# Chapter 12

# Thailand's Sufficiency Economy and Sustainable Consumption and Production

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## 12.1 Sustainability in Thailand: Sufficiency Economy and SCP

Thailand achieved the status of an upper-middle income economy in 2011 and is the second largest economy in the Association of Southeast Asian Nations (ASEAN) [IMF, 2014]. In 2015, the Thai economy recovered from a slump the previous year when political unrest disrupted the economy: Gross Domestic Product (GDP) grew by 2.9% in the first half of 2015 [ADB, 2015].

Sustainability in Thailand is characterised by the paradox between (i) the national drive to industrialise the economy and (ii) the Thai emphasis on localism, rooted in resistance to globalisation by self-sufficient rural communities. From 1969, King Bhumibol Adulyadej Rama IX of Thailand, the world's longest serving head of state, has spent decades nurturing a philosophy of life in balance with nature, building on traditional Thai values of self-reliance, perseverance, and wise living. The philosophy, promoted as "Sufficiency Economy" has been applied at

household levels, in rural areas, as well as being influential at the national level as a guiding principle, particularly since the 1997 global stock market crash and subsequent financial crisis.

Its key principle is moderation, in line with the Buddhist "Middle Way": living within one's means, neither lacking nor excess, and hence being equipped with risk mitigation capacity and increasing resilience, or "self-immunity" as the King's Chaipattana Foundation puts it [Chaipattana Foundation, 2015]. In the early 1990s, the sufficiency economy philosophy led to the New Theory, which His Majesty introduced to be implemented at the royally-initiated Wat Mongkol Chaipattana Area Development Project, to serve as a model of land and water management for farmers based on integrated agriculture and modern agricultural theory [Leaders Magazine, 2006].



Within this approach, farmers are advised to follow three steps. Firstly optimal farmland division is a ratio of 30:30:30:10, being a pond to store rainwater to irrigate the land during the dry season; land for rice cultivation in the rainy season; farmland used to grow fruit and perennial trees, vegetables, field crops and herbs for daily consumption; and finally areas for facilities and infrastructure, such as accommodation, animal husbandry, roads, and other structures. Secondly, grouping farmers for joint initiatives related to production, marketing, welfare (health services, financial services), and societal values. Finally, contacting banks and private funders to develop the farms. The emergency water reservoir, established for times of draught, simultaneously serves as a pond for fish farming. Rice fields, after the gathering season, are used for planting vegetables such as sweetcorn, bitter gourd and green beans. The selection of crops is made on the basis of suitability to the environment and market demand [Tourism Thailand, 2015].

The philosophy of sufficiency economy is very much in line with what was coined "sustainable consumption and production" (SCP) by the Oslo Symposium in 1994. Sufficiency is defined by meeting the needs of wellbeing, ranging within a scope defined by a maximum level of "within the carrying capacity of the planet" and a minimum level of "consuming enough to live well." SCP is a means to sustainable and fair development. It strives at achieving "better and more with less." This can include "consuming more" to meet one's minimum needs (e.g., nutrition, electricity).

SCP aims at decoupling economic growth from its potentially negative effects on the environment and society. The concept acknowledges that everyone in his/her diverse roles in society — e.g., citizen, government, industry — is both a consumer of resources and a producer of goods and/or services, and that sustainable consumption patterns can stimulate green production behaviour, and vice versa. Striving at decreasing the overall negative impact of economic growth, SCP accounts for mitigating potential rebound effects by looking at the optimisation of footprints of the entire product life cycle, i.e., from cradle to cradle (reduce, reuse, recycle) or cradle to grave (see Chapter 2).

A consumerist lifestyle has been adopted by the growing urban elite and upper middle classes [Ünaldi, 2014], and stands in contrast to the sufficiency economy principle of moderation promoted in rural areas. The richest 20% of Thai society make almost 60% of the income and the poorest 20% garnered only 4% (the Gini coefficient which measures inequality, has decreased but remains consistently high; last time estimated in 2010 at 39.37) [Yuthamanop, 2011]. In 2009, compared against Indonesia, Laos, Malaysia, the Philippines, and Vietnam, these figures show the severest gap between rich and poor. Poverty in Thailand is primarily a rural phenomenon, with (in 2013) over 80% of the country's 7.3 million poor living in rural areas. Some regions, especially the North and Northeast, and some ethnic groups, lag behind others, and the benefits of economic success have not been shared equally, especially between Bangkok, Thailand's largest urban area, and the rest of the country [World Bank, 2015]. A differentiated approach to SCP by geographical area is thus expected to have an impact in Thailand.



## 12.2 Designated Special Economic Zones for Sustainable Tourism

The introduction of individual company-level resource efficiency measures and low carbon development at different stages of product life cycle over the last two decades has advanced sustainable tourism in Thailand. This started in the mid-1990s with the cleaner production movement [UNEP, 2015]. Below, three examples of SCP instruments in Thailand are

identified, together with their potential to shape SCP both domestically and globally.

### 12.2.1 *Tourism and sustainability potentials in Thailand*

Thailand is a veteran among Asian economies when it comes to benefitting from visits of international guests. Starting in the early 1960s, boosted by the presence of US military who arrived for rest and recuperation (R&R) during the Vietnam War [Ouyyanont, 2001], Thailand was one of the first players in Asia to capitalise on the then-new trend of tourism [UNESCO, 2015]. From 1979, tourism was the main contributor to the Thai economy, surpassing exports, textiles, and agricultural goods [Wirudchawong, 2011]. From the 6th National Economic and Social Development Plan (NESDP 1987–1991) onwards, Thailand has given particular attention to the development of tourism, resulting in an additional boost to the sector. Each local administration currently allocates budget for tourism promotion and development, recognising its pivotal role in regional economic development. Arrival figures show a significant rise from 2000 onwards, with a peak of 26.74 million visitors entering Thailand in 2013. This reflects an increase of almost 170% in the last decade, despite several incidents that could have caused a setback for the sector (see Figure 12.1).

The long-term prospects of Thailand's tourism sector look promising, with an estimated annual increase of 7.3% [WTTC, 2014]. The contribution of the tourism industry to GDP is estimated at 9% (THB 1 trillion or about USD 6.8 billion in 2013), and when including the indirect effects of tourism, it accounted for 20.2% of Thailand's GDP (THB 2.4 trillion or about USD 16.5 billion in 2013) [WTTC, 2014]. Worldwide, tourism is considered one of the most resource-intensive industries, so the hidden cost behind these rising numbers is environmental damage, in particular in countries like Thailand where tourism is one of the major industries.

