





“2013 marked the 20th

anniversary of the establishment of Thailand Environment Institute. It was founded on 24 February 1993 as a non-profit making and nonpartisan organization with a working philosophy of serving as a reliable and up-to-date information and knowledge resource. The mission of TEI is “to be the national center of excellence in environment” through policy research, field work as well as capacity building for environmental personnel. Founded on the belief that partnerships are the most effective approach in achieving sustainable development and better quality of life, TEI advocates a participatory approach to shared environmental responsibility. By working closely with the private sector, government, local communities, other civil society partners, academia and in international circles with international organizations, TEI helps to formulate environmental directives and link policy with action to encourage meaningful environmental progress in Thailand.





Message from Mr. Mechai Viravaidya Chairman of Thailand Environment Institute Foundation

Current Environmental situations are more complex and affect human life more severely. It urges not only the policy makers but all concerned parties to get involved in urgently solving the problems. To cope with environmental problem, many factors have to be taken into account including education. It is the most important particularly to instill in young generation who are the future of the country. We need to start from elementary all through to secondary levels building environmental knowledge and understanding on the roles of youth in the present situation. It is also crucial to include such learning process into Thai educational system and in the curriculum in a concrete manner.

The other significant aspect that cannot be ignored is to provide an opportunity for women to play a participatory role. The society in which women's roles are limited is considered "a loss" in my opinion and is no different from committing suicide. It is like having two hands but making use of only one.

One more essential issue that has been in the spotlight and a challenge of the Thai society is transparency and integrity. It does not only refer to in a manner or profession but also the proper and fair access to information. The public has the right to be educated in the accurate facts of the environmental situations. Otherwise, the failure can be eventually expected.

Lastly, I would like to thank the Board of Directors, the management and all staff of TEI. May TEI take a firm step forward and be successful in its mandate to enhance shared environmental responsibility leading to a better life for all.



A handwritten signature in black ink, appearing to read 'Mecha Viravaidya'.

Mr. Mechai Viravaidya
Chairman of Thailand Environment
Institute Foundation



A handwritten signature in black ink, reading "Krissanapong Kirtikara". The signature is stylized, with a large, flowing initial "K" and "K" for the last name.

Dr. Krissanapong Kirtikara
Chairman, Executive Board of
Director of Thailand
Environment Institute

Message from **Dr. Krissanapong Kirtikara** Chairman, Executive Board of Director of Thailand Environment Institute

Thailand Environment Institute has reached its 20 years of journey in the academic field on environmental issues. Over the years, we have gained valuable experience, in-depth knowledge and expertise in environment. We also adjusted our direction to be more focus in response to changes with in and outside the organization.

Committed to being a national center of excellence in environment, TEI has been conducting a number of environmental research activities at national and international levels. It's findings have been applied into efficient practices and meaningful actions contributing to sustainable natural resources and environment as well as sustainable human development.

Celebrating the next decade, TEI certainly continues building on the strengths of our past and commit to policy advocacy. We also gear towards changing social behaviour on natural resource and environmental consumption, and pave our own way for the future of environment as stated since the establishment of the Institute.

I would like to take this opportunity to thank the Executive Boards of TEI for their contributions to the best benefit of the Institute. I also wish to express my appreciation to all the staff for their commitment and hard work throughout these 20 years.

Message from Dr. Qwanruedee Chotichanathawewong

President of TEI

Over the past 20 years since its founding, TEI has endeavored to address the global environmental changes that have been taking place. In consonance with these changes as well as to conform with its vision which is to be the leading organization on environment in the country, we have adjusted its direction focusing on environmental development which is certainly also for the benefit of better society.

In our constant aim to solve environmental problems and to strengthen the foundation of the society emphasising the importance roles of youth, government, private sector, civil society organization, one keystone of operations is to act as intermediary manner to encourage collaboration among all sectors. Through this networking, TEI hopes to develop environmental solutions in a peaceful manner and propose it to the society.

Moving on to the next decade, TEI will continue to focus on the development of research and academic work in environment to guide the formation of national policy. We aim to lead the society towards behavioural changes upon the basis of sustainable production and consumption as well as environmental governance which offer long-term immunity to the society. By praising the great work of an individual or an organisation, we hope to create a partnership to positively drive the society forward. At the same time, we are committing to TEI's way which are environmental mastery, moral integrity, accountable partnerships, down-to-earth practicality.



A handwritten signature in black ink, appearing to read 'Q Chl'.

**Dr. Qwanruedee
Chotichanathawewong**
President of TEI

Partnership & Participation

Founded on the Belief that partnership is the most effective and good governance approach to achieving a more sustainable way of life, TEI advocates a participatory approach to shared environment responsibility. Only through harnessing our collective strengths can we hope to achieve a better life for all.

Table of contents



About TEI

3	Message from Chairman of Thailand Environment Institute Foundation
4	Message from Chairman, Executive Board of Director of TEI
5	Message from President of TEI
7	Table of contents
8	Thailand Environment Institute and Partnerships
10	Policy Proposal: Call for Actions
14	Report on Social Change towards Sustainable Natural Resources and the Environment
15	Natural Resources and Environment
24	Sustainable Consumption and Production
32	Climate Change
40	Economic Instruments for Pollution Control and Prevention
46	Energy and Environmental
54	Energy and Environmental Management
60	Environmental Education
72	Capacity building on environmental management
80	Thailand Business Council for Sustainable Development (TBCSD)
88	Financial report
93	Board of Thailand Environment Institute Foundation
93	Executive Board of Directors of the Thailand Environment Institute
94	Thailand Business Council for Sustainable Development (TBCSD)
98	List of Donors

Thailand Environment Institute and Partnerships

Thailand Environment Institute established with a working philosophy of serving as a reliable and up-to-date information and knowledge resources. TEI believes that partnerships are the most effective approach in achieving sustainable development and better quality of life. Thus working closely with various organization in all sectors is one of our major role.

TEI and government sector

The natural resources and environmental management in the country relies on the management mechanism of the government sector. TEI, as an independent and academic institute, has been collaborating with government agencies in the implementation of various activities i.e. the development of important environmental policies. For example, the preparation of the master plan on water quality management of Thailand as a guideline for the restoration and reduction of pollutants released into water sources in 2005 and the preparation of Chaopraya, Thacheen and Maeklong Rivers Action Plan in 1996. TEI has also continuously built capacity and knowledge on environment for the personnel of the governmental sector.

In addition, TEI collaborates with the government agency to drive forward and cascade the knowledge on environmental management to the local community and regional levels. This entails a learning

network and integrated environmental work in the local area. We help link policy with action to encourage meaningful environmental work at the grassroots level to sustainable environmental management.

TEI and local community

The operation of TEI heavily relies on environmental good governance and promotes access to information on environment that is up-to-date, precise and accurate. TEI collaborates with local communities by encouraging participation from all sectors. The idea is to work together as “friends” so as to bring about collaboration and togetherness. The implementation of environmental activities of local communities thus becomes stronger and is suitable with the local context. The projects are accessible leading to tangible results in many areas.

TEI has constantly been working in-depth in the local area and accumulating experiences to build the foundation of research analysis and synthesis. The empirical

knowledge has been transferred to the local communities as well as to the society at large.

TEI and private sector

In relation to the collaboration with the business sector, TEI supports for improvement of production process through clean development mechanism. It starts from cradle to grave i.e. procurement of raw materials, production technology to the delivery of product and knowledge that is accurate and up-to-date to customers. TEI also works on capacity building especially for the personnel in the industrial and business sectors on natural resources and environmental management and sustainable energy consumption. This would lead to behavioural changes and best practice in making use of natural resources in a sustainable and environmental friendly.

Green Product development is another area TEI has been working on through green and eco labels which identifies products that are more environmentally preferable than other similar products in the market. The regulations are developed to cover a wide range of products and services. The main objective is to change the consumers' behaviour to buy more environmentally-friendly products. In terms of social development, TEI also supports various activities of the business and private sectors to pay back to the

society and the ecological system.

At present, TEI continues commits to collaborate with the private sector to promote knowledge and understanding and exchange experiences on environmental work through a variety of activities which also benefit to the society in the long term.

TEI and international organization

Climate change adaptation is the challenging issue for many countries to keep up closely with. It results in a wide range of collaboration of nations in response to the global climate change. The policy of TEI is to work with other countries particularly those in ASEAN to bring about co-management and adaptation policy in preparation for climate change impacts as well as to sustainably manage the use of natural resources and environment in a holistic approach. For example, Asian Cities Climate Change Resilience Network (ACCCRN) is the project that is implementing in ten pilot cities in Asia including Chiang Rai and Hatyai cities in Thailand and another project entitled "Sustainable Development of Mekong sub-region: Promoting the capacity of civil society organisations in climate change adaptation".

TEI pursues the development of regional collaboration in Asia conducive to greater strength to counter environmental changes. ■



Policy Proposal: Call for Actions

In the past management of the natural resources and the environment in Thailand, some problems were successfully resolved, and some were delayed. As a result, although the problems were gradually resolved, it was too late to catch up with the loss, degradation and transformation that had occurred in the meantime. TEI, thus propose the solutions for implementation as follows.

Establishment of an intermediary organisation or mediator:

In many cases, a dispute occurred because the community had no solution; there was no intermediary organisation or mediator to resolve differences or to listen to the opinions of various stakeholders. Establishing an intermediary organisation or mediator with academic knowledge or skills in bringing about compromise can turn a crisis into opportunity or at least into positive attitudes to the benefit of all parties.

Using the natural resource base fairly:

The approaching ASEAN Economic Community and the opening of the Free Trade Agreement will be an opportunity for the joint use of the natural resource base at the regional level. At the same time, it will open opportunities for seizing natural resource unfairly, as well as shifting non-standard goods and services into the country. Amendments to the laws and regulations are urgently needed to be ready to handle the approach of AEC, especially in the management of water resources,

ecosystems, hazardous waste, E-Waste, etc. In addition, we should use the amendments to deal with the problems in both proactive and reactive ways to benefit to the economy, society and the environment.

Promoting behavioural change through sustainable production and consumption plan:

The behaviour of “super” consumption must be changed to “sustainable” consumption, and “super” production to “sustainable” production. In addition, we should push more green goods onto the market to increase marketplaces and channels for the consumer, including the upgrading of the system and certification of standards for international acceptance and suitability for Asian countries.



Building readiness to cope with climate change:

The rapid changes and development despite the balance of the ecosystem is leading to the remote possibility of the global community's efforts to maintain the world temperature at 2°C. In future directions, Thailand needs to be proactive by looking beyond the target of 4°C. Apart from the mitigation measure to reduce GHG emissions, it is urgent that projects be implemented for the adaptation measure to cope with the impact and the risk of future climate change; vulnerable areas are the agriculture sector in particular, as Thailand is one of the world's major exporters of rice, and towns.

Reinforcement of economic instrument:

In the future, we will still need to emphasise the principle of the “Polluters Pay Principle” (PPP) and “Beneficiaries Pay Principle”

(BPP) by building motivation and accountability in reducing pollution, promoting the efficient use of natural resources, and the building of substantial fairness for disadvantaged persons to reduce social disputes.

Strengthening renewable and alternative energy:

Thailand needs to reduce the risk of dependency on energy imports and increase domestic energy resources, ie. the renewable and alternative energy in particular. In addition, the industrial promotion policy should take into consideration the analysis of a product's life, value, and especially an energy intensive industries that use Thailand as a production base for exporting.

Environmental Governance:

The current problem in society is lack of knowledge and understanding. We need to emphasise disclosing information and building comprehension by bringing the principles of “environmental governance” into practice in our daily lives. Enhancing the roles of women and youth should be highlighted. Environmental governance, in particular, needs to be put into the school curriculum to build a strong foundation within society and to stimulate society, especially the authority to realise the importance of this matter at all times.

Environmental study:

The society has to give precedence to the participation of youth as the important power of the country in carrying on the policy, together with the drive to transform the educational system and educational personnel in the context of natural resources and the environment rather than just providing knowledge and raising understanding. This participation will lead to the proper behaviour adjustment in order to get people ready to move towards sustainable development.

Capacity building on environmental management: The development of green economy results in the increasing number of labor demand of green jobs. We should take this opportunity to improve the related workers' skills in both quantity and quality to support the coming development.

The private sector's role in sustainable development:

Admittedly, the overall image of business operations and the environment has begun to change. The private sector's role in solving natural resource and environment problems has been increasing and has been able to propel several environmental tasks successfully. For global economic development that emphasises green growth, future business development must do business and take care of the environment at the same time by considering the value chain. Through budgeting, technology and management, if the private sector collaborates in expanding the body of knowledge and focusing on CSR at the same time, an alliance will be created to hasten solutions to the country's natural resource and environment problems. The government should use this strong point to encourage cooperation from the private sector to fulfill these aims. ■



Report on Social Change towards Sustainable Natural Resources and the Environment

Natural Resources and Environment



In addition to an increase in world population which has reached 7 billion at present, change in human lifestyles, inappropriate management of natural resources and environment, and non-compliance with environmental and public health standards, the productivity development and the overconsumption with disregard to natural resources and environment have led to the continued reduction of natural resources and increasing emissions and wastes worldwide and this can directly affect quality of life of city peoples. Increasing illnesses would increase in medical and healthcare costs and in other subsequence losses.

Thailand Environmental Institute (TEI) has been promoting sustainable development both at national and organizational levels based on the principles of reducing natural resources uses, reducing pollution and wastes, and/or adopting good environmental management practices which could help increasing competitiveness of the country. TEI has been working collaboratively on researches and taking actions on capacity development with the concerned agencies responsible for setting macro development policy as well as with entrepreneurs at micro level so that they could have approaches, systems, processes, tools, and databases for use in the evaluation and development of environmental administration within the country development framework and operations of the entrepreneurs.



