MARKET ANALYSIS OF SOLAR WATER HEATING IN HOSPITALITY INDUSTRY, THAILAND

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SANSANEE PONGTHONG: Market Analysis of Solar Water Heating in Hospitality Industry, Thailand

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ABSTRACT

This study examines the strategic market approach for investing in solar water heating in the hosptality industry in Thailand. The main question in this study is 'What are the market strategies for potential market segment for SWH in Thailand?' This study focuses on the marketing strategy planning to the Thai market.

The thesis follows the qualitative study design where the data was collected by observing the market and interviewing main stakeholders and possible customers of Solar Water Heating.

The targets segments are in the hospitality business. There are two groups to whose purpose there is some difference in the marketing strategy. The recommended entry mode invests directly to the market through agent and distributor.

Key words: Marketing Strategy, Marketing Mix, Solar Water Heating, solar companies, Hospitality Industry, Hotel, Entry Mode

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ABBREVIATIONS

B&Bs	Beverage and Breakfast
CIF	Cost, Insurance & Freight
DEDE	Department of Alternative Energy Development and Efficiency
EE	Energy Efficiency
GDP	Gross domestic product
GHG	Green house gas
SWH	Solar Water Heating, Solar Water Heater
TGO	Thailand Greenhouse Gas Organization

1 INTRODUCTION

The study aims to find the feasibility and the market analysis of the Solar Water Heating (SWH) in the hospitality industry in Thailand. The introduction part of the research will present Thailand in general and background of this study, pointing out why this research subject was chosen, overview of the Solar Water Heating industry in Thailand, an explanation of the objectives, questions and limitations of this study are given and a brief introduction to the theoretical background and the research approach chosen. All related technical and non-technical barriers prohibiting the effective development of the SWH market in Thailand are identified through detailed situation analysis, and developing a set of solutions, guidelines, measures and recommendations for a foreign Solar Water Heating company and industry stakeholders.

1.1 Background

- Thailand Overview

Thailand is located in Southeast Asia and has a land area of 513,115 sq. km. The country is divided into 76 provinces, which are gathered into 5 regions (North, Northeast, East, Central and South). Geographically Thailand can be classified into four natural regions. Northern Thailand is dominated by forested mountain ranges divided by four fertile river valleys. Central Thailand is mainly the Chao Praya basin, where the major part of the population and industry as well as the majority of agricultural production is based. The North-East is sparsely vegetated and largely infertile. The southern peninsula is dominated by dense tropical forests. The climate is essentially tropical with a wet, warm south-west monsoon from May to September and a drier, cooler monsoon from November to March. Temperatures vary from 20 to 37°C.

- The Thai Solar Water Heater Market Industry

Development of solar water heating in hospitality application in Thailand was initiated by the government since 1984, installing 325 square meters of the flat plate collectors for 6 hospitals, 1 hotel and 1 factory, later transferred the ownership and let them operate the system. After the Government initiation, there is about 10 local companies start to import the solar water heater into the country, in 1994 it was estimated that about 50,000 square meters of the solar flat plate collector has been installed in the country. Even till today, the solar thermal market in Thailand is still very small and growth of the solar hot water system installation in the past 15 years are only 10% annually and more than 50% are in residential

areas. The equipment was mainly imported until 10 years later, until local fabrication of solar collectors became a cheaper option, though less efficient, to Thai customers. Origins of the solar collectors were mainly from Australia until recently the imported SWH parts and collectors have shifted to China, Germany and Israel. The CIF import values have been increasing over the past couple of years in line with rising crude oil price in world market.

A study by JGSEE/IIEC/FRAUNHOFER ISE reported that the Thai solar water heating application is currently limited to water heating application in the residential sector while the large market potential in the commercial hospitality industry sector remains untapped. There are approximately 20 solar water heating companies in the market, however only a few companies have intensive experience and are capable of providing design and installation for solar system. The outlook for the Thai solar water heating market has been positive in the past few years due to recent fuel price escalation. It was estimated that the sales of solar water heaters were around 6,800 m2. (JGSEE et al., 2007)

Barriers: (a) Technical Barriers: system design and sizing, quality and selection of materials, water quality, and installation.

(b) Non-technical Barriers: high investment cost, no products standard, lack of government support, little public awareness.

The main reasons behind carrying out this study are:

- Technical barriers

Quality and selection of materials: with the limited number expertise of SWH, local companies have selected cheap material used in the system could also shorten the system life time.

System design and sizing: many solar companies are small and sometime specialize in other area i.e. import. These companies often install solar systems without knowledge of proper system design and sizing resulting poor performance of the solar system that can not serve the actual hot water demand.

Water quality**:** in some areas of Thailand, well water is a major water supply for even tourist cities like Chiang Mai and Phuket. Sediments from water have been a major problem for solar hot water with open-loop configuration installed in these areas.

Installation: small companies often hire installers which sometimes do not have knowledge in solar water heater or even plumbing. Wrong installation mostly fails the solar system instantly in just days after first operation. In many cases, owners who have no technical knowledge are not aware that their systems are not operating.

- Non-technical barriers

High investment cost and long pay-back period: due to limited size of market, solar companies need to mark up cost at high price in order to cover for the company's expense. The cost of SWH in Thailand is relatively high as compared to countries that have success in solar hot water installations.

Lack of quality control scheme: Thailand does not have sufficient standards, testing and certification or any other scheme that could control quality of solar water heater in the market. Poor quality of systems and improper installations lead to system failure and customers' dissatisfaction and distrust of the solar thermal technology.

Lack of effective policy support from the government: the Thai government, from time to time, supported solar hot water in forms of demonstration and subsidies to limited number of systems. However, these financial supports did not link with quality control and only resulted in more solar systems failure. Other policies that can result in a more lasting and steady support to the market such as tax incentives and awareness campaign have not been introduced.

1.2 Description of Solar Water Heating Systems

The solar water heating system is a process of harnessing the power from the sun as a renewable energy source to warm water for both domestic and industrial usage. It encourages high productivity, especially in tropical climates.

Solar water heating systems use solar collectors and a liquid handling unit to transfer heat to the load, generally via a storage tank. The liquid handling unit includes the pump(s) (used to circulate the working fluid from the collectors to the storage tank) and control and safety equipment. When properly designed, solar water heaters can work when the outside temperature is well below freezing and they are also protected from overheating on hot, sunny days. Many systems also have a back-up heater to ensure that all of a consumer's hot water needs are met even when there is insufficient sunshine. Solar water heaters perform

three basic operations as shown in Figure 1 (RETScreen,2011)

- Collection: Solar radiation is "captured" by a solar collector;
- Transfer: Circulating fluids transfer this energy to a storage tank, circulation can be natural (thermosiphon systems) or forced, using a circulator (low-head pump)
- Storage: Hot water is stored until it is needed at a later time in a mechanical room, or on the roof in the case of a thermosiphon system.

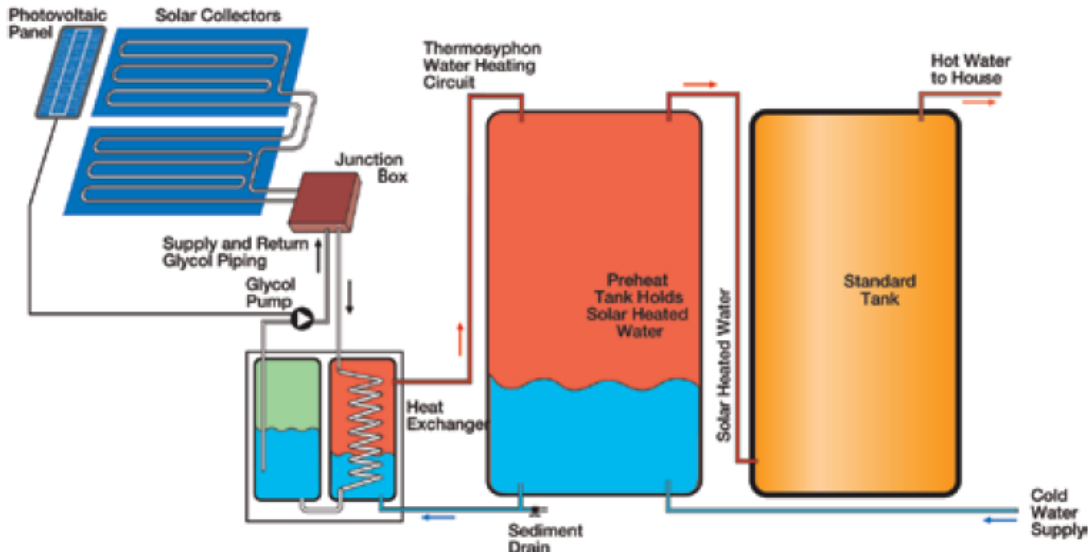


Figure 1: System Schematic for Typical Solar Domestic Water Heater.

The Economic potential of each technology is shown in the table below, it also shows average payback period, cost of energy saving and internal rate of return.

Table 1: Economic Potential of each EE technology

EE Technology	Average Payback Period (Year)	Service Life (Year)	Average Cost of Energy Saving (Baht/kW)	Average IRR %
Insulation	0.8	10	0.16	139
Water heater using waste heat from A/C	2.3	10	0.77	119
Automatic condenser cleaning system	1	10	0.21	103
Economizer	1.03	10	0.06	102
Variable speed drive	1.6	10	0.44	82
T5 fluorescent lamp	1.9	6-8	0.81	52
High efficiency chiller	4.4	15	0.54	37
High efficiency split-type air-conditioner	3.8	10	1	32
Solar water heating system*	4	15	0.63	26
Heat Pump	4.73	10	0.42	21

1.3 Research Objective and Questions

The primary objective is to establish the feasibility of Solar Water Heating Business in Thailand for the foreign company to enter to The Thais markets and identify the potential market segmentation of the Solar Water Heating in the hospitality industry, Thailand

After the feasibility and market analysis, if the results and choice of marketing model area applicable in Thailand and forecasts profitability, the Solar Water Heating company will benefit by having the opportunity to be able to enter to the Thai Market and to use this model as the business plan.

1.3.1 The main Research Question

- What are the market strategies for potential market segment for SWH in Thailand?

1.3.2 Research sub-questions

- What is the current solar energy market size in Thailand?
- What are the potential market segments in Thai hospitality industry for foreign solar companies?
- What are the laws and incentives provided by the government?
- How can the foreign solar companies enter Thai markets?

1.4 Theoretical framework

The theoretical framework of this research is based on the tools of a market analysis and a market strategy. The goal of a market analysis is to determine the attractiveness of a market and to understand its evolving opportunities and threats as they relate to the strengths and weaknesses of the firm. (Market.Org, 2011)

The market analysis will be an ongoing effort to show how the company or product is doing over time. It should address tracking and data about the product line's sales. Any future product lines or line extensions should also be outlined. There should be a competitive review and ideas on how to position the company better. In addition, business owners should consider how they plan to grow the demand within the industry. A thorough market analysis will be a blueprint for how to run the business. It is important to review the plan periodically and make changes when necessary. (Market.Org, 2011)

Starting a new business or launching a new product line can be a daunting task. Starting with a comprehensive market analysis though can help to determine the target market and the need for the concept. Once this is understood, it will be easier to develop a marketing plan without wasting valuable dollars trying to get into an already oversaturated market. This summary will also help to outline a strategic plan for bringing the product or service effectively to consumers. (Study Marketing.Org, 2011)

A marketing strategy is most effective when it is an integral component of corporate strategy, defining how the organization will successfully engage customers, prospects, and competitors in the market arena corporate strategies, corporate missions, and corporate goals. As the customer constitutes the source of a company's revenue, marketing strategy is closely linked with sales. A key component of marketing strategy is often to keep marketing in line with a company's overarching mission statement. (Market.Org, 2011)

An element of marketing strategy, a marketing strategy is composed of several interrelated elements. The first and most important is market selection: choosing the markets to be served. Product planning includes the specific products the company sells, the makeup of the product line, and the design of individual offerings in the line. Another element is the distribution system: the wholesale and retail channels through which the product moves to the people who ultimately buy it and use it. (Study Marketing.Org, 2011)

There are 3 market strategy levels, although alignment of strategic initiatives is a corporate-wide effort, considering strategy in terms of levels is a convenient way to distinguish among the various responsibilities involved in strategy formulation and implementation. A convenient way to classify levels of strategy is to view corporate-level strategy as responsible for market definition, business-level strategy as responsible for market navigation, and functional-level strategy as the foundation that supports both of these

Table 2: Stratregy levels

Level of Strategy	Definition	Example
Corporate strategy	Market definition	Diversification into new product or geographic markets
Business strategy	Market navigation	Attempts to secure competitive advantage in existing product or geographic markets

Functional strategy	Support of corporate strategy and business strategy	information systems, human resource practices, and production processes that facilitate achievement of corporate and business strategy

1.5 Research Approach

The research approach is qualitative design. The main methods in qualitative research are observation, interviews, and documentary analysis. The research questions are mainly aimed for understanding the market segmentation in hospitality industry of Solar Water Heating, Thailand. The research is a single case study with a multi-method case study, the researcher was able to design the research to answer the questions by using in-depth interviews with semi-structured questionnaires allowing some flexibility to discuss issues that might come up during the discussion unexpectedly but which can in the end turn out to be very significant. The researcher has conducted a further analysis of the master students' group study from the winter 2009. As well as collection of the previous studies, data information from internet, books and articles both in Thai and English related to the subject of marketing analysis of Solar Water Heating in Thailand was used to understand the current situation in Thailand and the characteristics in Solar Water Heating industry.

The first phase of the study was a desk study as a secondary research. The most important objectives in the first phase are more about finding a business opportunity by collecting the data, current situation in Thailand, Thailand overview and in general for a business company and the previous studies which is related to Solar Energy. Finding the information related to the research subject to ensure the subject and study are reasonable.

After the first phase, the study continued with a field study in Thailand. Then the researcher prepared questions for semi-structured interviews to the stakeholders. The interviews consisted of representatives of the potential hospitality industry, in order to evaluate their needs and expectations when choosing energy sources and buying the equipment. The objectives of the interviews were to find answers to the buying process of energy supplies, the costs and pricing expectations and to establish the possible need and interest of the installation of Solar Water Heating to their (hospitality industry) properties.

The potential hospitality companies approached by the interviews were selected after a first segmentation done based on the secondary research. The segmentation is explained in detail in the empirical part of this thesis.