On the other side, the Thai tourism sector has great potential to help reduce GHG emissions and environmental footprints, particularly in hotels and transport. For example, water usage per guest night in hotels in Thailand (800 litres) is currently more than double that of developed

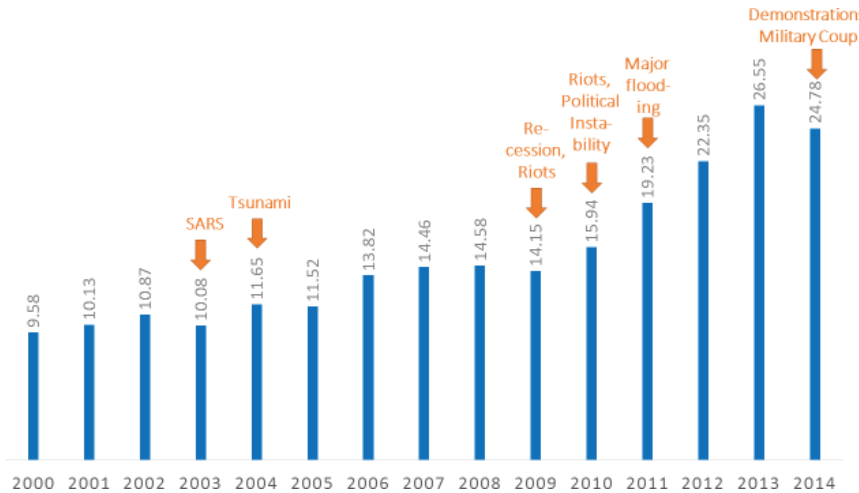


Figure 12.1: International visitors 2000–2014 [in million]

*Source*: Data from Department of Tourism [2014].

countries (e.g., Australia 350 litres) and eight times the amount used by local Thai people [LightBlue Environmental Consulting, 2015]. The pattern looks more or less the same with respect to energy usage and waste generation, due to the extra comforts expected by guests.

One of the models to be highlighted in Thailand's sustainability landscape is the creation of the Designated Areas for Sustainable Tourism Administration (DASTA) in 2003. DASTA is mandated to establish guidelines for sustainable tourism development and complements Thailand's well-established Tourism Authority Thailand (TAT, established in 1959) — with its 21 international representations — as well as the Ministry of Tourism and Sports (MOTS, established in 2002) and its 73 provincial (Changwat) offices of Tourism and Sports. The Decentralisation Plan and Process Act 1999, responding to the Thai Constitution promulgated in 1997, has expanded the obligations of local government to provide public services, among others in the area of tourism. Furthermore, the Thai institutional landscape includes private sector organisations, such as the Tourism Council of Thailand (2001), the Thailand Community-based Tourism Institute (2006), and several banks and financial institutions

which support SMEs in the tourism sector with special interest rates [Wirudchawong, 2011].

As in other parts of the world, increased awareness of the negative impact of tourism in Thailand motivated the search for alternative models of tourism with benefits for both the environment and more equal income distribution. With DASTA's creation, the Thai Government acknowledged the importance of sustainable tourism and its potential to increase and distribute income to local communities (see Chapter 14 on sustainable tourism). The DASTA model designates a special economic zone and creates a specific ad-hoc agency with full authority to act on behalf of local authorities. The model follows a holistic and participative approach, involving local communities and stakeholders, with activities ranging from town and spatial planning, to infrastructure provision (e.g., telecommunications) [Wirudchawong, 2011]. DASTA coordinates with government agencies nationwide, with civil society, businesses, and network partners. It aims at striking a balance between the economic, social, and environmental impact of tourism development, while retaining the natural beauty of the places, as well as their local culture and traditions.



Following a pre-set list of criteria covering destination value, potential for destination development and administrative aspects, regions can apply for registration as designated areas for sustainable tourism. To be selected, the applicant area needs to score a minimum of 75% of the available scores. Between 2004 and 2012, six regions were chosen; two aimed at low-carbon development: the Elephant Island "Koh Chang" (2004) and Pattaya (2009) [Sangsnit, 2013]. Eco-friendly tourism has been extended to other designated areas, such as the development of a DASTA Low Carbon Route in the Designated Area of Loei, and the Green Historical Town development in the Designated Areas of Sukhothai — Si Satchanalai — Kamphaeng Phet Historical Parks [Muqbil, 2013]. Participation in DASTA has contributed to increased income, with gains from tourism-related businesses such as food and souvenirs, e.g., on Chang Islands and Vicinity in three participating communities: Salak Khok (+20% in less than 1 year), Nam Chiao (+130%), Laem Klat (+63.5%) [Sangsnit, 2013].

Koh Chang island cluster in Trat province was promoted as the first climate-friendly tourism destination in ASEAN when the ASEAN

Economic Community (AEC) took effect in December 2015 [Chinmaneevong, 2014]. The project is one of six under the German-sponsored International Climate Initiative in Thailand. The destination has evolved using a holistic approach including community-based solid waste management, training in the tourism sector about climate change, energy and resource efficiency, and organic production. In 2014, 12 tourism-based communities in six special designated areas helped reduce tourism-cased carbon-dioxide emissions. DASTA further emphasises creative tourism and low carbon development as their two key projects for tourism development plans from 2015 [National News Bureau in Thailand, 2015].

The next generation of Thai society will focus less on attracting further tourists and more on sustainability and preservation of environment, culture and heritage. The National Tourism Development Plan 2012–2016 acknowledges, "*tourism development must meet the needs of present tourists and host regions while protecting and enhancing opportunities for the future.*" In line with the King's vision of sufficiency economy, Thailand's vision is to become a quality tourism destination competitive across all provinces, enabling the country to generate more income and distribute wealth on a sustainable basis. The strategy of sustainable tourism is based on four pillars, namely co-creation (community benefit and participation), working together with all partners, creative tourism ("*Thainess*" — local wisdom, way of life, art, culture, and history) and low carbon tourism [Sangsnit, 2013].

Within the AEC, Thailand seeks to maintain its leading position, yet is now competing against Laos, Cambodia, and Vietnam, since they opened up to international tourism in the 1980s and 1990s. Destinations like Angkor Wat, Luang Prabang, and Halong Bay now contest Thailand's former monopoly on tourism in the Indochina region. The AEC will intensify competition in the tourism sector. Thailand needs to understand how to maintain and increase revenue from tourism without overstretching its resources, e.g., by higher spending per tourist per day. The country therefore has been targeting niche markets such as golf holidays, or holidays combined with medical treatment, and international meetings and exhibitions (MICE). The Thailand Convention & Exhibition Bureau TCEB is taking a determined stance on making Thailand the first sustainability hub for MICE in Asia [Rungfapaisarn, 2012]. Thailand also plans on

becoming the hub for Buddhist tourism in the region. Eco-friendly and green tourism have become more popular in recent years, and inclusiveness will be supported with community-based tourism (CBT), which counts as a promising approach to increasing local revenue and at the same time improving hygiene, new skills and know-how, and access to finance [Wirudchawong, 2011]. The concept of CBT directly supports community-level social, cultural and environmental initiatives. It is managed and owned by the community, for the community, with the purpose of enabling visitors to increase their awareness and learn about local ways of life. In the event of partnerships with the private sector, community members retain decision-making authority and are able to guide the direction of tourism development in their village [CBT-I, 2012]. Instruments, such as CBT or DASTA, provide the chance for local communities to sharpen their awareness on how important sustainable consumption is for sustained local welfare and prosperity. With this knowledge, it is more likely that all stakeholders collaborate in transmitting the same values when receiving domestic and international visitors.

