Environmental Management in Thai Hotel Industry

Canadian University Consortium
Asian Institute of Technology
Urabn Environmental Management
Private Sector Initiative
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Background

Tourism Industry in Thailand

The tourism industry in Thailand has played an important role in the economic and social development of the country for around four decades. Since 1959, when the Thai Government established the Tourist Promotion Organization to handle the Government's public relations' work, providing information about Thailand and its tourist destinations overseas, the number of tourist arrivals has risen from 81,340 in 1960 to as many as 5,760,533 in 1993 and 7,192,145 in 1996.

The increasing number of tourists resulting in substantial inflows of foreign currency, together with a significant expansion of the tourism industry led the Thai Government to legislate the 'Tourism Act' in 1979, in order to provide guidance for tourism promotion and related developments. This also led to the formation of the Tourism Authority of Thailand and the Board of Tourism.

After the establishment of the Tourism Authority of Thailand (TAT), tourism promotion activities have grown considerably. Importantly, infrastructure development to support the tourism industry, regional and provincial tourism development plans, together with the encouragement of private businesses to invest in a variety of tourist facilities has further helped to attract foreign tourists to Thailand. The revenue generated by foreign tourists in 1983 was approximately 25,000 million Baht. In 1993, this figure increased to approximately 150,000 million Baht, making it the country's top revenue earner, over and above other exporting industries.

Tourist Accommodation Services

To cope with the growing number of inbound foreign tourists as well as local Thai tourists travelling within Thailand, several types of lodging and accommodation service have emerged, some of which are registered and some unregistered. Some lodgings are located in remote areas and some in less remote areas. Lodging types comprise:

1. *Hotels and Bungalows:* In 1994, there were a total of 4,850 tourist accommodation establishments in Thailand offering 246,113 tourist rooms. Almost all of these are unsuitable to serve as eco-lodges. Only some resort lodgings have appropriate features, which can be developed into eco-lodges.
2. *Golf Resorts:* This type of resorts has become very popular in recent years and constitutes the high-end luxury class accommodations.
3. *Guesthouses in National Park Areas:* These lodgings are under administration of the Royal Forestry Department and are located in every national park. Staff houses are also used as guest houses, and there are tents and camping facilities, as well.

The number of tourist accommodation establishments has steadily increased since 1994 till date and presently there is a significant problem of oversupply of hotel rooms, especially in Bangkok. Moreover, most of the lodging facilities have been built in the modern urban style and lack environmental consciousness in their design and operation.

Environmental Impact of Tourism in Thailand

The tourism industry has adversely affected the environmental quality of the tourist destinations' neighboring communities both physically and socially, with major contribution from the tourist accommodation services. In many areas where mass tourism prevails, tourist facilities, such as hotels, restaurants, entertainment structures, etc., are over-developed and cluttered, to such an extent that the natural scenery and local culture has been overwhelmed. Consequently, garbage and other wastes have caused air, water and 'visual' pollution. In many extreme cases, the tourism industry has also led to illegal encroachments on public lands and forest resources, causing the deterioration of natural forests and disturbances to both flora and fauna. As a result, famous tourist destinations, such as Pattaya Beach, the Patong Beach in Phuket, the Phi-Phi Islands in Krabi and the Ao Phang-Nga National Park, have deteriorated to such as extent that restoring them to their original state, is very difficult, if not impossible.

Throughout the ongoing period of tourism activities from the inception to the full-blown hospitality industry, following issues have been of major concern:

Deterioration of Tourist Destinations and Pollution

Tourist destinations became deteriorated and dirty with garbage and waste matter strewn around the tourist sites. The components of the destinations lost their natural balance, resulting in a disturbed ecosystem such as polluted waterways, discolored beaches, stench from garbage dump, and rapid destruction of flora and fauna whose numbers were vastly reduced or threatened with extinction.

Sewage and garbage formed the major problems that were caused by tourists and tourist business operators such as hotels, bungalows, restaurants, shops as well as adjoining communities. Other problems related to polluted air with dust/ fumes and traffic noise. These problems not only degraded the quality and beauty of the destinations but also were injurious to the visitors' health and induced psychological distress and displeasure to them. They left with a negative impression and had no wish to make a repeat visit.

Encroachment on Public Land

The encroachment on public land includes occupation and utilization, which came in many forms such as occupation and holding without ownership papers or with illegal ownership

papers. The usual gambits used were the trespassing or occupation of mountains or forest reserves to pave the way for the construction of resorts, occupation of islands, beaches and mangrove forests for commercial tourism purposes, and encroaching on waterways to build houses or restaurant rafts.
Another type of violation involved encroachment on the public land that adjoins one's own land. This includes, for instance, building into rivers and canals or public beaches, and erecting shacks and stalls on public lands such as shacks selling food and drinks, or souvenir stalls found in most tourist destinations around beaches, waterfalls, temples, and archaeological sites. The serious incidents of encroachment on public land were found in mangrove forests, forest reserves and national parks. Appropriate and effective measures therefore must be devised to forestall the problems and stop illegal encroachment.

Buildings and Structures
Buildings and structures sprang up everywhere and all the time, particularly at major or popular tourist destinations such as Phuket, Pattaya and Chiang Mai. These buildings often were erected without compliance with the building control law regarding height, structure and open space, causing the picturesque scenery to be impaired.
Another type of violation involved putting up buildings and structures that disfigured the original natural contour of the land. The arrangement of various components at the destinations ran counter to natural conditions and the environment, which resulted in the gross distortion of the delicate and attractive landscape out of its original state.
The congestion of buildings was another problem often encountered in popular tourist destinations. The congestion appeared as food and drink shacks, street peddlers, souvenir stalls, and rows of shophouses which mushroomed in complete chaos, resulting in a jumbled sea of eyesores. More important, the destination became deteriorated rapidly. Examples of the problem were the sprouting of beer bars in Phuket and Koh Samui, and the shophouses or shopping arcades standing next to temples or archaeological sites in Chiang Mai.

Development of Infrastructure and Facilities without regard to the Environment
The problems classified under this heading included the dumping of soil masses to fill up or obstruct natural waterways or coastal waters, roads built too close to the seashore, roads cut through mangrove forests, commercial digging of surface soil, rock explosion, dam building that causes soil avalanches, and accumulation of riverbed or sea sediment basins, all of which lead to destruction of the natural geography and ecosystem.
From the environmental point of view, these problems represented serious forms of damage or undue interference with the natural order, which included decay or deterioration of traditional tourism resources and their subsequent lowered quality, water and air pollution, loss of indigenous flora and fauna, destruction of natural geography, destruction of historical and archaeological evidence.

Environmental Impact of Hotel industry
Hotel development is a major trading component within the context of the tourism industry. However, unplanned and uncontrolled rapid hotel development has resulted in serious environmental degradation. The impact of hotel development is, in general, similar to that of all other structural facilities associated with the tourism industry. The impact can, therefore, be classified as either short-term or long-term.

