

IMPACT OF GLOBAL ENVIRONMENTAL PROTECTION REQUIREMENTS ON EFFICIENCY AND COST COMPETITIVENESS OF LOCAL POWER PRODUCERS IN THAILAND

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ABSTRACT

A global price variation of time-limited crude oil and gas had incurred cost constraints to all power producers around the world. Many power producers had diverted to alternative resources such as nuclear, lignite or coal to improve production efficiency and costs competitiveness with consequences to the environment. An emerging global environmental protection requirement such as global warming, CO₂ emission, renewable energy, regulation and health had added additional constraints to production efficiency and costs for all power producers. This paper presents the impact of global environmental protection requirements on efficiency and cost competitiveness of local power producers in Thailand. In order to sustain production efficiency and cost competitiveness, a strategic plan with inclusion of impact from global environmental protection requirements was developed using Strategic Management Process (SMP). SMP was adopted due to its ability to provide a step-by-step guideline to assimilate knowledge and expertise from top executives during strategic planning process. A Balance Scorecard was applied to develop six essential strategic perspectives using Strategic Map to graphically represent relationships and directions of six strategic perspectives and fourteen strategic initiatives to be implemented. A series of five brainstorming workshops of top executives was conducted as data collection method over a period of four months. The findings were used to develop global environmental protection requirements based: (1) core purposes, mission and vision, (2) management philosophy, principles and core values, (3) strategic perspectives, objectives, strategies, and (4) strategic initiative projects that included strategic implementation, strategic evaluation and control that may effectively ensure improvement of local power production efficiency and cost competitiveness that corresponded to emerging global environmental protection requirements in the future.

Key Words: Globally Distributed Power Generation, Strategic Management Process, Strategic Map, Balance Scorecard, Power Generation Efficiency

1. INTRODUCTION

The world demand for power or electricity had been expanded with an increasing growth rate due to increased industrialization, technical progress and globalization especially in developing countries such as China, India, Brazil, South Africa and countries in Southeast Asia (Reisinger et al, 2002). The world supply of power or electricity, however, had been provided by power generation from various energy resources such as crude oil, gas or nuclear including its storage and transmission technologies. The power generation would vary according to each country climate conditions, level of industrialization, economic development, cultural conditions, consumption from industrial, services, households, agriculture and transportation sectors, and relative price of electricity to other energy resources. Many existing power generation systems had been based on time-limited crude oil and gas centralized grid dependent network structure with many disadvantages such as high emissions and transmission loss, long lead time for plant construction, and required large and long term financial resources.

An emerging global environmental protection requirement such as global warming, CO₂ emission, regulation and health had incurred additional constraints and costs to all power producers around the world. A globally distributed power generation (GDPG) using alternative resources such as fuel cells, biomass, wind, solar, geothermal, photovoltaic, hydro power, ocean power, and hydrogen with less disadvantages had become an alternative or extension to many power production in many countries. A global changing in power generation focus from supply-safety-reserve and

2.1.1 Capability to Produce Electricity

The *System Installed Capacity* (Gwh - Giga Watt Hour) was used to determine capability to produce electricity. In 2004, the overall *system installed capacity* was equivalent to 47.2% of total system installed capacity in Thailand. In comparison to competitors, Independent Power Producers (IPP) and Small Power Producers (SPP) had system installed capacity equivalent to 50.3% or 3.1% and continued to increase in the future. The remaining 2.5% of total system installed capacity were imported from neighboring countries. The capability to produce power ranked by resource and volume was: (1) Natural Gas at 70.1%, (2) Lignite at 14.0%, (3) Fuel Oil at 5.9%, (4) Hydro at 4.7%, (5) Imported Power at 2.5%, (6) Imported Coal at 1.8%, (7) Renewable at 0.6%, and (8) Diesel at for 0.4% of overall energy used. *Natural Gas* had been ranked number one source of energy due to its low price variation and low pollution. *Lignite* was ranked number two and fuel oil was ranked number three respectively. The remaining *five* sources of energy had not been the major source of energy used to produce electricity.