Many hotels of all sizes in Thailand's major tourism destinations have steered their operations toward green policies, including reducing the use of energy, water and chemicals, and waste reduction programmes. Most efficiency programmes, however, are yet to show the desired results of decoupling growth from total resource depletion. The industry still mainly concentrates on implementing technology-based solutions to reduce energy consumption, water usage, etc. Often the sustainable consumption side and guest engagement are omitted, which results in those policies not yet being sufficiently adopted (including the provision of staff training, incentives for guest engagement, and life cycle aspects such as transport, upcycling, etc.) [LightBlue Environmental Consulting, 2015]. Despite the higher importance of "green" and "eco-friendliness" among certain groups of travellers [Chinmaneevong, 2014], e.g., Europeans, who account for approximately 25% of international visitors [Barnett, 2009], "green" remains widely associated with "less comfort" and "sacrifice." Unless this image can be transformed and 'marketed' as a desirable lifestyle, particularly among the growing middle-income bracket of upcoming Asian economies, including Thailand itself [Thai Department of Tourism, 2014], a mainstream paradigm change will be hard to achieve.

A reduction in impacts from the transport and aviation sector also remains a challenge. Thailand is a hub for travel across Southeast Asia. Globally, the aviation sector alone contributed 2% of total man-made $CO_2$ emissions in 2013 [ATAG, 2015]. When it comes to transport, most tourists choose speed and price over environment-friendliness. Only a few carriers consider carbon-offsetting or other environmental impact programmes. The Aviation GHG Emissions Reduction Working Group, headed by the Thai Department of Civil Aviation (DCA), acknowledged the importance of the issue, and was trained in 2013 in low emission development strategies and monitoring, reporting and verification approaches (MRV) for the new low carbon regime under the United Nations Framework Convention on Climate Change (UNFCCC) [Verifavia, 2015]. While offsetting does not avoid climate change from happening, it can reduce the overall impact and help raise awareness of the issue. As the most effective way to combat climate change is to reduce emissions, hope remains to capitalise on future fleet fuel efficiency, as forecast by the air transport cluster (25% improvement by 2020) [Chinmaneevong, 2014], and to commercialise renewable energy-based aircraft, such as the current solar-driven airplane "Solar Impulse" [Solar Impulse, 2015].



## 12.3 Green Industry Mark (GIM) in Combination with a Market for Sustainable Goods and Services

Thailand's GIM certification scheme, initiated by the Ministry of Industry (MOI), is a key tool to drive SCP into practice. Following the Johannesburg Declaration in 2002 and the Manila Declaration in 2009, the Green Industry Project was initiated by the MOI in May 2011, aimed at promoting continuous improvements and sustainable development through green industry operations. The GIM project activities range from creating awareness of reducing environmental impacts, implementation, certifying the environment management system, to network extension of practices throughout the supply chains. The project guideline practices include minimisation of environmental impact, prevention of pollution, resource efficiency, reduction of climate change, and protection and restoration of the ecosystem.

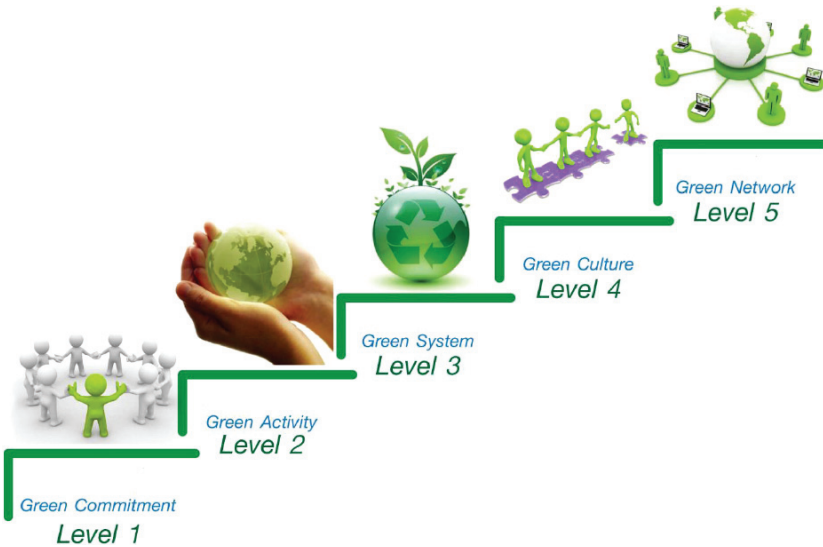


Figure 12.2: Five levels of the GIM

*Source*: SWITCH-Asia Policy Support Component Thailand (PSCT), [2014].



The Green Industry Award honours sustainability and environmentally friendly production on five levels (see Figure 12.2).

The core elements of green industry are the implementation of green productivity, environmental management systems and corporate social responsibility (CSR) throughout the supply chain, as well as community stakeholders. The GIM is an advanced scheme, which integrates many of the green industry instruments. Four areas link into the GIM, and which result in a reduction of the carbon footprint:

1. Reducing environmental impact and pollution.
2. Improving resource utilisation.
3. Mitigating climate change.
4. Protecting and restoring the natural environment.

The scheme comprises five levels: "Green Commitment" (GIM-1), "Green Activity" (GIM-2), "Green System" (GIM-3), "Green Culture" (GIM-4), and "Green Network" (GIM-5). For GIM-1, GIM-2, and GIM-3

(ISO 14001), only a document submission is required for approval, while for GIM-4 and GIM-5 additional on-site visits by specially trained government auditors are required. A company who wants to achieve the highest level (GIM-5) has to work together with the entire supply chain to get its business partners to level GIM-2 or GIM-3, as well as to gain community acceptance of the company's environmental management performance. Participating manufacturers who can achieve all the steps will be awarded the GIM, which makes them eligible for additional benefits. Such incentives include waivers of membership fees (to the MOI), tax reduction for energy-efficient equipment, being listed in a green directory, and specific green loans.

The green industry certification scheme targets especially those factories whose activities are likely to cause the highest pollution (i.e., large-scale enterprises, machines of more than 50 horsepower, more than 50 staff), which amounts to some 70,000 factories, 50% of the total in Thailand [SWITCH-Asia PSCT, 2014]. The MOI aims at spreading the application of the green industry concept throughout the country, leading to sustainable communities, cities and industries.

In December 2014, after only three years of implementation, there were 17,668 companies certified by the GIM scheme, which represents a share of 25% of the target population [SWITCH-Asia PSCT, 2014]:

At the time of writing, only five companies have reached GIM-5, the level at which companies act as multipliers of the green industry concept (see Table 12.1). One among them is the Siam Cement Group, which has at the same time shown leadership in reacting to new market opportunities



Table 12.1: Share of companies by GIM level

| Level | Number of Certified Companies | % |
|---|---|---|
| GIM-1 | 11,532 | 65.27 |
| GIM-2 | 3,429 | 19.40 |
| GIM-3 | 2,651 | 15.01 |
| GIM-4 | 51 | 0.29 |
| GIM-5 | 5 | 0.03 |

*Source*: [SWITCH-Asia PSCT, 2014].

offered by Thai Green Public Procurement (GPP): the group pioneered change in one business segment by developing a green product line (recycled paper) so it could be procured by Thai public agencies. By creating a market, the sustainable procurement policy has created an exemplary pull factor for making a sustainable version of an existing product. The inclusion of GIM-certified companies in the approved list of suppliers in the GPP national policy will give competitive advantage to green producers.

