

The EC - ASEAN Business Facilitator

National Energy Policy Review

Thailand



March 2004

The EC - ASEAN Business Facilitator

National Energy Policy Review

Thailand

Prepared by EC-ASEAN COGEN Programme (COGEN 3)

COGEN 3 Programme Management Unit
Asian Institute of Technology, Energy Building
Km. 42 Paholyotin Highway
Klong Luang, Phatumthani 12120, THAILAND
Tel. +66 2 524 5399. Fax +66 2 524 5396, Email: cogen3@cogen3.net, Web: www.cogen3.net

COGEN 3 European Focal Point
Carl Bro International AB
Carl Gustafs Väg 4
SE-205 09 Malmö, SWEDEN
Tel. +46 40 25 61 12, Fax +46 40 30 59 44, Email: efp@carlbro.se

COGEN 3

Proven, Clean & Efficient Biomass, Coal, Gas Cogeneration

The objective of COGEN 3 is to promote the use of proven, clean and efficient cogeneration using biomass, coal or gas as fuel. This is achieved through partnership between ASEAN industries and European equipment suppliers.

The programme is co-ordinated in ASEAN by the Asian Institute of Technology (AIT), Bangkok, Thailand and in Europe by Carl Bro International, Sweden. COGEN 3 started its operation in January 2002 and will continue until December 2004.

Disclaimer

The views expressed in this report are those of COGEN 3 and do not represent any official view of either the European Commission or the Association of Southeast Asian Nations. By providing links to other sources, COGEN 3 does not guarantee, approve or endorse the information or products available at these websites, nor does a link indicate any association with or endorsement by the linked website to COGEN 3. All information contained in this report has been researched and compiled from sources believed to be accurate and reliable at the time of publishing.

TABLE OF CONTENTS

List of Abbreviations.....	4
Executive Summary.....	5
1. Introduction.....	6
2. General Overview of the Energy Sector.....	7
2.1. Energy Statistics and Data.....	7
2.2. The Electricity Supply Industry.....	9
2.3. Electricity and Fuel Tariff / Prices.....	10
2.4. The Energy Forecast up to year 2010.....	15
2.5. Key Players in the Cogeneration market.....	16
3. Energy Sector Legislation Framework.....	19
3.1. Liberalisation of the Electricity and Gas Market.....	21
3.2. Legislation and Programs Promoting Cogeneration.....	22
3.3. Legislation and Programs Promoting Energy Efficiency.....	22
3.4. Programs Initiated To Promote The Use Of Renewable Energy (RE).....	23
3.5. Legislation and Programs Promoting Biomass.....	24
3.6. Legislation and Programs Promoting Natural Gas.....	24
3.7. Legislation and Programs Promoting Coal.....	25
3.8. Other Legislations:.....	26
4. Conclusions.....	27
5. Links and Sources of Information.....	28
ANNEXES.....	29
Annex 1. Currency Exchange Rates (per Euro)	
Annex 2. Domestic Production of Primary Energy	
Annex 3. Imports of Energy by Type	
Annex 4. Exports of Energy by Type	
Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP)	
Annex 6. Classified Generated Electricity of SPP by Type of Fuel – August 03	
Annex 7. EGAT Power Development Plan (PDP 2003)	
Annex 8. Area of Coal Mineral sites.	
Annex 9. SPP Cogeneration Experiences in Thailand	

TABLE OF FIGURES

Figure 2.1: The Electricity Supply Industry.....	9
Figure 2.2: Thailand's Largest Industrial Parks.....	17

TABLE OF TABLES

Table 2.1: Economic Figures – compared to other ASEAN countries.....	7
Table 2.2: Total Primary Energy Supply by Type (Unit: ktoe).....	8
Table 2.3: Energy Consumption by Different Fuel Types and by Different Sectors.....	8
Table 2.4: Installed Capacity in Thailand.....	10
Table 2.5: Medium General Service.....	11
Table 2.6: Large General Service.....	11
Table 2.7: Standby Tariff for EGAT.....	12
Table 2.8: Format A - Thailand Survey Report on Retail Price System of Oil Product and LPG.....	14
Table 2.9: Forecasted Power Generation by Type 2000 – 2010 in GWh.....	15
Table 2.10: Forecasted Power Generation by Fuel Type 1980, 1999, 2000, 2005 and 2010 in %.....	16
Table 2.11: Breakdown of Installed Capacity at the Glow SPP.....	17
Table 3.1: Policy making Institutions responsible for energy related activities in Thailand:.....	20
Table 3.2: Electricity power reform and privatisation plans:.....	21

List of Abbreviations

CHP	Combined Heat and Power
DEDE	Department of Alternative Energy Development and Efficiency
COCO	Cogeneration Public Company Ltd, now called Glow SPP.
DEDP	Department of Energy Development and Promotion
ECP	Energy Conservation Plan
EGAT	Electric Generating Authority of Thailand
EGCO	Electricity Generating Company
EPPO	Energy Policy Planning Office
ESI	Electricity supply industry
GEF	Global Environment Fund
IPP	Independent Power Producers
LNG	Liquid Natural Gas
LPG	Liquid Petroleum Gas
MEA	Metropolitan Electric Authority
NEPO	National Energy Policy Office, Now EPPO.
NERC	National Energy Regulatory Commission
NPC	National Policy Committee
PCAF	Power Consumer Assistant Fund
PEA	Provincial Electric Authority
PTT Plc	Petroleum Authority of Thailand Public Company
RATCH	Ratchaburi Electricity Generating Holding
SPP	Small Power Producer
TOD	Time of Day
TOU	Time of Use
VSP	Very Small Power Producer
VAT	Value Added Tax

List of energy units

B/kWh	Baht/kilowatt – hour
GWh	Giga watt hour
BOE	Barrel of Oil Equivalent
Kcal/kg	kilo Calories per KG
MT	Mega tonnes
MW	Mega Watt
ktoe	kilo ton oil equivalent
kV	kilo volt
kVAr	kilo voltage – ampere reactive
TSCF	Trillion standard cubic feet

Executive Summary

This report reviews the national energy policy of Thailand with special focus on cogeneration. The flow of information in this report is structured to provide a deeper understanding of on-going energy activities in Thailand, organisations responsible for energy related activities and the Government's role in promoting energy efficiency and conservation.

Energy has become such an important issue to Thailand that a new Ministry for Energy was formed in 2002 to oversee planning and policy, energy regulation, energy development and promotion of issues including petroleum, electricity, renewable energy and conservation in Thailand. The primary agency of the Thai government that handles energy matters is the Energy Policy and Planning Office (EPPO) and the Department of Alternative Energy Development and Efficiency (DEDE). Thai energy policies mainly aim at reducing the dependency on energy sources from foreign countries which is set to be achieved by conserving and developing energy resources as well as promoting the efficient use of energy.

The Energy Policy promulgated by the Thai Energy Ministry strives to provide significant support on Clean and Alternative Energy Initiative. Renewable Energy (RE) and Cogeneration systems will be the main types of alternative energy under this initiative. The success of such Renewable Energy projects is said to require cooperation among the owners of fuels, technologies, investment funds.

In 1992 the Thai Government announced the policy of state enterprise privatisation and promotion of private sector participation in the electricity industry especially the IPPs and SPPs. Through the 1992 SPP program 1618 MW of cogeneration fossil fuelled plants (fuels like, Natural Gas, Coal and Oil) were supplying electricity to the national grid with about 235 MW produced from mixed fuelled (biomass and fossil fuel) and till date, 246 biomass based SPP projects were supplying electricity to the national grid. Though many of the RE projects will require cooperation among the stakeholders, SPP power and cogeneration plants utilising biomass as fuels are expected to take advantage of the immediate opportunities presented under these newest policies supporting biomass based renewable energy resources.

Thailand's reserve electricity capacity in 2003 is at 29% of the total capacity (25,000 MW). It is evident that new capacity will be required in the next 5 years as power demand in Thailand is projected to increase by 1200 - 1500 MW per year from 2003 – 2012. The Electricity Generating Authority of Thailand (EGAT), a public enterprise, under the Ministry of Energy, is the power generating and transmission authority for the whole of Thailand. It operates through two subsidiaries, the Provincial Electricity Authority (PEA) and the Metropolitan Electricity Authority (MEA).

The Thai Government has been pro-active in disseminating energy related policies. The formation of the new Thailand Energy Ministry in 2002 encouraged the privatisation of state monopolies in the energy industry. After many years of considerations the Energy Policy and Planning Office (EPPO) has advocated electricity power reform in Thailand with a power pool arrangement. The Government has plans to corporatise and list the 3 power utilities (EGAT, MEA and PEA) on the stock market in 2004. One of the major barriers for cogeneration today is the lack of a direct policy framework similar to the SPP program in the 1990's.

1. Introduction

In 1999, the Energy Conservation Promotion Fund Committee, under the umbrella of the energy policy of 1992 set up an Energy Conservation Plan (ECP) for the purposes of efficient uses of energy, development and use of renewable energy, dissemination of energy conservation technologies and the environment protection. Within the scope of these policies, given the prominence for promoting renewable energy & efficient energy measures, cogeneration through SPPs stand, a good chance.

The Energy Policy in 2002 was approved by the National Energy Policy Council of Thailand. The policies attempt to address the following four segments:

1. Promoting Natural Gas.
2. Petroleum and Fuel Gas Utilisation -This component of the policy aims to reduce the dependence on fossil fuels as they make up to 70% of the total fuel used.
3. Promotion of Small Power Producers (or SPPs) using Renewable Energy for fuel has been initiated in this program by allocating a budget of 2,060 million baht from the government's Energy Conservation Promotion fund to provide subsidies for SPPs.
4. The strategic plan for Energy Conservation during 2002-2011 endorses efficient and economic use of energy in three main energy-intensive sectors like transportation sector, the industrial sector and the residential and commercial sector, including service provision and government offices. Through Energy Conservation, Renewable Energy Utilisation, Human Resource Development and Public Awareness Campaigns, this strategic plan serves as a framework for the concerned parties to implement projects to reduce total energy demand and to promote the use of renewable energy sources.

2. General Overview of the Energy Sector

The Thai economy grew at a rate of 5.75% to 6.4% during the year 2003. First-half growth was 6.2% from the year before, led by a torrid 6.7% expansion in the first quarter. Thai exports have been spectacular in 2003, with gains recorded in both volume and value. While the Bank of Thailand expects the regional trade to increase through 2004, Thai export trends will continue to be dependent to a large extent on the economic prospects of the US, Japan and Europe. The central bank, generally conservative in its forecasts, maintained a 5.75% to 6.25% growth projection for 2003 as of October, and a 5.5% to 6.5% projection for 2004.

Table 2.1: Economic Figures – compared to other ASEAN countries

Countries	Purchasing power parity (PPP) \$	Real GDP Growth %		Per Capita PPP \$	GDP per Sector		
		2003	2004		Agriculture %	Industry %	Services %
Cambodia	18 billion	5.0	5.5	1500	50	15	35
Indonesia	663 billion	3.5	4.0	3100	17	41	42
Malaysia	210 billion	4.2	5.1	9300	12	40	48
Philippines	356 billion	4.0	4.5	4200	15	31	54
Singapore	105 billion	2.2	4.2	24000	Negl	33	67
Thailand	429 billion	5.75	5.5 to 6.5	6900	11	40	49
Vietnam	168 billion	6.9	7.1	2100	25	35	40

Sources: - Asian Development Bank
 - World Bank Yearly Report for Year 2002 and
 - The Bank of Thailand.

2.1. Energy Statistics and Data

Despite the Iraq situation, the demand for domestic oil and gas was recording a growth of 6% average till October 2003 amounting to nearly one million barrels of oil per day. For year 2004, almost 5% rise in electricity consumption has been projected by the Thai energy ministry. Interestingly, the total Energy demand of Thailand continued increasing at rate of 3.6%. Modern or Commercial Energy contributed 83.0% of the total energy demand and Renewable Energy contributed 17.0%. Meanwhile, the total Energy supply rose by 4.5%, the Domestic Energy Supply accounted for 53.3% and the Energy Import was 46.7%. The VAT value of energy Import was 266,244 million Baht, with an increase of 7.9%. Total electric consumption in Thailand was 92,290 GWh, an increase of 5.0%. The total installed capacity of 22,888 MW was an increase of 1.3% from 2001. The state power utilities contributed 69.9% and the private powers producers contributed the other 30.1% of this total installed capacity.

