

Attachment 1  
TECRO-AIT Technical Cooperation Program Description and Estimated Budget  
for 2008, 2009 and 2010

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*SCOPE*

Collaboration under this implementing arrangement is focused on topics affecting the US, Taiwan, and/or the global environment. Current topics include air pollutants, greenhouse gases, climate change, marine protection, water, energy, transboundary pollution, chemicals, pesticides, land pollution and waste management. Activities addressing current priorities in these areas are described below. These activities may evolve, change, or be replaced by other activities as information becomes available, progress is made in implementing the activities, or priorities change. Implementation of these activities involves information and data gathering, research, analysis, modeling, training, documentation, study tours, development and implementation of best practices in technology, regulation, and partnerships; technology transfer and other efforts. As progress is made in implementing activities, the tools used to continue implementation may be adjusted to optimize results. (i.e., an activity may shift from information gathering to training or partnering).

*AIR POLLUTANTS, GREENHOUSE GASES, CLIMATE*

This area of collaboration focuses on reducing emissions of air pollutants and greenhouse gases from various activities and sectors. These may include transportation, energy generation and use, manufacturing, and others.

*Activity 1 Reducing GHG Emissions from the Electronics Industry*

Implementation Format:	International Conference, co-developing Standard Measurement, Survey and Technical Assistance
US Participants: EPA/OAR/OAP	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	US\$ 29,412
2008 funds (NTD):	\$1,500,000(NTD)
Estimated 2009 funds (NTD):	\$1,500,000(NTD)
Estimated 2010 funds (NTD):	\$0(NTD)

**Project Description:**

This is a project to learn about GHG emissions of strong fluorinated GHGs from the manufacture of electronics (i.e., semiconductors, liquid crystal displays (LCD), solar panels, and other electronics) and develop capacity to reduce emissions from these processes. This project builds and continues initial collaboration in this area under IA#7. Activities may focus on the LCD sector but may include and expand to other sectors as work progresses and more information is gathered about the magnitude and impact of other sectors.

**Objectives:**

- Improve understanding of the global electronics industry's environmental impact and co-develop protection activities / opportunities;
- Promote emissions reductions in Taiwan and internationally.

**Activities:**

- Establish a web-information exchange system;
- Review Annual Emissions Report from the World LCD Industry Cooperation Committee and prepare a progress report and web site (Summer 08 – Spring 09);
- Conduct survey of PFC heat transfer fluid use and losses and prepare web training module on alternatives and best practices (Summer – Winter 09);
- Develop standard methodology for measuring performance of abatement devices for fluorinated compounds (FCs). Apply and test the methods at three to five facilities. Prepare report on results.(Winter 08 – Fall 09);
- Organize and host an Electronics Industry Climate Conference (2009 – 2010) to present findings, lessons learned/best practices, and abatement strategies.

**Results for Taiwan:**

- Information, capacity to reduce emissions in the electronics manufacturing sector.

**Overall benefits to Taiwan and the US:**

- Improved understanding of the GHG/environmental impact of electronics manufacturing and collaboration to reduce emissions of greenhouse gases and disseminate lessons learned in the region and internationally.

**Measuring results:**

- Survey and methodologies to measure emissions completed;
- Reduction & abatement strategies/best practices developed;
- Document the number of plants or companies adopting the measures;
- Estimated reduction in emissions from plants/companies adopting measures in Taiwan one year after they adopt them;

**Project sustainability and transferability:**

- Share expertise and lessons learned in measurement, abatement, and best practices at the international conference to promote emissions reductions from the LCD /other electronics manufacturing sectors in the region and internationally

**Time Frame:** 2008–2010

Activity 2 Forecasting Greenhouse Gas Emissions and Assessing Greenhouse Gas Mitigation Strategies

Implementation Format:	Training and Technology Transfer
US Participants: DOE/BNL, if available	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	\$0
2008 funds (NTD):	\$ 3,500,000 (NTD)
Estimated 2009 funds (NTD):	\$ 3,500,000 (NTD)

**Project Description:**

- Training and technology transfer in MARKAL GHG emissions modeling.

**Objectives:**

- Build EPAT analytical capability for policy formulation, program evaluation and integrated policy analysis using the MARKAL model to analyze GHG emission mitigation strategies.

**Activities:**

- BNL will assist in the enhancement of Taiwan MARKAL to model carbon sequestration and storage options to mitigate climate change;
- BNL will assist in the development of alternative industrial energy service demands in Taiwan MARKAL based on projected structural change;
- 2009 tasks include:
  - evaluating the impact of GHG emission reduction targets on energy, environment, and the economy;
  - development of carbon market links between Taiwan and China to evaluate potential CDM projects and reduction costs;
  - incorporating Taiwan program goals into the MARKAL analysis to reconcile differing stakeholder objectives.
- 2010 tasks include:
  - evaluating the impact of waste recycling and alternative materials for industrial inputs on energy and the environment and the cost of GHG reductions under specific GHG reduction targets;
  - incorporating the costs of damage resulting from emissions of GHGs and criteria pollutants into the MARKAL model functions;
  - evaluating technological progress of new energy technologies, including hydrogen and their impact on Taiwan's future energy supply;
- BNL will supervise the analysis and results using Taiwan MARKAL with the enhancements listed above;
- BNL will conduct workshops in Taiwan on the formulation on the enhanced model and its application for the analysis of carbon tax policies, a possible cap and trade

program, and alternative industrial development strategies with GHG emission constraints.

