# Status of Cogeneration in Singapore

by

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## 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 900MW to serve petrochemical cluster on Jurong Island
- ExxonMobil 180MW for own use
- Singapore Syngas 20MW for own use
- Island Power 800MW
- Keppel Merlimau Cogen 470MW
- 2 FSDPs total 1.5MW using wood waste



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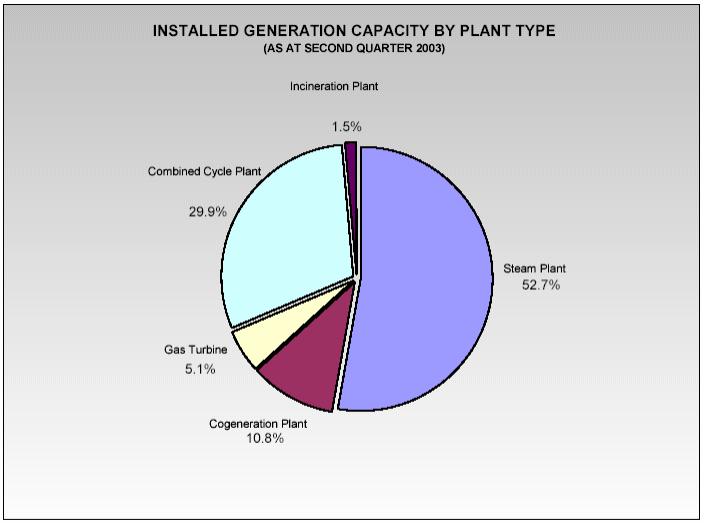
## Table 1: Power Generators in Singapore

| 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).



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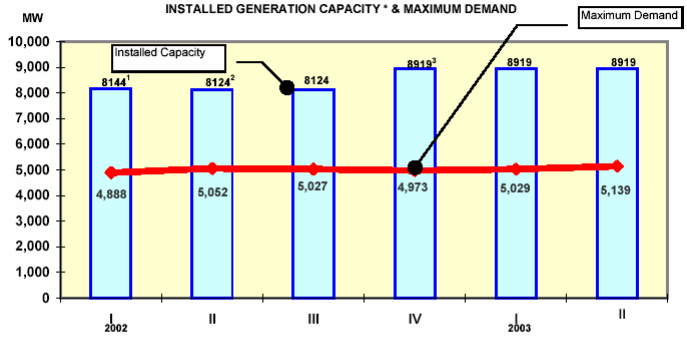
## Installed Capacity & Maximum Demand




Notes:
1. Tuas Stage II, CCP2 (367MW) commenced commercial operation in Jan 2002 and Senoko Stage I, units 2 & 3 (2x120MW) shutdown for repowering in Jan 2002, and Senoko CCP3 (360MW) commenced commercial operation in Feb 2002.
2. Senoko CCP3 has derated its installed capacity from 360MW to 340MW in Apr 2002.
3. Seraya CCP1 & 2 (2x362MW) commenced commercial operation in Oct 2002 and Nov 2002 respectively. Exxon from 120MW to 176MW (2x88), SNK CCP3 from 340 to 360MW, NEA's average output from 135MW to 130MW respectively.
* Installed capacity includes NEA's average output of 130MW.

# Prospects for further cogen applications

- Economic Review Commission's Sub-Committee on Manufacturing highlighted "utilities cost as consistently expensive in Singapore…" and recommended that "regulations around cogeneration and transmission and distribution charges be reviewed"
- Concerning the Electronics Industry Cluster it identified 7 Key Initiatives, among which: "Centralised co-generation facilities for wafer-fab parks that could generate cost savings…"
- Similarly, for the Chemicals Cluster it listed 2 of 11Key Initiatives as:
  - Review regulations to encourage more efficient methods of power generation including cogeneration
  - Ensure cost competitiveness of power, including reviewing transmission and distribution charges



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# Prospects for further cogen applications

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 despatch 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



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# But,

## 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



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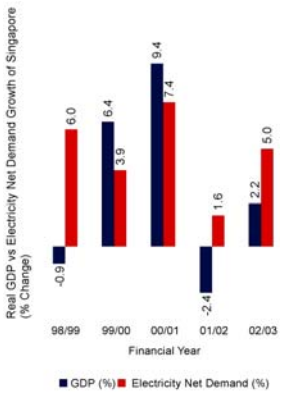
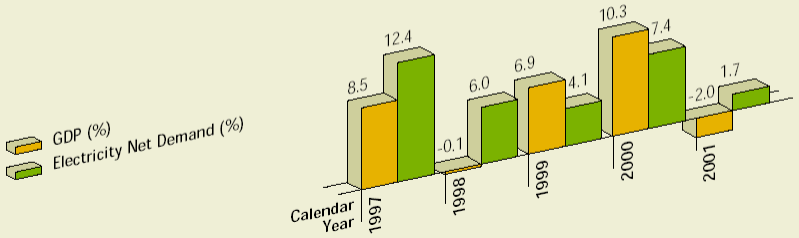


Real GDP Vs Electricity Net Demand Growth Of Singapore (% Change)








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

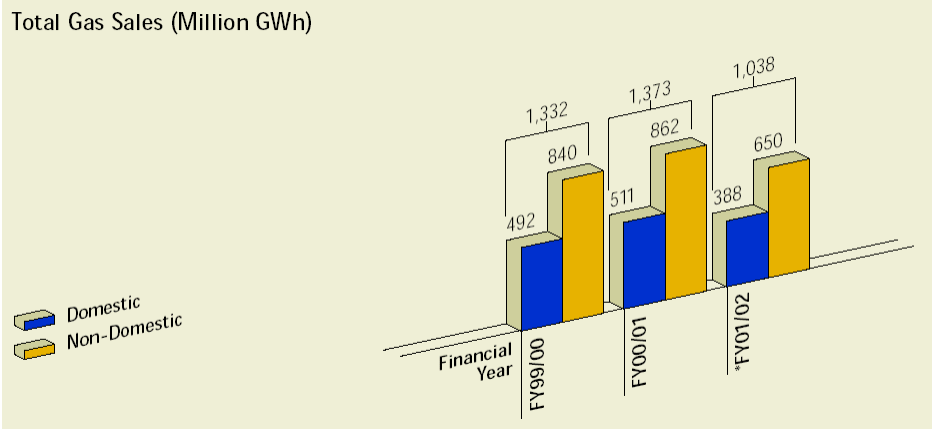
- All generating units >10MW to be included in the NEM, i.e. all such generators will have to be made available for despatch by EMA and generated power have to be put on the market
- All licensed 1MW – 10MW generators are to be registered with the Energy Market Company as market participants either for despatch 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







# 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 burning cogeneration plants such as the 2 FSDPs, but fuel supply security will be an issue



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