Table 2.2: Total Primary Energy Supply by Type (Unit: ktoe)

Type	1996	1997	1998	1999	2000	2001	2002
Commercial Energy	58,498	61,230	57,416	60,839	63,683	67,276	72,033
%	100	100	100	100	100	100	100
Coal ¹	8643	8716	7264	7915	7792	8816	10219
%	14	14	12	13	12	13	12.9
Crude Oil	32,747	37,944	36,004	37,274	37,270	37,594	39,431
%	56	62	62.7	61.3	58.5	55.9	54.7
Condensate	604	673	424	1,542	2,045	2,384	2,131
%	1	1.1	0.7	2.5	3.2	3.5	3.0
Natural Gas	11,518	14,029	15,303	16,681	19,440	22,679	24,311
%	19.7	22.9	26.6	27.4	30.5	33.7	33.7
Natural Gasoline	-30	-117	-132	-152	-114	-76	-52
%	-0.1	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1
Petroleum Products	3,328	-1,666	-2,719	-3,381	-4,321	-5,741	-4879
%	5.7	-2.7	-4.7	-5.6	-6.8	-8.5	-6.8
Electricity	1,688	1,651	1,272	960	1,571	1,620	1,872
%	2.9	2.7	2.2	1.6	2.5	2.4	2.6
Renewable Energy	13,937	12,865	12,283	12,723	13,201	13,031	13,821
%	100	100	100	100	100	100	100
Fuel Wood	9,224	9,486	9,439	9,508	9,629	9,648	9,793
%	66.2	73.7	76.9	74.7	72.9	74.1	70.9
Charcoal	11	7	1	-12	13	5	7
%	0.1	0.1	0	-0.1	0.1	0	0.1
Paddy Husk	1,539	970	1,048	1,027	1,142	1,212	1,223
%	11	7.5	8.5	8.1	8.7	9.3	8.8
Bagasse	3,163	2,402	1,795	2,200	2,417	2,166	2,798
%	22.7	18.7	14.6	17.3	18.3	16.6	20.2
Total	72,435	74,095	69,699	73,562	76,884	80,307	85,854
Commercial Energy (%)	80.8	82.6	82.4	82.7	82.8	83.8	83.9
Renewable Energy (%)	19.2	17.4	17.6	17.3	17.2	16.2	16.1

Notes : 1/ Total primary energy supply = Domestic production + Imports–Exports+/-Stock change.
2/ Revised by DEDE during 1997 – 2002

Table 2.3: Energy Consumption by Different Fuel Types and by Different Sectors

Energy Consumption (% YOY)								
	1993	1994	1995	1996	1997	1998	1999	2000
Gasoline Sale	11.2	12.1	3.3	6.3	12.0	9.2	2.0	8.4
High Speed Diesel Sale	6.2	5.1	10.3	6.6	2.9	7.8	1.5	5.9
Fuel Oil Sale	-23.9	-12.7	0.6	-1.8	-3.7	-2.3	12.6	7.6
Cooking Gas (LPG) Sale	10.7	9.7	8.2	0.9	4.1	2.0	8.8	6.9
Electricity Consumption	4.6	2.7	1.3	1.7	3.5	8.5	4.4	6.8
Household Electricity Consumption	11.7	3.4	-2.6	-4.9	-1.7	11.1	5.6	n.a
Business Electricity Use	5.8	-1.3	1.4	1.5	2.4	6.8	7.2	n.a
Electricity use in Manufacturing	6.4	-1.2	2.1	2.0	2.4	7.6	8.6	n.a

Source: NEPO

¹ Coal includes Anthracite, bituminous, coke, briquettes and other coal.

2.2. The Electricity Supply Industry

The electricity sector is controlled by Electricity Generating Authority of Thailand (EGAT) which oversees all the generation and transmission activities in Thailand. The monopolistic nature of EGAT could be explained by the fact that EGAT is one of the largest public enterprises under the supervision of the Ministry of Energy and is solely responsible for generation and the transmission activities for the whole country and is carried out through the Metropolitan Electricity Authority (MEA) and the Provincial Electricity Authority (PEA). EGAT has been scheduled to be listed on the Stock Exchange of Thailand (SET) between October 2003 and March 2004. The government has opened up this sector for private sector by participation in the form of SPPs and IPPs who are required to sell the power produced to EGAT. The functions of the EGAT, MEA, PEA and IPPs are:

1. Electricity Generating Authority of Thailand (EGAT) is the power producer and supplier/selling electricity via high voltage transmission lines to the Metropolitan Electricity Authority and the Provincial Electricity Authority.
2. Metropolitan Electricity Authority (MEA) is the power distributor for consumers in Bangkok, Nonthaburi and Samutprakarn provinces.
3. Provincial Electricity Authority (PEA) is the power distributor for consumer in the remaining areas of country.

The private enterprises participate in the Thai electricity market as Independent Power Producers and Small Power Producers who abide by certain working procedures laid down by EGAT. In this context, the Independent Power Producer (IPP) is a power producer in the private sector with large generating capacity, using commercial energy (excluding nuclear) as fuel, such as natural gas and coal (both indigenous and imported). The Small Power Producers (SPP) have to foster the use of renewable energies and the residual energy content of wastes as fuel sources to produce electricity with a plant capacity of 90MW or less than 50MW and are entitled to sell their electricity to EGAT. The SPPs can also sell power to their neighbors.

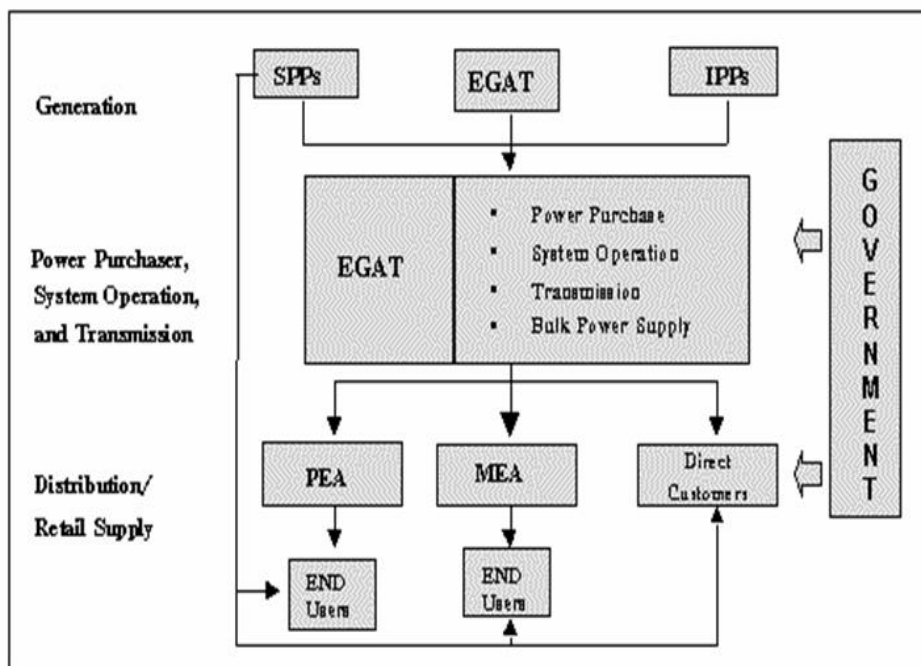


Figure 2.1: The Electricity Supply Industry

Table 2.4: Installed Capacity in Thailand

Generators	MW
EGAT	15,025
RATCHBURI, IPP	3,615
EGCO, IPP	2,056
Other IPPs	2,463
SPPs	1,898
Laos ²	340
Malaysia ³	300
Total	25,697

Source: DEDE, 2003

EGAT's and IPPs' Installed Capacity for Years 2001 to 2003				
	UNIT	2001	2002	2003
Total Installed Capacity	MW	22,034	23,755	25,241
EGAT's Installed Capacity	MW	15,000	15,000	14,811
IPP's Installed Capacity	MW	7,074	8,775	10,430
Transmission Line Length	Circuit-KM	27,039	27,932	28,322

Source: http://www.boi.go.th/thai/business/infrastructure_electric.html. / Board of Investment-Thailand.

2.3. Electricity and Fuel Tariff / Prices

The existing tariff structure came into existence in 1991 after which little has been done to change this. Marginal costs, load pattern and uniform tariff for each individual category of consumers is to be applied nation wide, while subsidising residential consumers and minimum consumption category were the main factors of considerations for finalising the existing tariff structure. The tariff consists of two parameters, the base tariff rate and automatic adjustment clause (Ft). The base rate is determined by the investment in the construction of power plants, transmission lines, substations, and fuel cost. The Ft is calculated on the basis of investment cost in transmission and distribution operations as affected by prevailing inflation rates. Ft is adjusted every 4 months by the subcommittee for the consideration of electricity tariff under the supervision of the committee for energy policy.

² Electricity imported from Laos and Malaysia which totalled 2,812 Gwh in 2002.

³ Electricity imported from Laos and Malaysia which totalled 2,812 Gwh in 2002.

2.3.1 PEA/MEA Electricity Tariff

Table 2.5: Medium General Service

Item	Type of User/Seller	Unit Price			
		Demand Charge (B/kW)	Energy Charge (B/kWh)	Service Charge (B/month)	
1.	Normal tariff				
	• 69 kV and Over	175.70	1.6660	-	
	• 11 – 33 kV	196.26	1.7034	-	
	• Below 11 kV	221.50	1.7314	-	
2.	Time of Use (TOU)	• 69 kV and Over	1) 74.14	1) 2.613	228.17
				2) 1.7726	
	• 11 – 33 kV	1) 132.93	1) 2.6950	228.17	
			2) 1.1914		
	• Below 11 kV	1) 210.00	1) 2.8408	228.17	
			2) 2246		

1) On Peak : Monday – Friday from 9.00 AM to 10.00 PM

2) Off Peak : Monday – Friday from 10.00 PM to 09.00 AM

: Saturday – Sunday and normal public holiday (including substitution holiday)

Table 2.6: Large General Service

Item	Type of User/Seller	Unit Price			
		Demand Charge (B/kW)	Energy Charge (B/kWh)	Service Charge (B/month)	
*1.	Time of Day (TOD)	• 69 kV and Over	1) 224.30	1.6660	0
			2) 29.91		
	• 11 – 33 kV	1) 285.05	1.7034	0	
		2) 58.88			
	• Below 11 kV	3) 0	1.7314	0	
		1) 332.71			
2) 68.22					
**2.	Time of Use (TOU)	• 69 kV and Over	1) 74.14	1) 2.6136	228.17
				2) 1.1726	
	• 11 – 33 kV	1) 132.93	1) 2.6950	228.17	
			2) 1.1914		
	• Below 11 kV	1) 210.00	1) 2.8408	228.17	
			2) 1.2246		

* 1) On Peak : Everyday from 06.30 PM to 9.30 PM

2) Partial Peak : Everyday from 08.00 AM to 06.30 PM (Only the amount of maximum demand that is out of the On – Peak period will be charged at this rate)

3) Off – Peak : Everyday from 09.00 PM to 08.00 AM (No demand charge)
: Saturday – Sunday and normal public holiday (including substitution holiday)

** 1) On Peak : Monday – Friday from 9.00 AM to 10.00 PM

2) Off Peak : Monday – Friday from 10.00 PM to 09.00 AM

: Saturday – Sunday and normal public holiday (including substitution holiday)

2.3.2 Standby – by Tariff for MEA and PEA

This tariff comprises 2 cases

Case 1:

This schedule of tariff is applicable to customers who own an electricity generator and utilise the electricity produced for own consumption, but also require electricity from the MEA&PEA as reserve in the event of a breakdown of such generators.

Case 2:

This schedule of tariff is applicable to customers who own electricity generator for co-generation and mainly use electricity from their own co-generations plant but also require electricity from the MEA&PEA as reserve in the event of a breakdown of such generator.

2.3.3 Standby – by Tariff for EGAT

- 1) For the month that customer do not use electricity :
The contracted demand is standby power purchase agreement and is charged at rates below:

Table 2.7: Standby Tariff for EGAT

Voltage Level	Standby Demand Charge (Baht/kW)	
	Cogeneration	Non-Cogeneration
69 kV and over	26.36	52.71
11 – 33 kV	29.44	58.88
Below 11 kV	33.22	66.45

There is no energy charge

- 2) For the month that customer uses electricity :
 - 2.1 The actual demand is less than or equal to the contracted demand stipulated in the standby power purchase agreement. The actual demand is charged at normal demand rate of the time-of-use tariff and the demand up to contracted demand at standby rate in the table above. Energy is charged at normal energy rate of the time-of-use tariff.
 - 2.2 The actual demand is more than the contracted demand stipulated in the standby power purchase agreement. The actual demand, which is equal to contracted demand, is charged at normal demand rate of the time-of-use tariff and demand, which exceeds contracted demand, is charged at twice of normal demand rate of the time-of-use tariff. Energy is charged at normal energy rate of the time-of-use tariff.

