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調査対象施設である DCAP の操業記録は、事業者の操業記録として非公開であるため、本報告書に所収しない。

PDP2010: Revision 3
June 2012

SUMMARY

OF

THAILAND POWER DEVELOPMENT PLAN

2012 – 2030

(PDP2010: REVISION 3)

Energy Policy
and Planning Office
MINISTRY OF ENERGY

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1. Introduction

Thailand Power Development Plan 2010 - 2030 (PDP2010) was approved by the Nation Energy Policy Council (NEPC) on 12 March 2011, and then was endorsed by the Cabinet on 23 March 2011. The themes of PDP2010 substantially focused on security and adequacy of power system along with the policies of the Ministry of Energy (MoEN) on the aspects of environment concern, energy efficiency and renewable energy promotion to be in line with the 15-Year Renewable Energy Development Plan (REDP 2008 - 20212). Parenthetically, cogeneration system was recognized to promote as the efficient electricity generation.

In 2010, the recorded actual power demand (peak) of the country increased significantly higher than the forecast and tended to grow continuously. Additionally, the new power plant construction of Independent Power Producers (IPP) as plan has been delayed causing power system security to fall at risk influencing power reserve margin (RM) into the level of lower than the setting criteria or standards. Accordingly, the MoEN set a framework for a short-term urgent relief (2012 – 2019) by revising the power development plan (the PDP 2010) to be the one so called PDP2010: Revision 1 subsequently approved by NEPC on 25 November 2010, and endorsed by the Cabinet on 30 November 2010.

On 11 March 2011, an earthquake and tsunami occurred to strike the east coast of Japan, leading to severe damages on nuclear reactors as well as radiation leak and contamination on the Fukushima Daiichi Nuclear Power Plant. This disaster lessened public acceptance and trust in the Thailand’s nuclear power project development, encouraging the MoEN to contemplated the postponement of scheduled commercial operation date (SCOD) of the first unit on nuclear power project. Consequently, the PDP2010: Revision 2 was prepared and submitted to the NEPC, and accordingly was approved by the NEPC on 27 April 2011, and endorsed by the Cabinet on 3 May 2011 to shift SCOD of the first unit on nuclear power project forward by 3 years from 2020 to 2023 for the reasons of safety measures review, legislation framework, regulatory framework and stakeholder involvement review as well as additional supporting plans.

By the way, on 27 December 2011, the Cabinet approved the resolution of NEPC proposed on 30 November 2011 calling for Alternative Energy Development Plan: AEDP 2012– 2021 (by 25 percent instead of fossil fuels within the next 10 years) and also 20-Year Energy Efficiency Development Plan 2011 – 2030 (EE Plan 2011 – 2030).

The scope of the new government policies and the variation of current economic situation induce changes and fluctuation in both power demand and power supply. Therefore, to have clear vision on power supply acquiring, Thailand Power Development Plan 2010 – 2030 (PDP2010: Revision 3) is developed with crucial issues as the following:

1) Forecasted power demand results approved by the Thailand Load Forecast Subcommittee (TLFS) on 30 May 2012 are adopted within frameworks as the following.

- Refer to the projected Thai Gross Domestic Products (GDP) and projected Gross Regional Products (GRP) estimated by the Office of National Economic and Social Development Board (NESDB), and issued on 29 November 2011, covering the economic stimulation policies and flooding effects at the end of 2011
- Refer to the approved 20-Year Energy Efficiency Development Plan 2011 – 2030 (EE Plan 2011 – 2030) proposed by the MoEN

2) Alternative Energy Development is regarded according to Alternative Energy Development Plan: AEDP 2012-2021 to use renewable energy and alternative energy by 25 percent instead of fossil fuels within the next 10 years.

3) Energy supply security is taken into consideration of fuel diversification and suitable power reserve margin level.

2. Summary

The revised PDP or *"Thailand Power Development Plan 2010 – 2030 (PDP2010: Revision 3)"* is suggested within the scope of the new government's energy policies frameworks as listed below.

1) The 20-Year Energy Efficiency Development Plan 2011 – 2030 (EE Plan 2011 – 2030): this policy is targeting on 25 percent reduction of energy intensity (ratio of energy consumption to GDP) of the country within 20 years (2011 – 2030), resulting in the decrease of country's power demand projection on account of energy saving programs and energy efficiency promotions.

2) The 10-Year Alternative Energy Development Plan 2012 - 2021 (AEDP 2012 – 2021): this policy is targeting on increasing the share of renewable energy and alternative energy uses by 25 percent instead of fossil fuels within the next 10 years, resulting in replacement of some planned conventional (fossil fuels as coal-fired or gas-fired based) power plants by renewable power plants.

In addition, the government has set the new policies for economic stimulation, causing trajectory changes in GDP growth rate projection during the year 2012 – 2020. However, power demand forecast in terms of 2030 net peak demand is still stand at about 52,256 Megawatt (MW) lower than that of the previous version of the forecast around 3,494 MW (or 6.27 percent).

The total generating capacities during 2012 – 2030 can be summarized as the following:

- Total capacity (as of December 2011) 32,395 MW
- Total added capacity during 2012 – 2030 55,130 MW
- Total retired capacity during 2012 – 2030 -16,839 MW
- Grand total capacity (at the end of 2030) 70,686 MW

3. Thailand Electricity Overview and Power Demand Forecast

3.1 Electricity Overview

In 2012, the country's electricity demand grew at an a bit accelerating rate in tandem with the hot weather. Net peak generation requirement (on EGAT system) rose up to 26,121.1 MW on 26 April 2012 at 14.30 hours, higher than that of the preceding year (standing at 23,900.2 MW) by 2,220.9 MW or 9.24 percent.

Net energy generation requirement throughout the first five-month of the year 2012 (January – May 2012) grew in line with the peak demand growth rate, amounting to 71,698.4 GWh, higher than that of the prior year, month on month, (standing at 65,552.0 GWh) by 6,146.4 GWh or 9.38 percent.

3.2 Power Demand Forecast

The latest power demand forecast was approved by the Thailand Load Forecast Subcommittee (TLFS) on 30 May 2012 with considerable assumptions as the following.

1. Set a timeframe of the 20-year power demand forecast of 2012 – 2030
2. Implement the new model of load forecast developed by the Energy for Environmental Foundation (E for E) under the project of Energy Policy and Planning Office (EPPO) on "Thailand Future Load Forecast" submitted by April 2010
3. Refer to the trajectory GDP growth rate projection during 2011 – 2030 estimated by the Office of National Economic and Social Development Board (NESDB), and issued on 29 November 2011, taking into account economic stimulation policies and flooding effects faced at the end of 2011 (shown as Table 3.1)
4. Incorporate energy saving programs and energy efficiency promotions in accordance with the MoEN's 20-Year Energy Efficiency Development Plan 2011 – 2030 (EE Plan 2011 – 2030) approved by the NEPC on 30 November 2011 on intense thrust targeting on 25 percent reduction of the country's energy intensity (ratio of energy consumption to GDP) within 20 years (as the governmental policy statement declaration to the parliament on 23 August 2011 of the Prime Minister: Miss Yingluck Shinawatra)

Table 3.1 Trajectory GDP Growth Rate Projection (2011 – 2030)

Unit: Percent

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP	1.5	5.0	5.1	5.7	6.0	5.1	4.7	4.1	4.2	4.3

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
GDP	4.2	4.1	4.0	4.0	4.0	4.0	3.9	3.9	3.8	3.8

The two main purposes of Thailand power development plan formulation are to maintain power system security and to provide adequate and reliable electricity supply. Hence, in order to maintain power system security, avoid blackout risk and provide adequate electricity supply for future power demand growth (in line with economic stimulation policy), the Thailand PDP Review Subcommittee (Chaired by the Permanent Secretary of the MoEN) decided, as a risk adverse on EE Plan implementation, to adopt the high case of load forecast expected to achieve 20% of 20-Year EE Plan target called EE20% for PDP formulation.

As net peak generation requirement (on EGAT system) rose up to 26,121.1 MW on 26 April 2012 at 14.30 hours, the Load Forecast Working Group agreed to adjust load forecast by applying the actual power demand of the first 4-month as the starting point in the modeling of load forecast. The revised load forecast was approved by the TLFS on 30 May 2012 within 3 scenarios as the following:

- Base case (EE40%): expected to achieve the 40% of 20-Year EE Plan target
- High case (EE20%): expected to achieve the 20% of 20-Year EE Plan target
- Low case (EE60%): expected to achieve the 60% of 20-Year EE Plan target

As decided by the Thailand PDP Review Subcommittee to use the High case of EE20% for the revised PDP formulation, the High case of load forecast of the year 2030 net peak generation requirement is then adopted – about 52,256 MW, higher than that of the year 2011 by 1,483 MW or 4.16 percent per year. In terms of net energy generation

requirement, the High case reveals about 346,767 GWh of net energy generation requirement in 2030, higher than that of the year 2011 by 9,793 GWh or 4.13 percent per year.

By comparison of the latest 30 May 2012 load forecast of PDP2010: Revision 3 and the previous load forecast of PDP2010: Revision 2, it indicates that peak demand of the latest version is lower than that of the previous one by 3,494 MW or 6,27 percent. For the energy demand, the latest version is lower than that of the previous one by 20,497 GWh or 5.58 percent. Decreasing in projection comes from the effect of EE Plan, and the details are presented in Appendix 1.

4. Thailand Power Development Plan 2012 – 2030 (PDP2010: Revision 3)

4.1 Key Assumptions for PDP2010: Revision 3 Formulation

To formulate the revised PDP to be in line with the new government energy policies, several assumptions need to be reviewed and reconsidered. Key assumptions, made for PDP2010: Revision 3 formulation, are listed below.

1) **The power demand forecast or load forecast:** it is approved by the TLFS on 30 May 2012 to incorporate energy saving programs and energy efficiency promotions in accordance with the 20-Year Energy Efficiency Development Plan 2011 – 2030 (EE Plan 2011 – 2030) formulated by the MoEN, and approved by the NEPC on 30 November 2011.

2) **Thailand power system security:** Thailand should have the proper level of reserve margin to be not less than 15 percent of peak power demand. Moreover, to avoid the risk of the natural gas acquiring from sources in the western part of Thailand, in case of no natural gas supply, the appropriate level of reserve margin should be higher than 20 percent of the peak demand.

3) **The future electricity acquiring:** fuel type diversification in appropriate proportion is considered to reduce natural gas dependency in power generation.

4) **Electricity acquiring from renewable energy:** the MoEN targeted to increase the proportion of renewable energy for Thailand's electricity generation by not less than 5% from that of the previous PDP2010: Revision 2 within 2030 by taking into account the 10-Year Alternative Energy Development Plan 2012 - 2021 (AEDP 2012 – 2021). And then in 2022 – 2030, the generation from renewable energy will be expanded in accordance with its potential and advanced technology development.

5) **Electricity acquiring from nuclear power plant:** with the scope of the government's policy, a share of nuclear power generation should be not greater than 5 percent of total generating capacity. Additionally, the MoEN suggested shifting the scheduled commercial operation date (SCOD) of the first unit on nuclear power project forward by 3 years from 2020 to 2023.

6) **Electricity acquiring from coal-fired power plant:** the MoEN suggested considering coal-fired power plant development in an appropriate proportion as the necessity of Thailand power system except for considerations of other fuel types. Incidentally, for greenhouse gas emission reduction, CO_2 in particular, clean coal technologies should be recommended.

7) **Foreign power purchase:** the suggested proportion of power purchase from neighboring countries should be not greater than 15 percent of total generating capacity by emphasizing only on the projects that having been signed Tariff MOU already.

8) **Efficient power generation by cogeneration system:** it is suggested to promote cogeneration and to increase the amount of power purchases from cogeneration system as the following:

- During 2010 – 2014: conforming to the projects that have been settled
- During 2014 – 2019: scheduling the power purchases of SPP projects with Firm contract amounting 3,500 MW as the NEPC approval on 24 August 2009 and 25 November 2010,
- After 2020: planning to purchase more electricity from SPP cogeneration with Firm contract totaling 1,350 MW.

9) **CO_2 emission from power sector:** the target of CO_2 emission reduction (ton CO_2/kWh) of PDP2010: Revision 3 is still set to be not higher than that of the previous PDP2010.

4.2 Thailand Power Development Plan (PDP2010: Revision 3)

With the aforementioned key assumptions for PDP2010: Revision 3 formulation, Thailand Power Development Plan 2012 – 2030 (PDP2010: Revision 3) can be summarized as the following.

At the end of 2030, grand total capacity will be about 70,686 MW comprising total capacity (as of December 2011) amounting 32,395 MW, total added capacity of 55,130 MW and deduction of the retired capacity totaling 16,839 MW. The details of

generating capacity classified by power plant types are shown in Appendix 4; the details of estimation of energy generation by fuel types are presented in Appendix 5.

Total added capacity during 2012 – 2019 composes of all projects planned with commitment and agreement. The total added capacity will be about 23,325 MW detailed as the following:

- Power purchases from renewable energy (both domestic and neighboring countries) 8,194 MW
- Cogeneration 5,107 MW
- Combined cycle power plants 6,551 MW
- Thermal power plants (coal/lignite) 3,473 MW

Total added capacity during 2020 – 2030 comprises all projects planned for serving future power demand increasing annually and also replacement of the retired power plants. The total added capacity during this period will be about 31,805 MW summarized as the following:

- Power purchases from renewable energy (both domestic and neighboring countries) 6,387 MW
- Cogeneration 1,368 MW
- Gas turbine power plant (3 x 250 MW) 750 MW
- Combined cycle power plants (21 x 900 MW) 18,900 MW
- Thermal power plants (coal) (3 x 800 MW) 2,400 MW
- Thermal power plants (nuclear) (2 x 1,000 MW) 2,000 MW

The total capacities during 2012 – 2030 can be concluded as the following:

- Total capacity (as of December 2011) 32,395 MW
- Total added capacity during 2012 – 2030 55,130 MW
- Total retired capacity during 2012 – 2030 -16,839 MW
- Grand total capacity (at the end of 2030) 70,686 MW

The added capacity during 2012 – 2030 of 55,130 MW can be classified by power plant types as the following:

1. Renewable energy power plants	**14,580**	**MW**
– Power purchase from domestic	9,481	MW
– Power purchase from neighboring countries	5,099	MW
2. Cogeneration	**6,476**	**MW**
3. Combined cycle power plants	**25,451**	**MW**
4. Thermal power plants	**8,623**	**MW**
– Coal-fired power plants	4,400	MW
– Nuclear power plants	2,000	MW
– Gas turbine power plants	750	MW
– Power purchase from neighboring countries	1,473	MW
Total	**55,130**	**MW**

Details of Thailand power development plan 2012 – 2030 (PDP2010: Rev.3) and names of power plants to be completed during the planning period are listed in Table 4.1.

Table 4.1
Thailand Power Development Plan 2012-2030
PDP2010: Revision 3

Year	Peak Demand (MW)	Projects			Fuel Types	Contract Capacity (MW)	Minimum Reserve Margin (%)
2012	**26,355**	SPP-Renewables	498	MW	-		
		SPP-Cogeneration	254	MW	Gas		
		VSPP-Renewables	201	MW	-		
		VSPP-Cogeneration	8	MW	Gas		
		GHECO-ONE Co.,Ltd.	660	MW	Coal		
		Chao Phraya Dam #1-2	12	MW	Hydro		
		Naresuan Dam	8	MW	Hydro		
		Khun Dan Prakarnchon Dam	10	MW	Hydro		
		Power Purchase from Lao PDR (Theun Hinboun Ext.) (Jul)	220	MW	Hydro	**34,265**	**16.0**
2013	**27,443**	SPP-Renewables	249	MW	-		
		SPP-Cogeneration	1,170	MW	Gas		
		VSPP-Renewables	772	MW	-		
		VSPP-Cogeneration	16	MW	Gas		
		Mae Klong Dam #1-2	2x6	MW	Hydro		
		Pasak Jolasid Dam	7	MW	Hydro	**36,491**	**18.4**
2014	**28,790**	SPP-Renewables	420	MW	-		
		SPP-Cogeneration	270	MW	Gas		
		VSPP-Renewables	181	MW	-		
		VSPP-Cogeneration	16	MW	Gas		
		Renewable Energy (Additional)	60	MW	-		
		Gulf JP NS Co.,Ltd. #1-2 (Jun, Dec)	2x800	MW	Gas		
		Wang Noi CC #4 (Apr)	769	MW	Gas		
		Chana CC #2 (Apr)	782	MW	Gas		
		Thap Sakae Solar Cell	5	MW	Solar		
		Sirindhorn Dam Solar Cell	0.1	MW	Solar	**39,542**	**17.7**
2015	**30,231**	SPP-Renewables	369	MW	-		
		SPP-Cogeneration	540	MW	Gas		
		VSPP-Renewables	83	MW	-		
		VSPP-Cogeneration	17	MW	Gas		
		Renewable Energy (Additional)	230	MW	-		
		Gulf JP UT Co.,Ltd. #1-2 (Jun, Dec)	2x800	MW	Gas		
		North Bangkok CC#2 (Oct)	900	MW	Gas		
		Bang Lang Dam (Renovated)	12	MW	Hydro		
		Kwae Noi Dam #1-2	2x15	MW	Hydro		
		Khao Yai Thiang Wind Turbine (North)	18	MW	Wind		
		Chulabhorn Hydropower	1	MW	Hydro		
		Klong Tron Hydropower	3	MW	Hydro		
		Kiew Kohma Hydropower	6	MW	Hydro		
		Mae Karm Solar Cell	0.1	MW	Solar		
		Power Purchase from Lao PDR (Hongsa TH #1-2) (Jun, Nov)	2x491	MW	Lignite	**43,157**	**16.5**

Table 4.1 (Continued)
Thailand Power Development Plan 2012-2030
PDP2010: Revision 3

Year	Peak Demand (MW)	Projects			Fuel Types	Contract Capacity (MW)	Minimum Reserve Margin (%)
2016	**31,808**	SPP-Renewables	635	MW	-		
		SPP-Cogeneration	450	MW	Gas		
		VSPP-Renewables	79	MW	-		
		VSPP-Cogeneration	21	MW	Gas		
		Renewable Energy (Additional)	270	MW	-		
		National Power Supply Co.,Ltd. TH #1-2 (Nov)	270	MW	Coal		
		New Power Plant (South) (Jul)	900	MW	Gas		
		Phayaman Hydropower	2	MW	Hydro		
		Lam Pao Hydropower	1	MW	Hydro		
		Lam Ta Khong Hydropower	2	MW	Hydro		
		Bhumubol Dam Solar Cell	0.1	MW	Solar		
		Power Purchase from Lao PDR (Hongsa TH #3) (Mar)	491	MW	Lignite	**45,530**	**24.3**
2017	**33,263**	SPP-Renewables	153	MW	-		
		SPP-Cogeneration	900	MW	Gas		
		VSPP-Renewables	77	MW	-		
		Renewable Energy (Additional)	280	MW	-		
		National Power Supply Co.,Ltd. TH #3-4 (Mar)	270	MW	Coal		
		LamTa Khong Pumped Storage #3-4 (Jun)	500	MW	Hydro		
		That Noi Hydropower	2	MW	Hydro		
		Rawai Stadium Wind Turbine	3	MW	Wind		
		Rajjaprabha Dam Solar Cell	0.1	MW	Solar		
		Pha Chuk Hydropower	20	MW	Hydro	**47,240**	**21.4**
2018	**34,592**	SPP-Cogeneration	720	MW	Gas		
		VSPP-Renewables	86	MW	-		
		VSPP-Cogeneration	1	MW	Gas		
		Renewable Energy (Additional)	280	MW	-		
		Mae Moh TH #4-7 (Replaced) (600MW)			-		
		Yaso Thorn - Phanom Prai Hydropower	4	MW	Hydro		
		Khao Laem Hydropower # 1-2	2x9	MW	Hydro		
		Kra Seao Hydropower	2	MW	Hydro		
		Power Purchase from Lao PDR (Nam-Ngiep 1) (Jan)	269	MW	Hydro		
		Power Purchase from Lao PDR (Xe-Pian) (Aug)	390	MW	Hydro	**48,329**	**19.6**
2019	**35,869**	SPP-Renewables	60	MW	-		
		SPP-Cogeneration	720	MW	Gas		
		VSPP-Renewables	72	MW	-		
		VSPP-Cogeneration	5	MW	Gas		
		Renewable Energy (Additional)	310	MW	-		
		EGAT Coal-Fired TH #1 (Jun)	800	MW	Coal		
		Huai Sataw Hydropower	1	MW	Hydro		
		Bang Pakong Hydropower	2	MW	Hydro		
		Sirindhorn Dam Solar Cell	1	MW	Solar		
		Khao Yai Thiang Wind Turbine (South)	50	MW	Wind		
		Power Purchase from Lao PDR (Xaiyaburi) (Oct)	1,220	MW	Hydro	**51,386**	**18.7**
2020	**37,325**	SPP-Renewables	45	MW	-		
		SPP-Cogeneration (Additional # 1)	90	MW	Gas		
		VSPP-Renewables	81	MW	-		
		Renewable Energy (Additional)	310	MW	-		
		Mae Saruay Hydropower	2	MW	Hydro		
		Thatako Solar Cell #1	1	MW	Solar		
		Klong See Yud Hydropower	3	MW	Hydro	**50,389**	**18.1**

Table 4.1 (Continued)
Thailand Power Development Plan 2012-2030
PDP2010: Revision 3

Year	Peak Demand (MW)	Projects			Fuel Types	Contract Capacity (MW)	Minimum Reserve Margin (%)
2021	**38,726**	SPP-Cogeneration (Additional # 2-3)	180	MW	Gas		
		VSPP-Renewables	79	MW	-		
		VSPP-Cogeneration	1	MW	Gas		
		Renewable Energy (Additional)	360	MW	-		
		New Gas-fired Power Plant	900	MW	Gas		
		Bang Pakong CC #1 (Replaced)	900	MW	Gas		
		Chonnaboat Hydropower	2	MW	Hydro		
		Thatako Solar Cell #2	1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**52,912**	**17.8**
2022	**40,134**	SPP-Cogeneration (Additional # 4-5)	180	MW	Gas		
		VSPP-Renewables	67	MW	-		
		VSPP-Cogeneration	5	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		New Gas-Fired Power Plant	900	MW	Gas		
		Bang Pakong CC #2 (Replaced)	900	MW	Gas		
		EGAT Coal-Fired TH #2	800	MW	Coal		
		Mahasarakam Hydropower	1	MW	Hydro		
		Chulabhorn Dam Solar Cell	0.1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**56,135**	**16.9**
2023	**41,567**	SPP-Cogeneration (Additional # 6-7)	180	MW	Gas		
		VSPP-Renewables	47	MW	-		
		Renewable Energy (Additional)	220	MW	-		
		New Gas-Fired Power Plant	900	MW	Gas		
		South Bangkok CC #1-2 (Replaced)	2x900	MW	Gas		
		Low Wind Speed Wind Turbine	10	MW	Wind		
		Huai Nam Sai Hydropower	2	MW	Hydro		
		Rasisalai Hydropower	2	MW	Hydro		
		Ubonrat Dam Solar Cell	0.1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**56,732**	**16.4**
2024	**43,049**	SPP-Cogeneration (Additional # 8-9)	180	MW	Gas		
		VSPP-Renewables	53	MW	-		
		VSPP-Cogeneration	1	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		New Gas-Fired Power Plant	900	MW	Gas		
		South Bangkok CC #3 (Replaced)	900	MW	Gas		
		Bang Pakong CC #3 (Replaced)	900	MW	Gas		
		Hua Na Hydropower	1	MW	Hydro		
		Lamtapearn Hydropower	1	MW	Hydro		
		Sirikit Dam Solar Cell	0.1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**59,509**	**16.3**
2025	**44,521**	SPP-Cogeneration (Additional # 10-11)	180	MW	Gas		
		VSPP-Renewables	37	MW	-		
		VSPP-Cogeneration	5	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		New Gas-Fired Power Plant	900	MW	Gas		
		Bang Pakong CC #4 (Replaced)	900	MW	Gas		
		EGAT Coal-Fired TH #3	800	MW	Coal		
		Pranburi Hydropower	2	MW	Hydro		
		Tabsalao Hydropower	2	MW	Hydro		
		Power Purchase from Neighbouring Countries	300	MW	-	**60,477**	**16.5**

Table 4.1 (Continued)
Thailand Power Development Plan 2012-2030
PDP2010: Revision 3

Year	Peak Demand (MW)	Projects			Fuel Types	Contract Capacity (MW)	Minimum Reserve Margin (%)
2026	**46,002**	SPP-Cogeneration (Additional # 12-13)	180	MW	Gas		
		VSPP-Renewables	32	MW	-		
		Renewable Energy (Additional)	220	MW	-		
		New Gas-Fired Power Plant	900	MW	Gas		
		Bang Pakong CC #5 (Replaced)	900	MW	Gas		
		EGAT Nuclear Power Plant #1	1,000	MW	Uranium		
		Kamalasai Hydropower	1	MW	Hydro		
		Numpung Dam Solar Cell	1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**64,007**	**16.5**
2027	**47,545**	SPP-Cogeneration (Additional # 14-15)	180	MW	Gas		
		VSPP-Renewables	33	MW	-		
		VSPP-Cogeneration	1	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		Wang Noi CC #1 (Replaced)	900	MW	Gas		
		Bang Pakong CC #6 (Replaced)	900	MW	Gas		
		EGAT Nuclear Power Plant #2	1,000	MW	Uranium		
		Mae Wong Hydropower	12	MW	Hydro		
		Vajiralongkorn Dam Solar Cell	0.1	MW	Solar		
		Chaiyaphum and Nakhon Ratchasima Wind Turbine	50	MW	Wind		
		Power Purchase from Neighbouring Countries	300	MW	-	**64,979**	**16.2**
2028	**49,114**	VSPP-Renewables	32	MW	-		
		VSPP-Cogeneration	5	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		EGAT Coal-Fired TH #4	800	MW	Coal		
		Wang Noi CC #2-3 (Replaced)	2x900	MW	Gas		
		Gas Turbine #1	250	MW	Diesel		
		Mae Khan Hydropower	16	MW	Hydro		
		Huai Samong Hydropower	1	MW	Hydro		
		Mae Moh Solar Cell	1	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**67,012**	**16.4**
2029	**50,624**	VSPP-Renewables	32	MW	-		
		Renewable Energy (Additional)	220	MW	-		
		South Bangkok CC #4 (Replaced)	900	MW	Gas		
		EGAT New Combined Cycle Power Plant	900	MW	Gas		
		Gas Turbine #2	250	MW	Diesel		
		Ao Phai Wind Turbine	10	MW	Wind		
		Lam Dome Yai Hydropower	1	MW	Hydro		
		Kamphaeng Phet Solar Cell	3	MW	Solar		
		Power Purchase from Neighbouring Countries	300	MW	-	**69,358**	**16.4**
2030	**52,256**	VSPP-Renewables	33	MW	-		
		VSPP-Cogeneration	1	MW	Gas		
		Renewable Energy (Additional)	220	MW	-		
		EGAT New Combined Cycle Power Plant	900	MW	Gas		
		Gas Turbine #3	250	MW	Diesel		
		Solar Cell , Southern Part of Thailand	10	MW	Solar		
		Samut Sakhon Wind Turbine	30	MW	Wind		
		Klong Luang Hydropower	1	MW	Hydro		
		Power Purchase from Neighbouring Countries	300	MW	-	**70,686**	**16.2**

Total Contract Capacity as of December 2011	32,395	MW
Total Added Capacity	55,130	MW
Total Retired Capacity	- 16,839	MW
Grand Total Capacity at the End of 2030	**70,686**	**MW**

4.3 Renewable Energy Generation

With the government policy targeting on increasing the share of renewable energy and alternative energy uses by 25 percent instead of fossil fuels within the next 10 years, new projects of renewable energy development are initiated into PDP2010: Revision 3. Hence, at the end of 2030, total capacity of renewable energy will be around 20,546.3 MW (or 29 percent of total generating capacity in the power system) comprising total existing capacity amounting 6,340.2 MW, total added capacity of renewable energy of 14,580.4 MW and deduction of the retired capacity of renewable energy totaling 374.3 MW. The 20,546.3 MW capacity of renewable energy can be classified into domestic renewable energy of 13,688 MW and renewable energy from neighboring countries of 6,858 MW as the following.

