

# DEE 3143 BASIC ELECTRICAL MACHINE & POWER SYSTEMS

## CHAPTER 6 COST OF ELECTRICITY

by

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# Lesson Outcomes

- Estimate the electric bill.
- Compare the Malaysia tariff with other countries.
- Obtain the reactive power capacity of capacitor bank to improve the power factor.

# Topics

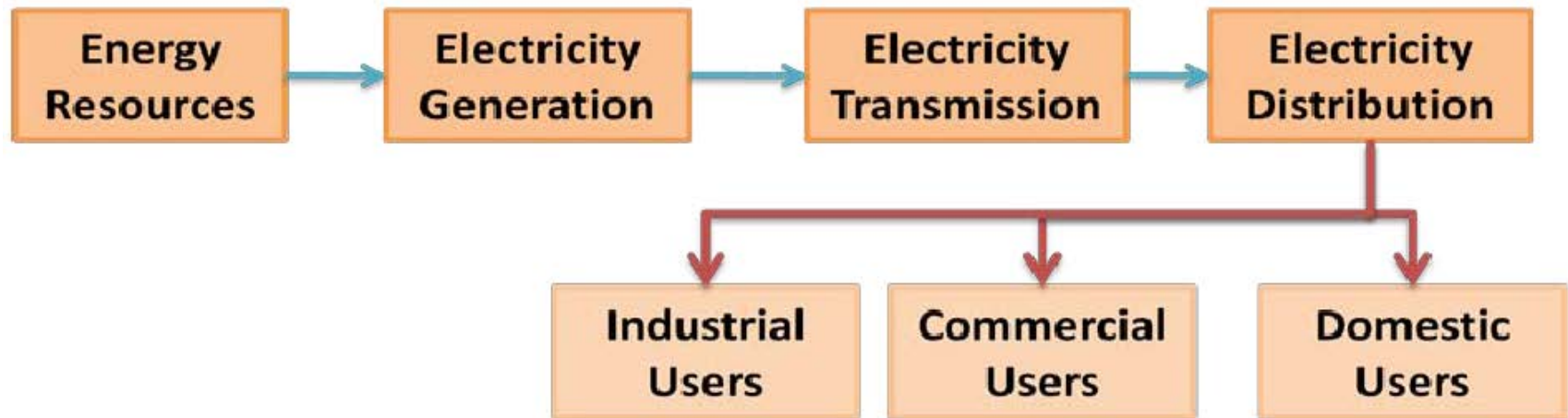
- Electricity Tariff
- Comparison of Malaysia Tariff with Other Countries.
- Power Factor Correction.

# Introduction

The production, transmission and distribution of energy involves important costs:-

- **Fixed costs** - depreciation charges against buildings, dams, turbines, generators, circuit breakers, transformers, transmission lines and other equipment used in the production, transmission and distribution of electrical energy.
- **Operating costs** - salaries, fuel costs, administration and any other daily or weekly expense.