Notification:

1. An annual load factor should not exceed more than 15%, if the annual load factor exceeds 15%, EGAT will terminate the standby tariff in the standby power purchase agreement and charge to normal energy rate of the time-of-use rate in the following month.

2. The annual load factor is calculated as follows:

$$\text{Annual Load Factor} = \frac{\text{Yearly energy consumption} \times 100}{\text{Annual maximum demand} \times \text{Total hours in 1 year}}$$

3. The customer who wants to use the standby tariff must contact EGAT to sign a standby power purchase agreement. EGAT will consider the amount of standby power to provide the appropriate quantity requested by the customer.

4. For the month that customer uses electricity, the customer will be charged at time-of-use- rate instead of time-of-day rate. The actual demand to be charged is the maximum demand in peak period rather than the whole-day period.

5. If the actual maximum demand on peak period of each month exceeds the demand stipulated in the standby power purchase agreement by 6 times, EGAT will amend the contracted demand to actual maximum demand instead of the stipulated demand in the following month.

6. After amending the contracted demand, if the actual maximum demand on peak period of each month is lower than the amended demand, the customer may reduce contracted demand to the average of the maximum demand of the following 6 month. If the customer does not use standby power for 6 months, the amended demand will be the former contracted demand standby power purchase agreement in the following month.

7. The maximum charge should not be less than 70% of the total amount of maximum demand charge for the last 12-month period ending with the current month. According to the cabinet resolution on February 16, 2000, the minimum charge is 0 until September 2002. And there is no charge for standby power for the month that customer does not use electricity until September 2002.

8. A power factor charge of Baht 14.02 will be made on each kilo voltage-ampere reactive (kVAr) in excess of kVAr equivalent to power factor 0.85 and customer must pay monthly service charge of Baht 228.17.

9. All tariffs need to add the Value Added Tax.

National Energy Policy Review – Thailand

Table 2.8: Format A - Thailand Survey Report on Retail Price System of Oil Product and LPG

(Date of Survey: 5 June 2003, Period Covered: June 2003)

		Unleaded Gasoline		Automotive Diesel Oil	Kerosene	LPG (Baht / kg)			Heavy Fuel Oil		
		Pump Price	Pump Price	Pump Price	Delivery Price	Cooking	Industry	Car	Delivery Price	Delivery Price	Delivery Price
Premises	1. Type of Price Price (Baht)	Pump Price 15.09	Pump Price 14.09	Pump Price 12.79	Delivery Price 15.85	Delivery Price 14.81	Delivery Price 14.81	Pump Price 14.81	Delivery Price 10.48	Delivery Price 9.88	Delivery Price 9.37
	2. Leaded or Unleaded Octane Number / Sulfur Content WT. %	Unleaded Octane 95	Unleaded Octane 91	- 0.25%	-	-	-	-	Vic 600 2%	Vic 1500 2%	Vic 2500 2%
	3. Self – nb bService or Full Services Station	Full Service Station	Full Service Station	Full Service Station	Full Service	Full Service	Full Service	Full Service Station	Full Service To Factory	Full Service To Factory	Full Service To Factory
Price Structure	1. Ex-Refinery	8.4941	8.0566	7.9891	7.6883	9.4903	9.4903	9.4903	6.9650	6.7324	6.4589
	2. Excise Tax (Including Municipal Tax)	4.0535	4.0535	2.5355	3.3605	2.3870	2.3870	2.3870	0.4576	0.4376	0.4002
	3. Oil Fund	0.5000	0.3000	0.5000	0.1000	-1.2895	-1.2895	-1.2895	0.0600	0.0600	0.0600
	4. Energy Conservation Fund	0.0400	0.0400	0.0400	0.0400	0.0000	0.0000	0.0000	0.0400	0.0400	0.0400
	5. Price included Tax & Fund	13.0876	12.4501	11.0646	11.1888	10.5878	10.5878	10.5878	7.5226	7.2700	6.9591
	6. Profit Margin	1.0152	0.7181	0.8887	3.6236	3.2533	3.2533	3.2533	2.2748	1.9610	1.7946
	7. VAT 7%	0.9872	0.9218	0.8367	1.0369	0.9689	0.9689	0.9689	0.6858	0.6462	0.6128
	8. Retail Price	15.30900	14.0900	12.7900	15.8493	14.8100	14.8100	14.8100	10.4832	9.8772	9.3664
Term of Business	1. Typical Terms of Payment	Cash & Card	Cash & Card	Cash & Card	Cash & Credit	Cash & Credit	Cash & Credit	Cash & Card	Cash & Credit	Cash & Credit	Cash & Credit
	2. Average Purchase Lot (Liter)	12000-18000	12000-18000	12000-18000	12000	8000-8500 kg	8000-8500 kg	N/A	8000-16000	8000-16000	8000-16000
	3. Type of Delivery in Drums or Lorry - loads	Both	Both	Both	Drums	Drums	Drums	Drums	Both	Both	Both
	4. Other Conditions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Remarks	1. Data Source	PTT	PTT	PTT	PTT	PTT	PTT	PTT	PTT	PTT	PTT
	2. Details of Tax										
	2.1 Name of Tax	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT	Excise Tax Municipal Tax VAT
	2.2 Rate and Amount of Tax	5.5807	5.3153	3.9122	4.5374	2.0664	2.0664	2.0664	1.2434	1.1838	1.1129

Source: EPPO (Energy Policy and Planning Office), PTTT (The Petroleum Institute of Thailand), MOC (The Ministry of Commerce)

Exchange Rate: 41.71 Baht per 1 US\$

2.4. The Energy Forecast up to year 2010

In 2002, the total generating capacity and power purchase of Thailand reached 108,389 GWh. This could be divided into the generation by EGAT's power plants (71.1%), purchase from IPPs and SPPs (26.1%) and import from the Lao PDR (2.8%). Power generation in 2005 is forecasted to be 132,782 GWh, or an average increasing rate of 6.3%. The share of EGAT generation is expected to decrease from 71.1% in 2000 to 46.2% in 2005 and 32.2% in 2010. On the contrary, IPP generation will significantly increase from 16.4% in 2000 to 50.6% in 2010. Similarly, power import from the Lao PDR will increase from 2.8% in 2000 to 9.8% in 2010. However, the share of power purchase from SPPs will slightly decrease from 9.8% in 2000 to 7.4% in 2010.

The new projections, prepared by the state electricity load-forecast body, now estimates Thailand's peak power demand rising by 1,104 megawatts a year between October 2002 and September 2006 from a previous projection of 1285 MW. From this data, the peak demand in 2006 is expected to be 21648 MW. In 2003, Thailand's peak demand was 17,452 MW with a reserve capacity of approximately 29% of total capacity. New capacity will be required in the next 5 years as the power demand is projected to increase by 1,200 – 1,500 MW per year from 2003 - 2012.

Table 2.9: Forecasted Power Generation by Type 2000 – 2010 in GWh.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EGAT	69,488	68,701	56,163	57,993	58,891	61,290	63,041	62,017	62,289	61,093	59,716
-Hydro	3,853	3,642	3,642	4,446	4,349	4,466	4,749	4,556	4,563	4,590	4,999
-Fuel Oil	12,935	6,158	5,611	2,937	2,642	3,068	4,273	3,713	2,505	2,135	1,951
-Lignite	16,115	14,931	15,413	17,784	16,708	16,950	18,460	17,052	17,414	16,057	17,165
-NG	36,501	43,916	31,439	32,694	35,169	36,783	35,536	36,673	37,784	38,288	35,578
-Diesel	63	29	33	109							
-Others	21	25	25	23	23	23	23	23	23	23	23
Purchased	28,271	34,984	54,273	59,880	66,078	71,492	78,851	89,973	100,798	113,116	125,714
-IPP	15,999	20,269	38,291	43,400	49,561	54,928	59,789	63,461	70,293	81,083	93,848
-NG	15,999	20,269	38,291	43,400	37,176	39,710	42,965	40,423	42,024	41,019	39,722
-Coal					12,385	15,218	16,824	23,038	24,900	24,822	24,822
-Other IPP									3,369	15,242	29,304
-SPP	9,571	12,025	13,292	13,619	13,724	13,724	15,978	13,724	13,724	13,724	13,724
-Imported	2,701	2,690	2,690	2,861	2,793	2,840	3,084	12,788	16,781	18,309	18,142
Grand Total	97,759	103,685	110,436	117,873	124,969	132,782	141,892	151,990	163,087	174,209	185,43

Source: NEPO

Among the fuel types used in power generation in 2002, natural gas remained the major fuel. The share of power generation by fuel type was as follows: natural gas 63.3%, lignite/coal 15.3%, fuel oil 2.4%, hydropower 6.8%, SPPs 11.5% and imported electricity 2.8%. It is forecasted that natural gas will remain the major fuel used in power generation in 2010. The share of power generation using lignite/coal as fuel will increase to 24.3% and that of power import from the Lao PDR will increase to 9.8%. Nonetheless, power generation using fuel oil as fuel will dramatically decrease from 2.4% in 2002 to only 1.1% in 2010. The share of hydropower generation will slightly decrease to 2.7% in 2010.

Table 2.10: Forecasted Power Generation by Fuel Type 1980, 1999, 2000, 2005 and 2010 in %.

Fuel Type	1980	1999	2000	2005	2010
Hydro	8.38	3.70	3.90	3.40	2.70
Natural Gas	0.00	59.00	60.30	65.60	62.20
Oil	77.30	17.20	13.30	2.30	1.10
Coal and Lignite	9.28	17.70	19.60	26.50	24.30
Import	5.04	2.40	2.80	2.20	9.80

Summary analysis and forecast of energy demand and supply in Thailand from 1995 to 2025.
www.nepo.go.th/encon/strategy/encon-EnergyStrategy-E.doc Units:%

2.5. Key Players in the Cogeneration Market

The latest installed cogeneration capacity of the SPPs' in August 2003 was 3768 MW and from this, a total of 2099 MW was sold to the national grid. Cogeneration is making a visible contribution in Thailand's energy needs. Most of the cogeneration facilities are the SPPs in Thailand, as with the energy policy guidelines of promoting renewable energy through cogeneration. In the context of Thailand Energy policies, the Small Power producer (SPP) is a power producer that produces electricity using the cogeneration (thermal and electricity) system or using renewable energy fuels/sources such as waste or residues from agriculture activities, urban waste, biogas, solar energy, as fuel which will contribute to more efficient use of domestic energy resources. To date, the EGAT has plans to purchase a total power of 2500 MW from the SPPs. Private standalone cogeneration installations have been erected for serving the own energy consumption purposes especially in the palm oil and sugar processing industries. One example of cogeneration facility with absorption chillers is the Crown Seal Public Co Ltd at Thanyaburi, Bangkok with a capacity of 6 MWe and 1.6 tph of steam generation.

There are several large industrial parks in Thailand that are supported by one or more cogeneration facilities. A map of the location of Thailand's largest industrial parks is shown in Figure 2.2.

A list of the latest SPP installations in Thailand is attached as ANNEX 6, for further information.

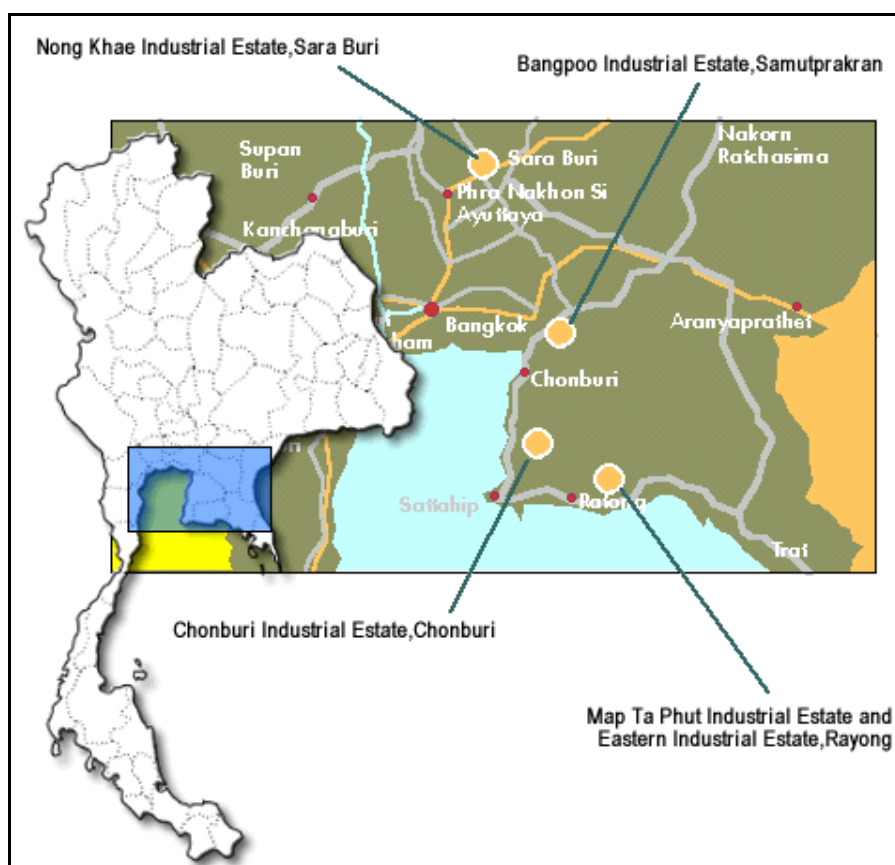


Figure 2.2: Thailand's Largest Industrial Parks

Source: Glow Group

The Glow SPP is the largest private electricity provider with a capacity of just under 1700 MW and provides 600 tonnes per hour of processed steam and 3,000 cubic metres per hour of clarified and demineralised water. There are 6 plants operated by the Glow group at 3 different locations in the Rayong region and Map Ta Phut Industrial Estates providing the electricity and steam requirements in the neighbouring industries.

