

# REEEP GROUP SDN. BHD.

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## RENEWABLE ENERGY & ENERGY EFFICIENCY PARTNERSHIP

### LONG TERM ENERGY SOLUTION in MALAYSIA – Review on COGEN / CHP

- 24 hour operation Plant
- Electricity Bill > RM10k/month
- Natural Gas Bill > RM10k/month
- Contract with Utility Providers: Over

Engineering Services, Contract & Project Management:-

- Renewable Energy
- Power Plant
- Oil & Gas
- Utility
- Industrial & Commercial



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1

# Introduction

# OVERVIEW - GTG COGEN PLANT cum Combined Cycle Power Plant (> 100 MWe)



✓ => Large COGEN System



# OVERVIEW - Gas-Engine-Generator (4kWe ~ 2.15MWe) COGEN PLANT (2 MWe)

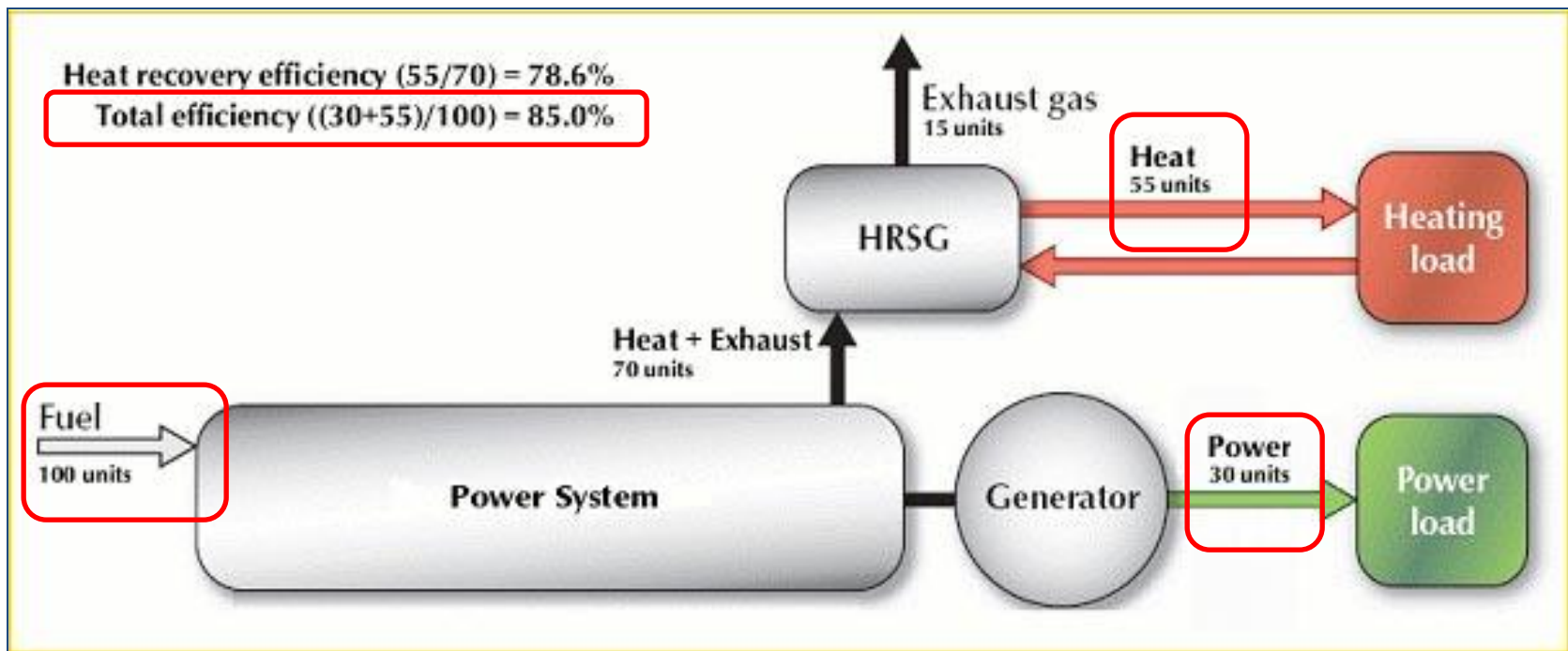


✓ => Medium COGEN System

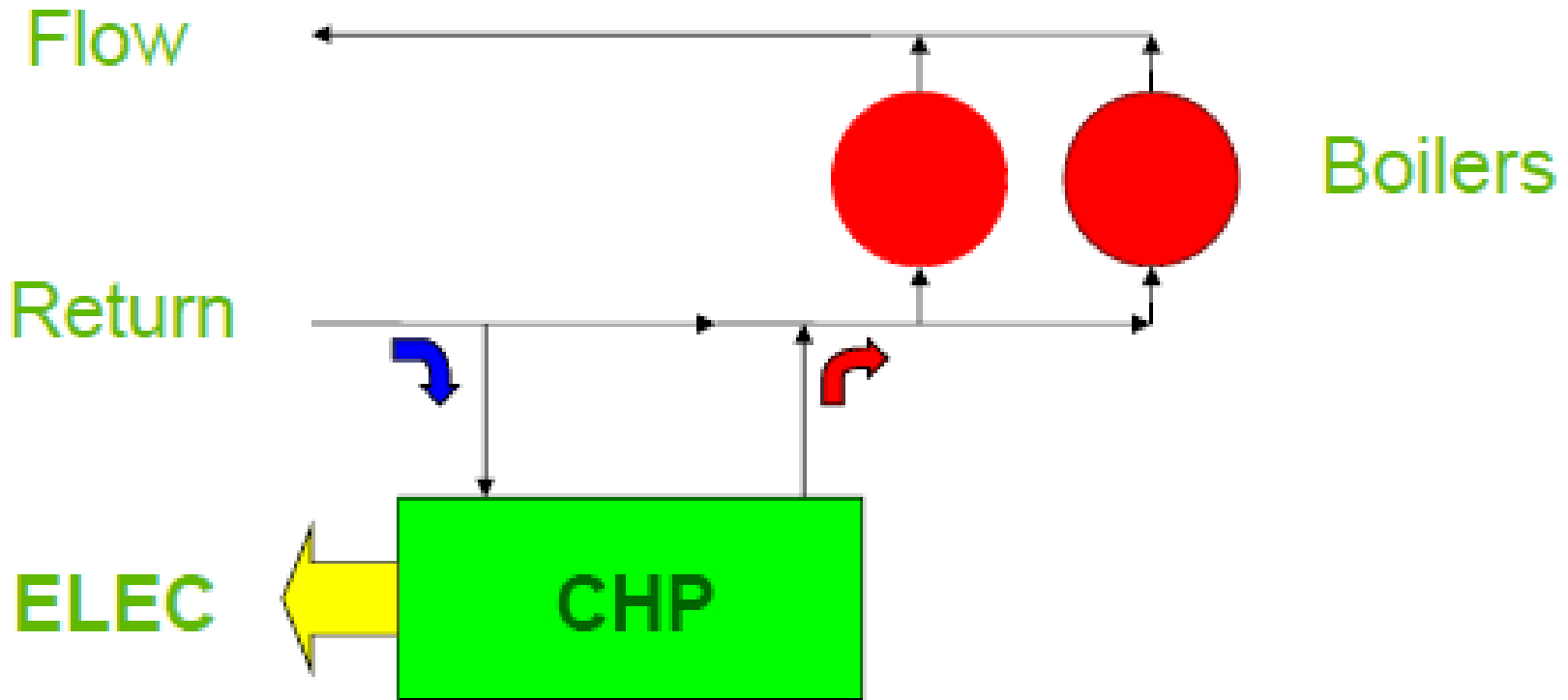
=> Small and Micro COGEN System => Apply Cogen Tariff?