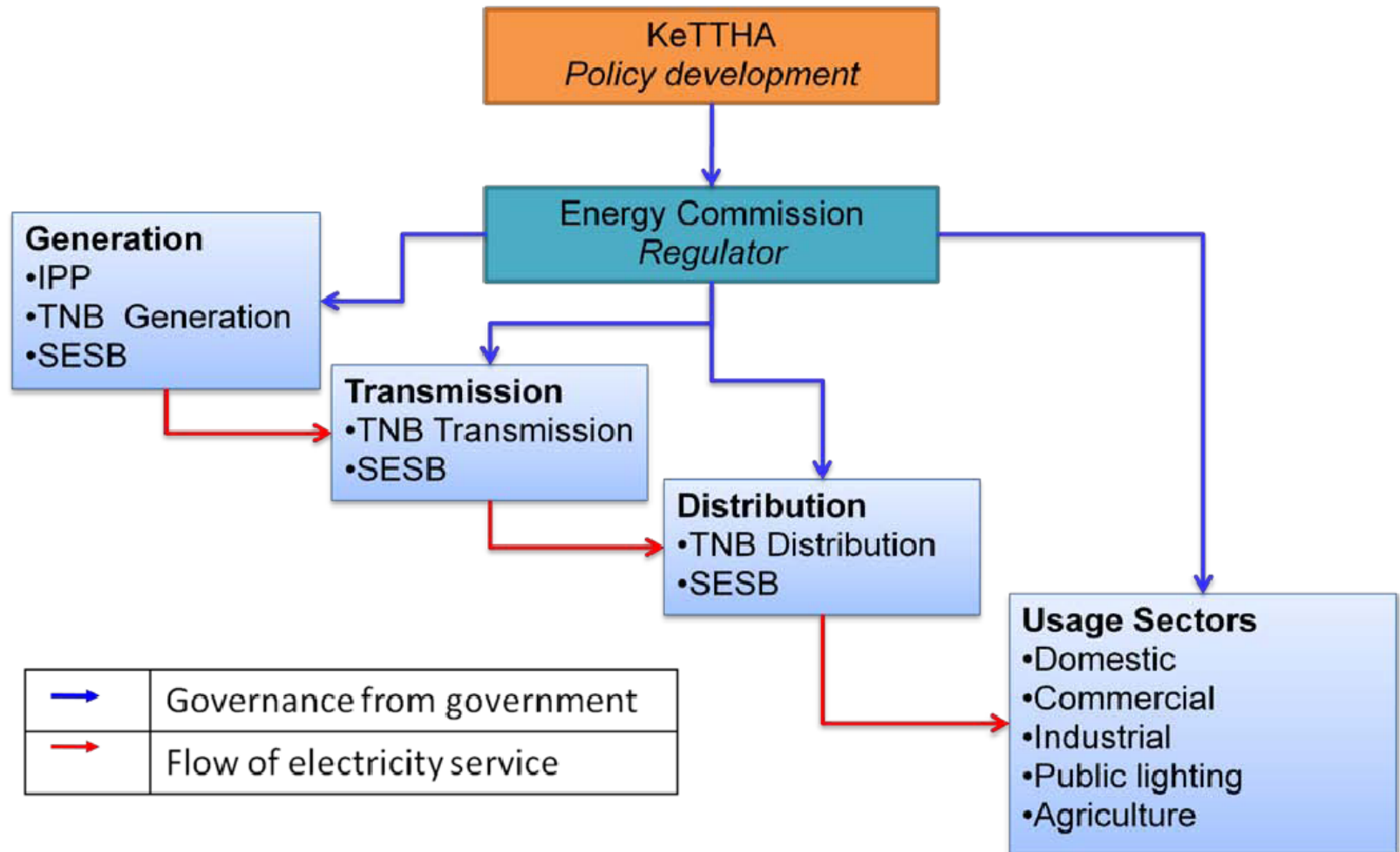
# Electricity Industry in Malaysia



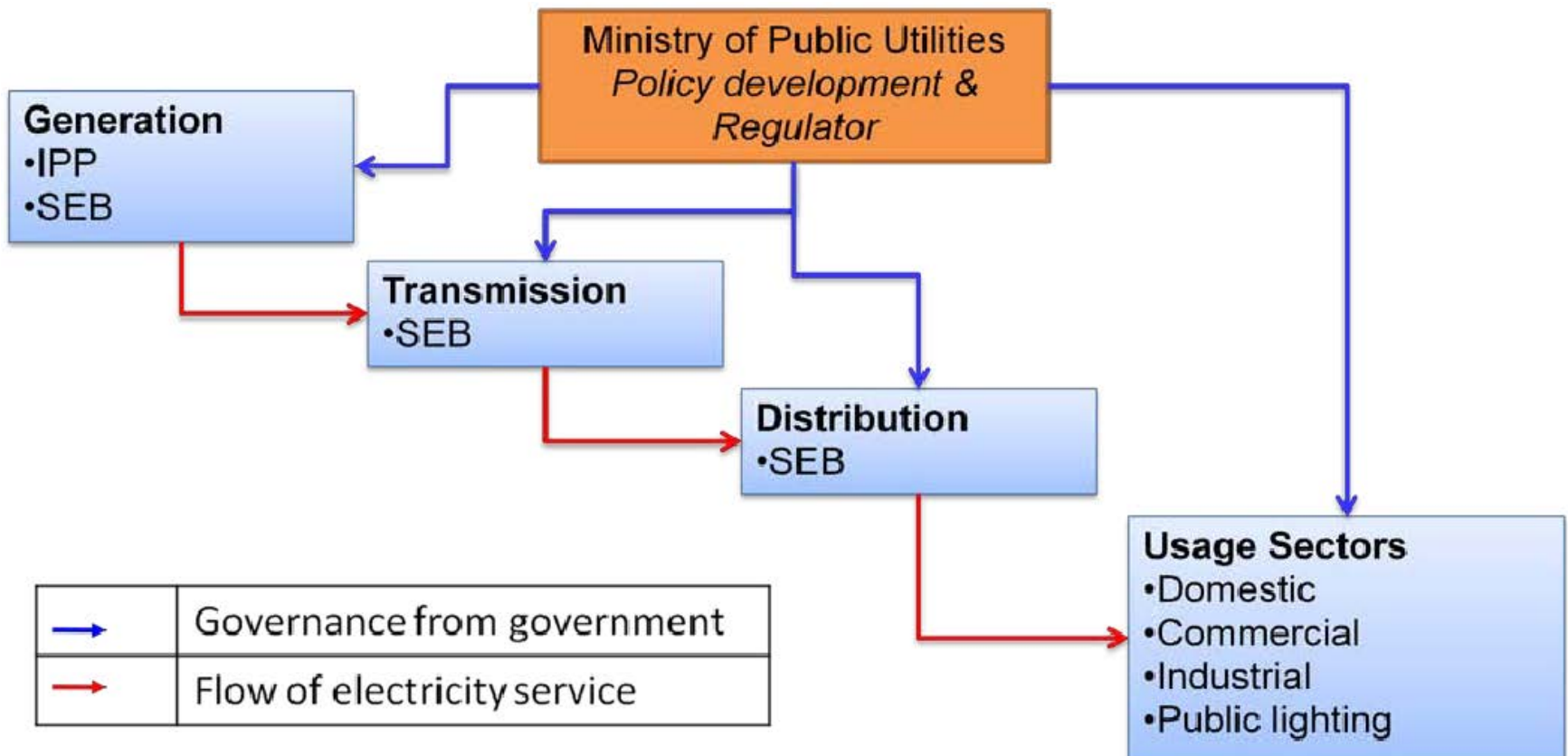
# Electricity Industry in Malaysia

- The electricity industry in Peninsular Malaysia (Tenaga Nasional Berhad –TNB)- is regulated under the Energy Commission (*Suruhanjaya Tenaga*).
- Sabah (Sabah Electricity Sdn Bhd – SESB) is regulated under the Energy Commission (*Suruhanjaya Tenaga*).
- Sarawak Energy is being regulated/governed under the state government.

# Electricity Industry in Malaysia- Peninsular Malaysia and Sabah



# Electricity Industry in Malaysia- Sarawak





# Electricity Tariff

- Tariff – The cost electric generate from generation system to distribution system till reaching end user customers
- Voltages → TNB's declared supply voltages are as set out below:

Voltage Level	Supply Voltage
Low Voltage	240 V
	415 V
Medium Voltage	6,600 V
	11,000 V
	22,000 V
	33,000 V
	66,000 V
High Voltage	132,000 V
	275,000 V



# Typical Rate Structures (Tariff)

- Malaysia's tariff categories:-
  - Domestic Tariff - applies to consumers occupying private dwellings with intake of 230 kV (single-phase) or 400 kV (three-phase, which are not used to carry out any business.
  - **Commercial Tariff** - applies to consumers occupying or operating premises for commercial purposes.
  - **Industrial Tariff** - applies to consumers engaging in manufacturing, quarrying and pumping for water treatment plant.

# Typical Rate Structures (Tariff)

- Malaysia's tariff categories (cont.):
  - **Mining Tariff** - applies to consumers that use electrical power for extracting minerals.