Table 2.11: Breakdown of Installed Capacity at the Glow SPP.

Plant	Power (MW)	Steam (t/h)	Clarified Water (m ³ /h)	Demin. Water (m ³ /h)
Glow IPP	740	-	-	-
Glow SPP Phase 1 Central Utilities Plant	-	250	1,110	230
Glow SPP Phase 2 Central Utilities Cogeneration Plant	300	320	900	280
Glow SPP Phase 3 Hybrid Cogeneration Plant	514	200	-	150
Glow SPP 1	120	130	-	70
Glow Demin Water	-	-	-	80
Total Capacity	1,674	900	2,010	810

Source: 2002 Glow Group.

One of the larger facilities in Thailand designed specifically for cogeneration purposes is a 165 MWe combined cycle facility located in the Amata Nakhorn Industrial Estate, in Chonburi province, that supplies about one-third of its electrical output to adjacent industrial users, and also supplies the adjacent industries with a cumulative 30 tons per hour of steam. The Amata Nakhorn power plant is owned by a joint venture of two Thai energy companies, Amata Power and Electricity Generating Public Company (EGCO).

A similar situation exists at the Map Ta Phut Industrial Estate in Rayong province in eastern Thailand, where a cogeneration facility owned by H-Power (a joint venture of Belgium's Tractebel and Thailand's Hemaraj Land Development Co.) is supplying steam and of the electrical output to adjacent industrial users. Other players in the cogeneration subsector include Unocal, which owns minority stakes in the Amata Power (Bangpakong) and Amata Power (Rayong) cogeneration companies, and Ogden Energy, which has a minority stake in Rojana Power Company.

3. Energy Sector Legislation Framework

The primary agency of the Thai government that handles energy matters is the Energy Policy and Planning Office (EPPO) and the Department of Alternative Energy Development and Efficiency (DEDE) under the umbrella of Ministry of Energy. The Thai Government's energy policy is aimed at conserving and developing energy resources as well as promoting the efficient use of energy, while still protecting the environment.

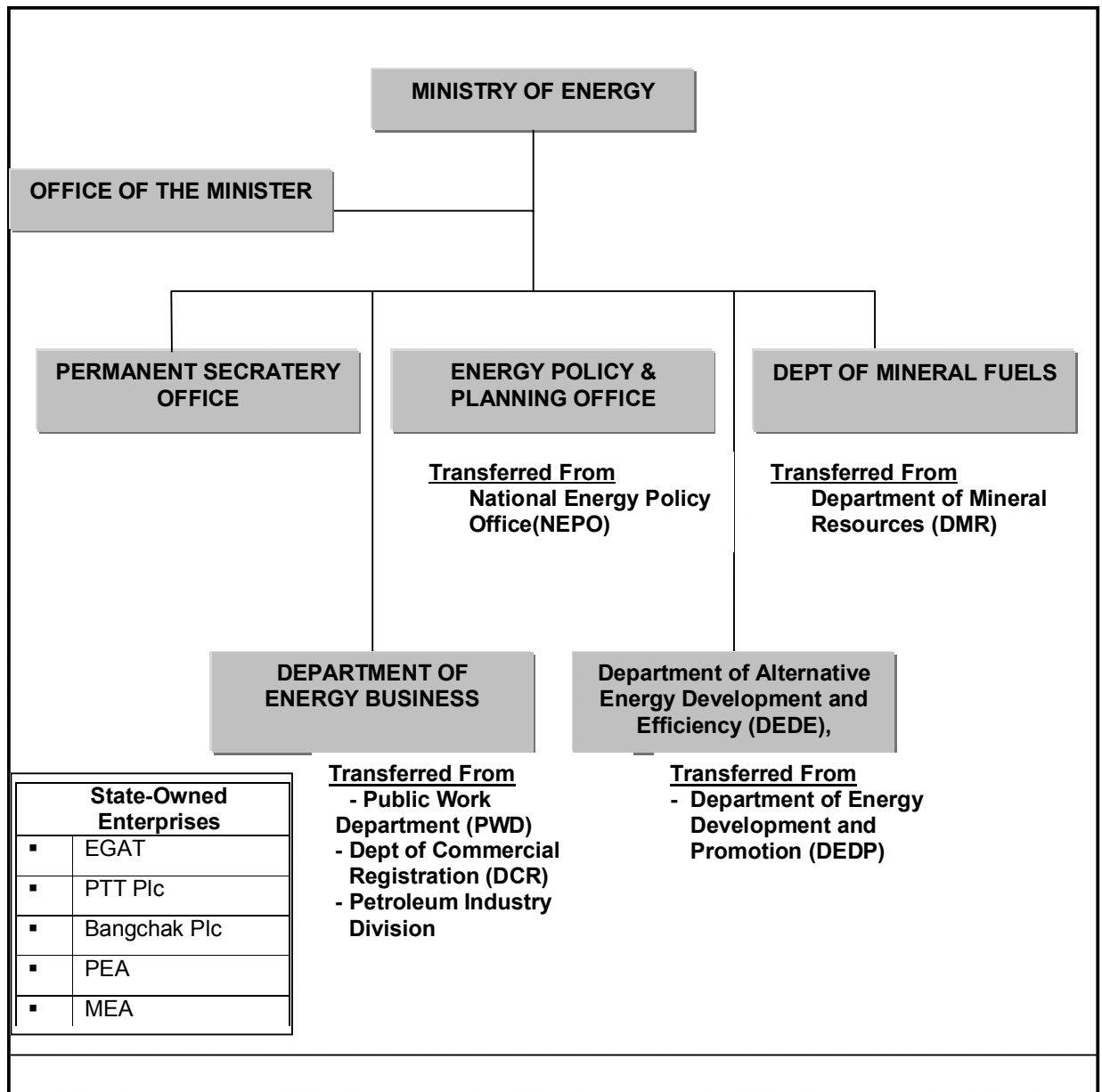


Figure 3.1: Structure of Thailand Ministry of Energy

Table 3.1: Policy making Institutions responsible for Energy related activities in Thailand:

THE ENERGY SECTOR			
The Policy Maker		The economic and technical regulatory functions related activities.	
Institution	Area of Jurisdiction	Institution	Area of Jurisdiction
Energy Policy and Planning Office(EPPO)	<ul style="list-style-type: none"> - To propose policies and plans, to develop energy sector of Thailand. - To determine energy conservation strategies and boundary of budget management for estimating energy conservation projects. - To determine strategies to improve and structure policies during lack of fuel oil circumstances. - Also formulate related policies as per energy laws laid by Thai ministry of energy 	Department of Alternative Energy Development and Efficiency (DEDP)	<ul style="list-style-type: none"> To research, develop and promote renewable and alternative energy. - To promote the energy conservation. - To determine rule, standard and distribution of technologies of production, transformation, utilisation and energy conservation. - To inspect and estimate results of development and energy conservation promotion. - To operate the other related functions which follow by laws of energy policies.
THE ENVIRONMENT SECTOR			
The Policy Maker		The economic and technical regulatory functions related activities.	
Institution	Area of Jurisdiction	Institution	Area of Jurisdiction
Office of Environmental Policy and Planning (OEPP)	<ul style="list-style-type: none"> To formulate as well as to monitor conservation of National Environmental Quality in accordance with the sectoral policies of the country. - To coordinate the natural resource management in accordance with the Policy and Prospective Plan for Enhancement and Conservation of the National Environmental Quality, the National Economic and Social Development Plan, and the Environmental Quality Management Plan. - To propose policies, guidelines, and coordinate the environmental fund administration and management, as well as mobilise the fund for Environmental Fund in accordance with the enhancement and Conservation of National Environmental Quality Act. 	The pollution control department.	<ul style="list-style-type: none"> To support the formulation of national policy and plans of Environmental quality conservation and promotion in respect to pollution control, - To formulate environmental quality management plans which include measures to control, prevent and solve environmental problems caused by pollution, - To perform any activities specified in the Enhancement and Conservation of National Environment Quality Act B.E. 2535 (1992) concerning pollution control, - To take actions on public complaints related to pollution.

THE INDUSTRY SECTOR			
The Policy Maker		The economic and technical regulatory functions related activities.	
Institution	Area of Jurisdiction	Institution	Area of Jurisdiction
Office of Industrial Economics (OIE)	Responsible for proposing the MOI's policies and strategies in accordance to the National Economic and Social Development Plans, the Government and the ministry's policies. - Responsible for internal collaborated plans/policies and budget setting, following up and monitoring MOI 's plans/projects implementations, conducting written reports an fundamental industrial groups and take them to consideration of plans/policies setting.	Department of Industrials Works (DIW)	Responsible for controlling, checking and development of industrial works according to the Factory Acts (B.E.2535), Dangerous Substance Acts (B.E.2535), Registration of Machinery Acts (B.E.2514), Gas Prevention Acts (B.E.2533), and other laws related to industry. <ul style="list-style-type: none"> • Factory Acts B.E.2535 • Dangerous Substance Acts B.E.2535 • Registration of Machinery Acts B.E.2514 • Registration of Machinery Acts (2nd Volume) B.E.2530 • Gaseous Prevention Acts B.E.2533 • Notification of Ministry of Industry: Ref 6/2540 • Notification of Ministry of Industry : ReF Measure of Supportin the Industrial Coal • Notification of ministry of Industry: Ref.Policy of Industrial Community.

3.1. Liberalisation of the Electricity and Gas Market

Energy Policy and Planning Office (EPPO) has advocated electricity power reform in Thailand with a power pool arrangement. The Government has plans to corporatise and list the 3 power utilities on the stock market as follow:

Table 3.2: Electricity power reform and privatisation plans:

Name	Privatisation Plan
• PTT Plc.	Q4 2001 (completed)
• EGAT	Q2 – 3 2004
• MEA	Q3 – 4 2004
• PEA	Q4 2004

Source : Power Gas Asia 2003 conference

The electricity supply industry (ESI) is a major public utility of the country. Until the IPP and SPP introduction in the 90s these three state-owned enterprises, were the only operators of the industry.

- Electricity Generating Authority of Thailand (EGAT) – the power producer and supplier, selling electricity via high-voltage transmission lines to the Metropolitan Electricity Authority and the Provincial Electricity
- Metropolitan Electricity Authority (MEA) – the power distributor for consumers in Bangkok, Nonthaburi and Samut Prakarn provinces.
- Provincial Electricity Authority (PEA) – the power distributor for consumers in the remaining areas of the country.

The Electricity Generating Authority of Thailand (EGAT), has opposed the power pool concept and drafted a new model which would instead let power users purchase bulk power directly from generators. Full deregulation in the electric power sector is not expected until the end of 2004 or early 2005.

3.2. Legislation and Programs Promoting Cogeneration

In 1992, the Thai Government enacted the Small Power Producers (SPP) scheme as a means of promoting the generation of electricity by use of non-conventional energy. The SPP scheme was announced at the same time as the Independent Power Producers scheme. Both schemes signalled a move towards private sector participation in the electricity sector in Thailand. Prior to 1992 EGAT was solely responsible for both the generation and distribution of all Thailand's electricity. EGAT purchases the generated electricity under the two schemes. Under this program SPP with power plant capacities of 90 MW or less were entitled to sell their electricity to EGAT, provided that the electricity was generated by Renewable Energy or by cogeneration.