Construction / Short-term impact
Activities include overall construction and residuals, or waste disposal, from these activities (for example, bulldozer operations, cranes, supply trucks, which generate minor oil spills, dust, and, sludge, and workers sewage). Oil spills and other wastes may contaminate the soil and the

water supply when rains come. Run-off has the potential to contaminate ground, surface, and near shore marine waters. Contamination of water supply could lead to human health problems, especially bacterially related ones from sewage spills.
During construction, a large amount of labor may be necessary; if this resource is not available locally, then workers must be brought in and housed. However, an influx of immigrant labor has the potential to introduce new diseases; and different and conflicting morals, lifestyles and standards of sanitation frequently result in the creation of urban slums. The increase in population may also place an additional demand on infrastructure and services. Temporary housing structures and roads could lead to erosion problems. If supplied locally, labor resources would likely be drawn away from primary production activities of either economic or subsistence significance such as agriculture of fishing.

Operation and Long-term Impacts
The activities related to the day-to-day operations of hotel complex require a certain level of infrastructure and public services. Demand increases on existing sewer, water, waste disposal, and power facilities. Serious deterioration could occur in either the physical or social environment. Air emissions from boiler stacks could pose air pollution problem, while the food waste and other organic waste may result in odor problems.

Tourism Policies and Legislation: Changing Winds
It must be stressed that the current situation vis-à-vis tourism is a direct outcome of the past tourism policies and plans of the Government. In 1976, for the first time ever, a consulting company from Netherlands formulated a National Tourism Development Plan. The focus of this plan was primarily on marketing, so as to generate maximum inflows of foreign currency, and on physical development in order to facilitate increasing numbers of international tourists. Though the plan did acknowledge the presence of some environmental problems, which might jeopardize the industry; it did not put forth any concrete suggestions as to how to solve these problems. It only advised the Government to issue strict regulations as a tool towards environmental protection. However, this National Tourism Development Plan was regarded as having a significant influence on the formulation of later tourist development plans within the National Economic and Social Development Plans.
The Fourth National Economic and Social Development Plan (1977-1981), as a result highlighted three main plans for tourism development: a tourism promotion plan; a tourism destination development and maintenance plan; and, a tourism services plan. However, an analysis of this plan showed that it, indirectly, caused many problems associated with rapidly increasing tourist destinations. The Government was unable to control inappropriate land use activities and construction in these sites. Moreover, both private and public sectors still lacked the knowledge and understanding about the conservation of tourist destinations. Thus, the environment of many tourist locations inevitably deteriorated especially that of coastal destinations.
Despite these problems, the proceeding Fifth National Economic and Social Development Plan (1982-1986), set the objectives of the tourism plan as: the promotion and marketing of tourism so as to attract more foreign tourists; supporting public investments to develop tourist destinations; and private sector investments in the services business.
All of these Plans resulted in a sharp expansion in the tourism industry. The increase in the number of tourists, both domestic and international, seriously affected the natural and cultural environment of the tourist destinations, which had already started to deteriorate substantially by the middle of the Fourth Plan. Environmental problems became increasingly visible in many tourist destinations.
Even though by the time of the Sixth National Economic and Social Development plan (1987-1991), the negative impacts on the environment as a result of tourism became even more

visible and were now being publicly criticized, the Government still concentrated on tourism promotion in order to attract more foreign visitors. However, during the period of this Plan, the Government commenced to place higher value on conserving the environment of tourist sites. A significant chunk of the Plan's budget was therefore used to restore and maintain the surroundings of tourist destinations, which were under the control of various government departments, such as Royal Forestry Department, the Fine Arts Department, and the Department of Local Administration. There were however, weaknesses and limitations in the coordination between the concerned agencies, particularly between the Tourism Authority of Thailand (TAT), and the agencies mentioned above. Such poor coordination did little, if nothing, to improve the degraded environment of tourist sites.

The Seventh National Economic and Social Development Plan (1992-1996), placed greater emphasis on the environmental conservation of tourist destinations. This is not only because most tourist resources had already been degraded, but also because, Thailand had to compete with its neighbors in order to become the regional tourism center. As a result, Thailand had to change its tourism strategies, in order to maintain stable growth in this sector alongside with 'high quality' tourism and the tourist development plan therefore focused heavily on 'sustainable tourism'. Promotional campaigns concerning this new focus were launched domestically and internationally including the seeking out of public funds for the conservation of tourist resources, nationwide. Furthermore, this plan also emphasized cooperation between the public and private sectors of the industry in rectifying the environmental problems of the country's tourist destinations.

In line with the policies and directions in the Seventh Plan and contrary to the earlier Plans, the current Eighth National Economic and Social Development Plan (1997-2001) strongly emphasizes on and seeks to deploy strategies for environmental protection contributing towards sustainable development. Select strategies of interest, which have important bearing on the sustainable tourism practices in general and hotel industry in particular, include:

- Reducing the volume of various types of pollution, including community and industrial wastewater, air pollution, industrial waste and hazardous substances;
- Establishing appropriate criteria for garbage and waste management with an emphasis on the processes of reducing, reusing and recycling waste;
- Disseminating useful data to the public, recognizing the equal right of access to information of all parties;
- Encouraging eco-tourism by local communities, including capacity building in project formulation and planning in order to obtain financial assistance from appropriate government budgets and funds;
- Shifting from chemical fertilizer to organic fertilizer (agricultural pollution prevention);
- Collecting fees for raw water from industrial, agricultural and domestic consumers, minimizing wastage of clean water through leaks and encouraging water-saving devices and the reuse of cooling water and treated wastewater in some industrial activities.

Regulatory Framework For Hotel Industry in Thailand

Legislation for the Thai Hotel Industry

The basic legislation for the hotel industry is the Hotel Act of 1935. However, this does not have much significance in the context of environmental management.

In view of the potential impact of hotel development on the environment, the Government has stipulated the requirement of conducting an EIA study for hotel or resort facilities (greater than 80 rooms) to be located at environmentally sensitive areas such as areas adjacent to rivers, coastal areas, lakes or beaches or in the vicinity of national parks.

Apart from this, there are a number of laws and regulations in isolation, that are applicable to the hotel industry. Typically, most of the laws include those applicable to commercial buildings and hence are administered by the local government (for instance Bangkok Metropolitan Admisnstration in Bangkok). These laws and regulations include necessary clearances from helath department, fire and safety related laws etc. In addition, labor laws are applicable to the hotel industry, as they are applicable to other businesses in Thailand.

Environmental Legislation

Through a Notification of the Ministry of Science, Technology and the Environment, issued under the Enhancement and Conservation of National Environmental Quality Act (1992), the Pollution Control Department has stipulated following as effluent discharge standards for the hotel buildings. Most of the hotels discharge the wastewater to the municipal sewer after treating it in their own wastewater treatment plant.

Building Effluent Standards for Hotels

Building Attributes			***Effluent Standards***		
Type	**Size Range**	**Standard**	**Parameter *****	**Units**	**Maximum**
Hotels	200 rooms or more	A*	"pH"	-	5-9
			BOD	mg/l	20
			Solids (SS)	mg/l	30
			Setlleable Solids	mg/l	0.5
			Solids (TDS)	mg/l	500
			Sulfide	mg/l	1.0
			Nitrogen as TKN	mg/l	35
			Fat oil and grease	mg/l	20
	60 but not more than 200	B	"pH"	-	5-9
			BOD	mg/l	30
			Solids (SS)	mg/l	40
			Setlleable Solids	mg/l	0.5
			Solids (TDS)**	mg/l	500
			Sulfide	mg/l	1.0
			Nitrogen as TKN	mg/l	35
			Fat oil and grease	mg/l	20
	Less than 60 rooms	C	"pH"	-	5-9
			BOD	mg/l	40
			Solids (SS)	mg/l	50
			Setlleable Solids	mg/l	0.5
			Solids (TDS)**	mg/l	500
			Sulfide	mg/l	3.0
			Nitrogen as (TKN)	mg/l	40
			Fat oil and grease	mg/l	20

*: The Pollution Control Officer, as specified in the Section 69 of the Act will control this type and size of the building.

