



SINGAPORE ENERGY SUPPLY AND DEMAND





Cogen3 Launching Seminar 30 August 2002

Orchard Hotel, Singapore

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SCOPE

⊕ Energy Profile

- ▶ Energy Supply
- ▶ Energy Demand
- ▶ Sectoral Energy Review

⊕ Electricity Generation & Demand



SCOPE

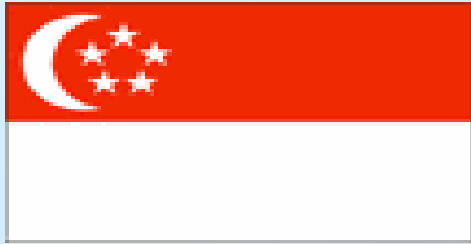
⊕ Natural Gas Status

- ▶ Malaysia – Singapore : Gas Sales Agreement
- ▶ Indonesia – Singapore : Gas Sales Agreements

⊕ Cogeneration

- ▶ Cogeneration Potential

⊕ Role of Singapore Cogen3 Team



Country Profile

- **Small island state ~ 650 km²**
- **Population ~ 4.1 million (Yr 2000)**
- **GNP ~ US\$92.3 Billion (Yr 2000)**
- **Per capita GDP ~US\$20,900 (2001)**
- **No natural resources**
- **Economy ~ Services, Major exports & imports are petroleum and petroleum products, chemicals, telecommunication and computer equipment.**

Environmental Impact

Energy Intensity

~ Singapore 25th out of 45 Countries Yr2000
20,530 kJ/\$

Per Capita Energy Consumption

~ 360 Million kJ (US value : 376 Million kJ)

Per Capita Carbon Emission

~ 6.4 Metric Tonnes (US value : 5.5 Tonnes)

Carbon Emission

~ 25.5 Million Tonnes

~ 0.4% of World Total



Limited Fresh Water Resources

Limited Land For Waste Disposal

Seasonal Haze from Indonesian

Forest Fires



Carbon Emission by Sector

Industrial - 58.3%

**Transportation -
26.5%**

Commercial - 9.1%

Residential - 6.1%



Overall Energy Use

- **No Indigenous Energy Resource**
Singapore : Dependent on import for its energy use
- **Crude Oil Refinery Capacity**
1.3 Million Barrels/Day
- **Oil Consumption**
600,000 Barrels/Day (Yr2000)
- **Natural Gas Consumption**
53 BSCF (Yr1999)

