



Cogeneration in Singapore

Budapest, Hungary September 27, 2004
Bratislava, Slovakia September 30, 2004

Ong Chor Eong

COGEN 3 Country Coordinator, Singapore

EC ASEAN Cogeneration Programme



Introduction

- Cogeneration is well accepted by govt & industry
 - essential for Singapore to remain competitive
- Development of industry clusters (chemical, pharma, electronics) made possible implementation of centralised cogen plants to serve the clusters
- Major petrochemical players have taken lead to have own cogen plants
- 2 FSDPs under Cogen3 being implemented

But further significant applications (in terms of MW) may face limitations & barriers



Applications of Cogeneration in Singapore

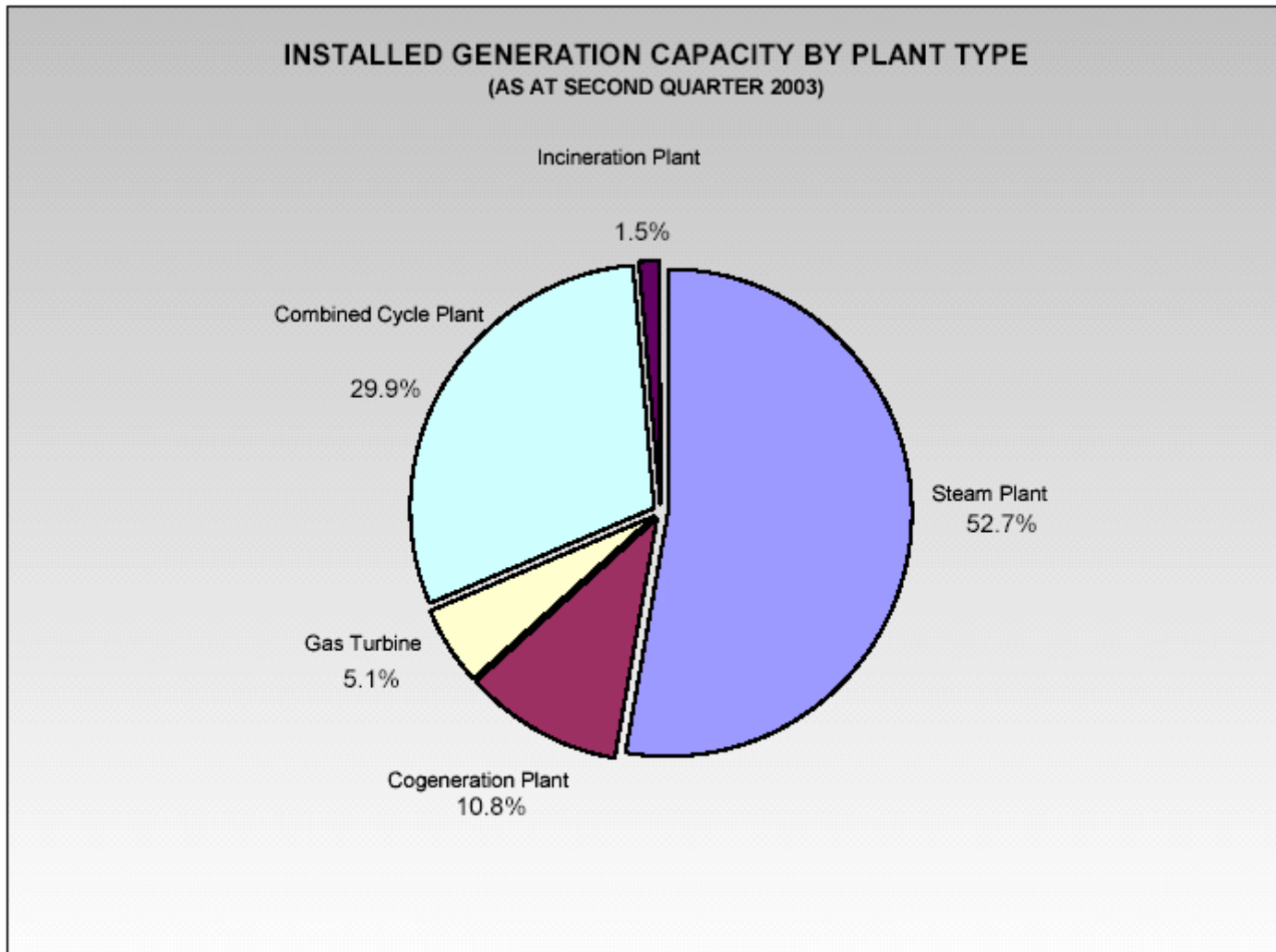
- SembCorp Cogen 900MWe to serve petrochemical cluster on Jurong Island
- ExxonMobil 180MWe for own use
- 2 FSDPs total 1.5MWe using wood waste
- NEA's incineration and sewage treatment plants
- Island Power 800MWe
- Keppel Merlimau Cogen 470MWe