TEI's Roles

TEI played an important role in the development of the 20-year policy and plan on the natural resources and environment (1997-2016), the preparation of the master plan for management of the central river basins, the preparation of the guidelines for waste management in Thailand, the preparation of the master plan on water pollution, the preparation of the national strategy on climate change, and the development of sustainable development indicators for Thailand which can be used to assess the environmental status compared to the results from social and economic development.

Water Resource and Water Pollution Management

To provide clean water supply for different types of water use and to create cooperation in conservation of limited water resources, TEI has been working continuously and collaboratively with the private sector and communities on reserving soil moisture for self restoration of ecosystem by building small dams and small ponds, reducing contamination of wastes and pollution from communities and industries into water courses, water scarcity in some areas, and the wise use of water resources. The activities were carried out through educational process, campaigns, and public relations with all sectors to be

aware of the importance of water resources.

In 1996, TEI was assigned by the Department of Pollution Control to prepare the action plans for the Chao Praya, Thajeen and Mae Klong river basins by collecting the basic data on water quality and pollution sources, predicting water quality over the next 30-year period by using information technology and mathematical simulation model (Mike11) to study the assimilative capacity of these 3 main rivers and for planning for future changes and pollution control.

In 2005, TEI played an important role in the development of the master plan for national water quality management which established a framework and guidelines for recovery of water resources and reduction of water pollution. Thereafter, TEI had an opportunity to conduct an in-depth spatial study using participatory process of all sectors (which is one of TEI expertise) to establish measures for prevention and rehabilitation of important water courses in critical areas such as in the Bang Prakong River and Songkla Lake. Application of this approach requires expertise of multi-disciplinary



team to build partners/alliances from the central agencies, local agencies, industries, pig farmers, and communities to work together for the conservation and reduction on pollution discharge and the monitoring of water quality.

Forests and Mangroves

Since 1995, TEI has been working on sustainable forest management through community participatory process. The activities included management of buffer zone, development of livelihood alternatives for local communities to reduce the need for forest resources, and the use of “Group Facilitation” process to establish community rules on forest resource uses and conservation by establish pilot areas in the northern, central, northeastern, and western parts of the country. In 1999, TEI established a network on forest monitoring to be a forum for exchange of knowledge and learning on community forest management.

After the tsunami disaster in late 2004, TEI has translated cumulative experience in working with community on sustainable forest management through community participatory process mentioned above to working on sustainable mangrove management with the tsunami affected communities in Phanga and Ranong provinces from 2005-present and some mangrove areas have been rehabilitated and expanded at a certain level. The process has also improved



capacity and skills of local communities to apply the Group Facilitation process in the preparation of a sustainable mangrove resources management plan based on local wisdoms, on-site surveys, and data collection and analysis, and in the implementation of the plan. Moreover, TEI has also promoted the development of additional occupations for local peoples, of community revolving fund, and of the learning center for mangrove management.

Based on the implementation and field activities on mangrove management mentioned above, TEI is capable of extending the research products in terms of the process, analysis, and synthesis of local knowledge on management and utilization of mangrove resources. This is a form of knowledge management that can transfer intrinsic knowledge of local community to empirical knowledge for wider public information. In 2009-2010, TEI collected the implementation experience on the ground and the information on adaptation and reduction of disaster impacts on coastal communities and they will be used as the database for future work on ecosystem security and coastal communities.



All the work mentioned above could not be claimed by TEI alone but they are the results from collaboration, coordination, and cooperation on strengths and minds of all sectors, including the private, who see the importance of ecosystems, the values of natural resources, and the values of local lifestyle and culture, and worked with TEI to build capacity of local communities on conservation and preservation of resources which will build immunity in all areas in the country.

Air Pollution Management

Since treatment and disposal of air pollution requires high capital investment, TEI focused the activities in this area towards reducing emissions before creating pollution or upstream management by starting from selection of appropriate raw materials, promote replacement of substances, use of appropriate technology, reduction of leaks and losses in production processes, management of pollution, and design of environmental friendly products.

In addition to the basic air quality parameters like SO_x, NO_x, Ozone, dust, etc., TEI conducted an in-depth study on Volatile Organic Compounds (VOCs) of which some could cause cancer by sending experts to individual factory to prepare the chemicals listing and provide training on leak detection and leak control. At present, TEI is studying the non-point sources of VOCs such as paint shops and the use of chemicals in agriculture and household sectors too.

An open burning for cultivation of rice, corn and cassava and for mushroom or for harvests of katuk plant, including open burning of wastes, can cause air pollution, car accidents, visual pollution in tourist attraction areas, and eventually may have impacts on human health. TEI worked with the Department of Pollution Control in regulating the open burning of agriculture wastes in many provinces according to the absorptive capacity and weather conditions in each area as well as in promoting biological fertilization to avoid burning and reduce smog.

Development of Database on Environmental Inventory

TEI developed a database on Life Cycle Inventory for agricultural products, industries, water resources, electricity, and basic materials; conducted a study on impacts of environmental measures on international trade; and developed indicators for measuring environmental performance in industrial sector. At present, TEI is focusing on expanding the Life Cycle Inventory to cover variety of products including development of guidelines and methodologies for monitoring and evaluation on results of environmental administration and management.

As part of the Pollutant Release and Transfer Register project, TEI also created a database on the use of chemical substances including manufacturing, imports, and exports in Thailand and



conducted an analysis of the overall picture during 2007 to 2011. Results from the study were useful for the development of the national pollution control plan. Based on the chemical database, TEI established procedures and guidelines for actions to declare Tributyltin (TBT) as the Hazardous Substance Type 3, and prepared the chemical label for products with TBT. The TBT has been found as a contaminant in seawater and some water sources and can affect mussels.

Livable Cities

Rapid expansion of city communities forged TEI to work on development of urban environment from the beginning of the organization with the idea of 'Livable City' to promote a better quality of urban life. TEI has adopted the approach to build potential and support communities and civil society to actively participate in urban environmental management and promote/support local authorities, which is the closest administrative body to the people, to establish their agendas and take actions for environmental development in their own areas with





active participation of communities. This is part of actions defined in the Local Agenda 21 of the United Nations Conference on Development and Environment Program and it is also in line with the decentralization policy for the country.

At the beginning in 1995-2003, TEI played an important role in the development of master plan, strategy, and prototype on development of urban environment for concerned government agencies and policy making agencies as well as in taking actions on the ground to develop capacity of community and local authorities on urban environmental management in many areas such as Phuket, Samut Prakarn and Nakhon Srithammaraj, including advocating for the development and management of green area in urban community. In 2003-2004, TEI played a role in developing indicators for livable city to be an empirical tool for evaluation of livable city development for Bangkok and Chiangmai. In cooperation with the Department of Environmental Quality

Promotion and the National Municipal League of Thailand, TEI prepared and implemented a project on Livable City for Thailand in 2004 and 2009 and established 5 elements for a Livable City condition comprising: learning and development within municipality, good governance, physical development of the city, economic development of the city, livable society, and sustainable environmental management, including development of index for each parameters to be used for evaluation of the participated municipalities (Tambon, Muang/city, and Nakhon/metropolitan). In 2004, 24 municipalities were certified as a Livable City while 53 municipalities were certified in 2010. Some outstanding municipalities have been accepted as the knowledge sharing and training centers on community environmental management for interested entities in the country and internationally.

Given that TEI's has been working continuously with local authorities and communities, TEI can extend the efforts on development of urban environment for specific issues such as undertaking an in-depth study on biodiversity conservation in urban area and for management of fundamental issues on development of urban environment such as project on comprehensive city plan that can keep a balance between physical infrastructure development and land use zoning for promoting quality of life.



Regional Environmental Management

On international cooperation, TEI has continuously worked with many research institutes in many countries and in many projects as well as participated in the research team to carry out evaluation and field work in many countries. These activities have promoted the exchange of knowledge and lessons learned on the implementation process and experiences, coordination, and management of activities aiming to create results. Examples of important international cooperation on research are as follows:

➤ In 2004-2009, in collaboration with many research institutes in Philippines, India, Indonesia, Vietnam, Malaysia, Japan, China and Bangladesh, TEI was supported by the Institute for Global Environmental Strategies(IGES) Fund to study the Asia-Pacific Environment and Trading, in terms of recycling, small and

medium enterprises campaigns, data systems, energy and free trade agreements.

- In 2008, TEI worked with the Asian Development Bank (ADB) and the Energy and Resources Institute (TERI) on the energy and climate change by cooperating with the research institutes in Indonesia, Malaysia, Philippines, China, and Japan such that TEI was responsible for conducting research activities in 5 countries i.e. Vietnam, Lao PDR, Myanmar, Cambodia, and Thailand.
- In year 2009, worked with ADB and TERI on Technology Transfer for preparation of negotiation in the United Nations Framework Convention on Climate Change, (UNFCCC; COP15 Negotiations) in Copenhagen, Denmark. This was done in cooperation with the research institutes in India, Malaysia, Philippines, China, and Japan.

Call for Actions

The ASEAN Economic Community (AEC) and free trade agreement opens opportunities for natural resources utilization by member countries at a regional scale. These opportunities however can also cause unfair exploitation of natural resources. Actions to be carried out by Thailand are the followings:

Rules and regulations

- Develop agreements and cooperation, including implementation guidelines at regional level, on monitoring of pollution, greenhouse effect, and hazardous substances in the context of AEC implementation.
- Improve laws, regulations, and other related instruments in the context of AEC implementation, especially those related to water resource management, ecological system, and hazardous waste management.
- Reform governmental financial system for the suitability of environmental management.
- Increase efficiency of law enforcement on natural resources and environment by applying economic and social measures. It has been proven that using only command and control measures are less successful in persuading stakeholders to conform to laws and regulations. Making stakeholders to comply with the environmental law need incentives and disincentives.
- Free trade agreement of AEC may open up free flow of goods and services within the region, especially the non-standard goods, which could shift the burden for environmental management

to neighboring countries. It is therefore necessary to develop a clear Codes of Conduct and Codes of Practice to be the technical guideline for the member countries to follow in terms of natural resources management and hazardous waste treatment and management.

Large-scale project development

- Development of large-scale projects by the government has to take into account results of the study common benefits and impacts on various aspects (economic, social, and environment) and results from cost benefit analysis as the basis for decision making.
- Use opportunity for various development activities to study land use suitability and assess trends of economic growth in and around the areas likely to be involved with large scale projects, including study trends and directions of residential expansion, tourism development, and agricultural land conversion so that a plan to response to the expansion or compensation to affected population could be developed to reduce continued impacts on natural resources and environment nearby both proactively and reactively.

Natural resources and ecological system

- Increase forest cover to be at 40% of the country area and this should be one of the national agenda.
- Promote ecosystem conservation approach and enhance knowledge on values of ecosystem services to all sectors who utilizes and/or benefits from the ecosystem services to be responsible for maintenance and conservation of ecosystem. Increasing forest areas and urban forest should be the responsibility of the local and private sector while the government should provide policy and supports.
- Consider the application of the Payment for Ecological Services (PES) for reducing the problems on natural resources and environmental exploitation such as haze problem from open burning or burning before planting, pollution control, or restoration of degraded areas that may violate the right of the private land holders.
- Review and evaluate cost-benefit (both from investment from natural resources and management of environment and health impacts) for development of natural resource and energy intensive industries to be base in Thailand to reduce degradation of natural resources and the need for building more power plants.

- Solve water shortages in specific areas and seasons that can be barrier for increasing forest areas and health of ecosystem and forest fire.

Air Pollution and Waste Management

- Accelerate correction measures for air pollution in major cities and rapid growing cities by improving logistics and transportation system, pollution source management, and city planning as these air pollution will directly affect health, respiratory system, and allergies of the residents which require budget for treatment and can ultimately impact the urban ecosystem in the city.
- The progress and rapid change in technology development especially those related to electronic equipments, electric machines, and household appliances has resulted in increased burden on waste management especially hazardous wastes and Electronic-wastes. Future actions have to focus on effective collection and management of wastes and hazardous wastes and create a culture of manufacturer responsible for the entire life-cycle of the products especially for taking back after usages or expired and packaging management. ■



ตลาดขายส่ง



Sustainable Consumption and Production



Many current researches mentioned that human consumes resources more than 50% of the world available resources (biocapacity), and with this rate it will require resources from 2.9 worlds to meet the population demand for nearly 7,000 million people which will be increased to 9,000 million people in year 2050. In year 2008, only 10 countries consume more than 60% of the world biocapacity while high income countries use resources 5 times more than lower income countries. These data indicate the situation of resources consumption more than available resources and this is a turning point that we all need to consider the way of life that are in balance with the world biocapacity. People around the world are already aware of the issues and discussed them in many forums. While the term “Sustainable Production and Consumption”

has been in use for over 20 years an extensive discussion began in the 1990 RIO conference in Brazil.

Result from the conference has forged the business sector, who is both producer and consumer, to revise their business plans by integrating environmental issues into their business operations and to change their behaviors from being the “super” consumption to the “sustainable” consumption and from being the “super” production to the “sustainable” production. As both producers and consumers, in order to reduce external and domestic pressures the following factors should be considered:

- Trends in environment and trade (non-tariff barriers).
- Corporate Social Responsibility.
- Requirements and expectations of business partners, society and the Global Community (green supply chain).
- Environmental measures of business partners, especially in developed countries like the USA and the EU.

Internal factors



- Climate change issues, disasters, and decreasing of natural resources.
- Pollution causing health's impacts and increasing health care costs.