### **Results for Taiwan:**

- Improved analytical capability for policy formulation and program implementation in GHG emission reduction;
- Expanded outreach and interaction to the world's MARKAL model user community (over 50 countries).

### **Overall benefits to Taiwan and the US:**

- Identification of cost effective strategies for GHG reductions based on detailed assessment of alternative technologies and mitigation methods;
- Promotion of U.S. based technologies (e.g., clean coal technologies, fuel cells) and programs (e.g., Energy Star Buildings) to reduce GHG and criteria pollutants in Taiwan.

### **Measuring results:**

- MARKAL model enhanced and run successfully for Taiwan;
- Strategy for reducing Greenhouse Gases, based on MARKAL model is developed and adopted;
- Progress reported on key strategic milestones;
- Estimate of greenhouse gas reductions to be achieved under strategy options provided;
- Actual greenhouse gas reductions achieved by implementation of the strategy;
- GHG reduction credits certified through international flexible mechanism (e.g., CDM).

### **Project sustainability and transferability:**

- An international conference will be held to share experience from the MARKAL model's application;
- Continued enhancement and updates of MARKAL database to reflect changing conditions (e.g., world energy prices) for more refined policy and strategy formulation, and for long-term planning under sustainable development;
- Continued monitoring of the performance of U.S. based technologies and programs for feedback and improvements.

**Time Frame:** 2008–2010

### Activity 3 Sector Study on Taiwanese Foundries

Implementation Format:	Workshop and Technology Transfer
US Participants: EPA/OAQPS	Taiwan Participants:

Reprogrammed IA7 funds (NTD):	\$0
2008 funds (NTD):	\$ 1,000,000 (NTD)
Estimated 2009 funds (NTD):	\$ 1,000,000 (NTD)

**Project description:**

- Study of Taiwan's foundries and transfer of technology for pollution reduction.

**Objectives:**

- Develop scientific and technical recommendations to strengthen Taiwan's air quality management system and reduce air emissions from foundries;
- Identify important sources of exposure to humans and ecosystems.

**Activities:**

- develop or refine existing emission inventories to characterize all foundry emissions in Taiwan;
- investigate multi-pollutant control technologies, pollution prevention and energy efficiency improvement opportunities;
- monitor emission sources;
- provide risk assessment and benefits information for local communities, and
- Assess current compliance status and provide recommendations to improve compliance with environmental requirements.
- Publish a report on the world-wide web summarizing the results of the studies including industry characterization, process emissions and baseline emission inventories, multi-pollutant control options and costs, pollution prevention opportunities, monitoring strategies, risks assessments, compliance and enforcement recommendations, BenMap modeling.

**Results for Taiwan:**

- Quantify emissions from foundries and identify options, costs, benefits and recommendations for reducing those emissions;
- Technology transfer opportunities from U.S. to Taiwanese foundries.

**Overall benefits to Taiwan and the US:**

- Using experience gained and information collected from the U.S. regulatory development on the foundries sector, the proposed study takes a holistic approach to investigate innovative methods for simultaneous emissions reduction for multiple pollutants, such as criteria pollutants (SO<sub>x</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>), greenhouse gases (carbon dioxide, methane, etc.), and air toxics (mercury, volatile organic hazardous air pollutants), and metallic hazardous air pollutants etc;
- Work in Taiwan to identify best available control technologies may be applicable to both Taiwan and the US.

**Measuring results:**

- Identify the scientific and technical recommendations from this study that are adopted to strengthen Taiwan's air quality management system;
- Quantity of important polluting sources that are under control one year after adoption of this study's recommendations;
- Estimated and actual reductions in pollutants as a result of adopting this study's recommendations.

**Project sustainability and transferability:**

- Results of this study can be presented in an international workshop in Taiwan or another forum, such as The Better Air Quality Workshop sponsored by CAI-Asia.
- The study will be published on the EPAT and the CAI-Asia websites so that the results are available to other Asian countries, including China.

**Time Frame:** 2008–2010

*Activity 4 Air Quality Modeling (Models 3)*

Implementation Format:	Technical Assistance/workshops
US Participants: EPA/OAQPS, GSA, University of Tennessee	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	\$0
2008 funds (NTD):	\$ 3,000,000 (NTD)
Estimated 2009 funds (NTD):	\$ 3,000,000 (NTD)

**Project description:**

- Technology transfer and technical assistance on air quality modeling and assessment of regional and trans-boundary pollution impacts to build Taiwan's capacity to develop emissions control strategies and policies to improve air quality.

**Objectives:**

- Assist in developing cost-effective control strategies for ozone and particulates using advanced air quality modeling assessment tools developed by US EPA (Models-3/CMAQ/SMOKE);
- Expand Taiwan Emissions Control Cost Analysis System (TECCAS), based on the US Air Control NET system, to include greenhouse gases;
- Link Taiwan emissions inventories in TECCAS and CMAQ model results to Google Earth tools to ensure inventories cover all sources and to improve how air quality impacts are displayed to the public.