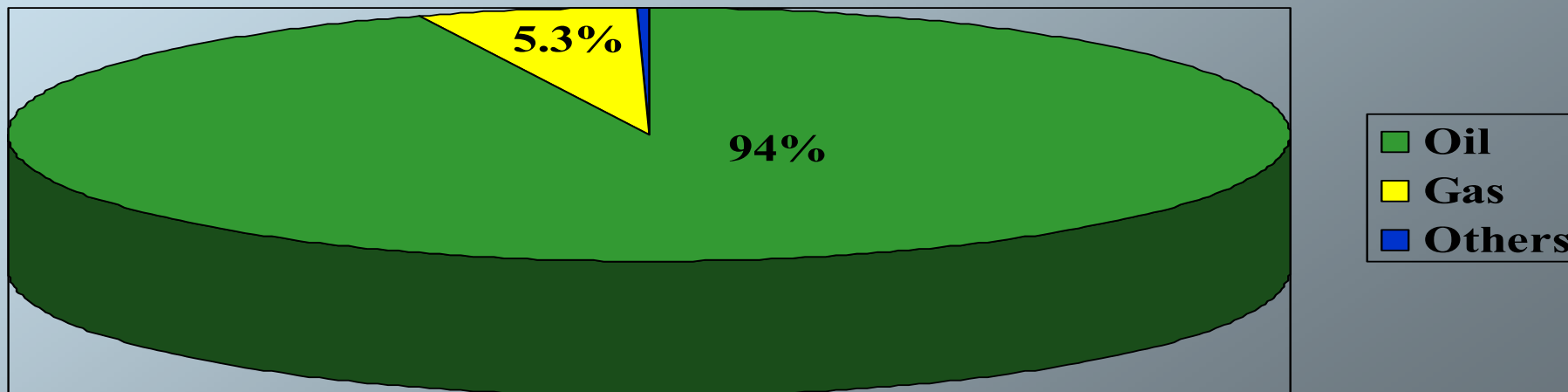
Primary Energy Supply

Total Primary Energy – 20,975 kTOE

Oil – 19,780 kTOE

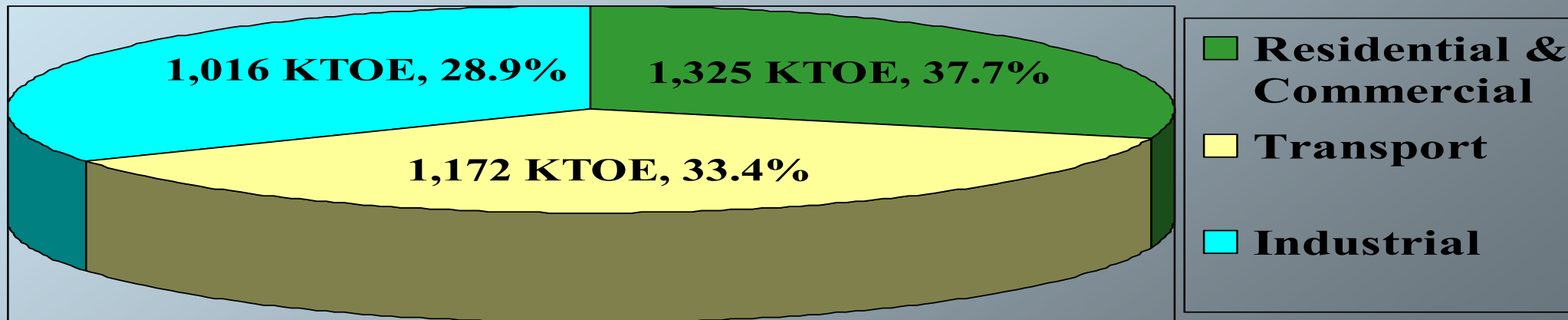
Gas – 1,132 kTOE

Others – 64 kTOE



Energy Demand : A Breakdown

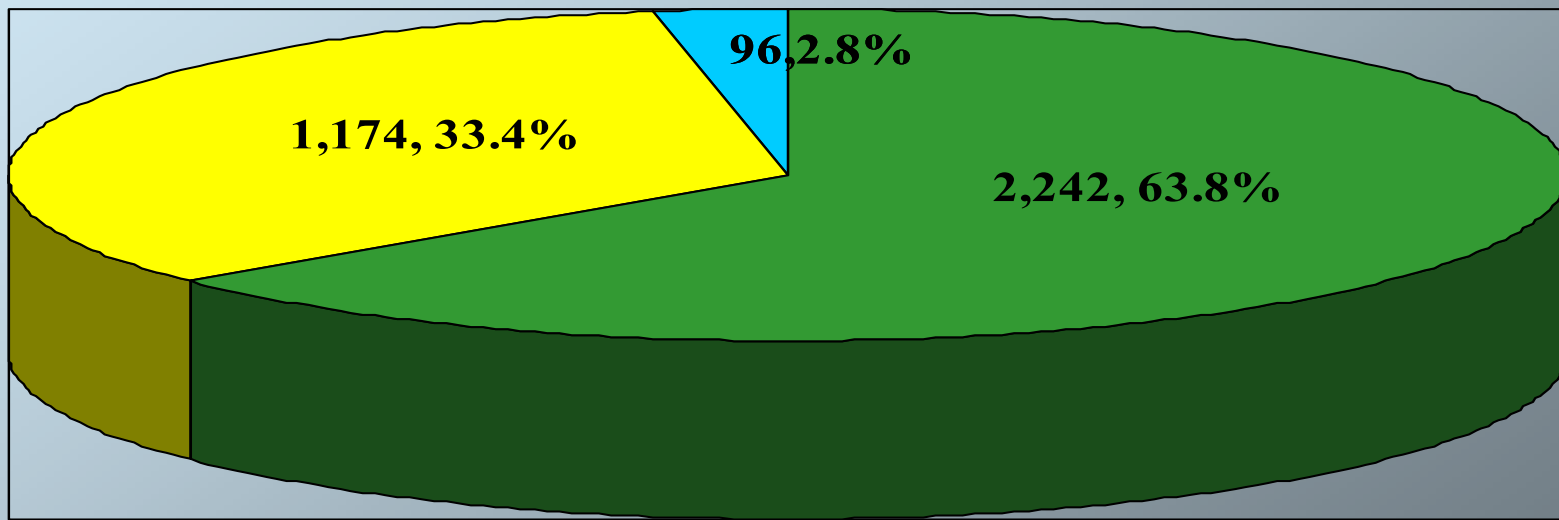
**Total Energy Consumption
~ 3,513 kTOE (YR1998)**





