2014 International E-Waste Management Network (IEMN) Meeting Report

Summary:

USEPA, Environmental Protection Administration Taiwan (EPAT) and the Vietnam Environment Administration (VEA) co-hosted the fourth annual meeting of the International E-Waste Management Network (IEMN) from July 14-17, 2014 in Hanoi, Vietnam. Vietnam's Ministry of Environment and Natural Resources (MONRE) had announced that Vietnam would be hosting this meeting during EPA Administrator Gina McCarthy's April 2014 mission to Asia. This was the first international activity implemented under Taiwan's International Environmental Partnership (IEP). In addition to officials from Vietnam, Taiwan and the United States, representatives from Thailand, Malaysia, Indonesia, Japan, Colombia, Argentina, El Salvador, Brazil, Nigeria, Costa Rica, Egypt, Canada, Mexico, Washington State and California joined the meeting.

The meeting was opened by MONRE Vice Minister Bui Cach Tuyen, who emphasized the importance of e-waste issues in Vietnam. Barnes Johnson, Director of USEPA's Office of Resource Conservation and Recovery, and Ying-Ying Lai, Deputy Director of EPAT's Department of Waste Management, also provided opening remarks at this inaugural IEP event. As in previous years, meeting participants exchanged their latest updates related to e-waste management.

The primary feature of this year's IEMN meeting was training on Environmentally Sound Management (ESM) of E-Waste adapted from materials developed by the North American Commission for Environmental Cooperation (CEC). These materials were adapted for the IEMN and presented by Michael Vanderpol of Environment Canada and Frineé Cano of Mexico's Ministry of Environment, both of whom participated in the CEC working group which developed the original training. The training was supplemented by examples from Washington State, presented by Christine Haun of the Department of Ecology, examples from California presented by Matt McCarron of the Department of Toxic Substances Control, as well as examples from Canada, Mexico and other countries. During and after the training, participants discussed approaches to promoting ESM of e-waste in their respective locations, such as stages of voluntary and mandatory efforts.

The final day of the meeting concluded with panel discussions featuring external speakers on the future of cathode ray tube recycling and financial mechanisms for e-waste management. Taipei Economic & Cultural Representative in Hanoi Deputy Representative David Kuang-Chung Liang greeted the group and speakers, noting that environmental protection requires international cooperation to be successful. He noted the importance of the 2014 IEMN meeting as the inaugural event under IEP.

At the end of the meeting, Participants confirmed their commitment to continuing the network and sharing updates 'through quarterly teleconferences and annual meetings. Representatives offered to share additional information on financial structures and incentives from the countries and locations represented by the IEMN. Participants also expressed interest in continuing to learn about ESM in greater detail, as well as about how to recycle difficult-to-manage wastes such as mercury-containing lamps. In addition, participants expressed a willingness to compile additional information or case studies on topics of specific interest to IEMN members.

This report summarizes the key points from meeting presentations and discussions.

Day 1: Presentations from Around the World

The Vietnam Environment Administration noted that Vietnam's producer takeback law for e-waste will come into force from 2015-2016, with exact timing varying by product. The Circular which will define how the takeback system will be implemented is currently being developed. The lack of material flow to companies certified by VEA for treating e-waste is a challenge. The strong network of individual collectors may also present a challenge to the developing takeback system. Hanoi University of Science and Technology (HUST) estimated that e-waste generation in Vietnam is increasing 20-25% each year and noted that the quality of products produced by Vietnam's electronics recycling industry is not very high. The same informal dismantling methods that generate these low-quality products also result in negative environmental and health impacts.

Japan regulates e-waste through two major laws, the Law for Recycling of Specified Kinds of Home Appliances, and the more recent Law for Recycling of Small Electronic Appliances. Secondhand goods remain outside of the regulatory scheme.

In Brazil, the point at which e-waste should be considered hazardous is currently being debated as implementation progresses on the National Solid Waste Policy's takeback requirements. The government is currently working on a law that says e-waste is not hazardous until dismantling begins, otherwise every collection and transportation point would need a hazardous waste permit, which would be a significant economic burden. The first R2 certified company in South America was certified in Brazil this year.