**Activities:**

**(1) *Expand Taiwan Emission Control Cost Analysis System (TECCAS) to include Greenhouse Gases (GHG):*** A prototype of Taiwan Emission Control Cost Analysis System (TECCAS) has been developed based on USEPA's AirControlNET system. TECCAS was designed to include a comprehensive database of control measures and cost information for reducing the emissions of criteria pollutants and precursors (e.g., NO<sub>x</sub>, SO<sub>2</sub>, CO, VOC, PM<sub>10</sub>, PM<sub>2.5</sub>, NH<sub>3</sub>) from point, area, and mobile emissions sources. This TECCAS tool will be expanded to include GHG such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O).

**(2) *Assist in developing Cost-effective Control Strategies for Ozone and PM in Taiwan using advanced air quality modeling assessment tools:*** A series of air quality modeling simulations based on US EPA's Models-3/CMAQ system have been conducted in Taiwan under this bilateral project. We will use the modeling results to assist in analyzing cost-effective emissions control strategies to meet air quality standards of ozone and PM in Taiwan. We will also prepare a report on the impact of long-range trans-boundary transport to air quality in Taiwan.

**(3) *Explore Google Earth Applications for Taiwan Emission Inventory and Air Quality Modeling:*** Google Earth tools will allow high-resolution aerial and satellite imagery, photos, elevation terrain, road and street labels, business listings, and more. US EPA will work with EPAT to explore and develop applications to link Google Earth with the Taiwan emission inventories developed under TECCAS and the CMAQ model results in Taiwan.

Deliverables include:

- Enhanced software and technical documentations for Taiwan Emission Control Cost Analysis System (TECCAS), including Greenhouse Gases (GHG);
- Software and technical documentation on use of air quality modeling assessment tools of Cost effective Control Strategies for Ozone and PM in Taiwan;
- Technical report on Google Earth Applications for Taiwan Emission Inventory and Air Quality Modeling;
- Jointly published papers in these areas.

**Results for Taiwan:**

- Enhanced technical capability resulting in improved assessments;
- Increased capacity to assess regional transport of air pollutants (i.e., O<sub>3</sub>, PM, acid deposition) from outside of Taiwan region;
- Strengthened policy decision-making using results of modeling and assessment tools;
- Improved ability to communicate significant air quality issues and impacts to key stakeholders and the public.

**Overall benefits to Taiwan and the US:**

- Capacity may be used to encourage Taiwan partners and others in Asia to participate in efforts addressing the international transport of air pollutants and climate change issues, which benefits Taiwan and global air quality and climate;
- This project will be leveraged with ongoing USEPA programs in Asia and China and will benefit USEPA in developing and implementing strategies to address international pollution transport and climate change issues.

### **Measuring results:**

- Number of EPAT staff and scientists trained in the application of the Model-3/CMAQ system, Google Earth Applications, and TECCAS, including GHG;
- A summary of how EPAT utilizes Models-3/CMAQ/SMOKE analyses to assess options for reducing ozone and particulates, including using these model results in EIAs;
- Changes adopted into the air quality management programs in Taiwan as a result of models, including plans for non-attainment areas;
- Estimated and actual reductions in the quantity of air pollutants achieved by changes to air quality management programs made as a result of this project.

### **Project sustainability and transferability:**

- The project will share information with other countries through encouraging EPAT staff and scientists in Taiwan to participate in international efforts to address the issues of international transport of air pollutants and climate change.

**Time Frame:** 2008–2010

### Activity 5 Emission Trading Training Program

Implementation Format:	Training and Technology Transfer
US Participants: OAR/OAP	Taiwan Participants:
Reprogrammed IA 7 funds (NTD):	\$0 NTD (\$490,000 NTD if available in IA7 remaining funds)
2008 funds (NTD):	\$0
Estimated 2009 funds (NTD):	\$0

### **Project Description:**

- This project delivers training in emissions trading.

### **Objectives:**

- To introduce policymakers, industry, and other stakeholders to the concepts, experiences, and requirements of an effective, credible emission trading program.

**Activities:**

US EPA will deliver a two- three day workshop/training covering:

- Theory of emission trading as a way to achieve an environmental target at least cost;
- Experience of US and EU emission trading programs: SO<sub>2</sub>; NO<sub>x</sub>; CO<sub>2</sub>, etc.
- Design elements of emission trading programs:
  - Setting the emissions cap;
  - Determining applicability (which sources are required to participate in the program);
  - Distributing allowances through auctions, free allocations, direct sales, or set-asides as incentives for desired behavior;
  - Evaluating trading rules;
  - Designing emission monitoring, reporting, and verification procedures;
  - Establishing incentives for compliance (i.e., penalties for non-compliance).
- Operation of emission trading programs:
  - Tracking allowance transactions;
  - Auditing emission reports;
  - Providing compliance assistance and technical support;
  - Assessing compliance.
- Other emission trading efforts: Chile; PRC; Japan; South Korea; The Netherlands; Slovakia; etc.
- Discussion – Taiwan’s emission trading challenges and opportunities.
- Interactive simulation – a computer-based emission trading simulation in which the participants take on the role of a power plant manager and must comply with new emission reduction targets.