In August 2003, 60 PPAs (Power Purchase Agreement) have been entered by EGAT supplying 2099 MW to the National grid⁴. 1618 MW of electricity was produced from the cogeneration systems using fossil fuels and was supplied to the National grid. Following the economic crises in 1997, many of the SPP program was modified to accommodate the non-profit making SPPs due to fluctuating exchange rates and also the fact that the economy slowed down. A cabinet resolution in November 1997 modified the SPP program to relax certain criteria which was mandatory for cogeneration systems. By year 2001, only 176MW of electricity was being generated from renewable energy resources under this SPP program. To promote RE as fuel and to attract private investors, NEPO issued a Request for Proposals inviting potential investors and SPPs, using biomass as fuel for a subsidy on energy payment. There has been a second call for proposals within the same guidelines of SPP program. Till date, no amendments have been made to the SPP program mandate of 2001.

3.3. Legislation and Programs Promoting Energy Efficiency

Another step to promote energy efficiency in Thailand has been seen in the form of promulgating the "energy conservation promotion act". His Majesty the king by and with the advice and consent of the National Assembly in the capacity of Parliament graciously enacted the "Energy Conservation Promotion Act, B.E. 2535" The Energy Conservation Promotion (ECP) comprises of three programs, namely the compulsory, Complimentary and Voluntary programs. The three programs under this programme can be understood as below:

1. The compulsory program is aimed at energy conservation activities for the designated buildings, factories and government buildings with the goal to achieve more significant levels of energy savings.

⁴ See annex 5 for details

2. The Complementary program is expected to address the activities concerning public relations, human resource development, and administration of the Act as well as monitoring the implementation of the certain funds allocated for program activities.
3. All activities concerning new and renewable energy for rural and small industry, research and development and demonstration of technologies and energy conservation business facilitation for private sectors form the voluntary program. The DEDP supervises the complimentary program while EPPO is responsible for the other two programs.

3.4. Programs Initiated To Promote The Use Of Renewable Energy (RE)

▪ *Solar energy*

Solar energy is expected to replace 24 ktoe of electricity per year by 2006 and increase to 72 ktoe per year by 2011. Main strategies include:

1. Increase installation of PV in remote villages not yet electrified, as well as rooftop PV grid connections.
2. Increase energy security of power supply in Mae Hong sorn Province by building 4.25 MW PV power plant.
3. Increase dissemination of solar water heater, solar drying machines and solar herbicide extracting system, totalling 150,000 systems
4. Increase R & D to make use of solar energy for electricity and heat

▪ *Wind energy*

Wind energy is expected to replace 0.87 ktoe of electricity per year by 2006 and increase to 2.64 ktoe per year 2011, with the plan to disseminate wind mapping to attract potential investors.

▪ *Biogas*

Biogas is expected to replace 37.89 ktoe of electricity per year by 2006 and increase to 125 ktoe per year by 2011 by promoting cooperation between government and private sector to install biogas system in pig farms nationwide to cover 4.9 million pigs and factories such as tapioca and palm oil factories; slaughterhouses; as well as, to increase biogas production from landfills.

▪ *Biomass*

Biomass is expected to replace 6,643 ktoe of electricity per year by 2006 or equivalent to 1,030 MW and increase to 11,863 ktoe per year or equivalent to 1,459 MW by 2001, with the following main strategies:

- Increase power generation and sale of power generated from biomass
- Increasing the buy back rate of electricity from biomass to be competitive with power from fossil fuel. With the targets of increase sale of power generated from biomass to the grid of 800 MW and implementing biomass cogeneration in factories amounting to 900 MW by 2011.
- Increase the use of efficient cooking stoves up to 3 million stoves which is expected to reduce 3% of fuel wood used in households per year
- Increase the efficiency of charcoal making technology by 50%
- Development fast growing plantations for fuel covering 30 rais of wasteland

▪ *Ethanol and Bio diesel*

Strategies include efforts to develop ethanol and biodiesel technology and increase planting area for oil palms and tapioca by 1.3 times, increase the conversion of used cooking oil to engine fuel which is expected to produce 3,679 ktoe/year of ethanol and biodiesel by the year 2011 or

equivalent to 10% reduction of gasoline use (777 million litres/year of gasoline) and 20% reduction of diesel use (3,596 million litres/year).

▪ *Utilisation of agricultural residues as fuel*

Thailand, being an agricultural country, has a vast potential of agro-industrial residues and wastes such as rice husk, sawdust, corncobs, coconut shells and outer covering, leaves, bagasse or weeds, which are left decaying in the fields as fertiliser or awaiting burning. The ENCON Fund has provided financial assistance for an R&D project on the utilisation of agricultural residues or wastes to generate energy as alternative fuel, called “the Green Fuel Briquette,” instead of using charcoal, firewood, LPG or electricity.

3.5. Legislation and Programs Promoting Biomass

In 2002, biomass's share formed 18% of the total primary energy consumed. Forty five percent of biomass was utilised by industries while fifty five percent was utilised for household cooking purposes. During the period 2003 – 2008, various pilot and demonstration plans to generate power from biomass are expected to be implemented. These plans consist the following:

1. Promotion to generate power from biomass and synchronise into the system for SPP of EGAT by producing about 300 MW to reduce the energy consumption by 157 ktoe/year.
2. Promotion to demonstrate best public practice to generate power for the medium scale biomass projects using rice husks, cassava root, waste wood etc. These demonstrations are aimed to build and educate public in general about environmentally friendly technologies and their corresponding benefits which could lead to a reduction in the electric consumption upto 37.5 MW consequently reduce the energy consumption by 230 million units and oil consumption upto 26.25 million litre/year equivalent to 25 ktoe/yr.
3. Setting up of Information Service Centre for promoting the power generation by biomass (supported by GEF 6.8 mil. US \$)
4. Creating awareness of using biomass as fuel.

3.6. Legislation and Programs Promoting Natural Gas

The government of Thailand has introduced a new national energy policy to encourage consumers to use natural gas. In January 1999, the cabinet approved a proposal to promote the use of natural gas over other fuels for power generation. This put pressure on IPPs planning coal or oil-fired power plants to switch their designs to accommodate natural gas. EGAT plans to convert at least three of its existing power plants to gas. PTT also has plans for an extensive gas distribution network around Bangkok to provide fuel for power plants and large industrial consumers.

The increase in natural gas demand and the subsequent reduction of its productions from contracting sources has led the Thai government to promote the exploration and provision of new gas sources as follows:

1. To negotiate with natural gas commercial sector from both in Thailand and foreign country resources, because they would like to balance the demand and supply in Thailand.
2. To promote development of natural gas between Thailand and Malaysia.
3. To promote the sources of natural gas from Arthit and Budsabong area.
4. To optimise the efficiency of natural gas utilisation, Thai government will construct two distillation gas factories between 2006 and 2011 to support the demand of liquid natural gas (LNG) and raw materials in Petrochemical industries.
5. To promote the role of PTT (Exploration) to be a mechanism of government in developing petroleum sources, especially at the level of international co-operations.
6. To promote Thai energy companies to establish joint exploration ventures.

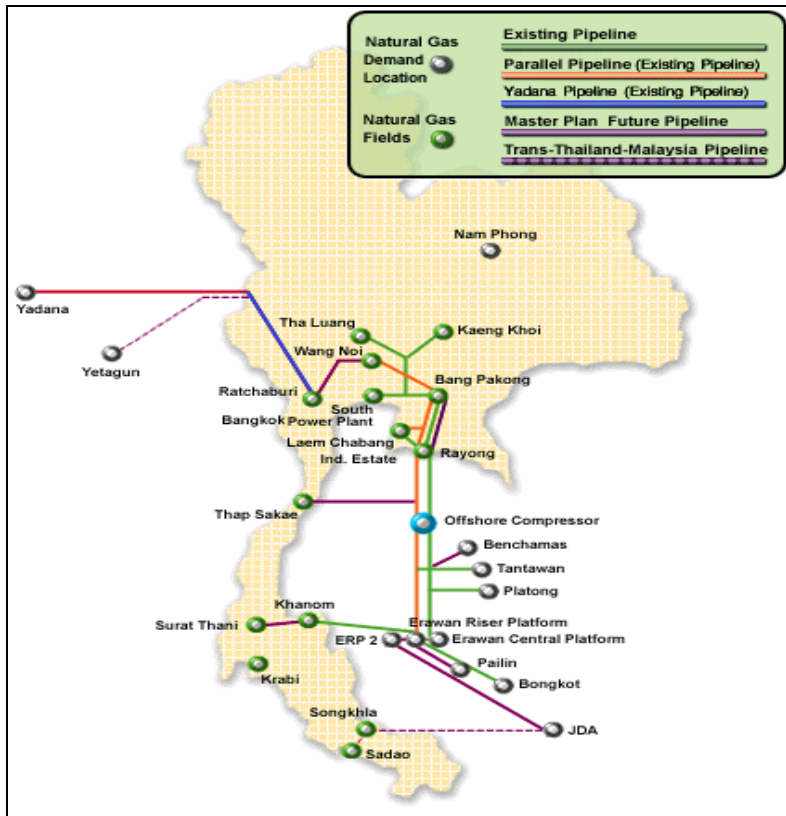


Figure 3.2: Natural Gas Pipeline in Thailand:

3.7. Legislation and Programs Promoting Coal

For coal and lignite source, Thai government will accelerate development of lignite sources as follows:

1. To promote exploration of coal and lignite at locations for possible future use by improving and amending rules and regulations which have actually hindered such activities.
2. Also arrangement for providing support to private sector to develop the coal mines initially explored by the Department of Mineral resources.
3. To use modern plant technology for coal-fired plants to reduce environmental impacts due to emissions from such plants.
4. To reserve some sources of lignite for generating electricity by EGAT. Examples of the sources are Vienghang and Sabayoi.



Figure 3.3: Coal Production Areas in Thailand

3.8. Other Legislations:

In order to promote power from Renewable Energy, the cabinet approved on 14 May 2002 to purchase power from very small power producers (VSPP) using Renewable Energy(RE) less than 1 MW. Now there are 15 such power producers. Energy Industry Act was approved by cabinet in October 2000. The act has created an independent regulatory body, the National Energy Regulatory Commission (NERC) to regulate electricity and natural gas supply industries. A Power Consumer Assistant Fund (PCAF) to subsidise low-income and rural power users was also set up in accordance with this law.

4. Conclusions

Energy has become of such importance to Thailand, that the Ministry of Energy was formed in 2002. This new Ministry will oversee planning & policy, energy regulation, and energy development & promotion in Thailand.

The primary agency of the Thai government that handles energy matters is the Department of Alternative Energy Development and Efficiency (DEDE) in the Ministry of Energy. The Thai Government's energy policy is aimed at conserving and developing energy resources as well as promoting the efficient use of energy, while still protecting the environment. In particular, Thailand hopes to reduce dependency on energy resources from foreign countries. There are three main policies that make up Thailand's Energy Strategy:

- Promote the combined use of energy by further developing the use and exploitation of Thailand's natural gas as the country's major source of energy.
- Promote the development and use of alternative and renewable energy sources.
- Emphasise energy management and conservation to increase the competitiveness of Thailand's industries and stabilise energy prices through appropriate monetary, fiscal and managerial measures.

Despite the Thai government's aim of reducing its dependency on foreign energy sources, in January 1999 a plan was approved to encourage the use of natural gas in the electric power sector, which would require, at least in near term, the import of major quantities of natural gas.

Energy Policy and Planning Office (EPPO) has advocated electric power reform in Thailand with a power pool arrangement. The state-owned electricity company, the Electricity Generating Authority of Thailand (EGAT), has opposed the power pool concept and drafted a new model which would instead let power users purchase bulk power directly from generators. Full deregulation in the electric power sector is not expected until at least the end of 2004 or early 2005.

In 1992, the Thai Government enacted the Small Power Producers (SPP) Program, which intended to increase the utilisation of renewable energy in Thailand. Under this program, small power producers with power plant capacities of 90 MWe or less are entitled to sell their electricity to EGAT, provided that the electricity is generated by one of the following ways:

- (1) Hydroelectric, wind, and mini-hydroelectric power generation
- (2) Biomass power generation
- (3) Thermal power generation and co-generation (Combined supply of heat and electricity) using any types of fuel

The SPP program in 1992 targeted 300 MW. In 1995 the Cumulative Maximum Capacity was adjusted to 1444 MW and later in 1996 to 3,200 MW.

In 1999 the Energy Conservation Promotion Fund Committee (ENCON Fund Committee) authorized the National Energy Policy Office (NEPO) to manage a new amount of 2,060 million Baht to subsidize SPPs using renewable energy. In Jul 2001 NEPO announced the Request for Proposal. The funding would be given by Bidding Procedure, which requested amount of funding not exceeding 0.36 Baht/kWh for the total period of 5 years. In 2002 31 selected proposals totalling 511.1 MW was approved and additional 15 SPPs totalling 214.1 MW was approved in 2003.