**: These values are in addition to the TDS of water used.

Issues of Concern for the Thai Hotel Industry

Utilities Related Issues

From an environmental standpoint, the concerns for the hotel industry primarily revolve around the utilities area. This includes:

- Water
- Energy (Electrical as well as Steam): HVAC (Heating, Ventilation and Air Conditioning)
- Wastewater Management
- Solid Waste Management
- Air Quality (indoor as well as external)

The Thai hotel industry per se does not have to face many strignet environmental laws and regulations yet. Therefore, a number of avenues, leading towards environmental improvement, can be explored to reduce the wasteful consumption of the utilities.

It is not always true that water and energy consumption is in direct proportion to the monthly average guest room occupancy. Rather, electricity consumption is more related to outdoor air temperature, as consumption is dominated by air conditioning. Water consumption may not be directly proportional to average occupancy either, being rather constant over a year.

The costs for utilities typically constitute less than 10% of the total operating costs in Thai hotels. As such, there is minimal economic incentive to reduce the consumption. Moreover, being a service industry, the quality of service can not be compromised at all in any hotel, to save on any of these resources.

However, the strategies and policies as outlined in the National Plans, clearly indicate the changing trends and the Thai hotel industry in the future will have to meet with: an increasing costs of utilities and waste management in line with Polluter Pays Principle; a more responsible resource and waste management; and increasing public disclosure about the environmental performance of the hotels.

Energy Issues

Amongst all the utilities mentioned earlier, energy issues are of primary concern due to their substantial cost share. Generally, amongst the types of energy supplied to a hotel building, electricity consumption dominates in terms of both units used (GJ) and cost. Hence the measures to cut electricity consumption could result in more direct and significant impact on total cost of energy consumption in a hotel.

Consumption

Energy consumtion and hence the cost for heating, ventilation and air conditioning (HVAC) can range from 25 - 50 % of the grand total energy cost - the higher figure applies to the luxury hotels in hot and tropical climates which require heavy air conditioning. Lighting accounts for 15-25% of the hotel's electricity consumption.

The pattern of energy consumption in laundry depends largely on the type of equipment in use and to a lesser extent, on the type of fabrics being processed. Washing accounts for approximately 35 % of the total energy consumed in the process. Drying and finishing account for the rest (65%).

Other forms of energy include steam for laundry and hot water for guest floors, which is typically produced using boiler which operate on LSHS fuel oil.

Costs

The electricity cost for hotels in Thailand, comprises of three elements.

- Firstly, the hotel is charged as per the actual consumption of electricity units (kW-h) at a rate of 1.06 Baht/unit.
- Further, the hotel is charged for the peak demand anytime during the month at a rate of 256 Baht/unit. (For instance, the maximum or peak consumption anytime during the month touches say 2,000 units, then the hotel is charged for peak demand at 2,000 units X 256 Baht = 512,000 Baht).
- Lastly, the hotels are charged by the electricity authorities a Fuel Charge, which is more or less ad-hoc, and covers the deficits for the authorities by charging to the commercial and industrial establishments. This charge can vary from month to month and presently, it is ranging around 0.55 Baht/unit.

It can be thus observed that major savings in electricity bills could be achieved by controlling the peak demand in the first place prior to reducing the actual consumption.
As regards the fuel costs for boiler, they are not substantial and the hotels have been typically using LSHS oil which is available for 6-7 Baht/Lit. Moreover, the fuel oil is required only for boiler which produces steam primarily for laundry, and hence the consumption is not substantial.

Water and Wastewater
Hotels consume a lot of water. The following gives some indication of the volume of water used by different sizes of hotels in Thailand:

- Hotel Size 150 - 200 rooms need 50,000 - 100,000 m3/yr
- Hotel Size 200 - 300 rooms need 120,000 - 180,000 m3/yr
- Hotel Size 300 - 400 rooms need 180,000 - 250,000 m3/yr
- Hotel Size 400 - up rooms need 300,000 - 500,000 m3/yr

In Bangkok, the treated municipal water is the primary water source for all the purposes and is available at 16 Baht/m3.
There are no sewer charges for discharging the treated wastewater in the municipal sewers. Most of the hotels have their own wastewater treatment plants for treating the raw watewater to meet the stipulated discharge limits, which is the only direct wastewater management cost to borne by the hotels. However, the wastewater from hotels is primarily domestic in nature and hence is not difficult to treat, hence this is not considered as an area of concern.
The laundry operation of a hotel can have an enormous impact on the environment. For various cleaning and finishing processes an enormous amount of energy and water is used, while the chemicals used can cause air pollution, toxic waste and sewage problems.

Solid Waste
A hotel's solid waste stream is as diverse as it is enormous. Office paper, restaurant food waste, amenity bottles, plastic and aluminum beverage containers, countless cardboard packaging boxes, heavy machinery, and guestroom furnishings all find their way into a property's dumpster. Although this waste is diverse, the hotels typically generate a fairly consistent type of waste. The majority is paper and food waste, and there are lesser amounts of metals, plastic and glass. This profile is similar to the standard municipal solid waste stream coming from residential communities, largely because a hotel is much like a big house.

A Typical Hotel's Solid Waste Composition

Waste	**% based on volume**
Food & Non-recyclables	46 %
Paper	25 %
Cardboard	12 %
Plastics	7 %
Glass	5 %
Metals	5 %

Variations in a hotel's waste composition can be attributed to differences in the scope of operations and target market of the hotel. For example, limited-service hotels and motels often do not offer an on-site restaurant. This eliminates most of the food waste that makes up a large portion of a full-service hotel's waste stream. Some hotels cater to business travelers who leave office paper-type waste behind; other hotels cater to families on vacation who leave a lot of container waste (take-out boxes and bags, soda bottles and cans); and others cater to the convention and trade-show market which generates significant cardboard waste.

Solid Waste Management Practices

In Thailand, typically organic wastes from the hotel (e.g. kitchen waste) have been sold to pig farms, which is collected by the buyer at the hotel itself. Most of the other solid waste like newspaper and plastics is collected/purchased by scavengers. As such, there are no costs for the hotel for managing this solid waste, instead the hotels can earn a little revenue by selling these wastes.

Remaining solid waste and grabage is disposed of through the municipal garbage collection truck. There are very nominal charges for collecting the garbage - typically less than 1,000 Baht a month for hotels in Bangkok.