Renewable Energy Power Projects during 2012 – 2021

In this period, renewable energy power projects should be in line with the 10-Year Alternative Energy Development Plan: AEDP 2012-2021 of the MoEN detailed as the following:

– Solar power	1,806.4	MW
– Wind power	1,774.3	MW
– Hydro power	3,061.4	MW
– (both domestic and neighboring countries)		
– Biomass	2,378.7	MW
– Biogas	22.1	MW
– Municipal solid waste (MSW)	334.5	MW
Total	**9,377.4**	**MW**

Renewable Energy Power Projects during 2022 – 2030

Renewable energy power project development during 2022 – 2030 will be considered in accordance with its potential detailed as the following:

– Solar power	1,995.7	MW
– Wind power	199.4	MW

– Hydro power (both domestic and neighboring countries)	2,742.5	MW
– Biomass	223.5	MW
– Biogas	24.1	MW
– Municipal solid waste (MSW)	17.8	MW
Total	**5,203.0**	**MW**

The lists of power plant types to be completed during 2012 – 2030 are presented in Table 4.2.

4.4 CO2 Emission from Power Sector

In 2011, an average greenhouse gas (CO_2) emission released from Power sector is about 0.505 kgCO_2/kWh. In response to the MoEN policies on clean energy development promotion, the 2030 target of CO_2 emission reduction (ton CO_2/kWh) of PDP2010: Revision 3 is set to be not higher than that of the previous PDP2010: Revision 2 by rearranging generation mix appropriately.

Estimation of CO2 emission amounts on PDP2010: Revision 3 is calculated with reference to the international principles as the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Details as shown in Table 4.3).

Table 4.2 Annual Capacity of Renewable Energy by Fuel Types

(Unit: MW)

Year	Fuel Types							
	Solar	Wind	Hydro	Biomass	Biogas	MSW	New energy form	Total
Capacity as of 2011	**138.0**	**3.0**	**5,322.5**	**747.3**	**106.0**	**21.4**	**2.0**	**6,340.2**
New Renewable Contract Capacity								
2012	164.9	246.9	250.5	280.5	4.2	1.0	-	948.1
2013	375.8	14.0	19.2	574.5	-	56.0	-	1,039.5
2014	181.1	263.6	0.5	206.8	1.2	12.8	-	666.0
2015	191.1	302.9	51.8	180.5	2.3	22.8	-	751.3
2016	130.1	641.8	5.2	176.8	2.3	32.8	-	989.0
2017	130.1	163.1	522.0	175.3	2.3	41.8	-	1,034.6
2018	130.0	7.4	682.6	184.5	2.4	41.8	-	1,048.8
2019	151.0	117.8	1,223.5	179.8	2.4	41.8	-	1,716.4
2020	151.0	8.2	4.7	234.0	2.5	41.9	-	442.2
2021	201.0	8.6	301.5	186.0	2.5	41.9	-	741.5
Total New Capacity 2012-2021	**1,806.4**	**1,774.3**	**3,061.4**	**2,378.7**	**22.1**	**334.5**	**-**	**9,377.4**
2022	220.1	9.0	301.3	53.7	2.5	1.9	-	588.5
2023	220.1	19.5	303.5	32.8	2.6	1.9	-	580.4
2024	220.1	9.9	302.2	38.6	2.6	1.9	-	575.4
2025	220.0	10.4	303.3	21.2	2.6	2.0	-	559.5
2026	221.0	11.0	301.0	16.8	2.7	2.0	-	554.4
2027	220.1	61.5	312.0	16.9	2.7	2.0	-	615.2
2028	221.0	12.1	317.3	14.4	2.8	2.0	-	569.5
2029	223.0	22.7	301.0	14.5	2.8	2.0	-	566.1
2030	230.0	43.3	301.0	14.7	2.8	2.1	-	594.0
Total New Capacity 2022-2030	**1,995.4**	**199.4**	**2,742.6**	**223.6**	**24.1**	**17.8**	**-**	**5,203.0**
Total New Capacity 2012-2030	**3,802.0**	**1,973.7**	**5,804.0**	**2,602.2**	**46.2**	**352.3**	**-**	**14,580.4**

Table 4.3 Estimation of CO_2 Emission Amounts

(Unit: $kgCO_2/kWh$)

Year	PDP2010: Revision 2		PDP2010: Revision 3	
	Annual Amounts	**Accumulative Amounts** (Base Year: 2012)	**Annual Amounts**	**Accumulative Amounts** (Base Year: 2012)
2012	0.488	0.488	0.478	0.478
2013	0.481	0.485	0.471	0.474
2014	0.467	0.479	0.468	0.472
2015	0.447	0.470	0.448	0.466
2016	0.422	0.460	0.430	0.458
2017	0.412	0.451	0.429	0.452
2018	0.401	0.443	0.413	0.446
2019	0.401	0.437	0.416	0.442
2020	0.405	0.433	0.412	0.438
2021	0.410	0.430	0.407	0.434
2022	0.404	0.427	0.410	0.432
2023	0.400	0.424	0.413	0.430
2024	0.382	0.420	0.406	0.427
2025	0.377	0.416	0.407	0.426
2026	0.391	0.414	0.403	0.424
2027	0.377	0.411	0.391	0.421
2028	0.382	0.409	0.395	0.419
2029	0.385	0.407	0.391	0.417
2030	0.386	0.405	0.385	0.415

Appendices

Power Demand Statistic and Load Forecast for PDP

(EGAT System and Purchase from VSPP)

Case : May 2012 (EE20%)

Year	Peak			Energy			Load Factor	Elasticity
	MW	Increase		GWh	Increase			
		MW	%		GWh	%	%	
Actual : NET Generation								
2008	22,093.7	56.4	0.26	145,816.5	2,002.9	1.39	75.14	0.56
2009	22,155.0	61.3	0.28	146,279.7	463.2	0.32	75.37	-0.14
2010	24,174.4	2,019.4	9.11	161,350.2	15,070.5	10.30	76.19	1.32
2011	24,069.6	-104.8	-0.43	160,705.5	-644.7	-0.40	76.22	-5.18
Forecast : NET Generation								
2012	**26,355**	2,285	9.49	**175,089**	14,383	8.95	75.84	1.38
2013	**27,443**	1,088	4.13	**183,283**	8,194	4.68	76.24	0.92
2014	**28,790**	1,348	4.91	**191,630**	8,348	4.55	75.98	0.80
2015	**30,231**	1,441	5.00	**200,726**	9,096	4.75	75.80	0.79
2016	**31,809**	1,577	5.22	**210,619**	9,893	4.93	75.59	0.96
2017	**33,264**	1,455	4.58	**219,616**	8,997	4.27	75.37	0.91
2018	**34,593**	1,329	4.00	**227,760**	8,144	3.71	75.16	0.90
2019	**35,869**	1,276	3.69	**236,408**	8,648	3.80	75.24	0.91
2020	**37,326**	1,457	4.06	**246,164**	9,756	4.13	75.29	0.97
2021	**38,726**	1,400	3.75	**255,591**	9,428	3.83	75.34	0.91
2022	**40,134**	1,409	3.64	**265,039**	9,448	3.70	75.39	0.91
2023	**41,567**	1,433	3.57	**274,672**	9,633	3.63	75.43	0.90
2024	**43,049**	1,482	3.57	**284,640**	9,968	3.63	75.48	0.90
2025	**44,521**	1,471	3.42	**294,508**	9,868	3.47	75.51	0.87
2026	**46,003**	1,482	3.33	**304,548**	10,040	3.41	75.57	0.86
2027	**47,545**	1,543	3.35	**314,925**	10,377	3.41	75.61	0.87
2028	**49,115**	1,570	3.30	**325,470**	10,544	3.35	75.65	0.87
2029	**50,624**	1,509	3.07	**335,787**	10,318	3.17	75.72	0.83
2030	**52,256**	1,632	3.22	**346,767**	10,979	3.27	75.75	0.87
Average Growth								
2008-2010	-	712	3.13	-	5,846	3.91	-	1.52
2011-2015	-	1,211	4.57	-	7,875	4.46	-	0.96
2016-2020	-	1,419	4.31	-	9,087	4.17	-	0.93
2021-2025	-	1,439	3.59	-	9,669	3.65	-	0.90
2026-2030	-	1,547	3.26	-	10,452	3.32	-	0.86
2012-2030	-	1,483	4.16	-	9,793	4.13	-	0.92

Remark : Power Purchase from VSPP is included.

Comparison of Load Forecast
(Including Power Purchase from VSPP)

YEAR	CASE : February (Adjusted) (1)		CASE : May 2012 EE20% (2)		Difference (2)-(1)			
	MW	GWh	MW	GWh	MW	%	GWh	%
2011	25,952	169,444	24,070	160,706	-1,882	-7.25	-8,738	-5.16
2012	27,367	177,584	26,355	175,089	-1,012	-3.70	-2,495	-1.41
2013	28,707	185,561	27,443	183,283	-1,264	-4.40	-2,278	-1.23
2014	29,917	193,803	28,790	191,630	-1,127	-3.77	-2,173	-1.12
2015	31,096	201,998	30,231	200,726	-865	-2.78	-1,272	-0.63
2016	32,451	211,248	31,809	210,619	-643	-1.98	-629	-0.30
2017	33,996	221,066	33,264	219,616	-732	-2.15	-1,450	-0.66
2018	35,536	231,079	34,593	227,760	-943	-2.65	-3,319	-1.44
2019	36,903	240,341	35,869	236,408	-1,034	-2.80	-3,933	-1.64
2020	38,320	250,210	37,326	246,164	-994	-2.60	-4,046	-1.62
2021	39,921	260,526	38,726	255,591	-1,195	-2.99	-4,935	-1.89
2022	41,443	270,776	40,134	265,039	-1,309	-3.16	-5,737	-2.12
2023	42,995	281,330	41,567	274,672	-1,428	-3.32	-6,658	-2.37
2024	44,527	292,214	43,049	284,640	-1,478	-3.32	-7,574	-2.59
2025	46,345	303,587	44,521	294,508	-1,824	-3.94	-9,079	-2.99
2026	48,093	315,392	46,003	304,548	-2,091	-4.35	-10,844	-3.44
2027	49,908	327,638	47,545	314,925	-2,363	-4.73	-12,713	-3.88
2028	51,693	340,340	49,115	325,470	-2,578	-4.99	-14,870	-4.37
2029	53,716	353,520	50,624	335,787	-3,092	-5.76	-17,733	-5.02
2030	55,750	367,264	52,256	346,767	-3,494	-6.27	-20,497	-5.58

Power Demand Statistic and Load Forecast

(EGAT System)

Case : May 2012 (EE20%)

Year	Peak			Energy			Load Factor
	MW	Increase		GWh	Increase		
		MW	%		GWh	%	%
Actual : NET Generation							
2008	22,018.0	8.8	0.04	145,227.5	1,486.5	1.03	75.09
2009	22,044.9	26.9	0.12	145,297.3	69.8	0.05	75.24
2010	24,009.9	1,965.0	8.91	160,189.5	14,892.2	10.25	76.16
2011	23,900.2	-109.7	-0.46	158,963.3	-1,226.2	-0.77	75.93
Forecast : NET Generation							
2012	**26,121**	2,221	9.29	**172,895**	13,932	8.76	75.56
2013	**26,950**	829	3.17	**178,962**	6,067	3.51	75.81
2014	**28,236**	1,286	4.77	**186,745**	7,783	4.35	75.50
2015	**29,641**	1,405	4.98	**195,482**	8,737	4.68	75.29
2016	**31,182**	1,541	5.20	**205,020**	9,538	4.88	75.06
2017	**32,613**	1,431	4.59	**213,717**	8,697	4.24	74.81
2018	**33,914**	1,301	3.99	**221,485**	7,768	3.63	74.55
2019	**35,165**	1,251	3.69	**229,806**	8,321	3.76	74.60
2020	**36,596**	1,431	4.07	**239,291**	9,485	4.13	74.64
2021	**37,971**	1,375	3.76	**248,456**	9,165	3.83	74.70
2022	**39,357**	1,386	3.65	**257,676**	9,220	3.71	74.74
2023	**40,777**	1,420	3.61	**267,166**	9,490	3.68	74.79
2024	**42,244**	1,467	3.60	**276,967**	9,801	3.67	74.84
2025	**43,704**	1,460	3.46	**286,722**	9,755	3.52	74.89
2026	**45,179**	1,475	3.37	**296,674**	9,952	3.47	74.96
2027	**46,714**	1,535	3.40	**306,960**	10,286	3.47	75.01
2028	**48,275**	1,561	3.34	**317,413**	10,453	3.41	75.06
2029	**49,778**	1,503	3.11	**327,648**	10,235	3.22	75.14
2030	**51,403**	1,625	3.26	**338,541**	10,893	3.32	75.18
Average Growth							
2008-2010	-	667	2.94	-	5,483	3.68	-
2011-2015	-	1,126	4.30	-	7,058	4.06	-
2016-2020	-	1,391	4.31	-	8,762	4.13	-
2021-2025	-	1,422	3.61	-	9,486	3.68	-
2026-2030	-	1,540	3.30	-	10,364	3.38	-
2012-2030	-	1,448	4.11	-	9,451	4.06	-

Figure of Thailand Power Development Plan (PDP2010: Revision 3)

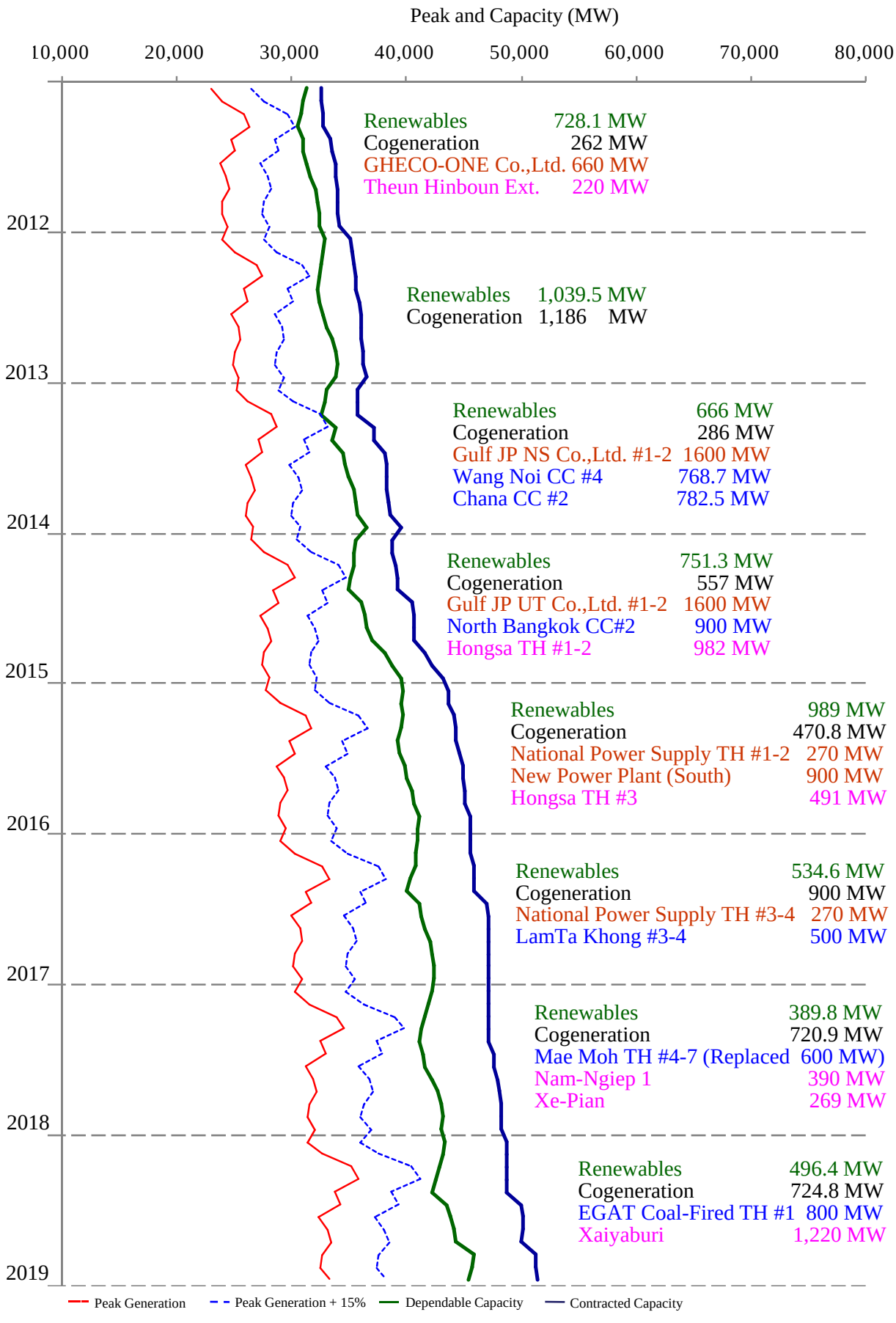
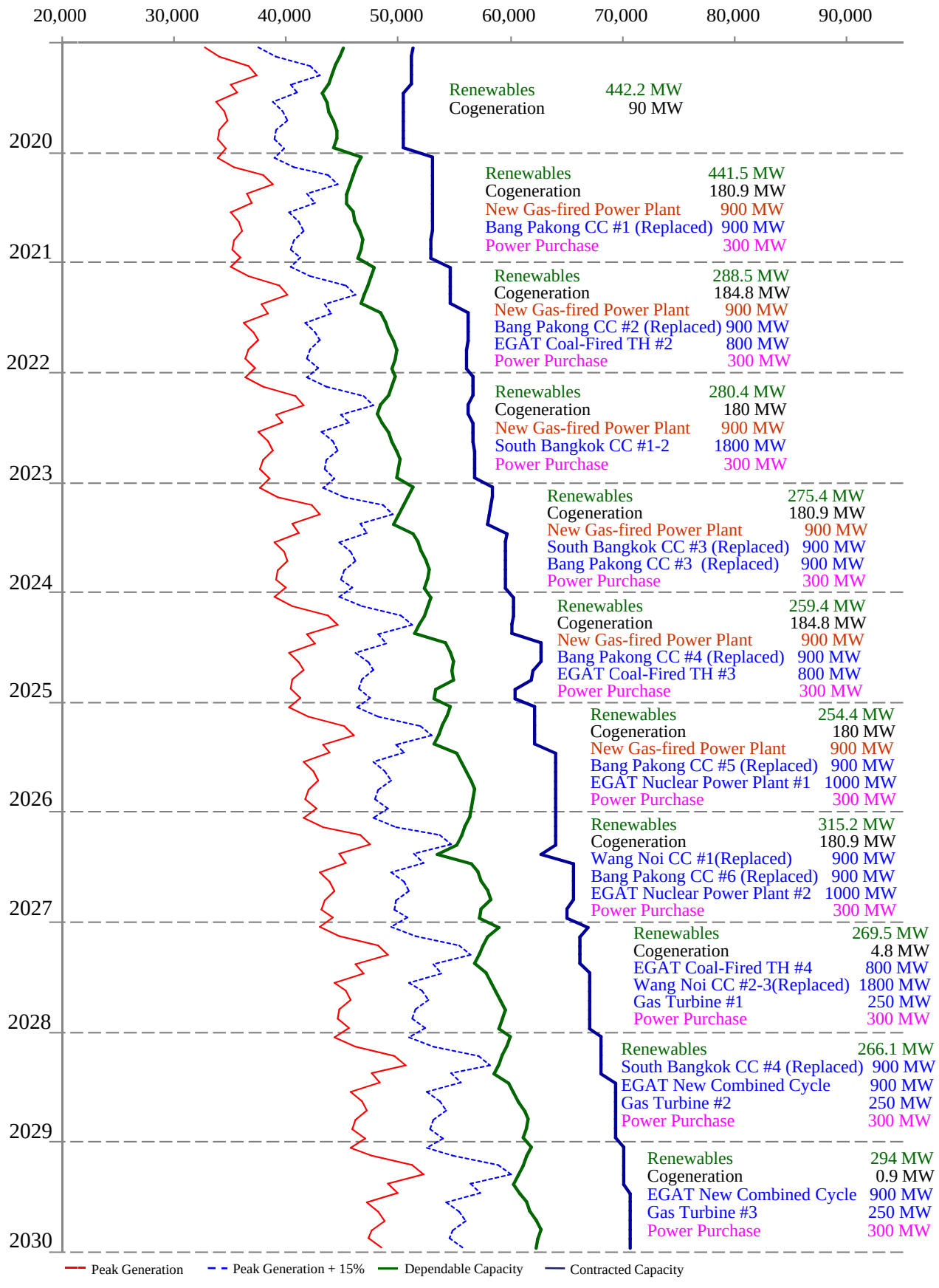


Figure of Thailand Power Development Plan (PDP2010: Revision 3)

Peak and Capacity (MW)



Comparison of Thailand Power Development Plans
(2012-2019)

Year	PDP2010 Revision 2 (NPEC 27 Apr 2011)		PDP2010 Revision 3 (NPEC 8 Jun 2012)	
	Projects	**MW**	**Projects**	**MW**
2012	Renewables	183.3	Renewables	728.1
	Cogeneration	434	Cogeneration	262
			GHECO-ONE Co.,Ltd.	660
	Theun Hinboun Ext.	220	Theun Hinboun Ext.	220
2013	Renewables	212.7	Renewables	1,039.5
	Cogeneration	996	Cogeneration	1,186
2014	Renewables	330.3	Renewables	666
	Cogeneration	361	Cogeneration	286
	Wang Noi CC #4 (Apr)	800	Wang Noi CC #4 (Apr)	768.7
	Chana CC #2 (Apr)	800	Chana CC #2 (Apr)	782.2
	Power Generation.#1-2(Jun-Dec)	2x800	Gulf JP NS Co.,Ltd. #1-2 (Jun, Dec)	2x800
2015	Renewables	181.5	Renewables	751.3
	Cogeneration	632	Cogeneration	557
	North Bangkok CC#2 (Apr)	800	North Bangkok CC#2 (Oct)	900
	Siam Energy #1-2 (Jun, Dec)	2x800	Gulf JP UT Co.,Ltd. #1-2 (Jun, Dec)	2x800
	Hongsa TH #1-2 (May, Oct)	2x491	Hongsa TH #1-2 (Jun, Nov)	2x491
2016	Renewables	228.3	Renewables	989
	Cogeneration	726	Cogeneration	470.8
	New Power Plant (South) (Jul)	800	New Power Plant (South) (Jul)	900
	National Power Supply TH #1-2 (Nov)	2x135	National Power Supply TH #1-2 (Nov)	2x135
	My Khot TH #1-3 (Jan, Apr, Jul)	3x123		
	Hongsa TH #3 (Mar)	491	Hongsa TH #3 (Mar)	491
2017	Renewables	299.1	Renewables	534.6
	Cogeneration	721	Cogeneration	900
	National Power Supply TH #3-4 (Mar)	2x135	National Power Supply TH #3-4 (Mar)	2x135
	LamTa Khong Pumped Storage #3-4	500	LamTa Khong Pumped Storage #3-4	500
	Nam-Ngum 3 (Jan)	440		
2018	Renewables	186.5	Renewables	389.8
	Cogeneration	723	Cogeneration	720.9
			Mae Moh TH #4-7 (Replaced) (600MW)	
	Nam-Ngiep 1 (Jan)	269	Nam-Ngiep 1 (Jan)	269
	Xe-Pian (Jan)	390	Xe-Pian (Aug)	390
2019	Renewables	183	Renewables	496.4
	Cogeneration	457	Cogeneration	724.8
	EGAT Coal-Fired TH #1 (Jun)	800	EGAT Coal-Fired TH #1 (Jun)	800
	Xaiyaburi (Jan)	1,220	Xaiyaburi (Oct)	1,220

Comparison of Thailand Power Development Plans
(2020-2026)

Year	PDP2010 Revision 2 (NPEC 27 Apr 2011)		PDP2010 Revision 3 (NPEC 8 Jun 2012)	
	Projects	**MW**	**Projects**	**MW**
2020	Renewables	193	Renewables	442.2
	Cogeneration	2	Cogeneration	90
	New Gas-fired Power Plant #1	800		
	Power Purchase	600		
2021	Renewables	134	Renewables	441.5
	Cogeneration	2	Cogeneration	180.9
			New Gas-fired Power Plant	900
	EGAT Coal-Fired TH #2	800	Bang Pakong CC #1 (Replaced)	900
	Power Purchase	600	Power Purchase	300
2022	Renewables	309.5	Renewables	288.5
	Cogeneration	367	Cogeneration	184.8
	New Gas-fired Power Plant #2-3	2x800	New Gas-fired Power Plant	900
			Bang Pakong CC #2 (Replaced)	900
			EGAT Coal-Fired TH #2	800
	Power Purchase	600	Power Purchase	300
2023	Renewables	148	Renewables	280.4
	Cogeneration	361	Cogeneration	180
	New Gas-fired Power Plant # 4-7	4x800	New Gas-fired Power Plant	900
	EGAT Coal-Fired TH #3	800	South Bangkok CC #1-2 (Replaced)	2x900
	EGAT Nuclear Power Plant #1	1,000		
	Power Purchase	600	Power Purchase	300
2024	Renewables	158	Renewables	275.4
	Cogeneration	362	Cogeneration	180.9
	EGAT Nuclear Power Plant #2	1,000	New Gas-fired Power Plant	900
			South Bangkok CC #3 (Replaced)	900
			Bang Pakong CC #3 (Replaced)	900
	Power Purchase	600	Power Purchase	300
2025	Renewables	165	Renewables	259.5
	Cogeneration	367	Cogeneration	184.8
	New Gas-fired Power Plant # 8-9	2x800	New Gas-fired Power Plant	900
			EGAT Coal-Fired TH #3	800
			Bang Pakong CC #4 (Replaced)	900
	Power Purchase	600	Power Purchase	300
2026	Renewables	160	Renewables	254.4
	Cogeneration	362	Cogeneration	180
	New Gas-fired Power Plant #10-11	2x800	New Gas-fired Power Plant	900
	EGAT Coal-Fired TH #4-5	2x800	EGAT Nuclear Power Plant #1	1,000
			Bang Pakong CC #5 (Replaced)	900
	Power Purchase	600	Power Purchase	300

Comparison of Thailand Power Development Plans
(2027-2030)

Year	PDP2010 Revision 2 (NPEC 27 Apr 2011)		PDP2010 Revision 3 (NPEC 8 Jun 2012)	
	Projects	**MW**	**Projects**	**MW**
2027	Renewables	241	Renewables	315.2
	Cogeneration	361	Cogeneration	180.9
	EGAT Nuclear Power Plant #3	1,000	EGAT Nuclear Power Plant #2	1,000
			Wang Noi CC #1 (Replaced)	900
			Bang Pakong CC #6 (Replaced)	900
	Power Purchase	600	Power Purchase	300
2028	Renewables	184	Renewables	269.5
	Cogeneration	365	Cogeneration	4.8
	EGAT Coal-Fired TH #6-7	2x800	EGAT Coal-Fired TH #4	800
	New Gas-fired Power Plant #12-13	2x800	Wang Noi CC #2-3 (Replaced)	2x900
	EGAT Nuclear Power Plant #4	1,000	Gas Turbine #1	250
	Power Purchase	600	Power Purchase	300
2029	Renewables	209	Renewables	266.1
	Cogeneration	360	South Bangkok CC #4 (Replaced)	900
	EGAT Coal-Fired TH #8	800	EGAT New Combined Cycle Power Plant	900
	New Gas-fired Power Plant #14	800	Gas Turbine #2	250
	Power Purchase	600	Power Purchase	300
2030	Renewables	226.5	Renewables	294
	Cogeneration	360	Cogeneration	0.9
	EGAT Coal-Fired TH #9	800	EGAT New Combined Cycle Power Plant	900
	New Gas-fired Power Plant #15	800	Gas Turbine #3	250
	Power Purchase	600	Power Purchase	300