**Results for Taiwan:**

- Learn about policy options and methods for developing and implementing an emissions trading program, including requirements, benefits and limitations of each;
- Gain experience in how an emissions trading program works,

**Overall benefits to Taiwan and the US:**

- Transfer the USEPA’s experience in Emissions Trading to achieve emissions reductions in Taiwan and create a model that may be shared with others in the Region.

**Measuring results:**

- The number of policymakers, industry, and other stakeholders who learn the concepts, experiences, and requirements of the US emission trading program;
- Develop a plan and proposed schedule for implementing a trading program. Track and report progress against milestones.
- Identify the emission trading measures that are adopted and implemented successfully by EPAT.

- Estimated and actual quantity of air pollutants reduced as a result of implementing emission trading measures.

### **Project sustainability and transferability:**

- Share the measures adopted as a result of this training on the EPAT or other Regional website and in Regional air quality forums with other countries considering or implementing emission trading programs, such as PRC, Japan, and South Korea.

**Time Frame:** 2008-2010

### Activity 6 Reducing Air Pollutant and GHG Emissions from Ocean-Going Vessels that call at Northwest US and Taiwan Ports

Implementation Format:	Workshop, Information Exchange and Demonstration Project
US Participants: EPA Region 10, OAR, OIA, Ports of Tacoma and Seattle	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	US\$ 73,530
2008 funds (NTD):	\$200,000 (NTD)
Estimated 2009 funds (NTD):	\$200,000 (NTD)
Estimated 2010 funds (NTD):	\$500,000(NTD)

### **Project Description:**

- Establish Partnership at Northwest US and Taiwan Ports and shipping lines to reduce air emissions from marine port and vessel operations

### **Objectives:**

- Engage shipping companies and vessels in partnership
- Reduce emissions of air pollutants and GHG from participating vessels while at berth in the ports of Kaohsiung, Keelung, Tacoma and Seattle.
- Aim for future expansion of the program to include other port operations and additional shipping lines.

### **Activities:**

Phase 1	Interviews and/or high level meetings with key stakeholders to obtain commitments	Fall 2008
	Start fuel-switching or other emissions reduction project and start emissions monitoring or modeling to track reductions	Winter 2008
	Joint workshop to evaluate results and decide on possible program expansion	Fall 2009
	Expansion of program to other lines, ports, and/or approaches to ports	Winter 2009

	Joint workshop to evaluate and report results of expanded program	Summer 2010
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### Results for Taiwan:

- Reduction of air pollutants and GHG emissions from ships in port areas.

### Overall benefits to Taiwan and the US:

- Reduce emissions of air pollutants and GHG from participating vessels while at berth in both Northwest US and Taiwan ports.
- Additional strategies and controls for reducing emissions from vessels and port operations, such as cargo handling equipment, may be developed.
- If a low sulfur fuel option is chosen, greater demand for low-sulfur fuel from major container lines may prompt refineries and bunker providers in Asia to begin the upgrades to produce more low-sulfur fuel in advance of the deadlines established in the newly-developed MARPOL Annex VI amendments.
- Promote and implement the US initiatives of Pan-Pacific Cleaner Port Partnership.

### Measuring results:

- The number of private sector participants in the ports partnership program.
- The number of emission reduction measures that are adopted by the Port Partnership's partners.
- Estimated and actual reductions in the quantity of air emissions from port and vessel operations.

### Project sustainability and transferability:

- A cooperation program will be co-developed with the proper APEC forum to extend the scope of the Partnership.

**Time Frame:** 2008-2010

### Activity 7 Environmental Impact of Non-Ionizing Radiation

Implementation Format:	International Conference and Technical Assistance
US Participants: Region 10, FCC, NIEHS, if available	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	\$0
2008 funds (NTD):	\$ 1,000,000 (NTD)
Estimated 2009 funds (NTD):	\$ 0 (NTD)

### Project Description:

- Training on risks of non-ionizing radiation and capacity to reduce them.

**Objectives:**

- Present in Taiwan the most current information on health risks and practices related to non-ionizing radiation;
- Taiwan intends to draft or revise the Taiwan EPA's laws and practices related to non-ionizing radiation.

**Activities:**

- Hold an international academic conference
- Participants from Taiwan will include professionals, academics, municipal environmental protection officials and members of the public
- Request US assistance to invite specialists from the field, for example from the NIEHS, FCC, and USEPA;
- Conference topics will include current research on the risks of non-ionizing radiations, control approaches and education tools.

**Results for Taiwan:**

- Develop capacity to reduce the risks of non-ionizing radiation and to inform/educate the public.
- Prevent unreasonable risks caused by non-ionizing radiation.
- Ensure that regulations are based on best available science

**Overall benefits to Taiwan and the US:**

- The conference proceedings will include an inventory of the non-ionizing radiation data in Taiwan and other countries. Information provided by the panel of experts convened for the conference will provide an opportunity for both Taiwan and the US to create integrated public education and outreach materials.

**Measuring results:**

- The number of control and management measures that are developed for preventing the unreasonable risks of non-ionizing radiation.
- Outreach materials that are developed to explain the risks of non-ionizing radiation

**Project sustainability and transferability:**

- Conference proceedings and outreach materials will be made available as a resource to others on the web.