- Higher expectations: With higher education and understanding, Thai people requires better quality of life, better environment, and better health care and this is also true for clients from foreign countries, especially from EU and US.

As consumers, in making a decision to buy goods and in addition to price consideration, people have to also consider the origin of goods to ensure that they use resources efficiently durable, do not cause problems with waste management and disposal, and have good after-sales and after-use services from the manufacturers.

This is a turning point for us to develop a new way of living that allow us to live in the world that are considerate and can provide fair/similar access to basic consumption of goods or services and to live happily in the world with a healthy ecology system.

TEI's Roles



Green Label

In 1994, Thailand put together the Green Label Project in line with Agenda 21 which is the world's master plan affirmed by the United Nations on environment and development known as the Earth Summit in June 1992. The Project aims to achieve sustainable development in terms of social, economy, and the environment through the collaboration of the Ministry of Industry, the Ministry of Science and Technology, the Ministry of Natural Resources and Environment and other related organizations, and the Thailand Industrial Standards Institute and TEI served as the secretariat. The Project was designed to 1) promote goods and services that cause less pollution than the same type of products during acquisition of raw materials, production, transport, consumption, and disposal; 2) be used as a tool for protection and conservation of the environment by focusing on the participation of both manufacturers and consumers.

The Green Label is the Type 1 Environmental Label operating in accordance with the principles of ISO 14024 and the Life Cycle Consideration will be used as a tool for setting up various criteria. The Green Label is considered as an environmental strategy using market instrument as a mean to participate in protection of the environment through the production and consumption of every manufacturers and consumers.



Carbon Reduction Label and Greenhouse Gas Emission Reduction Certification



Since Thailand participates with the global community in Greenhouse Gas (GHG) emission reduction, in 2008 the TEI developed the Carbon Reduction Label for Products and Services in order to certify the products that can reduce GHG emissions during the processing according to the established criteria.

Afterwards, this label was further developed into the Carbon Reduction

Certification for Buildings and the Alternative Energy Certification in business sector under the same principles.

At present, the environmental labels including the Green Label, the Carbon Reduction Label, and the Carbon Reduction Certification for Buildings are the main activities that TEI is working on to improve services to the manufacturers/producers; to increase number of the eco-friendly products, services, and buildings; and to improve eco-friendliness of products and services, including communication with consumers in raising awareness and participation in developing the quality of life and environment by supporting goods and services from the producers who care for the environment.

Green Procurement

Many international conferences concluded that if consumers have enough strengths, information, and knowledge they could be the key driver for encouraging the production sector to pay attention in selecting raw materials, manufacturing, quality of goods, and wastes management. This led to the implementation of the Green Label Project in 1996.

TEI and the network members achieved significant success again in January 2008 when the Cabinet issued a resolution requiring the public agencies to implement the policy on green procurement in the fiscal years 2008-2011. The Green Label was certified as part of the government procurement policy in response to the

Cabinet's resolution. TEI in cooperation with the Thai Industrial Standards Institute (TISI) which is the secretariat to the Green Label Project signed an MOU with 19 government agencies including the Ministry of Natural Resources and Environment and the Ministry of Industry, and the private corporations to support the green-label production and consumption of goods and services. In addition, the network has widely publicized the activities to consumers including undertaking various activities in department stores in Bangkok, conducting seminars and exhibitions, and introducing the Green Label products directly to consumers.

At present, TEI has not stopped at driving green procurement only in the government agency, but has also coordinated with the private sector as well, starting with leading companies in Thailand such as PTT Public Company Limited, Bangchak Petroleum Public Company Limited, etc.

Green Meeting

Since every agency conducts meetings every day and this could create costly and inappropriate use of resources as well as a large volume of wastes such as the distribution of plastic-bottle drinking water to participants, excessive production of documents, air conditioners set at unsuitable temperatures, meals served in styro-foam or plastic containers. TEI was aware of the problem and developed a green meeting guideline and evaluated performance of the agency according to the



guidelines at no charge or fee.

In 2013, the project has been expanded into the Green Meetings Plus program which will certify the agency that apply the green meetings in their organization, including supporting business partners to apply the green meetings guideline in their operations.

Green Consumption: “Eating-up and Drinking-up” Campaign

Mobilizing sustainable consumption can start with simple actions that everyone can do. TEI in coordination with media network, business, and schools carried out an “Eating-up and Drinking-up” campaign continuously. By consuming enough food for each meal, not putting too much rice and food on your plate could help reducing the amount of rice, vegetables, and meat used for cooking as well as reducing energy and water required for cooking and washing as well as reducing wastes. In addition, it also reduces the emission of green house gases (methane and carbon dioxide) occurring from the decomposition of food wastes.

Drinking water is part of natural resources utilization that can affect the environment and ecosystem. The water treatment process involves the treatment of raw water and the chemical substances and energy necessary for water treatment as well as wastewater treatment. The process also includes the bottling process and transportation. Preparation/pouring just

enough drinking water each time can reduce the amount of untreated water, energy and chemical substances required in producing drinking water, as well as reducing the energy in treating large amounts of wastewater and reducing water scarcity in other areas.

Call for Actions

In the past, the government accepted the private sector’s strengths and the consumer’s weaknesses by raising awareness and understanding about sustainable consumption and production. However, this has not reached the point that could change consumer behaviors towards sustainable consumption. To move forward, the following actions should be accelerated:

- The government should systematically promote and support green procurement of the public and private sectors by focusing on improving efficiency of the green procurement by the public agencies and the private sector that could results in increasing public demands for environmental friendly products.
- Maximize effectiveness of the demand side management for energy saving and utilization so that the ratio between energy use per gross domestic products of the country (Energy Elasticity) is reduced.
- Parts of sustainable production should include: 1) Support the production of

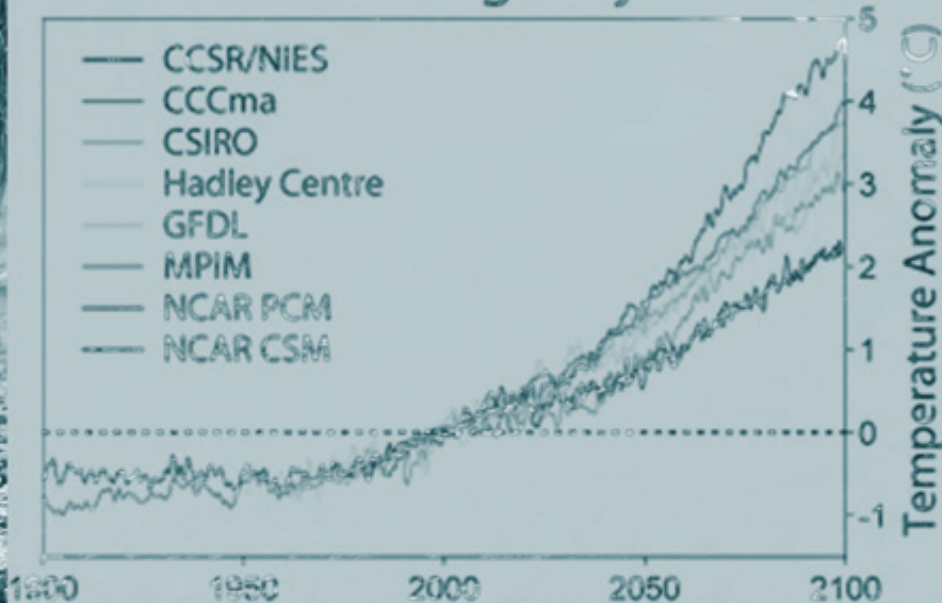
durable goods for longer end-of-life to reduce waste, 2) Use products with less energy and requires less maintenance, and 3) Products must be non-hazardous and with less toxic substances.

- Eco-design products should not only aim at reducing the impact of the designed products, but should also be the design of products that use the natural resource efficiently. The private sector capacity in product designs, technologies, and innovations for the environment should be supported at the industrial or commercial scale.
- Promote certification of standardized and environment friendly manufacturing, products, and services such as green label, carbon reduction label, GAP (good agricultural practice), GIM (Green Industrial Mark), energy saving label, energy efficiency label, alternative energy certification, and green leaf label.
- Develop appropriate standards and certification systems for the Asian region such as green label for environment friendly product, agricultural standards and system to scale-up the standards and certification system for accreditation and recognition at the international level as well as develop appropriate Code of Practice for the country, which can be linked internationally.
- Promote and develop suitable technology and innovations for national production specifically for SMEs and also production for the region to scale-up clean production and environment friendly technologies and innovations as well as green products.
- Promote recycle of wastes as a formal recycle system to build active participation of the manufacturers and consumers in increasing effectiveness of recyclable waste collection.
- Conserve, restore, and develop regulations that prevent degradation of tourism areas including development of participation mechanism for all sectors for sustainable tourism.
- Develop mass transit and transport logistics by rails to cover larger area for energy saving and pollution reduction.
- Changing consumer behaviors should be made through the social network of specific groups and at the community level to create awareness of the consumers that the consumers are not only the buyers but are also part of the world citizens that will be affected by bad products. ■





Global Warming Projections



Climate Change



Increasing population, industrialisation and rapid urbanisation leading to increasing use of non-renewable fossil fuels contribute to global warming. The effects of global warming are the cause of irreversible climate change.

With the recognition of the significance of climate change, the Thailand Environmental Institute (TEI), founded in 1993, was one of the first organisations to work on climate change issues in Thailand, focusing on policy research and recommendations. The government sector. One of the top-ranked performances of TEI after the Thai government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 is the preparation of Thailand's National Greenhouse Gas Inventories. The study shows that the major sources of greenhouse gas emissions come from the energy, agricultural and forestry sectors. At the same time, TEI has studied and produced the National Climate

Change Strategy and Action Plan and assessed the possibilities of the impacts of global climate change for the government sector throughout the years. These achievements have escalated TEI operations, especially in terms of the study of national strategy on climate change in 2006. The study includes the strategy on natural resources management, natural disasters risk management, public participation and the development of environmental studies curriculum, which has been used by the government as a tool for climate change adaptation.

The problem of climate change, its impacts on all regions of the world plus the intense negotiations regarding climate and the changes in the agreement and position of some countries has magnified the seriousness of climate change issues. TEI realises the importance of such problems and commits to work in partnership with all parties to prepare and develop the capacity of all sectors, particularly communities in high-risk areas, to be ready to tackle climate change. In order to join the global climate change community of practice, TEI focuses on both climate mitigation and adaptation.

TEI's Roles

Climate mitigation, adaptation and resilience

Based on the above operation, at present, TEI has expanded the work related to climate change adaptation to cover the implementation level and research in specific sectors that either cause or are affected by climate change, e.g., tourism, agricultural and energy sectors. We work in partnership with the government and business sectors, local administration organisations, educational institutions, the civil society, communities and international organisations. The scope of the operation involves various levels and target groups. At the local level, the projects include the Asia-Pacific Forum for Environment and

Development, the Global Warming Reduction Operation (in terms of agriculture), Climate Change Preparedness and the Increase of Efficiency in Water Usage in Rice Cultivation with the application of the System of Rice Intensification (SRI) in the central region of Thailand.

The key objective of the Urban Climate Resilience programme in Thailand is to strengthen knowledge and skill capacities of second tier cities in urban

climate resilience. The programme focuses on understanding the linkages and implications of urbanisation and climate change, and application and practice of the climate



resilience framework.

Second tier cities in Thailand are experiencing rapid urbanisation process, which leads to increasing energy and water demands, extensive land use changes, increasing wastes, and migration. These cities are already faced with existing urban, social and environmental issues, as well as, natural hazards. Weak institutional capacity of the local government contributes to unregulated urban expansion and ineffective land use planning. Cities are located in risky areas, such as low-lying / flood prone, river delta and coastal areas. Rapid urbanisation without long-term planning will lead to more disasters, increasing risks and vulnerabilities. Climate change will also exacerbate these existing risks and vulnerabilities.

Both urbanisation and climate change pose as a complex process with a degree of uncertainties, creating new risks and hazard patterns. Current planning process often involves using historical data and past experiences and may not be applicable with rapid urban expansion and changing hydrological profiles. Existing infrastructure in many cities was designed and developed over twenty years ago and may not be able to cope with emerging disasters and extreme weather events. New infrastructure plans are also using historical data and based on past experiences without factoring in climate change, changing landscapes, and changing hazard profiles, making cities at risk.



Urban climate resilience is a relatively new area of knowledge and practice that requires understanding of cross-disciplinary issues on climate vulnerability, urbanisation, governance, and social science. Interactions between urbanisation and climate change results in new risk profiles with uncertainty as an inherent attribute. Building urban resilience to climate change is a system-oriented approach to adapt to new risks and uncertainties ensuring responses and recovery to urban-climate stresses.

Raising public awareness and advocacy, as well as mainstreaming resilience will contribute to ensure authorities to function and perform for the benefit of the general public. However, the linkages between urban development and climate risks are not easily understood. Scientific translation, application and communication of climate resilience approach are critical. The role of TEI in urban climate resilience is to strengthen knowledge and practical skills of city stakeholders in urban climate resilience that will contribute to policy change.

The Urban Climate Resilience

Programme at TEI includes,

- The Asian Cities Climate Change Resilience Network (ACCCRN), funded by the Rockefeller Foundation, is implemented in ten medium-sized cities across four countries in Asia. In Thailand, Chiang Rai and Hat Yai are the core pilot cities.
- The Mekong-Building Climate Resilient Asian Cities (M-BRACE), funded by the United States Agency for International Development (USAID), developed by Institute for Social and Environmental Transition (ISET) and implemented in partnership with TEI, is implemented in Thailand and Vietnam. M-BRACE is implemented in Udonthani and Phuket.

