

Meeting Summary
Prepared by ETV Canada

**1st International Environmental Technology
Verification Forum**
July 13-14, 2005, Washington, DC

Hosted by the U.S. Environmental Protection Agency

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**“U.S. Environmental Protection Agency ETV Program
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The full report can be found at www.epa.gov/etv.

Summary Report on the U.S. EPA Environmental Technology Verification International Forum: July 13-14, 2005, Washington, DC

The U.S. EPA ETV International Forum took place on July 13-14, 2005, in Washington, DC. Approximately 200 people attended the Forum, including representatives from 14 countries – Austria, Belgium, Canada, Finland, Germany, India, Israel, Japan, Korea, Laos, Singapore, Thailand, The Netherlands, and the United States. Participants from the United States, Canada, Korea, Japan, Singapore, and the European Union provided presentations on the various national and international verification programs in existence and under development around the world. Vendors of ETV verified technologies, such as ambient ammonia sensors, portable cyanide analyzers, lead in dust detection devices, residential nutrient reduction technologies, mobile sources devices, and mercury continuous emission monitors, exhibited at the Forum. On July 15, 2005, following the Forum was a tour took place at the EPA Office of Research and Development facilities in Cincinnati, Ohio.

The EPA ETV Program has been in existence since 1995, and over the years has interacted with many different countries. The Program has provided training workshops in India and Thailand, and many countries have come to the United States and met with EPA ETV Program staff and ETV Centers. Given this interest, U.S. EPA thought it would be appropriate to invite all countries that are operating ETV programs around the world to the forum and provide the opportunity for them to discuss the technologies that are of interest, as well as to explore the potential for multi-lateral collaboration.

1. Global Perspective

William Mansfield III is Special Consultant to the Executive Director of the United Nations Environment Program (UNEP), working in UNEP's Regional Office for North America in Washington, DC. He is a former Assistant Secretary General of the United Nations and Deputy Executive Director of UNEP. UNEP is the principal environmental arm of the United Nations, addressing primarily global and North-South environmental issues.

He provided a perspective on the state of the global environment and the earth's natural resource base and pointed out that what we call the global environment is actually the foundation of the world economy. Yet, while acknowledging the importance of the global environment, we are, nonetheless, already using and degrading it faster than nature is able to restore and replenish it. These changes are not a good sign for the world economy or for global stability. Together they signal a serious undermining of the earth's natural resource base and, if they continue, portend crucial environmental, economic, political and social problems for our future. The most serious harmful impacts will fall disproportionately on the poorest parts of the world, which is the most rapidly growing population. In our globalized world, wealthy countries will not be able to shield themselves entirely from the deteriorating environment and resource base.

What does this changing world situation signify for technology verification? He noted that in order to address the crucial global needs in the years ahead, we must direct our technology development, assessment, and verification to facing the critical issues of the planet and its mounting population. There is a tendency for industrialized countries to address their own problems, sometimes at the expense of the needs of the developing world. That is to some extent understandable, though in the long term it may not be

advisable. It is natural to focus attention on pressing issues in your own community, and most companies have in the past traditionally found the best and most lucrative markets in the wealthy industrialized countries. That means much of the attention of our environmental technological development, and needs for verification, will focus on sustainable energy technologies, chemical processing technologies, information technologies, biotechnology, and nanotechnologies of interest to industrialized countries.

However, the world's needs for technological development will more and more be in the developing world, because that is where the world's problems will be most acute and with some four billion potential customers that is where the growing markets for technologies will be. These consumers and markets need many of the technologies of the wealthy countries, and we must find better ways to get those technologies to them. They will need even more technologies to help them address the more basic environmental and developmental problems they themselves are facing.

The key environmental challenges in the growing developing world fall into several major areas:

- air quality
- energy efficiency and climate change
- water resources
- toxic substances and hazardous and solid wastes, and
- resource use and management.

New prevention and control technologies are needed to deal cost effectively with local and global air quality problems in the developing world, such as air toxicity, indoor air pollution, acid deposition and ground-level ozone. Developing countries need:

- new building materials and consumer products that minimize adverse impacts on indoor air quality
- cars and trucks that emit fewer pollutants and transport systems redesigned to address the increasing number of vehicles on the road
- redesigned industrial and chemical production technologies with inherently low potential for air emissions, and
- cost-effective, efficient particulate, air toxicity, sulphur dioxide and nitrogen oxide control technologies capable of being retrofitted to existing power plants.