Table 1: Power Generators in Singapore

Company	Authorized Capacity (MW)
Power Seraya	3,100
Senoko Power	3,300
Tuas Power	2,670
SembCorp Cogen	900
Island Power Company	800
Singapore Syngas Pte. Ltd.*	20
Exxon Mobil Asia Pacific Pte. Ltd.*	180
Keppel Merlimau Cogen	470
Elba Eastern (Pte) Ltd.*	50
National Environment Agency	250
TOTAL	11,740

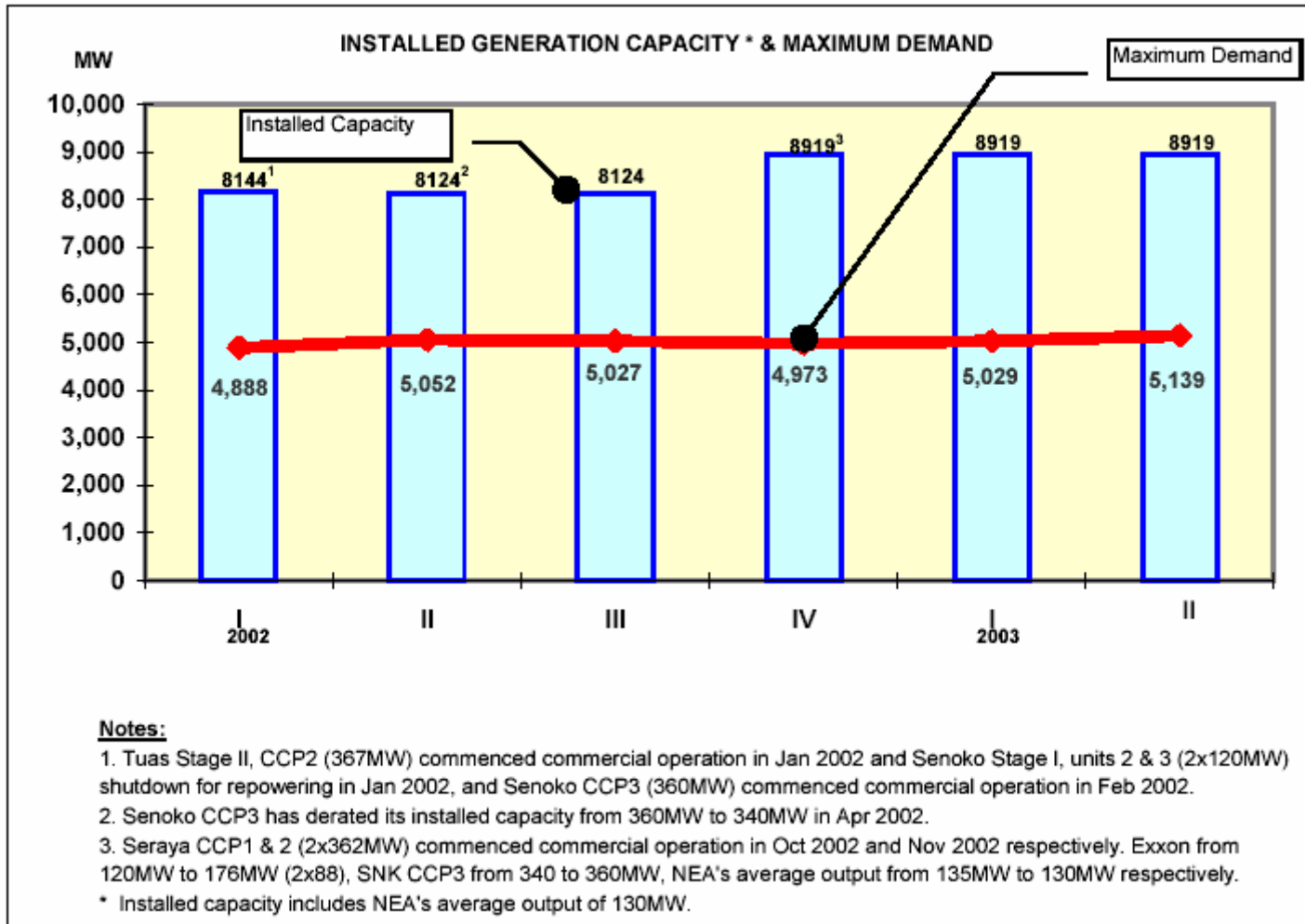
* exempt from New Energy Market rules



Note: Incineration plant refers to generation of electricity from refuse incineration by the National Environment Agency (NEA).



Installed Capacity & Maximum Demand





Prospects for new power plants

- Excess capacity and new power plants already in the pipeline will mean no new large power plants (>50MW) likely in the new few years
- More waste burning/biogas plants possible because of negative fuel cost (US\$42/tonne) from waste disposal fee
- Interest in embedded cogeneration plants of up to 20MW by selected industries with balanced heat and electricity needs



Prospects for further cogen applications

Strong government acceptance of benefits of cogeneration

ERC's Sub-committee on manufacturing in its
Recommendations/Action Plan:

“Review regulations to encourage co-generation. The chemical industry... are large consumers of electricity, while many petrochemical processes utilize large amount of steam, making the industry ideal for the use of **highly efficient methods of power generation such as co-generation...**”

It correctly identified the New Energy Market rule requiring co-generators to put their generators to the EMA for dispatch would put them at risk of disrupting steam production.



Prospects for further cogen applications

- In 2002, the Ministry of the Environment & the National Environment Agency put up the Singapore Green Plan 2012
- It cited the 2 existing **cogeneration plants** by SembCorp Cogen and ExxonMobil **as examples of clean and efficient use of energy**
- Growth of refuse to be slowed and cost of disposal (by incineration) to be increased. Privatization of refuse disposal (the incinerators) will pose a threat/opportunity to waste collectors. May lead to more small wood waste burning cogen plants
- Grants/incentives may be available to those setting up their own energy efficient cogeneration plants