Nigeria regulates all non-functioning electrical and electronic equipment as hazardous waste. It is working to establish an environmentally sound formal e-waste recycling facility. Nigeria is building a data bank of certified e-waste importers and the quantities they import. Since a January 2013 interception, it appears that the illegal import issue has declined significantly and that domestic e-waste is more of a concern.

In the United States, both the amount of e-waste generated and the percentage of electronic waste recycled have increased dramatically over the last decade. Under the National Strategy for Electronics Stewardship, federal agencies have come together on a number of e-waste-related actions, including strengthening of the Cathode Ray Tube Rule and a study that found substantial lead exposure in workers at CRT glass processing centers. The number of third-party-certified recyclers in the United States has increased significantly since certification began in 2009, approximately a five year period, and has helped to achieve one of the main goals of the US strategy, to increase the safe and effective management and handling of used electronics in the United States and elsewhere in the world.

Taiwan regulates six types of waste home appliances and six types of waste electronic items, as well as waste light bulbs, under its extended producer responsibility system. As of 2014, waste tablets are also regulated under this system. The new Differential Fee entitles manufacturers of environmentally friendly electrical and electronic equipment to a 30% fee discount for those products.

Malaysia has 138 e-waste recovery facilities, out of which 99 are small-to-medium dismantling facilities and 39 are full recovery facilities which can recover precious metals from e-waste. E-waste collection centers are listed on the Department of Environment's website. Household e-waste collection is currently in the pilot phase through public-private partnerships.

The Central American WEEE Strategy has been presented to the Central American Council of Ministers. The next step is to develop a detailed action plan that can be financed. An ongoing Rapid Assessment on ESM of Chemicals and Hazardous Wastes and Other Wastes, including E-waste, includes a pilot on CRT treatment on a facility that recycles Used Lead Acid Batteries in Guatemala. El Salvador has prepared draft technical guidelines for e-waste is also developing a national WEEE strategy as well as awareness-raising and collection events, including a Music for the Earth/Safe Planet campaign.

In Mexico, e-waste are the domain of state government, however some components are regulated by federal government depending on the hazardous nature of the devices, as CRTs. According to the legal framework, e-waste recyclers have to register their management plan with state environmental offices, but this sometimes ends up being more of a paperwork exercise than technical enhancement of process. Mexico has published guidelines for recycling and complying with the regulation in Spanish, which may be of use to LAC countries.

Egypt only has one formal e-waste recycler. A national assessment for e-waste management practices in Egypt will soon be conducted in partnership with the World Bank. Other projects are also being conducted on topics including collection systems and accreditation for e-waste recyclers.

Colombia's 2013 e-waste legislation establishes requirements for Extended Producer Responsibility (EPR) as well as obligations for other stakeholders, and applies to all WEEE categories. Colombia's national standard for e-waste management is under final revision and will be available in English and Spanish.

Indonesia is working to collect and manage household e-waste through draft regulation. Indonesia has 37 provinces, which makes it challenging to develop an incentive system or an effective primary collection system that could be applied nationwide. Pilot formal collection systems are ongoing.

In Canada, standards for the recycling industry were originally developed by the industry itself with initial feedback from the government. Those standards have since been incorporated into the EPR program requirements of 9 of 13 provinces. Eco-fees applied at the point of sale of new devices vary by province and have been adjusted over time.

Argentina's national law on e-waste management has still not passed, so provinces continue to move ahead. The province of Chaco passed its law this year, bringing the total of provinces with e-waste laws to 15. A MERCOSUR project in Argentina has come up with a best practices manual for e-waste recycling in Spanish.

Twenty-two facilities are permitted for e-waste recycling in Thailand but they only do manual dismantling. Work is ongoing on a draft WEEE management law in Thailand, which will include EPR. The National E-Waste Strategy Committee is chaired by the National Environmental Board, whose chair is appointed by the Prime Minister.

In Costa Rica, a recent decree requires that producers, importers and distributors of e-waste have to be a part of compliance units, meaning that they have to give consumers information about where to take e-waste, submit EPR plans to the Ministry of Health, and report statistics to the government. Compliance units must be formed by September.

