



## **Policy Framework and the Promotion of Cogeneration in Malaysia**

*Ministry of Energy,  
Communication and Multimedia  
Kuala Lumpur  
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## **The global energy challenge**

- Volatile Oil and Gas markets
- Depleting fossil fuel reserves
- Pressure to increase efficiency
- Promotion of Renewable Energy
- Environmental degradation
- Poor efficiency of thermal power stations
  - Up to 35% in open cycle, up to 55% in Combined Cycle mode



## Major users of energy

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- In Asia-Pacific:
- **Industry**
  - 20% Electricity, 80% Thermal (Process heating or cooling)
- **Commercial/ Offices**
  - 40% Electricity, 60% Comfort cooling or heating



## Definition of Cogeneration

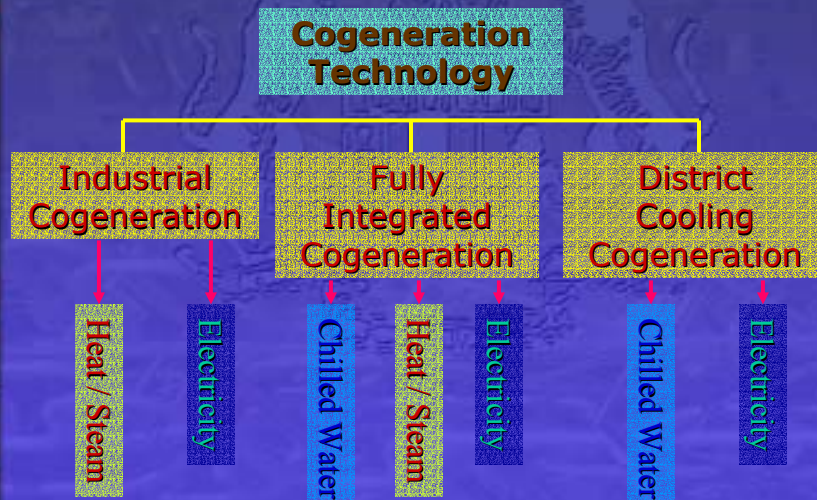
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*“Simultaneous production of two or more forms of usable energy from a single energy source”*

## Cogeneration cycles

- **Topping Cycle**
  - Fuel used to produce electrical energy first, then thermal energy
- **Bottoming Cycle**
  - Fuel used to produce thermal energy first, then electrical energy

## Types of Cogeneration Plants





## The Ideal Cogeneration Site:

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- Requires reliable power
- Has a relatively steady electrical and thermal energy demand pattern
- Has a higher demand for thermal energy compared to electrical energy
- Has long operation hours in the year
- Inaccessible to the grid or high price of grid electricity

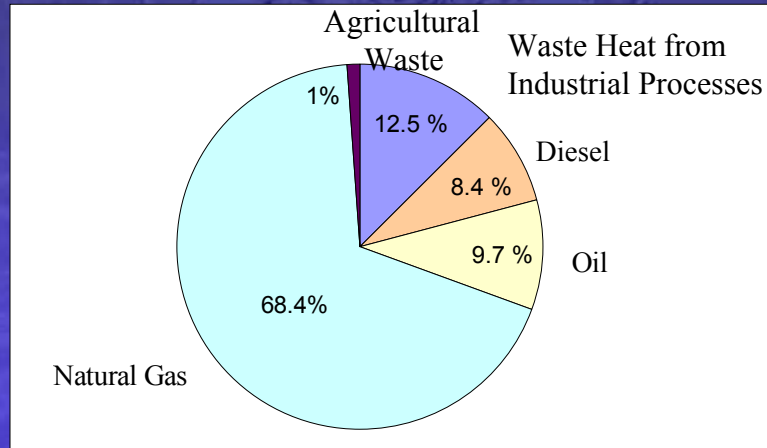


## Cogeneration in Malaysia

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- Have existed in Malaysia for a long time, but more can be done
- District cooling most common due to tropical climate
- Licensing under purview of Ministry of Energy, Communication & Multimedia
- 36 licenses issued - 13 public, 23 private

## Cogeneration fuel mix in Malaysia (2002)



## Typical Use of Cogeneration in Malaysia

Type	Area	Examples
<b>Industrial Cogeneration</b>	Pulp & paper, Cement, Steel, Glass, etc	Perwaja Steel, Shell Refining, Titan Petrochemical
<b>Fully Integrated Cogeneration</b>	Large industrial complexes requiring heating, cooling & electricity	Petronas CUF, Proton City
<b>District Cooling Cogeneration</b>	Large commercial complex or high rise office buildings	KLIA, KLCC, KL Sentral, Tractors Malaysia



## Policy Framework

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- Government in support of highly efficient energy systems, especially those using **Renewable Energy** sources
- Need to balance growth of **Cogeneration** and **National Grid**
- Strike a balance so that *existence of one doesn't jeopardise the other*



## Policy Framework - Envisioned Cogeneration Policy

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- Policy needs fine-tuning from time to time
- Need to maintain a reliable, stable & viable grid and electricity supply system for the masses
- To avoid 'back-door IPP'