  - **Street Lighting Tariff** - applies to consumers utilizing electricity for public lighting, neon and floodlighting.

# Typical Rate Structures (Tariff)

- Malaysia's tariff categories (cont):-
  - **Special Agricultural Tariff** - applies to consumers conducting specific agricultural activities strictly related to agriculture cultivation and breeding. The activities are confined to agriculture **livestock** (poultry and/or hatching, cattle and/or dairy, rearing of other animals), **aquaculture** (the breeding and cultivation of water plants and animals), **horticulture** (growing of fruits, vegetables and flowers) and **pumping for irrigation/drainage** of land for controlling water gates for the production of grains such as padi.

# Typical Rate Structures (Tariff)

## Malaysian Domestic Tariff:-

Tariff Category	Unit	New Rates
<b>1. Tariff A – Domestic Tariff</b>		
For the first 200 kWh (1 -200 kWh) per month	sen/kWh	21.8
For the next 100 kWh (201 – 300 kWh) per month	sen/kWh	33.4
For the next 100 kWh (301 – 400 kWh) per month	sen/kWh	40.0
For the next 100kWh (401-500 kWh) per month	sen/kWh	40.2
For the next 100 kWh (501-600 kWh) per month	sen/kWh	41.6
For the next 100 kWh (601-700 kWh) per month	sen/kWh	42.6
For the next 100 kWh (701-800 kWh) per month	sen/kWh	43.7
For the next 100 kWh (801-900 kWh) per month	sen/kWh	45.3
For the next kWh (901 kWh onwards) per month	sen/kWh	45.4
<i>The minimum monthly charge is RM3.00</i>		

Source: [https://www.tnb.com.my/assets/files/Tariff\\_Rate\\_Final\\_01.Jan.2014.pdf](https://www.tnb.com.my/assets/files/Tariff_Rate_Final_01.Jan.2014.pdf)

