An Alternative to Thailand's Power Development Plan (PDP)*

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EGAT's Power Development Plan (PDP) 2004, which was approved by the Thailand Cabinet, is based on an unrealistically high peak demand forecast. In addition, less expensive, environmentally or socially superior alternatives are not taken into consideration. The PDP is thus likely to lead to both *over* investment and *misallocated* investment. The failings of the PDP indicate that the narrow criteria that EGAT employs for planning are inadequate for the critical task of determining Thailand's power sector investment priorities in a way that is best for the country. The PDP should be revised and the process by which the PDP is determined should be amended to include broader criteria and meaningful public participation. Below is an alternative PDP, presented with a discussion of the specific failings of the PDP 2004.

1. Revise Peak Demand Forecast

1.1 The January 2004 power demand forecast, which was used as the basis for planning the PDP, has already over-predicted the 2004 peak demand by 274 MW. The projected demand was 19,600 MW, but the actual peak was only 19,326 MW. The forecast should thus be revised by using the actual 2004 peak figure as the base for projecting demand in future years.

1.2 The forecast was made under the assumption that Thailand's annual GDP growth rate would maintain at 6.5 for the next 13 years. This rate is extremely optimistic, considering the high oil price situation unforeseen at the time of the forecast completion and the fact that the average actual GDP growth rates during past the 10 and 15 years were only 3.6% and 5.6% per year, respectively. Therefore, the GDP assumption should be revised to be more realistic by lowering to no more than the actual average of the past 15 years.

1.3 According to the National Energy Strategy Plan announced in August 2003, the Government plans to improve efficiency of energy use by improving the ratio of energy use to GDP to 1:1. The actual ratio of year 2004 for the power sector was already about 1:1 (peak demand increased 6.6% and GDP was estimated to increase 6.5%). Yet, the forecast was based on the 1.3:1 ratio. This needs to be corrected to reflect the strategy plan and the existing growth rates.

1.4 The Peak Demand should be lowered by 500 MW, according to the Peak Cut program as stated in the PDP 2004.

With all the abovementioned revisions, **the Peak Demand can be lowered by 6,290 MW** to the level of 39,891 MW, as shown in Table 1.

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Table 1 Adjusted peak demand forecast

Year	Jan 04 Forecast		Adjustments to Jan 04 forecast (MW)					Forecast (adjusted)
	Assumed per annum GDP growth rate	Peak Demand (MW)	Use actual 2004 peak as base (19,326)	GDP Growth = 5.6% (average past 15 yrs)	Demand : GDP = 1:1	Peak Cut (according to Egat's PDP 2004)	Total (MW)	Peak Demand (MW)
2547	6.5%	**19,600**	-274	0	0	0	-274	**19,326**
2548	6.5%	**21,143**	-296	-35	-259	0	-590	**20,553**
2549	6.5%	**22,738**	-318	-110	-482	-500	-1411	**21,327**
2550	6.5%	**24,344**	-340	-227	-629	-500	-1696	**22,648**
2551	6.4%	**26,048**	-364	-373	-797	-500	-2034	**24,014**
2552	6.4%	**27,852**	-389	-577	-962	-500	-2429	**25,423**
2553	6.6%	**29,808**	-417	-903	-1113	-500	-2933	**26,875**
2554	6.5%	**31,844**	-445	-1280	-1252	-500	-3477	**28,367**
2555	6.5%	**33,945**	-475	-1731	-1343	-500	-4048	**29,897**
2556	6.5%	**36,173**	-506	-2277	-1428	-500	-4711	**31,462**
2557	6.4%	**38,515**	-538	-2897	-1519	-500	-5454	**33,061**
2558	6.5%	**40,978**	-573	-3652	-1565	-500	-6290	**34,688**

2. <u>Revise the Electricity Generation Supply</u>

2.1 Use the revised peak demand forecast from item 1;

2.2 After the demand forecast reduction, the power sector still needs to seek an additional power generation supply of 15,120 MW by 2011 in order to meet the reliability criteria of 15% reserve margin (see Table 2). The new supply would best be provided by:

- Projects already under construction and having the contracts signed with EGAT, which amounts to 4,620 MW. Note: this figure excludes the Nam Theun 2 project in Lao PDR, whose purchase price will be as high as 1.80 baht/unit (inclusive of the designated transmission line routing cost) while there are concerns over the project's impacts and an uncertain guarantee of loans from the World Bank);
- For the remaining new supply, instead of developing new risky, large-scale fossil power plants or large hydro dams, the PDP should give priority to lower cost, lower impact, lower risk resources, e.g. DSM, renewable energy, cogeneration, and repowering of existing plants. These sources are incorporated in the alternative PDP as follows:

unit: MW

	Potential in Thailand	Capacity used in the Alternative PDP
DSM	~2,500	1,500
Renewable	>12,300	2,200
Cogeneration	>3,000	2,500
Repowering	~7,700	4,310
Total	>25,500	10,510

2.3 If the power sector reform follows the National Economic and Social Advisory Council's proposal—which suggests that large industrial customers consuming more than 60% of the country's total energy demand can directly negotiate their purchases with independent power producers—the state utilities will be hugely relieved of their obligations to supply power to serve increasing power demand.

The transition to allow major power users (including Medium General Service, Large General Service and Specific Businesses customers) to supply energy to meet their own load growth should happen gradually. There should be at least 3 years of preparation. Then, in 2008, the most well-prepared large users (approximately 1/3 of load growth from these groups) will procure the needed power supply or make power purchase agreements with IPPs directly to meet their additional power requirements. The proportion of large customers responsible for their own load growth will increase to 2/3 and 3/3 of all their new demand in 2009 and 2010, respectively. Some large users who are not ready to procure power to meet their new demand themselves can still buy power from the state (EGAT or electricity distribution authorities). The obligation to supply new power shall include the required reserve margin (around 15% of peak demand).