Pollution prevention technologies are critical for the developing world, especially to reduce mounting quantities of toxic and hazardous wastes and to promote recovery, recycling and reuse. As industrialization increases, toxic substances produced by industrial and combustion process are swelling rapidly as are chemical discharges. While end-of-pipe, burning and burying wastes are common, technologies are needed that help to avoid toxic and hazardous substances. Minimizing waste formation and promoting recovery, recycling and re-use and technologies that assist in cost-effective management of non-recycled wastes and their disposal are needed.

The four billion or more people in the developing world also have a special need to take care of their renewable and non-renewable resources more efficiently. Technologies that help to raise cropland and rangeland productivity, sustain forests and restore world fisheries and promote aquaculture will be critical. Technologies are required to conserve the mineral stocks already in circulation, and to reduce demand for virgin resources and the environmental damage due to extraction. Climate change also needs urgent attention. Today's technologies are inadequate to solve the problems of greenhouse gas emissions and global climate change. The developing world will need new technologies

that reduce energy requirements. Other measures include improving energy efficiency in road vehicles, lighting and heating conversion to low-carbon fuels, and reducing emissions of greenhouse gases. The energy-inefficient infrastructure needs improving, while developing countries must develop low-carbon energy sources. We need accelerated commercial development of renewable fuels and technologies and improved thermal efficiency of coal-fired plants through clean-coal technologies.

The need for technologies to protect rapidly dwindling and degraded water resources, improve their quality, and reduce their cost is also urgent. The developing world needs technologies that prevent agricultural contamination of groundwater, cost-effective and reduced water use in sewage treatment, and more efficient irrigation technologies. Bringing down the cost of water and wastewater treatment is one of the biggest challenges. Reducing the cost of existing technologies or finding other cheaper approaches are essential to ensure safe, adequate water supplies. Agriculture is another major source of pollution in much of the Third World. Non-point source runoff is a serious issue everywhere. Engineering solutions alone do not work: the answer will depend on technologies and practices that combine ecological know-how with engineering capabilities.

The technology needs outlined above all require technology transfer and verification, especially in the developing world, where barriers to transferring appropriate technologies abound. Among them are the lack of knowledge about the existence of commercially available technologies and the benefits they bring. Others include lack of skills and finance as well as inadequate policies.

The private sector is the principal developer, purveyor, financier and distributor of technology, so the governments and international organizations must work in partnership with business and industry to ensure that technology is developed and distributed. Increasingly, public and private partnerships are becoming a vehicle to promoting use of technologies. They bring industry's technology, finance, managerial efficiency, entrepreneurial experience and engineering expertise together with governments' capacity to generate the political will and create a policy environment conducive to investment and long-term sustainable development.

The various development organizations in the United Nations (UN) system over the years have sought to play a constructive role in promoting technology transfer to countries in economic transition and developing countries. Additionally, they have tried to institutionalize technology transfer in many of the environmental agreements and treaties negotiated under their auspices. Concern about technology and technology transfer was given priority at the United Nations Conference on Environment and Development in 1992 and again at the Johannesburg Conference on Sustainable Development in 2002. They signaled the need for favorable access to and transfer of environmentally sound technologies, in particular for developing countries, through technology cooperation and transfer of technological know-how as well as building capabilities for efficient use and further development of transferable technology.

A number of UN agencies have important technology programs to promote the use of appropriate technologies. The World Bank, the UN Development Programme, the regional development banks, the UN Industrial Development Organization, and the Global Environment Facility all have active programs to promote the use of new, safe

technologies. A number of specific international agreements encourage the use of new technologies and benefit from technology verification. Among them are:

- The Montreal Protocol on Substances that Deplete the Ozone Layer, which calls for the phase-out of fully halogenated chemical emissions by converting to alternative technologies. The Treaty's Multilateral Fund provides funding for development and employment of new technologies.
- The Climate Change Convention, which aims to reduce greenhouse gas emissions and encourage the use of alternative energy technologies to cut such emissions. Its Joint Implementation Program promotes technology transfer.
- The Persistent Organic Pollutant (POPs) Convention, which seeks to regulate the production and use of 12 persistent toxic substances and find alternatives to them.
- The Bio-Safety Protocol to the Biodiversity Convention seeks to regulate the trade in genetically modified agricultural commodities and find safe technologies for them.
- The Basel Convention on Hazardous Wastes, the Desertification Convention and others, which promote development and use of appropriate and new, more sustainable technologies.