The total installed SPP capacity in August 2003 was 2200 MW.

5. Links and Sources of Information

1. Quarterly Reports of COGEN 3 Country Co-ordinator
2. Website of the Ministry of Energy of Thailand http://www.energy.go.th/index_right-E.html
3. Department of Alternative Energy Development and Efficiency <http://www.dede.go.th/dede/>
4. Energy Policy and Planning Office <http://www.eppo.go.th/>
5. PTT Public Company Limited <http://www.pttplc.com/DesktopServlet>
6. Electricity Generating Authority of Thailand <http://www.egat.co.th/>

ANNEXES

Annex 1. Currency Exchange Rates (per Euro) during January – June 2003

ASEAN Currencies and United States Dollar compared to Euro

Countries	Jan 2003	Feb 2003	Mar 2003	Apr 2003	May 2003	Jun 2003
United State (USD)	1.0422	1.0748	1.0822	1.0730	1.0950	1.1756
Cambodian (KHR)	3,938.58	4,280.00	4,241.00	4,215.00	4,348.00	4,703.00
Indonesia (IDR)	9,228.68	9,554.97	9,611.03	9,573.28	9611.93	9,694.05
Malaysia (MYR)	3.8701	4.0719	4.0913	4.0328	4.1259	4.4530
Philippines (PHP)	55.4900	57.9334	58.7493	58.049	56.8981	61.2348
Singapore (SGD)	1.8093	1.8704	1.8744	1.9011	1.9487	2.0401
Thailand (THB)	44.0900	45.7655	46.2144	45.4744	46.4130	49.0650
Vietnam (VND)	15,729.60	16,579.90	16,699.40	16,353.30	16,957.90	18,019.80

Source: The European Commission

Annex 2. Domestic Production of Primary Energy ^{1/ 2/}

Unit: ktoe (the figures below show the percentage)

Type	1997	1998	1999	2000	2001
Commercial Energy	25,902	26,124	27,056	29,280	29,518
	100.0	100.0	100.0	100.0	100.0
Anthracite	0	0	0	0	0
	0.0	0.0	0.0	0.0	0.0
Lignite	6,868	6,075	5,699	5,148	5,645
	26.5	23.2	21.1	17.6	19.1
Crude Oil	1,374	1,512	1,694	2,896	3,091
	5.3	5.8	6.3	9.9	10.5
Condensate	2,035	2,106	2,225	2,379	2,350
	7.8	8.1	8.2	8.1	8.0
Natural Gas	14,029	15,284	16,655	17,522	17,035
	54.2	58.5	61.5	59.8	57.7
Hydro And Others ^{3/}	1,596	1,147	783	1,335	1,397
	6.2	4.4	2.9	4.6	4.7
Renewable Energy	12,858	12,282	12,735	13,188	12,025
	100.0	100.0	100.0	100.0	100.0
Fuel Wood	9,486	9,439	9,508	9,629	9,647
	73.8	76.9	74.6	73.0	74.1
Paddy Husk	970	1,048	1,027	1,142	1,212
	7.5	8.5	8.1	8.7	9.3
Bagasse	2,402	1,795	2,200	2,417	2,166
	18.7	14.6	17.3	18.3	16.6
Total	38,760	38,406	39,791	42,468	42,543
Total (%)	100.0	100.0	100.0	100.0	100.0
Commercial Energy	66.8	68.0	68.0	68.9	69.4
Renewable Energy	33.2	32.0	32.0	31.1	30.6

Notes : 1/ Data shown as "0" means figure is less than 0.5

2/ Revised by DEDP during 1997 – 2002.

3/ Others include geothermal, solar cell, and wind power.

Annex 3. Imports of Energy by Type ^{1/}

Unit: ktoe (the figures below show the percentage)

Type	1997	1998	1999	2000	2001
COMMERCIAL ENERGY	41,240	36,364	38,956	39,717	44,981
	100.0	100.0	100.0	100.0	100.0
ANTHRACITE	6	17	83	123	175
	0.0	0.0	0.2	0.3	0.4
BITUMINOUS	1,914	847	1,387	1,494	1,745
	4.6	2.3	3.6	3.8	3.9
COKE	54	52	54	53	37
	0.1	0.1	0.1	0.1	0.1
BRIQUETTES & OTHER COAL	79	102	505	961	1,154
	0.2	0.3	1.3	2.4	2.5
CRUDE OIL	36,419	33,924	34,860	33,748	35,592
	88.3	93.3	89.5	85.0	12.6
NATURAL GAS	0	19	26	1,918	5,644
	0.0	0.1	0.1	4.8	12.5
PETROLEUM PRODUCTS	2,704	1,265	1,849	1,167	388
	6.6	3.5	4.7	2.9	0.9
ELECTRICITY	64	138	192	253	246
	0.2	0.4	0.5	0.6	0.5
RENEWABLE ENERGY	10	5	9	14	8
	100.0	100.0	100.0	100.0	100.0
FUEL WOOD	0	0	0	0	1
	0.0	0.0	0.0	0.0	12.5
CHARCOAL	10	5	9	14	7
	100.0	100.0	100.0	100.0	87.5
TOTAL	41,250	36,369	38,965	39,731	44,989
TOTAL (%)	100.0	100.0	100.0	100.0	100.0
COMMERCIAL ENERGY	100.0	100.0	100.0	100.0	100.0
RENEWABLE ENERGY	0.0	0.0	0.0	0.0	0.0

Notes : 1/ Data shown as "0" means figure is less than 0.5

Annex 4. Exports of Energy by Type ^{1/}

Unit: ktoe (the figures below show the percentage)

Type	1997	1998	1999	2000	2001
COMMERCIAL ENERGY	5,969 100.0	5,309 100.0	6,172 100.0	6,905 100.0	7,488 100.0
CRUDE OIL	169 2.8	206 3.9	364 5.9	1,505 21.8	1,826 24.4
CONDENSATE	1,068 17.9	819 15.4	569 9.2	395 5.7	- -
NATURAL GASOLINE	117 2.0	132 2.5	152 2.5	114 1.7	81 1.1
PETROLEUM PRODUCTS	4,606 77.2	4,139 78.0	5,072 82.2	4,874 70.6	5,558 74.2
ELECTRICITY	9 0.1	13 0.2	15 0.2	17 0.2	23 0.3
RENEWABLE ENERGY	3 100.0	4 100.0	21 100.0	1 100.0	2 100.0
CHARCOAL	3 100.0	4 100.0	21 100.0	1 100.0	2 87.5
TOTAL	5,972	5,313	6,193	6,906	7,490
TOTAL (%)	100.0	100.0	100.0	100.0	100.0
COMMERCIAL ENERGY	99.9	99.9	99.7	100.0	100.0
RENEWABLE ENERGY	0.1	0.1	0.3	0.0	0.0

Notes : 1/ Revised by DEDP during 1997 – 2000.

Annex 5. Independent Power Producers & Small Power Producers (IPP/SPP)

No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
IPP									
Phase I									
1	Independent Power (Thailand) Co., Ltd (IPT)	<input type="checkbox"/> Thai oil Co., Ltd. <input type="checkbox"/> Unocal <input type="checkbox"/> Westinghouse Electric Co., Ltd.	Combined Cycle	Cogeneration Power Plant	Gas	700	700	N/A	In operation
2	Tri Energy Co., Ltd. (TECO)	<input type="checkbox"/> Banpu Power PLC. <input type="checkbox"/> Texaco (Thailand) Energy Company I <input type="checkbox"/> Edison Mission Energy (EME)	Combined Cycle	Cogeneration Power Plant	Gas		700	N/A	In operation
3	Eastern Power & Electric Co., Ltd. (EPEC)	<input type="checkbox"/> GMS Power PLC. <input type="checkbox"/> GSEPEC (BV) LTD. <input type="checkbox"/> Marubeni Corporation <input type="checkbox"/> TOTAL <input type="checkbox"/> China Development Industrial Bank	Combined Cycle	Cogeneration Power Plant	Gas	350	350	N/A	-
Phase II									
4	Union Power Development Co., Ltd. (UPDC)	<input type="checkbox"/> Tomen Power Singapore Pte.Ltd. (TPS) <input type="checkbox"/> Hongkong Electric International Power (Maruritus) Limited (HEIM) <input type="checkbox"/> Union Electric Co., Ltd. <input type="checkbox"/> Chabu Electric Power Co., International B.V. (Chabu) <input type="checkbox"/> Toyota Tsusho Corporation (TTC)	Combined Cycle	Cogeneration Power Plant	Gas	1400	1400 (2 x 700)	N/A	-

Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP) (continued)

No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
5	Bo Win Power Co., Ltd. (BOWIN)	<input type="checkbox"/> H-Power <input type="checkbox"/> Hemaraj Lanf & Development PLC	Combined Cycle	Cogeneration Power Plant	Gas	713	713 (2 x 356.5)	N/A	In operation
6	BLCP Power Limited (BLCP)	<input type="checkbox"/> Banpu Voal Power Ltd. <input type="checkbox"/> CLP Powergen Southeast Asia Ltd.	Combined Cycle	Cogeneration Power Plant	Gas	1,346.5	1,346.5 (2 x 673.25)	N/A	-
7	Gulf Power Generation Co., Ltd. (GPG)	<input type="checkbox"/> Gulf Electric Ltd. <input type="checkbox"/> MEC International B.V.	Combined Cycle	Cogeneration Power Plant	Coal	734	734 (2 x 367)	N/A	-
IPP Total									
SPP									
Firm Contact									
1	The Cogeneration Public Co., Ltd. (1)	Tractebel, Others	Combined Cycle	Cogeneration	NG	150,000	90,000	21	In operation
2	The Cogeneration Public Co., Ltd.(1)	Tractebel, Others	Combined Cycle	Cogeneration	NG	150,000	90,000	21	In operation
3	TPI Utilities Co., Ltd.		Thermal Cycle	Cogeneration	Coal	55,000	10,000	21	In operation
4	National Petrochemical Co., Ltd.	NPC	Combined Cycle	Cogeneration	NG, Waste Gas	133,700	32,000	21	In operation
5	Industrial Power Co., Ltd.	Glow, Hemaraj Land and Tractebel	Combined Cycle	Cogeneration	NG	67,680	55,000	23	In operation
6	Thai Oil Power Co., Ltd.	Thai Oil, PTTEP	Combined Cycle	Cogeneration	NG	117,200	41,000	25	In operation
7	Defence Energy		Diesel	Cogeneration	Heavy oil	10,400	9,000	21	In operation
8	Gulf Cogeneration Co., Ltd.	Gulf Electric	Combined Cycle	Cogeneration	NG	111,000	90,000	21	In operation
9	Amata Egco Power Co., Ltd. (Chonburi)	Amata Power, EGCO	Combined Cycle	Cogeneration	NG	150,000	90,000	21	In operation

Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP) (continued)

No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
10	Industrial Power Co., Ltd.(2)	Glow, Hemaraj Land, Tractebel	Combined Cycle	Cogeneration	NG	66,345	55,000	23	In operation
11	Bangkok Cogeneration Co., Ltd.	Hua ku, Chatri Sophon, BIG, Air Products Investment B.V., Naisteel	Combined Cycle	Cogeneration	NG	107,000	90,000	21	In operation
12	National Power Supply (1)	Soon Hua Seng, CMS Corporation	Thermal	Cogeneration	Coal, Wood Chip	164,000	90,000	25	In operation
13	M.T.P.Cogeneration Co., Ltd. (1)	The Cogeneration Public Co., Ltd.	Gas Turbine	Cogeneration	NG	70,000	60,000	25	In operation
14	Saha Cogen (Chonburi) Co., Ltd.	Saha Patana Inter Holding, Ogden	Combined Cycle	Cogeneration	NG	120,000	90,000	25	In operation
15	Thai Power Supply Co., Ltd. (1)	Soon Hua Seng Group	Thermal	Renewable	Rice Husk, Wood Chip	47,400	25,000	25	In operation
16	MTP Cogeneration Co., Ltd.(2)	The Cogeneration Public Co., Ltd.	Gas Turbine	Cogeneration	NG	70,000	60,000	25	In operation
17	Thai Power Supply Co., Ltd. (2)	Soon Hua Seng Group	Thermal	Renewable	Rice Husk, Wood Chip	10,400	6,400	21	In operation
18	Rojana Power Co., Ltd.	Rojana Industrial Part, Energie Baden, Ogden Caymen, Sumikin Bussan	Combined Cycle	Cogeneration	NG	120,000	90,000	25	In operation
19	National Power Supply Co., Ltd. (2)	Soon Hua Seng CMS	Thermal	Cogeneration	Coal, Wood Chip	164,000	90,000	25	In operation
20	Samutprakarn Cogeneration Co., Ltd.	Tractebel	Combined Cycle	Cogeneration	NG	160,000	90,000	21	In operation

Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP) (continued)

No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
21	Thai Cogeneration Co., Ltd. (1)	The Cogeneration Co., Ltd.	Thermal	Cogeneration	Coal	160,000	90,000	25	In operation
22	Thai Cogeneration Co., Ltd.(2)	The Cogeneration Co., Ltd.	Thermal	Cogeneration	Coal	160,000	90,000	25	In operation
23	Thai National Power Co., Ltd.	Thai National Power Co., Ltd.	Combined Cycle	Cogeneration	NG	110,000	90,000	25	In operation
24	Nong khæe Cogeneration Co., Ltd.	Tracibel	Combined Cycle	Cogeneration	NG	159,500	90,000	21	In operation
25	Laem Chabang Power Co., Ltd.	Fortum Power Holding B.V.	Combined Cycle	Cogeneration	NG	103,582	60,000	21	In operation
26	Bio-mass Power Co., Ltd.		Thermal	Renewable	Rice Husk	6,000	5,000	25	In operation
27	Amata Power (Banpakong) Co., Ltd.	Amata Power, Unocal (Bang pakong)	Combined Cycle	Cogeneration	NG	150,000	90,000	21	In operation
28	T.L.P.Cogeneration Co., Ltd.	TLP Cogeneration, EGCO, EPDC	Combined Cycle	Cogeneration Power Plant	NG	103,000	60,000	21	-
29	Alpha Power Co., Ltd.	Alphatech Group	Combined Cycle	Cogeneration Power Plant	NG	210,000	70,000	21	-
30	Roi-ET Green Co., Ltd.	EGCO	Thermal	Renewable	Rice Husk	9,900	8,000	21	-
31	Siam Power Supply	HEI Thailand (Rayong), SSP Property, Mahachai Power, Mr.Somsak, Nippon Plant Management Private, Siriboon Holding, other	Combined Cycle	Cogeneration	NG	300,000	60,000	25	-
32	Paniaphol Pulp Industry Public Co., Ltd.		Cogeneration	Cogeneration	Coal	150,000	90,000	25	-

Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP) (continued)

No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
	Non-firm Contact								
1	Kaset Thai Sugar Co., Ltd.	Kaset Thai Sugar Co., Ltd.	Thermal	Cogeneration	Bagasse	52,500	8,000	Extendable Y/Y	In operation
2	United Farmer & Industry Co., Ltd.	United Farmer & Industry Co., Ltd.	Thermal	Cogeneration	Bagasse	24,000	6,000	Extendable Y/Y	In operation
3	Mitr Phol Sugar Co., Ltd.	Mitr Phol Sugar	Thermal	Cogeneration	Bagasse	24,000	6,000	Y/Y	In operation
4	Ratchaburi Sugar Co., Ltd.		Thermal	Cogeneration	Bagasse	17,500	1,500	5	In operation
5	Thai Petrochemical Industry Public Co., Ltd.		Thermal	Cogeneration	Heavy Oil, Waste gas, Coal	108,000	45,000	Extendable Y/Y	In operation
6	Korach Industry Co., Ltd.	Korat Industry	Thermal	Cogeneration	Bagasse	15,000	8,000	5	In operation
7	Thai Identity Sugar Factory Co., Ltd.	Thai Identity Sugar Factory	Thermal	Cogeneration	Bagasse	16,500	3,000	1	In operation
8	Thai Acrylic Fibre Co., Ltd.	Thai Acrylic Fibre	Thermal	Cogeneration	Lignite	17,200	6,000	5	In operation
9	Panijapol Pulp Industry Public Co., Ltd.	Panijapol Pulp Industry Public	Thermal	Cogeneration	Black Liquor, Coal	40,000	10,000	10	In operation
10	Ruampol Enterprice Co., Ltd.	Ruampol Enterprice Co., Ltd.	Thermal	Cogeneration	Bagasse	12,500	2,500	Y/Y	In operation
11	Ban Pong Sugar Co., Ltd.	Ban Pong Sugar	Thermal	Cogeneration	Bagasse	18,000	3,000	Extendable Y/Y	In operation
12	Mitr Phu Viang Sugar Co., Ltd.	Mitr Phu Viang	Thermal	Cogeneration	Bagasse	27,000	6,000	5	In operation
13	N.Y.Sugar Co., Ltd.	N.Y.Sugar	Thermal	Cogeneration	Bagasse	26,000	6,000	Extendable Y/Y	In operation
14	T.N.Sugar Industry Co., Ltd.	T.N.Sugar	Thermal	Cogeneration	Bagasse	12,000	6,000	Y/Y	In operation
15	Ratchasima Sugar Co., Ltd.		Thermal	Cogeneration	Bagasse	15,000	8,000	Y/Y	In operation
16	Thai Power Supply Co., Ltd.	Soon Hua Seng	Thermal	Cogeneration	Rice Husk, Wood chips	3,000	1,500	5	In operation

Annex 5. Independent Power Producers & Small Power Producers (IPP & SPP) (continued)

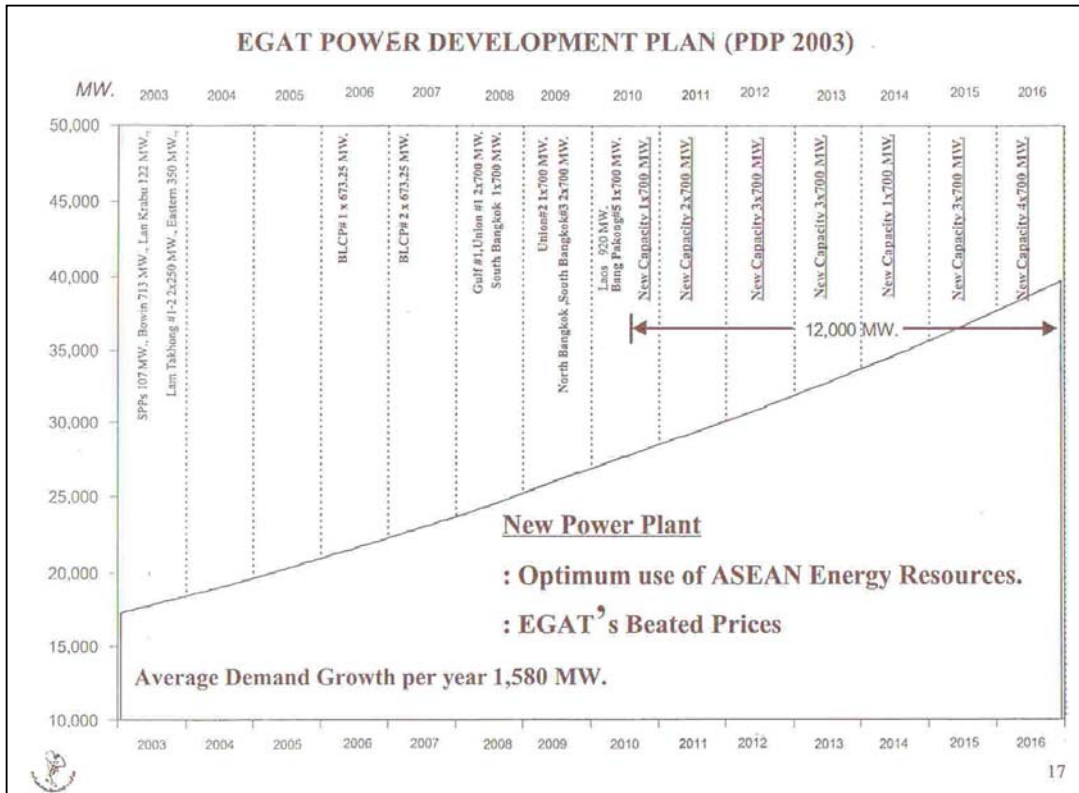
No	Power Plant Name	Owner	Type of Power Plant	Process	Type of Fuel	Installed Capacity (MW)	Contracted Capacity (MW)	Term of Contract (Year)	Status
17	Refine Chaimongkol Sugar Mill Co., Ltd.	Refined Chaimongkol Sugar	Thermal	Cogeneration	Bagasse	18,000	3,000	Extendable Y/Y	In operation
18	Mitr Kalasin Sugar Co., Ltd.	Mitr Kalasin Sugar	Thermal	Cogeneration	Bagasse	16,000	6,000	Extendable Y/Y	In operation
19	Advance Agro Public Co., Ltd.	Soon Hua Seng	Thermal	Cogeneration	Rice Husk, Bark, Wood chips	74,000	50,000	3	In operation
20	Eastern Sugar Co., Ltd.	Eastern Sugar	Thermal	Cogeneration	Bagasse	22,000	3,000	Extendable Y/Y	In operation
21	Kanchanaburi Sugar Industry Co., Ltd.	Eastern Sugar	Thermal	Cogeneration	Bagasse	20,000	1,500	Extendable Y/Y	In operation
22	Saraburi Sugar Co., Ltd.	Saraburi Sugar	Thermal	Cogeneration	Bagasse	29,500	2,200	Extendable Y/Y	In operation
23	T.R.T. Parawood Co., Ltd.	T.R.T. Parawood	Thermal	Cogeneration	Wood chips, Shaving, Sawdust	2,500	2,200	10	-
24	A.A.Pulp Mill 2 Co., Ltd.	Soon Hua Seng Group	Thermal	Cogeneration	Black Liquor	32,900	25,000	3	-
25	Buri Ram Sugar Co., Ltd.	Buri Ram Sugar	Thermal	Cogeneration	Bagasse	14,800	2,500	Extendable Y/Y	-
26	PRG Granary Co., Ltd.	PRG Agriculture Products	Thermal	Cogeneration	Paddy Husk	9,000	5,000	Extendable Y/Y	-
27	Thai Carbon Black Co., Ltd.	Thai Carbon Black	Thermal	Cogeneration	Waste Gas	19,000	12,000	Extendable Y/Y	-
28	Phuket Municipality	Phuket Municipality	Thermal	Power Plant	Solid Waste	2,500	1,000	Extendable Y/Y	-
29	Mitr Kaset Industry Co., Ltd.	Mitr Kaset Industry Co., Ltd.	Thermal		Bagasse	20,500	3,000	Extendable Y/Y	-
30	Thai Rungruang Industry Co., Ltd.	Thai Rungruang Ind.	Thermal	Cogeneration	Bagasse	29,500	4,000	Extendable Y/Y	-
31	Phitsanulok Sugar Co., Ltd.	Phitsanulok Sugar	Thermal	Power Plant	Bagasse	18,200	4,000	Extendable Y/Y	-
					SPP Total	4,422.71	2,217.3		

Annex 6 Classified Generated Electricity of SPP by Type of Fuel – August 03

	Received Notification of Acceptance			Supplying Power to The Grid		
	Number of Projects	Generating Capacity (MW)	Sale to EGAT (MW)	Number of Projects	Generating Capacity (MW)	Sale to EGAT (MW)
1. Non-Conventional Energy						
Bagasse	29	552.80	165.20	24	507.80	143.20
Paddy Husk	6	70.90	59.20	3	24.90	18.80
Paddy Husk, Wood Chips	3	60.30	33.60	2	57.80	31.40
Black Liquor	2	65.80	50.00	-	-	-
Municiple Waste	1	2.50	1.00	1	2.50	1.00
Waste Gas	1	19.00	12.00	-	-	-
Baggase, Wood bark, Paddy Husk	2	96.90	54.00	-	-	-
Rubber Wood Chips, Palm Residue	1	23.00	20.20	-	-	-
Paddy Husk, Bagasse, Eucalyptus	3	15.80	9.70	1	3.00	1.50
Wood bark, Wood Chips, Black Liquor	2	161.20	100.00	1	74.00	50.00
Rubber Wood Chips	3	32.60	28.20	-	-	-
total	53	1,100.80	533.1	32	670.00	245.90
2. Commercial Energy						
Natural Gas	20	2,519.31	1,473.00	19	2,219.31	1,413.00
Coal	4	392.20	196.00	4	392.20	196.00
Oil	1	10.40	9.00	1	10.40	9.00
total	25	2,921.91	1,678.00	24	2,621.91	1,618.00
3. Mixed Fuel						
Waste gas from production process / Oil / Coal (Thai Petrochemical Industry Public Co.,Ltd.)	1	108.00	45.00	1	108.00	45.00
Black Liquor /Coal (Panjapol Pulp Industry Co.,Ltd.)	1	40.00	10.00	1	40.00	10.00
Coal / Eucalyptus bark (National Power Supply Co.,Ltd.)	2	328.00	180.00	2	328.00	180.00
total	4	476.00	235.00	4	476.00	235.00
TOTAL	82	4,498.71	2,446.10	60	3,767.91	2,098.90

Source: <http://www.eppo.go.th/power/pw-spp-purch-E.html>

Annex 7. EGAT Power Development Plan (PDP 2003)



Annex 8: Area of Coal Mineral sites.