In order to complete the macro economics study and to establish an understanding of the environment and regulations concerning the Solar Water Heating in hospitality industry, Thailand, the researcher also tried (sometimes through difficulty) to meet the other stakeholder such as local officers, institutions, bank and tourists to interview about these issues.

1.6 Limitations

The research will be limited by choosing a specific industry for investing the Solar Water Heating Company in Thailand and target only in the hospitality industry segmentation.

The research will be limited to some cities in Thailand such as Cha-am, Hua Hin, Phuket, among others. The cities were chosen because it is the tourist destination where there are many hospitality business located. It will be impossible to carry out a research that covers the whole Thailand and interview all hospitality business companies.

This research will not address the other solar technologies apart of Solar Water Heating and not address also residential or industrial use of the Solar Water Heating. Since the research is done with qualitative methods and most of the data is collected by observing the markets and through personal interviews, the data will be more or less subjective.

1.7 Research Structure

The structure of this research will be following the phases of the study. The first chapter is the introduction and in the second chapter, there is a discussion of the theoretical background of the studies. The theoretical frameworks of this thesis rely on market analysis and market strategy, starting with the current situation of Solar Water Heating in the Thai market, using the Pestle analysis, Porter's Five Forces, Market Segmentation, Marketing Mix and finalize with the new marketing strategy.

In the third chapter, there will be a description of the research approach chosen and the methods that were used for analyzing and reporting the data.

The fourth chapter will include the empirical part of the studies starting with case study hotels and other hospitality providers. After the current analysis by using the market strategy analysis, there will be the content and the findings of the field study. This phase, empirical field study took place in many provinces in Thailand such as Bangkok, Ratchaburi, Petchaburi, Prachuabkirikhan, Suratthani, Phuket, Pang-nga. And there are also

some places that the researcher received the information by sending the questionnaire via e-mail and had a conversation via mobile without visiting their properties. This phase aims to find information from potential customers (hospitality industry) in order to position the products into the Thai market.

The empirical study was aiming at revealing the processes of buying and choosing Solar Energy into the company, more specifically their needs, purchasing power and expectations. The studies will combine the secondary and the primary studies, an evaluation and analysis of that data and develop a marketing strategy which will then work as a guideline for a Solar Water Heating company interested in investing in the business in Thailand. The fifth chapter will be the conclusions and recommendations.

2 THEORETICAL FRAMEWORK OF MARKETING ANALYSIS AND MARKET STRATEGY

This research is set out to study the markets in Thailand and the possibilities in that market for the Solar Water Heating in the hospitality industry. The goal of this research is to find the most valuable segmentation in hospitality industry for the foreign solar water heating company to establish the business into the Thai market. In this chapter, there is first shortly the whole theoretical background and then the theories and reason that were chosen for market analysis in the research in more detail.

2.1 Market Analysis

2.1.1 Macro Environment (Pestle Analysis)

In this chapter, the researcher uses Pestle Analysis as a tool. A PESTLE analysis is a business measurement tool, looking at factors external to the organization. Specifically the PESTLE analysis is a useful tool for understanding risks associated with market growth or decline, and as such the position, potential and direction for a business or organization.

PESTLE analysis is a useful tool for understanding the "big picture" of the environment, in which you are operating, and the opportunities and threats that lie within it. By understanding the environment in which you operate (external to your company or department), you can take advantage of the opportunities and minimize the threats.

The PESTLE Analysis is often used as a generic 'orientation' tool, finding out where an organization or product is in the context of what is happening out side that will at some point effect what is happening inside an organization. (RapicBI, 2011)

- Political

These refer to government policy such as the degree of intervention in the economy. What goods and services does a government want to provide? To what extent does it believe in subsidizing firms? What are its priorities in terms of business support?

- Economic factors

These include interest rates, taxation changes, economic growth, inflation and exchange rates

- Social factors

It is the study of human populations in terms of size, density, location, age, sex, race, occupation, and other statistics. It is of major interest to marketers because it involves people and people make up markets.

- Technological factors

New technologies crate a new product development and new access, innovation, rate of technological obsolescence.

- Legal factors

It is about the law that the company must know if they want to enter to Thai market.

- Environment factors

Environmental factors include the weather and climate change.

2.1.2 Mircro Environment (Porter’s 5 Forces)

These are internal factors close to the company that have a direct impact on the organization’s strategy.

Michael Porter devised a useful framework for evaluating the attractiveness of an industry or market. This framework, known as Porter's five forces, identifies five factors that influence the market profitability.

Porter explains that there are five forces that determine industry attractiveness and long-run industry profitability. These five "competitive forces" are:

- The threat of entry of new competitors (new entrants)

Barriers to entry can exist as a result of government intervention (industry regulation, legislative limitations on new firms, special tax benefits to existing firms, etc.), or they can occur naturally within the business world. Some naturally occurring barriers to entry could be technological patents or patents on business processes, a strong brand identity, strong customer loyalty or high customer switching costs.

- The bargaining power of buyers

Buyers are the people / organizations who create demand in an industry. The bargaining power of buyers is greater when:

- There are few dominant buyers and many sellers in the industry
- Products are standardized
- Buyers threaten to integrate backward into the industry
- Suppliers do not threaten to integrate forward into the buyer's industry
- The industry is not a key supplying group for buyers

- The bargaining power of suppliers

Suppliers are the businesses that supply materials & other products into the industry. The cost of items bought from suppliers (e.g. raw materials, components) can have a significant impact on a company's profitability. If suppliers have high bargaining power over a company, then in theory the company's industry is less attractive. The bargaining power of suppliers will be high when:

- There are many buyers and few dominant suppliers
- There are undifferentiated, highly valued products
- Suppliers threaten to integrate forward into the industry (e.g. brand manufacturers
- threatening to set up their own retail outlets)
- Buyers do not threaten to integrate backwards into supply
- The industry is not a key customer group to the supplier

- The threat of substitutes

The presence of substitute products can lower industry attractiveness and profitability because they limit price levels. The threat of substitute products depends on:

- Buyers' willingness to substitute
- The relative price and performance of substitutes
- The costs of switching to substitutes

- The degree of rivalry between existing competitors

Competitive Rivalry - This describes the intensity of competition between existing firms in an industry. Highly competitive industries generally earn low returns. A highly competitive market might result from:

- Many players of about the same size; there is no dominant firm
- Little differentiation between competitors' products and services
- A mature industry with very little growth; companies can only grow by attracting customers away from competitors

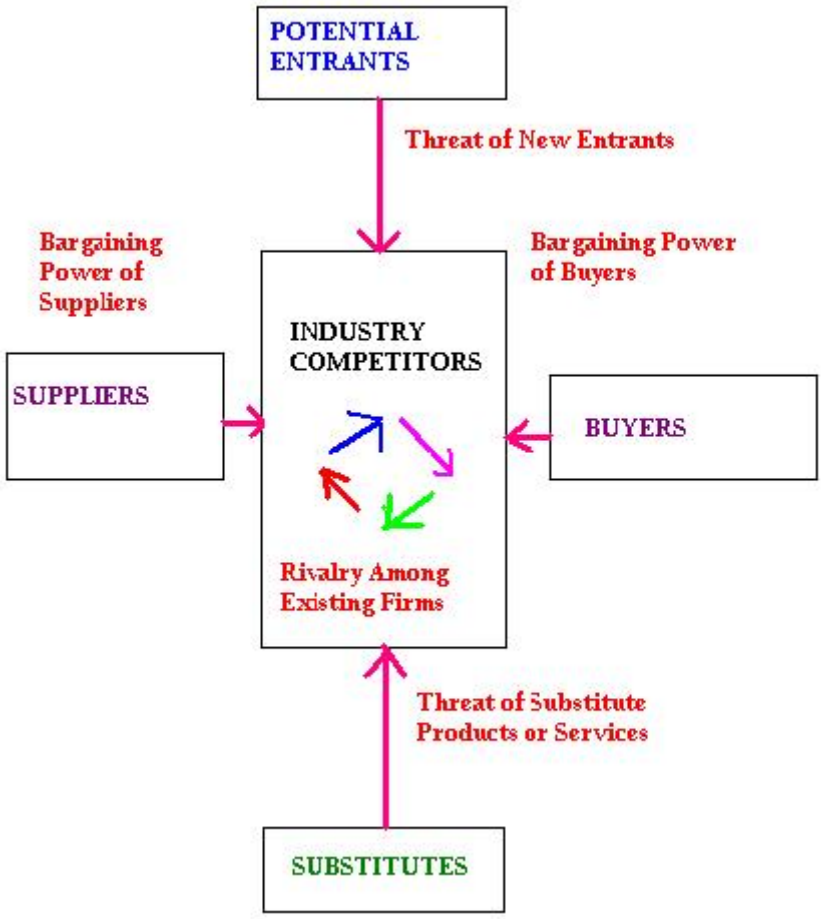


Figure 2: Porter's 5 Forces (Porter,2011)

2.2 Marketing Strategy

The marketing strategy sets your marketing goals, defines your target markets and describes how you will go about positioning the business to achieve advantage over your competitors.

2.2.1 Market Segmentation

Market segmentation is the identification of portions of the market that are different from one another. Segmentation allows the firm to better satisfy the needs of its potential customers

The marketing concept calls for understanding customers and satisfying their needs better than the competition. But different customers have different needs, and it rarely is possible to satisfy all customers by treating them alike.

In addition to having different needs, for segments to be practical they should be evaluated against the following criteria:

Identifiable: the differentiating attributes of the segments must be measurable so that they can be identified.

- Accessible: the segments must be reachable through communication and distribution channels.
- Substantial: the segments should be sufficiently large to justify the resources required to target them. Unique needs: to justify separate offerings, the segments must respond differently to the different marketing mixes.
- Durable: the segments should be relatively stable to minimize the cost of frequent changes.

A good market segmentation will result in segment members that are internally homogenous and externally heterogeneous; that is, as similar as possible within the segment, and as different as possible between segments.

The Bases for Segmentation in Industrial Markets

In contrast to consumers, industrial customers tend to be fewer in number and purchase larger quantities. They evaluate offerings in more detail, and the decision process usually involves more than one person. These characteristics apply to organizations such as manufacturers and service providers, as well as resellers, governments, and institutions.

Many of the consumer market segmentation variables can be applied to industrial markets. Industrial markets might be segmented on characteristics such as:

- Location

In industrial markets, customer location may be important in some cases. Shipping costs may be a purchase factor for vendor selection for products having a high bulk to value ratio, so distance from the vendor may be critical. In some industries firms tend to cluster together geographically and therefore may have similar needs within a region.

- Company Type

Business customers can be classified according to type as follows:

- ❖ Company size
- ❖ Industry
- ❖ Decision making unit
- ❖ Purchase Criteria

- Behavioral Characteristics

In industrial markets, patterns of purchase behavior can be a basis for segmentation. Such behavioral characteristics may include: usage rate, buying status: potential, first-time, regular, etc, purchase procedure: sealed bids, negotiations, etc

2.2.2 Marketing Mix

The marketing mix, which follows from the marketing strategy, is how you achieve that 'unique selling proposition' and deliver benefits to your customers.

Figure 3: The marketing Mix

3 RESEARCH METHOD

This research design is according to the qualitative method. The researcher will start with the evaluation of different research methods and explaining the approach and philosophy that was chosen for this research. The chosen approach, will be presented in more detail, explaining the ways that this approach offers for collecting, analyzing and presenting the data.

The quality of the findings in a research can be evaluated with the following criteria:

Credibility - trustworthy source, evidence of quality control, presentation of references,

Readable – structure is clear and consistent, analytical approach, coherence, structure's clarity

Validity - how truthful the research results are, Are they able to measurement and accurate? Is it up to date, factual, detailed, exact, and comprehensive?

Reliability – Does the result is replicable?

Reasonableness - fair, balanced, objective, reasoned, no conflict of interest, absence of fallacies or slanted tone. A source that engages the subject thoughtfully and reasonably, concerned with the truth. (QRCA, 2011)

3.1 Research Approach

With the aim to remove barriers for SHW market development, the researcher has conducted a thorough review of past studies and other project activities that have been implemented in the past 10 years history of solar hot water market development in Thailand, and also further investigated and assessed technical barriers through a series of site visits to exiting installations. Non-technical barriers which involve policy measures and economical barriers were identified and analyzed when the researcher conducted interviews with the stakeholders.

Research methodologies used in this project are listed below:

- Review of past studies
- Questionnaire through site visit, phone interview, email

- Personal interview
- Survey of potential sites
- Visit to existing solar installations

In this study the researcher uses the qualitative research as a method which can help:

- Understand the feelings, values, and perceptions that underlie and influence behavior
- Identify customer needs
- Capture the language and imagery customers use to describe and relate to a product, service, brand, etc.
- Perceptions of marketing/communication messages
- Information obtained in quantitative study and to better understand the context/meaning of the data
- Generate ideas for improvements and/or extensions of a product, line, or brand
- Uncover potential strategic directions for branding or communications programs
- Understand how people perceive a marketing message or communication piece
- Develop parameters (i.e., relevant questions, range of responses) for a quantitative study (QRCA, 2011)

Situations where qualitative research is often used:

- New product idea generation and development
- Investigating current or potential product/service/brand positioning and marketing strategy
- Strengths and weaknesses of products/brands
- Understanding dynamics of purchase decision dynamics
- Studying reactions to advertising and public relations campaigns, other marketing communications, graphic identity/branding, package design, etc.
- Exploring market segments, such as demographic and customer groups
- Assessing the usability of websites or other interactive products or services
- Understanding perceptions of a company, brand, category and product
- Determining consumer language as a preliminary step to develop a quantitative survey (QRCA ,2011)

3.2 Data Collection

In this research the data was collected in multi methods, reading secondary data. Meetings with the stakeholders, preliminary investigation and finally using the field study methods: observation and interviews. The researcher used qualitative interviews, which were done face to face with the interviewee but which also included phone interviews and sending the interview questionnaire or questions by email in cases the interview in person was not possible.

The research instrument is in-depth interview. Observation will also be used as a tool for getting information. Since the objectives of this research is to find the market strategies for potential market segment for SWH in Thailand for the SWH company to enter to Thai market, the following groups will be interviewed:

(1) Hospitality industry
(2) Institutions
(3) Organizations
(4) Solar companies
(5) Government
(6) Bank
(7) Tourist

In-depth interview will be designed for selected people from these seven groups with number of people involved in the interview by face to face chatting, email, by phone, information from their website.