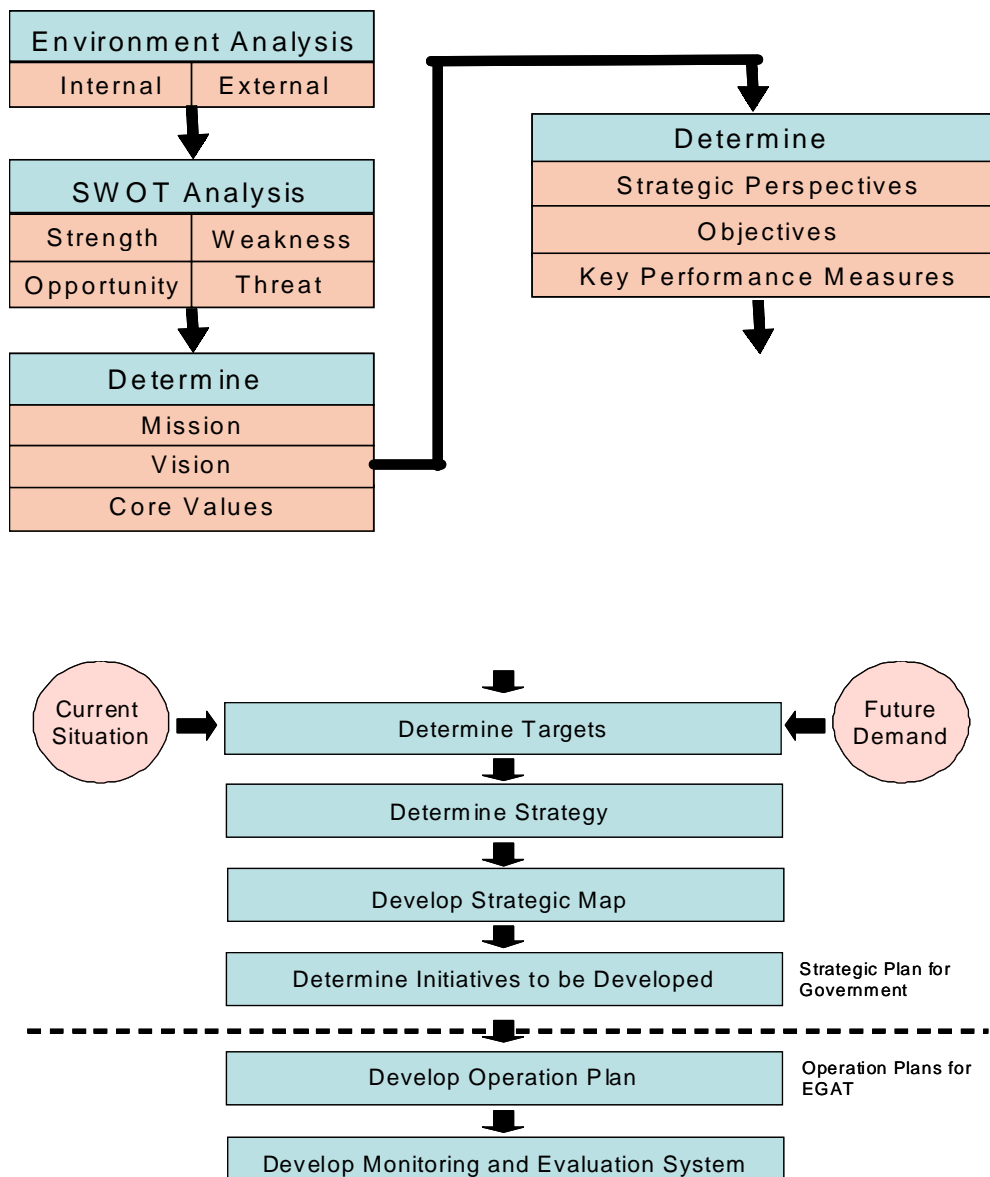


Figure 1 Strategic Management Process for Development of Strategic and Action Plans.