Projection of Generating Capacity by Power Plant Types

PDP 2010 : Revision 3

Plant Types			Unit	Year																	
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Renewable Energy		- EGAT	MW	3,459	3,477	3,483	3,552	3,557	4,082	4,105	4,159	4,165	4,168	4,169	4,182	4,185	4,188	4,190	4,252	4,270	4,284	4,325
			%	10.1	9.5	8.8	8.2	7.8	8.6	8.5	8.1	8.3	7.9	7.4	7.4	7.0	6.9	6.6	6.5	6.4	6.2	6.1
		- SPP	MW	966	1,215	1,634	2,003	2,638	2,791	2,791	2,851	2,888	2,888	2,888	2,888	2,838	2,782	2,777	2,770	2,667	2,667	2,647
			%	2.8	3.3	4.1	4.6	5.8	5.9	5.8	5.6	5.7	5.5	5.1	5.1	4.8	4.6	4.3	4.3	4.0	3.9	3.8
		- VSPP	MW	759	1,531	1,712	1,795	1,875	1,951	2,038	2,110	2,191	2,270	2,338	2,384	2,438	2,474	2,507	2,540	2,571	2,603	2,636
			%	2.2	4.2	4.3	4.2	4.1	4.1	4.2	4.1	4.4	4.3	4.2	4.2	4.1	4.1	3.9	3.9	3.8	3.8	3.7
		- Plan RE	MW	-	-	60	290	560	840	1,120	1,430	1,740	2,100	2,320	2,540	2,760	2,980	3,200	3,420	3,640	3,860	4,080
			%	-	-	0.2	0.7	1.2	1.8	2.3	2.8	3.5	4.0	4.1	4.5	4.6	4.9	5.0	5.3	5.4	5.6	5.8
		- Import	MW	2,105	2,105	2,105	2,105	2,105	2,105	2,764	3,984	3,984	4,284	4,584	4,884	5,184	5,484	5,784	6,084	6,384	6,684	6,858
			%	6.1	5.8	5.3	4.9	4.6	4.5	5.7	7.8	7.9	8.1	8.2	8.6	8.7	9.1	9.0	9.4	9.5	9.6	9.7
		Subtotal	**MW**	**7,288**	**8,327**	**8,993**	**9,745**	**10,734**	**11,768**	**12,817**	**14,534**	**14,968**	**15,709**	**16,298**	**16,878**	**17,404**	**17,907**	**18,457**	**19,065**	**19,532**	**20,098**	**20,546**
			%	**21**	**23**	**23**	**23**	**24**	**25**	**27**	**28**	**30**	**30**	**29**	**30**	**29**	**30**	**29**	**29**	**29**	**29**	**29**
Combined Cycle		- EGAT	MW	6,866	6,866	8,417	9,317	9,317	9,003	8,364	8,364	7,723	8,623	9,523	8,851	10,651	11,551	12,451	14,251	16,051	17,851	18,751
			%	20.0	18.8	21.3	21.6	20.5	19.1	17.3	16.3	15.3	16.3	17.0	15.6	17.9	19.1	19.5	21.9	24.0	25.7	26.5
		- IPP	MW	9,225	9,225	10,825	11,250	11,472	11,472	11,472	11,472	10,772	11,672	12,572	13,122	14,022	14,222	15,122	13,081	12,368	12,368	12,368
			%	26.9	25.3	27.4	26.1	25.2	24.3	23.7	22.3	21.4	22.1	22.4	23.1	23.6	23.5	23.6	20.1	18.5	17.8	17.5
		Subtotal	**MW**	**16,091**	**16,091**	**19,242**	**20,567**	**20,789**	**20,475**	**19,836**	**19,836**	**18,495**	**20,295**	**22,095**	**21,973**	**24,673**	**25,773**	**27,573**	**27,332**	**28,419**	**30,219**	**31,119**
			%	**47**	**44**	**49**	**48**	**46**	**43**	**41**	**39**	**37**	**38**	**39**	**39**	**41**	**43**	**43**	**42**	**42**	**44**	**44**
Cogeneration		- SPP	**MW**	**2,340**	**3,510**	**3,780**	**4,320**	**4,770**	**5,490**	**6,169**	**6,704**	**6,614**	**6,594**	**6,624**	**6,763**	**6,313**	**6,313**	**6,493**	**6,673**	**6,673**	**6,673**	**6,673**
			%	6.8	9.6	9.6	10.0	10.5	11.6	12.8	13.1	13.1	12.5	11.8	11.9	10.6	10.4	10.1	10.3	10.0	9.6	9.4
		- VSPP	MW	27	43	59	76	96	96	97	102	102	103	108	108	109	113	113	114	119	119	120
			%	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		Subtotal	**MW**	**2,367**	**3,553**	**3,839**	**4,396**	**4,866**	**5,586**	**6,266**	**6,806**	**6,716**	**6,697**	**6,732**	**6,871**	**6,422**	**6,426**	**6,606**	**6,787**	**6,792**	**6,792**	**6,793**
			%	**7**	**10**	**10**	**10**	**11**	**12**	**13**	**13**	**13**	**13**	**12**	**12**	**11**	**11**	**10**	**10**	**10**	**10**	**10**
Thermal	**Gas Turbine/Diesel**	- EGAT	MW	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	254	504	754
			%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	1.1
	Heavy Oil	- EGAT	MW	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315
			%	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Heavy Oil/Natural Gas	- EGAT	MW	2,204	2,204	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	576	-	-	-
			%	6.4	6.0	2.9	2.7	2.5	2.4	2.4	2.2	2.3	2.2	2.1	2.0	1.9	1.9	1.8	0.9	-	-	-
		- IPP	MW	1,510	1,510	1,510	1,510	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	-	-	-	-	-	-
			%	4.4	4.1	3.8	3.5	3.2	3.1	3.0	2.8	2.9	2.7	2.6	2.5	2.4	-	-	-	-	-	-
	Lignite	- EGAT	MW	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	1,910	1,640
			%	6.4	6.0	5.5	5.1	4.8	4.6	4.5	4.2	4.3	4.1	3.9	3.8	3.7	3.6	3.4	3.4	3.3	2.8	2.3
		- Lao PDR	MW	-	-	-	982	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473
			%	-	-	-	2.3	3.2	3.1	3.1	2.9	2.9	2.8	2.6	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2.1
	Coal	- EGAT	MW	-	-	-	-	-	-	-	-	800	800	800	1,600	1,600	2,400	2,400	2,400	3,200	3,200	3,200
			%	-	-	-	-	-	-	-	-	1.6	1.6	1.5	2.9	2.8	2.7	4.0	3.8	3.7	4.8	4.6	4.5
		- IPP	MW	2,007	2,007	2,007	2,007	2,277	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547	2,547
			%	5.9	5.5	5.1	4.7	5.0	5.4	5.3	5.0	5.1	4.8	4.5	4.5	4.3	4.2	4.0	3.9	3.8	3.7	3.6
	Nuclear	- EGAT	MW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,000	2,000	2,000	2,000	2,000
			%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	3.1	3.0	2.9	2.8
		Subtotal	**MW**	**8,220**	**8,220**	**7,168**	**8,150**	**8,841**	**9,111**	**9,111**	**9,911**	**9,911**	**9,911**	**10,711**	**10,711**	**10,711**	**10,071**	**11,071**	**11,495**	**11,969**	**11,949**	**11,929**
			%	**24**	**23**	**18**	**19**	**19**	**19**	**19**	**19**	**20**	**19**	**19**	**19**	**18**	**17**	**17**	**18**	**18**	**17**	**17**
EGAT - TNB , HVDC			**MW**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**	**300**
			%	**0.9**	**0.8**	**0.8**	**0.7**	**0.7**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.4**	**0.4**
Total			**MW**	**34,265**	**36,491**	**39,542**	**43,157**	**45,530**	**47,240**	**48,329**	**51,386**	**50,389**	**52,912**	**56,135**	**56,732**	**59,509**	**60,477**	**64,007**	**64,979**	**67,012**	**69,358**	**70,686**
			%	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Projection of Energy Generation by Fuel Types

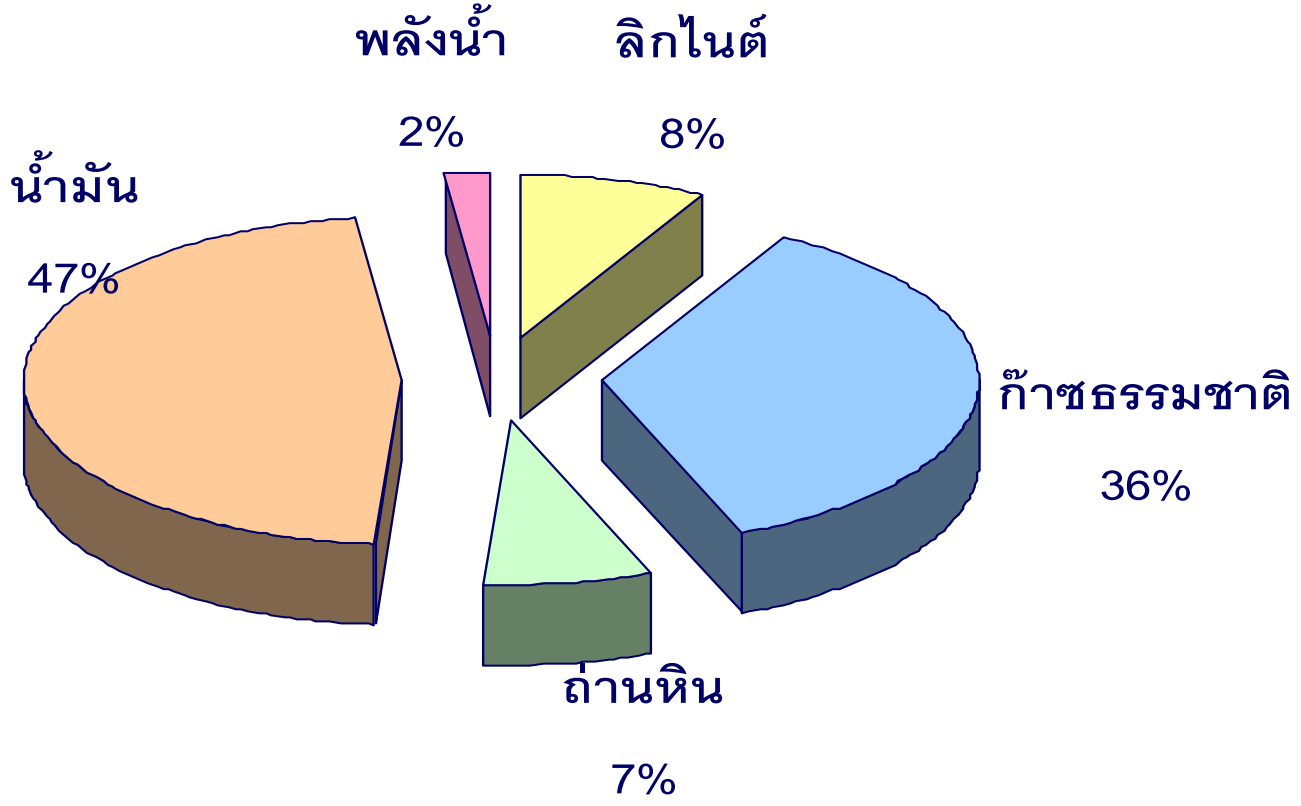
PDP 2010 : Revision 3

Fuel Types		Unit	Year																	
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Renewable Energy	- Domestic	GWh	13,843	14,823	14,709	16,322	17,620	20,080	21,284	22,378	23,472	24,441	24,937	25,367	25,587	25,685	25,814	26,184	26,343	26,298	26,673
		%	7.9	8.1	7.7	8.1	8.4	9.1	9.3	9.5	9.5	9.6	9.4	9.2	9.0	8.7	8.5	8.3	8.1	7.8	7.7
	- Import	GWh	12,605	12,306	11,527	11,073	12,346	11,120	13,269	15,959	19,990	21,530	23,070	24,040	26,150	27,689	29,229	30,769	32,309	33,279	34,205
		%	7.2	6.7	6.0	5.5	5.9	5.1	5.8	6.8	8.1	8.4	8.7	8.8	9.2	9.4	9.6	9.8	9.9	9.9	9.9
	Subtotal	**GWh**	**26,448**	**27,130**	**26,237**	**27,395**	**29,967**	**31,200**	**34,553**	**38,337**	**43,463**	**45,971**	**48,007**	**49,407**	**51,737**	**53,374**	**55,043**	**56,953**	**58,652**	**59,577**	**60,878**
		%	15.1	14.8	13.7	13.7	14.2	14.2	15.2	16.2	17.7	18.0	18.1	18.0	18.2	18.1	18.1	18.1	18.0	17.7	17.6
Natural Gas / LNG	- EGAT/IPP	GWh	102,387	103,846	108,810	109,754	106,569	104,598	104,573	101,125	101,624	108,483	112,351	118,087	126,606	132,603	133,073	132,997	131,500	143,147	154,873
		%	58.5	56.7	56.8	54.7	50.6	47.6	45.9	42.8	41.3	42.4	42.4	43.0	44.5	45.0	43.7	42.2	40.4	42.6	44.7
		MMCFD	2,166	2,178	2,217	2,211	2,102	2,051	2,039	1,978	1,974	2,096	2,173	2,279	2,435	2,551	2,568	2,576	2,539	2,763	2,975
	- SPP/VSPP	GWh	10,627	17,350	21,250	24,823	28,756	32,859	37,475	42,475	43,789	43,971	44,115	43,917	43,865	44,225	45,013	45,751	46,286	46,286	46,288
		%	6.1	9.5	11.1	12.4	13.7	15.0	16.5	18.0	17.8	17.2	16.6	16.0	15.4	15.0	14.8	14.5	14.2	13.8	13.4
	Subtotal	**GWh**	**113,013**	**121,197**	**130,060**	**134,577**	**135,325**	**137,456**	**142,048**	**143,600**	**145,412**	**152,454**	**156,466**	**162,004**	**170,470**	**176,828**	**178,086**	**178,748**	**177,786**	**189,434**	**201,161**
		%	64.6	66.1	67.9	67.1	64.3	62.6	62.4	60.8	59.1	59.6	59.0	59.0	59.9	60.1	58.5	56.8	54.6	56.4	58.0
		MMCFD	**2,166**	**2,178**	**2,217**	**2,211**	**2,102**	**2,051**	**2,039**	**1,978**	**1,974**	**2,096**	**2,173**	**2,279**	**2,435**	**2,551**	**2,568**	**2,576**	**2,539**	**2,763**	**2,975**
Import Coal	- EGAT/IPP	**GWh**	14,429	14,350	15,274	15,004	15,936	19,002	19,356	22,699	25,446	25,403	28,804	31,492	31,625	34,893	37,570	37,389	43,623	43,616	43,693
		%	8.2	7.8	8.0	7.5	7.6	8.7	8.5	9.6	10.3	9.9	10.9	11.5	11.1	11.9	12.3	11.9	13.4	13.0	12.6
		MTons	6	6	6	6	6	7	7	9	10	10	11	12	12	13	14	14	17	17	17
	- SPP	**GWh**	2,168	2,123	2,055	2,027	2,132	2,589	2,528	2,523	2,523	2,523	2,523	2,523	1,472	158	-	-	-	-	-
		%	1.2	1.2	1.1	1.0	1.0	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.5	0.1	-	-	-	-	-
	Subtotal	**GWh**	**16,596**	**16,473**	**17,328**	**17,032**	**18,068**	**21,591**	**21,884**	**25,221**	**27,969**	**27,926**	**31,326**	**34,015**	**33,097**	**35,051**	**37,570**	**37,389**	**43,623**	**43,616**	**43,693**
		%	9.5	9.0	9.0	8.5	8.6	9.8	9.6	10.7	11.4	10.9	11.8	12.4	11.6	11.9	12.3	11.9	13.4	13.0	12.6
		MTons	**5.66**	**5.63**	**6.07**	**5.89**	**6.32**	**7.35**	**7.49**	**8.74**	**9.77**	**9.75**	**11.02**	**12.03**	**12.08**	**13.31**	**14.31**	**14.24**	**16.57**	**16.57**	**16.60**
Lignite	- EGAT	GWh	16,749	16,696	16,736	16,738	16,614	17,120	17,030	17,024	17,077	17,031	17,031	17,039	17,090	17,041	17,037	17,019	17,078	14,910	12,786
		%	9.6	9.1	8.7	8.3	7.9	7.8	7.5	7.2	6.9	6.7	6.4	6.2	6.0	5.8	5.6	5.4	5.3	4.4	3.7
		MTons	16	16	16	16	16	16	14	14	14	14	14	14	14	14	14	14	14	12	10
	- Lao PDR	GWh	-	-	-	4,612	10,292	11,253	11,252	11,248	11,281	11,249	11,249	11,247	11,283	11,254	11,252	11,236	11,278	11,249	11,245
		%	-	-	-	2.3	4.9	5.1	4.9	4.8	4.6	4.4	4.2	4.1	4.0	3.8	3.7	3.6	3.5	3.4	3.2
	Subtotal	**GWh**	**16,749**	**16,696**	**16,736**	**21,349**	**26,906**	**28,373**	**28,282**	**28,273**	**28,358**	**28,280**	**28,281**	**28,286**	**28,374**	**28,296**	**28,289**	**28,255**	**28,356**	**26,159**	**24,031**
		%	9.6	9.1	8.7	10.6	12.8	12.9	12.4	12.0	11.5	11.1	10.7	10.3	10.0	9.6	9.3	9.0	8.7	7.8	6.9
		MTons	**16.04**	**15.99**	**16.03**	**16.03**	**15.92**	**16.00**	**13.81**	**14.02**	**14.16**	**14.12**	**14.12**	**14.13**	**13.87**	**13.74**	**13.62**	**13.61**	**13.66**	**11.84**	**9.78**
Nuclear	- EGAT	**GWh**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,600**	**12,620**	**16,090**	**16,042**	**16,046**
		%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	4.0	4.9	4.8	4.6
		Tons	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9**	**25**	**32**	**32**	**32**
Heavy Oil		**GWh**	**1,944**	**1,366**	**876**	**168**	**166**	**32**	**32**	**16**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		%	1.11	0.75	0.46	0.08	0.08	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-
		MLiters	**499.43**	**353.32**	**222.08**	**36.18**	**36.06**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Diesel	- EGAT	**GWh**	**130**	**133**	**172**	**75**	**55**	**26**	**23**	**23**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**
		%	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		MLiters	**29.10**	**31.86**	**40.60**	**20.92**	**13.47**	**7.00**	**6.30**	**6.30**	**5.61**	**5.60**	**5.60**	**5.60**	**5.61**	**5.60**	**5.60**	**5.60**	**5.61**	**5.60**	**5.60**
EGAT - TNB , HVDC		**GWh**	**209**	**290**	**221**	**131**	**132**	**939**	**939**	**939**	**941**	**939**	**939**	**939**	**941**	**939**	**939**	**938**	**941**	**938**	**938**
		%	0.1	0.2	0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total		**GWh**	**175,089**	**183,283**	**191,630**	**200,726**	**210,619**	**219,616**	**227,760**	**236,408**	**246,164**	**255,591**	**265,039**	**274,672**	**284,640**	**294,508**	**304,548**	**314,925**	**325,470**	**335,787**	**346,767**

พลังงานทดแทน..อนาคตอุตสาหกรรมไทย ยิ่งร้อน..ยิ่งเย็น..

วันที่ 22 สิงหาคม 2550

การใช้พลังงานของประเทศไทยปี 2549

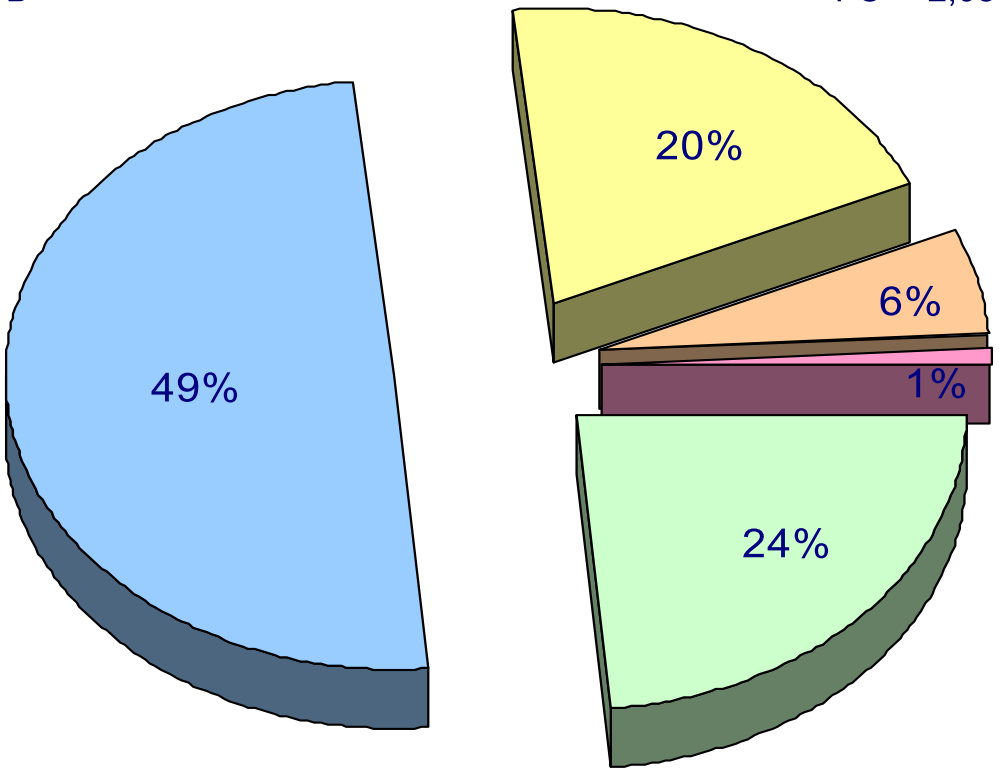


เทียบเท่าน้ำมันดิบ 1.45 ล้านบาเรลต่อวัน

สัดส่วนการใช้เชื้อเพลิงในภาคอุตสาหกรรมปี 2549

COAL = 11 ล้านตัน /ปี

FO = 2,088ล้านลิตร/ปี

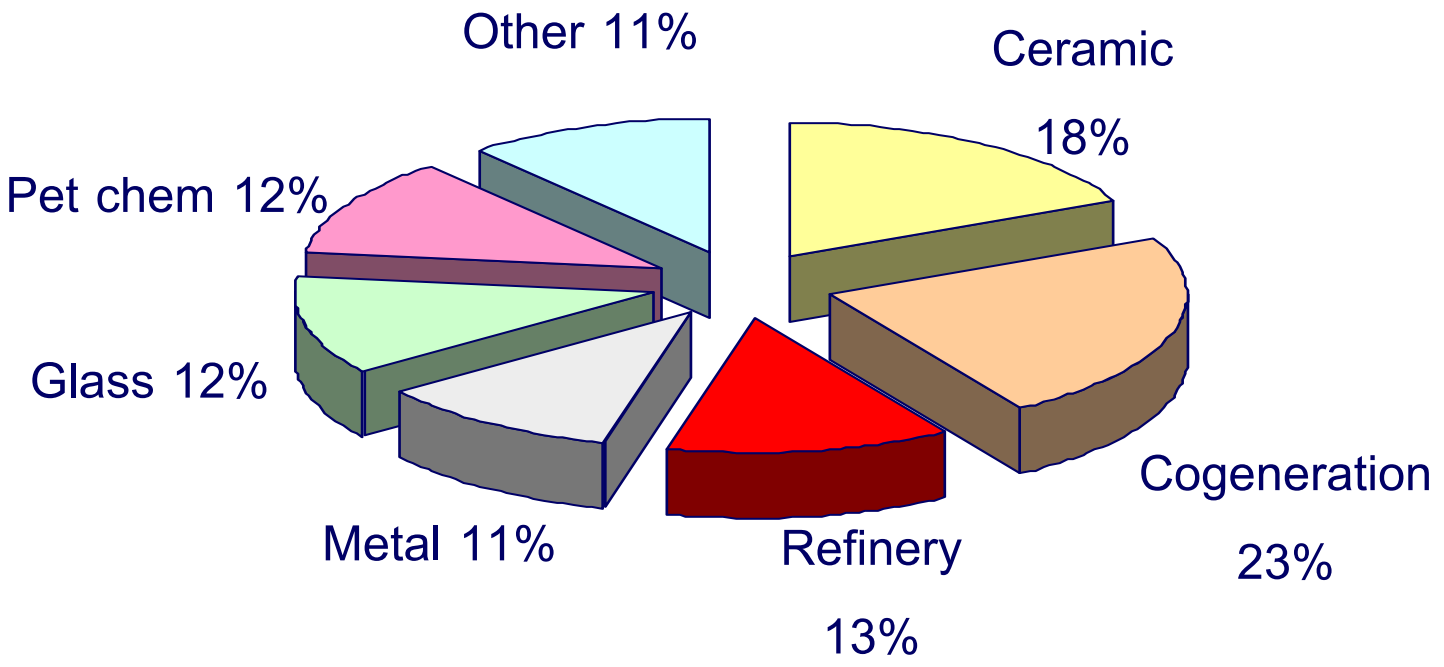


LPG = 517 ล้านกก. /ปี

NG = 275 MMSCFD

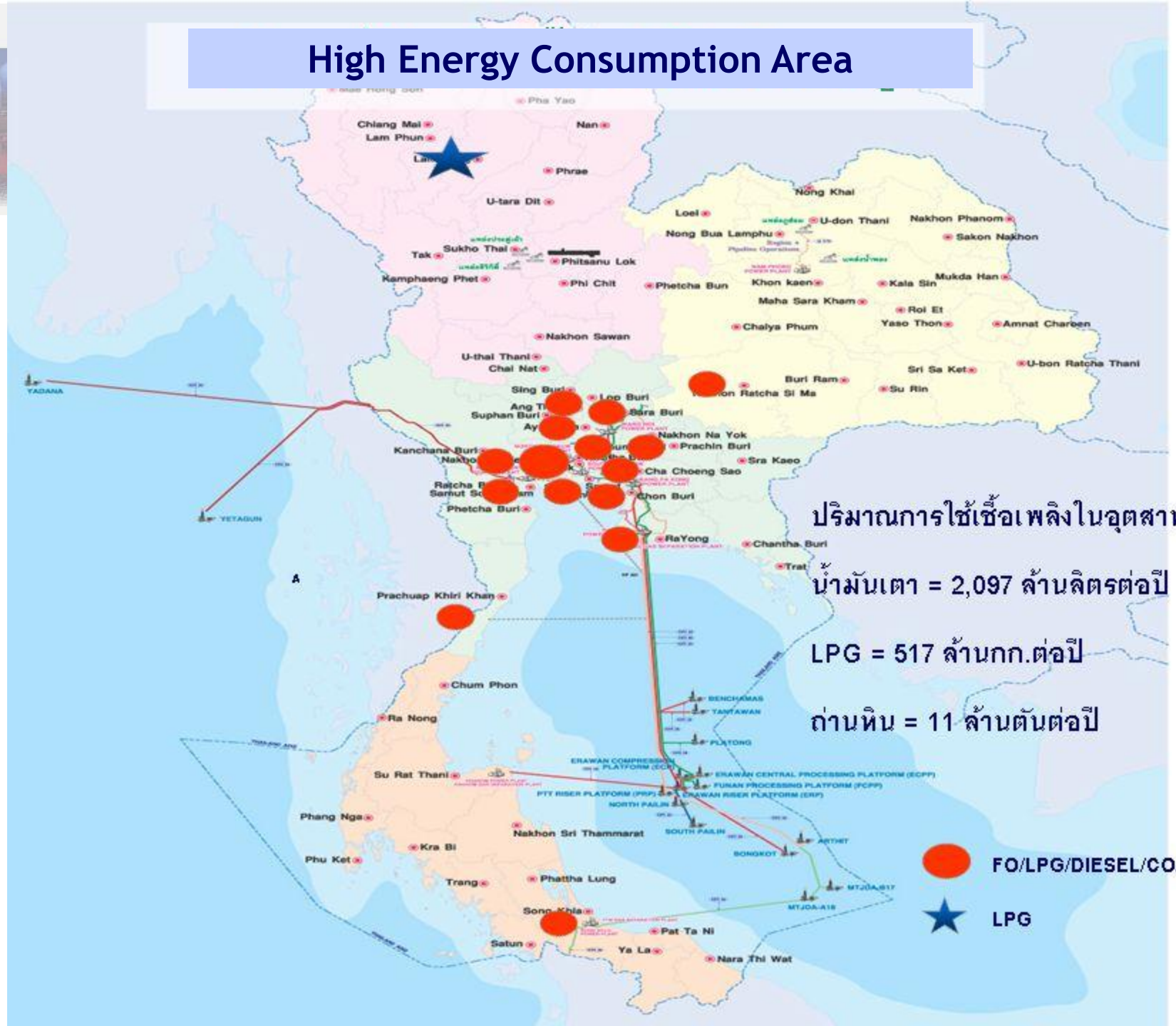
Total 1,157 MMSCFD

สัดส่วนการใช้ก๊าซธรรมชาติแต่ละประเภท



- การใช้ก๊าซธรรมชาติในภาคอุตสาหกรรมมีการขยายตัวอย่างต่อเนื่อง เนื่องจากการขยายระบบเครือข่ายท่อส่งก๊าซฯ และการประยุกต์ใช้ก๊าซในอุปกรณ์แบบใหม่

High Energy Consumption Area



ปริมาณการใช้เชื้อเพลิงในอุตสาหกรรม

น้ำมันเตา = 2,097 ล้านลิตรต่อปี

LPG = 517 ล้านกก.ต่อปี

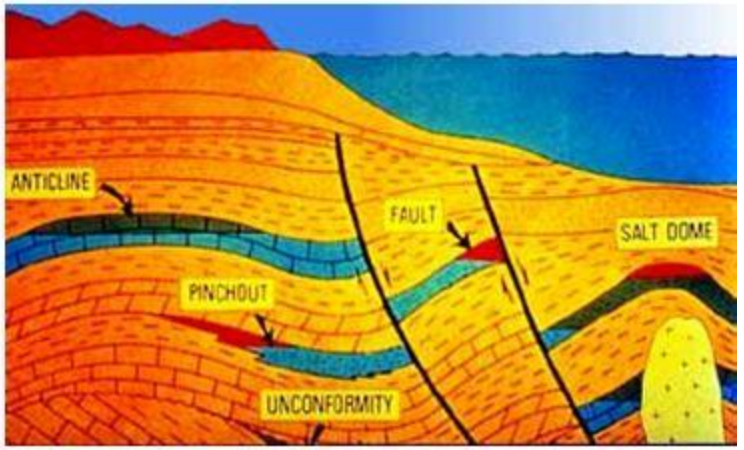
ถ่านหิน = 11 ล้านตันต่อปี

FO/LPG/DIESEL/COAL

LPG

What is Natural Gas?