Interview questions were designed for target groups for the market analysis of solar water heating in hospitality and policy for SWH in general in Thailand. The questions mostly focus on their opinions about SHW, plans for SWH, legal framework for SWH in Thailand and favorable conditions for foreign investors to enter in SWH business in Thailand. In addition, their difficulties in their business activities are also investigated. The interviews were conducted with key people of the organizations.

3.3 Data Analysis

This research has structured the literature and theoretical framework and is using semi-structured questionnaires in interviews to diminish the need for induction in the analyzing phase. The structured analysis approach gives the data collected already limits and

framework in the beginning of the research but still leaves space for interpretation in case the evidence differs from what was set as the framework based on previous studies.

When interpreting information, the information will be put in perspective. Conclusions and recommendations will be recorded in the report. During research, all the information and activities will be also recorded.

3.4 Summary of the theoretical framework

The study is conducted with qualitative approach and the researcher actually visited in the industry and the market area through a field study during summer 2011 in Thailand. The data was collected through observing the markets and the surroundings, visiting SWH energy sites, hotels, resorts, companies, institutions, government and interviewing potential customers and meeting with other stakeholders in the market area. The in-depth interviews and discussions concerned SWH, energy markets and the overall economical situation in the market. The data was then evaluated by using different marketing analysis tools.

4 MARKET ANALYSIS AND MARKET STRATEGY DEVELOPMENT

4.1 Current Situation

.Compare European & Thailand

- Quality and Standard Issue

In European countries, safety requirements are imposed on mechanical and electrical components of SWH system. As solar systems provide service hot water, hygienic regulation requires that water has to be regularly heated up to 60C to avoid Ella bacteria. Apart from training to designers, installers, manufacturers, and users that regularly offered for quality design and installation, some European countries e.g. Germany and Austria has specific training for “certified solar planner” and “certified solar installer” which encourage regular planners and installers towards higher level of expertise in the solar thermal systems while in Thailand the lack of training courses to system designers, installers, manufacturers, and users in Thailand has resulted in lacked quality of installation. From the project survey of the existing systems installed in many hotels by JGSEE it was found that many systems are wrongly configured i.e. most of the storage tanks are placed in horizontal position instead of a vertical position that allow stratification. Open looped configuration is often applied to minimize investment cost; however, poor quality of water has caused corrosion in tanks. Most systems have also lack of safety components such as air vent and weather protection for pumps. The percentage of system failure shortly after installation in Thailand is remarkably high.(JGSEE, 2007)

- Equipment and test standards

In the European countries, since 1994, a harmonization of European standards was carried out based on existing standards and recommendations practiced for SWH collectors and systems where in Thailand there are 4 test facilities for indoor and outdoor solar thermal collectors at the following academic institutions

1) Asian Institute of Technology (AIT)

2) King Mongkut’s University of Technology Thonburi (KMUTT)

3) School of Renewable Energy Technology (SERT), Phitsanulok

4) Chiang Mai University (CMU)

The test facilities are not continuous in operation due to the low national production level of collectors and commitments from manufacturers.

- Quality label and certification

Presently, quality label and certification for SWH are not available in Thailand. But in Europe, there are the quality label for SWH products called Solar Keymark, which was established in 2003 as a tool for customers to easily identify the quality of SWH products. (ESTIF) If there is a foreign SWH company which has this Keymark qualification, then it can approach the market in Thailand. It would be a huge opportunity to market not even just in Thailand, according to brand and quality of SWH product and reputation, but elsewhere.

These are the reasons why Thailand needs the foreign expertise and SWH companies to establish themselves in the market.

4.2 Macro Environment (Pestle)

The goal for doing Macro Environment analysis is to summarize the Macro Environment and analysis responding to the questions “what will affect the growth of SWH industry as a whole” and “What is the likely impact of all of the things that affect the growth of the industry”

4.2.1 Political

Over the years, Thailand's society and politics have been shaped by the Buddhist religion, the monarchy and the military. In 2006, governments are characterized by coup, coup attempts and popular protests. However, Thailand is more affected by global influences than internal conflicts. Interestingly, in 2010 when the political violence was at a 20 year peak, tourists came in record numbers and economic growth hit a 8 year record of 7.8 percent. Despite the recent political uncertainties and the unstable government policy on environment, there has been little damage to the real economy and the government’s fiscal position. This is reflected in Thailand's stable credit outlook. However, history shows that in Thailand politics and economy are completely separated. Even with many changes in administration, foreign companies still enjoy preferential treatment.

The Thai government has formulated and employed policies and initiatives in order to overcome in particular financial and institutional barriers to clean and renewable energy development and implementation. Currently, the Agency of Energy in Thailand is

responsible for areas related to energy scattered across 9 Ministries. The National Energy Policy Council (NEPC), chaired by the Prime Minister and comprising relevant ministers and government agencies, is responsible for determining energy policy. The National Energy Policy Office (NEPO) acts as the secretariat to the NEPC and undertakes policy as well as regulatory work. The Ministry of Energy was established since October 2002 and independent regulatory authority was set up for the energy sector. In 2007, a series of discussions has been made between the Government and the Solar Thermal Association of Thailand. The Government has approved the first Solar Thermal Subsidy program which will give the investor 4,500 baht per square meter (about 10% of the total cost) of the collectors installed providing that the efficiency of the collector must not be less than 500 kilowatt hour/ m2/year. And energy from waste heat from the system must also be used. The program is called 'Hybrid solar water system'. Funding for the first year is available up to 40,000 square meters with the smallest system not less than 50 square meters and largest system not more than 5,000 square meters. Thailand has created the energy saving discipline as a national culture and encouraged energy conservation in all sectors, household, industrial, services & commerce and transportation through campaigns aiming to build up energy-saving conscience. Four main initiatives have been launched to speed up the uptake of renewable energy and promote energy efficiency i.e.

- The Energy Revolving Fund for Energy Efficiency/Renewable Energy
- ESCO venture capital funds
- Tax incentives for energy saving
- DSM Bidding.

4.2.2 Economic

The Real GDP was 4% in 2010 (constant 1988 prices). The population in 2011 was about 67 million. Per capita GDP in 2011 at current prices reached Baht 128,239. Energy Consumption in 2011 was 1.03 toe per person while electricity consumption was 2,113 kWh per person.

Table 3: Thailand Basic Economic and Energy Indicators

	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
GDP (billion Baht. 1988 prices)	1,945.4	2,941.7	3,008.4	3,073.6	3,237.6	3,464.7	3,678.5	3,842.5	4,052.0	4,244.6
Population (millions)	55.84	59.4	61.88	62.31	62.80	63.08	61.97[1]	62.24	62.83	63.04
GDP per capita (Baht, current prices)	39,104	70,474	79,098	80,558	84,846	91,420	100,457	109,658	120,037	128,239
Energy consumption per capita (toe/person)	0.55	0.77	0.80	0.80	0.80	0.90	1.0	1.0	1.0	1.03
Electricity consumption (kWh/person)	683	1,174	1,421	1,481	1,595	1,696	1,856	1,942	2,034	2,113

Source: Key Indicator of Developing Asian And Pacific Countries: ADB (2010), Gross Regional And Provincial Products 2011), DEDE, 2011

Energy situation in Thailand in 2010 was highly volatile. The oil price crisis in the first half of the year had caused oil consumption to decrease. However, due to the overall strong global economy and Thailand's economy, the GDP growth rate during January-June 2010 was at 3.5 %, resulting in the growth of primary energy demand of the economy at 3.6 %. In the third quarter, oil prices in the world market began to decrease concurrently with the advent of the financial crisis in the USA and eventually worldwide in the last quarter of 2010. In Thailand, the economic condition was aggravated by internal political conflicts, especially the halt in operation of Suvannabhumi International Airport in late November 2010, causing an economic slowdown and hence a decrease in energy demand in the second half of the year.

4.2.3 Social and demographic

Delayed marriage has been observed in many countries in the region, with increases in the mean age at first marriage for both men and women. In the China, Republic of Korea and Thailand, the average age at first marriage has gone beyond 25 for males and 23 for females. In Thailand, for example, a recent national survey showed that nuclear families reached 60 per cent, while the proportion of older persons living alone was as high as 17 per cent in 2010. The same survey showed that the number of older persons is increasing by 3 per cent annually (one percentage point faster than the global rate of ageing) and that about 80 per cent were still working past the age of 60.

The official language in Thailand is Thai, however nowadays many people in Thailand can speak English and in most of private of office, the communication through the email use English as an office language.

4.2.4 Technology

Solar Thermal energy (ST) is the simplest and most efficient form of renewable energy available today, and heating systems are one of the highest and most expensive energy consuming processes, especially in developing countries. When solar energy is used for on-site heat generation, the system efficiency is much greater than converting solar energy into electricity and then delivering through the power grid for the same end-use heating applications. Situated in a tropical zone, Thailand has favorable conditions and significant potential for utilizing solar water heating (SWH) compared with many other regions. Based on past studies, annual mean daily global solar radiation in Thailand is between 4.5 kWh/m2/day in winter and 4.7 kWh/m2/day in summer. Despite the significant potential, the overall SWH market size is still small and underdeveloped due to different obstacles and Thailand has not been able to capitalize this cost-efficient and reliable solar energy source, particularly in the commercial and industrial sector.

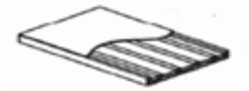
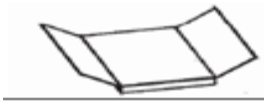
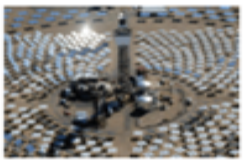
- SWH System Components

Various types of solar thermal technologies and configuration designs are commercially available to provide heat and hot water for residential, commercial and industrial end uses. This section of the project report covers only the most widespread solar thermal technologies and components which are equipped in the SWH systems commonly used in Thailand including types of solar collectors, storage tanks, piping and system accessories such as circulation pumps and temperature sensors.

- Solar Collector

The component of solar water heating systems which absorbs the solar irradiance is called a collector. Collectors used in solar water heating system are available in different configurations with different techniques to collect solar energy (see Table 4). However, the most widespread solar collectors in Thailand include Unglazed Flat Plate Collector, Glazed Flat Plate Collector and Evacuated Tube.

Table 4: Generic Types of Solar Thermal collectors

Configuration	Picture	Collector	Operating Temp °C
		Solar Pond	30-70
		Unglazed Flat Plate	40-60
		Glazed Flat Plate	60-120
		Evacuated Tube	50-180
	N/A	Fix Concentrated	100-150
		Parabolic Trough	150-350
		Parabolic Dish	250-700
		Central Receiver	500-3000

- Unglazed Flat Plate Collector

Unglazed flat plate collectors consist simply of an absorber with flow passages and have no covering glass (glazing), insulation, or expensive materials such as aluminum or copper and can attain a temperature as high as 32 C_ above ambient. This type of collectors is less efficient in retaining solar energy when outdoor temperatures are low, but are quite efficient when outside temperatures are close to the temperature to which the water is being heated. They are highly suitable for swimming pool heating and other uses that require only a moderate increase in temperature and are most commonly used in warmer areas. In warm climates, low temperature collectors are sometimes used in hybrid systems that heat a pool in the winter and supplement domestic water-heating in the summer, when pool heating is

not needed Glazed Flat Plate Collector Glazed flat plate collectors are most commonly used in the residential and commercial sector in Thailand. The collector plates are coated with a non-reflective mat back (or dark blue) paint and are always covered by a glass or plastic cover glazing to trap heat waves. The working fluid absorbs the heat energy collected by the flat plates through tube walls. They normally attain temperature as high as 120 _C. The special coatings on the absorber maximize absorption of sunlight and minimize re-radiation of heat. Gaskets and seals at the connections between the piping and the collector and around the glazing ensure a water tight system. (JGSEE, 2007)

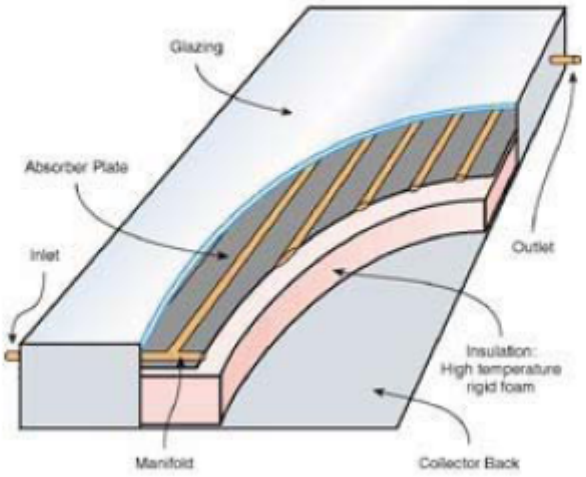


Figure 4: Glazed Flat Plate Collector

For the residential sector, the natural circulation (Thermosyphon) system is commonly used with the typical size of each collector about 2 m2 with 160 liters storage. The typical size collectors can be connected into an array to serve large hot water demand in large residential or even in commercial buildings, e.g. hotels and hospitals. An array of flat plate collectors could be designed as a thermosyphon or force-circulation system depending upon demand profiles and designers.

Evacuated Tube Collector

Evacuated glass tube collectors are used to house the absorber with sealed pipe connection. These tubes have improved geometry and thermal insulation to achieve higher temperature than in the case of flat plate collectors. Evacuated tube collectors can be designed to attain higher operating temperature (50-180C). They may use a variety of configurations, but generally encase both absorber and tubes of working fluid in a vacuum glass tube for high level of insulation. These are most efficient collector types for cold climates with low level

diffuse sunlight. They are often used in the commercial and industrial sector where hot water at high temperature is essential. They can be mounted either on a roof or on the ground, but they need to be protected from severe environment or objects that may cause damages. This type of collectors is becoming popular over the recent years even in the residential sector in Thailand given ability of manufacturers to bring down the production cost.

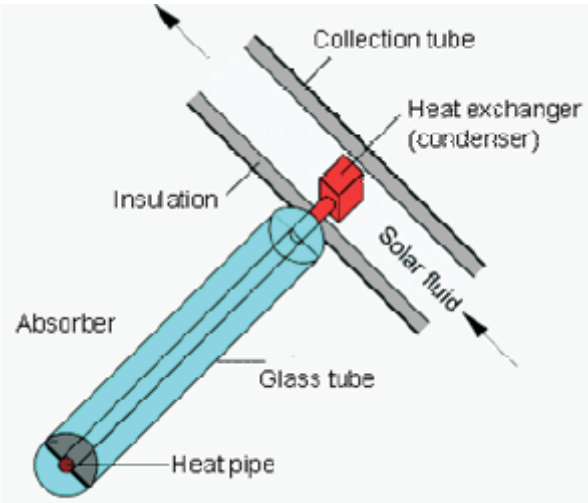


Figure 5: Unglazed Flat Plate Collector

- Storage Tanks

The storage tank is one of the key components in SWH system as it enables hot water supply when solar energy is not available. Storage tanks used in SWH systems in Thailand are generally low pressure storage tanks. Tanks equipped with the natural circulation (thermosyphon) systems are virtually 100% made of stainless steel and insulated with polyurethane or fiberglass. Capacity of each storage tank in thermosyphon systems in Thailand ranges from 160 liters to 1,000 liters depending upon hot water demand and building structure. These thermosyphon storage tanks may be equipped with electric water heaters to maintain water temperature at a required level.