Energy Demand: A Breakdown

Energy Demand by Source
Total ~ 3,513 KTOE



- Electricity
- Oil
- Gas
- Coal



Energy : A Breakdown (1998)

Total Primary Energy Supply kTOE		Total Energy Consumption kTOE		Power Generation GWh	
Indigenous Production	64*	Industry	1,016	Thermal	27,685
Net Imports	20,912	Transport	1,172	Others*	739
Total	20,975	Others	1,325	* Incineration Plants	
		Total	3,513		
Coal	-	Coal	-		
Oil	19,780	Oil	1,174		
Gas	1,132	Gas	96		
Others	64	Electricity	2,242		

Industrial Energy Use (Yr 2000)

**Total Establishments,
Approximately : 4044**

Electricity	\$1.189 Billion	640 kTOE
Fuel Oil	\$0.288 Billion	473 kTOE
Total	\$1.477 Billion	1152 kTOE



A Sample Break-Down

INDUSTRIES		\$Million	kTOE
Electronics Industry	197	414.10	280
Chemical Industry	236	366	270
Petrochemical Industry	18	171	214
Fabricated Metal Industry	688	47.10	70
Food, Beverage & Tobacco Industry	340	48.20	47

Overview of Electricity Generation & Use

Total Power Capacity
~7.296 GW (Yr 2001)

Power Generation / Sales
~29,653.4 Million kWh(Yr 2001)

Power Sector

Generation capacity	7.296 GW (Yr 2001)
Generation capacity to grow	8.8 GW (Yr 2007)
Electricity sales	29,600 GWh (Yr 2001)
Electricity sales to grow	41,017 GWh (Yr 2007)



Power Industry

•Senoko Power	3300 MW
•Power Seraya	3100 MW
•Tuas Power	2670 MW
•Semb Corp Cogen	900 MW
•Island Power Company	800 MW
•Keppel Merlimau Cogen	470 MW
•ExxonMobil Asia Pacific	180 MW
•Ellba Eastern	50 MW
•Singapore Syngas	20 MW