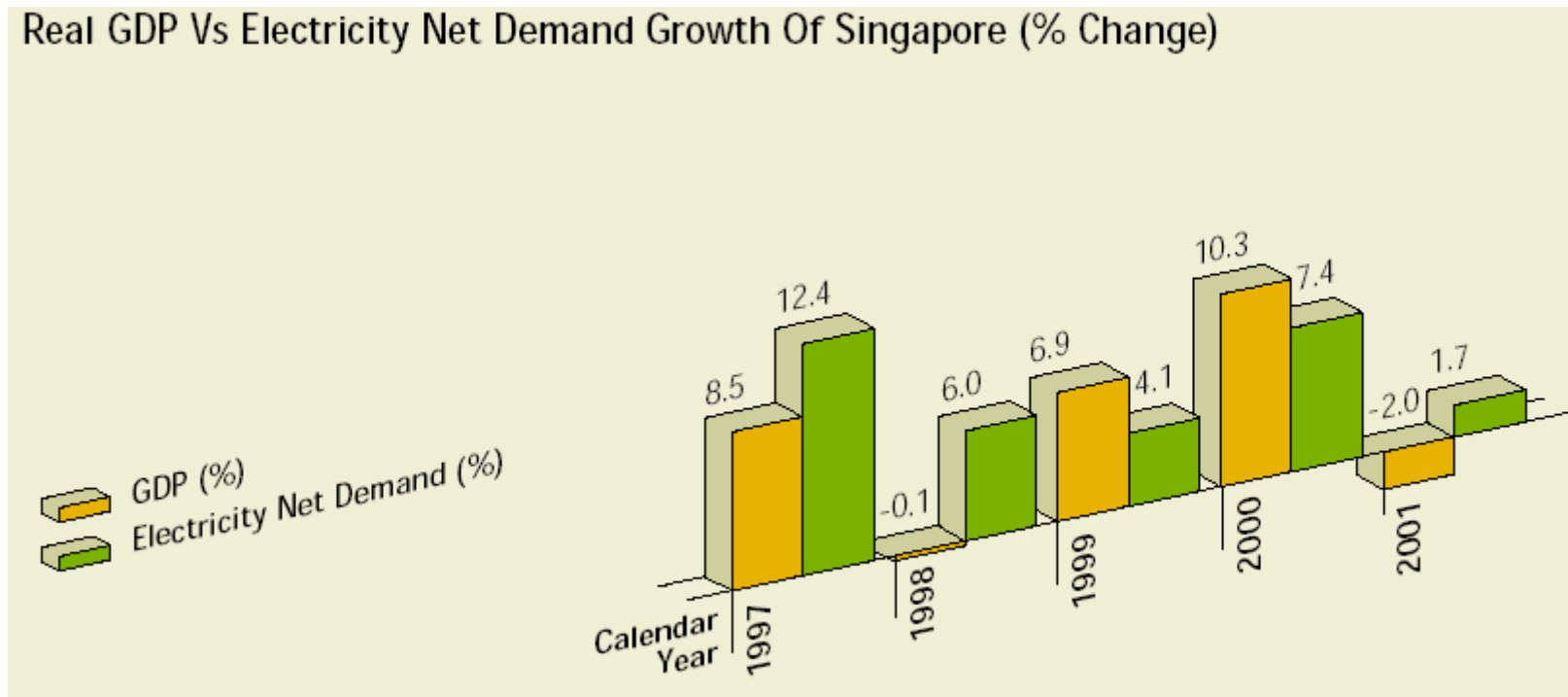


Barriers/Limits to further Cogeneration Applications -Supply and Demand

- Current installed capacity far exceeds current peak demand (57.6% of capacity) due to slower economic and power consumption growth
- If all licensed capacity is taken into account, and assuming 5% growth rate in consumption, peak demand likely to remain below 75% of capacity beyond 2010
- Industries with balanced needs for heat and electricity are limited. Embedded cogeneration plants being considered mainly for new plants



Real GDP Vs Electricity Net Demand Growth Of Singapore (% Change)





Barriers/Limits to further Cogeneration Applications - EMA's New Energy Market Rules

- All generating units >10MW to be included in the NEM, i.e. all such generators will have to be made available for dispatch by EMA and generated power have to be put on the market
- All licensed 1MW – 10MW generators are to be registered with the Energy Market Company as market participants either for dispatch or as a generation settlement facility
- (EMA has exempted some generators which had been operating before the new market rules, but other changes in policy has yet to be announced)
- EMA has issued an information paper on Policy on Direct Supply of Electricity by Generating Sets to On-site Loads, but this restricts the use of the power generated to users within the fences of the on-site generator



Barriers/Limits to further Cogeneration Applications - natural gas prices

- Cost of natural gas for smaller potential users of cogeneration may be pegged too high relative to the price of electricity to make cogeneration by natural gas economically feasible



Positive developments

- Government efforts to locate and develop industries by clusters make it feasible to supply them with cogenerated heat and electricity (e.g. food, biotech, pharma, chemical industries)
- Government has formed working group to identify barriers and to find solutions to facilitate cogeneration by industry
- Grants and incentives may be available from NEA's energy efficiency scheme for new embedded cogeneration plants



Conclusions

- Due to surplus power generating capacity the number of or size of major cogeneration plants will be limited until some of the spare capacity is taken up
- Natural gas price and EMA policy will be key to whether smaller users of electricity will set up their cogeneration plants
- There may be a few more wood waste/ biogas burning cogeneration plants such as the 2 FSDPs
- Embedded cogeneration plants for selected industries with balanced heat and electricity needs receiving government support



For more information

- mail to: **singapore@cogen3.net**
- or visit COGEN 3 website at
<http://www.cogen3.net>

Thank You !