# CONCEPT - COGENERATION/ COMBINED-HEAT-POWER(CHP)

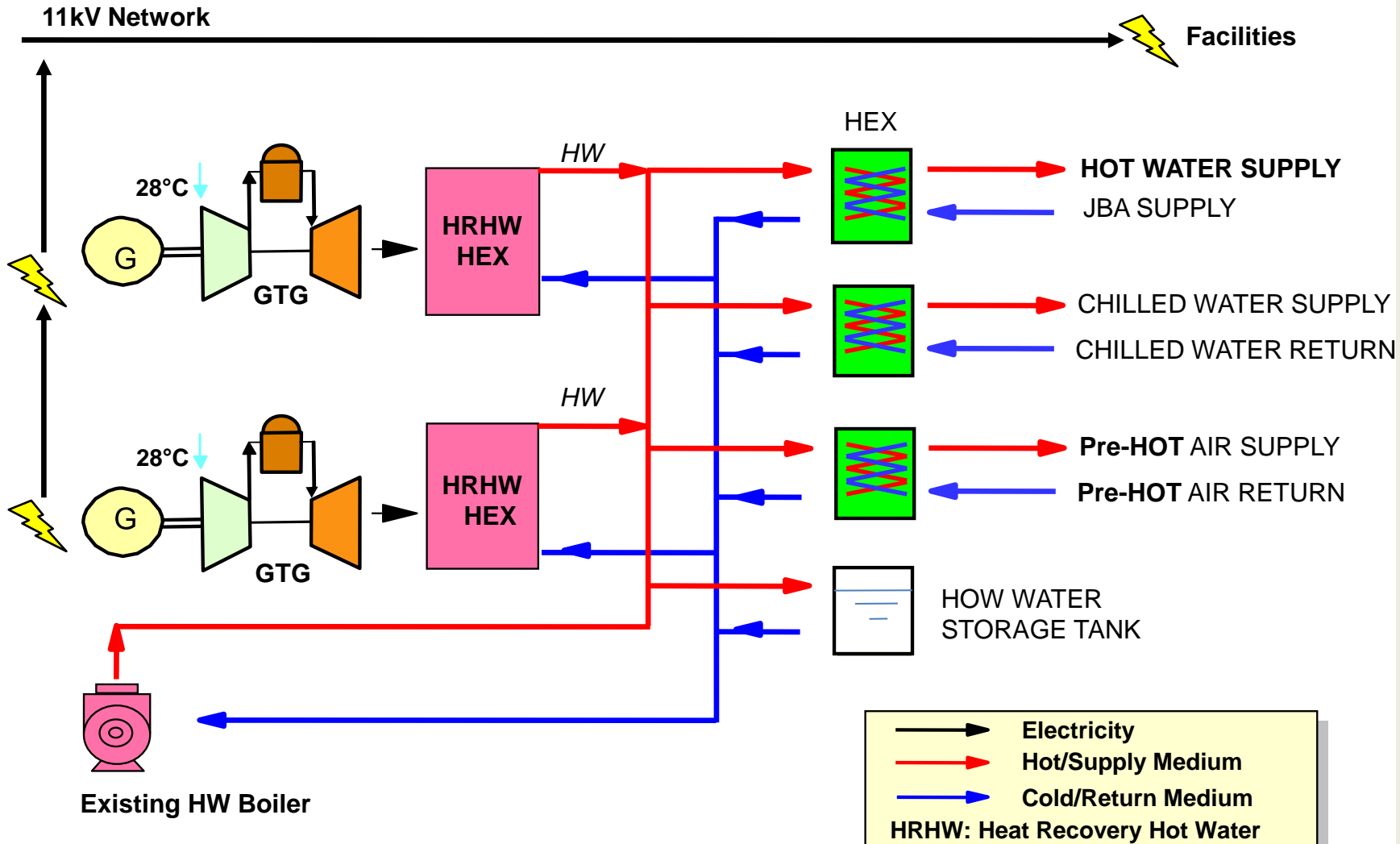
- Use of **single fuel** / energy source => produce two or more types of usable energy (**Electricity**, **Thermal Energy**)
- **Recover waste heat** from power generation equipment => usable **thermal energy** (Steam, Heat; Chilled/Hot: Water/Air)