**Time Frame:** 2008–2010

*TRANSBOUNDARY POLLUTION*

This area of collaboration is focused on identification, measurement, monitoring, prevention and efforts to correct or minimize transboundary pollution in areas that may include air pollutants, chemicals, and invasive species.

*Activity 8 Strengthen Regional Capability, Capability Building and International Collaborations*

Implementation Format:	Technology Transfer, Data Processing / Analysis and International Research Collaborations
US Participants: NOAA, NASA, US EPA	Taiwan Participants: NCU
Reprogrammed IA7 funds (NTD):	
2008 funds (NTD):	1,000,000NT(NASA); 800,000NT(NOAA); 800,000NT(EPA)
Estimated 2009 funds (NTD):	800,000NT(NASA); 2,800,000NT(NOAA); 800,000NT(EPA)

**Project Description:**

This project involves installation of equipment, training, capacity building for data collection and analysis on transport of pollutants. This project was initiated under IA7 with equipment installation and data collection. It continues in IA8 as described below.

**Objectives:**

To evaluate the long-range transport of aerosols, their regional impact, and their impact on climate.

**Activities:**

- NASA : MPLNET & AERONET technology transfer, EOS satellite products and LABS surface measurements, data analysis and synthesis.
- NOAA : Trace gas and aerosol monitoring technology transfer and data processing/analysis.

NOAA will work with Taiwan scientists to review, evaluate, and archive data, and do equipment maintenance visits in 2009. NOAA's scientific analysis of the data will begin in 2010. The first two years of aerosol data from LABS will be evaluated and compared with identical measurements made by NOAA/ESRL and collaborators at numerous sites around the globe. Analyses will focus on classification of aerosol types reaching LABS based on air-mass back trajectories, and categorization of typical aerosol radiative properties for the various classes. Work performed under this project is projected to

continue into 2011 with the goal of having the LABS site operators fully capable of conducting all aspects of the measurement program by the end of the year.

NASA will do complementary work with Taiwan scientists to integrate and analyze data from both satellite and ground sources on aerosols and their precursors to better understand their regional impacts and effects on climate.

Both Agencies will prepare papers for submission to refereed journals.

### **Results for Taiwan:**

- The collaboration between NOAA, NASA, TEPA, and NCU will train Taiwan scientists in techniques for obtaining and evaluating long-term measurements of aerosol chemical, physical, optical and radiative properties.
- The aerosol measurements at LABS are the starting point for a long-term record that can be used to evaluate and track the direct radiative forcing of aerosols in Taiwan.

### **Overall Benefits to Taiwan and the US:**

- Improve the capability to monitor and forecast air pollutants in Taiwan and the Region;
- Support NOAA's strategy for expanding the coverage and capability of the collaborative aerosol network in twinning arrangements, where established stations work with other site operators to improve and expand their measurement capabilities.

### **Measuring Results:**

- Number of Taiwan Scientists trained in techniques for obtaining and evaluating long-term measurements of aerosols
- Number of data sets on aerosol chemical, physical, optical, and radiative properties in Taiwan that are published in refereed journals;
- Applications of the data collected from this project that are employed for assessments of human effects on climate.

### **Project Sustainability and Transferability:**

- International research collaborations among Southeast Asian countries and Taiwan will be conducted to improve the regional capability of air pollutant monitoring and forecasting.
- The first two years of aerosol data from LABS will be evaluated and compared with identical measurements made by NOAA/ESRL and collaborators at numerous sites around the globe. Results will be submitted for publication in a refereed journal.

**Time Frame:** 2008-2010

*MARINE AND FRESH WATER*

Collaboration in this area is focused on protecting the marine environment and water and fresh water and supplies from pollution and identifying and implementing solutions to improve or restore water quality and conditions.

*Activity 9 Ocean Pollution Prevention and Emergency Response Management*

Implementation Format:	Workshop and study tour
US Participants: EPA Region 10, US Coast Guard, if available	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	US\$ 29,412
2008 funds (NTD):	0
Estimated 2009 funds (NTD):	\$1,000,000 (NTD)

**Project Description:**

- Taiwanese officials will visit the US to meet with US Coast Guard and observe exercises on marine/coastal protection and emergency response.

**Objectives:**

- To learn the US approaches and experience in managing marine environment and developing effective investigative/enforcement measures to prevent marine pollution.
- To learn about policy and regulations on preventive actions, processes, and techniques.
- To observe the implementation of best management practices and techniques for ocean pollution prevention and emergency response [in one of the US practice drills?]

**Activities:**

- Up to two study tours for Taiwan's officials to the US, one in 2009 and one in 2010.

**Results for Taiwan:**

- Expand Taiwan's technical capacity and understanding of the systems and resources that are needed to effectively prevent, prepare, and respond to marine pollution incidents, including management, monitoring, administrative, partnerships, investigation, and certifications included in the US system;
- EPAT will use the information gained in these study tours to review and update its regulations and procedures and report on the changes made as a result of these study tours.

**Overall benefits to Taiwan and the US:**

- Improve the marine environment and reduce the impact of marine pollution caused by marine disasters in Taiwan and the immediate region.

- Protect coastline habitats of the Pacific Ocean, marine species and seafood quality and safety from marine spills in Taiwan.