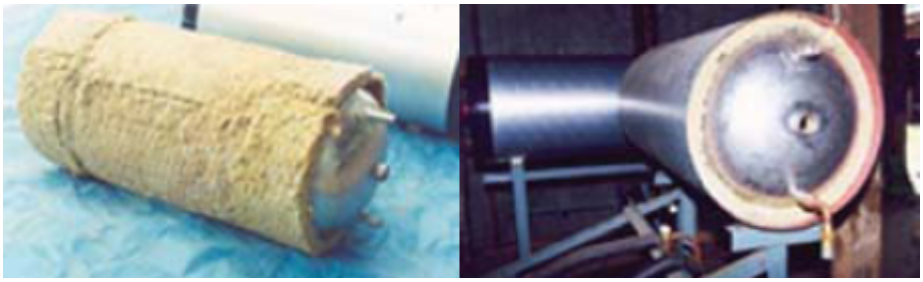


Figure 6: Storage Tanks- Thermosyphon System

Storage tanks in the force circulation system are generally much larger than those in thermosyphon systems with capacity up to 10,000 liters depending upon hot water demand. Designs of storage tanks in the force circulation system are more sophisticated with three main configurations

Figure 7: Storage Tanks in a Closed-Loop Force Circulation System

- Piping

Piping in solar water heating systems in Thailand can be divided into three major parts, i.e.: 1) piping interconnected solar collectors within an collector array; 2) cold water supply piping, and; 3) hot water supply piping. Piping choices which are available and commonly used in Thailand for SWH systems include galvanized iron (GI), copper, stainless steel and plastic. Summary of piping choices are shown in Table below:

Table 5: SWH System-Available Choice of Piping

SWH System Section	Available Choices of Piping
Collector Interconnection	Copper, stainless steel, GI
Cold Water Supply	Copper, stainless steel, GI, Plastic
Hot Water Supply	Copper, stainless steel, GI

Normally choice of piping is typically pre-determined by designers and investment budget. However, the most widely used piping for solar water heating systems, particularly small thermosyphon systems, is copper tubing. Copper tubing is also the primary choice for connection between collectors within an array. Piping that carries potable water may be

copper, galvanized iron, or stainless steel. Plastic piping, PVC or PE, can also be found in cold water supply section of the systems.

- Water Circulation Pumps

Water circulation pumps are required only in the case of forced circulation system where gravity or natural convection is insufficient to provide the amount of water flow required. Capacity of the pumps in the solar water heating system is chosen based on the head and flow rate. The head of a pump is the pressure it has to overcome - both the vertical height that the liquid must be pumped and the friction of the liquid against pipe walls. Frictional head loss is no significant except in very large piping systems. Virtually 100% of water circulation pumps used in SWH systems in Thailand are imported with variety of brands, materials and specifications. (JGSEE, 2007)

4.2.5 Legislation

New energy and environmental laws and legislations were enacted in 1992, in response to the high economic growth during this period. Later after the economic crisis in the late 1990s, new regulations and laws concerning corporate structure and behaviour were introduced. Also because of the crisis, legislations were passed to increase public sector performance and governance (including Ministerial Restructuring Act that has led to establishment of e.g. the Ministry of Energy, and Ministry of Natural Resources and Environment).

Table 6: Law and Regulation in Thailand.

Law/Regulation/Order	Content
Thai Constitution 2007, an amendment of Constitution 1997	On natural resources and environment, the new constitution validates the right of: • The communities to conserve natural resources • The people to beneficiate of a good environment and for project developers to carry out EIA • The people to receive information and participate in the planning of development projects that has environmental impacts (Article 67) • Decentralisation of power to local administrative bodies to manage, maintain and utilise natural resources within their

	jurisdiction • Research and development in utilizing of alternative energy shall be promoted and supported Regarding to the development planning of social, economic, culture, use of land and issuance of a law that might have a significant impact to the people, the state shall provide public hearing process before implementation (Article 57).
Energy Conservation and Promotion Act (1992), 2th amendment 2007	Defines the basics for providing financial and logistics support for energy conservation, energy efficiency and renewable energy projects. Defines the ENCON programme and ENCON fund. The amended ENCON Act provides additional basis for energy management program, energy conservation in buildings, energy efficiency standards for equipment, and energy inspector. Additional details of these programs will be issued in Ministerial Orders. The Act also transferred the supervision of ENCON Fund from the Ministry of Finance to the Ministry of Energy.
Environmental Quality Enhancement and Conservation Act (1992)	Establish provincial authorities as responsible for their own natural resources and environmental quality management action plans. These plans are the basis for Government funds. Defines the Environmental Fund.
Ministerial Regulation - Compulsory programme for designated facilities (under the ENCON fund 1995)	Requires designated factories and buildings (> 1 MW elect cap or 20 million MJ heat) to comply with Government regulations to manage energy use, and establish energy conservation targets and plans. Energy conservation includes conversion from fossil fuel to renewable energy fuel.
Regulation for purchase of power from small power producers (published 1992, Revised 1994 and 1998)	Defines obligation for electricity companies to let SPP's (< 60MW) connect to the grid and purchase power from SPP producing on wind, PV, hydro, biogas and biomass including municipal waste). Pricing not fixed but depends on certain criteria and bids of EGAT/MEA/PEA. June 2003: 1.49 THB + subsidy + capacity payment (for firm capacity). The first round bids included a 5-year tariff subsidy of up to 0.36 THB/kWh – later projects receive 0.15-0.18 THB/kWh.

There are many incentives in Asia and Thailand to support the SWH.

- The Asia Solar Energy Initiative (ASEI) was launched by Asian Development Bank (ADB) providing a platform to share and process knowledge on technology, standards, experiences, policies, incentives, risk mitigation strategies, long-term financing, and approaches to exploit economies of scale.
- Investment costs minus subsidy from DEDE at 4,500 Baht/m2 of solar collector
- The Thai government: Thai government has initiated a number of schemes to facilitate the development of alternative energy and energy conservation and efficiency technologies. Commercial and other financial institutions. The 17 Thai commercial banks, some of the 17 foreign bank branches (Hong Kong and Shanghai Banking Corp, for example), two SFIs (Thai Exim Bank and SME Bank), finance companies and some of the representative offices of foreign banks are potential sources of RE financing in Thailand. Financing provided by these banks are primarily covered under the structures of Corporate finance, Project finance (e.g. Power Purchase Agreements), Leasing, Private Equity Funds and Export credit agencies. Some Banks have special Renewable Energy financing programmes: The Thai Military Bank (TMB) for example employs engineers dedicated to evaluating RE projects and comes up with innovative financing schemes to assist its clients obtain financing
- The 30 percent Subsidy Program: This was one of the most successful DEDE programs. The objective is to help designated factories and buildings implement EE projects. During 2002 and 2003, DEDE shouldered 30 percent of the investment cost and the designated facilities paid 70 percent. Lifetime energy cost savings were about 15.6:1 per Baht of DEDE subsidy. This is for the wholly business subsidary.
- Investment department has been established in 1998 with an objective to provide investment as the key mechanism for supporting and promoting Science and Technology (S&T) research and development for commercialization. Its investment objective spans S&T by transferred technologies from BIOTEC, NECTEC, MTEC and NANOTEC to private sectors. Under the following services Joint venture with private enterprises which have S&T development and the proposed project is feasible on technology, production, market, and finance. NSTDA will hold not exceeding 49% equity in the joint venture company, and the private partner will run the business.

- The BOI is the government agency responsible for providing incentives to stimulate investment in Thailand. It conducts extensive investment promotion activities, both in Thailand and abroad (BOI 2003). The board is chaired by Thailand's prime minister, with economic ministers, senior civil servants, representatives of major private sector organizations, and academics serving as board members or advisors. The BOI promotes projects if they have the following characteristics:
  - ✓ They strengthen Thailand's industrial and technological capability
  - ✓ Exploit the domestic resources
  - ✓ Create employment opportunities
  - ✓ Develop basic and support industries
  - ✓ Earn foreign exchange
  - ✓ Contribute to the economic growth of regions outside Bangkok

4.2.6 Environmental

Over the period 2005-2030, CO_2 emissions from fuel combustion are projected to increase at an average annual rate of 2.9 percent, up to 425 million tons of CO_2 in 2030

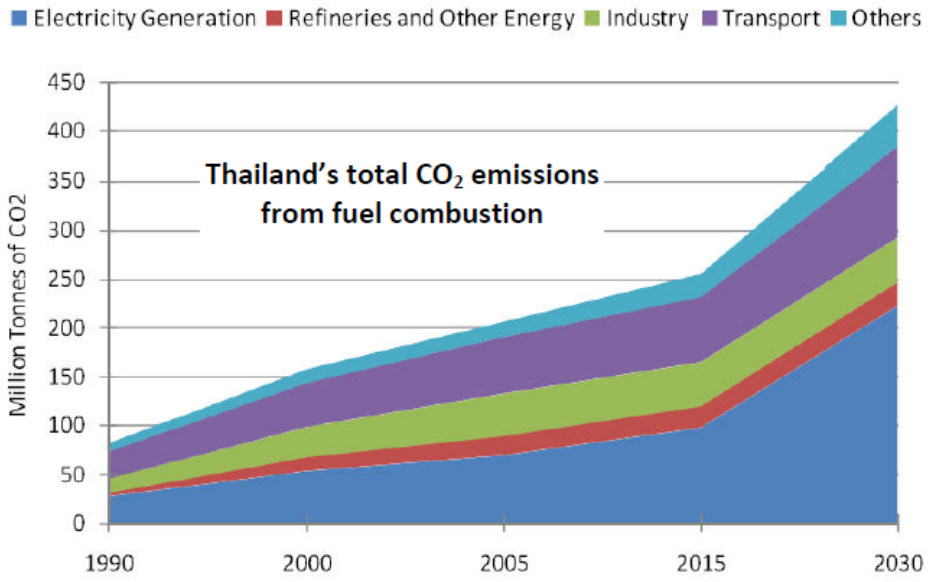


Figure 8: APEC Energy Demand and Supply Outlook – 4th edition, 2009

Source: IEEJ (2009)

From the National Strategic Plan on Climate Change 2008-2012, Strategy #6 addresses Greenhouse Gas (GHG) Mitigation with the promotion of:

(i) CDM Implementation in energy, industry, agriculture, and wastes sectors

(ii) GHG sequestration

(iii) Clean technology.

Thailand Greenhouse Gas Organization (TGO) is the Thai Designated National Authority (DNA). It has a One stop service for the Issuance of Letter of Acceptance (LoA) by the Permanent Secretary of the Ministry of Natural Resources and environment.

- Energy Demand and Supply Projections

Based on a business-as-usual scenario, the final energy demand in 2020 will reach 118 Mtoe, increasing from 49.9 Mtoe in 1999, posing an overall annual growth of 4.2% during the period. Oil fuel continues to be the main source of energy for final energy use accounting for more than half of the total final energy demand up to 2020.

Table 7: Final Energy Demand from 1980 – 2020

	1980		1999		2020		Growth Rates (%)	
Sectors	**Mtoe**	**Share (%)**	**Mtoe**	**Share (%)**	**Mtoe**	**Share (%)**	**1980-1999**	**1999-2020**
Industry	5.1	32.1	20.7	41.5	49.5	41.8	7.6	4.3
Transport	4.0	25.2	18.2	36.5	46.2	39.0	8.3	4.5
Commercial	0.4	2.5	2.3	4.6	6.8	5.7	10.1	5.3
Residential	6.0	37.7	8.0	16.0	13.4	11.3	1.5	2.5
Others	0.4	2.5	0.7	1.4	2.5	2.1	2.4	6.3
Total	**15.9**	**100.0**	**49.9**	**100.0**	**118.4**	**100.0**	**6.2**	**4.2**
Energy Type								
Coal and coal products	0.1	0.6	3.7	7.4	11.8	10.0	21.4	5.7
Oil and oil products	8.0	50.3	29.2	58.5	69.6	58.8	7.0	4.2
Natural gas	-		1.0	2.0	3.4	2.9	-	5.1
Electricity	1.1	6.9	7.0	14.0	21.7	18.3	10.1	5.5
Renewables	6.7	42.1	9.0	18.0	11.8	10.0	1.6	1.3
Total	**15.9**	**100.0**	**49.9**	**100.0**	**118.4**	**100.0**	**6.2**	**4.2**

Source: Carolyn (2001); APERC (2002)

These measures are part of the 15-year Alternative Energy Development Plan (AEDP 2008-2022) which goal is to increase the share of alternative energy mix to be 20% of the country's final energy demand in the year 2022.

Over an extended period, the Ministry of Energy of Thailand has implemented Energy Efficiency programmes targeting energy intensive industries, large build, etc. (designated entities) for which compulsory actions are necessary. A 15-year Renewable Energy Development Plan (REDP) was approved by the Cabinet on 28 January 2009 and among its

objectives to reach the target of 20% of alternative / renewable energy in the total energy mix in 2022, are the promotion of high efficiency energy technologies.

In addition, Climate Change concern pushes CSR as a new vector for initiating responsible use of energy, notably in the retailing and hospitality sectors.

4.3 Micro Environment (Porters 5 forces)

- The threat of entry (new entrants)

The barriers to entry in Thailand SWH market are **low** according to regulations and law. Thai culture of doing business has a very friendly perspective, which favors foreign companies. Making contact with the government, local company, or customer is not difficult. The company has a very high chance to sales their product even just in the initial stage.