# Possible Gas-Engine Co-Generation System Configuration

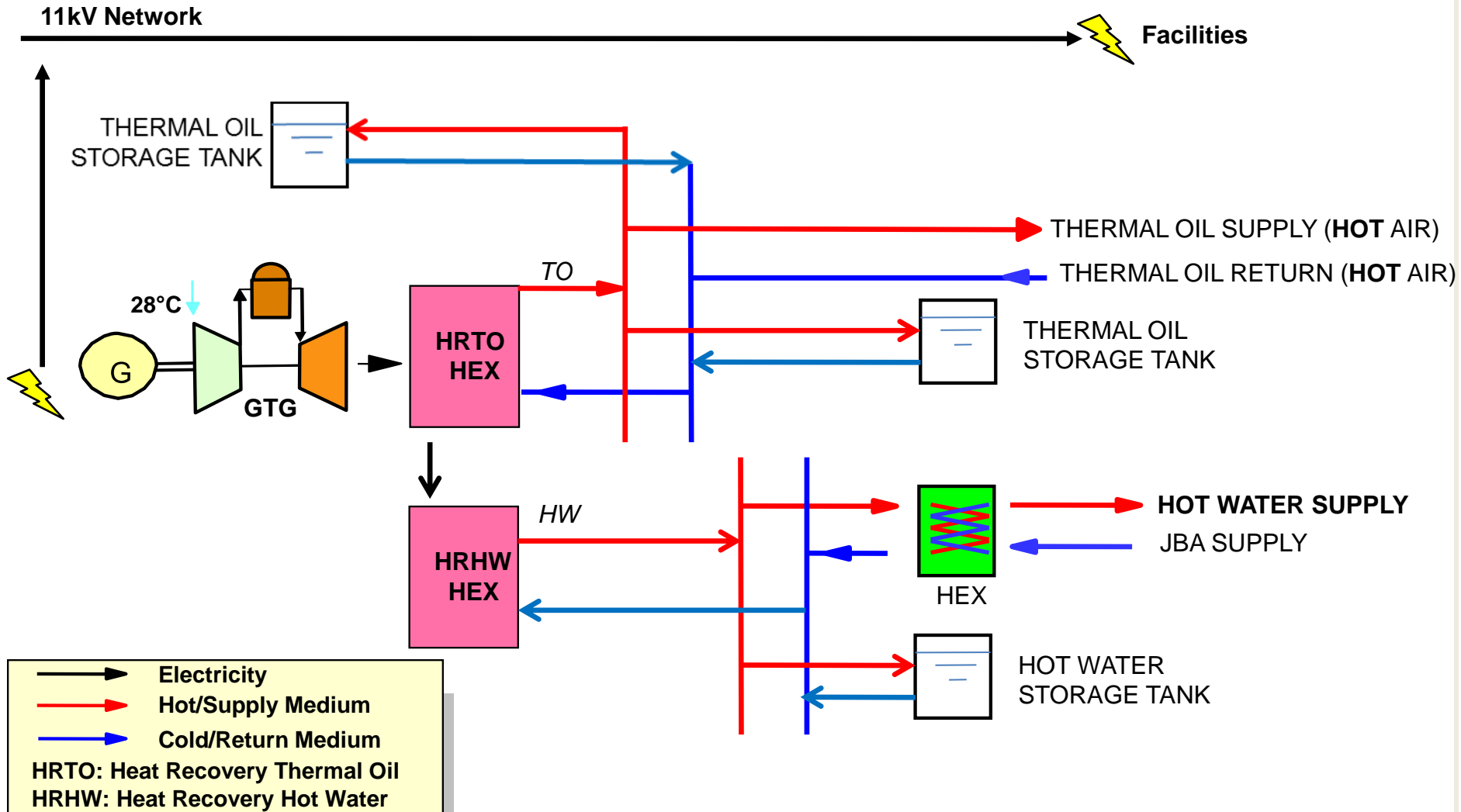


# Possible Gas-Turbine Co-Generation System Configuration - Single/Multiple Secondary Heat Recovery System





# Possible Gas-Turbine Co-Generation System Configuration - Multiple Primary Heat Recovery System



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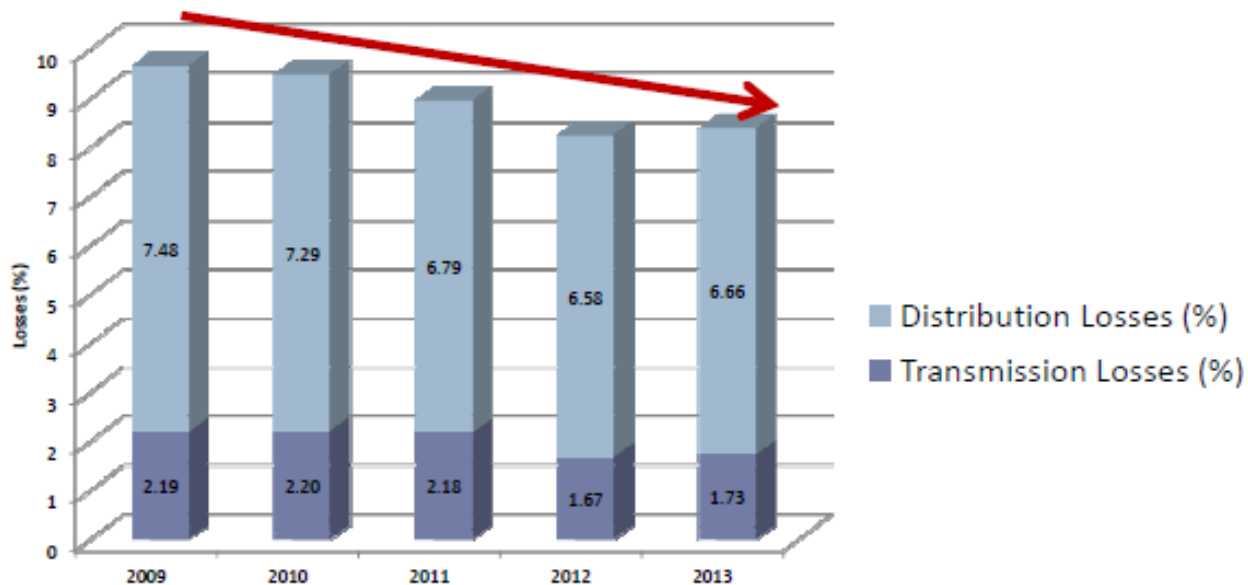
## 2

## Reasons to Implement Cogen System

1. Macro View - Energy Efficiency Issue
2. Saturated Electrical Supply - Shortage of Electricity => Reliability of Electricity Supply
3. Small and Micro System in a Large Consumer - EE
4. Energy Service Provider – New Business Opportunity