Days 2 and 3: CEC Training Materials on Environmentally Sound Management (ESM) of E-Waste

The first training presentation, given by Michael Vanderpol of Environment Canada, focused on an introduction to ESM. Key points included:

- Having frameworks like ISO 14008 + OHSAS 18001 makes it easier to put ESM frameworks in place. Although ISO 14001 is a consistent framework for EHS management systems and the plan-do-check-act models used in ESM, there are health and safety issues not necessarily addressed through this framework alone.
- ESM guidance should match overarching concepts, such as risk prevention and occupational safeguards, with industry-specific best practices.
- ESM standards can help countries move progressively along the waste hierarchy until they focus primarily on the prevention stage. Adopting ESM standards is usually an incremental process for both governments and individual facilities, with the first step being basic legal compliance. Over time, systems can become increasingly specific with regard to environmental, health and safety protections, eventually conforming to overarching ESM criteria.
- In developing requirements for ESM, policymakers should look at industry-specific standards. These should take companies above and beyond the letter of the law, and can become a performance requirement which ends up having the same effect as regulation. However, ESM standards should augment, not replace, regulations. For example, in Canada, e-processors must meet voluntary standards in order to participate in the provinces' EPR programs and have access to feedstock. This also helps the government avoid needing to be involved in details of each facility's operations, especially since the government initially gave feedback on the development of the standard. Auditing is also done by an industry association under Canada's system.
- Canada focused first on computers, printers and TVs because they were the biggest problems at the time. Over time the EPR programs added more products, thereby leaving room for corrections along the way. Continual improvement is an important part of Environment, Health and Safety (EHS) Management systems, which in turn facilitate ESM. Canada's standards, for example, have been revised four times in eight years.
- ESM programs can be developed to focus on different priorities and should be adapted to the baseline situation of each country based on the types of waste generated, existing laws and infrastructure, and the types of industries which may be able to assume responsibility for ESM. Transparency, communication and outreach are important aspects of successful ESM programs.

The second training presentation, also given by Michael Vanderpol of Environment Canada, focused on EHS management systems, which are facility-level components of ESM. Key points included:

- Top-level commitments to EHS systems from facility managers are important because they ensure that workers are given the resources they need to get ESM done. It's best to link EHS systems to commitments that government or industry have already made.

- Both government ESM policies and facility EHS policies should avoid being overly prescriptive and should allow for flexibility over time, since it is not possible to write a policy once and have it apply for life of an organization.
- Government policies should aim to make changes within realistic areas of influence instead of being overly ambitious. Governments need to be able to provide advice to facilities seeking to comply with ESM policies, especially to those entering the market for the first time.
- Several examples of EHS policies from private organizations show how management can state their commitments and identify how those commitments will be carried out.
- EHS planning should address all phases of processing done by a facility. Proper planning involves identifying EHS aspects, which are anything that can interact with the environment, health or safety, and their resulting negative changes to environment, health or safety, commonly known as impacts.
- Several examples of EHS aspects demonstrate how different activities throughout an e-waste recycler's process can present different aspects and impacts. EHS planning should prioritize critical risks first. Planning should also include a systematic approach to ensuring legal compliance, starting with procedures on how to identify legal requirements.
- Training and outreach are important parts of EHS systems and can have additional side benefits such as employee retention. Employees should undergo EHS training multiple times, not just once, because requirements change over time.
- Administrative controls are a type of hazard control that should be used during EHS implementation and operation. These can include procedures, practices, schedules, checklists, signs, training, and oversight measures, including closure plans and financial guarantees.
- Establishing and measuring performance indicators are essential to ensuring that EHS goals are met. Without measurement and record-keeping, it is not possible to improve over time.
- It's important to visit facilities to verify that they are implementing their EHS plans.
- Matt McCarron of California and Christine Haun of Washington State presented examples from their states that related to this module. California's "Guidance for Preparing an E-Waste Facility Closure Plan and Closure Cost Estimate" provides details on how closure plans can meet state requirements. Closure plans are important because closure is usually the last thing on the minds of facility managers, but facilities can go out of business, be bought by somebody else or can move locations. When e-waste recyclers in California open and send notification to the state government that they want to be in business, they are required to have a closure plan in place. Washington State's "Environmentally Sound Management and Performance Standards for Direct Processors" require EHS management systems as part of their ESM framework. Speakers noted that the combination of Washington's Preferred Performance Standards and California's closure plan can serve as a complete business plan for a recycling company.
- As part of a discussion on oversight, EPAT demonstrated its closed-circuit-television system which enables real-time monitoring of e-waste recyclers in Taiwan.