Air Pollution

External Air Emissions

Air emissions of solid, liquid, or gaseous substances to the outside atmosphere are potentially harmful to human health and to the general environment. Below are some of the ways in which hotels contribute to the environmental pollution:

- Chloro-fluoro-carbons (CFCs)
    - Freon loss from refrigerators, freezers, chillers, self-contained coolers.
    - Use of spray cans
    - Fire extinguisher and halon computer room protection
    - Foam insulation, styrofoam cups and packaging
    - Emissions from burning fossil fuels / gas
    - Boilers for generating steam
    - Car
    - Gas-fired equipment in the kitchens, laundries
    - Generators for emergency power
- Emissions from the evaporation of hydrocarbons
    - Usage or spill of petrol, diesel oil
    - Pesticides
- Emissions from Accidents
    - Fire

    - Spillage
- Odors, vapors and mists
    - Kitchen and laundry exhausts
    - Toilet exhausts
    - Paints (especially spray) solvents
- Bacteriological pollutants
    - Cooling towers
    - Swimming pools
    - Waste disposal
    - Stores, Kitchens, bathrooms
- Miscellaneous Gases
    - Formaldehyde (plywood, chipboard)
    - Trihalogen-methane, Chlorine (pools)
    - Perchloroethylene (Laundry)
    - Carbon dioxide (fire extinguisher equipment)
- Particulate
    - Asbestos
    - Lint (laundry)
    - Sawdust.

Amongst these, the issues of primary concern for Thai hotel industry are the boiler stack emissions and malodors that may occassionally annoy the neighboring community.
Given the exuberant air-conditioning and refrigeration used in Thai hotels, the CFC phase-out is likely to beomce a priority issue in near future. However, this needs a strong initiative and action from the Government side to drive the hotels and industry to follow the targets in the Montreal Protocol.

Indoor Air Quality
The indoor air quality is ideed an important area that needs attention from the hotel management, as it is directly associated with the guest comfort. Potential sources of indoor air pollutants that need attention are listed below:

- *Combustion*: Combustion emissions may include gases (such as carbon monoxide, nitrogen oxides, sulfur dioxide, or hydrocarbons) and suspended particulate from boilers, cooking stoves, vehicle engines in garages and other combustion sources.
- *Chemical Vapors*: These may come from cleaning solvents, pesticides, paints and varnishes.
- *Building Materials*: Such materials may include toxic substances such as formaldehyde in foam insulation, textile finishes or pressed wood, fiberglass or mineral fibers or plasticizers etc.
- *Asbestos*: A specific category of material used in older building for insulation, it requires special attention where it is deteriorating and should be eliminated wherever possible.
- *Tobacco*: People are adversely affected by "passive smoking". Building decorations and fittings are degraded.
- *Airborne Diseases*: Micro-organisms such as legionella are primarily associated with moisture in the air conditioning and ventilation systems, which can cause droplet infection.
- *Dust*: Dust introduced from outside or internal activities can be irritants, especially to people with allergies or respiratory problems. They can also damage equipment and décor and increase cleaning requirements.

- *Radon Gas*: Radon gas is released by the soil on which the building is situated or from stone, cement, bricks or granite.
- *Methane Gas*: This gas is produced from decomposing materials.
- *Ozone*: Photocopiers and fluorescent lights produce ozone.
- Solvents: Dry cleaning machines produce solvents, which can be pollutants.
- *Humidity*: In humid climates, high humidity causes discomfort. It also causes mildew that discolors and damages materials and smells unpleasant.
- *Odors*: Even at concentrations below health concern, pollutants can cause annoying odors. Besides chemicals such as those listed above, natural odors from sanitation and cooking can also contribute to poor air quality.

It can be observed that most of these emissions do not interfere directly with the guest areas and are primarily confined to the service area of the hotel, hence indoor air quality issues become more relevant for the occupational health and safety of the hotel employees rather than the guests.

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Assistance Programs for Thai Hotel Industry

Green Fair

The Thai Hotels Association (THA), has been promoting the cocnept of eco-tourism as a cost-saving means of protecting the country's greatest asset - its natural environment, while also investing in the future of the tourism industry. To get this point across, the THA, along with the Metropolitan Waterworks Authority, Electricity Generating Authority of Thailand (EGAT), Tourism Authority of Thailand (TAT) and Phuket Marine Biological Center, have held a series of environmental seminars across the country for the hotels. Discussions have covered topics ranging from the use of recyclable and washable products in hotel guestrooms (as opposed to non-biodegradable plastic) to protecting fragile coral reefs.

Environmental Best Practices Guide for Thai Hotels

In a similar effort of promoting "green hotels" concept, the Dusit Hotels and Resorts and Royal Princess Hotels and Resorts, jointly with Tourism Authority of Thailand have produced an environmental best practices guide Environmental Management for Hotels: A Hotel Guide for Best Practices in Thailand with the assistance from the British government.

This guide is an excellent resource for the hotels in Thailand as a starting point in their efforts for going green.

EGAT's High Efficiency Motor Program

Though not specifically targetted to the hotel industry per se, this demand side management program launched by the Electricity Generating Authority of Thailand (EGAT) is definitely of interest for the hotel industry in its energy conservation efforts.

Under this program, the EGAT provides technical as well as financial assistance for the industries as well as commercial establishments to adopt higher efficiency motors. However, there is no statistics available regarding the hotel industry's reponse and participation in this program.

UNEP's Sustainable Tourism Program

Within the framework of UNEP IE's mission and goals to promote cleaner and safer industrial production and consumption patterns, the Tourism programme assists decision makers in the public and private sectors, in developing and implementing policies and tools for environmentally-sound tourism.

The programme offers its support mainly through the publication of reports and guides, and participation in many events. It provides practical information on:

1. The development and management of tourism in sensitive areas such as: natural parks and protected areas; coastal zones.
2. The practices being used or to be developed by the tourism industry, such as: environmental codes of conduct; ecolabel schemes; environmental management practices in the hotel and tourism industry.

Most activities are conducted in cooperation with intergovernmental organizations, in particular the World Tourism Organization and the Council for Sustainable Development; international tourism industry associations, in particular the International Hotel and Restaurant Association, the International Hotels Environment Initiative and the World Travel & Tourism Council; non-governmental organizations, in particular the Foundation for Environmental Education in Europe and The Ecotourism Society.

A number of interesting publications prepared by this program can be very valuable source of information for Thai hotel industry.

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Environmental Improvement Opportunities for the Hotel Industry

The primary issues of concern for the hotel industry in Thailand have been those related to the utilities. Naturally, the opportunities for improved environmental performance revolve around the utilities areas.

Broadly, the opportunities for environmental improvement can be grouped under:

- Good Housekeeping
- Water Conservation
- Solid Waste Reduction and Recycling
- Energy Conservation
- Green Purchasing
- Training and Awareness.

Good Housekeeping

Much can be done to conserve energy and water through good housekeeping. This approach does not require major capital investment and specialist knowledge, but significant reductions in energy and water consumption, and thereby, operational cost can be obtained. Up to 10% reduction in energy and water consumption are achievable.

Good housekeeping means reducing wastage of water and energy when they are not required, or where they are oversupplied. For example, lights and air conditioning being switched off when a room is not in use, turning on water taps in kitchens only when needed; turning off equipment such as coffee machines when not in use. The key to successful good housekeeping is engendering self-motivation in the staff responsible for operating and maintaining equipment in the laundry, kitchens, guest floors and other areas.

Senior management should try its best to encourage and educate staff about the merits of saving energy and water through individual good housekeeping. The ultimate aim is that every staff member in the hotel is aware of the importance of energy and water conservation and is an active participant. The message that energy and water saving through good housekeeping is everyone's responsibility should be clearly communicated to all hotel staff.