(2) Revenue, (3) Revenue per employee, (4) number of fuel (in million units), (5) number of power produced per employee, (6) number of power sales (in million units), and (7) number of power sales per employee. Although it had large number of employees in comparison to many local and global producers, such as, in Singapore, Malaysia, Europe and USA, it had been *ranked second lowest production cost in the world or second to China*. However, the estimation of employee efficiency remained to be accurately determined.

2.1.8 Electrical Generated Availability

It was determined from *Gross Weighted Equivalent Availability Factor (GWEAF)* which had been at 89.02% in 2004. In comparison to GWEAF of North American Electric Reliability Council Average (NERC) which was at 86%. The local power producer in Thailand, therefore, had GWEAF at 3.2% higher than North American Electric Reliability Council (NERC) average.

2.1.9 Cost Management Efficiency

It was determined from *non-fuel costs as percentage of revenue during the last three years*. In comparison with six global power producers (i.e., HKE, Tenaga, Endesa, Iberdrola, Dominion and KEPCO), local power producer in Thailand had cost management efficiency at 13.3% and was ranked number *two* next to HKE which had been ranked number one at 7.6% in 2004. The cost management efficiency for the remaining producers were: Tenaga at 13.9%, Endesa at 15.4%, Iberdrola at 16.2%, Dominion at 24.5% and KEPCO at 28.7% (of Non-Fuel Costs as % of Revenues over the last three years).

2.1.10 Financial Comparison with Local and Global Competitors

It was determined from: (1) Return on Sale or Net-Profit/Sales (ROS), (2) Assets Turnover (Sales/Assets), (3) Net Profit per Assets (ROA), (4) Assets to Equity (Assets/Equity) and (5) Net Profit/Equity (ROE) as follows.

- *Return on Sales (ROS) (Net-Profit/Sales)*. ROS continued to increase at high rate of 12% in 1999 to 30% in 2004.
- *Assets Turnover (Sales/Assets)*. It continued to increase at satisfactory ratio of 0.37 in 2000 to 0.64 times 2004.
- *Return on Asset (ROA) (Net Profit/Assets)*. It had been at lower ratio than competitors due to accumulation of old assets including many old power plants with low production efficiency that required high maintenance cost or expensive termination process in order to improve an overall Return on Asset.
- *Asset to Equity (Asset/Equity)*. It had been slightly higher than competitors and continued to decline due to the improvement of production efficiency and termination of many old power plants with low production efficiency in order to improve overall asset to equity ratio.
- *Return on Equity (ROE) (Net Profit/Equity)*. It had been satisfactory higher with lower ratio than competitors due to larger numbers of shareholders and continued to be lower than both local and global competitors.

Although financial situation had been compared and ranked highly from above five indicators, additional financial comparison would be necessary to accurately determine its competitiveness.

2.2 REGIONAL ENERGY GRID - CURRENT SITUATION ANALYSIS

After ASEAN regional financial crisis in 1997, many countries that supplied electricity to *Regional Energy Grid* countries such as Thailand, Laos, Myanmar, Vietnam, Cambodia, and Southern Yunan of China had experienced drastic reduction of demand for electricity from major consumers in Thailand, Singapore, Vietnam and Cambodia. Until 2004, economic situation in ASEAN countries began to revive and demanded for more electricity. Many power generation plans had been revised and adjusted for increasing demand of electricity. Thailand led by *The Electricity Authority of Thailand (EGAT)* with support from *World Bank* Funding had prepared to import more electricity generated from Laos Government led by *Electricite de France (EDF)*. Thailand had agreed to purchase electricity generated from three new projects of regional energy grid: Nam Theun 2, Nam Ngum 2 and Nam Ngum 3 completely built in 2006. These three power plants supplied Thailand 1.8 GW in 2006 and will supply 3.3 GW by 2008.