# ELECTRICITY LOSSES - REDUCTION

## Reduction in losses

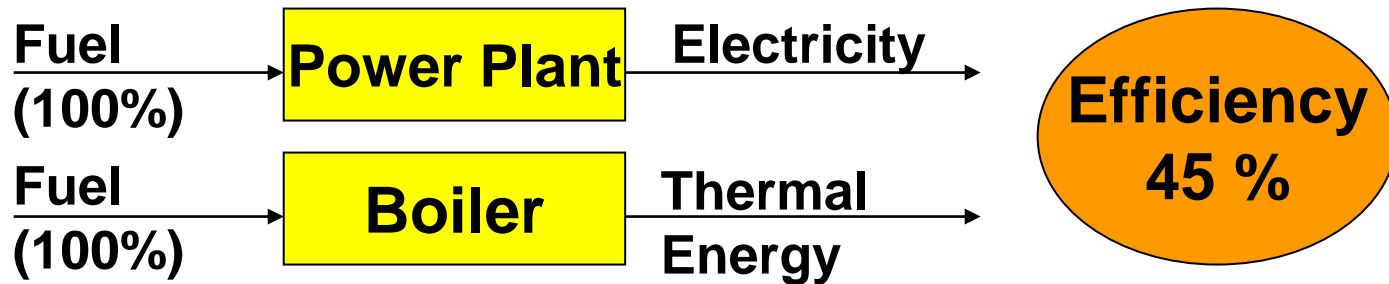


**A reduction of 1% losses translates to a saving of  
~RM 385 million/year**

# EFFICIENCY – Conventional versus Co-generation

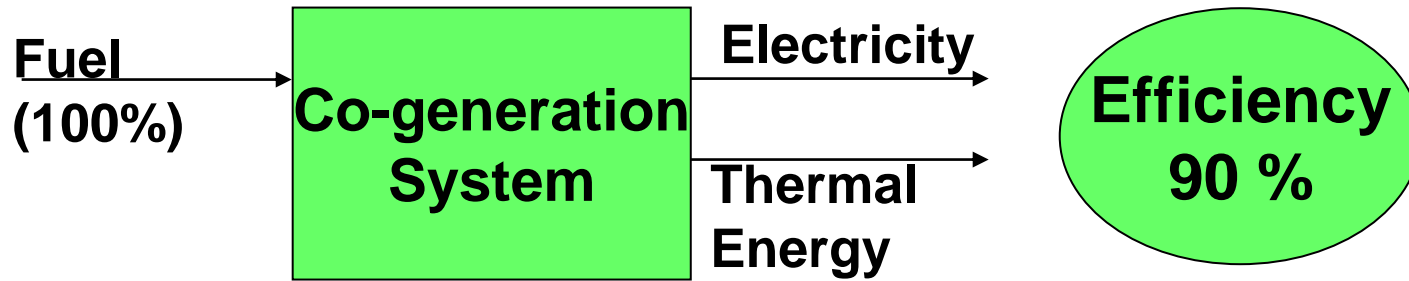
- ✓ Localized Energy Supply => Reduce Energy Transfer => Reduce Losses

## Conventional



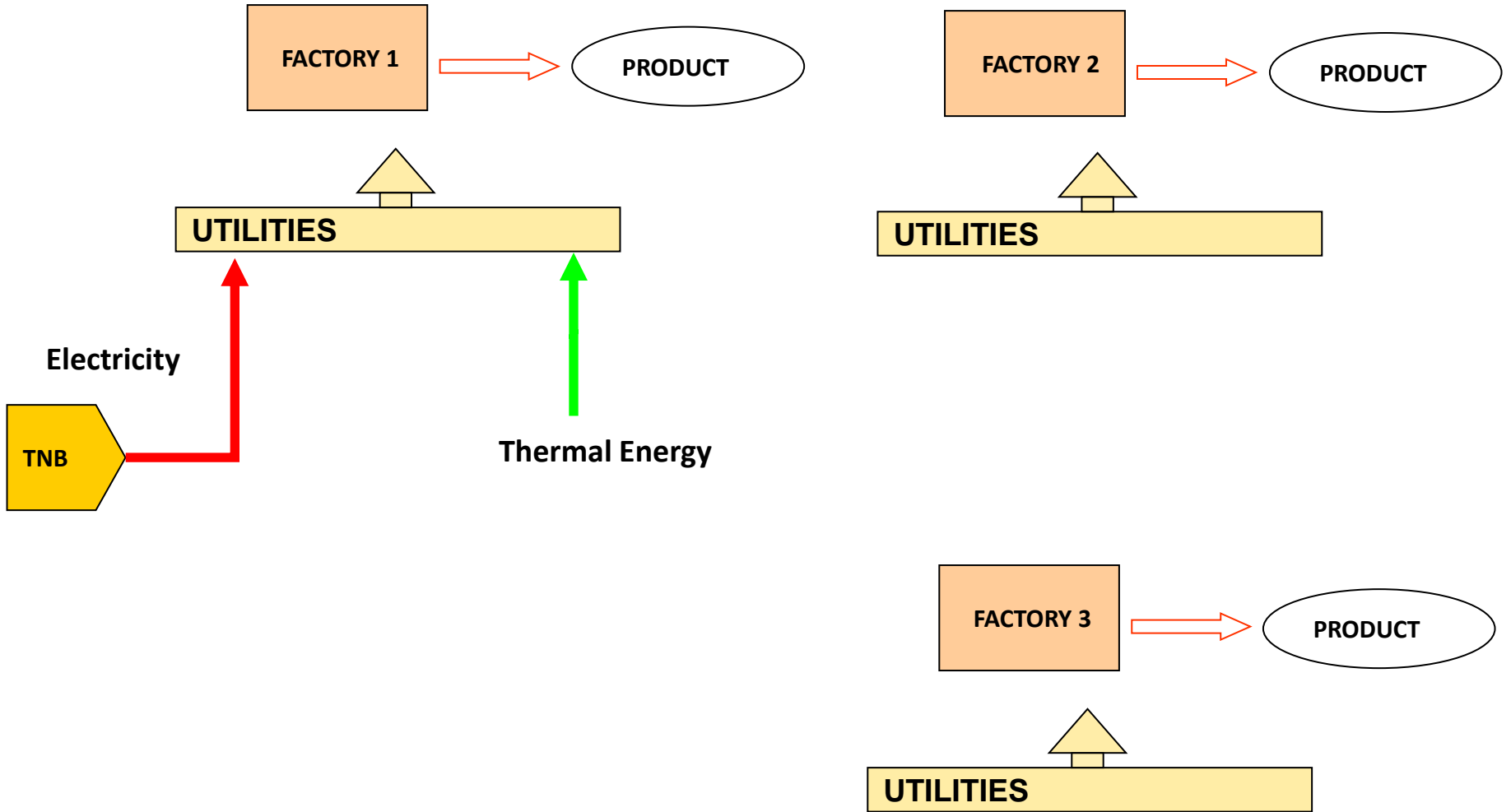
- ✓ Efficiency is inversely proportional to Energy Cost