Moreover, TEI networks with local civil society organisations emphasising water management and climate change adaptations under the project “Sustainable Development of the Mekong Sub-Region: Building Capacity of the Civil Society in Climate Change Adaptation.” Seminars and forums have been organised as a platform for the exchange of knowledge and communication of policy to planning agencies at the local, national and regional levels. The member countries are Yunnan province, China, Myanmar, Lao PDR, Vietnam, Cambodia and Thailand. As a result of the implementation of this project, the knowledge and action plans responding to the needs and capacity of civil society organisations both at the local and regional level are in place.

Greenhouse Gas Emissions Reduction

While the reduction of greenhouse gas emissions is critical, adapting to climate change should be prioritised in Thailand. Climate change will have serious impacts on our agricultural sector and various cities, we should join other countries in reducing greenhouse gas emissions, but also adapt to changes. TEI has closely followed the negotiations and positions of other countries in relation to greenhouse gas emissions reduction. The knowledge and tools/ techniques gained from each negotiation meeting or international agreement have flowed to relevant agencies in the business and industrial sectors so that they are informed, are able to adjust the direction of business operations for utmost benefit and can reduce greenhouse gas emissions in their organisations. The examples of such projects are the cooperative work in greenhouse gas emissions reduction amongst country groups, the Clean Development Mechanism (CDM), carbon management, the carbon footprint and carbon offset. It also includes the work on the Carbon Reduction Label, which urges producers via the consumers to reduce greenhouse gas emissions. The Label will certify that the greenhouse gas emissions are reduced during the production process of the product following the criteria. This is considered a tool that provides the opportunity for both producers and consumers to help reduce global warming and has been later developed into the Carbon Reduction Certification for Building for office buildings,





hotels and hospitals. In 2013, the buildings or businesses that use renewable energy to reduce the use of electricity and fossil fuels as well as reduce greenhouse gas emissions from fossil fuels are certified, directly resulting in fewer power plants construction needed nationally.

Call for Actions

Though the global community have agreed and accepted the targets to control the global temperature at 2 degrees Celcius as compared to pre-industrial era, the World Bank report and analytical results from different scientific working groups have the same opinion on the difficulty to control global temperature at 2 degrees Celcius and the trends of global temperature will rise to 4 degrees Celcius in 2100, which is considered a dangerous level.

To move forward, Thailand may have to overlook the target to control global temperature at 2 degrees Celcius but look at the target of 4 degrees Celcius. In addition

for taking mitigation measures, other important action is to take adaptation and preparation for risks caused by climate change that could occur in the future, especially on the agricultural sector because Thailand is one of the major world rice exporters, and adaptability of cities and risky areas. Key activities to be carried out include:

Adaptation to impacts

- Determine risk characteristics and areas at risk to climate change in the country especially for cities and agricultural sector so that they could prepare responsive plans and adapt to the changing environment.

Agricultural sector

- Adjust role of agricultural sector and prepare them to adapt to an increased climate change impacts including prepare the country to be ready if agriculture sector would be included as the target for climate change reduction during the climate change negotiations.
- Promote the application of research activities, technologies, and innovations in order to determine appropriate measures to assist farmers such as study on the sensitivity and responsiveness of agricultural production and service systems to climate change and develop guidelines for agriculture adaptation for Thailand since this sector still relies on rain water as the main source of

water supply (especially for rice cultivation) or develop methods to improve plant species that could withstand droughts and high temperature.

- Strengthen agricultural sector in increased productivity and adaptation to climate change.

Cities

- Scale-up cities network and municipalities in the country by evaluating risks to climate change and natural disasters for each city and group them for learning and preparation for potential impacts from climate change. This includes building effective communication and emergency warning systems for residents so that people can receive information, be prepared, and be ready.
- Scale-up cities network and municipalities to other ASEAN countries to prepare readiness of the cities at regional level.
- Improve city planning by evaluating the city's potential to recover after natural disasters, using the city area efficiently, and zoning suitable area for different type of occupations, salary, well-being, and health.
- Promote urban forest establishment surrounding city boundaries for pleasant environment, energy conservation, absorption of GHGs, and reduction of extreme climate and prevention of soil erosion and water runoffs.

Building personnel capacity

- Translate knowledge and guidelines on adaption of civil society to actions and share them with other related sectors at regional level.
- Promote the civil society as an important stakeholder in the decision-making process and promote their active participation in the climate change adaptation activities at the local and national levels.
- Research and develop production resources considered as raw materials for the 4 necessities for human survival (food, medicine, clothing, and home) to adapt and survive during emergency situations.

GHGs reduction and increasing GHGs sink

- Increase forest area by 40% of the total country area by involving all sectors and apply economic instruments as a supporting mechanism.
- Promote production and renewable energy as on-grid and off-grid to reduce GHGs emission.
- Promote demand side management with efficiency to reduce GHGs emission.
- Study behavioral changes and economic trends to reduce extreme disasters and climate change. ■





Economic Instruments for Pollution Control and Prevention



Command-and-Control (CAC) policy, or direct regulations, has been widely sought as a decision-making strategy for solving environmental problems during the past three decades. Only recently has it been clear that there are no ‘one-size-fits-all’ answers. Many factors enter into the decision to favor the blend of both policies: that set standards or regulations – CAC – and that harness the power of market incentives – economic instruments. The use of economic instruments is becoming more widespread, particularly in developed countries, for pollution control and natural resource management. The key benefits of economic instruments is that they would allow a given pollution target to be met for lower overall cost than traditional regulations, especially when taking into consideration the

perceived high cost burden of regulatory compliance. Economic instruments grant firms and individuals greater autonomy in deciding how to meet the target. They create ongoing incentives for firms to design new and improved abatement technologies ensuring that pollution control becomes cheaper or affordable, reduce the information burden on regulators, and provide potential revenue sources for governments. In addition, economic instruments may provide greater flexibility in dealing with smaller and diffuse emission sources (e.g. small companies) which collectively contribute large amounts of pollution.

The basic premise for economic instruments is to correct a ‘market failure’ by placing a cost on the released of pollutants or resource exploitation. Economists perceive pollution as a market failure, or when the allocation of goods and services by a free market is not efficient, which arises because polluters are not faced with the full consequences or implications of their production, consumption or disposal choices. The use of economic instruments will internalize the ‘externalities’ into the decision making process.

Depending on underlying determinants (which include a firm’s products, a country’s governmental and regulatory infrastructure, along with the nature of the environmental problems), different pollution control policies are implemented in different countries and by different firms. To promote environmental quality, there has been a remarkable surge of interest in economic instrument approaches in policy. Types of economic instrument for dealing with environmental problems are comprehensive, including emission charges/fees/taxes, user charges/fees/taxes, product charges, tradable permit systems, non-compliance fees, deposit-refund systems, non-compliance bonds, performance bonds, liability payments, and subsidies. There is substantial variation in the needs, opportunities, and constraints facing each country; and there is a substantial variation in the capacity to implement economic instruments across different regions or sectors.



TEI's Roles

Thailand Environment Institute (TEI) is among the first institutions in Thailand to conduct studies that apply economic instruments for natural resource and environmental management. Starting with

economic policies in forest management, TEI's research continues with the use of economic instruments for prevention and control of industrial emissions partly due to growing industrialization that contributes to increased emission

of pollution and partly due to higher administrative costs of CAC. The study introduced the Emission Charge and the Pollution Management Fee as the most appropriate economic instruments for managing and mitigating pollution from factories in Thailand. The two types of economic instruments have been included in the draft of Monetary Measure for Environment Act aiming to improve Thai industrial performance by creating incentives for firms to design new and improved abatement technologies, increasing productivity, reducing waste generation, and solving problems concerning environmental and pollution management in industry.

TEI's research on economic instruments for pollution control is in line with the Enhancement and Conservation of the National Environmental Quality Act B.E. 2535 (NEQA 1992) which introduces the Polluter-Pays Principle. The Institute fosters learning on economic instruments



for capacity development in the business sector and promotes collaboration among legal experts, economists and environmental specialists. The results of TEI's research on economic instruments for pollution control are well recognized and will be carried forward into the application of economic instruments for natural resource management.

Based on a series of successful research and case studies, TEI has expanded its work to conduct in-depth studies on the application of economic instruments for air pollution control and other areas. This includes packaging waste management, management of pollution in swine farming and agriculture, potential use of the Permit System for effective control of the overall level of pollutants released from a source, and environmental damage assessment and remediation for addressing illegal discharge issues (soil pollution and groundwater contamination)

Call for Actions

Thailand is committed to harnessing its natural resources and environment as a core asset for sustainable development using a package of complementary policy instruments including multi-lateral environmental agreements, legislation, standards, information, research, institutions and economic instruments. Whereas the integration of both economic and regulatory (CAC) instruments has been emphasized, economic instruments are increasingly being recognized as a viable solution to many environmental problems in the country. A broad overview of the pollution issues and relevant institutional settings in Thailand has suggested a range of policy proposals required addressing the existing and emerging issues of pollution management; learning by doing is the way forward since many instruments will not perfectly solve a specific problem. In designing and implementation of economic instruments for pollution management in Thailand, a range of strategies is identified as follows:

- Implement market-based instruments (i.e., charges, fees or taxes) founded on the Polluter Pays Principle (PPP) that deters and essentially reduces emission. This includes additional fees for using products with high pollution

emissions or payments (deposit) made when purchasing a product (e.g., hazardous waste containers and packaging) through deposit-refund system;

- Offer tax credits for zero-emission products;
- Set rules and measures for collecting waste disposal fees calculated based on actual costs incurred;
- Provide manufacturers with practical guidance about the use of green supply chains for increasing their ability to remove waste from the supply chains (i.e., transportation and logistics) in order to respond to demand for eco-friendly products;
- Promote organizations that apply commercial strategies to maximize improvements in human and environmental well-being (social enterprises) through the conduct of monetary policies at different stages in the supply chain;
- Use of economic instruments in measuring and minimizing the ecological impact (e.g., of carbon dioxide emissions) in logistics activities;
- Develop the Domestic Carbon Market aiming to capture and sequester carbon dioxide, energy efficiency and conservation of natural resources;
- Engage in the use of economic instruments for biodiversity conservation to reduce the rate of biodiversity loss and protect ecosystems and ecosystem



services, particularly to preserve the quality and value of water resources;

- ✎ Apply economic instruments such as monetary policy, Payment for Environmental Service (PES) and environmental taxation to support appropriate natural resource and environmental management;
- ✎ Promote effective green procurement in the public sector as well as create tax and financial incentives to advance and incorporate green procurement practices into purchasing and supply chain activities of the private sector;
- ✎ Build up attitude of green entrepreneurs by using life-cycle assessment and material tracking tools to identify materials, substances and chemicals in their products that pose significant environmental, health and safety risks and re-design their products to reduce or eliminate such materials, while improving the environmental

performance of their operations and products as well as green procurement;

- ✎ Encourage corporate environmental accounting that focuses on the cost structure and environmental performance of a company and provides accurate and complete environmental information to the public;
- ✎ Inspect and ensure that business environmental responsibility must include new ways of looking at all aspects of production and distribution, and moves beyond social and environmental (CSR) activities; and,
- ✎ Develop capacity in business sector on the use of economic policies to achieve environmental objectives and enhance their understanding of how to efficiently design and implement economic instruments for pollution control and natural resource management. ■



Energy and Environmental Management



Energy is an important basic requirement for human survival as well as a prerequisite for economic growth. However continuously increasing energy demand in parallel with population growth and a dependence on fossil fuel resources, which are limited, have brought about global climate change. These factors make it difficult to respond to long-term energy demand, which have seriously affected the environment and the well-being of human life.

TEI's Roles

To promote sustainable development, TEI has been emphasising the importance of energy since 1993. The goal of our research and operations is to promote energy conservation and create a balance that enhances appropriate energy usage in the context of Thai society to ensure the energy security of the country, reduce the impacts on health and the environment and reduce greenhouse gas emissions.

From 2004-2008, TEI promoted energy consumption reduction and increasing energy efficiency in the industrial sector by employing the Total Energy Management (TEM) method. Energy specialists have provided in-depth consultation to more than 200 factories and exchanged knowledge through hands-on operations for efficient energy usage. As a consequence, electricity consumption of more than 600 million THB has been reduced per year. TEI has also produced a handbook on the monitoring and maintenance of machinery and equipment in factories so that operators can become self-sustaining in the future.

Apart from the TEM method, TEI also uses other tools and approaches to promote the reduction of energy consumption and build positive behaviour in various sectors with different contexts, e.g., the Low-Carbon Society, the Clean Development Mechanism, Clean Production, Clean Technology, the Carbon Reduction Label and the Green Label. These tools have been introduced to operators and schools at local, national and regional levels to reduce greenhouse gas emissions, pollution and operational costs and increase competitive ability.

The promotion of participation in concrete reduction of energy consumption is evaluated by an important indicator, the reduced energy usage or greenhouse gas emissions as a result of operations of all parties. This indicator helps to emphasize that this issue requires contributions from everyone in society. The amount of energy saved or greenhouse gas emissions reduced can be monitored by joining TEI's activities/projects, such as:



- The partnership with Thailand Business Council for Sustainable Development to sign the Manifesto for the reduction of greenhouse gas emissions under the Low Carbon Society project;
- The development of the Carbon Reduction Label to certify that greenhouse gas emissions have been reduced during the production process following the criteria;
- The development of the Life Cycle

Inventory Database and Life Cycle Assessment to assess the level of energy usage and encourage reducing consumption of resources and energy in all stages of the life of products with a Green Label; and

- The use of the Carbon Footprint as a tool to establish a guideline for greenhouse gas emissions reduction.