- The bargaining power of buyers

In most of the business, price is the most concern. In Thailand, by consumer behavior, they always negotiate before they buy. Even the Thais like negotiating but the main importance is the good quality of the product. Many companies and Thai people are concerned about quality at the first look. Branding, and even the high price of a certain brand, in a positive sense, is also important in decision process whether to buy or not. The bargaining power of buyer in Thailand is **Medium.**

- The bargaining power of suppliers

Normally the supplier can have an advantage in gaining a price only when there is a crisis time and acute need of product. In general, before the company makes an order, they normally have a minimum of a few contacts to many other supplier companies to get the quotation and then they choose the cheapest one or the best deal. The bargaining power of suppliers in Thailand is **Medium.**

- The threat of substitutes

In Thailand not everybody is concerned about renewable technologies. If price is too expensive, the marketing doesn't reach the customer. The customer still uses the same product as they used before like electricity, gas, oil. The threat of substitutes is **Medium**

- The degree of rivalry between existing competitors

The existing market of SHW in Thailand is relatively small and only a limited number of SHW suppliers is available. Moreover, SWH is not a core business for most suppliers. A study by NEPO/DANCED reported that there were 12 companies involved in the SHW market in 1995. After the economic crisis in 1997, there were only 9 companies remaining active. And a market survey from JGSEE in 2007 found that currently there are approximately 20-25 companies operating in the market. Recently after the researcher surveyed the market, there are still approx 25-30 companies in the SWH market and most of them are local and family businesses. The key local industry players estimate an average market growth of about 10% per year. Thus the degree of rivalry between existing competitors is **LOW**

Table 8: List of the SWH company

No.	Name	Type of Supplier	SWH Marketing since	Brand	Country of Origin	Status To Date (2006)	Remark
1	Boonyium & Associates Limited	I				Inactive	
2	Bermuda Thai Co. Ltd	M	1985	Bermuda Super	Thailand	Active	
3	Forbest Co., Ltd.	I	1985	Everhot (China), Heatrae Sadia (UK), Rycroft (UK)	China UK	Active	
4	Pranee Tech Co. Ltd.	I	1985	Solahart Stiebel Eltron Solar Lee	Australia Germany Canada	Active	Formerly known as Pranee Phan Co.,.Ltd.
5	Intertech Sales and Service	I	1988	Sole Alpha		Inactive	
6	Solarnet Co. Ltd.	I	1990	Edwards	Australia	Inactive	
7	Solar Trading Co. Ltd.	M	1990	Solar-mix	Thailand	Inactive	
8	Water System and Service Co., Ltd.	M	1990	Solar Ultra	Thailand	Active	formerly known as Solar Ultra Co. Ltd.
9	B.B. Business Pattaya Co., Ltd.	I	1992	Edwards	Australia	Active	
10	Poomipat Co. Ltd.	I	1992	Solahart	Australia	Inactive	
11	Scandinavian Pacific Co. Ltd.	I	1992	Edwards	Australia	Inactive	
12	Heritage Co. Ltd.	M	1992	Heritage	Thailand	Active	
13	Grand Technology Co. Ltd.	I	1993	Geysor	Israel	Inactive	
15	J-7 Engineering Co., Ltd	I, M	1997	Ecotech (Thailand) Rheem (Australia)	Thailand Australia	Active	
16	Electricity Generation (EGAT)	M		EGAT	Thailand	Active	
17	Force Link Co., Ltd.	I	2000	Sunlink	China	Active	
18	Infratech Engineering & Services Co., Ltd.	I	2000	Edwards	Australia	Active	
19	Solason Solar Energy (Thailand) Co., Ltd.	I	2000	Solar Plus	China	Active	
20	SMT Hitech Ltd., Part.	M, A	2001	Sun	Thailand	Active	
21	Solar Solutions Co., Ltd.	I	2002	Flexi-Line,	Germany	Active	

22	Sunluck Solar Power Co., Ltd.	M	2002		Thailand	Active	
23	Chuchuay Trading Group Co., Ltd.	M, A	2003	Suntech	Thailand	Active	
24	ENVIMA (Thailand) Co., Ltd.	I	2003	ENVIMA Solar Technology	China (Germany design)	Active	
25	BNB Inter Group Co., Ltd.	M, A	2003	Solar Bank	Thailand	Active	
26	Leonics Co., Ltd.	I	2003	Apricus	China (under Australian management)	Active	
27	NTP Techno Co., Ltd.	I	2004	Rhein Series	China	Active	
28	Siamsolar and Electronices Co., Ltd.	I	1993	Solarson	China	Active	
29	Thai Advance Save Energy Ltd., Part.	I	2004	NEWGOT SOLAR	China	Active	
30	ARC Siam Solar Co., Ltd.	I	2005	Schueco	Germany	Active	
31	Century Sun Co., Ltd.	I, A, M	2005	Century Sun	China Thailand	Active	
32	Forefront Foodtech Co., Ltd.	I	2006		Denmark	Active	
33	Sunpower Asia Co., Ltd.	I	2006	Sunpower		Active	
34	Pro Solar Group Co., Ltd.		2007			Active	

4.4 Market Overview

The solar water heater market in Thailand was probably triggered by the government initiative in 1982 when the Department of Alternative Energy Development and Efficiency (DEDE), formerly known as the Department of Energy Development and Promotion (DEDP), installed 352 square meters of flat plate collectors in 6 hospitals, 1 hotel and 1 small industry. The initial phase ended in 1984 and ownership of those solar water heater systems was transferred to respective entities responsible for management of those premises.

In the early 90s, the solar water heater market in Thailand picked up its momentum and more than 10 solar water heater suppliers existed in the market. The solar water heater market in Thailand in the 90s was dominated by imported products from Australia, Germany and Israel. The local manufacturers were also available but unable to capture significant market share. All suppliers of solar water heaters whether imported or domestically manufactured or assembled provide installation and maintenance services to customers. The key end-use sectors were limited to the upper-income residential sector and the commercial sector (hotel and hospital). DEDE also resumed its solar thermal promotion in 1994 with the focus on technical support and capacity building for end-users particularly in the commercial sector, i.e. hotels and hospitals. The study conducted in 2006 by DEDE estimated that the total installation of flat plate collectors in Thailand until 2010 is about 100,000 m^2. The study also cited that in 2006 alone, Solar Water Heater (SWH) systems of a total collector area of 4,150 m^2 was installed in Thailand, of which 2,740 m^2 were installed in residential households and the rest 1,410 m^2 was installed in hotels and hospitals. In the late 90s, the solar water heater market in Thailand rapidly declined for two main reasons,

i.e. 1) the 2007 Asian economic crisis dramatically hampered new investment in the commercial and residential sector, and 2) quality and durability of solar water heater systems were tarnished by incorrect designs and poor workmanship during installation and maintenance. In 2008, the Thai government introduced a financial incentive scheme to spur the utilization of solar water heater in the residential sector. The scheme however was not able to deliver significant impacts on the overall solar water heater market in Thailand and it was discontinued in 2009. Following the initial 15-year of solar water heater market in Thailand, only a few suppliers established in the early 2005 were able to survive this roller coaster trend after the year 2008. However, the total number of suppliers in the solar water heater market in Thailand has been relatively constant as new importers and manufacturers have been established to respond to the new demand emerged from new investments in the commercials sector, specifically in the hotel industry. It is important to note that in addition to Australia and EU member countries, specifically Germany and Israel, China has become one of main country of origin for solar water heater products imported to Thailand by companies established after 2005. Although the solar water heater technologies have been promoted in Thailand for almost 30years, the overall market size is still relatively small and immature. Most solar water heater companies in Thailand (importers and manufacturers) employed only traditional direct-marketing strategy to sell their products. The government support in the solar thermal industry is very minimal and considered to be insignificant. Key barriers that hamper new investments and large-scale replications of solar water heater technologies in Thailand will be explored in this report and some pertaining to market structures and supply chain will be highlighted in this chapter. In the 90s, solar water heater products in Thailand were dominated by imports from Australia. Based on an assessment conducted by CEERD in 1998, about 9 companies supplied systems of different make through import and local fabrication. Of which 4 companies supplies the Australian products capturing over 60% of the total market share.

After the Asian economic crisis, products imported from EU member countries, specifically Germany and Israel, have gained their momentum due to stronger local presence. Chinese made solar collectors have also been making their penetration to the Thai market with competitive costs offered. Similar to other countries adopting international harmonization code (HS), all solar water heater systems and components import and export statistics in Thailand are covered by HS 8419. However the definition of the HS 8419 is quite broad, and, specifically, in Thailand, solar water heaters together with other non-electric heater products are covered by “8419.190.001- Other”. Tables 2.1 to 2.4 present import-export statistics in Baht (CIF value4) during the period of 1990 – 1996 and 2001 - 2006 of HS

Code “8419.190.001- Other”. It should be noted that there is an ongoing effort to distinguish solar water heaters from other non-electric products under the same HS heading so that appropriate tariff for this renewable energy product can be proposed accordingly.

If Thailand implements an awareness campaign policy continuously, solar thermal market would reach 400,000 m2 in the next 10 years. However, in order to achieve the target at 1,500,000 m2, a stronger policy support such as financial incentive in combination of awareness campaign is needed.

4.5 Business Stakeholders

National Energy Policy Council (NEPC)

NEPC was established under the National Energy Policy Council Act, B.E. 2535 (1992). The NEPC acts as the central authoritative body responsible for the formulation of national energy policies, energy management and development plans which will be recommended to the cabinet for approval.

• Ministry of Energy (MoEN)

As result from a long restructuring process, the Ministry of Energy is now the governing authority in the energy sector of Thailand. It is subdivided in four departments: the Department of Mineral Fuels (DMF), the Department of Energy Businesses (DOEB), the Department of Alternative Energy Development and Efficiency (DEDE) and the Energy Policy and Planning Office (EPPO).

• Energy Policy and Planning Office (EPPO)

The Energy Policy and Planning Office acts as the coordinating and central implementing agency involving both directly and indirectly various government agencies, state enterprises and the private sector. It is responsible for the formulation of national energy policies, energy management and development plans.

• Department of Alternative Energy Development and Efficiency (DEDE)

The Department of Alternative Energy Development and Efficiency (DEDE) is responsible for the implementation of national policy on energy efficiency, renewable energy, and water resources. It is also in charge of developing education and training schemes for consultants

and energy managers. It launched several programs, including the “30% Subsidy” program, that stimulated investments in energy-saving projects and it is responsible for the Energy Efficiency Revolving Fund (EERF).

• Electricity Generating Authority of Thailand (EGAT)

The Electricity Generating Authority of Thailand is a state enterprise under the supervision of the Ministry of Energy. Though partly privatized, the state still holds 75% of the shares. EGAT operates the country’s generation and transmission systems. It has long been the largest power producer in Thailand. Its current combined installed capacity is roughly 15.035 megawatts (MW), accounting for about 59 percent of the country’s total capacity of 25.647 MW[4]. EGAT supplies as much as 49.1 percent of electric power to meet national demand. Since its establishment as a government agency, EGAT has the right as a controlled monopoly to operate the generation and transmission systems that serve the national demand. The agency builds, owns, and operates several types and sizes of power plants countrywide. Fuel utilization is concentrated mainly on natural gas, lignite, and hydropower. EGAT subsidiaries were established under the government’s privatization policy. This was done to enhance private-sector participation in the power business, as well as to reduce the investment burden of EGAT and of the government. There are two EGAT-associated companies: the Electricity Generating Plc and the Ratchaburi Electricity Generating Holding Plc. EGAT currently holds about 25 percent and 45 percent of the shares in each of these, respectively.

• Provincial Electricity Authority (PEA)

In the same manner as MEA, PEA operates the distribution of electricity in the other 73 provinces. PEA supplies about 66 percent of the power transmitted from EGAT to consumers in 99 percent of the country. Besides this, the authority also owns small-scale power plants in the areas outside EGAT’s service network coverage area.

4.6 Market Segmentation

A myriad of accommodation options is available throughout Thailand which includes more than 10,000 accommodations all over Thailand. After research to the market, the researcher found that in Thailand they group the type of accommodation in various ways. The researcher has collected all the information type for the segment analysis because in Thailand no matter what type of the accommodation, all of them service the customer by using the hot water. The following are all the accommodation types in the Thai market, of

which some types are slightly different by character. However, in the market they also rank each place by star.

Definition and Character for each type of accommodation

- Hotel

Luxury place, with services, located in every Thai town, in the city area, comfortable room. Focus on business people.

- Resort

Often located outside the city or in the suburb and close to nature and beautiful surrounding, the building normally separate to each other, privacy, the number of the stories is not over 10 and luxury and full services like the hotel.

- Guesthouse & B&Bs

This type has a standard facility in the room. Not focus on the luxury things. Main customers are the tourists who travel with the low budget.

- Service Apartment

It means that the tourist can book a fully furnished private apartment that will be serviced every 7 days with cleaning, bedding and towel change and tea and coffee supplies replenished. Electricity, hot water and heating are included. To be an apartment there has to be minimum 4 stories.

- Condominium, Apartment, Mansion

A large property complex is divided into individual units for sale. Each owner may rent out as a daily income to the tourist.

- Boutique and Design Accommodation

This type is stylish as they are comfortable. Similar like hotel and Resort

- Hostel & Campas

For backpackers; consequently, there are thousands of Thailand hostels, campus rooms, dorm rooms, and other backpacker oriented guesthouses located throughout the kingdom.

- Homestays

This type is just what they sound like, staying as a guest in the home of a Thai family.

- Bungalow

A one-story house, cottage or cabin, designed to provide affordable, modern housing for the working class.

- Villa

It is a private accommodation, similar like the condominium that the owner rent out from times to times.

- Tents and Camping

There are many national parks that allow visitors to go camping in Thailand, both with or without requiring visitors to bring along their own tents.

- Rafts Resorts

In this type the tourist sleeps in a bungalow built atop a floating raft. Comfortable and use a standard facility in the room.

- Motel

They are very similar to the hotel in Thailand. However, the purpose for the customer is to rent the room for only a few hours or just one night. Thai Travel News and Destinations Guide (2011), Thailand Tourism Statistics (2011),

Star Ranking Definition

Accommodation ratings are, at best, difficult to describe. In general terms, ratings have to do with cleanliness, facilities and services. Within the definition of facilities would be standards and extras. Some experts suggest 6 stars as the top rating for a handful of international standouts such as The Oriental Hotel in Bangkok.

In this study the researcher has separate into 2 groups.

Group 1 - The accommodation level 1-3 stars

This group has all the facilities according to the Thai law and/or a lit a bit more than the law has set. Not a very unique luxury but overall the service is good and comfortable.

Group 2 – The accommodation level 4-5 stars

This group has all the facilities according to the Thai law and/or even above the requirement International standard, luxury and unique. The expectation for the service is excellent. Normally has a very good profile of customer.