weakness (see weakness). The outcomes from 2.1 and 2.2 indicated seven threats including: (1) many Thai people in the public disbelieved that privatization would not result in generating and distributing large amount of profit and share ownership to only a few privilege groups of private sector, (2) Thai government policy toward encouraging more independent power producers would result in increasing competition and declining in market share, (3) Thai government policy toward redefining structure for Electric Supply Industry (ESI), renewable energy and production capacity would result in higher costs and limited production capacity, (4) many public complaints toward environmental hazards and related issues would result in disruption to power generation, (5) many group of related individuals attempted to change the structure of power industry from Enhanced Single Buyer (ESB) to other structures which would result in decreasing competitiveness, (6) trend toward increasing construction of small distribution generators would result in decreasing demand for expanding transmission lines and services, and finally, (7) increasing price of fossil fuel and the lack of freedom to choose sources of energy would result in higher production costs.

4. CORE PURPOSE, VISION AND CORE VALUES

Section 2 and 3 were used to determine the first three most important outcomes of strategic planning process: global environmental protection requirements based- (1) core purpose, (2) vision, and (3) core values, as follow.

4.1 CORE PURPOSE

The global environmental requirements protection based core purpose of local power producer in Thailand in 2006 was “*To create and improve the quality of life through reliable and affordable energy and services for mankind and in harmony with the environment*” including:

- *Quality of life.* It referred to continuously provide availability of electricity to everyone with security and extend ability to generate their related income.
- *Reliability.* It referred to sufficient supply of electricity without disruption, weak and unstable signal.
- *Affordable.* It referred to the price of electricity that could be paid by general public and industry that remained reasonable for them to compete in their businesses.
- *Harmony with the environment.* It referred to managing environmental issues and problems related to power generation according to international standards with caring and concerning about well being of local communities and society.

4.2 VISION

The global environmental protection requirements based vision for local power producer in Thailand in 2006 was developed and defined as “*To be a world-class enterprise in producing and providing in electricity and related businesses*”. Additional five relevant issues to be considered in pursuing global-based vision included: (1) to become one of Fortune 500, (2) to become one of ten low-cost power producers in the world according to source of energy used, (3) to continuously grow with stability and sustainable growth, (4) to manage with high efficiency and acceptance from global competitors, and (5) to manage technology, quality, environment, security and health with good governance at global standard.

4.3 CORE VALUES

The global environmental protection requirements based core values of local power producer in Thailand used in the development of strategic plan in 2006 included: (1) Fairness, (2) Integrity, (3) Responsibilities and Accountability, (4) Mutually respect for people, and (5) Committed to continuous improvement and teamwork.

Fairness referred to maintaining indifferences.

Integrity referred to maintaining trustworthiness.

Responsibilities and Accountability referred to maintaining liability.

Mutually respect for people referred to respecting individual values.

Committed to continuous improvement and teamwork referred to pledging to improvement and teamwork.