Since the promotion of positive behaviour in energy and natural resources consumption will create a foundation for good practice in society, TEI focuses heavily on the Rungaroon project to foster sustainable energy and natural resources consumption among young people, such as The Ecological School Project, The Stop Global Warming Project and Reduce Global Warming in Sustainable Ways project. TEI concentrates on the energy management of related parties by organising training, workshops and seminars as a platform for knowledge exchange and consultation. Publications and websites are also developed to disseminate the knowledge on energy to the public.

Apart from the Carbon Reduction Label, which has been continuously implemented, the Green Label project focuses on the development of regulations to cover a wider range of products and Climate Friendly regulations to support the Green Procurement Policy. Emphasis is also put on the development of energy efficiency standards and labels that aims not only to enhance the

efficiency of electrical and electronics products but also to promote the standard and label testing system of developing countries in Asia to be in line with each other.

In the attempt to support agencies with good operations and set an example for the business sector, TEI has come up with the Alternative Energy Certificate which will be certified to organizations that produce energy for internal usage or for sale to external parties, for example, the organisations that produce electricity from renewable sources to replace the use of electricity from the main grid or the electricity provided by the Electricity Generating Authority of Thailand. If businesses realise the importance of the above and extensively build/establish renewable energy power sources in their buildings or factories, the need to build new power plants will be diminished and energy security will be ensured.

Establishing alternative energy or renewable energy sources is challenging work and is the future of the country. In 2010, TEI collaborated with Maehongsorn province and local and central partners such as the Ministry of Energy and the Electricity Generating Authority of Thailand in a project promoting renewable energy in Maehongsorn and nearby provinces. The objective is to strengthen the capacity in developing renewable energy in the province and to develop Maehongsorn as a model of a province that is fossil-fuel



free. The four stages of the implementation are as follows:

- Enhance the capability of provincial organisations in developing a renewable energy development plan;
- Seek further financial resources to support and develop renewable energy;
- Develop the capability of the locals in maintaining a renewable energy generation system; and
- Push forward policies and regulations supporting the locals to develop renewable energy.

During the past two years, the project has played an important role in strengthening the capacity of community/local leaders to be equipped with knowledge and understanding on the planning, the management of and the cooperation in maintaining their own power generation system. The capacity and readiness of the community has also been developed in order to become a model for other provinces. The awareness of energy and natural resources conservation has been raised in young people through collaborative activities with schools. Technical knowledge about the maintenance of the village's power plant system has been provided to community leaders and representatives. The project attempts to promote the development of a renewable energy plan in an integrated manner through the participation of all parties to set an example for other agencies in Maehongsorn province as well as to develop the province to become a model of renewable energy development in Thailand.

In terms of research at the international level, TEI has done collaborative projects with various research organisations in the Asia-Pacific region with the support

of ADB on energy security, energy technology transfer to reduce energy usage and reinforce energy security, and preparation for negotiations in the Conference of the Parties to the UNFCCC.

The work relating to energy conservation cannot be accomplished without the participation of the private sector. Such participation should not be compulsory but voluntary with mutual agreement. TEI has cooperated with business organisations to achieve sustainable development. The Manifesto from WBCSD has been used to promote the importance of the reduction of energy consumption in the private sector. Any business that wishes to participate in the project must publish the result of energy-saving measures or the improvement of the production process in the Annual Report of the company. After two years (2008-2010), the Department of Alternative Energy Development and Efficiency has upgraded the project to the promotion of voluntary energy conservation or Voluntary Agreement (VA) in order to increase the number of members of the energy conservation network. At present, 153 business organisations have joined the project, 95 of which are buildings and 58 are factories.



Call for Actions

Dependence on external energy sources for Thailand accounts for more than 60%, which as a developing country and an unstable economy poses high risks for the country. Internal energy production to reach 80-90% is very difficult, therefore it is recommended:

- All sectors should support and follow the implementation of Alternative Energy Development Plan, AEDP 2012-2021, and Thailand 20-Year Energy Efficiency Development Plan, EEDP 2011-2030, to increase the consumption of alternative energy and renewable energy by 25% by 2021 while energy intensity will be reduced by 25% by 2030.
- Promote research and development for commercial renewable energy and alternative energy to increase the ratio of different energy sources such as agricultural based renewable energy, solar panel production, and high efficiency battery production.
- Reduce risk by purchasing energy and electricity from various countries.
- Reduce energy consumption or use





energy efficiently through continuous cooperation with all sectors including the civil sector.

- Promote the production and consumption of alternative energy for both on-grid and off-grid to reduce the dependence on fossil fuel.
- Promote investment on smart grid system for transmission loss reduction.
- Promote the construction of community power plant especially for alternative energy to support grassroot community when facing energy problems from other countries, the electricity or energy in the country can partly reduce the impact on community. This should be supported along with smart grid system.
- Disseminate information of project plans with transparency, open to criticisms, and build mechanism for participation for all stakeholders to receive complete information, to reach agreements, to be beneficial

to all, and to accept the project proposal.

- Apply life cycle analysis, valuation, and supply chain management to revise industrial policies. Policies that supports industries that requires high amount of raw materials import, use energy intensively, and use Thailand only as a production base for exports should be revised. This is based on the fact that Thailand must import energy and the costs may outstaid the benefits as products or product parts are produced for other countries, which may also cause pollution problems and use of migrant workers in production where many of the business owners are foreigners.
- Study the suitability and guideline for the establishment of eco-agricultural industry as proper boundary or zoning for agricultural production and for food and energy for Thailand. The establishment should be flexible to consumers demand, market mechanism, and as preventative measure for food and energy crisis of the country. ■



Environmental Governance



Governance or good governance, is the concept of governing with ethics giving importance for participation of peoples in every sectors and having social responsibility, fairness, efficiency, transparency, and accountability. Good governance has been developed to address social, environmental, and economic problems caused by unsustainable development and economic imbalance which literally led to social and economic inequality, disparity and injustice for people living together. Moreover, the decline in morality of all professional and weaknesses and inefficiency of management mechanisms, both at national and organizational levels, of government agencies, private sector, or even society are the key factors causing instability for the country's development.



Role of Thailand Environment Institute

Since 1994, TEI has played a key role in supporting the concept of public participation in the development of fairness on the management of the natural resources and environment or “Environmental Governance” in line with the Principle number 10 of the Rio Declaration on Environment and Development that Thailand ratified in 1992. The Principle number 10 clearly stated the importance of people in sustainable development i.e. “Sustainable development must involve public participation from all sectors” and this has been an important element of TEI research and development nationally and internationally. Key activities included the study on role of environmental NGOs in Thailand, the public participation in the environmental impact assessment in Thailand and ASEAN countries, and the public participation in environmental vision of Asia and Europe.

In parallel, there are also activities to support communities and stakeholders in the form of tri-party arrangement for addressing issues related to the environmental impacts and health impacts on people and communities. These are the guidelines and framework for agencies to promote people participation in the setting up of policy and action plan for development which is an important element of sustainable development.

According to the success in conducting and advocating research studies, TEI was invited to become a member of an international environmental governance network or “The Access Initiative” (TAI) which received support from the World Resource Institute (WRI) as a representative from the South East Asia region along with representatives from other five countries from five continents during 2000 - 2001. TEI has jointly developed environmental governance indicators to be used as a tool to evaluate the work of government and industrial sectors regarding public participa-

tion aspect. During 2001-2009, these indicators were used in many development projects in Thailand and industrial development projects in Map Ta Phut Industrial Estate or environmental governance in Map Ta Phut project. At regional level, TEI initiated the development and provided supports to a non-government organization network with neighboring countries in ASEAN region and recommended for the application of these indicators in the EIA process in those countries including the establishment of networks and cooperation on climate change in the Greater Mekong Subregion. TEI achievement from the implementation of governance activities included:

- The findings from the 3rd Environmental Governance Study conducted by the TEI together with other organizations such as the Foundation for Sustainable Development and the Samutprakan Environment Club were used as the important inputs in 3 articles related to environmental and natural resource governance in the Constitution of Thailand in August 2007.
- There are requirements that information on environment and health must be available for public access by the Data and Information Act B.E. 2540, Article 7 (8).

To strengthen capacity of Civil Society Organizations (CSO) and media in participation in sustainable development, TEI has built capacity of these organizations

on effective communication with public and advocacy skill including the ability to access information, public participation, and Environmental Access Rights in which all of these are important principles for “Environmental Governance”. TEI activities will result in more effective law enforcement and compliance with Constitution so that the people and community will actually benefits.

Furthermore, TEI has provided assistance to personnel from the National Municipal League of Thailand and local administrative organizations in ASEAN region such as The Local Government Development Foundation of the Philippines (LOGODEF) and The Association of Cities in Vietnam (ACVN) in terms of capacity building. The program helped initiating healthy relationship and future collaboration in state, private and public sectors including local academics in order to plan and involve in decision-making process of urban and environmental development. This will subsequently shape a sustainable development network at local, national and regional levels.



Call for Actions

Based on more than 10 year experiences, TEI found that ethic standard has been lower because good behaviors and moral attitudes of each individual have been changed. TEI sees the need to focus on this area because children and youth find difficulty to differentiate what is ethical or unethical which is a principle of governance. Even though the Provision of the Constitution (Article 77), B.E. 2540 and the Constitution (Article 279), B.E. 2550 state that the requirement of official's behavior is ethical in order to prevent corruption and wrong-doing, and to increase performance efficiency, many unethical cases of officials are found. For example, some officials considered that receiving financial payment from entrepreneurs for approval of a development project is doable.

Governance is the fundamental consciousness or behavior of every individual, especially for youth. This behavior or conscious should be practiced in all single matter of everyday life, including management and family business. In another word, this governance should be taken into consideration in every matter in order to lay good foundation of Thai society. Therefore incorporating environmental governance into educational curriculum is considered critical important and advocated society especially those having power to see the important of governance all the time.

In addition, future activities related to the environmental governance consists of the followings:

- Build reliable and acceptable monitoring systems and processes for “environmental governance” in order to mitigate conflicts between development and management of natural resources, particularly, the one that affects the natural resources and the environment.



- Create mechanisms, channels, and communication approaches that enable people to be able to access to information. This includes reporting of current situations of and impacts on the environment, health and society, especially, the information for people who are directly related to those incidences. This includes encouragement



in presenting accurate information regarding the issues that are controversial in the society both negative and positive aspects. This information can be employed to reduce biases of stakeholders in decision making processes and show transparency.

- ▼ Improve and develop appropriate indicators for development in each area so that people and relevant agencies can monitor and assess environmental situation by themselves.
- ▼ Strengthen environmental governance networks in Thailand and Southeast Asia. By the first phase it is necessary to build the thematic network directly related to the region needs such as climate change, value

and utilization of ecological system and services, reduction of slash and burn agriculture including collaborative use of natural resources and environment .

- ▼ Expand regional networks by inviting new country members and to provide knowledge and understanding on environmental governance in member countries so they will be able to advocate various issues according to each member country's need and condition and also able to drive on regional issues. ■



Environmental Education



Environmental conservation and the solution of environmental problems can be achieved through cooperation, acceptance, determination and continuous interest of all stakeholders. Few problems can be solved in a short time as there are many complex factors involved. A plan must be established to ensure work sustainability in order to achieve goals, especially on education. It is important to instill in the young generation with values to appreciate what is left of our natural resources and ensure that children are well brought up since they will be an important foundation of our society.

Since its foundation in 1993, TEI has pushed for natural resources and environment policies on many

dimensions. The institute found that if we ignore the importance of instilling in youth group, environmental problems will only be solved for a short while. In 1997, the institute has begun to integrate natural resources and environment into curriculum and course at every educational level as well as has driven it continuously until the present following the approach below.

Driving Policies to Actions and from Actions back to Policies

In the past, TEI implemented and pushed policies through an integrated education both at primary and secondary levels. While waiting for the results from the policy driving TEI implemented the ideas and plans to bring about actions for learning and testing the ideas and hypotheses. At the same time, TEI also developed various tools that could be used for business and administration of other agencies to timely deal with the problems and to bring about acceptance from all relevant parties.

Moving forward, TEI will bring the results from driving the implementation back for driving the policies by working with the partner networks to push and help the government on educational changes in the context of natural resources integration in all aspects so that behavioral change could lead to cultural change more than just providing education and awareness.

Driving through Building Stakeholders and Partnerships

The government sector

“Pushing for environmental education will not succeed without cooperation and support from partners” is the statement

that has been used by TEI to remind itself. Therefore, the implementation of activities was carried out based on cooperation among the government agencies responsible for education such as the Office of Basic Education Board for Bangkok Metropolitan Administration (BMA, since there are BMA schools), private schools, and the institute to promote teaching on sciences and technology. In addition, TEI has been working in cooperation with the agencies responsible for natural resources, environment, and energy such as the Office of Policy and Energy Planning and the Department of Environmental Quality Promotion and this has helped TEI in ensuring consistency between the activities and policies. TEI has also provided guidelines on policies and plans to various government agencies so that every agencies realize the importance of education on changing in consumption behaviors or utilization of limited natural resources.

The private sector

Depending only on government budget and officials will not give us a clear picture of the future. Therefore, in every step, TEI always considers engagement of all parties to work with us. Similar approach is applied for education

when TEI has seen clear policy scenarios and various constraints especially in incorporating environment and energy into the eight subject groups. It is difficult in the context of driving changes in the working culture of the Ministry of Education. However, the problems could not be waited because new babies are born every day while natural resources are depleting and pollution continuously increased. TEI begins to look for partners and determines to help the society especially in filling the problem's gaps that could not be addressed by the government.