## Co-generation



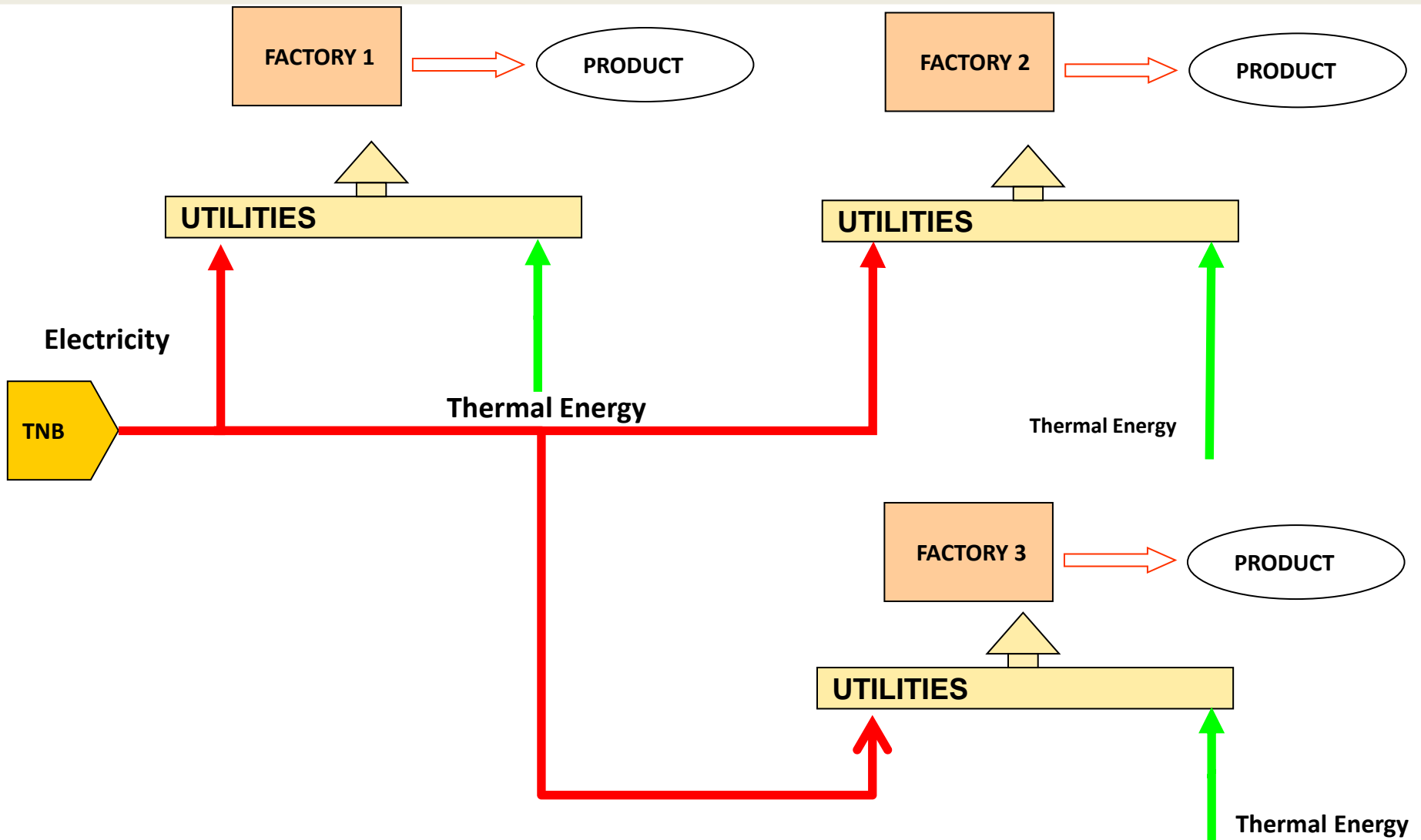
- ✓ Higher efficiency => Lower Impact on the **fluctuation** of Energy Cost

# EXPANSION - PROBLEM OF ENERGY SUPPLY





# EXPANSION - TYPICAL SUPPLY SOLUTION OF ELECTRICITY AND THERMAL ENERGY



# TNB: MINIMUM SUPPLY SCHEMES FOR VARIOUS M.D. LEVELS

1000kVA up to <5000kVA	11kV	Directly fed through TNB 11kV switching station. An additional PPU land may need to be allocated subject to system capability study by TNB.
1000kVA up to 10000kVA	22kV	Directly fed through TNB 22kV switching station An additional PPU land may need to be allocated subject to system capability study by TNB'
5000kVA to 25000kVA	33kV	Directly fed through TNB 33kV switching station An additional PMU land may need to be allocated subject to system capability study by TNB'
25,000kVA to <100,000kVA	132kV , 275 kV	Directly fed through TNB 132kV or 275kV substation respectively. TNB shall reserve the absolute right to provide alternative arrangements after taking into consideration the location, economic and system security factor