Good Housekeeping Checklist

This checklist is intended for all staff working in a hotel to guide them in their routine work in good housekeeping practices which minimise energy and water wastage.

- Main Entrance

    - Ensure that the main entrance door is normally closed to avoid air filtration.
- Guestrooms
    - When a room is not occupied, ensure that drapes and/or blinds are closed;
    - Housekeeping supervisors, in consultation with engineering staff, should ensure that temperature and fan speed settings for room thermostats are correctly adjusted;
    - Report any leaking taps, running toilets and similar faults and ensure all room windows are closed;
    - For guest rooms without automatic access control system, ensure that all power and lighting is off in unoccupied room as soon as guests have checked out.
- Kitchens
    - Turn off or turn down kitchen equipment in particular gas cookers, when not in use;
    - Minimise the opening of doors of cold store and freezers;
    - Turn on a water tap only when needed and never let water run continuously;
    - Adjust water flow rate and water temperature to suit different kitchen use and for cleaning;
    - Turn off ventilation and lights when no one is in a kitchen, or turn off local ventilation and lighting if the local area is not in use;
    - Operate dish washers at or near their full load to minimise the number of operations;
    - Keep kitchens clean at all times to reduce the amount of water used;
    - Clean daily and check frequently all kitchen equipment for highest possible efficiency;
    - Follow the operating instructions of kitchen equipment manufacturers;
    - Kitchen doors adjacent to dining areas should be normally kept closed to prevent excessive kitchen exhaust make-up air drawn from the dining areas; (this needs to be done in consultation with engineering department to check whether the exhaust make-up is via dining area).
- Laundry
    - Turn off lights and ventilation or air conditioning when the laundry is not in use;
    - Run full loads in washing machines to minimise number of operations. Weigh loads if necessary;
    - Ensure that water temperature and amount of water are in accordance with the specification by washing machine manufacturer.

Water Conservation

Water conservation is an effective way to save money and improve the environment, and it can be done without sacrificing the quality of service. Thus quality and commitment are key to the success of such a program in any hotel.

Water conservation is becoming increasingly important because it can reduce not only the total cost for actual water consumption, but also costs for wastewater treatment. Furthermore, water saving can also lead to energy saving because water storage and transportation consumes energy, and a reduction in hot water consumption means a direct boiler fuel saving. In the context of water conservation in a hotel, major water consumers should be identified, by undertaking a preliminary audit on water consumption, to facilitate any further actions for water conservation programme in a hotel.

It is realised that for many existing local hotel buildings, appropriate metering equipment for water consumption in various parts in a hotel is not available, making it impossible for an audit

on water consumption to be carried out. Therefore, to have appropriate water flow meters with sufficient accuracy installed in various water consuming areas such as kitchens and a laundry is a prerequisite for carrying out a valid water conservation programme in a hotel building. However, in many existing hotel buildings, installing water flow meters is not an easy task as space might not be available.

Major water users in a hotel include kitchens, laundry and guest floors. Water consumption in guest floors is difficult to predict but to some extent related to hotel occupancy. Even under similar occupancy, water consumption in guest floors might not be similar as it might be related to many different factors such as guest's personal preferences and habits, etc. However it is extremely important that care must be taken in implementing water saving measures in guest floors in order not to cause any inconvenience to guests. On the other hand, water conservation programme for a laundry and kitchens can be internally implemented without risk of complaints from guests.

Water Conservation Checklist

- Kitchens
    - There is usually more than one kitchen in a hotel, and water consumption in different kitchens depends largely on nature of a kitchen, for example, a French style kitchen would use less water than a Chinese style kitchen. Water conservation should be accomplished mainly by good housekeeping. Water discharged from a kitchen is normally greasy and is not economic to reuse water.
- Laundry
    - Water consumption in a laundry may account for up to 30 % of total water consumption in a hotel, therefore saving potential is large if appropriate measures are taken. Apart from good housekeeping practices mentioned earlier, there exists a number of measures worthy considering to be implemented.
        - Recycling rinse water for next prewash if space for building an additional recycling water tank is available;
        - In consultation with the supplier of washing detergent and with washing machines manufacturer, select the most suitable detergent and determine most economic washing cycle.
- Guest Floors
    - Water (both hot and cold) consumption is mainly in bath rooms for either shower or bath. Consider to install a calibrated water control system. The system uses a compact valve which is inserted into the hydraulic system and controls the pressure in a water system and regulates the flow in every shower or tap outlet.

      The quality of service provided to hotel guests should not be reduced in order to save water. Guests will not accept devices with weak water pressure. Therefore it is extremely important to choose high quality technologies when investing in water efficiency. A wide variety of technological products is available in Thailand. Consider the following basic technologies and water-saving practices:
        - Showers: Most showerheads use more water than they need - in fact, the water droplets are so big that they often bounce off the body without rinsing. Efficient showerheads use 10 liters per minute instead of 20, while delivering the same or better quality and service.
        - Toilets: A normal toilet uses 20 liters per flush and wastes water by sloshing it around the bowl. An efficient toilet uses only 6 liters and directs a powerful pulse of water into the bowl to wash it out effectively. This could save a household 83,000 liters/year. Another way to save water is to fix toilet leaks, which can save upto 100 m3/yr.

- Faucets: Faucet aerators work better (splash less), and save water. An open, unrestricted faucet uses approximately 12 - 30 liters per minute and most of the water splashes off the user. An aerator decreases the droplet size (splash less) and restricts the flow to 6 - 10 liters per minute. Many faucets leak, usually because of a worn washer. Fixing a faucet that leaks two drops a second can save 20 m3/day.
- Washing Machines: Washing machines that spin along the horizontal axis use 95 - 113 liters per load, while vertical axis use 132 - 208. Rinse water from industrial cloth washers can be collected and reused in the next cycle's wash, cutting water use by 60%.

Solid Waste Reduction and Recycling

Solid waste - both organic as well as other waste - presents many fine opportunities for reducing the waste, reusing it and recycling it.

Reducing Waste

Reducing waste means not producing it in the first place. By reducing the amount of waste generated, the handling, disposal and recycling costs can be saved. Here are a few easy, simple ways to reduce waste:

- use both sides of the paper when making copies
- substitute reusable items for disposable ones
- make discarded paper into scratch pads;
- equip guest rooms with a bulk dispensing system to replace individual plastic soap and shampoo bottles;
- use two-way shipping containers (ones that can be returned and refilled);
- reuse manila envelopes;
- order products in concentrated form or in bulk;
- Install cloth roll towels or hand dryers in public restrooms;
- have fax machine and laser printer cartridges recharged;
- use worn towels and linens as cleaning rags;
- reuse foam packaging pellets or bubble wrap;
- install reusable furnace and air conditioner filters;
- choose a low-maintenance landscape design that uses few chemicals and little water.

Reusing Waste Materials

Many items that are thrown away could be reused. Worn-out or out-of-style items that are still usable can be donated to service organizations, homeless shelters, or group homes. Usable goods may include blankets, mattresses, china and glassware, food, sheets, towels, soap pieces, furniture, lamps, draperies, uniforms, and lost-and-found items.

Recycling Waste Materials

Materials that can be recycled, include:

- cardboard boxes
- newspapers
- aluminum cans
- office paper
- glass bottles
- plastic containers
- steel cans

- yard debris
- food waste
- telephone books
- magazines
- kitchen fats and oils
- laser printer cartridges
- construction and demolition debris.