**Measuring results:**

- Identify the management practices and techniques that are adopted for ocean pollution prevention and emergency response in Taiwan;
- Report on new or revised spill preparedness activities undertaken in major ports.

**Project sustainability and transferability:**

- This project may result in improved regulations and practices resulting from experience gained from the US.

**Time Frame:** 2008-2010

*Activity 10 Watershed Management—Eutrophication Control of Reservoir Water Quality*

Implementation Format:	Technical Assistance and Study Tour
US Participants: US EPA Region 10	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	\$ 0
2008 funds (NTD):	\$ 1,000,000 (NTD)
Estimated 2009 funds (NTD):	\$ 1,000,000 (NTD)

**Project Description:**

- Training and study tours on water reservoir management.

**Objectives:**

- Train Taiwanese experts on ecological and other methods for improving reservoir water quality by reducing eutrophication

**Activities:**

- USEPA experts will travel to Taiwan to visit affected reservoirs and provide technical assistance/training on:
  - Use of ecological engineering methods to improve water quality in eutrophic reservoirs to allow natural self-cleansing of reservoirs;
  - Establishing assessment standards and feasibility studies for water quality improvement by ecological engineering methods;
  - Setting up “best management practices” for non-point pollution in water catchments;
  - Raising water treatment efficiency and water quality in reservoir water body and tap water.
- Taiwan officials will do study tours in the US in 2008 and 2009.

**Results for Taiwan:**

- Learn about environmentally friendly technology and best management practices for controlling eutrophication of reservoirs and reservoir water quality management.
- Technical capacity and understanding of management of water catchments and water quality in eutrophic reservoirs and methods for preventing or removing nutrient salts.

**Overall benefits to Taiwan and the US:**

- This work will enable both Taiwan and the US to expand our knowledge of various prevention, mitigation and management methods for eutrophication in reservoirs and compare their results in a variety of environments.

**Measuring results:**

- The number of assessment, ecological engineering methods and best management practices that are developed and implemented to reduce eutrophication.
- Number of reservoirs with reduced levels of eutrophication.

**Project sustainability and transferability:**

- The results could be reported in regional and international workshops or conferences.
- This project may result in improved regulations and practices resulting from experience gained from the US.

**Time Frame:** 2008-2010

*LAND AND WASTE MANAGEMENT*

Collaboration in this area focuses on prevention and remediation of land contamination and waste management.

*Activity 11 Remediation of Contaminated Sites*

Implementation Format:	Workshops and Technical Assistance
US Participants: EPA staff with relevant expertise, if available	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	US\$ 19,086
2008 funds (NTD):	\$ 650,000 (NTD)
Estimated 2009 funds (NTD):	\$ 650,000 (NTD)

**Project Description:**

- Training on contaminated site remediation technologies.

**Objectives:**

- Develop capacity to choose, design, operate, and monitor various remediation technologies and to comply with regulations when using these technologies.

**Activities:**

- 2008: A Workshop on Forced Air Remediation including, including these topics:
  - Forced-air remediation technologies (including soil vapor extraction, air sparging, in-well air stripping, multi-phase extraction, etc.);
  - strengths and limitations of these technologies
  - forced-air remediation of sites polluted by petroleum products, chlorinated solvents, and other chemicals
  - forced-air remediation of pollution at source area and plume
  - remediation investigation, (RI) and feasibility study (FS) of this method
  - important issues for potential responsible parties and residents in the vicinities where forced-air remediation is employed
  - how to choose different forced-air remediation technologies and combine with other technologies
  - important points when designing and operating these remediation systems on a laboratory scale, pilot scale and full scale
  - complying with regulations when using forced-air remediation
  - designs of extraction wells and air injection wells (such as orientation, amount, locations, depths, flow rate, operating cycle, etc.)
  - monitoring of processes and outcomes
  - how to resolve the problem of pollutant concentration rebound
  - estimating the time needed for remediation
  - case studies of successes and failures
  - common sources of failures
  - post-treatment
  - technical references and bibliography
  - investigating (and/or visiting) a few of Taiwan's contaminated sites.
- 2009: A Workshop on Bio-remediation, including:
  - bioremediation mechanisms (excluding natural attenuation; including aerobic, anaerobic, and cometabolic bioremediation, etc.)
  - strengths and limitations of these technologies
  - bioremediation of sites polluted by petroleum products, chlorinated solvents, and other chemicals
  - Forced-air remediation of pollution at source area and plume
  - Remediation investigation, (RI) and feasibility study (FS) of this method
  - important issues for potential responsible parties and residents in the vicinities where bioremediation is employed
  - how to choose different bioremediation technologies and combine them with other technologies

- important points when designing and operating these remediation systems on a laboratory scale, pilot scale and full scale
- complying with regulations when using bioremediation
- designs of bioremediation systems (electron acceptors, electron donors, carbon sources, nutrient salts, oxygen release compounds, hydrogen release compounds, methods and equipment for injecting substances)
- monitoring of processes and outcomes
- estimating the time needed for remediation
- case studies of successes and failures
- common sources of failures
- post-treatment
- technical references and bibliography
- investigating (and/or visiting) a few of Taiwan's contaminated sites.