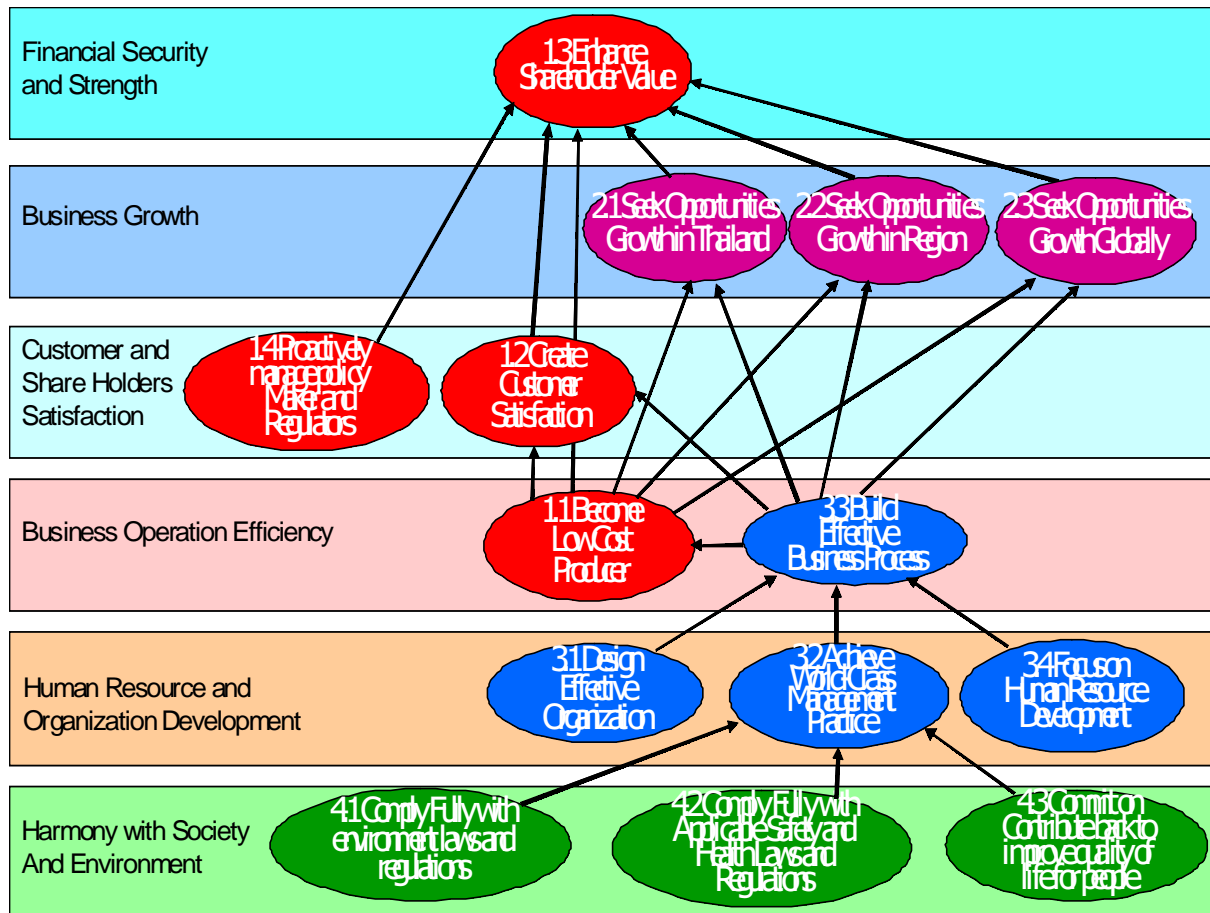


Figure 2 Strategic Map

To achieve global environmental protection requirement based core purpose and vision, the *sixth* strategic perspective of strategic map which was the harmony with society and environment would be initiated first.

The outcomes from complying fully with environment laws and regulations (4.1), safety and health laws and regulations (4.2), and commit on contribute back to improve quality of life of people (4.3) would assist local electricity power producer to achieve a world-class management practices (3.2).

Together with strategy to design effective organization (3.1) and focus on human resource development (3.4), the outcomes would support the building of premium organization (i.e., the *4th* strategic perspective) and effective business process (3.3). Having effective business process (3.3) was one of the most important strategies to achieve effective business operation strategic perspective (i.e., the *4th* strategic perspective).

The outcomes of effective business processes would have five subsequence effects on satisfying customers and shareholders requirements (i.e., the *3rd* strategic perspective) and business growth (i.e., the *2nd* strategic perspective).

The *five* consecutive strategies included becoming global-based low-cost electricity power producer (1.1), create customer satisfaction (1.2), seeking opportunities to grow in Thailand (2.1), in the region (2.2) and in the world (2.3) would assist in having effective business operation that satisfy customers and shareholders requirements (i.e., the *3rd* strategic perspective) and support business growth (i.e., the *2nd* strategic perspective).

The success of proactively manage policy maker and regulators (1.4) together with business growth and customer