TEI has persuaded and invited many private sectors to see the importance and be part of the efforts to upgrade and reform education that pay more attention on conservation of natural resources and pointed out the consequence of not doing any things in the future. Success can be seen from the fact that at present many companies are interested in promoting education as part of their Cooperate Social Responsibility (CSR). There are many companies that realized the importance of environmental education and continuously cooperate with TEI in developing activities to help strengthening society by providing strong foundation for young generation through trial and error process, adjusting idea on working that are modernized, understanding behaviors, and developing thoughts and learning of young generations.

Teacher and youth leaders

With the lessons learnt from actions, TEI found that implementation

with the lack of seeing self importance, self initiatives, self actions, and building participation of schools will result in weak school and that waiting for help from other sectors will lead to discontinuous and failure after a project is completed. TEI has therefore positioned its role as a “catalyst” or an implementation accelerator and be a guardian providing knowledge, recommendations, and teaching on systematic thinking and results-based to teachers and youth leaders.

Driving through technical knowledge and issues that society consider importance

TEI has brought the issues that capture attention both domestically and internationally to be the driving issues for building awareness in order to create behavioral change that could lead to cultural changes such as climate change, sufficiency economy, international system for chemical management and labeling, and integration of eco-schools.

Driving through technology and knowledge

Development of environmental management during each period will always generate modern technology, knowledge, and tools. Adjusting this knowledge for building management system that is appropriate is feasible in practice and this could create public participation, build teacher and student leaders that could



play an important role in extending the results or carry out the activities continuously and sustainably. Techniques, knowledge, and tools that was applied by TEI in driving the environmental education could be divided into 3 groups as follows:

- Integration of curriculum: Applied the principles related to Green map, Whole School Approach.
- Activities: Applied the principles related to Life Cycle Analysis (LCA) , Cleaner Technology (CT) , Carbon Footprint, Small Group Activities (SGA) .
- Empirical result: By giving reward, education fund, study visits both in the country and oversea, and competition on results.

Driving through Two Ways Communication

Providing opportunities for young generations and networks through the exchange of knowledge, learning, expressing opinions, and demonstrating capacity are importance for development of environmental education. This will let us know the progress, thoughts, and needs of the networks and leaders and help in assessing results of the TEI's performance. TEI has been using many different approaches to communicate with the networks, leaders

of teachers and students such as PliBai magazine, creation of project websites, and providing opportunities for youth to present their works such as research on health and global warming, picture drawing, and essay writing competition, and showcasing of their competency.

Driving from School to Family and to Community

Driving education within the educational institutes cannot lead to change on consumption behaviors if families and communities continue to carry out their usual daily routines. In other word, expanding the actions to families and communities through all youth will be much more productive. Therefore, many projects and activities on environmental education will incorporate families and communities. Past implementation has proven that this direction is right and it can drive both education, social, and environmental development as discussed below:

On Education:

- Students are able to learn through integration process and have adequate understanding to apply their knowledge into all aspects of their daily life both from learning, consumption, living style, and self

¹ Means study on environmental impacts throughout the live cycle of the products or activities starting from acquisition of raw materials (cradle), production, utilization, throughout disposal (grave) by considering every steps that how much resources and energy uses and what/how much wastes are generated (garbage, wastewater, air pollution).

²Strategy to improve production, services, processes, and operation continuously for effective management of resources with minimum change wastes or no wastes.

³To measure amount of gas carbon dioxide (CO₂) and other greenhouse gases that are emitted from human activities or from production process of products, services, or other activities.

⁴ Means team of actors that get together to solve problems in the areas that they are responsible for or reside in focusing on participation and team work.

actions that could live happily in harmony with nature including knowing how to manage and use the limited natural resources effectively and appropriately.

On Social

- Schools and communities and youths and parents have opportunities to learn and work closely together to adjust their living in order to reduce impact on environment such as reducing chemical use in agricultural sector and increasing green zones in communities and creating food stability for locals.
- Establishment of networks that realize the importance of sufficiency economy and natural resources and environmental management has taken actions on the ground and there are share/transfer of local wisdom and successful practices to neighboring communities which could help strengthening communities especially on natural resources and environment conservation in local area.

On Economic

- Schools and families have further developed activities in accordance with the sufficiency economy which enable them to grow organic products for their own consumption and sale which help increasing their income.

On Environment

- Establishment of ordering process for managing school environment after learning about relationships between man and nature and among nature them self including creating behavior on appropriate management of resources and solid wastes in schools and communities.

Driving Patterns

Human resource development: integration of learning and teaching on energy at primary and secondary levels

With support from the Energy Promotion Fund and cooperation with the Education Ministry, TEI has initiated the integration of learning process at primary and secondary levels on conservation of energy and environment (Rung Arun project) in 1997 and the activities has been continued to the present. The sixth stage (2012) activities focused on promotion of the development of thinking process and skills of teachers and personnel on education management, transfer of knowledge on energy to students, and management of energy and environment in schools under the main concept of participation, integration, learning, and whole-school approach and being an eco-school. So far, more than 1,000 primary and secondary schools participated in the project nationwide and this has created a



school network that adopted an integrated energy and environment. There are also an exchange of ideas and good practices in conserving energy among schools and development of teaching materials on energy and environment including other activities that can be further carried out and applied to communities and local peoples' daily life more objectively.

Driving schools to become eco-schools

This is to help schools developing good practices in natural resource management by (1) through working with the management and teachers to design curriculum for integrating of environmental content into school's learning system and (2) promoting the activities initiated and participated by youth by focusing on two operations i.e. Changing behaviors and building awareness on daily life activities that value natural resources through a thinking process and undertaking various activities, and Analysis of problems by students and specialists covering the environmental and energy so that there are improvement on the use of equipment more effectively and appropriately.

Such development of good practices in schools leading to development of a network of school with outstanding performance on natural resource management and integration of learning and teaching on environment with tangible results and are able to become a learning center for

neighboring schools and communities.

Integration of knowledge to management of learning and school activities

TEI has developed curriculum and activities that are appropriate to the problems facing the country such as

» Climate change and sufficiency economy

This is to push schools under the responsibility of the Office of Basic Education Commission to become model schools on “reducing global warming by self-sufficiency” through the development of knowledge and understanding of educational personnel and teacher leaders on how to convey facts on climate change to help adjusting the attitude and behavior of young people to adopt sufficiency life-style that help reducing global warming with educational measures by integrating learning management at schools and communities. Giving the importance of friendly learning and implementation of an integrated system has resulted in 7 learning activities: i.e. 1) classrooms that reduce global warming with self-sufficiency, 2) development of learners through learning sources, 3) build bio-diversity, 4) management of solid waste at schools, 5) reduce global warming with self-sufficiency, 6) efficient use of resources, and 7) bio-products.

- Educating students and youth on statements on danger of chemical substances according to an international GHS

Globally Harmonized System of Classification and Labeling of Chemicals (GHS) is a system designed under the Agenda 21 on toxic chemical management. In 2002 at the summit on sustainable development and from the 4th meeting on cooperation among governments on safety on chemical safety (2003) it was agreed that the member countries will adopt the GHS system within the year 2008 because the GHS system will help improving the management of chemical substances between countries which will lead to health safety for human and environment including reducing limitations on chemical products among countries.

TEI and the Food and Drug Administration have teamed up to support preparation of children and young people by enhancing their understanding through media in the learning and teaching process so that young people can carry out their daily routines related to chemical properly and safely by focusing on participation of the manager, teachers, learners, and those who play a key role on education promotion including education in the appropriate form and expand the results from implementation to other schools.

- Carbon footprints for schools

Since learning about carbon balance or greenhouse gases balance that are utilized and generated from daily activities will facilitate the analysis of activities that are necessary and those that are not. This will reduce the use and generation of carbon with good understanding and voluntary. TEI incorporation with the Office of Basic Education of the Ministry of Education see the importance of global warming and climate change that re related to resource uses and have been implementing the activities with the objectives to create awareness and campaign to reduce the use of resources important at school and reduce greenhouse gases such as in travelling, use of cooking gas, use of electricity, use of tap water, including reducing the need for bring garbage to landfill by separation, recycle and reuse of plastic bottles, paper and food wastes.

- Reduce global warming/climate change: Low Carbon School⁵

Global warming problems and climate change have become closer topic and can affect living conditions directly or indirectly. Building knowledge, understanding, and awareness on the problem conditions are necessary for teachers and students. To bring knowledge to development of curriculum and activities that could reduce energy consumption and



⁵ For easy understanding the word Carbon is used but in the implementation the word carbon means greenhouse gases

greenhouse gases from schools and homes including building networks to work with local communities.

TEI and Toyota Motor Thailand have carried out activities focusing on building learning process and transforming knowledge into actions with key indicators i.e. amount of greenhouse gases that can be reduced, and developing a network that could carry out the activities continuously by focusing on the main four areas:

- Activities to reduce energy consumption such as inspectors to check schools' energy consumption, changing of electricity equipment, bulbs and contests for outstanding families for energy conservation.
- Activities to reduce garbage generation in schools such as replacing use of plastic bottles with glasses, setting up garbage recycle banks and producing teaching tools from left-over material.
- Activities to increase green zones by stressing maintenance and survival of trees after plantation by increasing green zones both at school compounds and in communities.
- Activities to promote sustainable modes of transport such as use of student buses and promote use of bicycles.

At present, there are a total of 210 schools and 167 municipalities participated in the project. This could help reducing

more than 9,500 tons of greenhouse gases. This also makes the schools with good practices in reducing greenhouse gases to further develop the activities toward becoming "low carbon school" with sustainability.

➤ Sustainable development/sufficiency economy: model school on Doing Good for Father

Driving sufficiency economy principle to actions focusing on education sector and community is a way to transform knowledge that is good for actions from "the King's philosophy" to help building stability and balance sustainably both in terms of economic, social and environment. This could lead to building stability in one's life, conserving and inheriting of local wisdom, and conservation of natural resources and environment including building networks of learning throughout local communities in Chachoengsao Province.

The promotion and application of sufficiency economy started in 2008 until the present. Schools which took part as "model schools" will have learning management according to the sufficiency economy's principles and put them into practice and will expand the learning network from the school to communities by beginning from the family that is responsible for the student which then lead to the establishment of the learning networks on "Model School" and "Model Family".

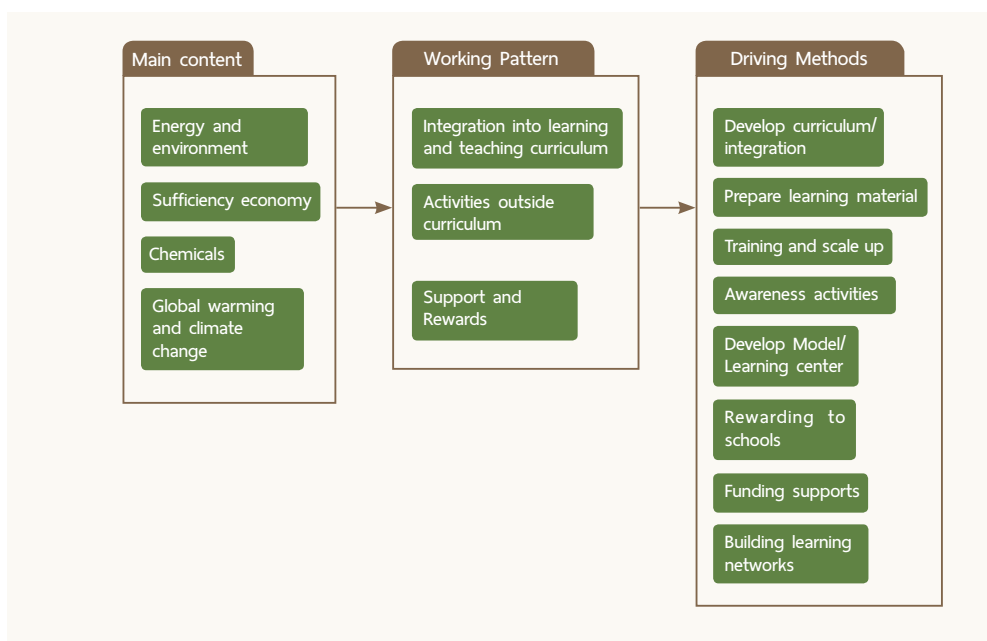
Enhancing potential of youth: Health and Climate Change Fund

Communication and provision of knowledge, understanding, and awareness on the impacts of global warming which will affect climate change, natural resources, natural disasters, and health are issues that capture worldwide attention and solutions are being sought. Thailand as a country with bio-diversity and is the world's food source is at risk of being greatly affected especially on health sector due to epidemics and rising numbers of disease carriers and new diseases. Communication to make young

therefore been established under the umbrella of TEI to produce local young researchers and to disseminate information on impacts to the network members.

Methods to push forward environmental education

The method to push forward environmental education can be divided into three parts: main content which is used as central media, working patterns to achieve the objectives, and methods for driving forward as shown in picture below



people understand and jointly conduct research to study about possible impacts and find solution since Thai society has given little attention to these issues. The Health and Climate Change Fund has

The center of excellence and actions on education promotion for sustainable development in the region

In 2006, TEI was selected by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to be the center for excellence and operation on educational promotion for sustainable development in the region. Main mission is to promote and support learning activities outside educational system in line with sustainable development. To achieve this mission, TEI focused on collection of achievements regarding education on sustainable development of schools that belong to the Department of Local Administration including setting direction for management of sustainable urban development with 146 participating municipalities in the project by presenting their work on education for sustainable development of schools and taking part in the network to manage education for urban sustainable development.