Following the above steps, the Alternative PDP will result in:

- **A decrease of the peak demand by 6,290 MW;**
- **Lowering the need for the overall sector's capacity expansion of 7,444 MW,** from 22,546 MW to 15,120 MW;
- **Lowering the (non-industrial) sector's obligation to supply new power generation to only 2,300 MW** (from 16,885 MW) while the 8,200-MW demand of the industrial sector shall be managed by private investors;
- **Eliminating the need for 20 new natural gas/coal/hydropower power plants (each with a 700-MW generating capacity),** by developing other low-cost, low-risk, low-impact alternatives;
- **Thus, lowering the obligation to expand the overall system's capacity investment (2004-2015) from 977,590 million baht** (735,000 million baht for EGAT) **as stated in the PDP 2004 to only 400,000 million baht** (including the cost of investment in transmission system (about 100,000 million Baht) and system expansion for the industrial sector).

Details of the Alternative PDP are presented in Table 2.

The calculation of the Alternative PDP budget was based on the following assumptions:

- The investment cost of a new power plant project (including the necessary transmission system upgrade) is 25 million baht per MW (according to the PDP 2004, the new thermal power plant in Songkhla costs 16,800 million baht/700 MW, or 24 million baht/MW [including the transmission system cost]).
- The cost of re-powering an existing power plant (including transmission system cost) is around 22 million baht/MW (which equals to the average of the costs of three re-powering projects –South Bangkok, North Bangkok and Bang Pakong power plants, according to EGAT's PDP 2004.
- The cost of the DSM program amounts to aobut one-fifth (5 million baht/MW) of the cost of building a new power plant.
- Renewable energy costs about twice the cost of a fossil-fuel-based power plant or around 50 mil.Bt/MW (Biomass/biogas power plant costs around 48 mil.Bt/MW)

- The construction cost of a co-generation power plant is approximately US$900,000/MW, or 36 million baht/MW.
- The investment cost for transmission system is the same as that in Egat's PDP 2004, except that the transmission system cost of Nam Thuen 2 is excluded. Therefore, the figure is at 100,000 million Baht which is very high and should be revised so that it reflects the reduced demand projection and number of new power plant projects.

Table 2: Comparison of EGAT's PDP 2004 and the Alternative PDP

Year	EGAT PDP 2004 Project		Installed Capacity (MW)	Alternative PDP Project		Installed Capacity (MW) Total	Non-industrial Sector	Industrial Sector
2003	*Projects under construction/negotiations*		25,263	*Projects under construction/negotiations*		25,263	25,263	-
	Krabi Thermal Unit 1	340 MW		Krabi Thermal Unit 1	340 MW			
2004	Lan Krabue Gas Turbine	122 MW	26,352	Lan Krabue Gas Turbine	122 MW	26,352	26,352	-
	Lam Takhong Dam Hydropower Units 1-2	500 MW		Lam Takhong Dam Hydropower Units 1-2	500 MW			
2005	BLCP Power Co., Ltd. Units 1-2	1,347 MW	26,372	BLCP Power Co., Ltd. Units 1-2	1,347 MW	26,372	26,372	-
	Gulf Power Generation Co., Ltd.	700 MW		Gulf Power Generation Co., Ltd.	700 MW			
2006	Ratchaburi Power Co., Ltd. Units 1-2	1,400 MW	26,372	Ratchaburi Power Co., Ltd. Units 1-2	1,400 MW	26,372	26,372	-
	Small Power Producers (Renewable power)	151 MW		Small Power Producers (Renewable power)	151 MW			
2007	Small Power Producers (Existing purchase)	60 MW	28,588	Small Power Producers (Existing purchase)	60 MW	26,372	26,372	-
	Lao PDR Project (Nam Theun 2)	920 MW						
2008	Total	5,540 MW	31,618	Total	4,620 MW	27,616	27,267	349
	New Projects		33,018	*New Projects*		29,237	28,169	1,068
2009			34,813	Non-Industrial Sector		30,906	28,727	2,180
2010				- DSM	500 MW			
			37,018	- Renewables	1,800 MW	32,622	29,300	3,322
2011	Re-powering 4 existing power plants	2,485 MW		Sub-total	2,300 MW			
			39,473	Industrial Sector		34,381	29,888	4,494
2012	Construction of 20 new power plants	13,770 MW		- DSM	1,000 MW			
			42,413	- RPS (5%)	390 MW	36,182	30,489	5,692
2013	Renewable Portfolio Standard (RPS)	770 MW		- Co-generation	2,500 MW			
			44,618	- Re-powering	4,310 MW	38,020	31,104	6,916
2014				Sub-total	8,200 MW			
			47,348			39,891	31,729	8,162
2015								
	Total	17,025 MW		Total	10,500 MW			
	Total Additional Capacity	22,565 MW		Total Additional Capacity	15,120 MW			

Installed Capacity as of December 2003	25,363 MW	Installed Capacity as of December 2003	25,363 MW
Total Additional Capacity	22,565 MW	Total Additional Capacity	15,120 MW
Power Plants decommissioned from the system	- 550 MW	Power Plants decommissioned from the system	- 550 MW
Total Capacity in 2015	47,378 MW	Total Capacity in 2015	39,933 MW