The third training presentation was given by Frineé Cano of Mexico's Ministry of Environment. It focused on risk assessment in facilities that process e-waste. Key points included:

- Science-based risk assessment and policy-based risk management should have an interactive exchange with each other.
- As mentioned in Module 2, EHS risk assessment involves identifying hazards and the potential environmental, health and safety risks they may pose. Risk assessment needs to be tailored to the specific types of devices being handled and the types of processes being used in particular facilities since different e-waste items contain different hazardous substances.
- Risk assessments should be conducted annually and can be required through ESM policies and standards. For example, the Electronics Product Stewardship Canada (EPSC) Recycler Qualification Program requires e-recyclers and e-refurbishers to maintain documented processes to conduct annual EHS risk assessments. The standard requires that the assessment covers all aspects of the operations. It identifies seven categories of risk identification and corresponding control identification that must be documented in the annual risk assessment.
- Risk assessments should be redone whenever new requirements or process changes come into effect.
- Different activities can have different risks depending on probability of having an accident. Different operating conditions, from normal to exceptional, can also affect the level of risk posed in a particular part of an operation. For example, certain risks may be higher after a large volume of material is received following a major collection event. Hazard identification must also take into account both routine activities (such as shredding) and non-routine activities (such as receiving unwanted equipment). Risks can also vary by the focus of the facility.
- Financial incentives that are based on the volume of equipment processed can lead to facility managers evaluating employees based on the number of units processed per day, which can promote higher risk.
- Assessing the severity of harm, or level of risk, from a hazard requires taking into account a number of factors, including worker observations and prior accident records, legal EHS requirements, and whether exposure potential from different hazards are chronic or acute. Knowledge of these factors, combined with the likelihood of different risks occurring, can support ranking and prioritization of risks in a facility.
- Gaps in policies, both facility policies and government policies regulating particular sectors, can also present risks. Governments need to assess whether policies for e-waste or for hazardous waste are adequate and cover all hazards. Then they can assess where to fill in gaps- should the focus be on overarching management plans? Facility-level policies to assess risk?

The fourth training presentation on risk prevention and minimization was also given by Frineé Cano of Mexico's Ministry of Environment. Key points included:

- Risk prevention and minimization at the facility level supports ESM and serves a number of functions from improving worker safety to improving a company's relations with the government and public. Three categories of controls are used to prevent and minimize EHS

risks: Engineering Controls, Administrative Controls, and Personal Protective Equipment (PPE). Using a combination of these controls provides the highest likelihood of preventing EHS risks.

- A number of examples demonstrate how different types of controls can be applied in different parts of an e-waste recycling operation.
- Training is essential for proper risk prevention and minimization; you can give people the best tools, but if they don't know how to use them, exposure can still occur. It is also essential to perform regular maintenance on equipment used for controls to prevent failure.
- An example from California showed how, in addition to basic monitoring for lead dust, DTSC inspectors have begun monitoring for mercury during inspections. This is because LCD panels are now being processed in e-waste recycling facilities and is done out of concern for facility workers as well as for the inspectors. Industrial hygienists accompany DTSC during inspections.
- Many controls for risk prevention and minimization, such as best practices for holding and storage, also relate to regulations on hazardous waste. An example from Washington State showed how a site visit revealed improper storage that did not meet state requirements.
- The Washington State Processors' Annual Audit is an example of an administrative control. It is performed by a third party and requires certain information to be reported. The most common areas in these audits that need correction include: missing labels, EHS management plans that are out of date, and the need for better employee training. These issues have often already been corrected by the time the audit is formally submitted.
- The collection network in Washington State is also required to submit an annual report.
- Closure plans and related financial assurance requirements are also examples of administrative controls. Examples were shared about requirements and challenges related to financial assurances in different countries and locations. The importance of having financial experts working in government agencies to set up financial assurance programs also emphasized.

Following the training presentations on both days, meeting participants discussed ESM in their countries and locations, identifying existing practices and needs. Common needs included training for all sectors (formal and informal recyclers as well as government), greater auditing, greater requirements for closure plans and financial assurance, better use of PPE, communicating ESM to stakeholders and the informal sector, and a lack of minimum requirements. Common practices contributing to ESM included some regulations or voluntary guidelines related to hazardous waste or e-waste, some best practices within the formal sector, and foundational preparation at facilities with ISO 14001 certification.