# Typical Rate Structures (Tariff)

## Malaysian Commercial Tariff:-

<p><b>2. Tariff B - Low Voltage Commercial Tariff</b></p> <p><b>For overall monthly consumption between 0-200 kWh per month:</b> For all kWh <i>The minimum monthly charge is RM7.20</i></p> <p><b>For overall monthly consumption more than 200 kWh per month:</b> For all kWh (from 1kWh and above) <i>The minimum monthly charge is RM7.20</i></p>	<p>sen/kWh</p> <p>sen/kWh</p>	<p>39.3</p> <p>43.0</p>
<p><b>3. Tariff C1 - Medium Voltage General Commercial Tariff</b></p> <p>For each kilowatt of maximum demand per month For all kWh <i>The minimum monthly charge is RM600.00</i></p>	<p>RM/kW</p> <p>sen/kWh</p>	<p>25.90</p> <p>31.2</p>
<p><b>4. Tariff C2 - Medium Voltage Peak/Off-Peak Commercial Tariff</b></p> <p>For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period <i>The minimum monthly charge is RM600.00</i></p>	<p>RM/kW</p> <p>sen/kWh</p> <p>sen/kWh</p>	<p>38.60</p> <p>31.2</p> <p>19.2</p>

Source: [https://www.tnb.com.my/assets/files/Tariff\\_Rate\\_Final\\_01.Jan.2014.pdf](https://www.tnb.com.my/assets/files/Tariff_Rate_Final_01.Jan.2014.pdf)

# Typical Rate Structures (Tariff)

## Malaysian Industrial Tariff:-

### 5. Tariff D - Low Voltage Industrial Tariff

**For overall monthly consumption between  
0-200 kWh per month:**

For all kWh

*The minimum monthly charge is RM7.20*

sen/kWh

34.5

**For overall monthly consumption more than  
200 kWh per month:**

For all kWh (from 1kWh and above)

*The minimum monthly charge is RM7.20*

sen/kWh

37.7

**Tariff Ds – Special Industrial Tariff  
(for consumers who qualify only)**

For all kWh

*The minimum monthly charge is RM7.20*

sen/kWh

35.9

Source: [https://www.tnb.com.my/assets/files/Tariff\\_Rate\\_Final\\_01.Jan.2014.pdf](https://www.tnb.com.my/assets/files/Tariff_Rate_Final_01.Jan.2014.pdf)



# Typical Rate Structures (Tariff)

## Malaysian Industrial Tariff:-

<b>6. Tariff E1 - Medium Voltage General Industrial Tariff</b> For each kilowatt of maximum demand per month For all kWh <i>The minimum monthly charge is RM600.00</i>	RM/kW sen/kWh	25.30 28.8
<b>Tariff E1s – Special Industrial Tariff (for consumers who qualify only)</b> For each kilowatt of maximum demand per month For all kWh <i>The minimum monthly charge is RM600.00</i>	RM/kW sen/kWh	19.90 28.3

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# Typical Rate Structures (Tariff)

## Malaysian Industrial Tariff:-

<p><b>7. Tariff E2 - Medium Voltage Peak/Off-Peak Industrial Tariff</b></p> <p>For each kilowatt of maximum demand per month during the peak period</p> <p>For all kWh during the peak period</p> <p>For all kWh during the off-peak period</p> <p><i>The minimum monthly charge is RM600.00</i></p> <p><b>Tariff E2s - Special Industrial Tariff (for consumers who qualify only)</b></p> <p>For each kilowatt of maximum demand per month during the peak period</p> <p>For all kWh during the peak period</p> <p>For all kWh during the off-peak period</p> <p><i>The minimum monthly charge is RM600.00</i></p>	<p>RM/kW</p> <p>sen/kWh</p> <p>sen/kWh</p> <p>RM/kW</p> <p>sen/kWh</p> <p>sen/kWh</p>	<p>31.70</p> <p>30.4</p> <p>18.7</p> <p>27.70</p> <p>28.3</p> <p>16.1</p>
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Source: [https://www.tnb.com.my/assets/files/Tariff\\_Rate\\_Final\\_01.Jan.2014.pdf](https://www.tnb.com.my/assets/files/Tariff_Rate_Final_01.Jan.2014.pdf)

# Typical Rate Structures (Tariff)

## Malaysian Industrial Tariff:-

<b>8. Tariff E3 - High Voltage Peak/Off-Peak Industrial Tariff</b>		
For each kilowatt of maximum demand per month during the peak period	RM/kW	30.40
For all kWh during the peak period	sen/kWh	28.8
For all kWh during the off-peak period	sen/kWh	17.3
<i>The minimum monthly charge is RM600.00</i>		
<b>Tariff E3s - Special Industrial Tariff (for consumers who qualify only)</b>		
For each kilowatt of maximum demand per month during the peak period	RM/kW	24.40
For all kWh during the peak period	sen/kWh	26.7
For all kWh during the off-peak period	sen/kWh	14.7
<i>The minimum monthly charge is RM600.00</i>		

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