The ten pilot projects under the Department of Industrial Works (DIW) and the Green Industry Promotion Office (GIPO), supported by the SWITCH-Asia Programme (in sectors like food, building materials, and automotive parts), have shown that GIM-5 in some sectors can be difficult to obtain even though the applying company tries to educate suppliers. For example, the highly competitive automotive industry is characterised by a large number of service providers involved in the multi-level supply chain, which offers a large potential to impact a great variety of different supply industries. However, suppliers often change from year to year [SWITCH-Asia Automotive SSCM, 2015]. Unless the companies applying for green industry certifications have implemented a green procurement programme to pre-select their "green" suppliers (such as ISO 14001-certified, green label awarded, energy award achieved, total quality assessment awarded, etc.), their effort in meeting the GIM criteria will be low.

The GIM model allows an easy start to participate in greening factories through the relatively simple and self-declaratory steps in stages 1–3. For stages 4 and 5, however, it is mainly the frontrunner companies that have the capacity to implement. Government auditors are also still too few to respond efficiently to the number of applications. Step 5 in particular takes into account the entire supply chain, which supports the spreading of the GIM scheme among the business community. Overall, the measure still focuses on cleaner production; a more streamlined integration of entire life cycle considerations, e.g., design for sustainability, clean mobility, cradle-to-cradle approaches, and respective education of the consumer (industry, government, civil society), is still underway.

The scheme has been vital to create awareness about green growth. It is in line with the framework of the current [NESDP, 2012–2016], which

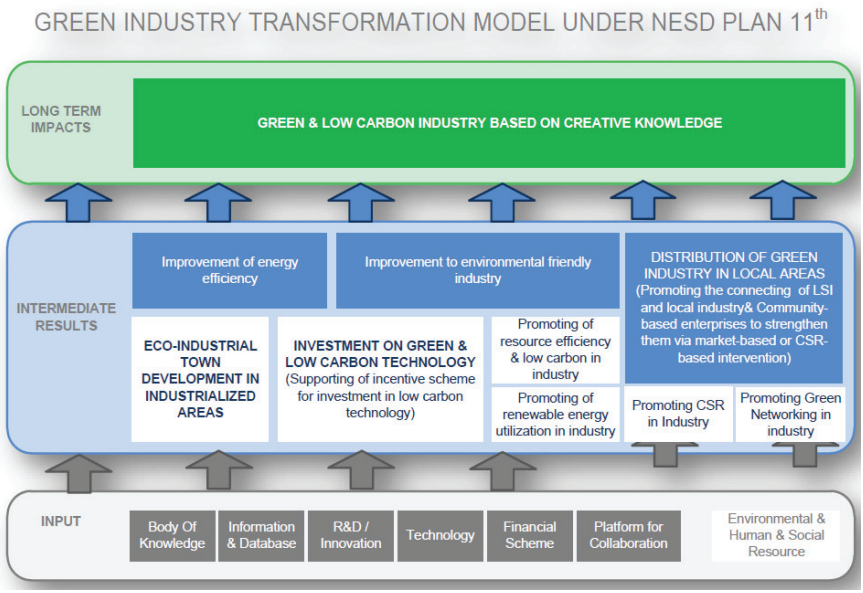


Figure 12.3: Green industry transformation model under the 11th NESDP

*Source*: [SWITCH-Asia PSCT, 2014].



seeks to transform Thailand into a "green society" (see Figure 12.3). The plan seeks to develop eco-industrial towns and restore the environment in major industrial regions by creating awareness of the need for co-existence between industries and communities.

## 12.4 Eco-Card and Sustainable Food Industry

Another business model that has the potential to strengthen Thailand's path towards a "Sustainable Society" is the creation of the "Eco-Card." The model brings together a great variety of partners, e.g., retailers like Tesco/Lotus, Big C, Tops, IKEA, Home Pro, 7 Eleven, Central, The Mall, and the Bangkok Mass Transit System BTS, as well as eco-label organisations. The Eco-Card provides points to consumers for the purchase of "eco-products." Those can be redeemed into cash coupons, discounts, free tickets for public transport, etc. This means that the scheme goes beyond

classic awareness raising and combines a financial incentive with responsible purchasing. At the same time, offering free tickets for public transport in Bangkok supports the effort of bringing more people to use the capital's low-carbon mobility options. Sustainable consumers and users drive the availability of sustainable goods and services, and more resource-efficient production processes. All products with any kind of eco-label (Types 1–3), e.g., "Thai Green Label" (excluding food & beverages, Type 1), "Chemical-free" (Type 2) and "Carbon Footprint" (Type 3) are classified as "eco-products" in the eco-card scheme [VGREEN, 2015].

Already in 2013, seven large retail chains (Siam Makro, Central Food Retail, CP All, Tesco Lotus, and Big C, 7-Eleven, and Thai Retailers Association) signed an agreement to support and distribute food products with ThaiGAP certifications showing good agricultural practice. This is one of the food safety certifications applicable at farming level [BOT, 2013b], building on earlier initiatives emphasising locally grown food, such the "From Farm to Table" or "From Farm to Forks" initiatives from 2004. When it comes to labelling and carbon footprint mapping, the Thai food industry is also a frontrunner, and hence the eco-card can be an effective tool to educate grocery shoppers. The food industry has further shown pioneering leadership in the Thai Life Cycle Inventory (LCI) database [Mungkung, 2015], carbon and eco-footprint labelling, as well as the GIM scheme [SWITCH-Asia PSCT, 2014].

Thailand's efforts in mapping and calculating footprints (see Table 12.2) have resulted in a relatively good overview of basic products as well as the potential to reduce negative environmental impacts. The carbon footprint labelling takes account of the entire life cycle of the product, including its raw materials, acquisition, manufacture, use, waste management, and final disposal, including related transport at all stages. It also accounts for the impact of food waste, which often is a neglected aspect, but which in Thailand comprises 64% of consumer waste per year (i.e., 17 million tonnes in 2013) [Pattaya Mail, 2014]. Worldwide, it creates an estimated 3.3 billion tonnes of $CO_2$ equivalent ($CO_2e$) without accounting for GHG emissions from land use change, according to a recent FAO report (2013) [FAO, 2013].

Thailand's food industry is known as the "*kitchen of the world*" [BOI, 2014]. Since its first National Plan (1961–1966), the Government of

Table 12.2: Four Carbon footprint labels and contribution of the food sector

| Label | Definition | Food Sector Contribution |
|---|---|---|
| Carbon Footprint (CFP and CFO) | Carbon score of life cycle GHG emissions | Launched in 2009, the food industry helped in drawing up 5 out of 23 national product category rules (PCRs) (22%), namely jasmine rice, fruits and vegetables, chicken meat, livestock products, and 83 of 138 company PCRs (60%). When the Carbon Footprint for Products (CFP) was piloted with 43 products, more than half of them came from the food industry. The Carbon Footprint for Organisations (CFO) was initiated in 2010. Since then, the number of piloting companies increased eightfold from 10 to 79, out of which 18 are in the food sector (23%). |
| Carbon Offset | Partial carbon offset of life cycle GHG emissions | Thailand Carbon Offsetting Programme (TCOP), with carbon offset and carbon neutral labels, was introduced by TGO in 2013. The first carbon neutral product was again reported to be in the food sector. In total, 3,687 tonnes $CO_2e$ GHG emissions have been offset. |
| Carbon Neutral | Full carbon offset of life cycle GHG emissions | |
| Carbon Footprint Reduction | Reduced carbon footprint value by 2% or equal/below the benchmarking value | Since 2014, 10 pilot companies have been involved as demonstration Carbon Footprint Reduction (CFR) projects, which is another advancement of the scheme that started with 25 certified products. |

*Source*: Mungkung [2015].