- เป็นทรัพยากรปิโตรเลียมที่เกิดจากซากพืชและซากสัตว์ที่ทับถมกันมานาน และโดนแรงกดดันจากการทับถมและความร้อนจากใต้ดินทำให้กลายเป็นน้ำมันและก๊าซธรรมชาติ
- ประกอบด้วยสารไฮโดรเจน (H) และ คาร์บอน (C)
  - C1 (C_1H_4) - Methane
  - C2 (C_2H_6) - Ethane
  - C3 (C_3H_8) - Propane
  - C4 (C_4H_{10}) - Butane
  - C5+



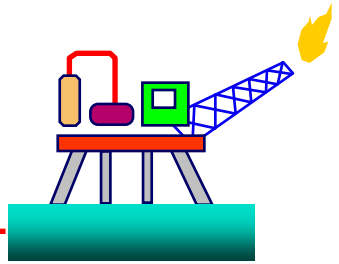
- นอกจากสารประกอบไฮโดรเจนคาร์บอนเหล่านี้แล้ว ยังอาจมีก๊าซอื่น ๆ เช่น ก๊าซคาร์บอนไดออกไซด์(CO_2), ไนโตรเจน (N_2) และน้ำเป็นต้น
- หน่วยวัดก๊าซธรรมชาติ คือ ค่าความร้อน (BTU), 1 cu.Ft = 1000 BTU

THAILAND NATURAL GAS UTILIZATION

PIPETYPE SLUG CATCHER

SLUG CATCHER DRUM

GAS PLANT

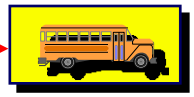


NATURAL GAS IN THE GULF OF THAILAND

C_1

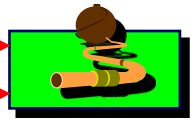
POWER GENERATION

INDUSTRIAL FUEL/ COGEN.



NGV

C_2

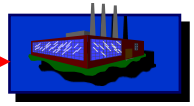


FEED STOCK FOR NPC

C_3

C_3+C_4

LPG / COOKING



THAI OLEFINS AROMATICS

C_5+

GASOLINE POOL REFINERY

CO_2

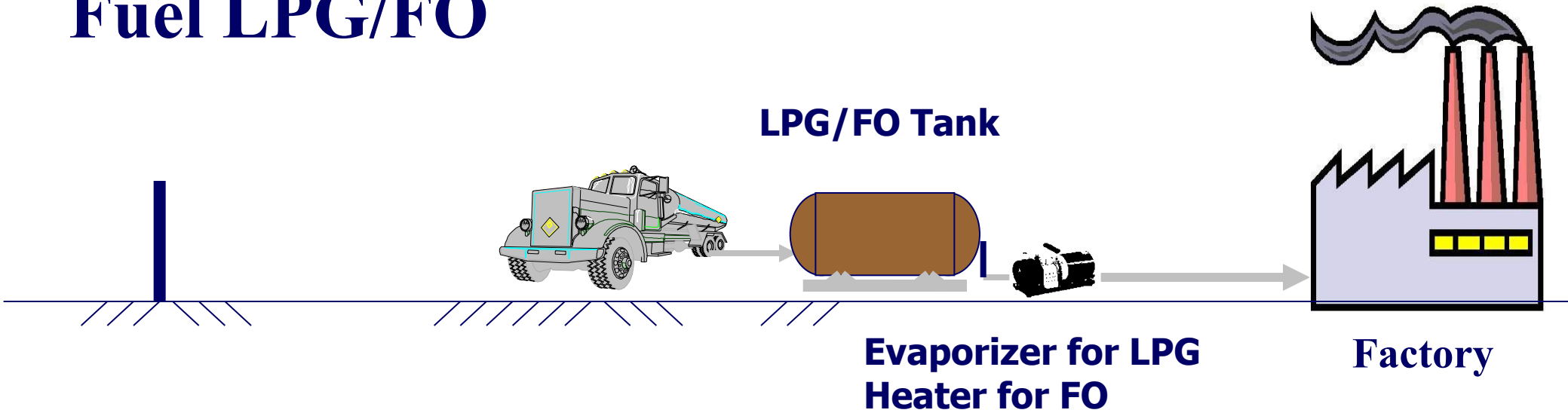
DRY ICE FOR FOOD PRESERVATION

NG Pipe Network

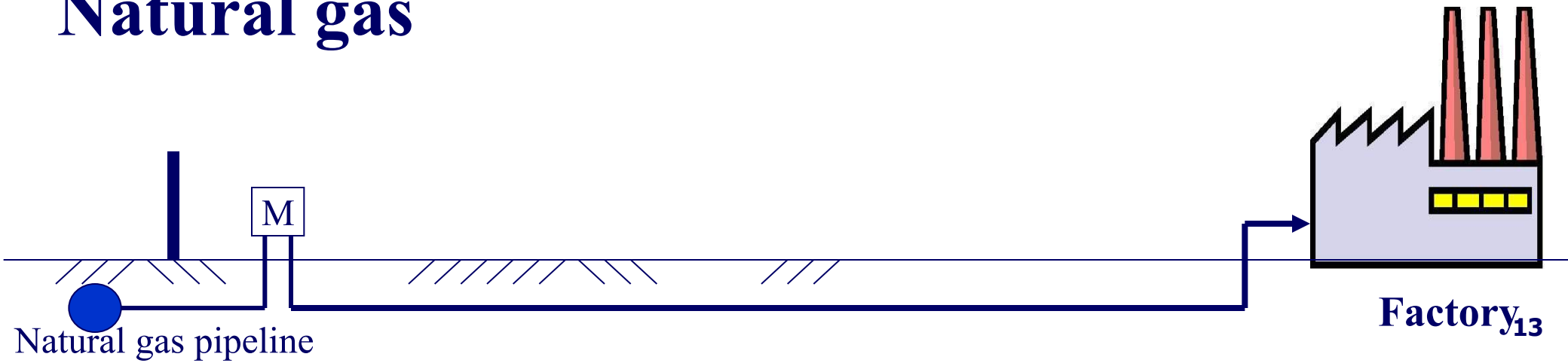
- ระบบท่อก๊าซในทะเลจะสามารถส่งก๊าซได้สูงสุด 4,000 MMSCFD
- ระบบท่อก๊าซจากสหภาพพม่าจะสามารถส่งก๊าซได้สูงสุด 1,200 MMSCFD

Fuel Supplied System

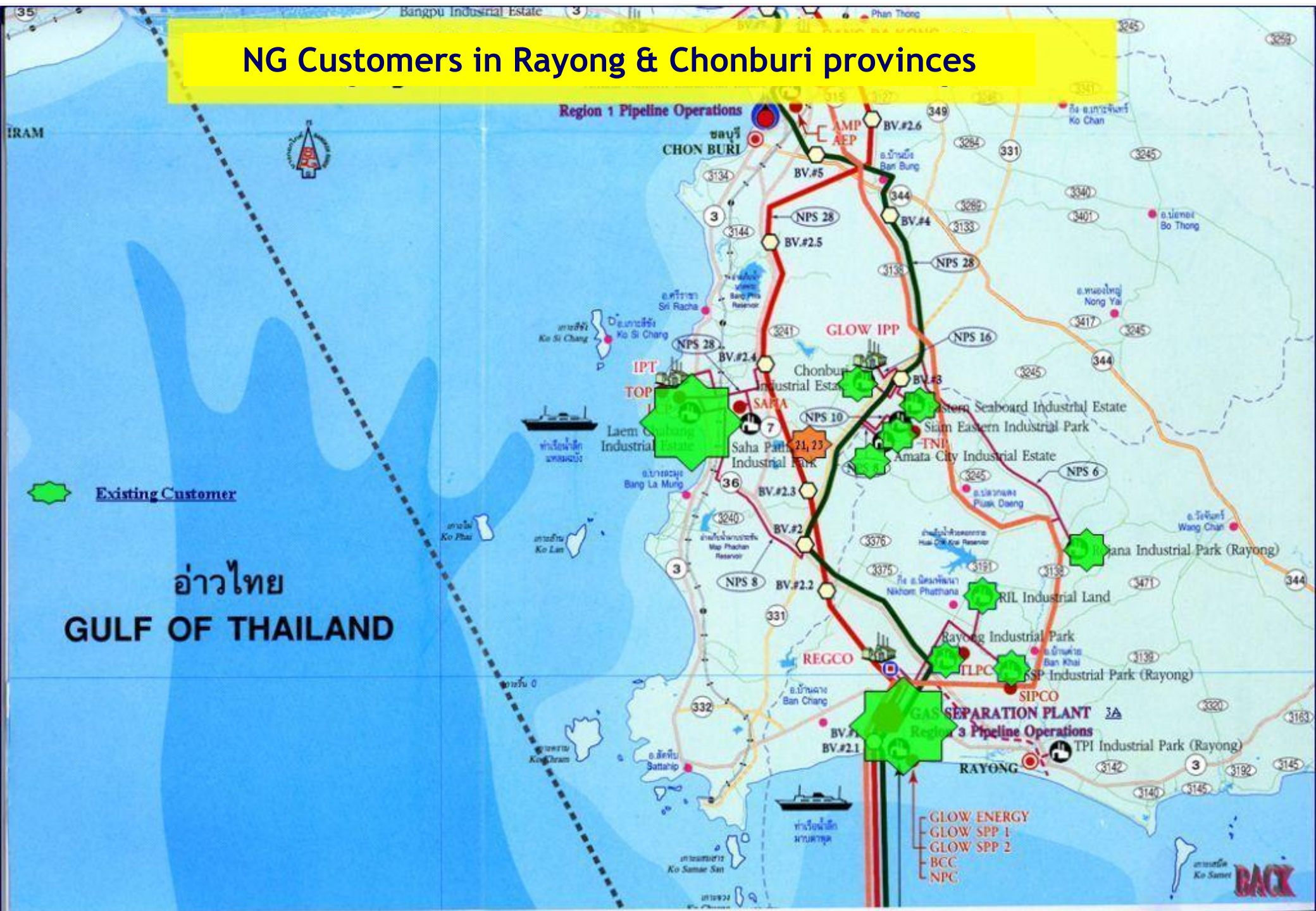
Fuel LPG/FO



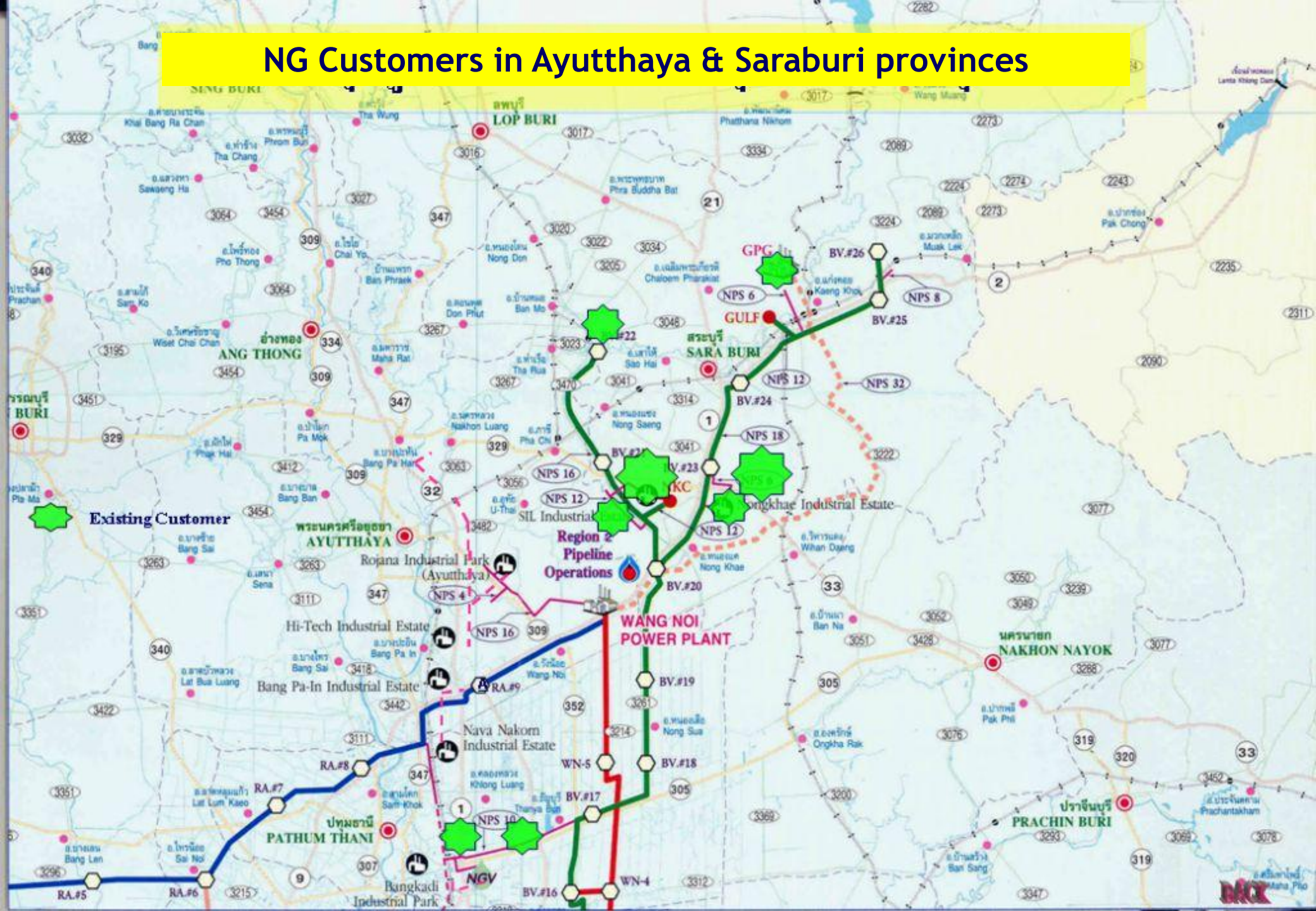
Natural gas



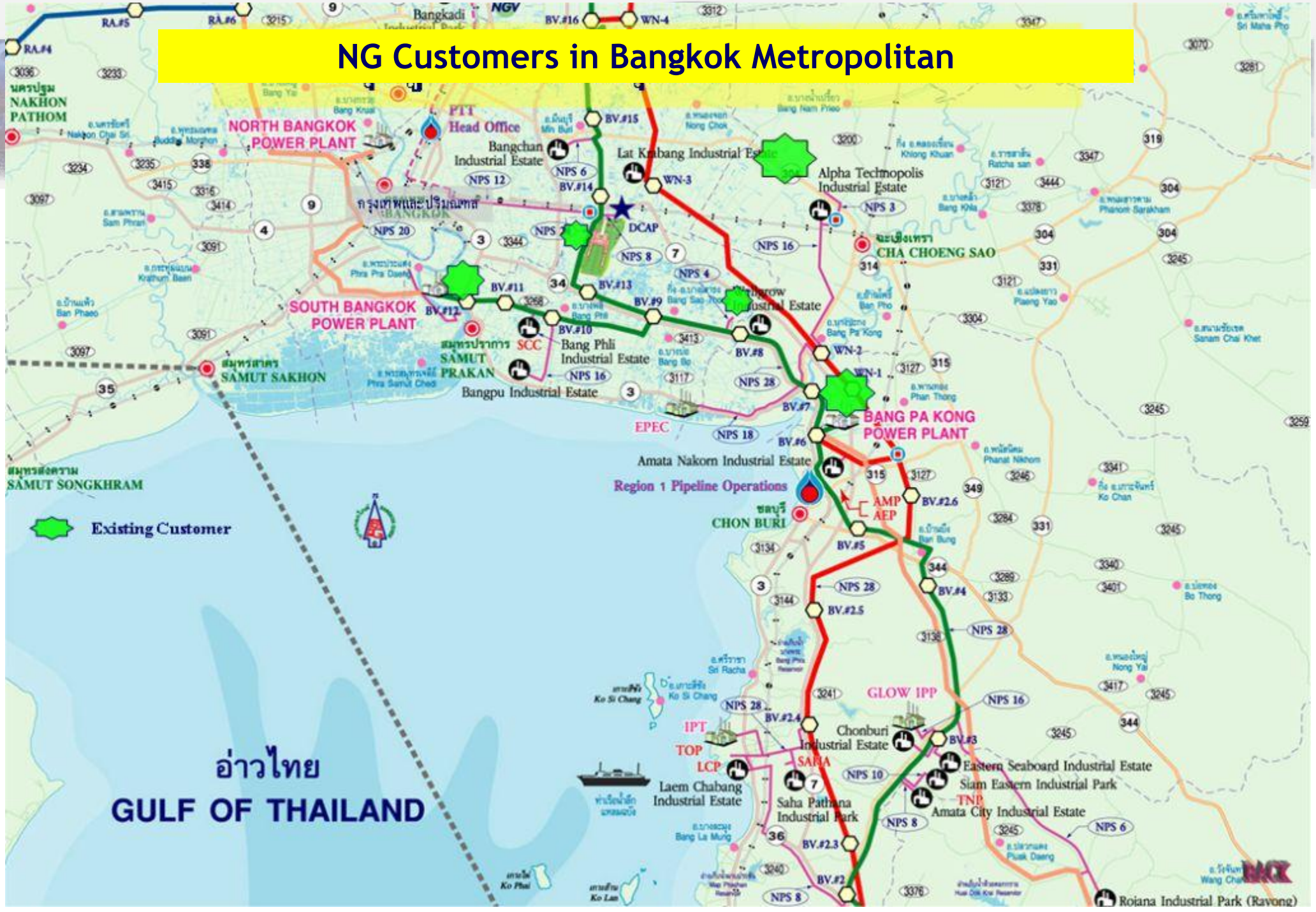
NG Customers in Rayong & Chonburi provinces



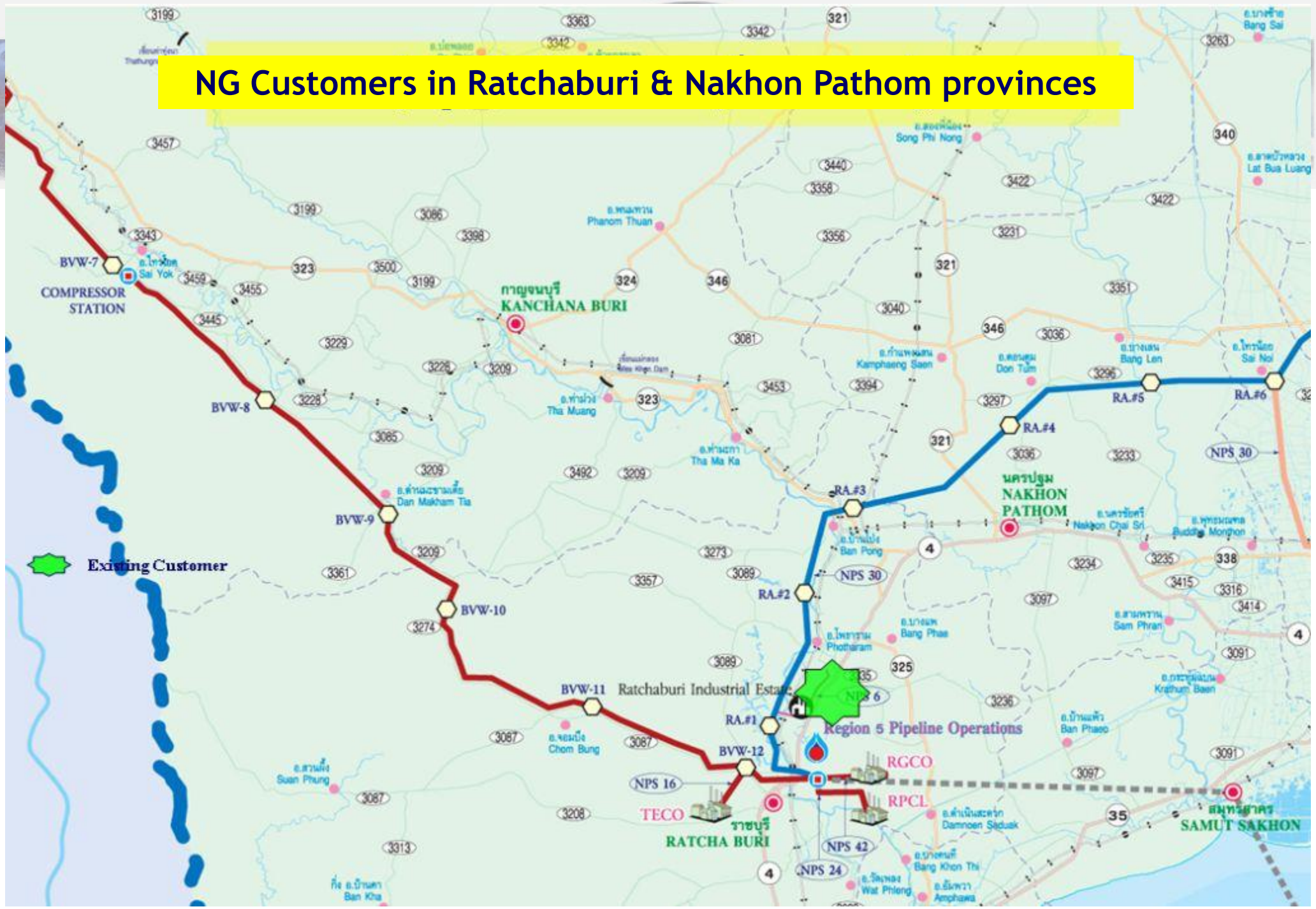
NG Customers in Ayutthaya & Saraburi provinces