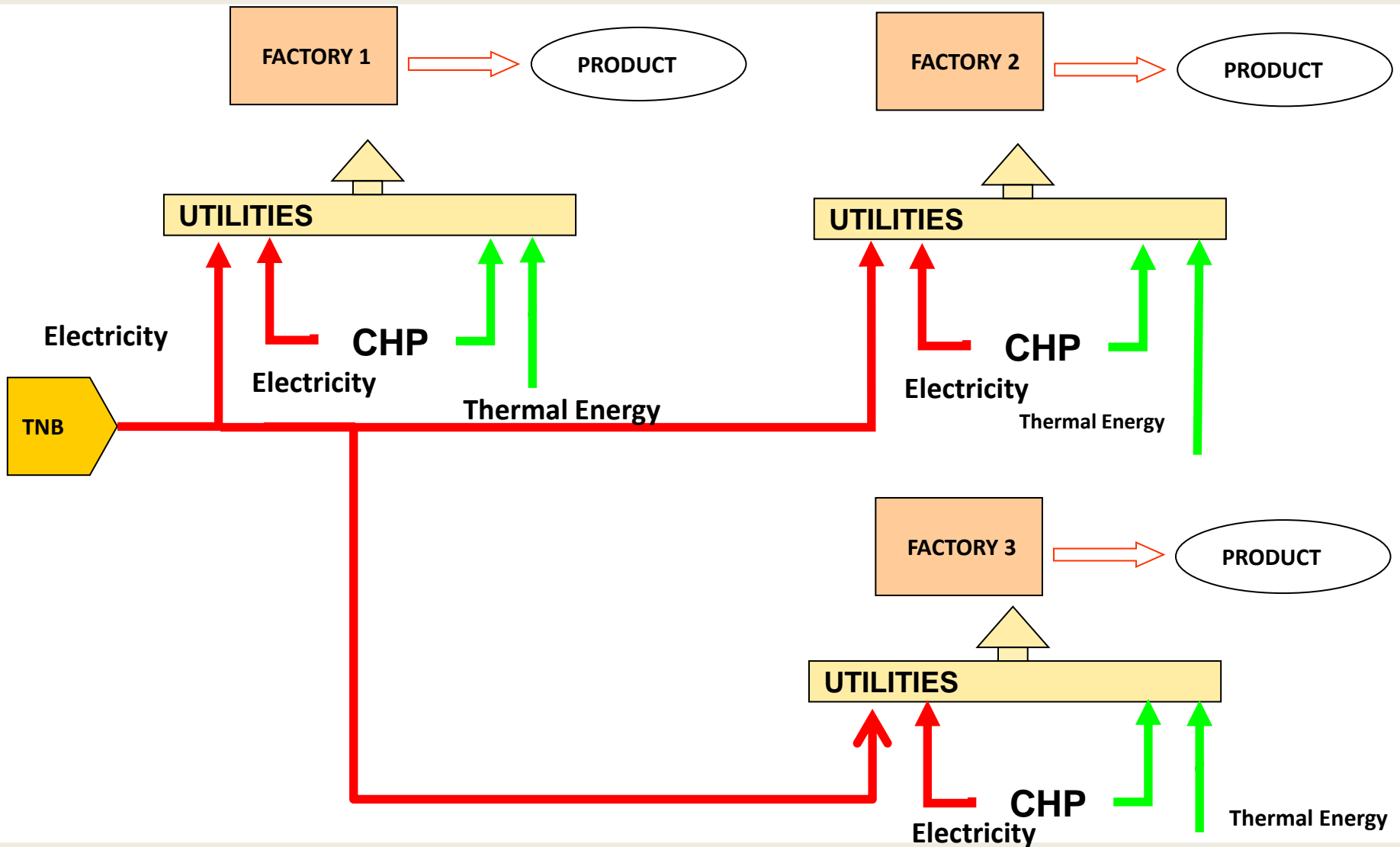
# PROBLEM & SOLUTION

## - Electricity Supply

- ✓ Direct **11kV** TNB Supply – Not Available, Tariff E2
- ✓ Direct **33kV** TNB Supply – Need More Space, Tariff E2
- ✓ Direct **132kV** TNB Supply – Need Space and Long Lead, Tariff E3 → Cheaper Tariff
- ✓ The Worst Case – Self Generation CHP Island Operation
- ✓ Diesel Engine Generator – Too Costly to Operate
- ✓ Cogeneration Plant / Combined Heat and Power (CHP)

→ **CHP is a Solution.**

# EXPANSION – MID-TERM SUPPLY SOLUTION OF ELECTRICITY AND THERMAL ENERGY



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**3**

**Cogen Tariff, Standby Fee, Agreement**



# COGEN TARIFF

## Schedule 2

Tariff rates for Topup and Standby Services (only for Co-generators) are set out as follows:

Tariff Category	Unit	New Rates (1 January 2014)	
		Top-Up	Standby**
<b>1. Tariff C1 - Medium Voltage General Commercial Tariff</b> Maximum demand charge per month For all kWh	RM/kW sen/kWh	30.30 36.50	14.00
<b>2. Tariff C2 - Medium Voltage Peak/Off-Peak Commercial Tariff</b>  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	RM/kW sen/kWh sen/kWh	45.10 36.50 22.40	14.00
<b>3. Tariff E1 - Medium Voltage General Industrial Tariff</b> Maximum demand charge per month For all kWh	RM/kW sen/kWh	29.60 33.70	14.00
<b>4. Tariff E2 - Medium Voltage Peak/Off-Peak Industrial Tariff</b>  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	RM/kW sen/kWh sen/kWh	37.00 35.50 21.90	14.00

Tariff Category	Unit	Existing Rates (1 June 2011)	New Rates (1 January 2014)
<b>5. Tariff E3 - High Voltage Peak/Off-Peak Industrial Tariff</b>  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	RM/kW sen/kWh sen/kWh	35.50 33.70 20.20	12.00
<b>6. Tariff F1 - Medium Voltage General Mining Tariff</b> Maximum demand charge per month For all kWh	RM/kW sen/kWh	21.10 31.30	14.00
<b>7. Tariff F2 - Medium Voltage Peak/Off-Peak Mining Tariff</b>  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	RM/kW sen/kWh sen/kWh	29.80 31.30 17.20	14.00

# START SMALL: PAY HIGH TOP-UP FEE

## Top-Up & Standby Service (Case I, $D_m \leq D_{tu}$ )

### Step 1

What is the Metered Demand ( $D_m$ )?

$$D_m = 5\text{MW}$$

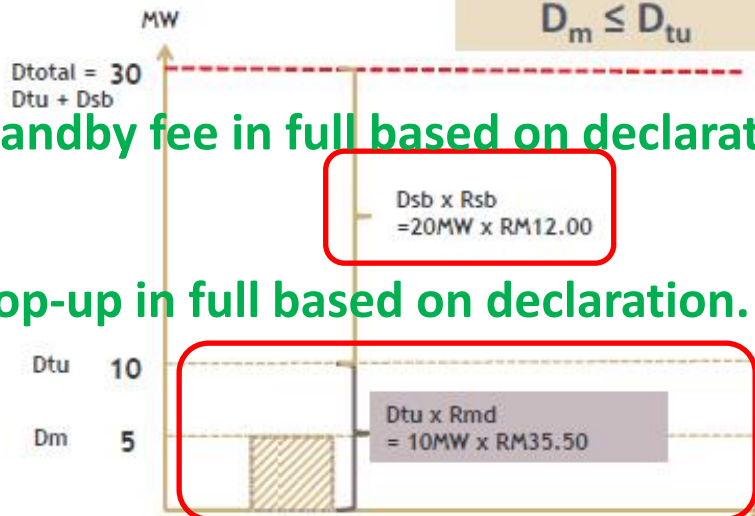
### Step 2

Billing based on which case? **Assumed Declared :**

$$\begin{aligned} D_{tu} &= 10\text{ MW} \\ D_{sb} &= 20\text{ MW} \\ D_{total} &= 30\text{ MW} \\ D_m &\leq D_{tu} \end{aligned}$$

### Step 3

Bill Calculation:-



✓ Pay Standby fee in full based on declaration.

✓ Pay Top-up in full based on declaration.

= Top Up Charge + Demand Charge + Standby Charge + Energy Charge

$$\begin{aligned} &= (D_{tu} \times R_{md}) \\ &+ (0) \\ &+ (D_{sb} \times R_{sb}) \\ &+ [ (E_p \times R_{ep}) \\ &+ (E_{op} \times R_{eop}) ] \end{aligned}$$

# COGEN AGREEMENT

1. Drafted and prepared by Distributor
2. One Sided
3. **Top-Up/Standby Declaration: Main Barrier**  
=> **Remove (Top-Up) => Change to Promotion Scheme**
4. MD > Declaration => Penalties => New Declaration
5. Upward Declaration: No downward / refreshment
6. Five years contract/agreement
7. Small Capacity Cogen  
=> Declare **Top-Up/Standby** wisely  
=> Start Small

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**Cogen License**

# LICENSE FEE - Private

## "PART IA

(subregulation 10(3))

### FEES FOR THE ISSUANCE OF A LICENCE FOR A PRIVATE INSTALLATION

1. Fees according to the following rates are payable for the issuance of a licence for a private installation under subregulation 10(3):

	<i>Installation Capacity</i>	<i>Fees per year</i>
(a)	for each installation of 10 kilowatts or less	RM30
(b)	for each installation above 10 kilowatts to 50 kilowatts	RM165
(c)	for each installation above 50 kilowatts to 100 kilowatts	RM550
(d)	for each installation above 100 kilowatts to 300 kilowatts	RM1,100
(e)	for each installation above 300 kilowatts to 600 kilowatts	RM1,165
(f)	for each installation above 600 kilowatts to 5,000 kilowatts	RM2,200
(g)	for each installation above 5,000 kilowatts	RM3,000



# LICENSE FEE - Public

1. The rates to determine the fees payable on an annual basis for the issuance of a licence for a public installation, other than the generation referred to in subregulation 10(2), is as follows:

(a) before the commissioning of any part of the installation—

1.1 cent per kilowatt based on the installation capacity as specified in the licence; and