Supporting rewards

In implementing environmental education providing incentives is considered part of the success since some projects had requested for His Majesty the King's royal trophies to reward schools with successful environment conservation and outstanding achievements on reducing global warming. This incentive has made the winning schools feel proud and help driving the school activities continuously and sustainably.

Environmental integration into education

With many years of determination to work on environmental education continuously, gap between education and understanding and access to information on natural resources and environment has been reduced which could be seen from an increased in the content on natural resources and management including conservation have been incorporated into more textbooks of every classroom of the Ministry of Education. Nearly every school has carried out campaigns and activities to educate on efficient use of natural resources especially on the use of electricity, energy, and garbage recycle. At present, these educational activities have been carried out at kindergarten level.

School networks

TEI has established school networks that are ready to implement the activities and move forward with TEI to drive the environmental education activities continuously so that it could lead to change in behaviour and culture of Thai society that respects and values natural resources and environment. Key activities are as follows:

- Integration of learning and teaching in the form of management system approach at more than 1,000 schools.
- Climate change activities more than 300 schools.
- Building networks on sufficiency economy

schools, eco-schools, and activities involving chemical substances at more than 100 schools.

- Establishing two-way communication through the magazine Pli Bai at more than 10,000 schools.
- Environmental education

Call for Actions

Children are our next generation and instilling good behavior at a young age is still one of the highest priorities that complements transformation of the educational system and development of education personnel in the context of natural resources and environment conservation, and sustainable production and consumption. Behavioral change is more important than raising awareness and understanding about the environment, which can better prepare an individual for sustainable production and consumption society. Important aspects for Thai society are as follows:

- Promote and develop capacity and teaching skills for teachers at all levels to better transfer the knowledge and effectively instill perspectives on environmental conservation to the youth as a standard in teacher development curriculum.
- Promote behavior changes at all levels in society for sustainable production and consumption, valuing ecological and natural resources, and



environment especially in children, youth, and university students.

- Develop indicators for practical behavior changes after implementing environmental education to youth, community, and society.
- Develop teaching materials adapted to modern society and interest of children and youth, which include physical, emotional, mental, and mind development.
- Mainstream environmental education into all education levels, including formal and non-formal education, by putting emphasis on learning outside of school and practical learning along with theoretical learning.
- Select outstanding environmental education activities to scale-up and expand to other schools.
- Create understanding about environmental ethics in all education levels as appropriate.
- Create a foundation for creative thinking in research in all education levels for elementary and secondary schools, vocational schools, and higher education and in local knowledge. ■



Capacity Building on Environmental Management



A capacity building on environmental management is one of the TEI's missions by means of organizing training program for personnel in both industrial and commercial sectors. The program aims to educate, widely create better understanding and awareness of effective environmental and natural resources management as well as to encourage the efficient and sustainable use of energy. TEI contributes to shaping and changing behaviours in terms of environmental-friendly production and consumption including an improved environmental management system.

TEI's Roles

With a 20 years of experiences, TEI has employed its valuable expertise to continuously develop training courses responding to current situations and in line with accuracy of academic principle and relevant laws and regulations. Since 2005, more than 16,000 people have undergone the training courses. The program is also considered as “TEI’s Social Service Practice” as it ultimately benefits all sectors in the society. The four main training packages are offered to public as follows:



Pollution control for industrial personnel courses.

The programs initiated for plant staff whose work directly relates to environment.

The Institute is an accredited training body under the steering of Department of Industrial Works, Ministry of Industry with objective to educate and increase personnel’s potential on environmental management. According to the notifications of Ministry of Industry in 2002 and 2011, it is stated that the industrial factories must employ staff to monitor the environmental

issues and assure the lowest level of pollution produced from the factories. In order to support MOI, the institute is providing a total number of 7 training programs which are categorized in 3 levels. These comprise of (1) environmental manager level (2) pollution control supervisor level and (3) pollution prevention practitioner level. The programs cover essential skills for environmental management, prevention of water and air pollution including industrial waste management.

In-house trainings provider.

TEI provides a number of in-house trainings for public organizations including energy management, energy conservation, awareness on environment, environmental management, waste management, environmental laws, global warming, climate change, New Mechanism Post 2012 and Small Group Activity (SGA).

Development of other convincing environmental courses.

TEI provides wide range of capacity building courses. These include Clean Development Mechanism (CDM), Conflict Management, Technology for High Efficiency in Building, Advanced Technology for Wastewater Treatment, Lean Management for Environment, Green Product Development for Sustainable Environment, Green Business for Sustainable Development, Water Quality & Wastewater Management, Environmental Law Enforcement and Tax for Executives and a basic technique to perform primary electrical test which helps reducing expenses on electricity.

Site Visit program

TEI is also provide an opportunity for its training participants to visit companies that are well-known for their Best Practice in energy management, environmental management, Small Group Activity, one page management, waste and industrial waste management and Clean Development Mechanism (CDM)

Having implemented all four parts of training program, the institute has significantly underlined the importance of course trainer selection to ensure the best quality of course content and service to participating parties. TEI wishes the knowledge acquired from the trainings is practical and can be maximized as it is used in real working context as well as fulfills the objective of capacity building for personnel at organizational, national and international level.

In summary, the main objectives of the Institute's capacity building program are to raise awareness, promote environmental friendly behavior and best practice for sustainable use of natural resources, energy conservation and management. It also has a focus on reducing Greenhouse gas which leads to world's climate change. By applying different theories and training tools, the institute has tailored courses to fit specific context of each organization. The theories include Low Carbon Society, Clean Development Mechanism, Carbon Footprint, Life Cycle Assessment, Cleaner





Production, Clean Technology, Carbon Reduction Label, Green Label, and Lean Management of Environment.

The training campaigns have been

promoted among business entrepreneurs, schools, local units, and organizations at national and regional level to effectively help reducing Greenhouse gas, pollution, and cost of business. Moreover, these will consequently result in country's capacity in managing energy and improve country's competitiveness in ASEAN Economics Community (AEC) and Global Community. The institute will soon be developed as a "Learning Organization" with objective to disseminate knowledge by arranging seminar, visit program, workshop, a forum that opens for public opinion and knowledge sharing, E-book, providing advisory service on environment as well as dissemination of publications and knowledge sharing on website.

Call for Actions

Global trends towards Green Economy development and Thailand National Economic and Social Development Plan will create needs in the labor market for workers with new knowledge and skills (Green Jobs) to support this new green economy. Especially, knowledge and skills related to energy efficiency and energy development, development and maintenance of circular energy system, environmental conservation and pollution control as well as conservation of foundational natural resources. Thailand must take advantage of the opportunity from this development and produce workers and personnel to fulfill this need in terms of numbers and quality. Different aspects of human resources capacity development for environmental management are as follows:

- Promote ethical conducts and development of regulations for environmental ethics as a guideline for environmental managers specifically for technical consultancy
- Develop curriculum, communication media, and lecturers with knowledge related to eco-design professions, agroforestry professions, and eco-tourism and adventure guides
- Develop environmental manager registration system for 1) businesses



with activities/production process that poses high risks to natural resources, environment, and ecological systems; especially, businesses with high emissions of pollution or generates large amount of packaging wastes
 2) businesses that directly depends on the ecosystem and its services
 3) factories in industrial estates for the development of eco-industrial park including activities for society
 4) environmental management and pollution control service providers

- Develop curriculum to build capacities of local government offices or local organizations in terms of 1) ability to analyze risks related to natural disasters or climate change that may

occur in the local area 2) ability to prepare for and respond to climate change impacts 3) ability to evaluate cost and benefits for investment in activities to reduce or prevent damages to the local economy, society, environment, and health 4) ability to plan and implement effectively

- Promote and develop local human resources capacity knowledge and understanding of ecological systems and basic environmental management including the ability to develop guidelines for local natural resources conservation
- Leverage information access to the public by developing E-learning system / E-magazine on natural





resources, environment, and ecological systems

- National needs assessment of the number and professions (Green Jobs) at different levels: vocational, higher education, and local skilled workers related to different aspects of development especially for large development projects, and rapidly develop curriculum and personnel to fulfill needs in the profession for the future
- Study the suitability in establishing funds for local labour skill development for training and development of local workers skill to fulfill the needs of project contractors at all stages of project implementation through promoting vocational schools and local colleges to organize training and promote workers' skills, which is part of promoting economic growth and education in various professions in the local area. ■



Thailand Business Council for Sustainable Development (TBCSD)



The Thailand Business Council for Sustainable Development (TBCSD) was established in November 1993, formerly chaired by the former Prime Minister Mr. Anand Panyarachun. At present, the members of the Council comprise 35 leading business organisations sharing the common goal of promoting social and environmental development. The concept is to manage the business operation in an environmental friendly and corporate social responsibility manner. Thailand Environment Institute serves as the Secretariat Office of TBCSD.

Over the past 20 years, TBCSD has been committed to focusing on enhancing participation and raising environmental awareness at the international, regional, national and local community levels through a systematic process utilising the latest and most diversified knowledge available. A proactive approach has been applied together with supporting our beautiful traditions for conservation and efficient development of the sustainable environmentally friendly manufacturing and aiming to concrete model of strengthening Thai business and society sustainably.

The 35 high-profile business leaders currently are members of TBCSD.

The Industrial Estate Authority of Thailand
 The Electricity Generating Authority of Thailand
 Krung Thai Bank Public Company Limited
 KASIKORN Bank Public Company Limited
 Siam Commercial Bank Public Company Limited
 Carpets International Thailand Public Company Limited
 Charoen Pokphand Foods Public Company Limited
 Chevron Thailand Exploration and Production Company Limited
 Double A (1991) Public Company Limited
 Dow Chemical Thailand Company Limited
 Tetra Pak (Thailand) Company Limited
 Toyota Motor Thailand Company Limited
 ThaiNamthip Company Limited
 Thai Oil Public Company Limited
 Mitr Phol Group
 The Bangchak Petroleum Public Company Limited
 Bayer Thai Company Limited
 PTT Public Company Limited
 PTT Exploration and Production Public Company Limited
 The Siam Cement Public Company Limited
 Siam City Cement Public Company Limited
 Asia Cement Public Company Limited
 Ratchaburi Electricity Generating Holding Public Company Limited
 PTT Global Chemical Public Company Limited
 Unilever Thai Trading Company Limited

Vinylthai Public Company Limited
 Star Petroleum Refining Company Limited
 MCOT Public Company Limited
 InterfaceFlor (Thailand) Company Limited
 Esso (Thailand) Public Company Limited
 Amway (Thailand) Company Limited
 IRPC Public Company Limited
 Honda Automobile (Thailand) Company Limited
 The Crown Property Bureau
 Thailand Environment Institute



TBCSD's Roles

For the last twenty years, TBCSD, with the Thailand Environment Institute as the Secretariat, has conducted all projects in keeping with their objectives, for example, the “Study on the Environmental Impact of Lignite”, which qualifies and quantifies effects on the environment and quality of life and investigates pollution control approaches; the “Environmental Conservation Circle (ECC)”, which aims to foster changes in attitude and practices regarding environmental conservation; “Benchmarking Environmental Management Project” to improve products and services to reduce the environmental impact as well as production costs; “Pesticide-Free Agricultural Villages” by providing knowledge and alternative agricultural systems so that farmers can use biological insect control agents; “The Renovation of Klong Lod”, to improve the landscape surrounding the canal and develop a historical education centre and a recreational area for the public; “The Promotion of the Preservation and Development of the Historic City of Ayutthaya” to restore and preserve the ancient ruins and promote tourism; “Koh Kret Project”, to formulate a master plan for sustainable management of the area and the communities as well promoted appropriate local ecotourism. In addition, in 1997 TBCSD collaborated with the World Business Council for Sustainable Development (WBCSD), TEI organized a seminar to share experiences on the implementation of sustainable development projects from BCSD members all over the world.

TBCSD continues the following projects and the main activities that aim to develop and be responsible for society and the environment of our country:

Global Warming and Health Fund,

which responds to the crisis of climate change, which is growing increasingly severe, by providing the young generation with local research on the indirect and direct effects of climate change on the health of people, setting up the guidelines to protect health and improve health problems resulting from global warming and also producing publications and passing on knowledge to related organisations as well as local people. The research by young people has been adjusted to be beneficial to the business sector in terms of waste management and alternative energy sources, such as the study project by Thepsirin Nonthaburi School on the efficiency of using grease trap waste for fuel in Plai Bang Municipality, Bangkrui District, Nonthaburi Province.

TBCSD Manifesto for Energy Efficiency in Buildings,

Thailand Environment Institute have been supporting the private sector and organisation members to join in declaring their intentions to reduce the energy usage in buildings. This will lead to reducing greenhouse gas emissions, including setting new standards for energy management in buildings in our country. In 2012, the Department of Alternative Energy Development and Efficiency (DEDE) asked for cooperation from entrepreneurs and the private sector to extend the results of the project campaigning for energy conservation in buildings, in the form of a “Voluntary

Agreement: VA Energy Beyond Standards”. The project aims to campaign and initiate entrepreneurs and private sector to collaborate in energy conservation that will extend and publicise the activities so that they will be better-known. In 2013, the networking of its members has continued to expand. In addition, a training course in energy conservation in buildings was offered for the organisations participating in the project. At present, more than 150 organisations with more than 1,400 buildings are in our networking.