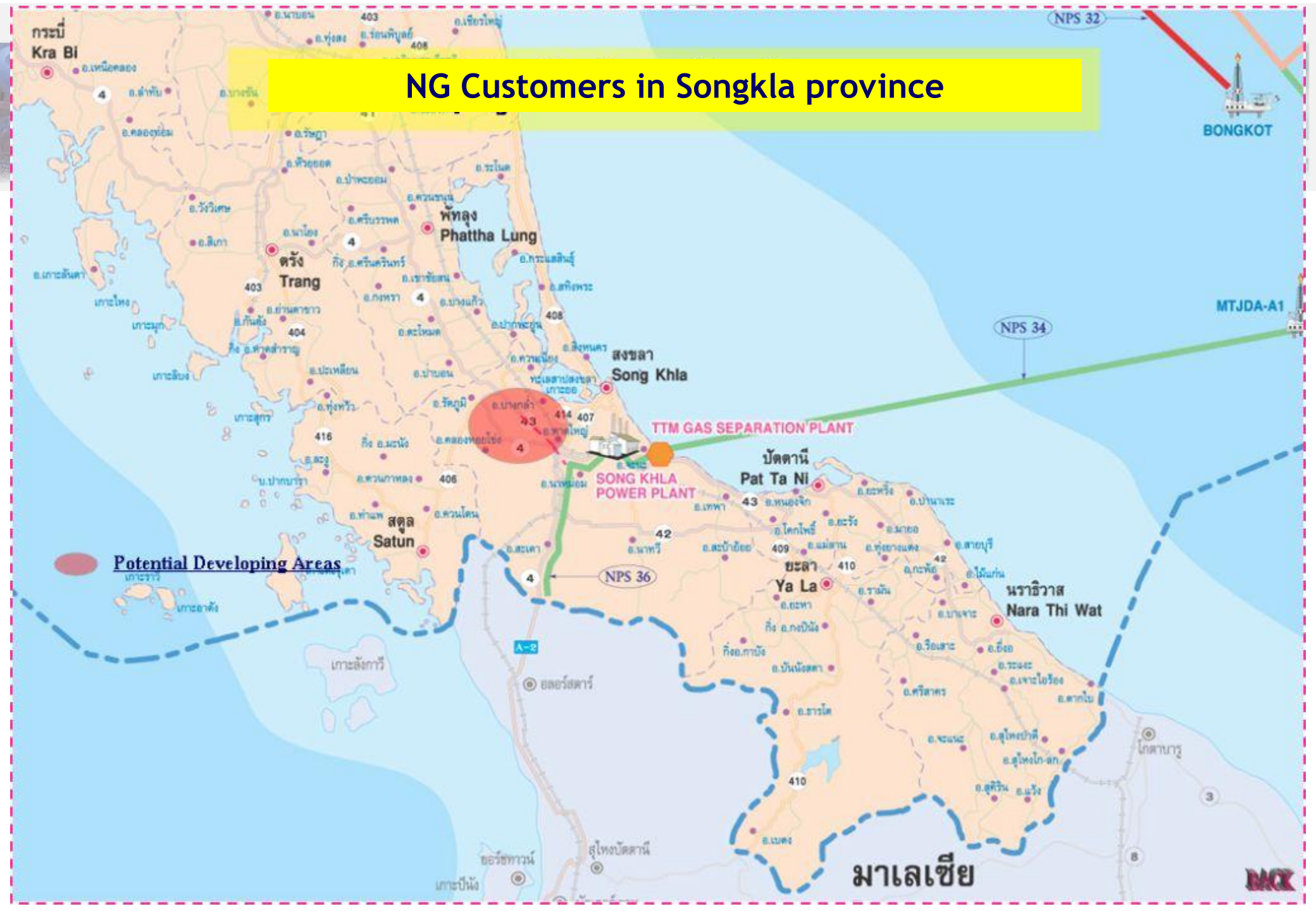


NG Customers in Bangkok Metropolitan

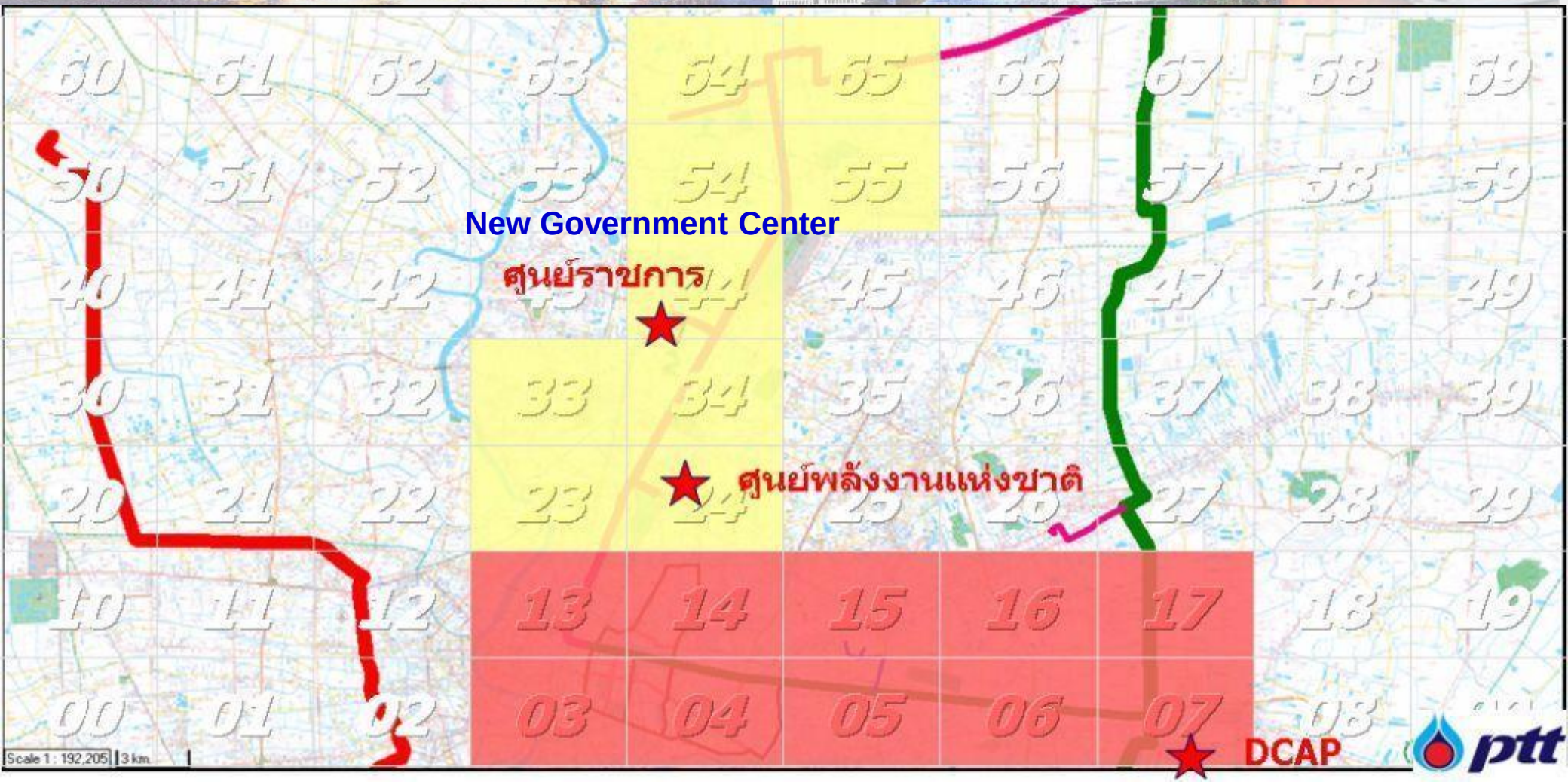


NG Customers in Ratchaburi & Nakhon Pathom provinces

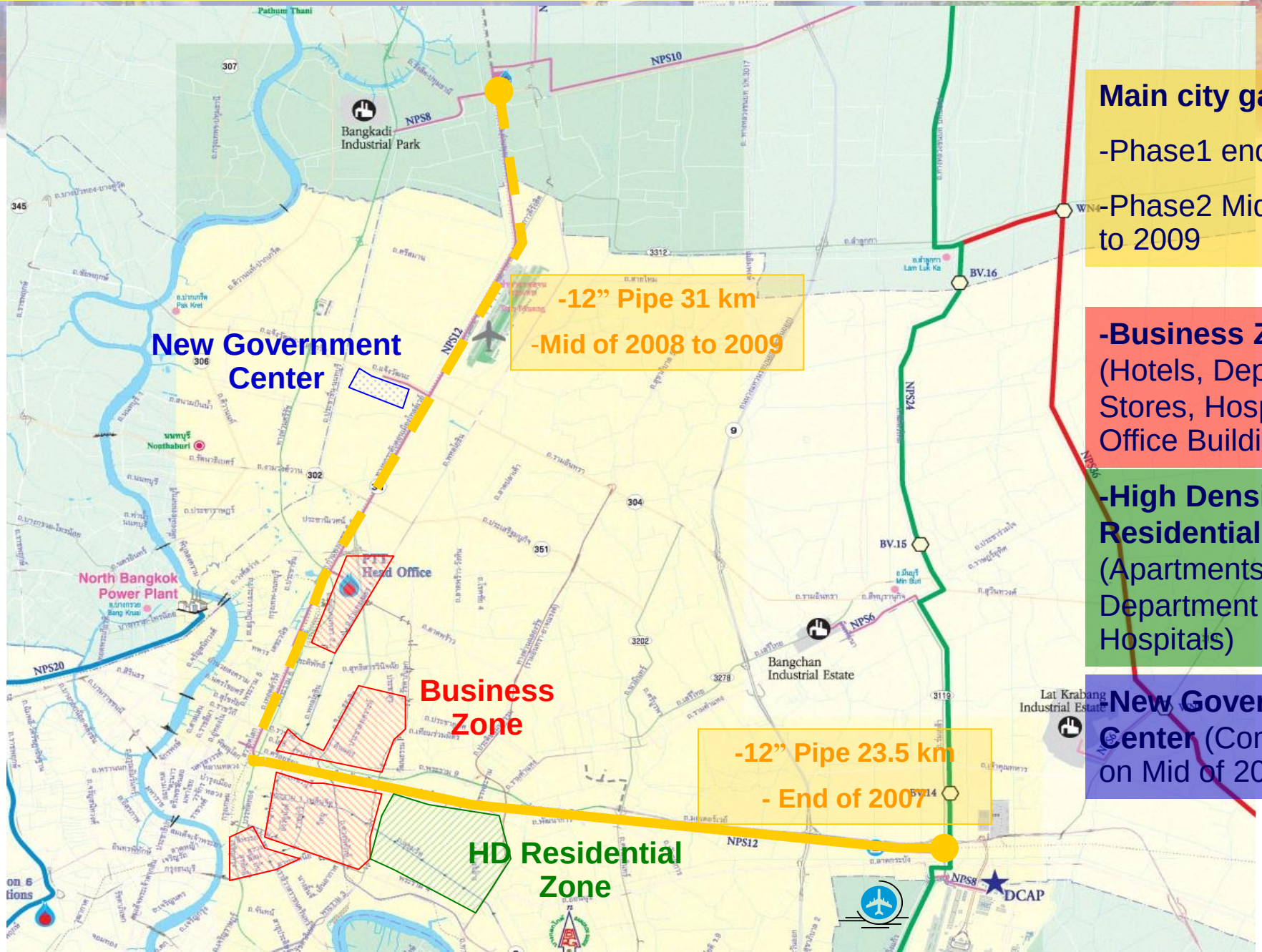



NG Customers in Songkla province
NPS 32
BONGKOT
MTJDA-A1
NPS 34
NPS 36
TTM GAS SEPARATION PLANT
SONG KHLA POWER PLANT
Potential Developing Areas
กระบี่
Kra Bi
พัทลุง
Phattha Lung
ตรัง
Trang
สงขลา
Song Khla
สตูล
Satun
ปัตตานี
Pat Ta Ni
ยะลา
Ya La
นราธิวาส
Nara Thi Wat
มาเลเซีย

NG Pipe Network Around Bangkok Metropolitan



City Gas Pipeline Network



Main city gas pipe

-Phase1 end of 2007

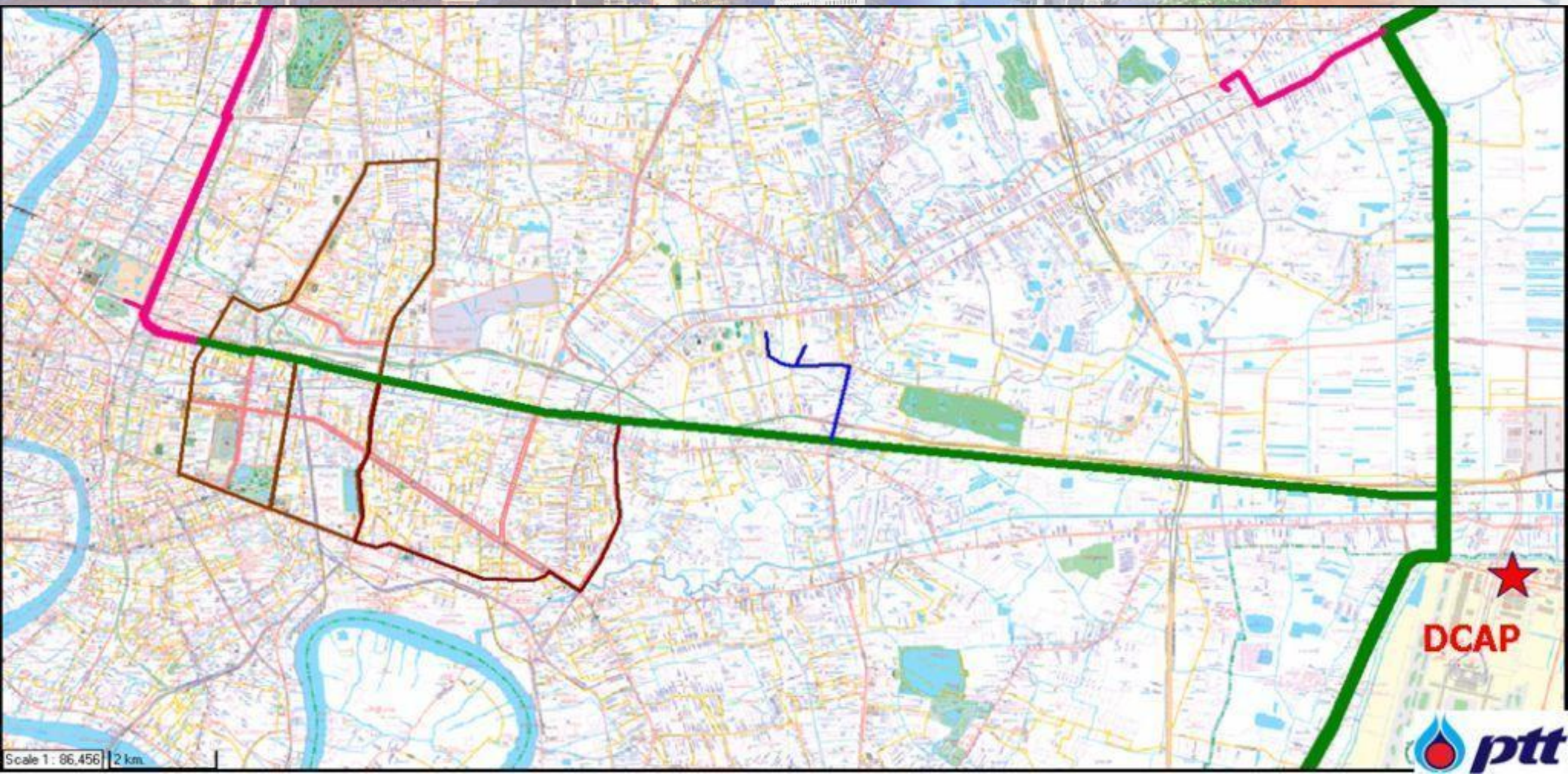
-Phase2 Mid of 2008 to 2009

-Business Zone (Hotels, Department Stores, Hospitals, Office Buildings)

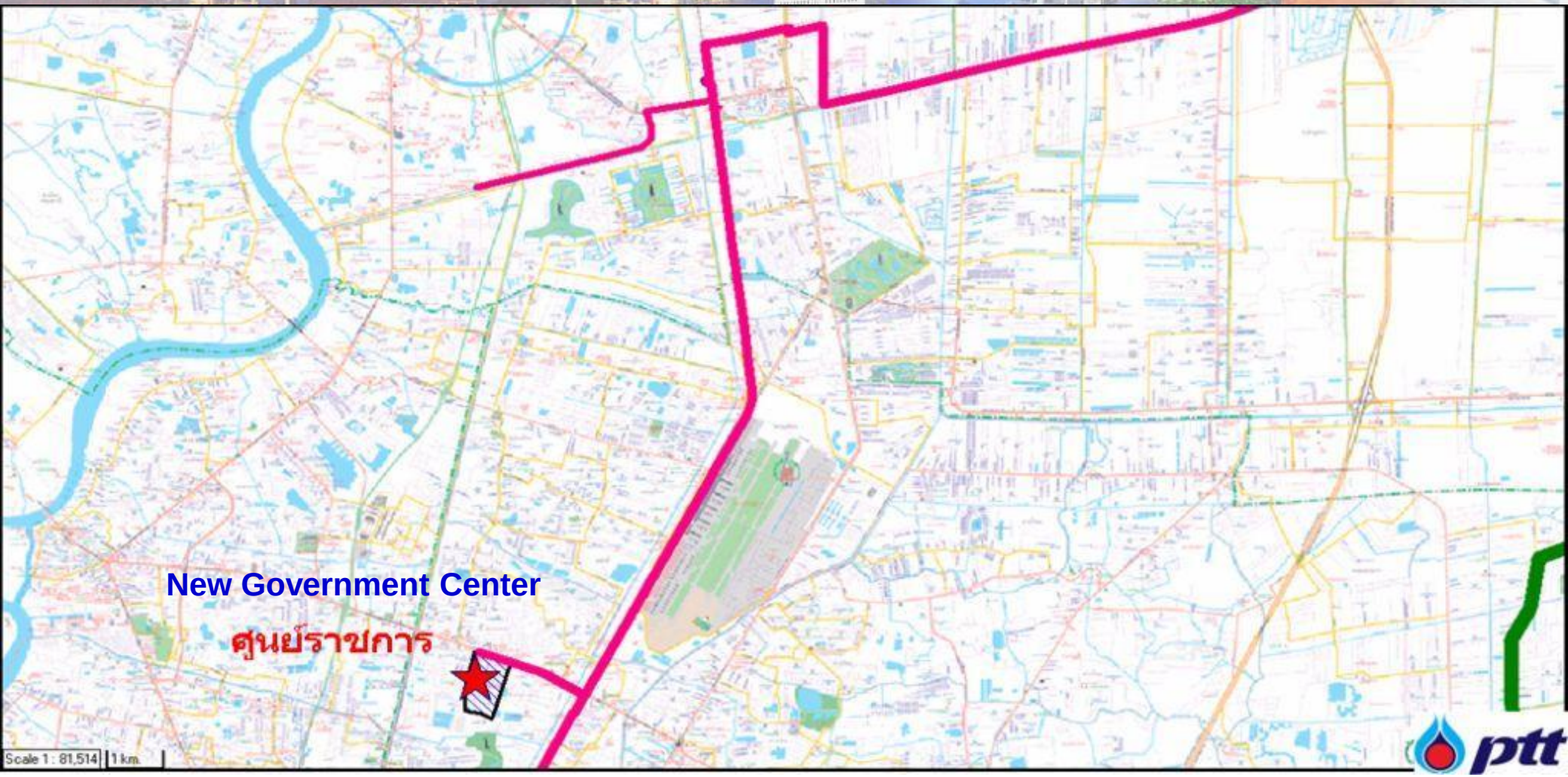
-High Density Residential Zone (Apartments, Department Stores, Hospitals)

New Government Center (Completed on Mid of 2008)

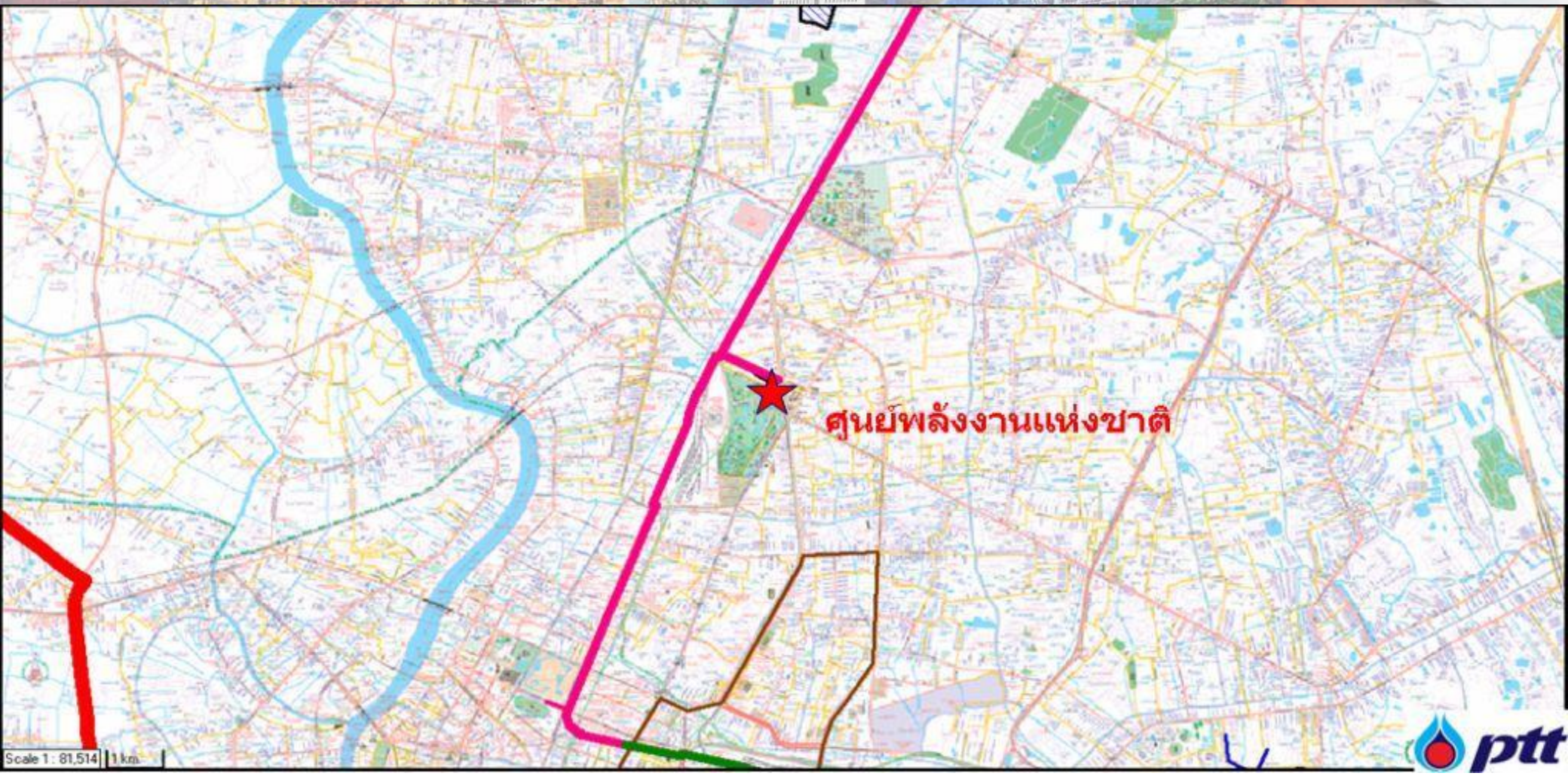
NG Pipeline Suvanabhumi-Phaya Thai Road



NG Pipeline Rangsit – Phaya Thai Road

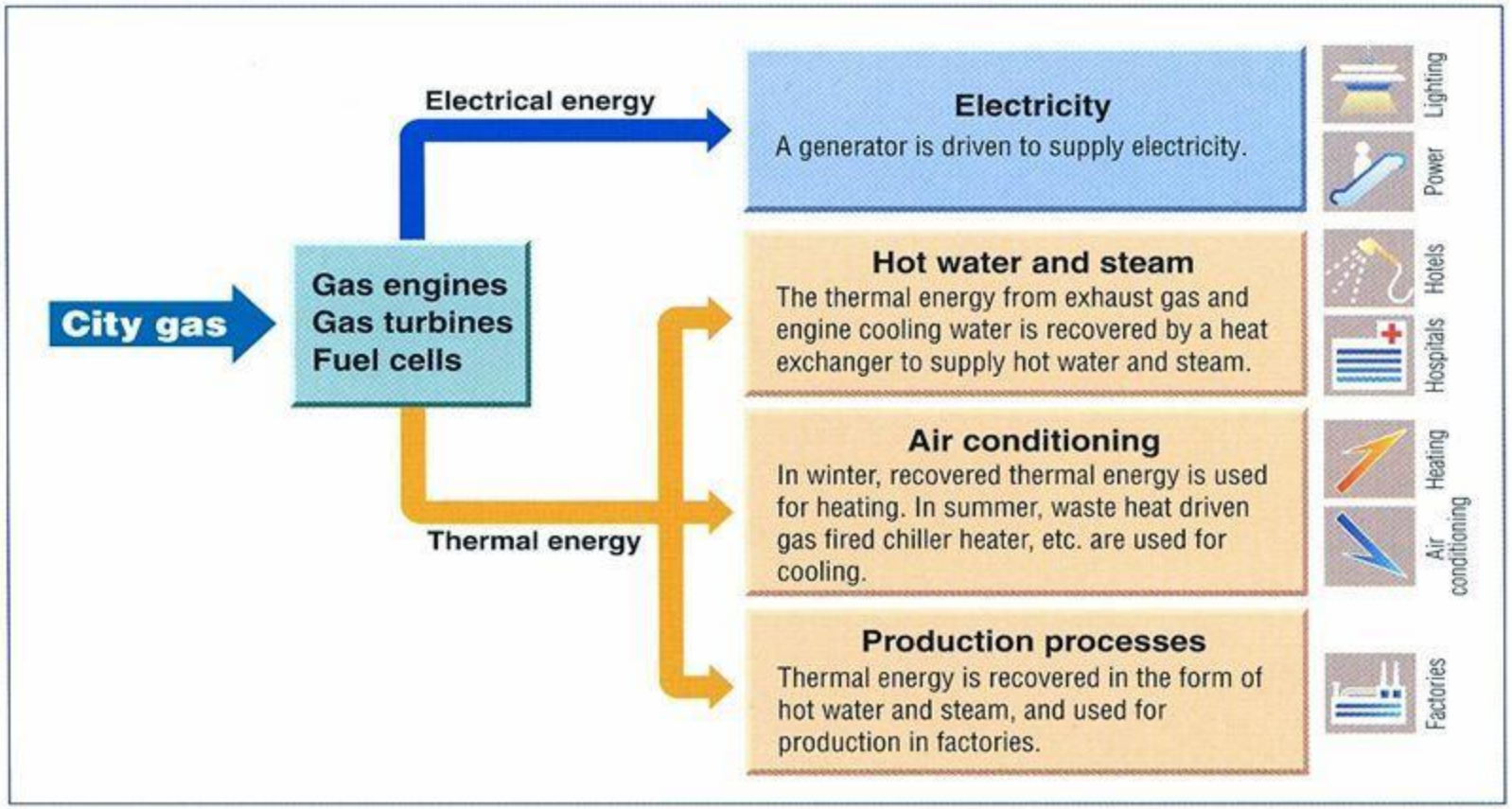


NG Pipeline Rangsit – Phaya Thai Road (Continue)



Commercial NG Applications

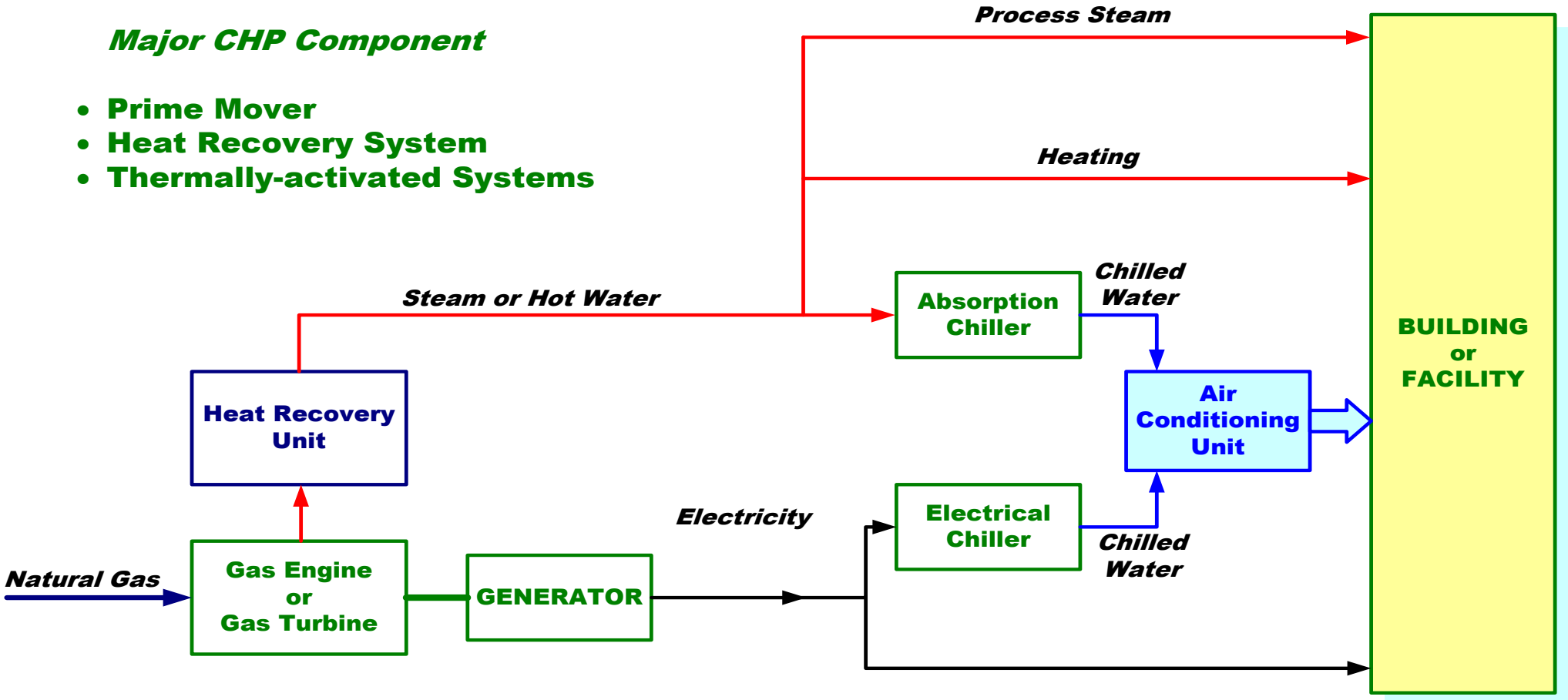
- Effective use of energy by gas cogeneration



Conceptual Scheme of a CHP System

Major CHP Component

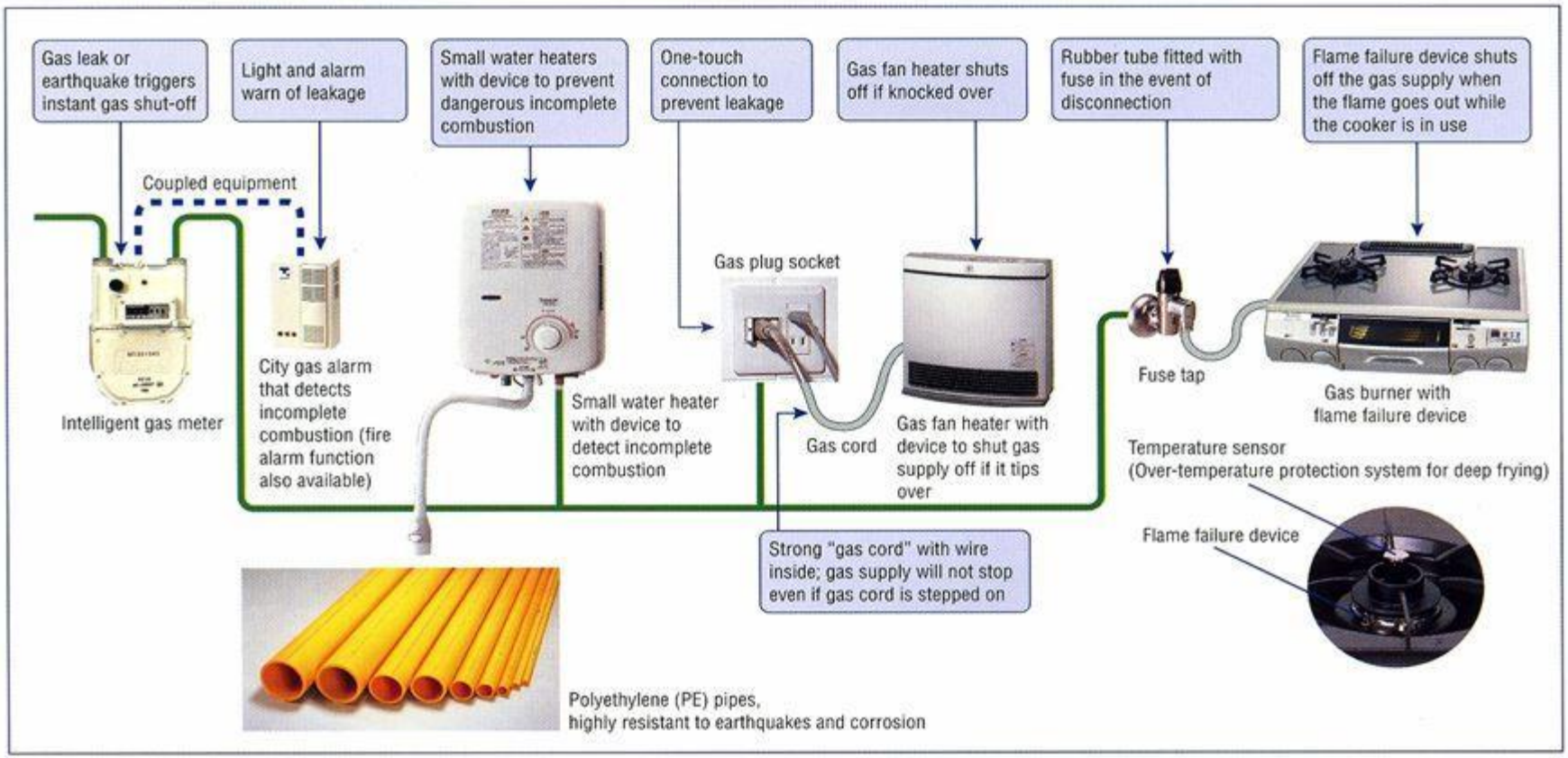
- **Prime Mover**
- **Heat Recovery System**
- **Thermally-activated Systems**