Cardboard
Corrugated cardboard probably makes up the greatest volume of the hotel's solid waste stream. In fact, hotels may be able to make money from selling the cardboard. Medium-sized and large hotels may purchase balers or compactors to manage their waste cardboard and get a better price for it. Other lodging facilities can reserve a separate dumpster for recyclable cardboard.

Guest Rooms
The recyclable materials typically collected from guest rooms are newspapers, aluminum cans, and glass and plastic bottles. There are several ways to encourage guests to separate their recyclable wastes: (1) ask them to leave recyclable materials in a specified location in the room-for example, on a table; (2) supply a bin for recyclable wastes in each room, or (3) set a recycling container near the elevators in each hallway or in another convenient location. Duffle or plastic bags can be added to housekeeping carts to collect recyclable materials.

Offices
Office workers can place recyclable paper in centralized bins. These bins should be placed in areas where large amounts of waste paper are generated-for example, next to copy machines. Each employee can keep a small box or container alongside the desk and empty it periodically into a centralized bin.

Restaurants and Lounges
Bins can be provided in the kitchen and behind the bar for glass, aluminum, and plastic containers. Food wastes from the kitchen can be composted or offered to hog farmers. Grease and oil can be possibly picked up by a recycling service.

Energy Conservation
Air-conditioning System
The air conditioning and ventilation systems combine to provide a thermally comfortable environment and good indoor air quality. There is a trade-off between energy use and indoor environmental quality. Sufficient cooling and fresh air must be provided to meet the occupants needs. However, it is not unlikely that the equipment will be oversized or improperly controlled. Proper sensors and controls are essential to good operation. In many hotels this key feature is the one most often neglected. Improvements can be derived from simply putting equipment into the best operating mode possible. This may involve better on/off control, or finer tuning of controllers. However, in the absence of measuring equipment this is almost impossible. Expert advice and equipment will be needed if significant performance gains are to be achieved.
The total energy for air conditioning can be divided into two major components:

1. The energy input to the main chiller plant including auxiliary pumps etc.,(the water side), and
2. The energy used to move the air inside a building (the air side).

The efficiency of the chiller plant is defined in terms of the cooling energy delivered in relation to the electrical energy supplied. Electrical energy is relatively easy to measure, but cooling energy requires more costly equipment.

Chillers

It is expected that the electricity consumed by the central chiller plant will account for around half of the total electricity used for air conditioning. Therefore, the central chiller plant deserves more attention than any other part of an air conditioning system.

- Ensure that all chillers are in good working order through regular maintenance, including annual machine overhaul and cleaning of heat exchange surfaces;
- Check for any leakage of refrigerant and water (chillers and pumps);
- Check the accuracy of built-in instruments, and take corrective measures if there are problems;
- Record all operating parameters and ensure that plant operators understand their interpretation in terms of safe and efficient operation for the plant;
- Ensure that chilled water flow rate through each chiller is as specified by the chiller manufacturer, because lower water flow rate could result in a poorer operating efficiency. Improper setting of butterfly valve in the chilled water exit may cause the problem of lowering efficiency;
- A water flow meter is required to measure water flow rate, if in case water flow meter is not present or is malfunctioning, flow rate can be estimated using water pump pressure head and characteristic curves of the pump;
- Ensure that chilled water bypass valves are fully closed when pressure difference does not exceed the preset value;
- The chilled water supply temperature should not be set too low. A supply temperature of 7oC with a temperature rise of 5oC is the normal practice. However, in case it can be set higher, set it higher, this is particularly useful when chillers are operated in mild seasons when cooling load for a hotel building is reduced;
- Delay the starting of a chiller if it is feasible and consider installing extra cooling distribution equipment to avoid running more chillers than necessary,
- For plant with multiple chillers and without automatic chiller sequencing control, always ensure that an additional chiller is only turned on when the capacity of operating chiller(s) is not sufficient. Endeavour to avoid chillers operating under light load conditions.
- Stop all associated water pumps when a chiller is shut off except for the safe operation of a chiller, i.e., to remove residual cooling from an evaporator to avoid freezing of heat exchange tubes;
- For a direct sea water cooled chiller plant where sea water pumps are designed for at least two chillers, consider retrofit to two speed sea water pumps;
- For plant still operated with CFCs, due consideration should be given to the time frame for CFC phase out set by the Government. CFC retrofit provides a good opportunity for plant with major design problems to be replaced.

Air Side

While there are many opportunities to substantially reduce the electricity consumption on chiller side, following are the opportunities for energy conservation on the air side:

- Never over cool a hotel building to an unnecessary low level, bearing in mind that for summer air conditioning, the recommended comfort temperature and humidity are 24oC and 50% respectively.

- For public areas in a hotel such as main lobby, restaurants, ballroom, etc., air temperature should be closely monitored by engineering staff and necessary actions taken to avoid too low a temperature; Original design specification should be checked and complied with respect to designed door parameters (temperatures and humidities)
- Endeavour to ensure that the hotel building maintains positive internal pressure relative to atmospheric pressure, to minimise infiltration of untreated outdoor air. If positive pressure is seldom maintained, make sure that air exhaust volume is less than the fresh air make-up volume, in particular the air supplied to and exhausted from kitchens;
- Pay special attention of fresh air supply to a hotel building. TheASHRAE Standard recommends for hotel buildings 15 L/s/room for guest roomsand 10 L/s/person for public areas. Check PAUs in guest floors to ensurethat the right amount of fresh air is supplied to each room and check alsothe fresh air dampers for these PAUS. If missing or malfunctioning, installnew dampers or replace;
- The fresh air supply for a ballroom in a hotel is normally designed based on maximum occupancy, but for most of the function time for a ballroom occupancy is often significantly lower, therefore, fresh air supply can also be reduced.
- Fine tuning of pneumatic control for all AHUs and PAUs can ensure proper distribution of cooling requirements;
- Carefully examine the cooling distribution within a hotel building as unbalanced distribution of cooling calls for early start of additional chillers. In particular areas with heat generating machine (a coffee shop with coffee makers) or with unfavourable orientation (east, north-west) are more prone to such problems. Installing additional cooling distributing apparatus might be necessary to satisfy local cooling requirement;
- When permitted by local weather conditions (air temperature is sufficiency low) and by duct system design (with appropriate filtration), use as much outdoor air as possible to maximise free cooling effect;
- Work in conjunction with other department, consider to close an entire guest floor in low occupancy, thus the air conditioning system as well as other energy consuming systems in that floor- can also be shut off.

Boiler Plant

Boilers are used to generate steam for use in laundries, for supply of hot water (stored in calorifiers), and for space heating in cold seasons. The oil used in a hotel might, account for, as 40% of total energy consumption, however because it is cheap, its share in the total cost is less significant. Nonetheless, worthwhile efforts can be made to improve efficiency.

Boiler efficiency can be in general represented by two values: combustion efficiency and operating efficiency. The combustion efficiency accounts for the energy loss due to incomplete combustion, and loss to flue gas. It is measured by using a commercially available combustion gas analyser; the percentage of oxygen (O2) and carbon monoxide (CO) concentration of flue gas are important indices for combustion efficiency and are obtainable using a gas analyser.