No.	Coal Source	Stock quality (million tons)		Heating Value
	Province	Estimated	Identified	Cal/gram
1	Sinpun Nakhonsrithammarat	91	0	1,210-4,783
2	Keansa Suratthani	15	40	1,743-5,869
3	Viengngea Chiangmai	93	34	2,368-5,256
4	Pua Nan	-	-	-
5	Pong Phayao	-	-	-
6	Chiengmuan Phayao	63	0	1,526-4,985
7	Wangneu Lumpang	9	21	1,425-4,965
8	Chaehom-Muangpan Lampang	16	41	1,013-4,427
9	Hangchat-Sermngam Lampang	6	13	1,798-4,915
10	Ngaw Lampang	48	51	1,041-3,972
11	Maetha Lampang	25	74	1,466-5,542
12	Maesort-Maeramat Tak	100	40	2,376-5,917
13	Sabayoi Songkhla	350	255	2,400-2,800
	Total 13 resources	816	569	

Annex 9: SPP Cogeneration Experiences in Thailand

Introduction

Thailand is the only country in ASEAN with a real cogeneration policy history. Cogeneration was one of the key Qualifying Facilities in the early nineties SPP program. Since the mid 90ties Thailand and other ASEAN countries have only indirectly supported cogeneration through IPP programs or/and Renewable Energy (RE) programs.

Thailand SPP program history and achievements

12 March 1992: in the second meeting of the National Energy Policy Council, The Council has drawn up the regulations for the purchase of electricity from Small Power Producer (SPP).

1992: The Government announced the policy of state enterprise privatization and encouraging more private sector participation in power development in the forms of Independent Power Producer.

Objectives in Purchasing Electricity from SPP in 1992:

- To encourage participation by SPPs in electricity generation
- To promote the use of indigenous by-product energy sources and renewable energy
- To promote more efficient use of primary energy
- To reduce the financial burden of government investment

Characteristic of Qualifying Facilities in the 1992 SPP program was:

1. Using non-conventional energy such as wind, solar and mini-hydro energy
2. Using the following fuels:
 - Waste or residues from agriculture activities or industrial production processes
 - Garbage (e.g. municipal waste)
 - Dendrothermal sources (e.g. tree plantations)
3. **Cogeneration** using any types of fuel that meet the following requirements:
 - The process involves the continuous use of energy by using a Topping Cycle or a Bottoming Cycle thermal process.
 - Steam production > 10% of the total energy production
 - Efficiency > 45%

The SPP program in 1992 targeted 300 MW. In 1995 the Cumulative Maximum Capacity was adjusted to 1444 MW. After the 1444 MW achievements in 1995 the fossil fuelled cogeneration plants were excluded the "Qualifying Facilities" for the new SPP program – cogeneration facilities based on renewable energy (biomass) was still qualified. However the signed contracts for fossil fuelled cogeneration facilities continued and are still supported by the 1992-1995 SPP programs.

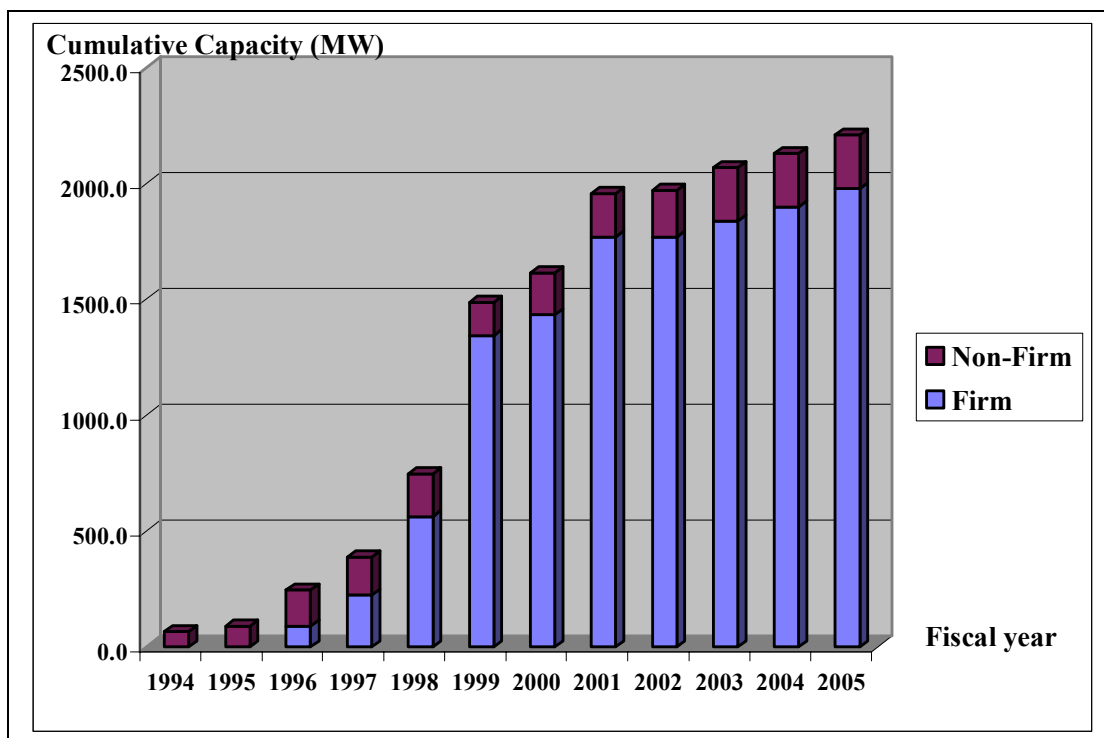
The changes and targets are summarised in the following table:

Date	Cumulative Maximum Capacity (MW)
EGAT Announcement Date	
1. March 1992	300
2. December 1995	1,444
3. September 1996 *	3,200
Cabinet Resolution Date	no limit
4. August 1997 **	
Remark:	
* two announcements : 1) To increase the purchasing capacity from 1,444 to 3,200 for pending SPPs 2) To purchase power from projects using renewable energy only.	
** Power purchase from Non-Firm Contract SPPs and/or SPPs using Renewable Energy.	

In 1999 the Energy Conservation Promotion Fund Committee (ENCON Fund Committee) authorized the National Energy Policy Office (NEPO) to manage an amount of 2,060 million Baht to subsidize SPPs using renewable energy and at 16 Jul 2001 NEPO announced the Request for Proposal. The funding would be given by Bidding Procedure, which requested amount of funding not exceeding 0.36 Baht/kWh for the total period of 5 years.

20 Jun 2002 the ENCON Fund Committee approved 31 selected proposals totalling 511.1 MW with the Fund of 2,991 mill. Baht. The selected SPPs were required to submit public hearing plan and the report on the result of public hearing.

28 Mar 2003 and 20 Jun 2003 the representatives of ENCON Fund Committee had assessed the result of public hearing and reported through EPPO to the ENCON Fund Committee and the Committee's resolution was to subsidize 15 SPPs totalling 214.1 MW with the Fund of 1,235 mill. Baht



Power Purchase Capacity from SPPs (Signed Contracts)

SPPs	Firm		Non-Firm	Total
	Co-gen.	Renew.		
No. of SPPs	26	14	40	80
Purchased Capacity (MW)	1,852.0	265.6	322.3	2,439.9
Signed Contracts				
No. of SPPs	26	5	34	65
Purchased Capacity (MW)	1,852.0	65.4	281.9	2,199.3
Achieved COD				
No. of SPPs	25	4	30	59
Purchased Capacity (MW)	1,792.0	45.2	231.7	2,068.9

Current Status of SPP program (as of August 20th, 2003)

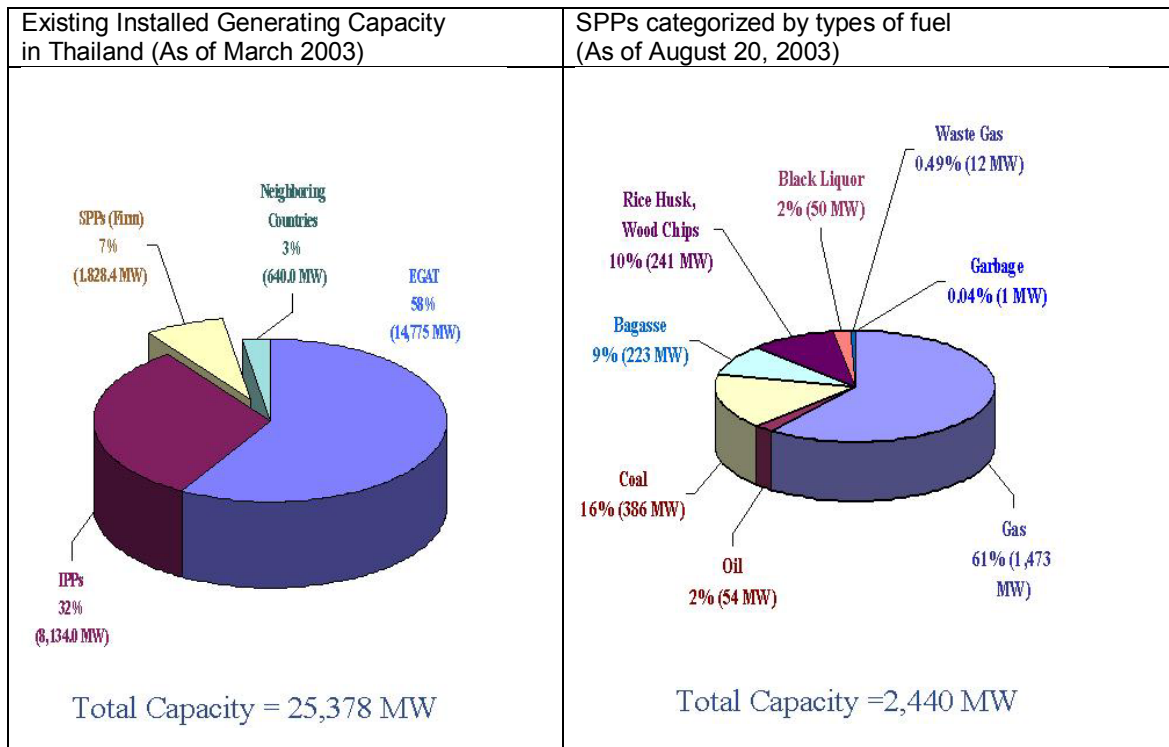
Facilities on firm contracts will be paid for both Capacity Payment (CP0) and Energy Payment (EP0). These payments are adjusted according to the development in oil and natural gas prices.

Facilities on non-firm contracts will be paid only Energy Payment (EP0).

The average Energy Payment are shown on the following table:

Unit : Cent/kWh			
SPP \ Year	2001	2002	2003 (Jan-May)
Non-Firm			
Gas	3.87	3.76	3.89
Firm			
Gas	5.41	5.33	5.39
Oil	4.79	6.97	7.15
Coal	4.38	4.06	4.52
Average	5.19	5.13	5.07

Thailand's total existing Installed Generating Capacity compared to the SPP facilities are shown on the following figure:



Thailand's total existing Installed Generating SPP capacity are shown in Annex 6. Please note that beside the firm and non-firm capacity contracted with EGAT the SPP have an installed capacity of approximately 1700 MW for own consumption.

General energy sector organisations

Ministry of Energy

- Office of the Minister
- Office of the Permanent Secretary
- Department of Mineral Fuels
- Department of Energy Business
- Department of Alternative Energy Development and Efficiency
- Energy Policy and Planning Office

Enterprises:

Electricity Generating Authority of Thailand

Autonomous public companies:

PTT Public Company Limited, PTT
 Bangchak Petroleum Public Company Limited, BCP

Note: The Metropolitan Electricity Authority (MEA) and the Provincial Authority (PEA), Ministry of Interior will be transferred to the Ministry of Energy in 2 years (from October 2002)

<http://www.thaigov.go.th/general/org/org-new/EnergyE.htm>

Source of information

Cogeneration Experiences in Thailand

Presented by Mr. Vinit Tangnoi

Director of Domestic Power Purchase Division, EGAT

26 August, 2003

(Programme for ASEAN Cogeneration policy forum and study tour):

z:\PMU\.....\Study Tour in Thailand August 26 -28\Presentations\Thailand-SPPcogen-Final.ppt