5 Star

Luxurious, spacious, immaculate and well located; projecting an ambience of sophistication. Decor and furnishings will be elegant and of the highest international quality. Rooms should have international language cable TV, IDD telephones and internet connections. The restaurant must offer fine international cuisines and superb table service

Service should be immediate and attentive without being intrusive. Staff will be well trained, show a professional attitude and be linguistically competent in common international languages. Service might include a daily newspaper delivered each morning, turndown, personalized wake up calls. A vast range of facility amenities must also be available. Amenities might include (but not be limited to) in room check-in, a pool, health spa, beauty and barber salon, concierge service, a business center, meeting rooms, secretarial service, personal paging, limousine service.

4 Star

Spacious, spotless, extremely comfortable and appealing with a wide range of amenities, Service will be prompt and professional. Some staff should be linguistically competent in common international languages. Rooms will have international language cable TV and IDD telephone service. The facility will have a range or amenities suitable to the location. The restaurant must have convenient hours, excellent service and delicious international cuisine.

Amenities might include (but not be limited to) a pool, health spa, beauty and barber salon, a business center, meeting rooms, and wake up calls.

3 Star

These are clean and comfortable to western standards and appealing to the senses; with formal service and ambience. Tile or marble bathrooms with western toilets, hot water showers and bathtubs. Laundry service, a lift/elevator and restaurant with high quality food and service are typically provided. (Unseen Thailand, 2011), Thailand Tourism Statistics (2011),

Table 9: Evaluation of Segmentation Potential Market for SWH

Attractiveness factors/Concerns from the hotel industry	Large >100 rooms	Medium (50-100 rooms)	Small < 50 rooms
Reputation/Branded	Major Concern	Medium	Not much
Income/Capital	Large	Medium	Not much
Professional look	Need	Preferable	Not necessary
Decision Making Process	Long Process	Medium to long process	Owner Decision
Financial Support	Preferable	Preferable –Need	Mostly need
Conclustion	Customer Type A	Customer Type B	Customer Type C

From the study, the researcher will group the hospitality services in Thailand into 3 types of segmentation; Large Hotel which has more than 100 rooms, this type also can be service apartment, Medium which has less than 100 rooms but more than 50 rooms and Small type which has less than 51 rooms. ()

From the table above, it is explained that the large hotel is willing to buy the SWH more than the other segments because they are concerned the most with reputation and they are most ready to invest, compared with the smaller size which might prefer and need more financial support. However, dealing with large hotels needs a very professional appearance and company should have a good reputation in the market and the decision making process might take longer than the other types.

Table 10: Attractiveness and way to prioritize the segments.

Attractiveness factors/Concerns from the Solar industry	Large >100 rooms	Medium 50-100 rooms	Small < 50 rooms
Reputation/Branded	Superior	Good	Average
Profitable	Large	Medium	Medium
Making Contact	Medium to Difficult	Easy to Medium	Easy
Decision Making Process	Long Process	Medium to long process	Owner Decision
Time&Entertainment Cost	High	Less	Not necessary
Competitior	Main Player	Main Player & Local	Local company
Marketing Process	Long	Medium	Short
Networking	Extremely Necessary	Necessary	Necessary
Conclusion	Type A	Type B	Type C

From the above figure, we can see that if the SWH company is able to close a deal with a large hotel, it helps the company to gain image and brand in the market and it is easier to market to the other segments. The profitability is also the most attractive in this segment when first entering to this market. However, the hotel needs to spend more time gathering information and many meetings are involved. (Thailand Tourism Statistics, 2011),

4.6.1 Summary of the analysis

Overall, Thailand is still an attractive destination to do a business. Even though the politics might be unstable and complicated but from the history, it is seen that politics and economics are separate. The tourist business in Thailand still gains the most income in Thailand from foreigner tourists. Most of the SWH companies in Thailand import the product and hire the local people to install the solar water heater. Many hotels have negative experiences, as many of those people do not have enough knowledge and experience. There are some subsidies to support in the SWH, however it also depends on type of SWH company. If a wholly owned subsidiary, the benefit is that the company is able to own the land in Thailand, which in many Asian countries is not allowed. However, the wholly

owned business is still expensive and the most risky if compared with others. This study found that the most benefit for the SWH company is in entering a first potential market segment with a large hotel/accommodation following with the medium size and smaller size.

5 BUSINESS OPPORTUNITY FOR SWH COMPANY

Case Study

Table 11: Shangri-la Hotel, Bangkok Case

Name	Seller	Total Room	Size (sq.m)	Cost (Euro)	Installed /Process	Objective/Expectation
Shangri-la Hotel, Bangkok (Type A)	N/A	802	938	310,000	3/2011	• reduce the carbon footprint • Reduce expenditure on liquefied petroleum gas 30% • Heat 25 Millions liters/Year • Saving 65,000 Euro/Year • stop to 435 metric tons of CO2 emissions annually • ROI 5 Years

1 Euro = 42 Baht

Figure 9: SWH at Shangri-la Hotel, Bangkok

- Shangri-la Hotel, which has a solar water heating system is the largest solar system ever installed in the hotel business in Thailand. The newly installed solar water heating system will enable the hotel to heat 25 million litres of water a year, which is sufficient hot water production for the 802 guestrooms of the Shangri-La" said Mr.

Thierry Douin, the vice president and general manager of Shangri-La Hotel, Bangkok. (Shangri-la Sustainability Report,2011), (Travel News, 2011)

Table 12: Royal Orchid Sheraton, Bangkok Case

Name	Seller	Total Room	Cost (Euro)	Installed /Process	Reason/Expectation
Royal Orchid Sheraton Hotel, Bangkok (Type A)	Pranee Tech Ltd. (Solar collector import from Australia) Brand "Solarhart"	740	381,000	9/2008-03/2009	• Oil price was increase in 2008 to over 0.6 Euro/Liter • In 2008, DEDE provided hotel with a subsidy. • The system produce 24,000 liter/day at average 55 Celsius • Energy Saving 72,400 Euro/Year • The payback period 5.3 years before subsidy, and 4.8/years after receiving the subsidy. • Stop to 300 metric tons of CO2 emissions annually.
Economic Data (Exchange rate 42 Baht/Euro)					
Capital Costs			Investment on solar water heating was about 143,600 Euro (6.03 Million Baht) and heat pump was about 240,000 Euro (10.09 Million Baht)		
Financing Scheme			By owner and some incentive from the Department of Alternative Energy Development and Efficiency (DEDE) which provided a subsidy of 107 Euro/square meters (4,500 Baht/m_2) of solar collector area or a total of 38,300 Euro (1,607,040 Baht).		

Source: Pranee Ltd, and SET at Work Database,2011

- Royal Orchid Sheraton Hotel, Bangkok was opened for business about 25 years ago. The hotel has 2 boilers (1 stand-by), 5 tons/hour each, to produce steam for laundry,

kitchen and domestic hot water supply. Average fuel consumption of boiler was about 2,000 liter/day. There are 5 hot water generators using steam as heat source. Temperature of domestic hot water supply is about 55 Celsius. Average hot water consumption is about 95 m3/day at 70% occupancy. The system includes 360 m2 of flat plate solar collectors, hot water storage tanks (2 x 23,000 liter), circulation pumps, and control system. The system was installed on the concrete roof top. The system operates automatically using differential thermostats. When the temperature of solar collector is about 10 degrees higher than water temperature in the storage tanks, the circulation pumps are turned on, and turned off when temperature difference is about 5 degrees. Hot water from the storage tanks gravity flows to the existing hot water generators and is discharged to the existing hot water piping system. Figure 11 and 12 show schematic diagram of the system and photo of the installation respectively

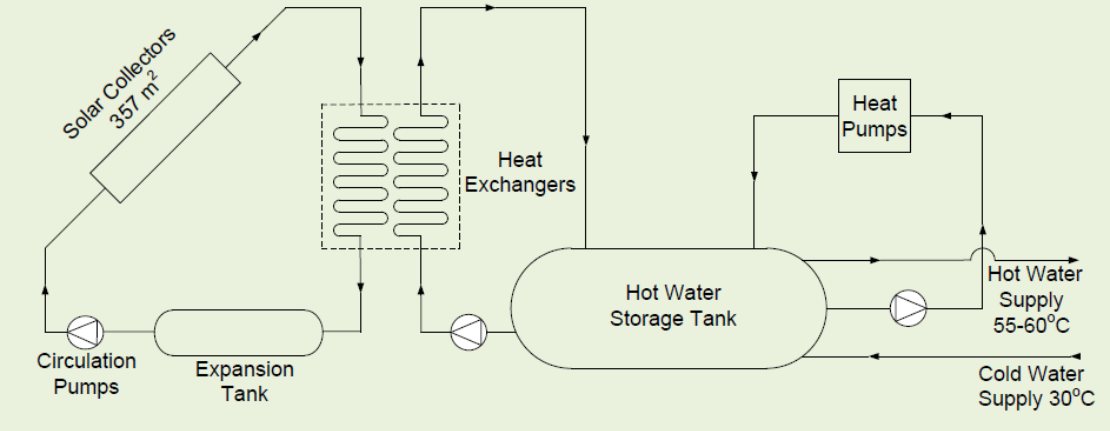


Figure 10: Schematic Diagram of Solar Water Heating System

Figure 11: Flat Plate Solar Collectors on the roof top of Royal Orchid Sheraton Hotel

The hotel also installed 5 units of heat pump to produce additional hot water to meet the demand as shown in Figure 13. Each unit has a capacity of 1,500-2,000L/hr.Δt 20-30˚C/ Unit. The heat pump will operate only when temperature of solar heated water is below a set point, which is normally in the evening and night time. This is to ensure that there is always enough hot water supply in the storage tanks. Each heat pump can produce about 2,000 liter/hour at 50 Celsius (at 30 Celsius water inlet temperature). Each has a rated power consumption of 18.8 kilowatt. Total investment for both solar water heating system and heat pumps was about 16 million Baht. Energy saving was about 3.04 million Baht/year. Therefore, the payback period is about 5.3 years before subsidy and about 4.8 years after receiving the subsidy. Figure 13:

Figure 12: Heat Pump on the roof top

5.1 Entry Mode

Table 13: Evaluation of Entry Modes

Mode	Agent	Distributor	Licensing	Joint Equity Venture	Strategic Business Alliance	Wholly Owned Subsidiary
Speed of market entry	High	High	Slower	Slow	Slow	Slowest
Cost-direct indirect	Low	Low	Higher	High	High	Highest
Degree of Freedom	Low	Low	Contractual	Limited	Limited	Total

Total exposure to risk	Low	Low	Moderate /High	Moderate /High	Moderate	Highest
Investment payback period	Short	Short	Short /Medium	Short /Medium	Short /Medium	Long term
Foreign market competition	Less likely	Less Likely	Limited	Less likely	Less likely	Less Likely
Ability to expand within mode	Less likely	Less Likely	Limited	Limited	Limited	Limited

Wholly owned subsidiary is the most in degree of freedom if compared with the other entry modes. Many exporters and manufacturers cannot afford to set up 100% sales subs in multiple foreign countries. Each country Thailand, Vietnam, etc has many distinct characteristics and it is best to have commission distributor partnership or agent. Sometimes one starts with a consultant to find the correct partner. In this study, the researcher thinks that the most suitable for the market and the best choice should be Agent Sales & Marketing Consultant together with distributor partnership.

Commission or indent agents sell on behalf of exporters and receive a commission on sales made. Agents seek out potential customers and may be used to facilitate and promote your products in their respective markets. Agents may be paid a salary, a retainer, a commission or a combination of all three but unlike importers/distributors, they do not take legal possession of any goods. Importers solely import goods for resale to other companies in the distribution chain and take legal possession of goods. Importers/distributors take legal possession of goods and pay exporters. They are usually obliged under the terms of their agreement with exporters to carry stocks and to provide after sales service where necessary.

5.2 Marketing Mix

- Product

To be a unique and to have a niche in the market, SWH manufacturer needs to have innovation and latest technologies brought to the market. This will be a mix for the customer Type A and B

However, for the customer Type B, it also necessary to have options for grade A-(A minus) products to be chosen and the customer will feel that they have options and power to control and decision-making power.

Table 14: lists components and accessories

SWH Components / Accessories	Domestic Manufacturers	Domestic Fabricators	Import
Solar Collector		Yes	Yes
Evacuated tubes		Yes	Yes
Tempered Glass (for solar collector)	Yes		
Copper tubing/piping	Yes		Yes
GI piping	Yes		
Plastic piping	Yes		
Stainless Steel piping	Yes		Yes
Insulation	Yes		Yes
Small Storage Tanks (< 600 liters)		Yes	Yes
Large Storage Tanks (> 600 liters)		Yes	
Circulation Pump	Yes		Yes
Differential Temperature Sensor, electrical apparatus and other controllers		Yes	Yes
Valves and Gauges	Yes		Yes

Although most SWH system components and accessories are locally available for SWH suppliers, one of the key problems in Thailand is that product standards which are appropriate for SWH applications have not yet been recognized by designers, manufacturers, SWH suppliers and even end-users. In many cases, sub-standard components and accessories have been integrated into the system with high quality solar collectors, and this incorrect combination has severely affected and shortened the SWH system lifetime.

However, the overall services with the SWH market in Thailand are respectively illustrated with orange and blue lines. Each bluish green rectangular box represents key stakeholders providing products or services. It should be noted that the Figure below does not include government regulatory frameworks and standards related to SWH products and systems as only voluntary product performance standards are available in Thailand.