The operating efficiency is defined as percentage of heat provided by fuel which is transferred to generate steam or hot water. It can be indirectly calculated if fuel consumption, steam consumption and pressure, feed water temperature are all measured.

The CO concentration is a good indicator for complete combustion. Although there is no regulations on the optimum level of CO concentration, recommendations have been made that a level below 400 ppm is acceptable.

- To achieve optimum combustion, air/fuel ratio has to be adjusted accordingly, which can be done by adjusting air damper opening or fuel flow rate while CO concentration level in flue gas is continuously monitored by an analyser. If there is a sudden significant change in CO concentration level, then the optimum combustion has been reached, and this

air/fuel ratio is the best obtainable. To allow a safety margin, the damper could be slightly opened further or fuel flow rate be slightly reduced;

- Adjusting air/fuel ratio should be best carried out at least twice a year, once in winter and once in summer, as an optimum air/fuel ratio is strongly affected by ambient temperature;
- The temperature difference between flue gas and steam temperature should be as small as possible, the smaller the temperature difference, the better heat transfer
- Whenever possible, a boiler should be operated at a percentage load of over 30% as otherwise, boiler operating efficiency decreases significantly. For an oversized boiler plant the load might be 30 to 50% of capacity;
- In order to obtain operating efficiency of reasonable accuracy, it is necessary to have appropriate steam meters installed and regularly calibrated;
- All heat transfer surfaces in a boiler should be regularly checked and cleaned;
- Daily routine check and record the normal operation of a boiler including operating pressure and temperature, consumption of fuel, amount of steam generated, ambient air temperature and feed water temperature, combustion and operating efficiencies;
- Maintain most appropriate chemical treatment for feed water for a boiler, for which the instruction of boiler manufacture should be strictly followed;
- Consider applying an Economiser to recover waste heat in hot flue gas by preheating feed water before entering a boiler as a 3% increase in boiler efficiency can be expected;
- Manufacture's instruction on boiler maintenance procedures should also be fully followed to ensure the highest possible safety and reliability.

Lighting Systems

Electricity consumption for lighting is typically 30 % of total electricity consumption. A reduction for electricity consumption in lighting is significant in terms of not only energy saving for its own, but also the reduction of cooling load for the air conditioning system.

Savings on lighting energy come in two forms. Conservation from switching off unnecessary lights, and efficiency gains from more energy efficient lamps and controls.

- When replacing light, use high energy efficiency fluorescent lamps/ tubes wherever possible as they require no more than one-third of electricity used by incandescent lamps to achieve the same illumination level;
- Reduce excess wattage to ensure that illumination level is not higher than necessary for guest visual comfort. Lights in public areas such as restaurants, coffee shop should have flexible switching arrangement so that part of the lighting system can be turned off if there is sufficient daylight available near windows area or if there are no people using the area;
- Use of electronic ballasts for fluorescent light fittings should be preferred because not only they are more energy efficient than the common magnetic type but also they do not generate heat which contributes to space cooling load;
- Scheduled cleaning for all light fittings in a hotel buildings should be carried out on a regular basis;
- Key tag room control to switch off power and guest room lighting is an effective way to ensure that energy is not wasted in guest floors when they are not occupied.

Aside: The measurement for lighting is a watt. A watt is not a measure of brightness, but a measure of energy. So for example, every 40W bulb uses 40 watts of electricity, but the amount of light given out can vary considerably depending on the type of bulb.

The lumen is the measure of light output. A 40 W incandescent bulb produces about 450 lumens, while a 40 W fluorescent tube produces about 2150 lumens - nearly five times as much the light with the same electricity consumption.

Other Engineering Systems
Lifts and Escalators
The typical percentage of electricity consumption for lifts and escalators is significant enough for attention in any hotel. However, outside ensuring proper maintenance by lift contractors the main feasible measure is to control elevators and escalators according to traffic demand.

Building Envelope
In summer, heat flows through the envelope into the hotel building by conduction, solar radiation and filtration, and in winter heat loss is also through the envelope. The objective is to minimise heat gain in summer and heat loss in winter to reduce both cooling demand in summer and heating demand in winter.

- Curtain wall structure is popular in many local hotels, which allows more heat gain in summer, in particular the solar heat penetration, resulting in large cooling load. In case of unfavourable orientation, large solar heat gains may call for earlier start and/or late shut-down of additional chillers. Applying anti-solar gain reflective film in glass may be useful in reducing solar heat gain;
- Use of internal venetian blinds can also have a significant effect on reducing solar gain through glazing;
- Eliminate all possible paths of uncontrolled infiftration including gaps of external doors and windows, cracks and unnecessary openings on external wall. Dampers for a fresh air intake should be in position and functioning.

Green Purchasing
This is one area that is attracting corporeal attention from the industry and business community as a tool to promote and practise sustaianable development concept.
In the context of Thai hotels, green purchasing can greatly boost the efforts of any hotel to go green. While, this could be directly helpful in reducing the environmental impact of the hotel operations, it would also create the awareness amongst the employees as well as hotel guests about the hotel's efforts for improvement in environmental performance.
There are a number of opportunities to change over to a more environment-friendly items to be used in the daily operations. Following items can directly contribute to environmental improvements in a hotel:

- Detergents and laundry chemicals
- Soaps and Shampoos
- Cleaning chemicals and solvents
- Non-CFC spreys
- Energy saving electrical appliances
- Water saving sanitary fixtures.

For ensuring the success, changeover to green purchasing should come as a top management policy. This should be followed by the training of purchasing staff. It is a good idea to involve the existing suppliers in such a program and seek their help to meet the new hotel policy.
There are eco-lable programs in many countries and in Thailand there is Green Lable program to provide lable for environment-friendly products. At present, a number of products relevant to the hotel industry have been awarded Green Lable in Thailand, which include: paper, energy efficient electrical appliances, water economizing sanitary fixtures etc. Such programs can provide a valuable help for the success of green purchasing programs in any hotel.

Training and Awareness

Last but not the least, training and awareness is the key issue for achieving any improvements in the hotel industry. The training is essential for the top management, for the hotel staff as well as for the hotel guests, since co-operation from each of these interest groups is extremely important for the success of any effort to improve environmental performance in the hotels.
Circulating leaflets to the guests about the hotel's efforts towards environmental improvements can not only create a positive image, but would also educate the guests about their role in such an effort.

Areas for Action

Priority Issues

From the foregoing disucssion, following can be identified as the priority issues for the Thai hotel industry, in order to improve its environmental performance:

- Energy Conservation
- Solid Waste
- Water Conservation
- Training

In addition, on a macro level, a clear and more active direcion through governmental policy instruments is essential for the promotion of these concepts and practices.

Energy Conservation

Undoubtedly, energy conservation is the issue of topmost priortiy for most of the hotels as it is directly associated with the operating costs and substantial savings can be preceived at the very outset by the hotel management. Promoting the commercial use of solar energy to compliment with the electrical or other sources of energy is another priority issue in this direction.

Solid Waste

Amongst the total solid waste generated in the hotel, around 50% is the organic waste. While, many hotels have been selling this waste for various secondary uses, like hog food, there are many opportunities for utilizing this waste in a better way. For instance, systematic composting could yield far more benefits than simply selling off the waste.
All other waste needs to be handled properly through a well designed recycling program.