In addition, participants discussed how to promote ESM in different countries and locations and what is possible for governments to do as opposed to what industry might do. Commonly identified roles of the government included training the private sector, creating incentives for ESM, auditing facilities and using enforcement as a deterrent for bad actors, raising awareness among all sectors including consumers, setting an example for ESM by properly managing government e-waste, and supporting collection for facilities using ESM. Participants noted a variety of roles for industry in promoting ESM, including training and educating both formal and informal sector workers, implementing EHS management systems, meeting voluntary standards and guidelines (whether created by government, industry or third

parties), using certified recyclers or processors using ESM to meet takeback requirements or to do downstream processing, and funding collection.

The discussion continued into how local and national policies can incorporate ESM. Examples and ideas included mandatory, voluntary and phased approaches. Mandatory approaches included regulatory requirements for ESM or basic certification requirements, EPR programs with ESM standards, landfill bans, reporting requirements, and auditing requirements. Voluntary approaches included ESM guidelines, third-party certification, financial incentives for ESM, and programs that reward good performers with publicity. It was noted that voluntary guidelines can later become mandatory requirements and that requirements might be mandatory for certain equipment at first, with additional devices being added to programs over time.

The group then synthesized these ideas to discuss how incremental approaches to ESM can be taken. Many suggestions were shared on what could make up initial steps towards ESM, and it was noted that multiple initial steps can be taken at the same time. As mentioned during the training, a first step towards ESM is often compliance with existing regulations, such as hazardous waste regulations. Participants affirmed that it is indeed important to enforce a set of minimum regulatory requirements. Other initial steps could include basic EHS training (including for informal recyclers), training and financial support for new or informal recyclers, partnerships between informal and formal sectors that allow each to do the processes which they can do safely, developing lower-level certifications that lay out minimum ESM requirements, conducting awareness-raising and outreach, and performing baseline risk assessments (both at the country and facility level). Secondary steps could involve licensing requirements and standards with more than minimal requirements, and advanced steps would involve the use of international certifications, comprehensive domestic certifications, and could apply ESM beyond regulatory requirements through corporate social responsibility and supply chain responsibility.

Day 4: Expert Discussions

The final day of the meeting concluded with panel discussions featuring external speakers on the future of cathode ray tube recycling and financial mechanisms for environmentally sound management.

The first discussion focused on the future of cathode ray tube recycling and was moderated by Dr. Shunichi Honda of Japan's Ministry of Environment. The speakers were Larry King of SIMS Recycling Solutions, Frineé Cano of Mexico's Ministry of Environment, and Priti Mahesh of Toxics Link. Key points included:

- 10 years ago it started costing recyclers money to recycle CRT glass, whereas prior to that, recyclers made money recycling CRTs.
- One factor that can increase the cost of recycling is manufacturers' desire to have the material they take back only be processed by downstream vendors they have audited.
- In Mexico, companies recycle funnel glass to substitute raw material in floor tiles and ceramic sinks (washbasins), but recently regulation on hazardous waste limited the growth of this activity.

- The Mexicali facility still accepts CRTs, including from the U.S., but there will probably be a need for another facility sometime in the future because transporting CRTs across Mexico to one facility is very expensive.
- Enforcement is an important role for government in CRT management. The government has to make sure that enforcement staff understand CRT issues well.
- In India, glass-to-glass recycling is no longer viable because there is no longer demand for new CRT televisions. However, CRTs from across the globe continue to be shipped to India, where improper CRT recycling that creates occupational risk and environmental damage is the norm. In the informal sector, CRT glass is being mixed in with regular glass through recycling, ending up in children's marbles and glass tops for bakeries' ovens.
- A video of the informal sector recycling CRTs in India showed workers smashing the screens with a hammer in order to recover the metal frame, which is not very valuable. The workers wore no personal protective equipment and no environmental protection measures were evident.
- In India, the general public is economically incentivized to give e-waste to the informal sector because it pays more for waste. However, under India's new e-waste regulation, the public is now required to return e-waste to producers without receiving payment; this system will require incentives to function properly. Companies and bulk sellers are now required to auction their e-waste to the formal sector.
- In India, there may be opportunities for the informal sector to link with manufacturers for collection and takeback because India is so large and transportation costs are very high.
- Regulations, especially EPR, should have systems to deal with historical CRT waste. Historical waste is currently unaccounted for in India because the e-waste rule came into effect in 2012 and says that manufacturers are responsible for everything sold after that. This means that nobody is responsible for CRTs, which were mostly sold before 2012.
- Many types of potential reuse of CRT glass are needed and information about which of them can be implemented legally is also needed. Currently, there is no consistently viable way to reuse leaded CRT glass or extract lead from glass.
- People need to avoid allowing a similar CRT situation to happen again with other devices. Priti Mahesh stated that funds need to be made available to deal with the historical waste, since EPR will only deal with new e-wastewhen implemented in India. Larry King and Frineé Cano both noted that greater enforcement of existing laws is needed.