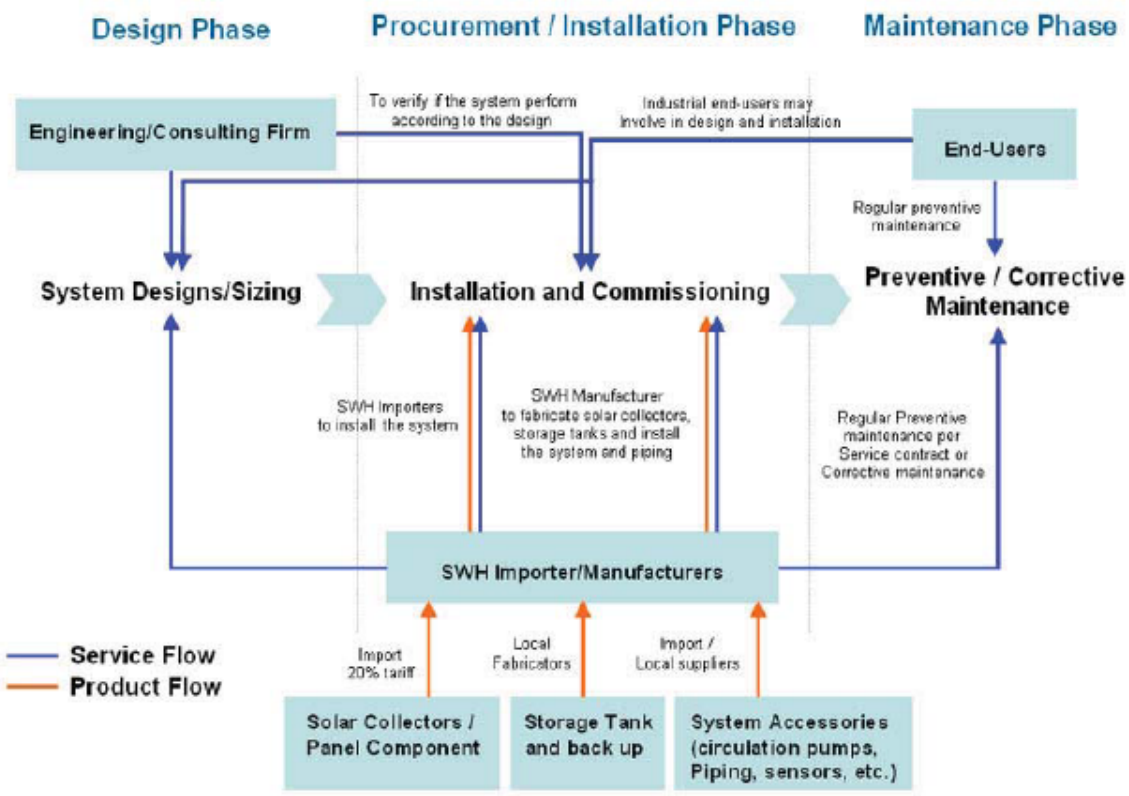


Figure 13: Service and Product Flow Diagram within the SWH Market in Thailand

Basically flows of service and product within the SWH market in Thailand are divided into 3 phases; i.e. 1) Design phase; 2) Procurement and Installation phase, and; 3) Maintenance phase. For any small capacity SWH systems, the design phase is normally by passed as standard sizes are already available for end-user selections, especially thermosyphon systems. Larger SWH systems in the commercial sector normally encompass all 3 phases in every market transaction.

- Price

Price and quality are prime criteria in the consumers' buying process, but your product/service should also have a competitive edge that will differentiate you from your competitors. It is a general rule that the more unique and value-added your product/service is in comparison with your competitors', the more potential and impact your company will have in the market.

From the market survey report that average system cost for domestic SHW is 29,000 baht/m2 and 23,000 baht/m2 for large systems in commercial and industrial applications. Even price is a strongest concern but the quality and the service is the most important for people making a decision whether to buy or not.

Customer type A and customer type B. Use a slightly different price strategy, price in the market should not be more than 5-7 % higher than similar quality products from the domestic market.

- Place

Place is of major importance to marketing. Even if the product might be excellent but the location is not in the right place, the business might not be successful or might not achieve a goal. In the strategy for the customer type A, the distributor might need sales people with videos and brochures about 'pay back periods'. Also there might be a stand with panels and advertising of 'save money on electricity - save the planet' in places where richer Thais are passing by. Secondly, sending sales persons with expertise on the product and foremost on how to close a deal and who have an international appearance, foreigner or Thai, can be beneficial.

- Promotion

A good promotion can influence and affect the decision making, create the need and demand of the buyers. The strategy for both target customer groups is as follows:

- SWH should come up with the good services, before and after sales, also should compare with the competitors, from the study. The researcher found that the other companies give after sales service for 5 years. The companies should have this point as well. Perhaps the company should promote that, there is free recheck of the system every 3 months which means free maintenance cost.
- Apart of some promotion discount, the company should also provide some gift when visiting the company/customer. This is also part of the culture. This means you have concern and thoughts for them. Make the customer feel that he is important. And you are able to invest something in them as well.

6 CONCLUSION

The below are major criteria that the SWH should consider developing.

Quality assurance addresses to the most important and urgent issue of solar thermal in Thailand. It is the starting point to build a firm foundation for a sustainable market growth. National standards and test centers may require a high level of commitment from the government. Measures that can have immediate and direct response to the needs of the industry are capacity training and qualification of manufacturers, planners and installers.

Therefore, capacity building is recommended for Thailand's first step to quality assurance. However, this also requires a monitoring and evaluation scheme to verify the effectiveness of measures. Trainees are needed to be tested before they can become certified planners or installers and the solar systems that are designed and installed by the certified installers should be monitored and checked.

Financial incentives such as subsidy and tax credit can stimulate the market growth particularly during the early stage. Thailand had some form of subsidy in the past, however, only to a limited number of systems and in a short period of time. Without national awareness campaign, the subsidy program had only a small impact on the solar thermal market in Thailand. This incentives measure is recommended for Thailand only in combination with quality assurance to ensure that only quality systems are installed.

Awareness campaign and demonstration programs are measures that address barriers from the customer side. Based on our interviews, many potential customers are not aware of the technology. Some cannot differentiate the two solar technologies; solar Photovoltaic and solar thermal. Awareness campaign is recommended not only to raise the awareness of technological potential; it can address the quality issue by providing customers with un-biased guidelines for a selection of quality suppliers.

7 RECOMMENDATION

First, the company should contact the consultant who has a high success rate in the market. To do business through an agent, the company needs only a simple contract. There is no need to involve the law. This agent will help the SWH company understand the market and test the market by launching a first product. This agent also both segment the market and slightly differentiate market strategy. This agent will also help the foreign company who does not have an idea about the new market to delay real launching until you find a high quality partner.(distributor partnership). The company might even consider paying 50/50 for training. They might consider bringing senior engineers to Finland or to their parent company/country for training as an example to solve the barrier problem about lack of expertise amongst SWH installation people in the market. For example, the company should contact the DKSH Company, for example, as they have a good story in successful business for Nestle, Levi's, Ovaltine for example. To be able to build up the name in the market is a great opportunity to share the market in all segments, especially the target that needs a good reputation and branding. In regard to agent implementation, emphasis is on customers of the Type A.

The knowledge of market and sales channels and regulatory framework is vital therefore, a good consultant and expertise is extremely necessary in marketing. A good agent will help the company to grow their business in a new and initial market because the company does not have experience and does not yet exist in the market.

Secondly, the distributor. For example, the company contacts a well-known or exclusive department store, or some chain department store that the customer is able to meet in daily life. The distributor might need sales people present with videos and brochures about 'pay back periods', and again sale and product training is required - not just a pretty lady with a nice smile and with no idea what the product is economically. Also they might have a stand with panels and advertising of 'save money on electricity - save the planet' in places where richer Thais are passing by. Focus here, would be towards Type B customers.

People will not necessarily buy SWH and they might just walk away, but will register their interest and contact from sales people or installation teams can follow.

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APPENDICES

Appendice 1: Interview Questionnaire for Potential Customers in Thai Hospitality Industry

LAHDEN AMMATTIKORKEAKOULU
Lahti University of Applied Sciences

Interview questionnaire for Hotel Industry

(For the hotel that do not have Solar Water Heating)

Company Name/ Hotel Name:_____

Hotel Ranking (star):_____ Hotel Address/Location_____

Contact No._____ Hotel Website:_____

Interviewee:_____ **Title:** _____

Place: _____ **Date/Time:** _____

Hotel Licensed Number:_____☐in process of licensing

Interviewer: SansaneePongthong (psansani@gmail.com) Tel +358(0) 40 376 3123

Master of International Business Management

1.	What is your duty in the company?
2.	How long have you been working in this company/hotel? _____(years/months) How long have you worked in this industry? _____(years/months)
3	When was the hotel established? _____ Number of employees: _____ Occupancy: _____ Number of Rooms:_____ Price/Rate: Start from _____till_____ Target Customer (Countries)_____ How big of your hotel property? Size?_____Rai_____Square Wah_____Square Meters Business Type ☐ Family business☐Chain ☐ Group

4	How much does electricity and water cost for the hotel? Annually or monthly? Water_____; Electricity _____
5.	Do you have any clean/renewable energy sources installed in your property? (you can choose more than one) ☐No. We don't have. ☐ On process, negotiating (Please specify below) ☐ Wind Power ☐ Water Treatment ☐ Waste Management ☐ Solar PV ☐ Solar Water Heating (SWH) ☐ others please specify
6.	Do you have any plan to install Solar Water Heating in the future? When? Why and Why not?
7.	What are the obstacles to install Solar Water Heating?
8.	How much would you like to invest? Budget in mind? How many years would you think it will take to get a return on the investment (break even)?
9.	Do you need the financial support from a bank? Or how is the hotel finance this kind of investments?
10	How do you find out information about possible suppliers?
11	How does the hotel select the suppliers of renewable energy installations?
12	Have you ever been offered Solar Water Heating by any company? How was it?
13	How is the decision making process? How long does it take if your hotel decided to install Solar Water Heating? Who is taking the buying decision? For example the manager, CEO, supply manager….etc
14	What do you think about the good reputation if the hotel has clean energy such as Solar Water Heating (Selling point)? Do you find that the image of a green hotel is important for your hotel reputation and marketing?

15

Please rate the following statements regarding to the importance of criteria if is chosen:	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Available and secured energy	**1**	**2**	**3**	**4**
Price	**1**	**2**	**3**	**4**
Maintenance fee and service	**1**	**2**	**3**	**4**
Installation process	**1**	**2**	**3**	**4**

Additional comments and suggestions

Appendice 2: Interview questionnaire for the hotels that have already installed Solar Water Heating

Company Name_____ **Hotel Name:** _____

Hotel Ranking(star):_____ Hotel Address/Location _____

Contact No._____ Hotel Website: _____

Interviewee:_____ **Title:** _____

Place: _____ **Date/Time:** _____

Hotel Licensed Number: _____ ☐ in process of licensing

Interviewer: SansaneePongthong (psansani@gmail.com) Tel +358(0) 40 376 3123

Master of International Business Management

1.	What is your duty in the company?
2.	How long have you been working in this company/hotel? _____(years/months) How long have you worked in this industry? _____(years/months)
3.	When was the hotel established? Number of employees: _____ Occupancy _____ Number of Rooms:_____ Price/Rate: Start from _____till _____ Target Customer (countries) _____ How big of your hotel property? Size?_____Rai_____Square Wah_____Square Meters Business Type ☐ family business☐Chain ☐ Group
4.	How much does electricity and water cost for the hotel? Annually or monthly? Water_____Electricity_____ ___

5.	Do you have any clean/renewable energy sources installed in your property? (you can choose more than one) ☐ Yes. We have. (Please specify below) ☐ On process, negotiating (Please specify below) ☐ Wind Power ☐ Water Treatment ☐ Waste Management ☐ Solar PV ☐ Solar Water Heating (SWH) ☐ others please specify_____ Why did your hotel choose to install Solar Water Heating? What is your purpose and expectation? Are you satisfied with your choice? Please explain why.
6.	How long have you had Solar Water Heating installed?
7.	Which type of the Solar Water Heating model that you bought? And which company did you bought from?
8.	How much did it cost? Is it valuable after you install in terms of cost and reputation growth? Why do you think so?
9.	Do you have any plans to install more units of Solar Water Heating in the future? When? Why? Why not?
10	How does your company find out about new energy sources and /or suppliers? How do you find out the information and supplier? ☐ By recommendation ☐ from_____
11	What do you think about Price of Solar Water Heating in the hotel? What is the hotel budget in mind?
12	Do you have any plans to install more units of Solar Water Heating in the future? When? Why? Why not?
13	How many years do you think needed to start getting return on your investment?

14	How long does it take to install the Solar Water Heating? Do you need renovation before the installation? Are you satisfied with time and processing? How difficult or easy to do the maintenance? How much does it cost per year? Approximately ____
15	How is the decision making process? How long does it take for your hotel to make the decision of install Solar Water Heating? How does the hotel select the suppliers of renewable energy installations? How many offers you ask before making a decision? (Bidding process)

Appendice 3: List of licensed hotels in Thailand – 2011

No.	Name	Level	Tel
	AYUTHDHAYA		
1	AYUTTHAYA GRAND HOTEL	5	0 3533 5483 / 9
	BANGKOK		
2	AMARI WATERGATE HOTEL	5	0 2653 9000
3	BANGKOK MARRIOTT RESORT & SPA	5	0 2476 0022
4	BANYAN TREE BANGKOK	5	0 2679 1200
5	CENTARA GRAND AT CENTRALWORLD	5	0 2100 1234
6	DUSIT THANI BANGKOK	5	0 2236 9999
7	INTERCONTINENTAL BANGKOK	5	0 2656 0444
8	JW MARRIOTT BANGKOK	5	0 2656 7700
9	MANDARIN ORIENTAL BANGKOK	5	0 2659 9000
10	PULLMAN BANGKOK KING POWER	5	0 2680 9999
11	RAMADA PLAZA MENAM RIVERSIDE B	5	0 2688 1000
12	ROYAL ORCHID SHERATON HOTEL & TOWERS	5	0 2266 0123
13	SHANGRI-LA HOTEL, BANGKOK	5	0 2236 7777
14	SHERATON GRANDE SUKHUMVIT	5	0 2649 8888
15	SIAM CITY HOTEL	5	0 2247 0123
16	SOFITEL SILOM BANGKOK	5	02-2381991
17	SOFITEL CENTARA GRAND BANGKOK	5	02-5411234
18	SWISSOTEL LE CONCORDE BANGKOK	5	02-694-2222
19	THE CONRAD HOTEL	5	02-6909999
20	THE PENINSULA BANGKOK	5	02-8612888
21	THE IMPERIAL QUEEN'S PARK HOTEL	5	02-2619000
22	THE SUKHOTHAI HOTEL	5	02-3448888
23	THE WESTIN GRANDE SUKHUMVIT	5	02-207-8000
24	VIE HOTEL BANGKOK	4	02-3093939
25	AMARI ATRIUM HOTEL	4	02-7182000-1
26	AMARI BOULEVARD HOTEL	4	02-2552930-40
27	AMARI DON MUANG AIRPORT		02-5661020-1
28	AMBASSADOR HOTEL BANGKOK	4	02-254-0444
29	A-ONE BANGKOK HOTEL	4	02-7181030-43
30	ARNOMA HOTEL BANGKOK	4	02-6555555
31	ASIA HOTEL BANGKOK	4	02-2150808
32	BANGKOK HOTEL LOTUS SUKHUMVIT	4	02-2610111
33	CENTURY PARK HOTEL	4	02-2467800
34	DUSIT PRINCESS SRINAKARIN	4	02-7218400
35	EASTIN HOTEL MAKASAN BANGKOK	4	02-651-7600
36	THE FOUR WINGS HOTEL, BANGKOK	4	02-2602100