Capacity Building with regards to Business Competitiveness and Good Practices covers the continuous provision and sharing of knowledge among organisation members and other related organisations on social-interest topics such as resource and energy conservation, global warming, conducting business with eco-awareness, environmental governance monitoring, and the role of business in resource restoration, etc. In addition, activities are offered, such as visits and field trips to study best-practice approaches of other national and international organisations. Lessons learned from organisations of beyond-standard operations cover issues of social and environmental responsibility or business operations with ethical practices and good governance principles for local and overseas societies. Also included are operations that are below standards required by law. Several organisation members have developed and improved their operations beyond standards



required by law because of their foresight and care for the surrounding community.

Awareness raising on natural resources and environment,

In line with raising the awareness by creating a learning centre of an ecosystem, TBCSD has developed a small island in water at Sirindhorn International Environmental Park as a biodiversity area fertile because of new planting methods that emphasises the suitable nurture of young plants after planting. In addition, since TBCSD realises the importance of increasing carbon capture and storage, we collaborate with the people of Koh Klang, Krabi Province, to restore its natural abundance and also instill in the youth and the local people the value of loving and caring for mangrove forests and wildlife. We also aim to instill the same values in the public and private sectors while pushing Koh Samui to develop into a green island with sustainable diversity such as Water Security, Low Carbon Society, Clean Development Mechanisms, Youth Development as well as Waste Management.

Green Label,

TBCSD started the Green Label in Thailand in 1993 to signify to the consumer that one product has less impact on the environment compared to another product of the same kind. Under the approval and cooperation of the Ministry of Industry, the Ministry of Science, Technology and Environment including other related private

organisations, the Thai Industrial Standards Institute and Thailand Environment Institute have served as the secretariat. At present, the Green Label project is accepted at the national and international levels. Furthermore, the government's green procurement policy and the Global Ecobelling Network group contain aims to change the consumer's behaviour to use the more and more eco-products.

In preparation for disasters,

TBCSD has set up a Hotline Centre as an aid network in disasters in which all resources are mobilized as well as collaboration from the private sector, so that aid will be directly delivered to those areas as soon as possible, such as drinking water, medicine, clothes, fuel, cement, sugar, etc. For example, winter clothing, scarves and blankets were collected to give to sufferers of cold weather at Ban Hang Thang Luang, Phu Fah Sub-district, Bor Kluea District, Nan Province; and Barn Mae Dok Dang, Village No. 1, Chueng Doi Sub-district, Doi Saket District, Chiangmai Province; necessities were distributed to fire victims at the Barn Mae Surin evacuation centre, Khun Yuam Sub-district, Khun Yuam District, Mae Hong Son Province; and to flood disaster victims at Kabin Buri District and Sri Maha Pho District, Prachinburi Province. In addition, the model for landslide disaster protection was constructed. In 2010-2011, TBCSD collaborated with the Department of Mineral Resources in developing a model

of landslide disaster protection for three villages in Phu Fah District, Nan Province,

which will act as a representative area before expanding to other disaster areas.

Call for Actions

Environmentally conscious in conjunction with business practices with regard to supply chain values must be the focus for driving business development forward. The following are the key directions:

- ✎ Give importance to private sectors' role in collectively conserve natural resources and environment by providing advice and guidelines for the private sector to take initiatives on natural resources restoration
- ✎ For national natural resources and environmental issues that requires immediate intervention, the private sector should collaborate to further the knowledge and use CSR implementation effectively to intervene in these issues
- ✎ Provide tax incentives to the private sector to support and implement corporate social responsibility relating to the country issues on a yearly basis or for every 3 years
- ✎ Disseminate best practices cases by enterprises and businesses that are operating better than standards as a showcase to the society
- ✎ Promote green growth in the private sector, which will affect research and technology development for manufacturing of environment friendly products and services within the industrial sector. This is a great opportunity for having the cooperation with the private sector, in terms of budget and research improvement, to produce more environmental research that can be commercialized at the industrial scale.
- ✎ Public sector should concretely support energy efficiency of building
- ✎ Research fund should be increased by 0.2% to 0.5% of GDP. The public sector should ask for the private sectors' support by creating a partnership in further research and to produce good quality researcher for the country since they have the capability in commercial research and development and efficient budget management
- ✎ Natural disaster preparedness plan is an urgent matter that needs attention and it must respond to disaster victims' needs immediately and properly
- ✎ Promote research related to global warming and disseminate the information to the public to raise awareness and be better prepare for occurrence of events as a result of global warming in the future. ■



Financial Report

Thailand Environment Institute Foundation
Statement of Financial Position
As at 31 December 2012

	2012				2011
	Operating fund	Sponsored program fund	Capital and reserve funds	Total all funds	Total all funds
	Baht	Baht	Baht	Baht	Baht
Assets					
Current assets					
Cash and cash equivalents	52,014,838	78,324,995	629,877	130,969,710	111,608,730
Short-term investments	18,932,356	13,988,731	91,496,078	124,417,165	98,502,889
Trade and other receivables	483,746	21,851,606	2,331,713	24,667,065	28,070,880
Total current assets	71,430,940	114,165,332	94,457,668	280,053,940	238,182,499
Non-current assets					
Long-term investments	-	-	12,000,000	12,000,000	20,000,000
Restricted cash	5,100,000	-	-	5,100,000	1,090,960
Property, plant and equipment, net	29,533,552	760,835	-	30,294,387	34,474,293
Intangible assets, net	31,833	21,740	-	53,573	76,183
Total non-current assets	34,665,385	782,575	12,000,000	47,447,960	55,641,436
Total assets	106,096,325	114,947,907	106,457,668	327,501,900	293,823,935
Liabilities and fund balances					
Current liabilities					
Trade and other payables	2,141,118	90,125,203	75,315	92,341,636	89,253,597
Total current liabilities	2,141,118	90,125,203	75,315	92,341,636	89,253,597
Non-current liabilities					
Retirement benefit obligations	-	-	4,458,507	4,458,507	7,421,309
Total non-current liabilities	-	-	4,458,507	4,458,507	7,421,309
Total liabilities	2,141,118	90,125,203	4,533,822	96,800,143	96,674,906
Fund balances					
Unrestricted funds	103,955,207	-	17,373,839	121,329,046	119,256,609
Restricted funds	-	24,822,704	84,550,007	109,372,711	77,892,420
Total fund balances	103,955,207	24,822,704	101,923,846	230,701,757	197,149,029
Total liabilities and fund balances	106,096,325	114,947,907	106,457,668	327,501,900	293,823,935

Thailand Environment Institute Foundation
Statement of Financial Position
As at 31 December 2012

	2012				2011
	Operating fund	Sponsored program fund	Capital and reserve funds	Total all funds	Total all funds
	Baht	Baht	Baht	Baht	Baht
Revenues					
Sponsorships for research activities	900,000	152,583,676	-	153,483,676	102,092,473
Membership fee income	1,900	9,437,726	-	9,439,626	8,546,228
Other income	2,638,429	1,010,577	2,897,406	6,546,412	5,133,465
Total revenues	3,540,329	163,031,979	2,897,406	169,469,714	115,772,166
Expenditures					
Salaries and related staff costs	15,408,865	29,176,095	(1,833,342)	42,751,618	50,353,985
Sub-contracts for researches	631,417	16,567,961	-	17,199,378	7,133,904
Rental expense	210,882	2,656,449	-	2,867,331	3,080,782
Utility expenses	1,046,047	35,475	-	1,081,522	848,027
Communication expenses	370,468	2,375,388	-	2,745,856	2,375,458
Travelling and related costs	238,305	7,280,882	-	7,519,187	4,773,645
Meeting and seminar expenses	1,102,641	22,992,263	-	24,094,904	13,155,351
Publication expenses	228,842	6,532,814	-	6,761,656	5,798,638
Promotional materials	231,842	1,893,477	-	2,125,319	1,485,678
Library expenses	79,562	74,560	-	154,122	138,276
Stationery supplies	1,563,824	703,620	-	2,267,444	1,803,655
Bank charges and duty stamps	121,201	497,027	-	618,228	273,561
Professional consulting and audit fees	348,527	179,000	-	527,527	607,060
Media expenses	-	83,879	-	83,879	68,027
Field expenses	-	56,500	-	56,500	227,100
Amortisation and depreciation charges	4,744,145	524,592	-	5,268,737	5,425,439
Contributions for project activities	3,625	16,613,764	-	16,617,389	7,392,337
Miscellaneous expenses	1,886,112	1,290,277	-	3,176,389	4,016,441
Total expenditures	28,216,305	109,534,023	(1,833,342)	135,916,986	108,957,364
Excess of revenues over (under) expenditures	(24,675,976)	53,497,956	4,730,748	33,552,728	6,814,802
Fund balances brought forward	100,414,878	16,914,892	79,819,259	197,149,029	190,334,227
Fund transfers					
- completed projects	28,216,305	(45,590,144)	17,373,839	-	-
Fund balances carried forward	103,955,207	24,822,704	101,923,846	230,701,757	197,149,029

Thailand Environment Institute Foundation

Notes to the Financial Statements

For the year ended 31 December 2012

1 General information

Thailand Environment Institute Foundation (formerly Thailand Environment Foundation) (“the Foundation”) was established on 24 February 1993 as a non-profit making organisation and aims at playing a catalytic role in promoting close cooperation among government, private sector, and a coalition of NGOs, medias and academia. The Foundation conducts policy research and action-oriented research for protection of the environment and promoting Thailand’s long-term policy on the environment.

The address of its registered office is as follows:

16/151, Muang Thong Thani, Bond Street, Tambon Bangpood, Amphur Pakkred, Nonthaburi 11120

Thailand Environment Institute Foundation was declared to be a public charity No. 322 in accordance with the Ministry of Finance’s notification dated 14 October 1997.

The financial statements have been approved by the Foundation’s Board of Directors on 18 April 2013.

2 Accounting policies

The principal accounting policies adopted in the preparation of these financial statements are set out below.

2.1 Basis of preparation

These financial statements have been prepared in accordance with the Thai Financial Reporting Standards for Non-publicly Accountable Entities as issued by the Federation of Accounting Professions.

The financial statements have been prepared under the historical cost convention.

Comparative figures have been adjusted to conform with the changes in the presentation in the current year.

An English version of the financial statements have been prepared from the statutory financial statements that are in Thai language. In the event of a conflict or a difference in interpretation between the two languages, the Thai language statutory financial statements shall prevail.

2.2 Fund accounting

To ensure observance of limitations and restrictions placed on the use of the resources available to Thailand Environment Foundation, the financial statements

are maintained in accordance with the principles of “fund accounting”. The purposes of the funds maintained by the Foundation are as follows:

Operating fund: represents funds available for general operating purposes. The operating fund is generally supported at the rates 30% of gross revenues of the completed projects from the sponsored program fund. In case the general basis of the allocation is not appropriate, the allocation is depended on the judgment of the Foundation’s management. The allocation is made when cash is received.

Sponsored program fund: represents funds for research activities, field activities, seminars, workshops, conferences, symposia, or training, supported by donors or other outside agencies.

Capital fund: represents the initial registered fund of the Foundation of Baht 5 million. Commencing from 1 January 1996, interest income derived from the capital fund has been included in the reserve fund.

Reserve fund: represents funds derived from contributions received from various sources and are accumulated as a reserve for future uses. Commencing from 1 January 1996, interest income derived from the reserve fund has been included in the reserve fund.

2.3 Cash and cash equivalents

Cash and cash equivalents comprise cash on hand, deposits held at call with banks but do not include deposits with banks which are held to maturity, and other short-term highly liquid investments with maturities of three months or less from the acquisition date which are not used as collateral.

2.4 Property, plant and equipment

An item of property, plant, and equipment is stated at cost less any accumulated depreciation and any allowance for devaluation (if any).

Depreciation is calculated on the straight-line basis to write off the cost of each asset to its residual value over the estimated useful life as follows:

Buildings and building improvements	5 and 20 years
Furniture and office equipment	3 and 5 years
Motor vehicles	5 years

The assets’ residual value, useful lives, and depreciation method are regularly reviewed.

2.5 Intangible asset

Acquired computer software licenses are capitalised on the basis of the costs incurred to acquire and bring to use the specific software. These costs are amortised over their estimated useful lives of 3 years.

Costs associated with maintaining computer software programmes are recognised as an expense as incurred.

2.6 Provisions

Provisions are recognised when the Foundation has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation and a reliable estimate of the amount can be made. Where the Foundation expects a provision to be reimbursed, the reimbursement is recognised as a separate asset but only when the reimbursement is virtually certain.

The Foundation has an obligation under labour law in benefit payable under the plan for employees until retirement date. The maximum amount of obligation shall not exceed the amount of latest salary payable for 10 months. The employees will receive the payment amount at retirement date. The Foundation estimated a provision at the end of reporting period, which calculation is based on current salary reflected by the employee turnover and the proportion of working period of employees and working period until retirement.

2.7 Revenues and expenditures

The financial statements of the Foundation have been prepared on an accrual basis. Sponsorships are recorded as revenues when due. Sponsorship income on a cost reimbursement program is recognised as income when direct contract costs are incurred. When sponsorships received exceed the income recognised for the year, the net balance is presented as advances received from sponsors, and vice versa, the net balance is presented as sponsorship receivables.

Membership fee income is recognised when due. Interest income is recognised on a time proportion basis, taking account of the principal outstanding and the effective rate over the period to maturity.

The Foundation recognises expenditures on an accrual basis.

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Published by: Thailand Environment Institute (TEI)
Date of Issue: October 2013
Printed by: MATA KARNPHIM CO.,LTD.
77/261 Moo 4 Bangkurad Sub-district
Bangbuathong District, Nonthaburi Province 11110
Tel./Fax 0-2923-5725 , 08-9775-9892

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