The second discussion focused on financial incentives for environmentally sound management of e-waste and was moderated by Barnes Johnson, Director of USEPA's Office of Resource Conservation and Recovery. The speakers were Jason Linnell of the National Center for Electronics Recycling in the U.S., Nguyen Hoang Duc of VEA and Professor Ssu-Li Chang of National Taipei University. Key points included:

- In the United States, there has been resistance to consumer fees since California implemented its consumer fee program. After that, all new state laws have looked at putting the burden of environmentally sound management of e-waste on producers.
- The entity who is considered the "producer" differs from state to state but usually includes the brand, licensee, or even the seller. Outside of state programs in the U.S., there are also many private sector programs whose "incentives" are mostly through online mailback programs.
- There are still many areas in the U.S. where consumers have to pay the government or collectors to take used electronic devices.
- In Vietnam, the government approved a decree in August 2013 on the takeback and recycling of disposed e-products. Beginning 2015, products such as batteries and electronic devices will need to be taken back and recycled. In 2016, the requirement will go into effect for home appliances. The list of approved recyclers will be on the VEA website.
- Taiwan is currently in the third iteration of its e-waste management program. The first iteration was an EPR program where manufacturers had the responsibility to do takeback and recycling by themselves. The manufacturers did not do that well, so the law had to be revised. The second iteration of the program was operated by public/private enterprises, but this was also not successful. In the current, third iteration, the government receives fees from manufacturers and importers and uses these fees to subsidize recyclers.
- There are currently 14 WEEE devices regulated under Taiwan's program. The fee is calculated separately for each product.
- Taiwan's per capita WEEE collection rate is comparable with that of European countries like Finland.
- The goal of the fee system in Taiwan is to assure financial sustainability of the program. It includes administrative costs. It is calculated annually using total program expenditure and total sales of EEE for any given year.
- In the developing Taiwan's fee system, it was important for the public to trust that fees were being used properly by the government. For that reason, the fees collected under the recycling program are allocated to a fund which can only be used to pay program subsidies. The subsidy system also has to be coupled with enforcement in order to be effective.
- Administrative cost calculation and recovery vary among U.S. states' e-waste programs. Some have fixed fees while others total their costs and divide them among manufacturers.
- For example, Washington State has a tiered system in which larger companies pay higher fees. California's highest administrative cost comes from collecting money from retailers because there are so many of them. Some states have no fee system at all and just approve the manufacturers' takeback plans.
- EPR programs vary in how they are set up. Takeback of certain devices can be left to the market, especially where large manufacturers or producers may already have their own

recycling programs. But where there are large-scale informal systems, the government must get involved to ensure proper final disposal of waste.

- EPR and shared responsibility are not necessarily mutually exclusive. EPR programs such as those in the United States depend on consumers choosing to recycle their e-waste.
- In Vietnam, the likely first step for EPR is that the government will work with recyclers and possibly subsidize them during the initial stages of the takeback program. Once the program reaches a larger scale with more recycling companies, the market could be more of a driving force.
- All systems have disadvantages depending on the incentives in place. In EPR programs, producers generally prefer to pay fees and transfer their responsibility to the government or another party. If manufacturers are required to pay for recycling based on the number of pounds collected, they will work to limit the amount of pounds coming in and to treat them in the cheapest way possible.