Time Trend

Historical Power Chart





Natural Gas Sector

No Indigenous Gas Reserves

Gas supply secured through Sales Agreements

40% of Power Generation by Gas

Malaysia – Singapore : Gas Sales Agreements

1. Petronas and Singapore Power (Yr 1992)

15 Years

150 MMSCF/day

Solely for Power Generation

Senoko Power Plant

Natural Gas Sector

Indonesia – Singapore : Gas Sales Agreements

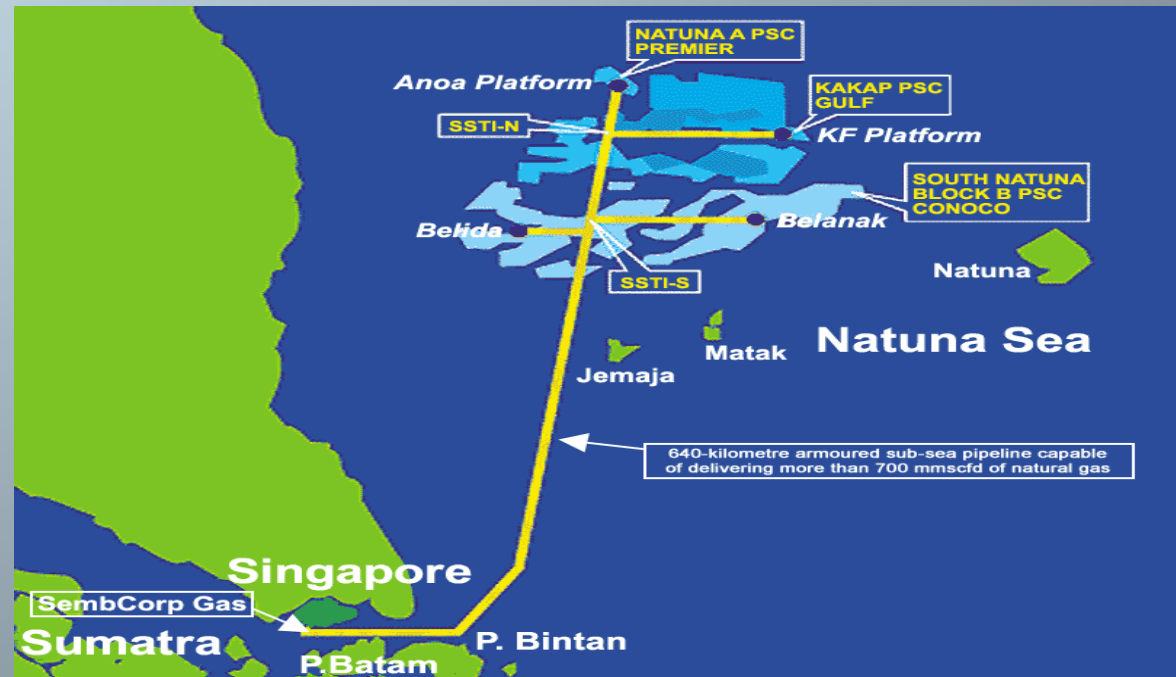
1. Pertamina and SembCorp Gas (Yr 2001)

22 Years

325 MMSCF/day

Power Generation

Industrial Sales



Natural Gas Sector

Pertamina & Semb Corp Gas Sales Agreement

Power Generation

- SembCorp Cogen
- Tuas Power
- PowerSeraya

Gas Sales

- Industrial Customers





Natural Gas Sector

Pertamina & Semb Corp Gas Sales Agreement Natural Gas in Transport

- **First CNG refueling station commenced operation in April 2002**
- **Fleet of 27 Buses & 100 Taxis on a Trial – Run Basis**