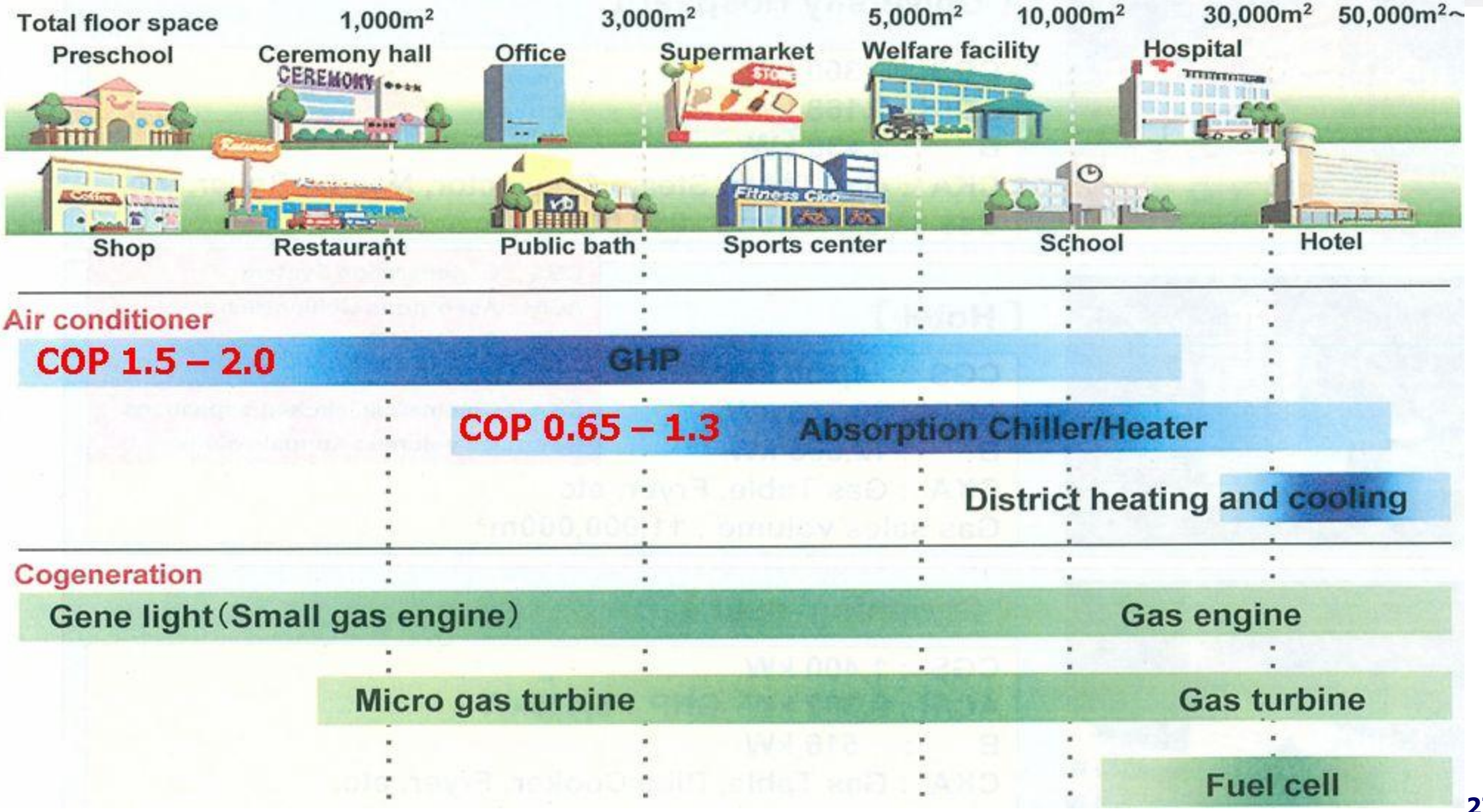
Residential NG Applications

To increase safety in using city gas

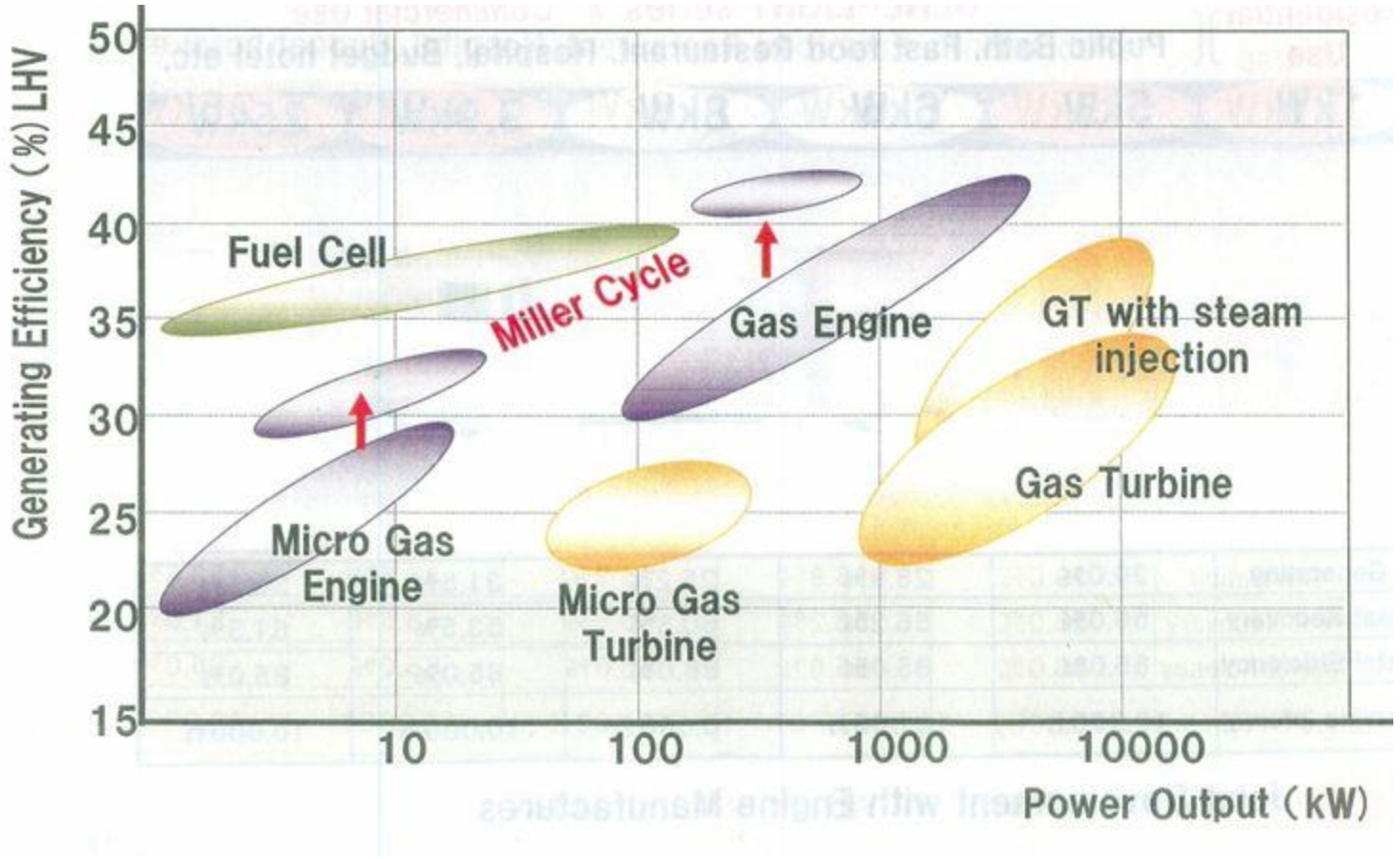
- **Gas equipment safety system**



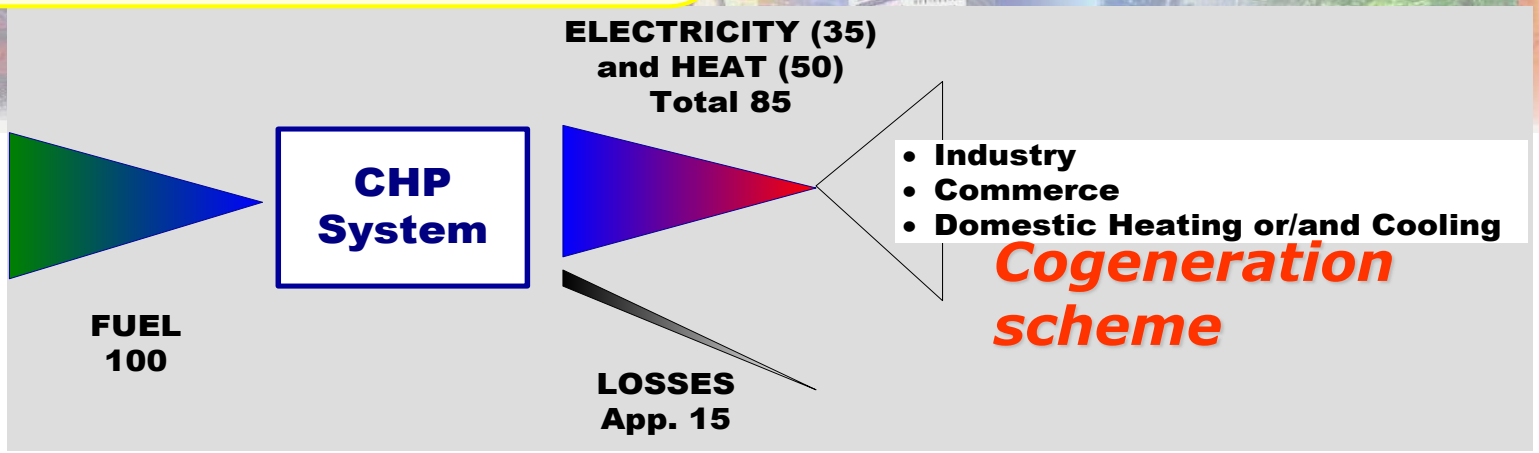
Introduction of NG Appliances for Commercial Use

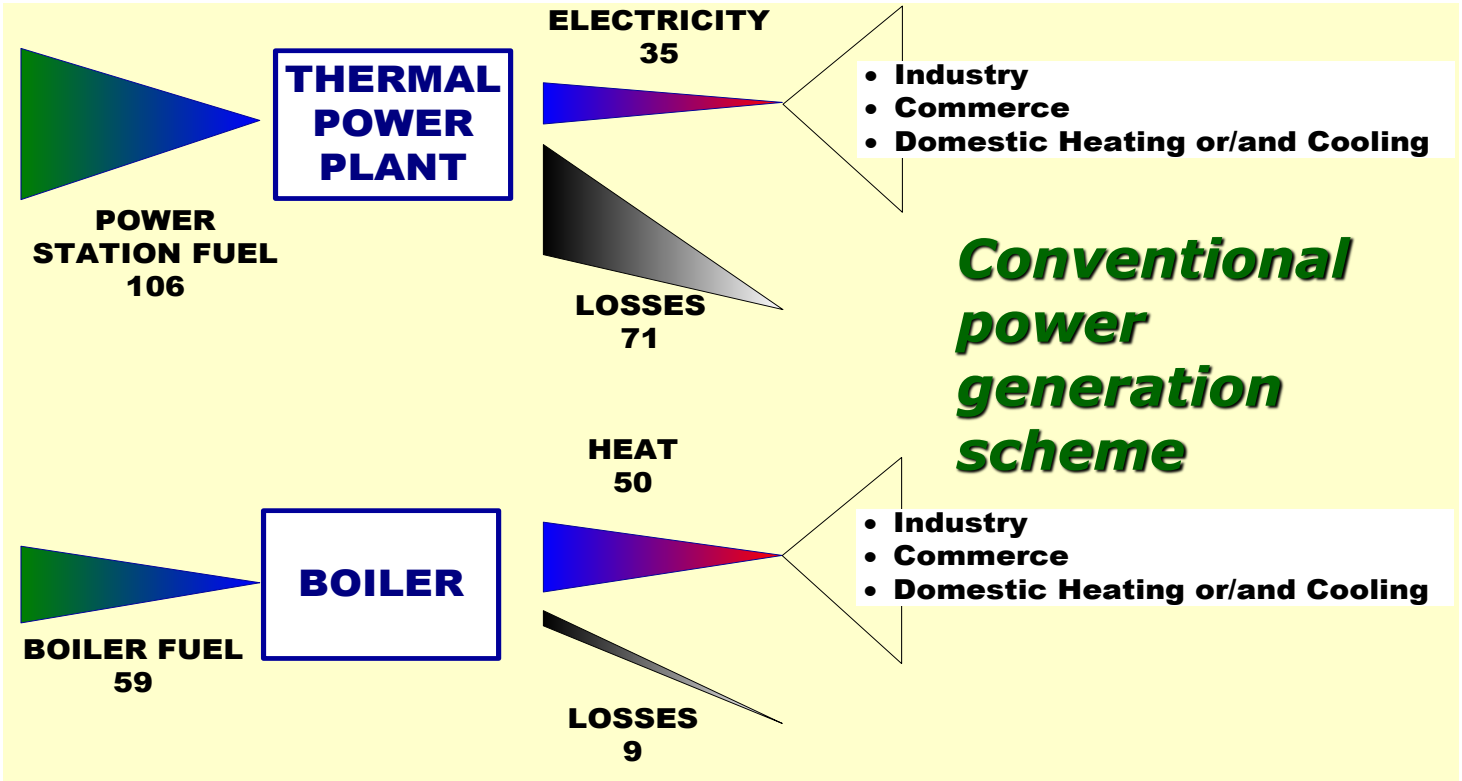


Status of Generating Efficiency



Primary Energy Use Comparison





	Advantages	Disadvantages
GAS TURBINES	• High reliability which permits - long-term unattended operation; • High grade heat available; • Constant high speed enabling - close frequency control of electrical output; • High power to weight ratio; • No cooling water required; • Relatively low investment cost per kWe electrical output; • Wide fuel range capability (diesel, LPG, naphtha, associated gas, landfill sewage); • Multi fuel capability; • Low emissions.	• Limited number of unit sizes within the output range; • Lower mechanical efficiency than Reciprocating engines; • If gas fired, requires high-pressure supply or in-house boosters; • High noise levels (of high frequency can be easily alternated); • Poor efficiency at low loading (but they can operate continuously at low loads); • Can operate on premium fuels but need to be clean of dry; • Output falls as ambient temperature rises due to thermal constraints within the turbine; • May need long overhaul periods.

	Advantages	Disadvantages
RECIPROCATING ENGINES	• High power efficiency, achievable over a wide load range; • Relatively low investment cost per kWe electrical output; • Part-load operation flexibility from 30% to 100% with high efficiency; • Can be used in island mode (all ships do this) good load following capability; • Fast start-up time of 15 second to full load (gas turbine needs 0.5 – 2 hours); • Real multi-fuel capability, can also use HFO as fuel; • Can be overhaul on site with normal operators; • Low investment cost in small sizes; • Can operate with low-pressure gas (down to 1 bar).	• Must be cooled, even if the heat recovered is not reusable; • Low power to weight ratio and out-of balance. Forces requiring substantial foundations; • High levels of low frequency noise; • High maintenance costs.

Example of Design

- *1,200 RT Chillers matched with 2.5 MW Gas Turbine*
- *250 RT Chillers matched with 1.0 MW Gas Engine*
- *CHP can be utilized for 24 Hours with eff. more than 75%*
- *Above Base Cooling Load, Chilled Water can be supplied by NG Direct Fired Absorption Chillers/Electric Chillers*

Reference of BCHP

[DCAP] District Cooling (Y2005)

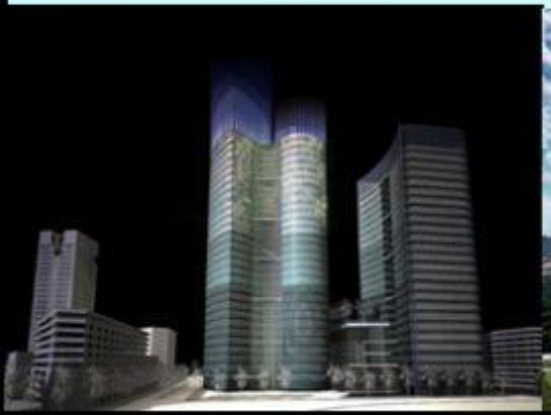
GT/ST : 50 MW

AC : 12500 RT

Government Center (Y2008)

GT : 9.6 MW

AC : 6000 RT out of 12000 RT



Energy Complex (Y2009)

GE : 5 MW

AC : 1300 RT out of 4200 RT

Classified Generated Electricity of SPP by type of Fuel
As of March 2012

	Type of Fuel/ Technology	Under Consideration Process			Approved (wait for PPA)			Have PPA (wait for COD)			Supplying Power to the Grid			Total		
		Number of Projects	Installed Capacity	Sale to EGAT (MW)	Number of Projects	Installed Capacity	Sale to EGAT (MW)	Number of Projects	Installed Capacity	Sale to EGAT (MW)	Number of Projects	Installed Capacity	Sale to EGAT (MW)	Number of Projects	Installed Capacity	Sale to EGAT (MW)
Commercial Energy																
	Coals	-	-	-	-	-	-	-	-	-	5	432.20	203.50	5	432.20	203.50
	Nutural Gas	-	-	-	9	1,019.53	810.00	47	5,604.84	4,214.00	23	2,934.24	1,653.00	79	9,558.61	6,677.00
	Heavy Oil	-	-	-	0	-	-	0	-	-	1	10.40	4.50	1	10.40	4.50
Total Commercial Energy		**0**	**-**	**-**	**9**	**1,019.53**	**810.00**	**47**	**5,604.84**	**4,214.00**	**29**	**3,376.84**	**1,861.00**	**85**	**10,001.21**	**6,885.00**
Non-Conventional Energy																
1	**Solar**	**3**	**175.72**	**171.00**	**0**	**-**	**-**	**3**	**211.85**	**210.00**	**1**	**60.00**	**55.00**	**7**	**447.57**	**436.00**
2	**Biogas**	**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**
3	**Biomass**	**5**	**148.00**	**121.00**	**3**	**214.00**	**133.50**	**3**	**96.80**	**89.00**	**22**	**614.00**	**362.10**	**33**	**1,072.80**	**705.60**
	Bagasse	5	148.00	121.00				2	92.00	85.00	9	245.40	109.80	16	485.40	315.80
	Rice Husk	0	-	-	0	-	-	0	-	-	4	48.30	41.80	4	48.30	41.80
	Rice Husk, Wood Chips	0	-	-	2	182.00	105.50	0	-	-	2	57.80	49.00	4	239.80	154.50
	Bagasse, Wood Chips, Rice Husk	0	-	-	0	-	-	0	-	-	2	104.90	56.00	2	104.90	56.00
	Palm Residue, Cassava Root	0	-	-	0	-	-	0	-	-	1	9.90	8.80	1	9.90	8.80
	Rice Husk, Bagasse, Eucalyptus	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
	Wood bark, Wood Chips, Black Liquor	0	-	-	0	-	-	0	-	-	1	87.20	50.00	1	87.20	50.00
	Rubber Wood Chips	0	-	-	0	-	-	1	4.80	4.00	1	23.00	20.20	2	27.80	24.20
	Baggase, Paddy Husk, Biomass	0	-	-	1	32.00	28.00	0	-	-	2	37.50	26.50	3	69.50	54.50
4	**Trash**	**0**			**1**	**60.00**	**55.00**	**0**		**-**	**0**	**-**	**-**	**1**	**60.00**	**55.00**
5	**Hydroelectric**	**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**	**1**	**13.26**	**12.20**	**1**	**13.26**	**12.20**
6	**Wind**	**19**	**904.30**	**856.10**	**3**	**276.00**	**270.00**	**4**	**326.20**	**290.00**	**0**	**-**	**-**	**26**	**1,506.50**	**1,416.10**
7	**Other**	**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**	**3**	**53.85**	**38.72**	**3**	**53.85**	**38.72**
	Black Liquor	0	-	-	0	-	-	0	-	-	1	32.90	25.00	1	32.90	25.00
	Waste Gas	0	-	-	0	-	-	0	-	-	1	19.00	12.00	1	19.00	12.00
	Natural gas by-product of Crude Oil	0	-	-	0	-	-	0	-	-	1	1.95	1.72	1	1.95	1.72
Total Non-Conventional Energy		**27**	**1,228.02**	**1,148.10**	**7**	**550.00**	**458.50**	**10**	**634.85**	**589.00**	**27**	**741.11**	**468.02**	**71**	**3,153.98**	**2,663.62**
Mixed Fuel																
	Heavy Oil, Coals	0	-	-	0	-	-	0	-	-	1	108.00	45.00	1	108.00	45.00
	Coals, Black Liquor	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
	Coals, Wood Chips	0	-	-	0	-	-	0	-	-	2	328.00	180.00	2	328.00	180.00
Total Mixed Energy		**0**	**-**	**-**	**0**	**-**	**-**	**0**	**-**	**-**	**3**	**436.00**	**225.00**	**3**	**436.00**	**225.00**
	Total	**27**	**1,228.02**	**1,148.10**	**16**	**1,569.53**	**1,268.50**	**57**	**6,239.69**	**4,803.00**	**59**	**4,553.95**	**2,554.02**	**159**	**13,591.19**	**9,773.62**

List of SPP fueled by renewable energy (as of March 2012)

Code	No.	Company	Location	Installed Capacity (MW)	Sale to EGAT (MW)	Type of Business	Adder/ Subsidy	Type of fuel	Classified type pf fuel	Type of electric purchasing	Type pf fuel Adder	Voltage (kV)	Step	Date of Result announcement	Contract Signing Date	Length of Contract	COD	Note
EGAT0001	1	Mitr Phu Viang co, ltd	Nongrua Khon Kean	27.00	8.000	Sugar Mill	Non Adder	Bagasse	Bagasse	Renew	Biomass	22	4	30/04/1997	22/05/1997	Non - Firm years and Cont	11/06/1997	
EGAT0002	2	U-Thong Industry co, ltd	Uthing Suphanburi	18.00	7.000	Sugar Mill	Subsidy	Bagasse	Bagasse	Renew	Biomass	22	4	07/09/1998	09/06/2008	Non - Firm years and Cont	08/02/2000	
EGAT0003	3	Saraburi Sugar co, ltd	Wangmuang Saraburi	29.50	8.000	Sugar Mill	Subsidy	Bagasse	Bagasse	Renew	Biomass	22	4	12/12/2003	04/04/2009	Non - Firm years and Cont	04/01/2002	
EGAT0004	4	Thai Roong Ruang industry co, ltd.	Srithep Phetchabul	29.50	8.000	Sugar Mill	Subsidy	Bagasse	Bagasse	Renew	Biomass	22	4	12/10/2001	05/03/2009	Non - Firm years and Cont	21/01/2003	
EGAT0005	5	Ratchasima Sugar co,ltd	Kengsanamnang Nakhonratchasrima	34.00	30.000	Power Plant	Subsidy	Bagasse	Bagasse	Renew	Biomass	115	4	09/04/2003	06/06/2008	Non - Firm years and Cont	22/08/2003	
EGAT0006	6	Kumphawapi co, ltd	Kumpawapee Udonthani	19.60	6.000	Power Plant	Non Adder	Bagasse	Bagasse	Renew	Biomass	22	4	18/08/2005	24/07/2008	Non - Firm years and Cont	02/04/2004	
EGAT0007	7	Thai Carbon Black plc co ltd	Muang Angthong	19.00	12.000	Factory	Non Adder	Waste Gas	Waste Gas	Renew	Others	22	4	05/03/2001	05/04/2001	Non - Firm years and Cont	20/07/2006	
EGAT0008	8	Ratchburi Energy co ltd (Project2)	Kongkailad Sukhothai	1.95	1.723	Power Plant	Non Adder	Natural gas by product of	Natural gas by-product of Crude Oil	Renew	Others	22	4	23/05/2006	03/12/2008	Non - Firm years and Cont	27/06/2007	
EGAT0009	9	Khon Kean Sugar co ltd (Project2)	Boploy Kanchanaburi	65.00	22.00	Power Plant	On Process	Bagasse	Bagasse	Renew	Biomass	115	4	03/04/2009	12/01/2010	Non - Firm 5 years and Cont	30/11/2010	
EGAT0010	10	Department of Alternative Energy and Efficiency	Makham Chantaburi	13.26	12.20	Hydroelectric	Non Adder	Hydroelectric	Hydroelectric	Renew	Hydroelectric		4			Non - Firm 5 years and Cont	21/03/2011	
EGAT0011	11	Natual Energy Development co, ltd	Khoksamrong Lopburi	60.00	55.00	Solar	Adder	Solar	Solar	Renew	Solar	115	4	11/11/2009	04/03/2010	Non - Firm 5 years and Cont	22/12/2011	The project has 10 phases, COD Every 2 Months
EGAT0012	12	Thai Power Supply co, ltd (1)	Panomsarakarm Chacheangsao	47.40	41.00	Rice Mill, Wood Chips Plant	Subsidy	Rice Husk,Wood Chips	Rice Husk, Wood Chips	Renew	Biomass	115	4	16/12/2004	16/04/1999	Firm 25 years	21/04/1999	
EGAT0013	13	BPK Power Supply co, ltd	Bangpakong Chacheangsao	10.40	8.00	Rice Mill, Wood Chips Plant	Subsidy	Rice Husk,Wood Chips	Rice Husk, Wood Chips	Renew	Biomass	N/A	4	16/02/1998	16/04/1999	Firm 21 years	07/05/1999	
EGAT0014	14	Bio-Mass Power co, ltd	Watsing Chainat	6.00	5.00	Power Plant	Non Adder	Rice Husk	Rice Husk	Renew	Biomass	22	4	10/01/1995	22/06/1998	Firm 25 years	09/10/2001	
EGAT0015	15	Roi-Et Green co, ltd	Muang Roi-Et	9.90	8.80	Power Plant	Non Adder	Rice Husk	Rice Husk	Renew	Biomass	22	4	20/02/2000	22/10/2001	Firm 21 years	29/05/2003	
EGAT0016	16	National Power Plant 5 co, ltd	Srimahaphot Prachinburi	87.20	50.00	Black Liquor Power Plant	Subsidy	Wood bark,Wood	Wood bark,Wood Chips,Black	Renew	Biomass	115	4	10/02/2003	22/09/2003	Firm 25 years	05/11/2003	
EGAT0017	17	National Power Plant 11 co, ltd	Srimahaphot Prachinburi	32.90	25.00	Power Plant	Subsidy	Black Liquor	Black Liquor	Renew	Others	115	4	09/04/2003	22/09/2003	Firm 25 years	2/12/2003	
EGAT0018	18	Dan Chang Bio-Energy co, ltd	Dan Chang Suphanburi	48.00	27.00	Power Plant	Subsidy	Bagasse, Rice Husk,	Bagasse,Rice Husk, Wood Chips	Renew	Biomass	115	4	20/05/2005	19/12/2003	Firm 21 years	15/07/2004	
EGAT0019	19	Phu Khieo Bio-Energy co, ltd	Phu Khieo Chaiyaphum	56.90	29.00	Power Plant	Non Adder	Bagasse, Rice Husk,	Bagasse,Rice Husk, Wood Chips	Renew	Biomass	115	4	09/04/2003	12/05/2004	Firm 21 years	06/09/2004	
EGAT0020	20	A.T. Bio-Power co,ltd	Bangmulnak Pichit	22.50	20.00	Power Plant	Subsidy	Rice Husk	Rice Husk	Renew	Biomass	22	4	30/05/2003	29/03/2004	Firm 25 years	21/12/2005	
EGAT0021	21	Satik Bio-Mass co, ltd	Satik Buriram	7.50	6.50	Power Plant	Non Adder	Rice Husk,Biomass	Baggase,Rice Husk,Biomass	Renew	Biomass	22	4	26/08/2005	14/12/2005	Firm 21 years	24/01/2006	
EGAT0022	22	Gulf Yala Green co, ltd	Muang Yala	23.00	20.20	Power Plant	Adder+Subsidy	Wood Chips,Rubber	Rubber Wood Chips	Renew	Biomass	115	4	26/09/2002	19/05/2003	Firm 25 years	28/11/2006	
EGAT0023	23	Khon Kean Sugar co ltd	Nampong Khon Kean	30.00	20.00	Power Plant	Non Adder	Bagasse and Biomass	Baggase,Rice Husk,Biomass	Renew	Biomass	22	4	23/07/2004	21/01/2005	Firm 21 years	26/12/2006	
EGAT0024	24	Mung Chalean Green Power co, ltd	Muang Surin	9.90	8.00	Power Plant	Non Adder	Rice Husk	Rice Husk	Renew	Biomass	22	4	29/10/2004	20/05/2005	Firm 21 years	23/01/1997	
EGAT0025	25	Suratthani Green Energy co, ltd	Punpin Suratthani	9.90	8.80	Power Plant	Non Adder	Palm	Palm Residue, Cassava Root	Renew	Biomass	33	4	20/12/2004	18/10/2005	Firm 25 years	13/09/2007	
EGAT0026	26	Dan Chang Bio-Energy co, ltd (Project2)	Dan Chang Suphanburi	11.40	10.800	Power Plant	Adder	Bagasse	Bagasse	Renew	Biomass	115	4	16/06/2008	09/09/2009	Firm 25 years	13/11/2009	
EGAT0027	27	Phu Khieo Bio-Energy co, ltd (Project2)	Phu Khieo Chaiyaphum	11.40	10.000	Power Plant	Adder	Bagasse	Bagasse	Renew	Biomass	115	4	23/06/2008	09/09/2009	Firm 25 years	13/11/2009	
EGAT0028	28	Siam Modern Palm co, ltd	Aowlung Kabee	4.80	4.00	Power Plant	Non Adder	Wood Chips,Rubber	Rubber Wood Chips	Renew	Biomass	33	3	22/08/2003	27/11/2003	Non - Firm 1year and Cont		
EGAT0029	29	Bangchak Petroleum plc co ltd (Project2)	Bangpain Ayutthaya	30.413	30.00	Solar	On Process	Solar	Solar	Renew	Solar	115	3	19/02/2010	10/08/2010	Non - Firm 5 years and Cont	01/11/2011	
EGAT0030	30	K.R. 2 co, ltd (West Huay Bong 2)	Dankhunthod Nakhonratchasrima	103.50	90.00	Wind	On Process	Wind	Wind	Renew	Wind	115	3	17/02/2010	03/12/2010	Non - Firm 5 years and Cont	26/11/2012	
EGAT0031	31	First Korat Wind co, ltd (West huay Bong 2)	Dankhunthod Nakhonratchasrima	103.50	90.00	Wind	On Process	Wind	Wind	Renew	Wind	115	3	17/02/2010	03/12/2010	Non - Firm 5 years and Cont	29/08/2012	
EGAT0032	32	Khao Kor Wind co, ltd	Khao Kor Phetchabul	60.00	60.00	Wind	On Process	Wind	Wind	Renew	Wind	115	3	21/08/2008	20/12/2010	Non - Firm 5 years and Cont	31/01/2012	
EGAT0033	33	Energy Absolute plc co ltd (Project1)	Tatako Nakhonsawan	90.72	90.00	Solar	On Process	Solar	Solar	Renew	Solar	115	3	13/07/2011	xx/11/2011	Non - Firm 5 years and Cont	01/12/2013	
EGAT0034	34	Energy Absolute plc co ltd (Project2)	Lumpang	90.72	90.00	Solar	On Process	Solar	Solar	Renew	Solar	115	3	xx/08/2011	xx/11/2012	Non - Firm 5 years and Cont	01/12/2014	
EGAT0035	35	Wind Energy Development co, ltd (Wayu Wind Farm)	Dankhunthod Nakhonratchasrima	59.20	50	Wind	On Process	Wind	Wind	Renew	Wind	115	3	xx/08/2011	xx/11/2013	Non - Firm 5 years and Cont	01/09/2016	
EGAT0036	36	Kaset Thai Bio-Power co, ltd	Tacli Nakornsawan	60.00	60.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	3	xx/10/2011		Non - Firm 5 years and Cont	15/03/2012	
EGAT0037	37	Dan Chang Bio-Energy co, ltd (Project3)	Tacli Nakornsawan	32.00	25.000	Power Plant	On Process	Bagasse	Bagasse	Renew	Biomass	115	3	08/06/2011	23/02/2012	Non - Firm 5 years and Cont	31/03/2012	
EGAT0038	38	Kalasin Bio-Energy co, ltd	Kuchinaray Karasin	32.00	28.00	Biomass	On Process	Bagasse	Baggase,Rice Husk,Biomass	Renew	Biomass	115	2	08/06/2011		Non - Firm 5 years and Cont	15/12/2011	
EGAT0039	39	Teparak Wind co, ltd (Korat Project 02/1)	Teparak Nakhonratchasrima	92.00	90.00	Wind	On Process	Wind	Wind	Renew	Wind	115	2	28/12/2011		Non - Firm 5 years and Cont	31/01/2016	
EGAT0040	40	Tropical Wind co, ltd (Korat Project 02/2)	Teparak Nakhonratchasrima	92.00	90	Wind	On Process	Wind	Wind	Renew	Wind	115	2	28/12/2011		Non - Firm 5 years and Cont	30/06/2016	
EGAT0041	41	K.R.S 3 co,ltd (Korat Project 02/3)	Teparak Nakhonratchasrima	92.00	90	Wind	On Process	Wind	Wind	Renew	Wind	115	2	28/12/2011		Non - Firm 5 years and Cont	30/06/2016	
EGAT0042	42	PTTPLC Power co, ltd	Kengkoi Saraburi	60.00	55.00	Trash	On Process	Trash	Trash	Renew	Trash	115	2			Non - Firm 5 years and Cont	xx/08/2013	
EGAT0043	43	Biomass Electricity co, ltd	Srimahaphot Prachinburi	165.00	90.00	Power Plant	On Process	Rice Husk,Eucalyptus,W	Rice Husk, Wood Chips	Renew	Biomass	115	2	29/06/2006		Firm 25 years	01/06/2014	
EGAT0044	44	Mungcharoen Biomass co, ltd	Muang Surin	17.000	15.500	Rice Husk, Wood Chips	On Process	Rice Husk,Wood Chips	Rice Husk, Wood Chips	Renew	Biomass	115	2	xx/08/2011		Firm 25 years	01/07/2012	