At the conclusion of the meeting, participants confirmed their commitment to continuing the network and sharing updates through quarterly teleconferences and annual meetings. Representatives offered to share additional information on financial structures and incentives, as well asto compile information resources or case studies on aspects of e-waste management of interest to the group, from the countries and locations represented by the IEMN. EPA noted that it may possible to translate documents from participants' locations into English in order to facilitate sharing. In addition, EPAT and EPA mentioned that there may be opportunities under the new IEP to conduct projects within IEMN participants' locations, including small grants, personnel exchanges or fellowships, and training.

Participants also expressed interest in continuing to learn about ESM in greater detail. Related topics for future discussion might be a basic set of ESM standards for the informal sector as well as an incremental approach for developing countries to take their recycling sectors from a basic ESM model to intermediate and advanced levels of ESM. Participants continued to be interested in how to recycle difficult-to-manage wastes such as mercury-containing lamps,particularly as they pertain to flat screen TVs. Multiple potential locations were suggested for the 2015 meeting, while a possible topic for the 2016 meeting might be how Brazil incorporates its informal sector into e-waste management.

Invitee List

Country or Location	Participant(s)	Organization
Malaysia	Khiruddin Mohammad Idris	Ministry of Environment
Indonesia	Amelia Rachmatunisa Ms. Tunjung Puitika	Ministry of Environment
Japan	Dr. Shunichi Honda	Ministry of Environment
Brazil	Beatriz Martins Carneiro	Ministry of Industry, Development and Foreign Trade
Colombia	Carlos Hernandez	National Centre for Cleaner Production
El Salvador	Miguel Araujo	Director, Centre for Basel Convention for Central America and Mexico
Argentina	Leila Devia	Director, Centre for Basel Convention for South America
Nigeria	Abdussalam Isa, Akhigbe Anastasia Odegua, IdaminaboTonye Rex	National Environment Standard and Regulation Enforcement
Egypt	Adel Osman	Ministry of Environment
Costa Rica	Jorge Valverde Quesada	Ministry of Health
Thailand	Pornpimon Chareonsong	Thailand Pollution Control Department
EPAT and Taiwan Universities	Ms. LAI Ying-Ying Mr. CHEN I-Hsing Ms. CHANG Ssu-Li Mr. FAN Kuo-Shuh (“Richard”) Mr. WANG Chia-Hsiang	Deputy Director, Department of Waste Management, EPAT Deputy Section Chief, EPAT Recycling Fund Management Board Professor, National Taipei University Professor and Vice President, National Kaohsiung First Univ of Science and Technology Contractor

Vietnam	Dr Bui Cach Tuyen	Vice Minister, Ministry of Natural resources and Environment
	Dr. Hoang Duong Tung	Vice Director General, Vietnam Environment Administration (VEA)
	Dang Van Loi	Vice head of Pollution Control Department
	Nguyen Hoang Duc	Pollution Control Department
	Truong Manh Tuan	Pollution Control Department
	Dr. Nguyen Anh Tuan	Pollution Control Department
	Nguyen Hong Ha	Pollution Control Department
	Tran Thi Hien Hanh	Pollution Control Department
	Vu Quynh Linh	Pollution Control Department
	Vu Thi Phuong	Pollution Control Department
	Dr. Huynh Trung Hai	Hanoi University of Science and Technology
	Nguyen Thanh Yen	Department of Waste Management and Environment Promotion
	Phan Thanh Giang	Department of Waste Management and Environment Promotion
	Nguyen Nhu Trung	Department of Waste Management and Environment Promotion
	Nguyen Thu Trang	International Department, MONRE
	Pham Thanh Tu	Department of International Cooperation and Science, Technology
Mexico/CEC Trainer	Frineé Kathia Cano Robles	National Institute of Ecology and Climate Change, Mexico Ministry of Environment
Canada/CEC Trainer	Michael Vanderpol	Environment Canada

USA	Barnes Johnson Dan Gallo Panah Stauffer, Justin Harris Christine Haun Matt McCarron	Director, USEPA Office of Resource Conservation and Recovery USEPA Region 3 USEPA Office of International and Tribal Affairs Washington State Department of Ecology California Department of Toxic Substances Control
Expert Speaker for July 17th Discussions	Larry King	SIMS Recycling Solutions (USA)
Expert Speaker for July 17th Discussions	Jason Linnell	National Center for Electronics Recycling (USA)
Expert Speaker for July 17th Discussions	Priti Mahesh	Toxics Link (India)