Natural Gas Sector

Indonesia – Singapore : Gas Sales Agreements

2. Pertamina and PowerGas (Yr 2003)

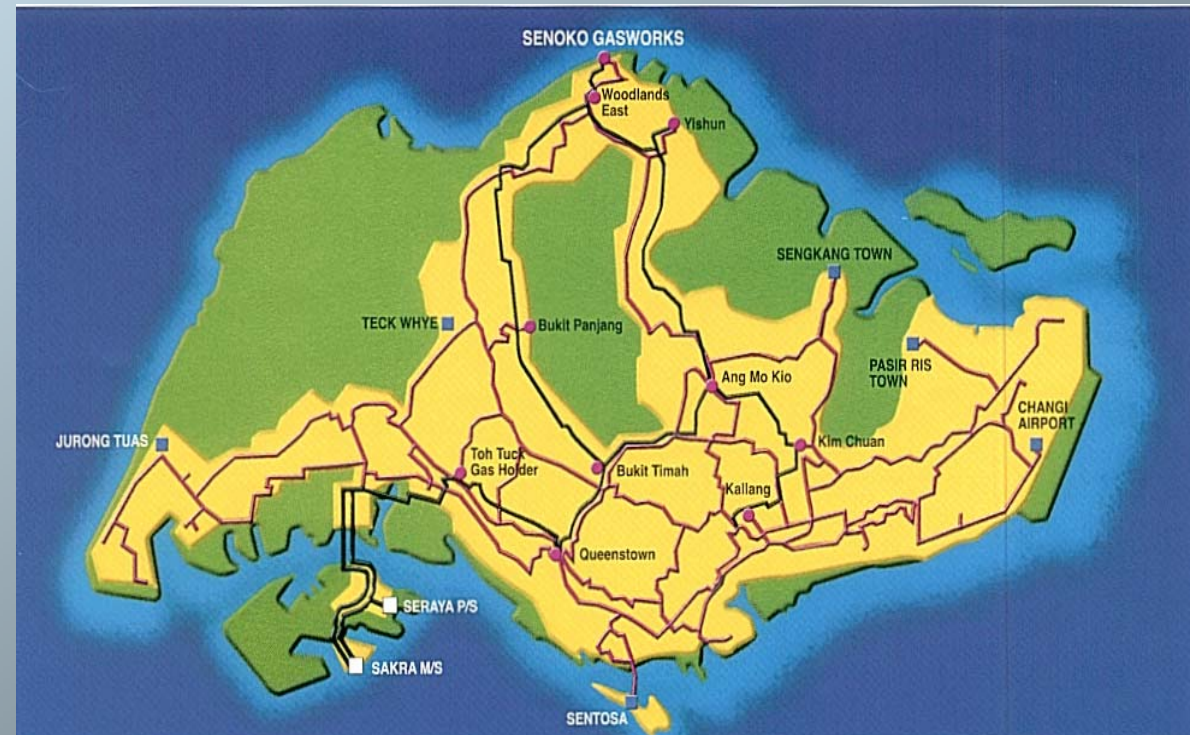
20 years

350 MMSCF/day

Island-wide

Commercial &

Industrial Sales





Natural Gas Sector

- **Plans In Incubation : LNG Import Facility**
- **Location of Proposed LNG Import Facility @ Tuas View**
- **To achieve greater energy diversification**
- **Potential as regional gas hub for South-East Asia**
- **Plans yet to be implemented**



Cogeneration Potential

- **Eventual island-wide distribution of natural gas**
- **City-Gas to promote natural gas use and cogeneration applications in industry**
- **Rise in awareness & availability of distributed generation**
- **Cogeneration in district cooling**



Revamping of Singapore Utilities

- **Parliament Passed Five Bills, March 2001**
To Develop a New Framework for the Utilities Market
- 1. **Public Utilities Bill**
- **Public Utilities Board's,(PUB) Water Department**
Merged with the Environment Ministry's Sewerage &
Drainage Department.
- **Restructured PUB with ENV.**



Revamping of Singapore Utilities

2. Energy Market Authority Bill

- Energy Market Authority, (EMA) Established
- As Regulator of Electricity & Gas Industries and other Energy Sectors

3. Gas Bill

- Designates EMA as Regulator of the Gas Industry.
- Promote Competition in Natural Gas Supply
- Regulate Price, Protect Customer Interests
- Set Practice Standards & Monitor Performance



Revamping of Singapore Utilities

4. Electricity Bill

- Empowers EMA to be Regulator of the Electricity Industry.
- EMA to Create a Competitive Electricity Industry
- Set Standards & Codes of Practice
- Monitor Performance & Safety Standards

5. District Cooling Bill

- Designates EMA as a Regulator for the Operators of District Cooling Services.



Revamping of Singapore Utilities