Code	No.	Company	Location	Installed Capacity (MW)	Sale to EGAT (MW)	Type of Business	Adder/ Subsidy	Type of fuel	Classified type pf fuel	Type of electric purchasing	Type pf fuel Adder	Voltage (kV)	Step	Date of Result announcement	Contract Signing Date	Length of Contract	COD	Note
EGAT0045	45	Energy Abosute co, ltd (Project3)	Phitsanulok	90.72	90.00	Solar	On Process	Solar	Solar	Renew	Solar	230	1			Non - Firm 5 years and Cont	01/12/2015	
EGAT0046	46	SPP 6 co, ltd	Khoksamrong Lopburi	45.00	41.00	Solar	On Process	Solar	Solar	Renew	Solar	115	1			Non - Firm 5 years and Cont	xx/12/2012	
EGAT0047	47	Energy Support co,ltd	Sraboat Lopburi	40.00	40.00	Solar	On Process	Solar	Solar	Renew	Solar	115	1			Non - Firm 5 years and Cont	01/10/2013	
EGAT0048	48	EGCO plc co ltd and CLP Power (Thailand) co, ltd (Nakhonratchasima Wind Farm	Sikew Nakhonratchasrima	64.80	60.00	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	xx/11/2016	
EGAT0049	49	Thai Roong Ruang Energy co, ltd.	Wangmuang Saraburi	20.00	18.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	ไม่ระบุ	1			Non - Firm 5 years and Cont	01/12/2011	
EGAT0050	50	Uthaithani Bio Energy co,ltd	Sawangarrom Uthaithani	20.00	16.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	ไม่ระบุ	1			Non - Firm 5 years and Cont	xx/12/2012	
EGAT0051	51	Watabak Wind co, ltd	Thepsatit Chaiyaphum	62.10	60.00	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	30/09/2014	
EGAT0052	52	Gunkul Engineering (2000) co, ltd (Wayu Wind Farm 2))	Dankhunthod Nakhonratchasrima	48.00	40.00	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	01/05/1958	
EGAT0053	53	Gunkul Engineering (2000) co, ltd (Wayu Wind Farm 3)	Dankhunthod Nakhonratchasrima	56.00	50.00	Wind	On Process	Wind	Wind	Renew	Wind	116	1			Non - Firm 5 years and Cont	01/08/2015	
EGAT0054	54	Infinite Wind co,ltd (S.T. 1 Project)	Teparak Nakhonratchasrima	62.10	60.00	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	30/06/2019	
EGAT0055	55	ES Energy co,ltd	Wattananakorn Srakaew	23.00	20.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	1			Non - Firm 5 years and Cont	01/11/2012	
EGAT0056	56	Global Green Energy co, ltd (45 MW)	Dankhunthod Nakhonratchasrima	47.50	45.00	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	01/10/2014	
EGAT0057	57	Global Green Energy co, ltd (32.5MW)	Dankhunthod Nakhonratchasrima	35.00	32.50	Wind	On Process	Wind	Wind	Renew	Wind	115	1			Non - Firm 5 years and Cont	01/04/2015	
EGAT0058	58	Uthaithani Bio Energy co,ltd (2)	Sawangarrom Uthaithani	50.00	45.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	1			Non - Firm 5 years and Cont	xx/01/2030	
EGAT0059	59	Energy Absolute plc co ltd (Turbine Beach 1)	Ranod Songkla	36.800	36.000	Wind		Wind	Wind	Renew	Wind	115	1			Non - Firm	21/03/2015	
EGAT0060	60	Energy Absolute plc co ltd (Turbine Beach 2)	Huasai Nakornratchasrima	46.000	45.000	Wind		Wind	Wind	Renew	Wind	115	1			Non - Firm	21/03/2015	
EGAT0061	61	Energy Absolute plc co ltd (Turbine Beach 3)	Pakpanung Nakhonsitammaratch	46.000	45.000	Wind		Wind	Wind	Renew	Wind	115	1			Non - Firm	30/09/2015	
EGAT0062	62	Energy Absolute plc co ltd (Hanuman 1)	Thepsatit Chaiyaphum	46.000	45.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	21/03/2017	
EGAT0063	63	Energy Absolute plc co ltd (Hanuman 2)	Thepsatit Chaiyaphum	46.000	45.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	30/09/2016	
EGAT0064	64	Energy Absolute plc co ltd (Hanuman 3)	Muang Chaiyaphum	32.200	30.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	30/09/2015	
EGAT0065	65	Energy Absolute plc co ltd (Hanuman 4)	Kengkor Chaiyaphum	32.200	30.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	21/03/2016	
EGAT0066	66	Energy Absolute plc co ltd (Hanuman 5)	Thepsatit Chaiyaphum	48.300	48.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	21/03/2017	
EGAT0067	67	Energy Absolute plc co ltd (Hanuman 6)	Nongbuadang Chaitaphum	41.400	40.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	30/09/2016	
EGAT0068	68	Energy Absolute plc co ltd (Hanuman 7)	Thepsatit Chaiyaphum	41.400	40.000	Wind		Wind	Wind	Renew	Wind	230	1			Non - Firm	21/03/2016	
EGAT0069	69	Thai Wind Power co, ltd	Nikom Kumsoy Mukdahan	45.000	44.600	Wind		Wind	Wind	Renew	Wind	115	1			Non - Firm	31/10/2014	
EGAT0070	70	Kon Buri Electric Generating co, ltd	Konburi Nakhonratchasrima	35.000	22.000	Biomass		Bagasse	Bagasse	Renew	Biomass	ยังไม่ระบุ	1			Firm	N/A	
EGAT0071	71	Greennovation co, ltd (Saranlom Wind Farm)	Dankhunthod Nakhonratchasrima	67.500	60.000	Wind		Wind	Wind	Renew	Wind	115	1			Non - Firm	01/09/2016	
	72	Roi-Et Wind Power co, ltd	Phochai Roi-Et	60.00	60	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	31/01/2020	
	73	Wind Power Development co, ltd (E-san Wind Farm)	Dankhunthod Nakhonratchasrima	102.50	90	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	01/07/2016	
	74	Ban Kung Hun co, ltd (Lom Ban Rai)	Thepsatit Chaiyaphum	60.00	60	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	20/12/2013	
	75	Rinergy co ltd	Sikew Nakhonratchasrima	45.00	45.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	02/07/2012	
	76	Teparak Wind co, ltd (Korat Project 02/1)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2012	
	77	Wind Energy Holding co, ltd (Korat 02/2)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2012	
	78	PTTPLC Power co, ltd (Project1)	Kengkoi Saraburi	90.00	90.00	Trash		Trash	Trash	Renew	Trash	115	5.1			Non - Firm 5 years and Cont	xx/08/2012	
	79	PTTPLC Power co, ltd (Project2)	Kengkoi Saraburi	90.00	90.00	Trash		Trash	Trash	Renew	Trash	115	5.1			Non - Firm 5 years and Cont	xx/08/2013	
	80	PTTPLC Power co, ltd (Project3)	Kengkoi Saraburi	90.00	90.00	Trash		Trash	Trash	Renew	Trash	115	5.1			Non - Firm 5 years and Cont	xx/08/2014	
	81	PTTPLC Power co, ltd (Project4)	Kengkoi Saraburi	15.00	15.00	Trash		Trash	Trash	Renew	Trash	115	5.1			Non - Firm 5 years and Cont	xx/08/2012	
	82	Wind Energy Holding co, ltd (Korat 02/3)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2011	
	83	East Huaybong Wind co, ltd (Huaybong)	Dankhunthod Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2012	
	84	K.R. 1 co, ltd (West Huaybong 1)	Dankhunthod Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2012	
	85	Watabak Wind co, ltd	Thepsatit Chaiyaphum	57.50	50.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	30/11/2011	
	86	Wind Energy Holding co, ltd (Roi-Et Wind Power)	Phochai Roi-Et	207.00	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	01/07/2014	
	87	Demco plc co ltd	Kongjeam Ubonratchathani	30.00	30.00	Solar		Solar	Solar	Renew	Solar	116	5.1			Non - Firm 5 years and Cont	31/05/2012	
	88	CLP Power (Thailand) co, ltd	Khoksamrong Lopburi	50.00	50.00	Solar		Solar	Solar	Renew	Solar	115	5.1			Non - Firm 5 years and Cont	01/11/2013	
	89	National Power Supply co, ltd (3)	Srimahaphot Prachinburi	70.00	65.00	Cogeneration Power Plant		Rice Husk,Eucalyptus,W	Rice Husk,Wood	Renew	Biomass	115	5.1			Firm 25 years	xx/05/2012	

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	90	CLP Power (Thailand) co, ltd and EGCO plc co ltd	Sikew Nakhonratchasrima	91.80	60.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	xx/06/2016	The project has 7 phases, COD Every 3-4 Months
	91	Rinergy co ltd	Sikew Nakhonratchasrima	55.00	50.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Non - Firm 5 years and Cont	01/11/2011	Contract not Approved
	92	Natural Energy Development co, ltd (Narai Solar)	Khoksamrong Lopburi	36.00	35.00	Solar		Solar	Solar	Renew	Solar	115	5.1			Non - Firm 5 years and Cont	01/11/2013	
	93	Bangchak Petroleum plc co ltd (Project2)	Bamnetnalong Chaiyaphum	50.00	50.00	Solar		Solar	Solar	Renew	Solar	115	5.1			Non - Firm 5 years and Cont	01/12/2012	
	94	Thepsatit Wind Farm co, ltd (2)	Supyai Chaiyaphum	90.00	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	01/11/2010	
	95	Thai Wind Power co, ltd (Z1P1)	Nikom Kumsoy Mukdahan	50.00	50.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/04/2012	Not sell electricity in normal condition N-0
	96	Thai Wind Energy co, ltd (Z2P1)	Nikom Kumsoy Mukdahan	90.00	90.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/04/2012	Not sell electricity in normal condition N-1
	97	Natioanal Wind Power co ltd (Z3P1)	Nikom Kumsoy Mukdahan	70.00	70.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/04/2012	Not sell electricity in normal condition N-1
	98	Keyman Wind Farm co, ltd (HB)	Dankhunthod Nakhonratchasrima	90.00	90.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/08/2012	Not sell Electricity in condition N-1
	99	Sikew Wind Energy co, ltd (SQ1)	Sikew Nakhonratchasrima	90.00	90.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/08/2012	Not sell Electricity in condition N-2
	100	Korat Wind Energy co, ltd (SQ2)	Sikew Nakhonratchasrima	90.00	90.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-4
	101	Korat Wind Energy co, ltd (SQ4)	Sikew Nakhonratchasrima	76.00	76.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-5
	102	Keyman Wind Farm co, ltd (HBF)	Dankhunthod Nakhonratchasrima	66.00	66.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	01/08/2012	Not sell Electricity in condition N-3
	103	Korat Wind Energy co, ltd (SQ3)	Sikew Nakhonratchasrima	90.00	90.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-6
	104	Thai Wind Power co, ltd (Z1P1)	Nikom Kumsoy Mukdahan	26.00	26.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	31/12/2012	Not sell electricity in normal condition N-2
	105	National Wind Power co, ltd (Z3P2)	Nikom Kumsoy Mukdahan	70.00	70.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-7
	106	Thai Wind Energy co, ltd (Z2P2)	Nikom Kumsoy Mukdahan	30.00	30.00	Wind		Wind	Wind	Renew	Wind	230	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-8
	107	Keyman Wind Farm co, ltd (KS1A)	Namon Karasin	90.00	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-9
	108	Keyman Wind Farm co, ltd (KS1B)	Namon Karasin	90.00	90.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-10
	109	Keyman Wind Farm co, ltd (KS2)	Ponthong Roi-Et	60.00	60.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	31/12/2012	Not sell Electricity in condition N-11
	110	Thai Wind Energy co, ltd (3A)	Nikom Namun Sakonakorn	38.00	38.00	Wind		Wind	Wind	Renew	Wind	115	5.1			Firm 25 years	31/12/2012	Contract not Approved
	111	Khon Kean Sugar co, ltd	Wangsapung Loei	70.00	24.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	5.1			Non - Firm 5 years and Cont	N/A	
	112	Mitr Phol Bio-Power (Phu Luang) co, ltd (Project1)	Wangsapung Loei	26.00	21.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	5.1			Non - Firm 5 years and Cont	01/01/2013	
	113	Mitr Phol Bio-Power (Phu Luang) co, ltd (Project2)	Wangsapung Loei	41.00	21.00	Biomass	On Process	Bagasse	Bagasse	Renew	Biomass	115	5.1			Non - Firm 5 years and Cont	02/01/2013	
	114	Ruam Phol Industry Nakhonsawan cp, ltd	Muang Nakhonsawan	12.50	2.50	Sugar Mill		Bagasse	Bagasse	Renew	Biomass	22	5.2	26/01/1996	30/05/2006	Non - Firm year to year and Cont	01/06/1996	Transfer to VSPP
	115	Phuket Council	Muang Phuket	2.50	1.00	Trash		Trash	Trash	Renew	Trash	22	5.2	26/04/01	12/07/2001	Non - Firm year to year and Cont	23/06/1993	Transfer to VSPP
	116	Thai Perm Poon Industry co, ltd	Thamuang Kanchanaburi	22.50	4.00	Power Plant		Bagasse	Bagasse	Renew	Biomass	22	5.2	19/01/2004	19/05/2004	Non - Firm year to year and Cont	02/03/2005	Transfer to VSPP
	117	Thai Ekalak Sugar co, ltd	Muang Uttaradit	16.50	3.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass	22	5.2	29/01/1993	17/02/1994	Non - Firm year to year and Cont	20/01/1995	Transfer to VSPP
	118	Thai Kaset Sugar co, ltd	Tacli Nakornsawan	52.50	8.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass	22	5.2	17/06/1994	16/08/1993	Non - Firm year to year and Cont	25/01/1994	Transfer to VSPP
	119	Singburi Sugar co, ltd	Bangrachan Singburi	12.00	4.00	Power Plant		Bagasse	Bagasse	Renew	Biomass	22	5.2	19/01/2004	19/05/2004	Non - Firm year to year and Cont	18/06/2004	Transfer to VSPP
	120	Surin Electric co, ltd	Prasard Surin	30.00	8.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	04/12/2006		Non - Firm year to year and Cont	09/04/2007	Transfer to VSPP
	121	Ratchasima Sugar co,ltd	Banpong Ratchaburi	17.50	6.80	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	29/01/1993	14/10/1993	Non - Firm year to year and Cont	07/04/1994	Transfer to VSPP
	122	Korat Industry 2 co, ltd	Pimai Nakhonratchasima	15.00	8.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	02/07/2002	17/01/2003	Non - Firm year to year and Cont	23/03/2003	Transfer to VSPP
	123	Pranburi Sugar Industry co, ltd	Pranburi Prachubkireekun	10.00	3.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	02/09/2002	25/12/2002	Non - Firm year to year and Cont	02/04/2003	Transfer to VSPP
	124	New Kung Thai Sugar co, ltd	Thamaka Kanchanaburi	13.00	2.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	01/08/2003	30/09/2003	Non - Firm year to year and Cont	07/04/2004	Transfer to VSPP
	125	Tamaka Sugar co, ltd	Thamaka Kanchanaburi	5.00	2.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	01/08/2003	30/09/2003	Non - Firm year to year and Cont	09/04/2004	Transfer to VSPP
	126	Khao Ream Udom Sugar co, ltd	Nonghan Udonthani	24.00	7.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	04/05/2005	16/06/2004	Non - Firm year to year and Cont	04/03/2005	Transfer to VSPP
	127	Buriram Sugar co, ltd	Kumuang Buriram	14.80	8.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	29/11/2000	19/12/2001	Non - Firm year to year and Cont	11/03/2003	Transfer to VSPP
	128	Phitsanulok Sugar co, ltd	Bangkatum Phitsanulok	18.50	4.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	18/12/2001	14/03/2002	Non - Firm year to year and Cont	25/03/2003	Transfer to VSPP
	129	Ban Pong Sugar co, ltd	Banpong Ratchaburi	18.00	3.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	26/02/1997	07/04/1996	Non - Firm year to year and Cont	24/03/1997	Transfer to VSPP
	130	Mitr Kaset Industry co, ltd	Thamaka Kanchanaburi	20.50	3.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	31/08/2001	29/08/2002	Non - Firm year to year and Cont	11/02/1993	Transfer to VSPP
	131	Bua Som Mary co, ltd	Muang Roi-Et	6.00	3.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	01/09/2004	05/10/2004	Non - Firm year to year and Cont	22/02/2006	Transfer to VSPP
	132	Rayong Sugar co, ltd	Bothong Chonburi	18.00	6.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	13/09/2004	19/11/2004	Non - Firm year to year and Cont	03/02/2006	Transfer to VSPP
	133	East Sugar and Sugar Cane co, ltd	Wattananakorn Srakaew	22.00	8.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	19/04/2000	22/09/2000	Non - Firm year to year and Cont	20/02/2001	Transfer to VSPP
	134	T.N. Sugar Industry co, ltd	Thaluang Lopburi	12.00	8.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	30/04/1997	07/08/1997	Non - Firm year to year and Cont	19/01/1998	Transfer to VSPP

Code	No.	Company	Location	Installed Capacity (MW)	Sale to EGAT (MW)	Type of Business	Adder/ Subsidy	Type of fuel	Classified type pf fuel	Type of electric purchasing	Type pf fuel Adder	Voltage (kV)	Step	Date of Result announcement	Contract Signing Date	Length of Contract	COD	Note
	135	Korat Industry co, ltd	Pimai Nakhonratchasima	15.00	8.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	09/12/1997	08/11/1994	Non - Firm year to year and Cont	1/01/1995	Transfer to VSPP
	136	Kanchanaburi Sugar Industry co, ltd	Ban Rai Uthaithani	20.00	4.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	16/11/2000	20/03/2001	Non - Firm year to year and Cont	03/01/2002	Transfer to VSPP
	137	E-san Sugar Industry co, ltd	Samchai Kanrasin	18.50	2.50	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	23/11/2004	18/11/2005	Non - Firm year to year and Cont	25/01/2006	Transfer to VSPP
	138	Advance Bio-Power co, ltd	Muang Buriram	9.80	6.50	Power Plant		Rice Husk,Bagasse,Euca	Rice Husk,Bagasse,Eucalyptus	Renew	Biomass		5.2	22/04/2004	06/06/2004	Non - Firm year to year and Cont	25/01/2007	Transfer to VSPP
	139	U-Thong Biomass co, ltd	Uthing Suphanburi	7.00	6.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	22/04/2003	06/100/2004	Non - Firm year to year and Cont	12/10/2006	Transfer to VSPP
	140	Konburi Sugar co, ltd	Konburi Nakhonratchasrima	26.00	6.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.2	14/08/1997	12/12/1997	Non - Firm year to year and Cont	23/12/1997	Transfer to VSPP
	141	Saharuang co, ltd	Muang Mukdahan	24.00	8.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	22/09/2005	23/06/2004	Non - Firm year to year and Cont	16/12/2004	Transfer to VSPP
	142	Saraff Energy co ,ltd	Khaopanom Kabee	12.00	8.50	Power Plant		Palm Residue	Palm Residue, Cassava Root	Renew	Biomass		5.2	01/09/2004	20/09/2005	Non - Firm year to year and Cont	28/12/2006	Transfer to VSPP
	143	Bua Yai Bio-Power co, ltd	Bua Yai Nakornratchasrima	7.30	7.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	05/09/2003	28/05/2004	Non - Firm year to year and Cont	11/09/2006	Transfer to VSPP
	144	New Khang Sun Lee Sugar co, ltd	Panatnikom Chonburi	5.00	2.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	01/08/2003	30/09/2003	Non - Firm year to year and Cont	26/04/2004	Transfer to VSPP
	145	BW Power Supply co, ltd	Bangsamak Chacheangsao	3.00	1.80	Power Plant		Rice Husk,Eucalyptus	Rice Husk, Wood Chips	Renew	Biomass	22	5.2	27/08/2003	26/12/2003	Firm 25 years	30/03/2004	Transfer to VSPP
	146	Deja Bio Green co, ltd	Bangplama Suphanburi	7.50	6.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass	N/A	5.2	17/09/2007	17/10/2008	Firm 21 years		Transfer to VSPP
	147	Khon Kean Sugar co, ltd	Nampong Khon Kean	5.00	3.00	Power Plant		Bagasse and Biomass	Baggase,Rice Husk,Biomass	Renew	Biomass		5.2	29/03/2005	21/09/2004			Transfer to VSPP
	148	Surin Bio-Power co, ltd	Mauang Surin	9.00	8.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	08/03/2006				Transfer to VSPP
	149	Sricharean Bio-Power co, ltd	Pakonchai Buriram	9.90	8.00	Power Plant		Rice Husk,Bagasse,Euca	Rice Husk,Bagasse,Eucalyptus	Renew	Biomass		5.2	08/03/2006				Transfer to VSPP
	150	Udonsiripisarn Rice Mill co, ltd	Muang Udonthani	9.80	8.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	05/07/2005	18/08/2005			Transfer to VSPP
	151	Rural Electricity co, ltd	Thawung Lopburi	18.00	3.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	15/08/2002				Transfer to VSPP
	152	Bua Som Mary Electric Generating co, ltd (2)	Suwanabhumi Roi-Et	9.80	8.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	18/07/2005	22/08/2005			Transfer to VSPP
	153	Bua Som Mary Electric Generating co, ltd (3)	Muang Roi-Et	9.00	8.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	08/03/2006	21/04/2006			Transfer to VSPP
	154	Deja Bio Green co, ltd	Bangplama Suphanburi	7.50	6.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.2	17/09/2007	17/10/2008	Firm 21 years		Transfer to VSPP
	155	Erawan Power co, ltd	Nakang Nongbualumpoo	15.00	8.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.2	04/12/2006				Transfer to VSPP
	156	Mitr Karasin Sugar co, ltd	Kuchinaray Karasin	25.70	8.00	Power Plant	Subsidy	Bagasse, Rice Husk,	Baggase,Rice Husk,Biomass	Renew	Biomass	22	5.2	07/08/2003	06/08/2004	Firm 21 years	20/09/2004	Transfer to VSPP
	157	Thepsatit Wind Farm co, ltd	Thepsatit Chaiyaphum	90.00	90.00	Wind	On Process	Wind	Wind	Renew	Wind	115	5.3	17/09/2009		Non - Firm 5 years and Cont	01/11/2010	PPA Cancelled
	158	Chaiyaphum Wind Farm co, ltd	Muang Chaiyaphum	90.00	90.00	Wind	On Process	Wind	Wind	Renew	Wind	115	5.3	17/09/2009		Non - Firm 5 years and Cont	01/11/2010	PPA Cancelled
	159	Chaiyaphum Wind Farm co, ltd (2)	Muang Chaiyaphum	50.40	50.00	Wind	On Process	Wind	Wind	Renew	Wind	115	5.3	08/12/2009		Non - Firm 5 years and Cont	01/11/2010	PPA Cancelled
	160	Chaiyaphum Wind Farm co, ltd (3)	Kengkor Chaiyaphum	50.40	50.00	Wind	On Process	Wind	Wind	Renew	Wind	115	5.3	08/12/2009		Non - Firm 5 years and Cont	01/11/2010	PPA Cancelled
	161	Wind Energy Holding co, ltd (East Huaybong 1)	Dankhunthod Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.3	N/A	N/A	N/A	31/12/2011	
	162	Wind Energy Holding co, ltd (Korat 02/1)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.3	N/A	N/A	N/A	30/06/2012	
	163	Wind Energy Holding co, ltd (Korat 02/2)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.3	N/A	N/A	N/A	30/06/2013	
	164	Wind Energy Holding co, ltd (Korat 02/3)	Teparak Nakhonratchasrima	103.50	90.00	Wind		Wind	Wind	Renew	Wind	115	5.3	N/A	N/A	N/A	30/12/2012	
	165	Watabak Wind co, ltd	Thepsatit Chaiyaphum	57.50	50.00	Wind		Wind	Wind	Renew	Wind	115	5.3	N/A	N/A	N/A	30/12/2012	
	166	Amnard Charoen Power Green co, ltd	Muang Amnard Charoen	9.90	8.00	Power Plant		Rice Husk,Bagasse,Euca	Rice Husk,Bagasse,Eucalyptus	Renew	Biomass	22	5.3	08/03/2006	22/11/2006	Non - Firm 1 year		PPA Cancelled
	167	Star Power Plant co, ltd	Bantak Tak	9.80	8.00	Power Plant		Rice Husk,Wood Chips	Baggase,Rice Husk,Biomass	Renew	Biomass	22	5.3	22/09/2005	06/07/2006	Non - Firm 1 year		PPA Cancelled
	168	Namchai Power Supply co, ltd	Donchedi Suphanburi	7.50	6.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass	22	5.3	23/05/2006	12/07/2006	Non - Firm 1 year		PPA Cancelled
	169	SS&P Construction co, ltd	Nongpai Phetchabul	6.00	5.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass	22	5.3	23/05/2006	12/07/2006	Non - Firm 1 year		PPA Cancelled
	170	Eco-Energy Plus co, ltd	Muang Samutsongkarm	90.00	90.00	Wind		Wind	Wind	Renew	Wind		5.3				SCOD 1 /01/2012	PPA Revoked
	171	Thai Seri Generating co, ltd	Klong Kung Kamphaengphet	6.00	3.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	13/10/2003	28/09/2004			PPA Cancelled
	172	Wang Kanay Sugar co, ltd	Kosumpisai Mahasarakarm	11.00	6.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.3	02/10/2006				PPA Cancelled
	173	Keawna Power Supply co, ltd	Sumrong Ubonratchathani	9.90	7.50	Power Plant		Rice Husk,Eucalyptus	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	29/06/2006				PPA Cancelled
	174	Compact Bio-Energy co, ltd	Sikao Trung	12.00	6.00	Power Plant		Palm Residue	Palm Residue, Cassava Root	Renew	Biomass		5.3	02/02/2005				Transfer to VSPP
	175	Kamphaengphet Electric Generating co, ltd	Muang Kamphaengphet	2.90	2.80	Power Plant		Cassava	Palm Residue, Cassava Root	Renew	Biomass		5.3	16/08/2005				Transfer to VSPP
	176	Isariyakul Bio-Mass co, ltd	Dokkhamtai Phayao	9.00	7.80	Power Plant		Rice Husk,Wood Chips	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	08/03/2006				Transfer to VSPP
	177	Chumporn Bio-Energy co, ltd	Tasae Chumporn	9.50	8.50	Power Plant		Palm Residue	Palm Residue, Cassava Root	Renew	Biomass		5.3	08/03/2006	06/12/2006			Transfer to VSPP
	178	Siam Bio-Mass co, ltd	Tron Uttaradit	4.50	4.20	Power Plant		Corncob, Cassava, Rice Husk	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	23/05/2006				Transfer to VSPP
	179	Udon Bio-Mass co, ltd	Muang Udonthani	9.90	8.00	Power Plant		Rice Husk,Eucalyptus	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	29/06/2006				Transfer to VSPP