Thailand has been supportive of developing the food industry. In the current vision 2026 and the 11th NESD Plan, the food sector was identified as one of the most significant. The priority of developing the food industry has been translated into national trade, financial, agricultural, industrial, health, and environmental policies. Supporting policies and significant

government and private sector investments in technology, food safety, R&D, and the strengthening of SMEs, have provided effective complementarities to the country's other comparative advantages, such as its geographic centrality and its abundant resources (including GMO-free raw materials). Food is available in a wide variety and at low prices in Thailand. More than 80% of the raw materials used in the food industry are sourced from the domestic market. This gives the industry a comparative advantage and a high level of competitiveness. As a result, Thailand has developed into a strategic hub for food production of both fresh and particularly of processed food [Food Industry in Thailand, 2012; Vanit-Anunchai and Schmidt, 2006; Fernquest, 2011].



The food industry contributes approximately 28% to the Thai GDP and grows at an average of 13% per year. Its value added makes up 19% of the total amount of value added in the industrial sector. The sector provides a market for domestic agricultural products and employment for over 10 million people in over 10,000 food processing companies. In 2014, Japan was Thailand's biggest market for food products, taking 14% of the total the export values, followed by the US at 11.1%, China at 7.6%, and Indonesia 3.8% [BOI, 2014]. With the AEC, the market of Thai food is expanding to around 600 million consumers over Southeast Asia.

Being one of the world's largest producers of food products, such as rice, canned tuna, frozen seafood, chicken, and canned pineapple, Thailand's produce could play an enormous role in minimising resource use in the sector and in influencing sustainable food purchasing and consumption patterns in ASEAN and globally. In the global value chain, the food industry's production patterns, trade flows and worldwide attempts to minimise resource consumption are not yet reflected. Given Thailand's role as a global kitchen, resource-wise the global community could benefit from improving Thailand's water productivity. The country particularly benchmarks poorly in its agricultural production and food processing. In fact, with 51.79 billion $m^3$ annual quantity of water withdrawn for irrigation purposes and livestock feed, Thailand's agricultural sector takes up 70% of the nation's total water supply. The issue is exacerbated by farmers who have expanded their activities outside irrigated zones. Many do not conserve water and have failed to plan crop production efficiently. The increasing demand for food, feed, and biofuels promises to increase

Table 12.3: Benchmark of virtual water footprints

| | **World Average ($m^3$/tonne)** | **Thai Average ($m^3$/tonne)** |
|---|---|---|
| Chicken | 4,325 | 5,443 |
| Rice Flour | 2,628 | 3,592 |
| Raw Sugar | 1,666 | 2,049 |
| Cassava | 563 | 467 |

*Source*: Yuwanan *et al*. [2011].



pressure on water competition, especially in Thailand with its large agricultural base [Gheewala *et al*., 2014]. In 2011, Thailand was identified as being a virtual water exporter, which means that the overall amount of exported products have been using more water in Thailand than the imported products sent into Thailand [Mekonnen and Hoekstra, 2011]. As seen in the following overview (Table 12.3) basic food products, only cassava can be processed and exported using less water units in Thailand than the global average.

In 2015, Thailand was certain to reclaim its position as the world's largest rice exporter, with a volume reaching 10.7 million tonnes, valued at USD 5.2 billion (THB 170 billion) [Pratruangkrai, 2014].

With each tonne of rice exported from Thailand to Indonesia, the world loses more than 2,300 $m^3$ of water [Chapagain and Hoekstra, 2011]. With an annual trade of approximately 416,000 tonnes, this loss translates to almost 1 billion $m^3$ (1 trillion litres) which compares to 400,000 Olympic size swimming pools and 1% of Thailand's total water footprint every year, for this trade flow of rice alone.

Being positioned at the very interface between consumers and producers, retailers through their procurement and promotion policies become the new powerhouses in fostering eco-friendly purchasing decisions and the availability of sustainable products in the food chain. At the domestic level in Thailand, the eco-card scheme has taken into account this leverage. The effectiveness of labelled products and organisations in decoupling their economic activities from negative environmental impact depends on quality assurance in the food chain. Their success in reaching consumers, both in terms of acceptance and accessibility, will determine

the actual leverage of the eco-label. While the importance of supermarkets among Thailand's grocery sales channels is growing in urban areas, and a next trend might be selling food online, a non-neglectable part of Thailand's food trade still happens in wet markets [Ruddick, 2013]. It remains to be seen how the concept and educational purpose of the eco-card will be rolled out to the majority of consumers in order to reach a critical mass in Thailand. Recently undertaken random tests of fresh fruit and vegetables among supermarkets and wet markets in Thailand resulted in a higher probability that products in supermarkets were the ones not meeting the promised food safety standards, which made their credibility questionable [Frederickson, 2014]. In this case, the eco-card would miss its target and suffer from poor credibility, even before its official introduction. Pioneering these labels, the food and retail industry has displayed its commitment to contribute to healthier and more sustainable food value chains. Given the food industry's size of about 10,000 companies, the current number of frontrunners represents a tiny fraction of the sector. The achievements of environmental impact reduction are yet to be implemented at the larger scale.



## 12.5 The European Union as Partner on SCP in Thailand

SCP is about the promotion of thoughtful and environment friendly choices and behaviour at both the production and the consumption side. However, behavioural change can take generations. To achieve most impact, strategies for change need a mix of short, medium, and long-term instruments ranging from financial incentives to comprehensive educational efforts. Initiatives for change can originate from business, civil society and government. Over the last decades, the Thai government, through its policies, has shown high awareness of the significance of sustainable development. Various international partners have accompanied Thailand in this task with technical and financial assistance dedicated at promoting SCP in the country. Cooperation between the European Union and Thailand started in the 1970s with assisting the Royal Thai Government's crop diversification efforts and improvement of farmers' revenue. The EU changed its role from a "donor of development assistance" to a "facilitator of knowledge sharing" and a "partner for policy

dialogue" on key development issues, which are both aligned with Thai development priorities and which serve mutual interest [EUD Thailand, 2015].

Since the start, four regional grants projects of the EU-funded SWITCH-Asia Programme have included Thailand and one grant focused on the Thai automotive industry (see Table 12.4).

Furthermore, Thailand was selected among the first batch of four (Thailand, Indonesia, Malaysia, Philippines) — now five (extending to Sri Lanka) — Asian countries which received a targeted policy support through a national technical assistance component under the SWITCH-Asia Programme, namely the Policy Support Component (PSC) project. The objective was "*To support the Thai government in selecting, adapting and implementing suitable economic and regulatory policy instruments to promote SCP, hereby enhancing the long-term sustainability of Thai consumption and production patterns*", i.e., to develop less polluting and more resource-efficient products, processes and services, and to promote sustainable consumption patterns and behaviour. The SWITCH-Asia PSC Thailand project ran from October 2011 until January 2015.

