Policy Framework and the Promotion of Cogeneration in Malaysia

Ministry of Energy, Communication and Multimedia

Kuala Lumpur

(17 June 2003)

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

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

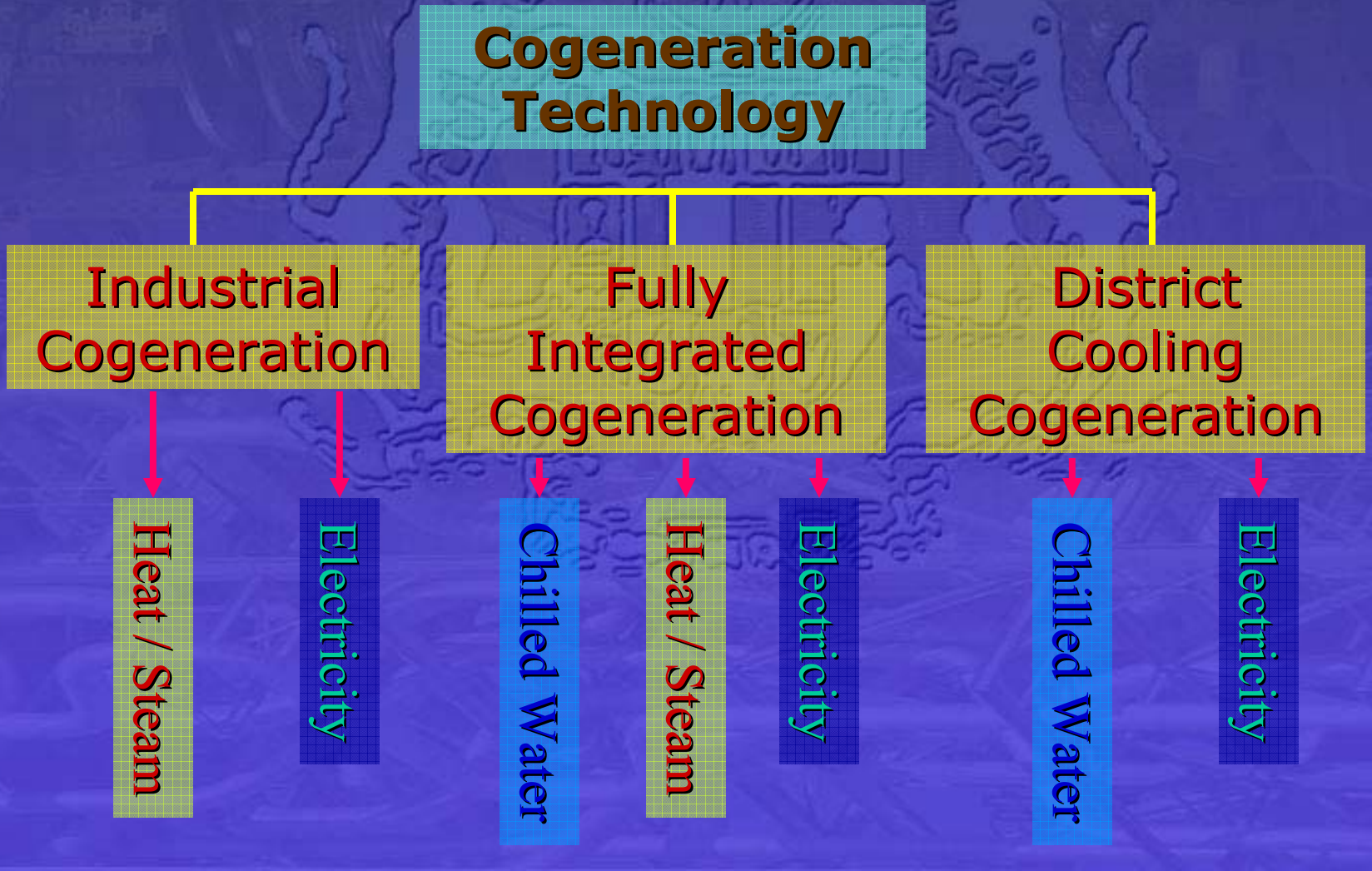
Definition of Cogeneration

"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



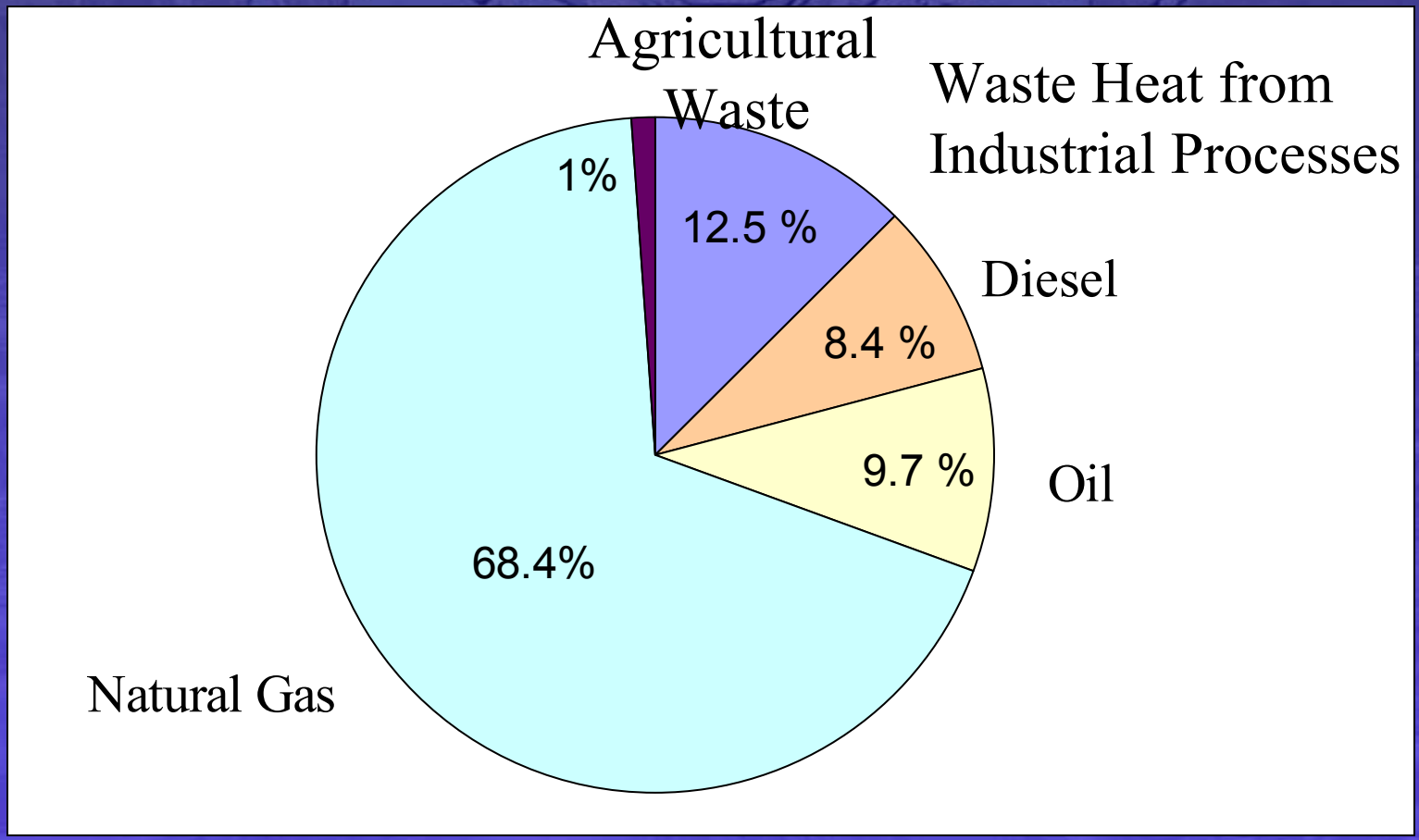
The Ideal Cogeneration Site:

- 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

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

Policy Framework

- 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

- 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

- 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*

- 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*

- 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*

- 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*

- 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*

- 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*

- 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*

- 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

- 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

- 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

- 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

Thank you