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	180	Bungsampun Biomass Power Plants co, ltd	Bungsampan Phetchabul	9.90	8.00	Power Plant		Corncob, Cassava, Rice Husk	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	13/07/2006				Transfer to VSPP
	181	R.V.N International Development co, ltd	Nangrong Buriram	6.00	5.50	Power Plant		Corncob, Cassava, Rice Husk	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	03/08/2006				Transfer to VSPP
	182	Pichit Steam Power Plant co, ltd	Saklek Pichit	4.50	4.20	Power Plant		Corncob, Cassava, Rice Husk	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	03/08/2006				Transfer to VSPP
	183	Siam Tanchat co, ltd	Manorom Chainat	8.50	5.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	15/09/2006				Transfer to VSPP
	184	Grand Araya co, ltd	Patew Yasothorn	9.90	8.00	Power Plant		Rice Husk,Bagasse,Euca	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	03/10/2006				Transfer to VSPP
	185	Kinetic Power Rayong co, ltd	Bankai Rayong	3.00	3.00	Power Plant		Wood Chips	Rubber Wood Chips	Renew	Biomass		5.3	20/11/2006				Transfer to VSPP
	186	Siam Biomass Power Plant co, ltd	Tron Uttaradit	6.00	5.40	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	04/12/2006				Transfer to VSPP
	187	Absolute Power P co, ltd	Banmee Lopburi	3.00	2.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	09/01/2007				Transfer to VSPP
	188	Golden Lion Green Power co, ltd	Muang Kamphaengphet	9.90	6.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	19/01/2007				Transfer to VSPP
	189	Mae Sod Power Plant co, ltd	Mae Sod Tak	4.50	4.20	Power Plant		Corncob Rice Husk	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	27/03/2007				Transfer to VSPP
	190	Kamphaengphet Generating co, ltd	Klong Kung Kamphaengphet	7.00	5.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	27/03/2007				Transfer to VSPP
	191	Nhong Yai Industry co, ltd	Nongyai Chonburi	16.50	2.20	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.3	29/01/1993	16/08/1993	Non - Firm 5 years	07/02/1995	Contract Cancelled
	192	Southern Power co, ltd	Punpin Suratthani	50.00	42.00	Palm		Palm Residue	Palm Residue, Cassava Root	Renew	Biomass		5.3	21/04/1997	28/03/1997	Firm 21 years	xx/12/1998	Project Cancelled
	193	Pichitpon co, ltd (Pichit)	Muang Pichit	9.98	8.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	09/09/1997		Firm 25 years	31/08/1999	Project Cancelled
	194	Pichitpon co, ltd (Suphanburi)	Samchook Supanburi	9.98	8.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	09/09/1997		Firm 25 years	31/10/1999	Project Cancelled
	195	Central Gypsum Industry co, ltd	Panomsarakarm Chacheangsao	9.98	8.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.3	09/09/1997		Firm 25 years	31/08/1999	Project Cancelled
	196	Department of Public Works and Town&Country Planning	Muang Phuket	2.50	1.00	Trash		Trash	Trash	Renew	Trash		5.3	04/12/1997		Non-Firm yearto year		Project Cancelled
	197	S.P.M. Agro Food co, ltd	Paktor Ratchaburi	0.06	0.05	Agro-Food		Biogas	Biogas	Renew	Biogas		5.3	27/08/1998		Non-Firm yearto year		Project Cancelled
	198	Pirojsompongpanit co, ltd	Bangplee Samutprakarn	1.04	0.94	Power Plant		Biogas	Biogas	Renew	Biogas		5.3	29/08/2002		Non-Firm yearto year		PPA Cancelled
	199	Phenix Pulp and Power co, ltd	Nampong Khon Kean	29.91	4.50	Power Plant		Black Liquor	Black Liquor	Renew	Others		5.3	23/05/2002		Non-Firm yearto year		PPA Cancelled
	200	A.A, Pulp Mill co, ltd	Srimahaphot Prachinburi	32.90	25.00	Paper		Black Liquor	Black Liquor	Renew	Others		5.3	28/09/1998		Non-Firm 3 years		Transfer to VSPP
	201	Korat Industry co, ltd (3)	Pimai Nakhonratchasima	12.00	8.00	Power Plant		Bagasse	Bagasse	Renew	Biomass		5.3	04/02/2003		Firm 25 years		PPA Cancelled
	202	T.R.T. Parawood co, ltd	Muang Saratthani	2.50	2.20	Palm		Wood chips	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	26/02/1996	24/02/1997	Non - Firm 1 year		PPA Cancelled
	203	Total Farmers Industry co, ltd	Phu Khieo Chaiyaphum	24.00	6.00	Sugar Mill		Bagasse	Bagasse	Renew	Biomass		5.3	25/04/1997	19/07/1993	Non - Firm year to year	22/02/1997	PPA Cancelled
	204	Gulf electric plc co ltd	Huayyod Trung	23.00	20.20	Power Plant		Wood Chips	Baggase,Rice Husk,Biomass	Renew	Biomass		5.3	25/10/2002		Firm 25 years	01/11/2004	PPA Cancelled
	205	Ratchaburi Power co, ltd	Pasakchonlasit Dam Lopburi	6.70	6.70	Power Plant		Hydroelectric	Hydroelectric	Renew	Hydroelectric		5.3	19/01/2004	01/02/2005			Contract Cancelled
	206	Thai Wind Energy co, ltd (6CD)	Dongluang Mukdahan	20.00	20.00	Wind		Wind	Wind	Renew	Wind	22	5.4	N/A	N/A	Firm 25 years	31/12/2012	
	207	Thepsatit Wind Farm co, ltd (3)	Thepsatit Chaiyaphum	50.00	50.00	Wind		Wind	Wind	Renew	Wind	115	5.4	N/A	N/A	N/A	01/11/2010	
	208	Housing Industrial Equipment co, ltd	Sanamchaiket Chachoengsao	3.00	1.50	Furniture		Wood Chips	Baggase,Rice Husk,Biomass	Renew	Biomass		5.4	26/02/1996		Firm 21 years	xx/07/1998	Project Cancelled
	209	S Thunder co, ltd	Manorom Chainat	21.50	18.50	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.4	26/02/1996		Firm 21 years	01/11/1998	Project Cancelled
	210	EGCO Group	Banglane Nakornpathom	28.00	26.00	Power Plant		Rice Husk	Rice Husk	Renew	Biomass		5.4	29/03/1996		Firm 21 years	11/04/1999	Project Cancelled

Note:
Stage of PPA processing
No. 1 = Submitted the aplication to sell power to authorities
No. 2= Authorities accepted to purchase the power from seller
No. 3= Both, authorities and seller executed the PPA
No.4 = Seller already sold the power to grid on the Commercial Operation Date (COD)
No. 5 = Seller stop to continue the project by following reason;
หมายเหตุ No. 5.1 = Authority deny to purchase power
No. 5.2 = Seller transfer the application to VSPP program
No. 5.3 = EGAT decline to consider the application
หมายเหตุ No. 5.4 = Seller cannot provide performance guarantee attach to the application
Adder/Subsidy
Adder = Received Adder
On Process = Under consideration the application
Non Adder = No Adder
Adder+Subsidy = Received Adder and subsidy from ENCON FUND
Subsidy = Received Subsidy from ENCON FUND

List of SPP located in industrial park and already

Item	Company
1	PTT Chemical Co. Public Limited
2	Glow SPP 1 Co.Ltd (Second project)
3	Glow SPP 1 Co.Ltd (First project)
4	Glow SPP 2 Co.Ltd (First project)
5	Glow SPP 2 Co.Ltd (Second project)
6	SIME DARBY LCP POWER CO.,LTD
7	EGCO Cogeneration Co., Ltd.
8	PTT Utilities Co, Ltd
9	Amata B. Grimm Power 2 Co,Ltd
10	Bangkok Cogeneration Company Limited
11	Glow SPP 11 Co, Ltd
12	Samutprakarn Cogeneration Co, Ltd
13	ROJANA Power Co, Ltd
14	Saha Cogen Co, Public Ltd.
15	Glow Energy Co. Public, Ltd (First Project)
16	Glow Energy Co. Public, Ltd (Second Project)
17	TPT Petrochemical Co. Ltd
18	Glow SPP3 Co,Ltd (First Project)

List of SPP underdevelopment or construction

19	Amata B. Grimm Power 3 Co,Ltd
20	BANGPA-IN COGENERATION LIMITED
23	Amata B. Grimm Power 1 Co,Ltd
24	Pluakdaeng Clean Power Co, Ltd
25	Pluakdaeng Clean Energy Co, Ltd
26	Bluesky Cogen Co, Ltd
27	Rangbua Clean Energy Co, Ltd
28	Jombung Clean Power Co, Ltd
29	Kabin Cogen Co, Ltd
30	2010 Cogeneration Co, Ltd
31	Suranaree Energy Generating Co,Ltd
32	ROJANA Power Co, Ltd (Third Project)
33	Parn Thong Clean Power Co, Ltd
34	BANGPA-IN COGENERATION LIMITED
35	Phomburi Energy Co,Ltd
36	Rainbow Power Co, Ltd
37	Map Yang Phon Clean Energy Co, Ltd

38	Parn Thong Clean Energy Co, Ltd
39	Rayong Electric Generating Co, Ltd
40	Eastern Seaboard Power Co, Ltd
41	Electric and Stream Co, Ltd
42	Producing Electricity Navanakorn Co, Ltd
43	Victory Energy Co, Ltd
44	Amata B. Grimm Power (Rayong) 2 Co,Ltd
45	ROJANA Power Co, Ltd (Second Project)
46	Glow Energy Co. Public, Ltd (the third project)
47	Bangadi Clean Energy Co,Ltd
48	Ratchaburi World Cogeneration Company Limited(2) **
49	PPPTT Co, Ltd
50	Bowin Clean Energy Co, Ltd
51	Ratchaburi World Cogeneration Company Limited(1)
52	Navanakorn Electric Co. ltd

List of SPP with unclear status and to be verifie

53	Surat Energy Co, Ltd
54	Leader Mint Power Co, Ltd
55	Rojana Industrail Park Co, Public Ltd
58	Glow SPP3 Co,Ltd (Second Project)

x = Electricity has already been sold to grid

W = Eletricity will be sold on the date in the bracket

N/A = NO COD information

List of factory with power generation and heat re

item	Company
1	Inter Pacific Paper
2	Ratchaburi Power (First Project)
3	United Paper
4	Elite Kraft Paper
5	Asian Superior Foods
6	The Siam Ceramic Group Industry
7	Thong Biomass Dryer
8	Siam Pellet Power
9	Supreme Power
10	Suwadee&Udomdej Power
11	Udomdej Power

12	Thai Acrylic Power
13	Ratchaburi Power (Second Project)
14	CP-Meji
15	Thai Taffeta
16	Matsushita Electric Works
17	Khaoshong Industry
18	Thai-German Ceramic Industry

in opertion

Location	Gross Generation (MW)	Net Export (MW)	COD
Map Ta Phut Industrial Estate, Rayong	171.10	32.00	x
Eastern Seaboard Industrial Estate, Rayong	66.345	55.00	x
Eastern Seaboard Industrial Estate, Rayong	67.68	55.00	x
Map Ta Phut Industrial Estate, Rayong	70.00	60.00	x
Map Ta Phut Industrial Estate, Rayong	70.00	60.00	x
Lam Chabang Industrial Estate, Chonburi	105.00	60.00	x
Rayong Industrial Park, Rayong	120.00	60.00	x
Map Ta Phut Industrial Estate, Rayong	300.00	60.00	x
Bangpakong Industrial Estate, Chachoengsao	108.00	90.00	x
Map Ta Phut Industrial Estate, Rayong	115.30	90.00	x
Siam Eastern Industrial Park, Rayong	120.00	90.00	x
Bangpoo Industrial Estate, Samutprakan	128.00	90.00	x
Rojana Industrial Park, Ayutthaya	131.50	90.00	x
Sahaphat Group Industrial Estate, Chaseangsao	139.00	90.00	x
Map Ta Phut Industrial Estate, Rayong	150.00	90.00	x
Map Ta Phut Industrial Estate, Rayong	150.00	90.00	x
Map Ta Phut Industrial Estate, Rayong	55.00	9.50	x
Map Ta Phut Industrial Estate, Rayong	160.00	90.00	x

Amata Nakorn Industrial Estate, Chonburi	165.82	90.00	W(1/9/12)
Bangpa-in Industrial Estate, Ayuthaya	106.25	90.00	W(1/6/13)
Bangpakong Industrial Estate, Chachoengsao	168.00	90.00	W(1/11/13)
Amata City Industrial Estate, Rayong	113.902	90.00	W (1/6/19)
Amata City Industrial Estate, Rayong	113.902	90.00	W (1/6/19)
Suranaree Induatrial Estate, Nakornratchasima	124.957	90.00	W (1/6/19)
V.R.M. Industrial Estate, Ratchaburi	113.902	90.00	W (1/6/18)
V.R.M. Industrial Estate, Ratchaburi	113.902	90.00	W (1/6/18)
Sahaphat Group Industrial Estate, Chaseangsao	119.643	90.00	W (1/6/18)
Hemaraj Eastern Seaboard Industrial Estate, Rayong	123.499	90.00	W (1/6/18)
Suranaree Induatrial Estate, Nakornratchasima	123.499	90.00	W (1/6/18)
Rojana Industrial Park, Ayutthaya	112.01	90.00	W (1/6/17)
Amata Nakorn Industrial Estate, Chonburi	113.902	90.00	W (1/6/17)
Bangpa-in Industrial Estate, Ayuthaya	120.50	90.00	W (1/6/17)
Phomburi Industrial Park, Singburi	122.35	90.00	W (1/6/17)
Hemaraj Eastern Seaboard Industrial Estate, Rayong	124.957	90.00	W (1/6/17)
Amata City Industrial Estate, Rayong	113.902	90.00	W (1/6/16)

Amata Nakorn Industrial Estate, Chonburi	113.902	90.00	W (1/6/16)
Hemaraj Eastern Seaboard Industrial Estate, Rayong	123.499	90.00	W (1/6/16)
Hemaraj Eastern Seaboard Industrial Estate, Rayong	123.499	90.00	W (1/6/16)
Hemaraj Eastern Seaboard Industrial Estate, Rayong	123.499	90.00	W (1/6/16)
Klongluang Pathumthani	129.32	90.00	W (1/6/16)
Banwa (Hi-Tech) Industrial Estate, Ayutthaya	124.957	90.00	W (1/6/15)
Pluakdaeng rayong	108.74	90.00	W (1/6/13)
Rojana Industrial Park, Ayutthaya	131.460	90.00	W (1/6/13)
Map Ta Phut Industrial Estate, Rayong	77.00	74.00	W (1/6/12)
Bangadi Industrial Park, Pathumthani	113.29	90.00	W (1/3/15)
Ratchaburi Industrial Estate, Ratchaburi	115.280	90.00	W (1/3/15)
Lardkrabang Industrial Estate, BKK	113.90	90.00	W (1/3/14)
Hemaraj Industrial Estate, Chonburi	113.902	90.00	W (1/3/14)
Ratchaburi Industrial Estate, Ratchaburi	115.28	90.00	W (1/3/14)
Navanakorn Industrial Estate, Pathumthani	118.50	90.00	W (1/11/12)

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Bangpoo Industrial Estate, Samutprakan	105.00	90.00	N/A
Jana Industrial Estate, Songkha	97.00	75.00	N/A
Bankary, Rayong	120.00	90.00	N/A
Map Ta Phut Industrial Estate, Rayong	160.00	90.00	N/A

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Location	Gross Generation (MW)	Net Export (MW)	
Prachinburi	9.5	3	
Sukhothai	0.975	0.9	
Prachinburi	9.5	3	
Sakaow	9.5	3	
Ratchaburi	3.36	2.2	
Saraburi	5.79	3	
Ratchaburi	4.8	4.8	
Ratchaburi	4.8	4.8	
Ratchaburi	3.6	3.6	
Ratchaburi	4.8	4.8	
Ratchaburi	3.6	3.6	

Saraburi	27.3	8	
Sukhothai	3.9	3.6	
Saraburi	2	2	
Rayong	10	N/A	
Ayutthaya	N/A	N/A	
Samutprakarn	N/A	N/A	
Saraburi	5	N/A	

Type of Business	Fuel according to the table	Supplementary Fuel
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Thermal Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Coal	Coal
Cogeneration Power Plant	Coal	Coal
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
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Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Natural Gas	Natural Gas

Cogeneration Power Plant	Natural Gas	Natural Gas
Cogeneration Power Plant	Heavy Oil	Heavy Oil
Cogeneration Power Plant	Heavy Oil	Heavy Oil
Cogeneration Power Plant	Coal	Coal

Type of power plant	**Type of fuel**
Steam turbine	Coal
Gas engine	Natural Gas
Steam turbine	Coal
Steam turbine	Coal
Gas engine	Natural Gas
Steam turbine	Natural Gas
Steam turbine	Natural Gas
Steam turbine	Natural Gas
Steam turbine	Natural Gas
Steam turbine	Natural Gas
Steam turbine	Natural Gas

Steam turbine	Coal
Gas engine	Natural Gas
Steam turbine	Natural Gas
Gas turbine	Natural Gas

Primary Energy Saving (PES) Ratio

1. PES Ratio Calculation Method

$$PES = \left(1 - \frac{1}{\frac{COGEN\ \ Heat\ \ Eff.}{ref\ .Heat\ \ Eff.} + \frac{COGEN\ \ Electricity\ \ Eff.}{ref.\ Electricity\ \ Eff.}} \right) \times 100\ \%$$

Whereby:

COGEN Heat Eff.	=	Heat utilization efficiency under the cogeneration system
	=	Ratio of the amount of heat energy (steam) utilized (annually) to the total amount of heat from all fuels used (calculated from the lower heating value)
COGEN Elect. Eff.	=	Electricity generation efficiency using the cogeneration system
	=	Ratio of the amount of electricity generated (annually) to the total amount of heat from all fuels used (calculated from the lower heating value)
Ref. Heat Eff.	=	Reference heat utilization efficiency of the sole heat generation system
Ref. Elect. Eff.	=	Reference electricity generation efficiency of the sole electricity generation system

The reference electricity generation efficiency and the reference heat utilization efficiency of VSPPs classified by fuel type used for electricity generation are as follows:

Fuel Type	**Ref. Elec. Eff.**	**Ref. Heat. Eff.**
Natural gas	45%	85%
Coal	40%	80%
~~Oil~~	~~40%~~	~~80%~~

(Translation of Thai engineering standard for air conditioning system)

Efficiency of Equipment (Chapter 6)

- Small air conditioning units and water chillers shall have energy efficiency ratio not less than the figures shown in the table 1 and 2 at the test conditions as stated in table 3.
- Testing procedure shall comply with Thai Industrial Standard (TIS) or ARI or other equivalent standards.

Table 1: Minimum energy efficiency ratio for small air conditioning units

Type and Size	EER (BTU/h/W)
Air cooling type	
Smaller than 17600 W (5.00 RT)	9.6
Greater than 17600 W (5.00 RT)	8.6
Water cooling type (All size)	13.6

Noted: Electric power for calculation the energy efficiency ratio (EER) shall include electric power of all auxiliary units of air conditioning, e.g., cooling fan and blower.

Table 2: Minimum coefficient of performance (COP) of chillers

Type and size	COP
Air cooled type electric chiller	
Up to 351.7 kW (100 RT)	2.70
Greater than 351.7 kW (100 RT)	2.93
Water cooled type electric chiller	
Less than 527.5 kW (150 RT)	3.91
From 527.5 kW to 703.3 kW (200 RT)	4.69
From 703.3 kW to 879.2 kW (250 RT)	5.25
From 879.2 kW to 1758.3 kW (500 RT)	5.40
Greater than 1758.3 kW (500 RT)	5.67
Water cooled type absorption chiller	
Single effect (all size)	0.70
Double effect (all size)	1.20

Noted: Energy input of electric chillers for COP calculation shall be electric power consumption of compressor. Energy input of absorption chiller for COP calculation shall be is heat input of water chiller.

Table 3: Standard Conditions for testing energy efficiency of equipment.

Conditions	Temperature (°C)
Ambient Temperature	35
Dry bulb temperature of air inlet of cooling coil	27
Wet bulb temperature of air inlet of cooling coil	19
Saturated suction temperature of cooling coil	7
Temperature of inlet cooling water	32
Temperature of outlet cooling water	38
Temperature of inlet chilled water	13
Temperature of outlet chilled water	7

Unofficial Translation

Ministry of Energy's Notification On Identification of Coefficient of Minimum Performance, Cooling Efficiency, and Electrical Power per Ton Refrigeration of Air Conditioning System in the Building B.E.2552

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Ministry of Energy's Notification On Identification of Coefficient of Minimum Performance, Cooling Efficiency, and Electrical Power per Ton Refrigeration of Air Conditioning System in the Building B.E. 2552

Ministry of Energy's Notification

On Identification of Coefficient of Minimum Performance, Cooling Efficiency, and Electrical Power per Ton Refrigeration of Air Conditioning System in the Building B.E.2552

By virtue of Clause 5 in the Ministerial Regulation prescribing type or size of building and standard, criteria and procedures in designing the building for energy conservation B.E.2552 issued according to the Energy Conservation promotion Act B.E.2535 amended by Energy Conservation Promotion Act (No. 2) B.E.2550, which is the law that has some provisions regarding the restriction of individual rights and freedom, and the permission from section 29, 33, 41, and 43 of Thai Constitution, and by virtue of the law, Minister of Energy issues the following notification.

Clause 1 In this notification,

"Air-conditioning System" means other parts of the air-conditioning system.

"Small-sized air-conditioner" means air-conditioner (split type) that ventilates by air or water. This air-conditioner is designed for condensing unit and fan-coil unit to work together and uses alternate current with the frequency of 50 Hertz for reducing the temperature and humidity in the air that passes fan-coil unit as identified in this notification.

"Water Cooler for Air-conditioning System" means equipment that lowers the temperature of water in order to be used in the air-conditioning or cooling by using the cooling cycle (vapor compression or absorption).

"Coefficient of Performance" means ratio between net cooling capacity of air-conditioning system (Watt) and electrical power (Watt).

"Cooling Efficiency" means cooling efficiency of air-conditioning system by identifying to be ratio of energy efficiency.

"Energy Efficiency Ratio" means ratio between net cooling capacity of air-conditioning system (BTU per hour) and electrical power (Watt).

"Electrical Power per Ton Refrigeration" means ratio between electrical power (Kilowatt) and net cooling capacity of water cooler (Ton Refrigeration).

Clause 2 Several types and sizes of air-conditioning system installed in the building shall have coefficient of performance, cooling efficiency in ratio of energy efficiency and electrical power per ton refrigeration of water cooler as follows.

(1) Small-sized air-conditioners shall have coefficient of performance or ratio of minimum energy efficiency as follows.

Size of Air-conditioner (Watt)	Coefficient of Performance (Watt per Watt)	Ratio of Energy Efficiency (BTU per hour per watt)
No more than 12,000	3.22	11

(2) Large-sized air-conditioning system shall have electrical power per ton refrigeration of water cooler and other parts of air-conditioning system as follows.

(A) Water cooler for air-conditioning system shall have electrical power per ton refrigeration of no more than the following.

Type of Water Cooler for Air-conditioning System		Size of Cooling Capacity according to the size of water cooler (ton refrigeration)	Electrical power per ton refrigeration (Kilowatt per ton refrigeration)
Heat Ventilation	Compressor		
Heat Ventilation by Air	Every Type	Less than 300	1.33
		More than 300	1.31
Heat Ventilation by Water	Piston	Every Size	1.24
	Rotary, Screw or Scroll	Less than 150 More than 150	0.89 0.78
	Centrifugal pump	Less than 500 More than 500	0.76 0.62

(B) Other parts of air-conditioning system driven by electricity consisting of heat ventilation system, water cooling system, and cooling fan system shall have electrical power per ton refrigeration of no more than 0.5 Kilowatt per ton refrigeration.

(3) The water cooler (absorption) shall have coefficient of minimum performance as follows. The coefficient of performance shall be calculated from heat only with no electrical power in the system.

(A) Identification of level by mentioning temperature and rate of water flow into condenser as follows.

Type of Water Cooler (Absorption)	Level				Coefficient of Performance
	Cool water		Hot Water		
	Temperature of Cool Water (In)	Temperature of Cool Water (Out)	Temperature of Water Flow Into Condenser	Rate of Water Flow Into Condenser	
	(Degree Celsius)			(Liter per Second per Kilowatt)	
A. One-Level	12.0	7.0	32.0	0.105	0.65
B. Two -Level	12.0	7.0	32.0	0.075	1.10

(B) Identification of Level by mentioning temperate of hot water into and from condenser as follows.

Type of Water Cooler (Absorption)	Level				Coefficient of Performance
	Cool water		Hot Water		
	Temperature of Cool Water (In)	Temperature of Cool Water (Out)	Temperature of Water Flow Into Condenser	Temperature of Water Flow from Condenser	
	(Degree Celsius)				
A. One-Level	12.0	7.0	32.0	37.5	0.65
B. Two -Level	12.0	7.0	32.0	37.5	1.10

Clause 3 The coefficient of performance, ratio of energy efficiency and electrical power per ton refrigeration identified in Clause 2 shall not be applied to air-conditioning system using solar energy.

Given on 14th July 2009

Wannarat Charnnukul

Minister of Energy