In line with the Thai 11th NESDP for 2012–2016, the PSC Thailand project encouraged responsible stakeholders to address sustainable development in four components and five work areas (SCP Monitoring, SCP Policy Assessment, Green Procurement, Green Industry, and SCP Awareness) Please consult Table 12.5 for the state of play. The specific objectives were:

- Component 1: To strengthen the institutional framework for SCP in Thailand and develop a national SCP monitoring system.
- Component 2: To update the Green Procurement Policy and develop a green procurement action plan as well as build capacity for implementing the Green Procurement Policy and action plan of target groups.
- Component 3: To conduct a number of pilot projects in order to demonstrate sustainable production principles and approaches in selected sector(s).
- Component 4: To introduce the issues and concepts of SCP, and apply awareness campaigns and driving forces for behavioural change of target group(s).

Table 12.4: Overview of SCP projects by EU-funded SWITCH-Asia Programme in Thailand

| Project Title | Period | Main Implementing Organisation | Places of Implementation | SCP Practices | Objectives |
|---|---|---|---|---|---|
| Greening Supply Chains in the Thai Auto and Automotive Parts Industries (Automotive SSCM) | 02/2012–10/2015 | Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); Thailand | Thailand | Sustainable supply chain, resource efficiency | To improve sustainable production of SMEs in the Thai auto and automotive parts supply chains. |
| Establishment of the ASEAN Energy Manager Accreditation Scheme (AEMAS) | 02/2010–01/2014 | ASEAN Centre for Energy (ACE), Indonesia; Department of Alternative Energy Development and Efficiency (DEDE), Thailand (associate status) | SWITCH-Asia Regional Project including Thailand | Energy efficiency, accreditation | To reduce energy consumption from the manufacturing industrial sector in ASEAN and to cut greenhouse gas emissions in ASEAN member countries. |
| Lead Paint Elimination | 12/2011–06/2015 | International POPs Elimination Network (IPEN), Sweden; Ecological Alert and Recovery Thailand (EARTH) | SWITCH-Asia Regional Project including Thailand | Eco-labelling | To reduce childhood lead poisoning in the eight participating countries by decreasing production and use of lead paint with a trend toward their elimination. |

| | | | | | |
|---|---|---|---|---|---|
| Efficient Air Conditioners | 01/2013–11/2016 | European Copper Institute, Belgium; Electrical and Electronics Institute (EEI), Thailand; International Copper Association Southeast Asia (ICASEA), Thailand | SWITCH-Asia Regional Project including Thailand | Energy efficiency | To increase the market share of more highly efficient ACs in ASEAN through harmonisation of test methods and energy efficiency (EE) standards, adoption of common Minimum Energy Performance Standards (MEPS), and changing consumer purchasing attitudes in favour of energy efficient ACs. |
| Zero Carbon Resorts for Sustainable Tourism | 05/2014–05/2018 | Center for Appropriate Technologies (GrAT), Austria; Green Leaf Foundation, Thailand; Healthy Public Policy Foundation (HPPF), Thailand | Philippines and Thailand | Resource efficiency | To contribute to sustainable development of the tourism sector and its value chain in the Philippines and Thailand with a focus on reduction of resource consumption and $CO_2$ emissions. It targets a critical mass of SMEs demonstrating the value of green tourism by increasing resource efficiency and using renewable resources. |
| Sustainable Freight & Logistics | 2016–2019 | GIZ, Germany | Cambodia, Laos, Myanmar, Vietnam, Thailand | Sustainable transportation, supply chain | To increase sustainable freight transport and logistics in the Mekong Region mainly through energy efficiency and safety measures in at least 500 SMEs in Cambodia, Lao PDR, Myanmar, Vietnam (CLMV), and Thailand. |

*Source*: EU SWITCH-Asia website [2015].

Table 12.5: SCP policy advice to Thai national stakeholders

| Work Area | Lead Stakeholder | Achievements |
|---|---|---|
| SCP Monitoring | Office of Natural Resources and Environmental Policy and Planning (ONEP) | • Importance of SCP institutional framework and monitoring system introduced<br>• ONEP and NESDB took charge of the SCP institutional framework and monitoring system |
| SCP Policy Assessment | National Economic and Social Development Board (NESDB) | • Road maps for the integration of SCP principles were formulated |
| Green Procurement | Pollution Control Department (PCD) within Ministry of Natural Resources and Environment (MNRE) | • Starting in 2005, a first phase of GPP was formulated for the Central Administration, and now all departments in Ministries have implemented GPP (primarily (a) office materials e.g., printing paper, pens, makers, light bulbs, and (b) machinery, e.g., photocopiers)<br>• The PCD has developed a second phase to promote GPP focusing at the sub-national level<br>• Seeing the business opportunity, one large supplier company changed production facilities to produce 'green' printing paper (Thai Paper/Siam Cement Group) to supply to the Government. Many smaller creative companies also produce or sell green products, including Concept Tree, Green Cotton Thailand, Eco-Shop and others |
| Green Industry | Department of Industrial Works (DIW), within the MOI | • Together the DIW and Green Industry Promotion Office (GIPO), within the MOI, assisted 10 leading companies to become certified according to the Ministry's "GIM"<br>• DIW and the Green Industry Promotion Office (GIPO) are in charge of further GIM implementation |
| SCP Awareness | Department of Environmental Quality Promotion (DEQP) | • Two surveys were conducted on SCP awareness in local communities. Two SCP awareness campaigns were carried out in Phanat Nikhom and Koh Samui in close cooperation with the respective municipal administrations<br>• DEQP has allocated budget for scaling up the SCP awareness model |

*Source*: SWITCH-Asia progress reports [2014].

## 12.6 Experiences and Impacts of the SWITCH-Asia Programme in Thailand

The SWITCH-Asia Policy Support Component for Thailand has supported cooperation between key stakeholders, a prerequisite for future beneficial planning and implementation of SCP policies and plans [SWITCH-Asia PSCT, 2015].

The PSC Thailand together with the SWITCH-Asia grant project "Automotive SSCM" resulted in the automotive industry approving the GIM certification system, a scheme initiated by the MoI to promote cleaner production processes in companies and their supply chains (for more on the scheme, see Section 12.3). The PSC Thailand supported 10 larger companies and a number of SMEs in gaining certification according to the GIM system. The PSC Thailand focused on companies within three sectors: Food Processing, Building Materials, and Automotive Parts sector. Companies were supported through training and preparation of the necessary documentation. The PSC Thailand also assisted DIW and GIPO in further development of the GIM system, including developing and testing the "opinion surveys", which are part of the criteria for Level 5 certification. Reaching Levels 4 and 5, which requires action at the company's supply chain level, has proven problematic, as it requires resources and time to fulfil the many requirements of the GIM system. By December 2014, only five larger companies, together with their supply chains, had reached Level 5, but many are part-way through the process. In the automotive sector, 46 companies have already complied with Levels 2 and 3 of the scheme [SWITCH-Asia PSCT, 2015].

Thailand is Southeast Asia's largest automotive manufacturer, and has been listed among the 10 most important car producers of the world since 2012 [The Economist, 2013]. In 2012, Thai automotive production capacity was 2.75 million vehicles and the industry employed over 500,000 people; the production capacity is expected to reach 3 million units by 2015 [Sullivan, 2015]. While Thailand has no car brand of its own, many foreign-owned companies produce or assemble cars and car parts in the country. Japan has the highest influence on Thai SMEs as European car makers tend to import parts from Europe and just assemble in Thailand [SWITCH-Asia Automotive SSCM, 2015; TSSD/DoLT, 2014]. The automotive industry is Thailand's second largest export industry after computer parts and components. It is interconnected to local supporting

industries of many kinds, e.g., glass, plastic, electronics, textiles, and various assembling steps [The Economist, 2013]. All this shows the potentials of automotive sector to introduce SCP practices and green the industry.