**Results for Taiwan:**

- Advance Taiwan's environmental protection professionals' understanding of forced-air remediation and bioremediation of polluted soil and ground water sites, in order to benefit from the use of these two technologies;
- Improve the decision making for employing remediation technologies for contaminated sites.

**Overall benefits to Taiwan and the US:**

- Will extend our understanding of the remediation technology applications and results in a different climate and geological zone.

**Measuring results:**

- EPAT will report on how the information from these workshops is used, including any changes or adjustments made as a result of the workshops.
- The total area of contaminated sites in Taiwan that are remediated by adopting the methods recommended by the participating US experts.
- The decision-making procedures and technical assessment tools that are developed as a result of this project.

**Project sustainability and transferability:**

- Question for Taiwan, about the Sustainability part of this: how will you ensure that the information from these workshops is maintained and used in Taiwan?
- The results of this project can be transferred to other parts of Asia, particularly those areas with similar climate, geology or language. The results could be posted on the EPAT's web site.

**Time Frame: 2008–2010**

*ENVIRONMENTAL MANAGEMENT AND GOVERNANCE*

Collaboration in this area focuses on building capacity to establish, administer, evaluate, and expand environmental management, evaluation, and enforcement programs.

*Activity 12 Air Quality Data Accessibility and QA/QC*

Implementation Format:	On-Site Training & technology transfer
US Participants: Puget Sound Clean Air Agency or another state/local air agency, University of Washington, OAQPS, EPA Region 10	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	
2008 funds (NTD):	\$ 200,000 (NTD)
Estimated 2009 funds (NTD):	\$ 200,000 (NTD)

**Project Description:**

- This project trains Taiwanese experts to develop air quality data management.

**Objectives:**

- Taiwanese officials will learn the methods to make air quality data accessible such as datamart and AirQuest; and
- The methods of QA/QC for air quality data; and
- To compare the toxic air pollutants monitoring program between USEPA and TEPA.
- Explore options to cooperate in monitoring emissions from an area of mutual concern: marine port and vessel operations.
- Information gained in this activity will be used to develop a standard of air quality data electronic exchange system in Taiwan for government and academic research purposes.

**Activities:**

- Two members from EPAT will visit the US each year to attend a seminar or other training on the topics of air quality data accessibility, QA/QC and toxic air pollutants monitoring.
- Identify opportunities to share US and Taiwan air monitoring data in an area of mutual concern: marine port and vessel operations.
- 

**Results for Taiwan:**

- Better understanding of methods to make air quality data accessible;
- Methods for quality analysis and control of air data survey;

- Better understand of QA/QC techniques for air quality data;
- Options for strengthening the toxic air pollutants monitoring program.
- Quantify emissions related to marine ports and vessel operations.

### **Overall Benefits to Taiwan and the US:**

#### **Enable Taiwan and other parts of Asia to unify the air quality data format for electronic exchange:**

- Better understanding of air toxics from marine port and vessel operations
- Better air quality data in Taiwan
- Strengthen Air Toxics monitoring program.
- Possible collaboration to measure and reduce toxics in an area of common interest, air pollutants from marine ports and vessel operations.

### **Measuring Results:**

- Report on methods for data accessibility adopted by EPAT;
- Report on changes made to Air toxics monitoring program and QA/QC programs as a result of this project
- Number of government agencies and research institutes in Taiwan that adopt the methods developed for air quality data accessibility;

### **Project Sustainability and Transferability:**

- A collaborative air toxics monitoring program between USEPA and EPAT could be co-published for regional interests, for example air toxics from marine vessel and port operations.

**Time Frame:** 2008-2010

#### *Activity 13 Establish a Good Laboratory Practices program in Taiwan for industrial chemicals and pesticide products*

Implementation Format:	On-Site Training
US Participants: Laboratory Data Integrity Branch, Agriculture Division, OECA	Taiwan Participants: Bureau of Standards, Metrology and Inspections in the Ministry of Economic Affairs, Taiwan Accreditation Foundation, Environmental Analysis Laboratory of EPAT
Reprogrammed IA7 funds (NTD):	\$664,000
2008 funds (NTD):	\$490,000 (NTD)
Estimated 2009 funds (NTD):	\$217,000 (NTD)

### **Project Description:**

- Training to establish a Good Laboratory Practice program in Taiwan.

**Objectives:**

- Establish a Good Laboratory Principles practice comparable to the US to enable exchange of research/study data between the two countries.

**Activities:**

- *November 10-14, 17-21, 2008*, US EPA will conduct a GLP training workshop in Taiwan for the regulated community and regulators. and jointly conduct a GLP inspection, with the Taiwan Accreditation Foundation, of a test facility in Taiwan;
- *March 16-20, 2009*, Taiwan Good Laboratory Practices Monitoring Authority will evaluate US EPA GLP inspection program to assure that the two programs are compatible;
- *June 8-12, 2009*, US EPA will evaluate the Taiwan GLP inspection program to assure that its GLP compliance program is compatible with US EPA's GLP inspection program.

**Results for Taiwan:**

- Develop capacity to inspect laboratories that conduct studies in accordance with the principles of Good Laboratory Practice (GLP);
- Gain international recognition for GLP inspection program.