37	GOLDEN TULIP SOVEREIGN HOTEL	4	02-6414777,6414888
38	GRAND DIAMOND SUITES HOTEL	4	02-6566888
39	HOLIDAY INN BANGKOK SILOM	4	02-2384300
40	IMPERIAL TARA HOTEL	4	02-2592900
41	INDRA REGENT HOTEL	4	**02-2080022,02-2080033**
42	MONTIEN HOTEL- BANGKOK	4	02-2337060-9
43	NARAI HOTEL	4	02-2370100
44	NOVOTEL BANGKOK ON SIAM SQUARE	4	02-2556888
45	NOVOTEL BANGNA BANGKOK	4	02-3660505
46	PATHUMWAN PRINCESS HOTEL	4	02-2163700
47	PRINCE PALACE HOTEL	4	02-6281111
48	RAMA GARDENS HOTEL BANGKOK	4	02-5610022
49	REMBRANDT HOTEL & TOWERS	4	02-2617100
50	ROYAL PRINCESS LARN LUANG HOTEL	4	02-2813088
51	ALEXANDER HOTEL BANGKOK	3	02-3750300 - 40,7158888
52	ALL SEASONS SATHORN HOTEL	3	023436333
53	BANGKOK RAMA HOTEL	3	044921113-5
54	GRANDE VILLE HOTEL	3	02-2250050
55	PINNACLE LUMPINEE HOTEL&SPA	3	02-2870111-31
56	S.D. AVENUE HOTEL	3	02-4340400
57	ST. JAMES HOTEL	3	02-2610890-7
58	VIENGTAI HOTEL	3	02-2805434-45
59	CITY LODGE SOI 19	2	02-2544783-5
60	CITY LODGE SOI 9	2	02-2537705
61	MALAYSIA HOTEL	2	02-679127-36
CHIANG MAI			
62	THE CHEDI CHIANG MAI	5	053-253333
63	DusitD2 chiang Mai	5	053-999-999
64	FOUR SEASONS RESORT CHIANG MAI	5	053-298181-8
65	RATILANNA RIVERSIDE SPA RESORT	5	053-999-333
66	SHANGRI-LA HOTEL, CHIANGMAI	5	053-253-888
67	AMARI RINCOME CHIANG MAI	4	053-221130
68	AMORA TAPAE HOTEL CHIANGMAI	4	053-251531
69	CHIANG MAI PLAZA HOTEL	4	053-903161-80
70	THE EMPRESS HOTEL	4	053-270240
71	THE IMPERIAL MAE PING HOTEL	4	053-283900
72	PANVIMAN CHIANG MAI SPA RESORT	4	02-910-8660-4 ext.108
73	ANGKHANG NATURE RESORT	3	053-45011

74	EURASIA CHIANG MAI HOTEL	3	053-247790-6
75	HOLIDAY GARDEN HOTEL & RESORT	3	053-211333,210901-4
76	THE PARK HOTEL	3	053-280080
CHIANG RAI			
77	ANANTARA RESORT & SPA GOLDEN TRIANGLE	5	053-784084
78	DUSIT ISLAND RESORT, CHIANG RAI	5	053-715777-9
79	GOLDEN PINE RESORT & SPA	4	053-706270-9
80	WIANG INN HOTEL	4	053-711533
81	THE IMPERIAL GOLDEN TRIANGLE RESORT	3	053-784001-5
CHONBURI			
82	AMARI ORCHID PATTAYA (OCEAN TOWER)	5	038-418418
83	DUSIT THANI PATTAYA	5	038-425611-7
84	PATTAYA MARRIOTT RESORT & SPA	5	038-412120
85	PULLMAN PATTAYA AISAWAN	5	038-411940-8
86	ROYAL CLIFF BEACH RESORT	5	038-250421
87	THE ZIGN HOTEL	5	038-909800-20
88	AMARI ORCHID PATTAYA (GARDEN WING)	4	038-428161
89	A-ONE THE ROYAL CRUISE HOTEL, PATTAYA	4	038-424-874-9
90	ASIA PATTAYA HOTEL	4	038-250491-5
91	CHOLCHAN PATTAYA RESORT	4	038-702-777
92	HARD ROCK HOTEL PATTAYA	4	038-428755-9
93	LONG BEACH GARDEN HOTEL & SPA	4	038-414616-26
94	THE MONTIEN HOTEL PATTAYA	4	038-428-155
95	SIAM BAYSHORE RESORT	4	038-428678
96	SIAM BAYVIEW HOTEL	4	038-423871-7
97	SUNBEAM HOTEL	4	038-427120-9
98	THAI GARDEN RESORT	4	038-370614-8
99	WOODLANDS HOTEL & RESORT	4	038-427061-9
100	BEST WESTERN PATTAYA	3	038-421707
101	CHON INTER HOTEL	3	038-781360-3
102	ISLAND VIEW HOTEL	3	038-250813-16
103	JP VILLA HOTEL	3	038-727470-4
104	MERCURE HOTEL PATTAYA	3	038-425050
KANCHANABURI			
105	THE LEGACY RIVER KWAI RESORT	3	**034-531345**
106	PUNG-WAAN RESORT	3	**034-634295-300**
107	RIVER KWAI HOTEL	3	**034-513348-9**
108	RIVER KWAI VILLAGE HOTEL	3	**034-634454-7**
KHON KAEN			

109	PULLMAN KHON KAEN RAJA ORCHID	5	043-322-155
110	CHAROEN THANI KHON KAEN	4	043-220400-14
111	BUSSARAKAM HOTEL	3	043-333666
112	CENTARA GRAND BEACH RESORT & VILLAS	5	**075-637789**
KRABI			
113	PIMALAI RESORT & SPA	5	075-607999
114	RAYAVADEE	5	075-620-740-3
115	SHERATON KRABI BEACH RESORT	5	075-628000
116	SOFITEL KRABI PHOKEETHRA GOLF & SPA RESORT	5	075-627800
117	AONANG VILLA RESORT	4	075-637270-4
118	CHA-DA BEACH RESORT AND SPA	4	(075)668124-5
119	KRABI THAI VILLAGE RESORT	4	(075)637710-9
120	MARITIME PARK & SPA RESORT	4	075-620-028-46
121	PAKASAI RESORT	4	075-637777
122	RED GINGER CHIC RESORT	4	(075)637888
123	BEST WESTERN AO NANG BAY RESORT & SPA	3	075-661400-3
124	BEST WESTERN BAN AO NANG RESORT	3	075-637071
125	DUANGJAI RESORT	3	075-638211-4
126	KRABI CHA-DA RESORT	3	(075)695721-4
127	PHI PHI NATURAL RESORT	3	02-591568-70
128	PHRA NANG INN	3	075-63710-3
129	KRABI ROYAL HOTEL	2	075-611582-4
LEI			
130	LOEI PALACE HOTEL	4	042-815668-73
LOBBURI			
131	PASAK HILLSIDE RESORT	3	036-462428
MAE HONG SON			
132	THE IMPERIAL TARA MAE HONG SON HOTEL	3	053-684444
MAHASARAKRAM			
133	TAKSILA HOTEL	4	043-719-999
134	NEWPATTANA HOTEL	3	043-719900
135	PATTANA HOTEL	2	043-711979
NAKONRATCHASRIMA			
136	DUSIT PRINCESS, KORAT	4	044-256629-35
137	THE BONANZA KHAO YAI HOTEL	3	02-722-6602
PATTHANI			

138	C.S. PATTANI HOTEL	4	073-335093-4,336090-6
PETCHABURI			
139	DUSIT THANI HUA HIN	5	032-520-009
140	SHERATON HUA HIN RESORT & SPA	5	032-708000
141	HAVEN RESORT HUA HIN	4	032-523023
142	HOLIDAY INN RESORT REGENT BEACH CHA-AM	4	032-451240-9
143	TARA MANTRA CHA-AM	4	032-433-999
144	LONG BEACH CHA-AM HOTEL	3	032-472-444,032-433-844
145	SUN HOTEL	2	032-400000
PANG-NGA			
146	LE MERIDIEN KHAO LAK BEACH & SPA RESORT	5	076-427500
147	KHAOLAK SEAVIEW RESORT & SPA	4	076-429800
148	AYARA VILLAS	3	076486478-9
149	BAAN KHAOLAK RESORT	3	076-485123-4
PHUKET			
150	DUSIT THANI LAGUNA PHUKET	5	076-324174
151	JW MARRIOTT PHUKET RESORT & SPA	5	076-348348
152	SHERATON GRAND LAGUNA PHUKET	5	076-340115
153	SRI PANWA RESORT & SPA	5	076-324108
154	AMARI CORAL BEACH RESORT	5	076-340893
155	ANDAMAN BEACH SUITES HOTEL	4	076-371011
156	ANDAMAN SEAVIEW HOTEL	4	076-398177
157	BEST WESTERN PREMIER BANGTAO BEACH RESORT & SPA	4	076-270679,270686
158	CENTARA KARON RESORT PHUKET	4	076-396491
159	CENTARA KATA BEACH RESORT	4	076-396491
160	CLUB ANDAMAN BEACH RESORT	4	076-340527-8
161	DUANGJITT RESORT & SPA	4	076-340288
162	HOLIDAY INN RESORT PHUKE	4	076-340435
163	NOVOTEL PHUKET RESORT PATONG BEACH	4	076-341110
164	PATONG BEACH HOTEL	4	076-340541
165	PATONG PARAGON HOTEL	4	076-290530

166	THE ROYAL PARADISE HOTEL & SPA (ROYAL WING)	4	076-340-565
167	ROYAL PHUKET CITY HOTEL	4	076-233335
168	SEAVIEW PATONG HOTE	4	076-340103
169	SUPALAI RESORT & SPA	4	076-302300
170	THARA PATONG BEACH RESORT & SPA	3	076-345415
171	ALL SEASONS NAIHARN PHUKET	3	076-289322
172	BEST WESTERN PHUKET OCEAN RESORT	3	076-396470,396177
173	BY THE SEA	3	076-200990
174	ROYAL CROWN HOTEL & PALM SPA RESORT		076-340376
PRACHUABKIRIKHAN			
175	ANANTARA HUA HIN RESORT & SPA	5	032-520250
176	DHEVAN DARA RESORT & SPA	5	032-576300
177	HUA HIN MARRIOTT RESORT & SPA	5	032-511881-4
178	SOFITEL CENTARA GRAND RESORT & VILLAS	5	032-512021-38
179	V VILLAS HUA HIN	5	032-616039
180	WORA BURA HUA HIN RESORT & SPA	5	032-536999
181	PURIMUNTRA RESORT & SPA	4	092-630550-3
182	BAAN TALAY DAO	3	032-536024-30
183	HUA-HIN GRAND HOTEL AND PLAZA	3	032-513230-4
184	KUIBURI HOTEL & RESORT	3	032-820111-14
185	NAPALAI RESORT & SPA	3	032-527555
186	BAAN DUANG KAEW RESORT HUA HIN	2	032-515307
187	HADTHONG HOTEL	2	032-601-050
188	MALAI ASIA RESORT	2	02-6797127-36, 01-9161217
RAYONG			
189	PARADEE	5	038-644-290
190	NOVOTEL RAYONG RIM PAE RESORT	4	038-638002
SAMUTPRAKRAN			
191	NOVOTEL SUVARNABHUMI AIRPORT HOTEL	4	02-1311042
SAMUTSONGKRAM			

192	BAANAMPHAWA RESORT & SPA	4	034-752222
SONGKHA			
193	NOVOTEL CENTARA HAT YAI	4	074-352223
194	GOLDEN CROWN PLAZA HOTEL	3	074-262908
195	HADYAI GOLDEN CROWN HOTEL	3	074-247188
196	KING'S HOTEL	2	074-236103
SURATTHANI			
197	ANANTARA BOPHUT RESORT& SPA	5	077-428310
198	BHUNDHARI SPA RESORT & VILLAS SAMUI,A CENTARA RESORT	5	077-601239
199	CENTARA GRAND BEACH RESORT SAMUI	5	077-422385
200	THE IMPERIAL RESORT & SPA,KOH SAMUI	5	077-422-396
201	MAI SAMUI BEACH RESORT & SAMUI	5	077 914611
202	MELATI BEACH RESORT & SPA	5	077-913444
203	MUANG SAMUI SPA RESORT	5	077-413225
204	RENAISSANCE KOH SAMUI RESORT & SPA	5	077-429333
205	SANTHIYA RESORT & SPA	5	077-428900
206	AMARI PALM REEF KOH SAMUI	4	077-422394
207	BANDARA RESORT AND SPA	4	077-427-340
208	CHABA CABANA BEACH RESORT & SPA	4	077-230771
209	FAIR HOUSE VILLAS & SPA	4	077-429099
210	THE IMPERIAL BOATHOUSE HOTEL	4	077-425-460-1
211	IMPIANA RESORT CHAWENG NOI, KOH SAMUI	4	077-422111
212	IYARA BEACH HOTEL & PLAZA	4	077-231-642
213	NORA BEACH RESORT & SPA	4	077-413990
214	PANVIMAN RESORT KOH PHANGAN	4	077-445100
215	PARADISE BEACH RESORT	4	077-425-290
216	Q SIGNATURE SAMUI	4	077-428133
217	BANBUREE RESORT & SPA	3	077-429649
218	BEST WESTERN SAMUI BAYVIEW RESORT&SPA	3	077-413321
219	CHABA SAMUI RESORT	3	077-422380
220	PHANGANBURI RESORT & SPA	3	077-375482
221	PINNACLE RESORT SAMUI	3	077-427309
222	SAMUI NATIEN RESORT	3	077-422604
TRANG			
223	ANANTARA SI KAO RESORT & SPA	5	075-205-888
TRAD			
224	AIYAPURA RESORT & SPA, KOH CHANG	5	

225	AMARI EMERLD COVE RESORT	5	039-555111-1
226	PANVIMAN KOH CHANG RESORT	4	02-255-4855
UDONTHANI			
227	IYARA PARK HOTEL & RESORT	5	039551290-6