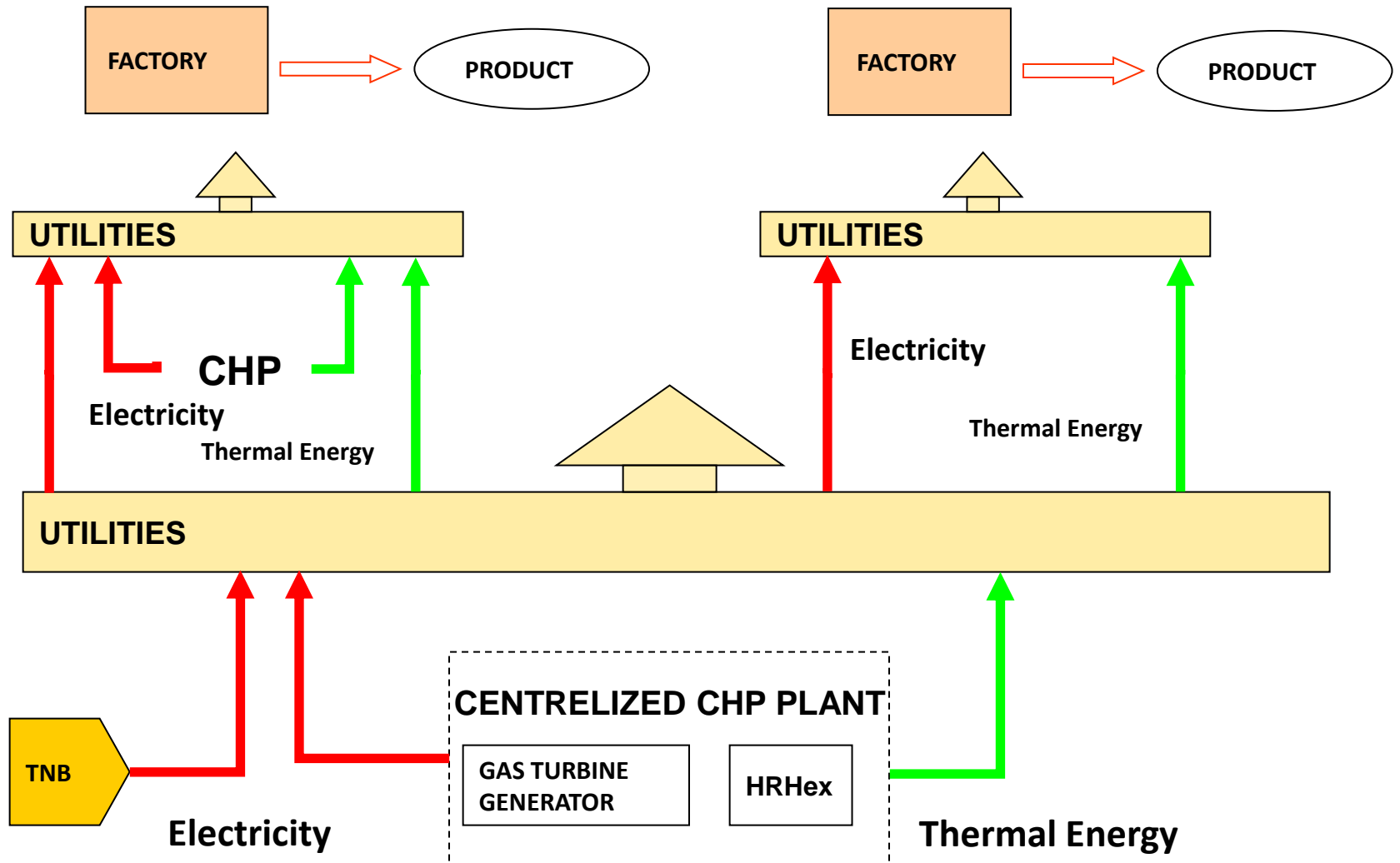
(b) after the whole installation or any part of it has been completed, commissioned and is ready to deliver electricity to any person:

Installation Capacity	Types of Activities		
	Generation	Transmission	Distribution
Where the aggregate power is 5 kilowatts and above	RM1.65/ kilowatt	RM0.33/ kilowatt	RM0.44/ kilowatt

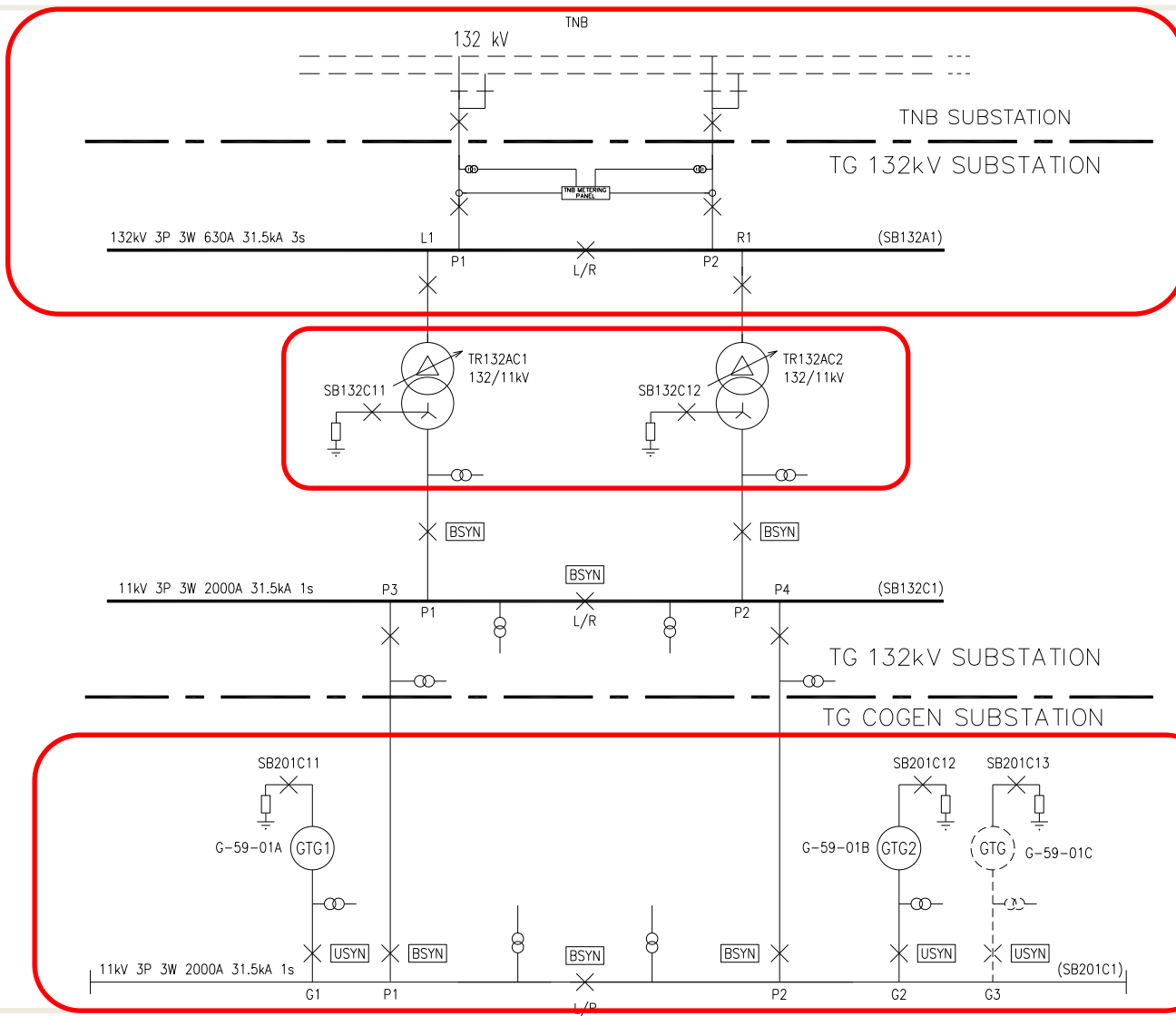
✓ Distributor License Fee => benefit public