The automotive policies of Thailand have long been more inclined towards growth than towards sustainability. In 2007, an "Eco-Car Programme" was introduced, the first of its kind in Southeast Asia. While the "eco-car" was defined as "fuel efficient" (2nd phase: max. 4.3 litres per 100 km) and "low carbon" (2nd phase: emitting less than 100 grams of $CO_2$ per kilometre), the policy ultimately aimed at boosting the sector through investment and production of more than 2 million new cars, translating to a minimum of 100,000 units per year per manufacturer. It was combined with a generous investment promotion scheme for "eco-car" manufacturing, granting special incentives and with tax reduced from 30% to 17% [BOI, 2013a].



After the devastating floods of 2011, which forced some manufacturers in central and lower Thailand to temporarily close plants, a "First Car Policy" was introduced by the former Prime Minister Yingluck Shinawatra to jump-start the sector (ending in December 2012). The policy promoted a tax exemption of THB 100,000 (equivalent to approx. EUR 2,500) for the first car, in combination with a cut in interest rates for private lending. It led to an exorbitant domestic demand and production of close to 2.5 million cars in 2012, five times more than the 500,000 units in 1998 [Thai Automotive Institute, 2014].

With the drop in domestic demand in 2014 (exports fell by 1.25%, domestic sales decreased by 34%), lower production (1.88 versus the targeted 2.1 million cars), the political uncertainty in Thailand under the military-led government, paired with banks' unwillingness to approve car loan applications, the question arises whether Thailand's car industry is viable [Sullivan, 2015]. Despite Thailand having long been attractive for car producers due to supply chains established over 50 years, some manufacturers could be tempted to relocate their production to other ASEAN Member States, e.g., Indonesia [The Economist, 2013; Panthong, 2012]. Currently, the bargaining power is clearly in the hands of around ten large car makers. The economy includes approximately 709 Tier 1 auto parts suppliers and 1,700 Tier 2 and 3 suppliers. More than half of the Tier 1

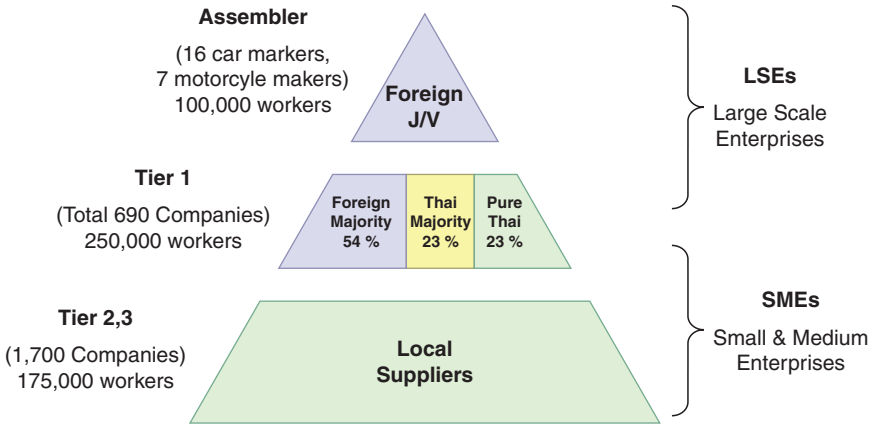


Figure 12.4: Structure of Thai automotive industry

*Source*: Thailand Business News [2015].



suppliers are car parts companies [Sullivan, 2015]. For an overview on the structure of the Thai automotive industry please see Figure 12.4.

The first priority for many car manufacturers in the region is to guarantee and assure supply 24 hours a day, 7 days a week. Environmental and social aspects clearly come second. While other industries, such as food and beverages, textiles and tourism operate at a high level of awareness, using international state-of-the-art measurements and labels such as carbon footprint and water footprint (see Sections 12.2–12.4), the SWITCH-Asia project "Automotive SSCM" is the first educational project of its kind in Thailand's automotive industry.

Since February 2012, the project has demonstrated through 300 SMEs that:

1. A commercially relevant production cost reduction and increased productivity can be achieved through what is called "good housekeeping."
2. At the same time as economic benefit, the improved production process in all companies resulted in lower consumption of resources such as energy, water, etc. per produced unit.

3. Turnover usually is monitored closely but monitoring savings from resource efficiency has thus far not been a usual business practice, while both parts are equally essential to increasing revenue.
4. Companies (SMEs) were also willing to make higher investments as long as the return on investment could be expected in less than a year [SWITCH-Asia Automotive SSCM, 2015].

With the "Automotive SSCM" project, by February 2014, 83 SMEs participated in Profitable Environmental Management (PREMA) assessments, 92 SMEs joined the Automotive Manufacturing Automation System (AMAS), and the Best Available Technique (BAT) was applied to 20 SMEs. The project offered a thorough consultancy programme of 3–4 days classroom training with a subsequent 5–6 months individual in-company coaching to identify measurable resources for reduction in order to achieve impact [SWITCH-Asia Automotive SSCM, 2015].

The total cost savings from all 289 resource efficiency measures implemented to date amount to over THB 134 million/year (EUR 3.6 million/year) with a total one-off investment required of only THB 22.3 million (EUR 0.6 million). The average annual cost savings achieved per implemented measure was about THB 465,000/year (EUR 12,800/year). The **return on investment** materialised on average after only four months. Many of the measures implemented could be achieved through "good housekeeping", for example, better quality checks and process control, better materials handling, etc., and did not require larger investments from the SMEs [SWITCH-Asia Automotive SSCM, 2015].

The figure below (Figure 12.5) shows the **total environmental savings**, which the SMEs were able to achieve by February 2015, including reductions in energy use, greenhouse gas emissions, water use, raw material use, and waste.

- Energy consumption of about 27,700 GJ per year for participating SMEs. These energy savings translated to about 4,500 metric tonnes of greenhouse gas savings per year.
- The resource efficiency measures have enabled the participating SMEs to reduce the use of raw materials by about 1,140 tonnes per year.

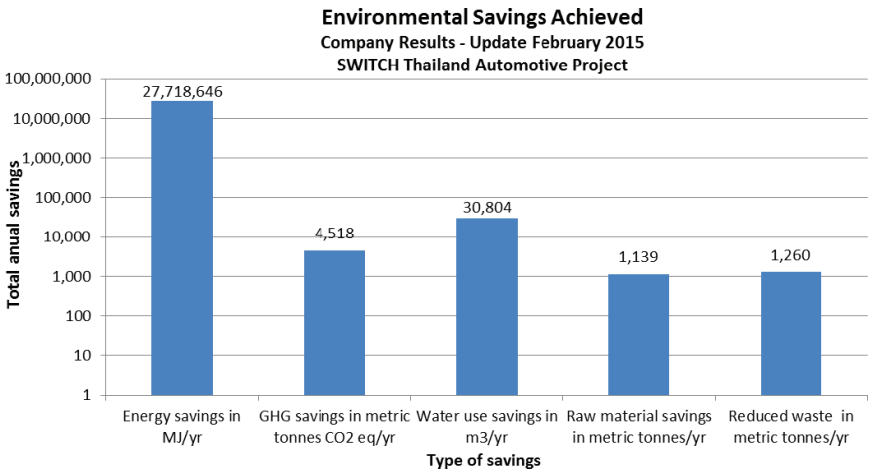


Figure 12.5: Environmental results achieved to date

*Source*: SWITCH-Asia progress report [2015].