**Overall benefits to Taiwan and the US:**

- At the conclusion of the project, the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office (TECRO) will verify and confirm upon an exchange of letters that Taiwan has a US Environmental Protection Agency (EPA) compatible GLP program.
- Data generated from studies conducted in either country will be acceptable to each other.
- The benefits to the US: help ensure the quality and integrity of data used to evaluate the safety of pesticides that are applying for licensing or registrations and industrial chemicals that are applying for research and /or marketing permits

**Measuring results:**

- The number of labs in Taiwan that adopt GLP standards to support the approval of applications for research and /or marketing permits and licensing or registration of pesticide products and industrial chemicals.
- The number of inspectors in Taiwan who demonstrate proficiency in GLP practices.
- The number of industrial chemicals and pesticide products which undergo tests according to GLP standards, and that are mutually accepted by both countries.

**Project sustainability and transferability:**

- The results of this project can be reported in regional forums or international conferences to transfer the experience to other parts of Asia.

**Time Frame:** 2008-2010

***Activity 14 Environmental Impact Assessment***

Implementation Format:	Study Tour
US Participants: US EPA Region 10, US EPA Office of Federal Activities	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	\$ 0
2008 funds (NTD):	\$ 0(NTD)
Estimated 2009 funds (NTD):	\$ 0(NTD)

**Project Description:**

- Training and study tours to learn about US environmental impact assessment policies, regulations, techniques.

**Objectives:**

- To strengthen the EPAT's capacity to conduct timely environmental impact assessments (EIA) to prevent unreasonable delays in appropriate economic development while protecting the environment.

**Activities:**

This project will transfer US approaches and experience in environmental impact assessment (EIA). Taiwan officials will visit on study tours to the US, one in 2008 and one in 2009. Topics will include:

- US regulations and guidelines for EIAs;
- How the US Federal Government implements EIAs;
- How the US Federal Government and the local government divide up EIA supervision tasks;
- A comparison of Taiwan's and US's EIA supervision regulations (e.g., air, water, waste, toxic substances, etc.) and how they are implemented;
- Partnerships with NGOs and other key stakeholders;
- Demonstration of best management practices and techniques for environmental impact assessments (EIA).

**Results for Taiwan:**

- Improve the efficiency and effectiveness of environmental impact assessments (EIA).

**Overall benefits to Taiwan and the US:**

- Inventory the comparison of Taiwan's and the US's EIA supervision regulations (e.g., air, water, waste, toxic substances, etc.) and how well they are implemented.

**Measuring results:**

- The number of EIA cases that are adjusted based on the recommendations of the study tour.
- The adoption of best management practices and techniques for environmental impact assessment (EIA) based on the recommendations of the study tour.

**Project sustainability and transferability:**

- This project may result in improved regulations and practices resulting from experience gained from the US.

**Time Frame:** 2008-2010

*COORDINATION AND ADMINISTRATION**Activity 15 Annual Meeting*

Implementation Format:	Study Tour
US Participants: EPA Region 10, OIA	Taiwan Participants:
Reprogrammed IA8 funds (NTD):	US\$ 50,681
2008 funds (NTD):	650,000 (NTD)
Estimated 2009 funds (NTD):	650,000 (NTD)
Estimated 2010 funds (NTD):	\$150,000 (NTD)

**Project Description:**

- Multi-day annual conference during which environmental issues of common interest are discussed and scientific papers are presented.

**Objectives:**

- EPAT and USEPA officials will review the progress and accomplishments of projects that were implemented during the previous year and evaluate future needs and opportunities, strategize on work plans, measures, and timeframes; and agree on activities for the next year.

**Activities:**

- Each country has pre-meeting reviews with in-country experts to assess the status of current and proposed activities, including resources, milestones, issues, progress, successes and benefits to Taiwan and the US, timelines, synergies with other projects.
- Multi-day meetings & site visits.
  - Spring 2009 – Taiwan;
  - Spring 2010 – US.
- Post meeting completion of agreements, activities, resources;
- Management and implementation ongoing throughout the year.

**Results:**

- EPAT and USEPA senior managers and project managers will evaluate and agree on the benefits and accomplishments of current and future activities, better understand the key environmental issues of common concern, and plan cooperative activities accordingly.

*Activity 16 USEPA/OIA Management of the Implementing Arrangement*

Implementation Format:	Travel
US Participants: OIA, Region 10	Taiwan Participants:
Reprogrammed IA7 funds (NTD):	US\$35,294
2008 funds (NTD):	\$100,000 (NTD)
Estimated 2009 funds (NTD):	\$100,000 (NTD)
Estimated 2010 funds (NTD):	\$100,000 (NTD)

**Project Description:**

- Management of EPA-AIT agreement, resources, and oversight of activities.

**Objectives:**

- Strategic planning and resource management focused on shared needs, opportunities, and priorities, and maximizing results.

**Activities:**

- Funds for travel will enable OIA project officer to make site visits and attend project activities to learn whether project goals are being met and whether scheduled activities are being implemented on time and effectively. Funds also will allow the USEPA project officer to travel to Taiwan to meet with EPAT for strategic planning and oversight of the Implementing Arrangement.

**Results:**

- US EPA Office of International Affairs (OIA) will collaborate with Taiwan to achieve effective and timely implementation of cooperative activities.