✓ Generation License Fee => Cover Distributor License?

# EXPANSION – LONG-TERM SUPPLY SOLUTION OF ELECTRICITY AND THERMAL ENERGY



# LONG TERM COGEN Plant - Simplified Electrical Network



# LONG TERM ELECTRICITY SUPPLY SCHEME

## New Factories w/o CHP (Tariff E3 => Cheaper)

### Existing Factories w/o CHP

- Diversion
- **Add Power Supply**
- Tariff E3

### New Factories With CHP

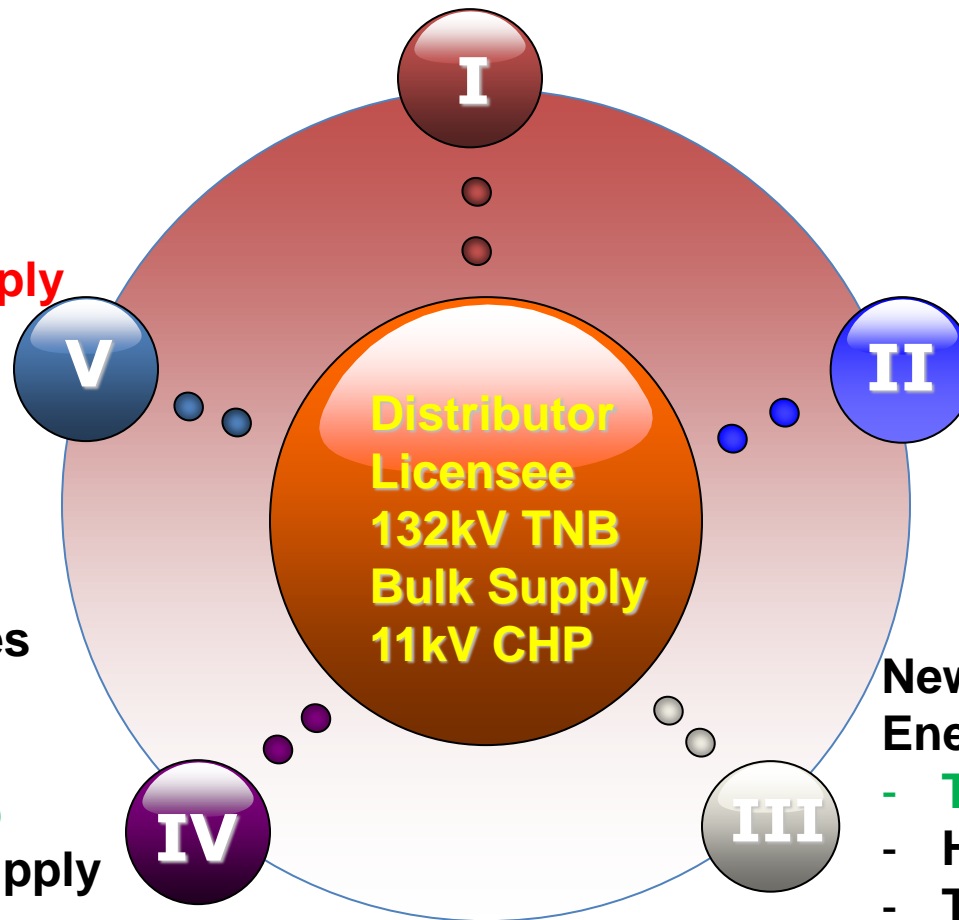
- **No TNB Standby Fee**
- **132kV Backup**
- Tariff E3

### Existing Factories with CHP

- Diversion
- **132kV Backup**
- **Add Power Supply**
- Tariff E3

### New Factories With Energy Conservation

- **Technology**
- **Hot Air Generator**
- Tariff E3



# Various Cases of POWER SOURCE after Integration

ITEM	PLANT	POWER SOURCE			
		Case 1	Case 2	Case 3	Case 4
	A. Case 1: Normal: 132kV TNB + CHPs			C. Case 3: 1*CHP Supply is Outage	
	B. Case 2: TNB Supply is Outage		==> Then,	D. Case 4: CHP Supply is Weak	
1	Existing Factory w/o CHP	TNB + CHP	CHPs	TNB + CHP	CHP Load Sharing
2	Existing Factory with CHP	TNB + CHP*2	CHP*2	TNB + CHP	CHP Load Sharing
3	New Factory w/o CHP	TNB + CHP	CHPs	TNB + CHP	CHP Load Sharing
4	New Factory with CHP	TNB + CHP*2	CHP*2	TNB + CHP	CHP Load Sharing





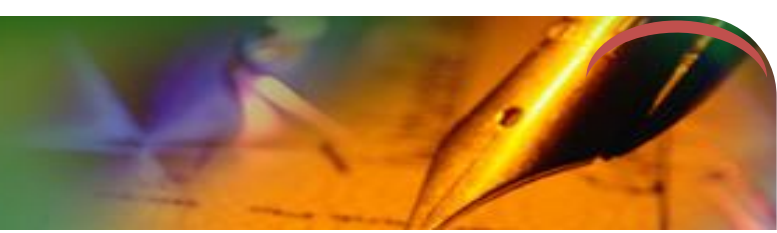
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## **Recommendations**

# RECOMMENDATIONS



- 1. Appoint REEEP Group to follow up**
- 2. Meet Energy Commission: Licensing Issue**
- 3. Meet TNB: Technical and Commercial Issue**
- 3. Meet ST to Resolve any dispute issue with TNB**



## ***THANK YOU***



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