## Policy Framework - Envisioned Cogeneration Policy

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- Important elements to consider
  - Effect on existing system
  - Impact of distributed generation
  - Sizing and location of plant
  - Type of plant
  - Fuel type
  - Gas price
  - Sale of excess electricity to the grid
- Need to specify minimum overall energy efficiency and maximum or minimum heat to power ratio of plant



## Envisioned Cogeneration Policy - *Effect on existing system*

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- If cogen plant not connected to grid
  - Indirect effect. Grid capacity planned for that area not taken up, increasing reserve margin
  - Cogen capacity planning must be done together with grid capacity planning
- If cogen plant connected to grid
  - As above, plus unreliable capacity from cogenerators since smaller machines generally more susceptible to unplanned outages
  - Only excess power can be exported. Grid operator cannot be certain of the capacity available from cogenerators



## Envisioned Cogeneration Policy - *Impact of Distributed Generation*

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- Power quality must be controlled by cogenerators themselves
- Too many generators can hamper power quality improvement efforts, e.g. frequency fluctuation
- Localised exhaust emission - fuel burnt in vicinity.
- Large dedicated power stations are away from populated areas and can install Electrostatic Precipitators (ESP) and Flue Gas Desulphurisers (FGD)



## Envisioned Cogeneration Policy - *Sizing of plant*

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- Largest licensed is 210MW, but capacity for future development may be capped, e.g. <50MW
- Topping Cycle plant - capacity matched to electrical load/ demand
- Bottoming Cycle - capacity matched to thermal load



## Envisioned Cogeneration Policy - *Location of Cogen Plant*

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- In newly developed or remote areas away from the grid and cost of building infrastructure to connect is exorbitant
- Being remote, more space for exhaust emission to dissipate and settle away from population
- E.g. Palm oil mills, timber processing, municipal waste disposal facilities



## Envisioned Cogeneration Policy - *Plant type*

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- All types of topping or bottoming cycle Industrial, District Cooling and Fully Integrated Cogeneration plant allowed
- Selection of type and capacity of plant must be justified



## Envisioned Cogeneration Policy - *Fuel type*

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- Renewable energy favoured to promote RE as Fifth Fuel
- Reduce dependence on fossil fuels
- Fossil fuels should only be considered based on merit of the project and should be minimised



## Envisioned Cogeneration Policy - *Gas Price*

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- Gas is largest contributor to Malaysia's Generation fuel mix
- RM6.40/mmBTU only for power sector, not for Industry/ cogenerator
- For Industry/ Cogenerator, Government has revised tariff effective 1 October 2001 until 31 December 2005
- Monthly fee & infrastructure capital contribution scrapped
- New price not pegged to Medium Fuel Oil (MFO) - no fluctuation

## Envisioned Cogeneration Policy - Gas Price

### New Gas Tariff

Category	Consumption range (mmBTU/yr)		Rate (RM/mmBTU)		% Reduction
	Old	New	Old	New	
Tariff A (Domestic)			21.04	19.72	6.25
Tariff B (Commercial)		Up to 600	19.72	15.25	22.67
Tariff C (Comm. & Ind)	601-5000	601-5000	17.10	13.41	21.54
Tariff D (Comm. & Ind)	5001-50,000	5001-50,000	13.15	13.15	0
Tariff E (Industrial)	50,001-200,000	50,001-750,000	29.06	12.87	55.45
Tariff F (Industrial)	200,001-750,000	50,001-750,000	23.05	12.87	43.67

## Envisioned Cogeneration Policy - Sale of excess power to grid

- Selling of excess power to grid is not allowed to avoid jeopardising existing electricity supply system
- Cogenerator developers shouldn't oversize their capacity and end up with redundant energy



## Future of Cogeneration in Malaysia - Renewable Energy

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- Fifth Fuel Policy formulated in 2001 to promote use of Renewable Energy (RE)
- Since cogeneration promotes energy efficiency, its use is encouraged
- Cogeneration using RE is especially encouraged
  - Will reduce dependence on fossil fuels
  - Will help dispose agricultural and municipal waste
- Research being done to use palm oil olein as a fuel for power generation



## Future of Cogeneration in Malaysia - Energy Efficiency

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- Cogeneration as a tool to enhance and promote Energy Efficiency (EE)
- Cogen has thermal efficiency of 75-90% compared to 55% maximum in Combined Cycle Gas Turbines
- Plant thermal efficiency alone is useless if useful forms of energy produced are redundant and wasted due to over-sizing of cogen plant
- Cogenerators must be careful in their planning so as not to under-utilise their plant



## Conclusion

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- Government is in full support of cogeneration, especially RE-based.
- Promoting cogeneration should not jeopardise or destabilise the existing electricity supply system
- RE based cogeneration project could qualify under Small Renewable Energy Program (SREP) and enjoy its benefits if it fulfils the criteria
- Future policy on cogeneration will emphasise cogeneration plant based on RE and systems that would greatly enhance efficiency



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## Thank you