Water Conservation

A number of water conservation opportunities exist for the Thai hotels, without sacrificing the quality of service offered to the guests. A systematic approach and a well designed water conservation program is the pre-requisite and technical assistance for the hotels in this area is needed.

Training, Awareness and Advisory Services

It is generally perceived that there is not much awareness about the environmental improvement opportunities for Thai hotel industry. Moreover, there are not many training and advisory services for the hotels to assist in their efforts in this direction. Hence, initial awareness and training on the environmental issues of concern for the Thai hotel industry, followed by the supporting advisory services is indeed a priority issue.

Governmental Policy Support

To encourage and drive the hotel industry for making improvements in their environmental performance, a clear direction and a strong governmental policy support is very essential. In this direction, necessary training of the policy makers and the government officers is required.

Market Opportunities

Based on the various priority issues discussed above, there exist a number of market opportunities in Thai hotel industry for foreign products and services.

Rising public concern and pressure on the environmenyal issues as manifested in the various National Plans will certainly generate new opportunities for environmental service and technology suppliers.

Typically, domestic Thai companies have been linking up with international partners. This presents a clear opportunity for international partners to supply technology and service expertise.

Training and Advisory Services

As repeatedly mentioned, training and advisory services for Thai hotels on environmental performance improvement, energy and water conservation, organic solid waste management and solid waste recycling present good market potential.

This will be much more attractive to hotels if a package of training and advisory services is offered to the hotels.

Wastewater Treatment

Wastewater treatment demand for industries (notably in the pulp and paper, electronics and food processing sectors) and commercial buildings continues to grow steadily, where basic needs are increasingly well served by the domestic environmental industry.

Opportunities for the international technology suppliers to provide compact, low energy, low maintenance systems that can be fabricated locally will grow. A range of financial incentives exist to encourage domestic industry to invest in the wastewater treatment ahead of rigorous enforcement of new legislation.

Energy Conservation

The market for energy conservation consulting services and energy efficient technologies, for industrial, commercial and residential sectors, is sure to build strongly over the next few years. Another key element driving the Thai energy conservation market is the existence of the 1993-established Demand Side Management (DSM) office of the national electricity utility, Electricity Generating Authority of Thailand (EGAT). EGAT savings targets for the first five years of the program have been boosted from an initial estimate of 238 MegaWatts (MW) to 1,400 MW.

Collaboration with Potential Stakeholders

A number of organizations can be identified in Thailand, who have been active in promoting sustainable tourism with a focus on the environmental and related issues for the Thai hotel industry. These organizations will be an excellent starting contact points for anyone interested.

The Institute of Eco-tourism at Srinakharinwirot University

The Institute of Ecotourism at Srinakharinwirot University (SWU) was established in 1994. The Institute aims to search for an appropriate way to develop trained professionals through action research in the area of eco-tourism, incorporating socio-cultural, economics, and environmental values into the practice of tourism. It is also hoped that SWU will become a regional center eventually providing training in eco-tourism management for countries in the sub-Maekong such as Cambodia, Laos, Vietnam and other countries in Asia.

Contact: Director
Institute of Eco-tourism
Srinakharinwirot University
Patumwan Campus
Henri- Dunant Road
Bangkok 10330
Telephone (662) 2527055, 7048
Facsimile (662) 2544599

Thailand Environment Institute

Thailand Environment Institute (TEI), is a non-profit non-government organization established in Bangkok in 1993 that plays a catalytic role regarding environmental management in Thailand. TEI has around 180 staff members with varied academic backgrounds working under its various programs.

By linking policy with action, through the efforts of various Programs, TEI monitors the pulse of environmental issues and directs initiatives and resources accordingly. Whether formulating strategic policies, generating technical information or raising environmental awareness, the Institute incorporates a participatory approach to achieve environmental sustainability in Thailand.

Business and Environment Program of TEI

The Business and Environment Program fulfils the Institute's objective of promoting a leadership role among the business community regarding environmental management. The primary goal of the program is to encourage the business community to actively participate in solving Thailand's environmental challenges through the adoption of sustainable practices which minimize the use of natural resources, prevent pollution, and through the production of "green products" which have a minimal impact on the environment. BEP at TEI is serving as the Secretariat for the Thai Business Council for Sustainable Development (TBCSD).

BEP has been the focal point of all the cleaner production related activities at TEI. It had adopted a novel approach of packaging the various business-tools for the sustainable development if Thai industries and businesses. Accordingly, BEP is attempting to combine the concepts of Cleaner Technology, Environmental Management Systems (EMS) as per ISO

14000 and Green Label and has taken a leading role in all of these areas.

Contact: Dr. Chaiyod Bunyagidj
Vice President and Director, BEP
Thailand Environment Institute
59/27, Soi Sampobnarumit, Sukumvit 62
Prakanong, Bangkok 10260
Telephone 741 63 50 - 7
Facsimile 741 63 61
Email chaiyod@tei.or.th
URL http://www.tei.or.th

Hotel and Tourism Training Institute

In order to foster the understanding about the importance of environmental issues in the future managers in Thai hotels, the role of specialized universities and schools like Hotel and Tourism Training Institute is extremely important.

Contact: Suwat Juthakorn
Director, Hotel and Tourism Training Institute
Chonburi
Telephone (38) 381 029, 382 008

Facsimile (38) 381 025
Email: htti-tat@chon.a-net.net.th

Other Stakeholders

1. **Institute of Food Research and Product Development, Kasetsart University**
   P.O. Box 1043
   Jatujak, Bangkok 10903
   Telephone (662) 579 5551, 570 0572
   Facsimile (662) 561 1970
   Contact: Mrs. Warunee Varanyanond, Dy. Director
   (Possible assistance in activities related to composting of organic solid waste)
2. **Energy Conservation Center of Thailand**
   Bangkok Thai Tower, 9th Floor
   108, Rangnam Road, Phayathai, Ratchathevi
   Bangkok 10400
   Telephone (662) 642 7090 - 6
   Facsimile (662) 642 7099
   Contact: Mr. Pongjaroon Srisovanna, Div. Manager, Engg. Services Div.
   (Possible assistance in energy conservation training and advise for hotels).
3. **United Nations Environment Programme**,
   Regional Office for the Asia and Pacific,
   UN Building, Rajdamnern Avenue
   Bangkok
   Telephone (662) 288 1133
   Facsimile (662) 280 3829
   Email svenningsen.unescap@un.org
   (Information dissemination, regional/international networking)

Contents

Information Resources on Internet

1. **http://www.wttc.org**
   Econett: ECoNETT is a dedicated, structured site giving comprehensive coverage of sustainable tourism initiatives, as well as providing contacts and links to other sources. EcoNett contains over 1000 files. This is probably the best starting point on Internet for searching the information about sustainable tourism and environmental management of hotels.
2. **http://www.unepie.org/tourism/home.html**
   UNEP's Sustainable Tourism Program Homepage
3. **http://emcentre.com**
   UNEP's International Cleaner Production Information Clearinghouse (ICPIC) Case studies for Cleaner Production in Hotels
4. **http://www.golfecology.com/comtogrn/comeng.htm**
   Committed to Green Handbook for Golf Courses
5. **http://www.hotelnikko.com.hk/**
   A Guide to Energy and Water Conservation in Hotels, Department of Building Services Engineering, Hong Kong Polytechnic University and Hotel Nikko Hong Kong

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