- The SMEs have reduced their waste by about 1,260 tonnes per year [SWITCH-Asia Automotive SSCM, 2015].

In addition to economic and environmental benefits, the PREMA and AMAS assessments undertaken delivered social benefits to the participating SMEs, such as:

- Improved occupational safety and work conditions for SMEs' workers, e.g., less exposure to dust, safer chemical handling, less noise, reduced risk to metal scrap related injuries, etc.
- Easier and less stressful working environment for the company staff, e.g., more efficient material handling, clearer operational manuals, reduced rework, etc.

The clear driver for SMEs to participate in the sustainability measures was the reduced production cost. All resource efficiency measures were economically and technically viable. The assessments delivered very favourable financial results for the participating SMEs [SWITCH-Asia Automotive SSCM, 2015].

Currently, there is no systematic data available of the overall environmental or carbon footprint of the industry. Biking, the most environment-friendly mobility, has become more and more popular. Pun Pun Bike rental stations make biking possible for non-bike owners in Bangkok. Inner-city cycling, however, is still rarely observed due to heavy traffic congestion and health concerns. The lack of alternative modern, safe and comfortable public transport only reinforces the supremacy of the car and motorcycle. The taxis, "tuk-tuks" and "moto-taxis" have been complemented with some car sharing services in recent years (e.g., Uber; Grab-a-Taxi, Easy Taxi) to ensure a safer transport option. Those are limited to the capital city [G2D, 2014]. Car-pooling, which might convince some consumers to use the service when needed rather than investing in car (hence reducing the number of cars on the roads and resulting in less automotive waste) are rare or purely based on a private individual's initiative. The current Thai railway system is safe, affordable, and environmentally friendly but does not address all transport needs, and is usually slow [Thai Railways Website, 2015].

The government coordinated with the private sector to formulate the Master Plan for Automotive Industry (2012–2016). They seek to develop Thailand as a global green automotive production base and to increase research and development for automotive technology. The next plan was due to be launched in early 2016 (Masterplan 2016–2020). While the car specifications are more and more eco-friendly, the production capacity shall be increased to 3 million cars by 2017 according to the plan, a target which might already be reached in 2015 [MPAI, 2012–2016; Sullivan, 2015]. It remains to be seen if, in addition to cleaner production and green(er) products, the next Masterplan will also include sustainable business models that address sustainable consumption, the potential rebound effect, and alternative clean(er) mobility concepts. The latter concept is where the automotive industry collaborates with time-efficient and eco-friendly public transport, such as inner-city BTS/MRT lines or the upcoming Japanese high-speed trains between Bangkok and the northern city of Chiang Mai, and between the capital and the Cambodian border, as well as the separate Chinese scheme to build a medium-speed network [Rogers, 2015].

## 12.7 Conclusion and Recommendations

Thailand has been among the frontrunners of SCP practice in Asia, both in terms of policy instruments as well as application by consumers, understood as businesses, government, and civil society. Most of the initiatives introduced concentrate on sourcing and production stages. Holistic life cycle approaches with an emphasis on actual reduction of resources by design, as well as consumer contribution to resource reduction — which eventually would lead to a paradigm shift at sector-specific or cross-sectoral levels — have so far been underexplored and/or under-reported.

Selected SCP instruments in Thailand, which include incentivising sustainable consumption, have been discussed here, i.e., DASTA, the GIM, the Eco-Card and LCI, in combination with the respective markets and users. The green industry award is a step forward for green manufacturing in Thailand and can serve as a role model in the Asian region. The GIM scheme has been instrumental in providing easy access to rewarding green intention, and clustering five levels of a continuously growing scope of action, including buyer–supplier cooperation at Level 5, which serves as a multiplier effect. The MOI and MNRE can look back at many years of close collaboration, which has certainly benefitted the linkages of GIM with GPP. First, greener products have been included in the government procurement, which confirmed the viability of eco-friendliness options. Emphasis has been placed on cleaner production. A more streamlined integration of entire life cycle considerations, e.g., design for sustainability, clean mobility, cradle-to-cradle approaches, and education of the consumer (industry, government, private households), is still underway.

With the Eco-Card, an interesting consumer-focused business model has been introduced, but the level of implementation is unclear and clarification is needed on the detailed eligibility of products. The mechanism could motivate consumer contributions to environmental friendliness. However, its effectiveness rises and falls with the scrutiny applied when establishing criteria for the eco-labels, the due diligence undertaken when awarding the eco-label to a product or service, as well as the ultimate outreach to card-carrying consumers. Possible confusion among the many different labels could be lessened through such an accreditation scheme.

In order to emphasise the commercial nature of environmentally friendly measures, detailed implementation should foresee mechanisms to include the most effective green goods and services, looking at the entire life cycle of the products. The LCI has provided an important insight into eco-friendliness and carbon footprints of certain products. Its value is still to be translated for the end-consumer to fully materialise its potential, e.g., following the idea of the eco-card. Globally, Thailand, being the 'kitchen of the world,' has the chance to improve eco-footprints of domestic and international food and beverage consumers by ensuring that their segments of the global value chains are optimised.

Being a world-famous mass tourism destination, Thailand has an enormous potential to shape and educate a large number of domestic and global citizens in what constitutes sustainable tourism. Its role as a regional hub for travel in Asia provides it with the chance to create region-wide lower carbon and eco-friendly travel opportunities in collaboration with tour operators, the transport industry (particularly flight carriers) and tourism destinations in Thailand and the larger region. An increased guest engagement would eventually lead to increased implementation of resource savings and eventually result in world citizens taking home their learnings.

Evidence that SCP can be made as a business case has been shaped and up-scaled with the support of the SWITCH-Asia Programme in frontrunner countries and lesser advanced countries in ASEAN such as Cambodia, Laos, Myanmar and Vietnam (CLMV) alike. Those can now serve as examples from which others can learn, in Thailand, in ASEAN and beyond.

It needs to be acknowledged that sustainability and low-carbon efforts in the automotive sector are limited if an increase in scale is promoted simultaneously. It is recommended, and in line with the original SCP approach, to focus on the need first, and not the product. The need for mobility can be met with different technologies. Given the sensitivity of the automotive production network and the high economic importance of this industry to Thailand, a paradigm shift towards alternative transport technology is not to be expected any time soon. However, a clean mobility movement led by this Southeast Asian production hub could provide new momentum to the economy, which outweighs the eventual losses of a conventional automotive industry.

To solve the paradox of "growth" and "sustainability" would be to start committing — authentically, and with a strong vision — to putting

the highest priority on promoting those businesses that follow a cradle-to-cradle approach. This automatically leads to less harmful goods and services or even those with a positive impact on the environment. This would also result in less importance of the potential "rebound effect" which in Thailand, just like anywhere in the world, is the most difficult to address.

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