These UN organizations and treaties can all benefit from technology verification. In addition, UNEP has a number of technology programs. The Environmental Technology Assessment Programme aims to create awareness of the need and value of environmental technology assessment among key decision makers, such as government agencies, industries and trade associations, nongovernmental organizations (NGOs), research institutions, and funding organizations. They see technology assessment as an essential support to developing and applying environmentally sound technologies.

UNEP provides directories of technology assessment institutions and sources of information and training resources. These programs are carried out by the Technology, Industry and Economics office, headquartered in Paris, France, and the International Environmental Technology Centre in Osaka and Shiga, Japan.

Given what has been said about the global environmental issues, UNEP is convinced that EPA's Environmental Technology Verification Program is making an important and vital contribution to technology development and transfer. UNEP believes it is essential to provide third party, quality-assured testing to speed implementation and use of innovative environmental technologies. Given the mounting pressures and needs of a mushrooming developing world, they believe an important effort must be devoted to bringing the benefits of ETV and other similar technology verification programs to the poorer countries and countries in economic transition. This calls for, perhaps, a less sophisticated program than ETV, one that requires a somewhat less technical infrastructure of skilled professionals, measurement and analytical facilities and well-defined testing protocols, which are more likely to be available in developing countries. Developing countries' immediate need is assessment for technology selection and implementation. Given their resource and skill constraints, the assessment process for them should be fast, simple, and inexpensive. They are not looking for 99.99% accuracy, rather a much broader level of 90% accuracy. They are looking for robust, low-tech and easy maintenance, operational programs that do not require specialists to operate and maintain.

For the verification to really yield results in the developing world, part of the program must build in capacity building so that nationally tailor-made programs can be developed and put in place. With financial support, UNEP could undertake to carry out such capacity building within the framework of their Bali Strategic Plan on Technology Transfer and Capacity Building. UNEP thinks that they should increasingly incorporate the environment focus of the verification program into a Sustainable Technology Verification Program where increasingly development and social factors also are assessed (e.g., the impact on jobs and on poverty reduction). This, of course, is more difficult but increasingly in keeping with the direction of world thinking.

As the biggest need for selecting the right and environmentally sound technology in the developing world is in the Small and Medium Sized Enterprises (SMEs), the program could very usefully be evolved to address more specifically the technologies they use, keeping in mind their resource constraints.

It is clear that the technology verification program should reach out for acceptance by a wider international audience. Broader international acceptance would help to ensure that verification would achieve greater use and also would not contribute to the potential of trade barriers. Ideally, the verification process should be adaptable and implementable by as many technology suppliers and users as possible around the world.

In the past, the international community has undertaken to adapt these specialized and often nationally based programs (e.g., hazardous wastes) first within the framework of the Organization for Economic Cooperation and Development (OECD) for developed countries. That accomplished, the baton has been passed to UNEP to work with developing countries to adapt the approach and program to their needs.

UNEP through their International Environmental Technology Centre (IETC) is ready to participate in technical discussions on how to move forward on a technology verification program that takes into consideration the wider set of information and other needs of developing countries to assist them in their choice of suitable technologies with parameters that help them.

As decision-makers in government, industry, and other areas focus more on introducing environmentally sound technologies into their policies, programs and practices for managing environmental issues, environmental technology verification will become an even more essential tool for protecting the global environment. UNEP commends EPA on its program, and urges them to consider with others in the field ways to expand its current reach to the wider international community. Attaining sustainable development is a great challenge facing the community of nations; it is a challenge that can be met by developing and deploying technologies that will protect the environment while sustaining economic growth. That makes technology verification an essential tool for achieving sustainable development in the 21st century.

2. Market Perspective - U.S. Department of Commerce

Carlos Montoulieu is the Director of the Office of Energy and Environmental Industries (OEEI) in the International Trade Administration of the U.S. Department of Commerce (DOC). In that capacity, he oversees the Department's programs and initiatives to develop greater commercial opportunities in, and exports to, foreign markets for U.S. energy and environmental companies.

Mr. Montouliou stated that for policy, technical, and commercial reasons, environmental technology verification is critical. It is something that we have to have, and we have to have more of it. He provided background information on the link between verification and the commercial work that is done in the DOC. Their mandate in the international trade administration and, in particular, in his Office of Energy and Environmental Industries, is relatively straightforward. They work in a variety of ways to enhance the international competitiveness of U.S. environmental and energy companies and to help them increase their exports to the world. One way that this is done is through trade policy development. For example, they are very actively involved in work in the World Trade Organization (WTO) to liberalize trade in environmental goods and services.

Another area that DOC actively works in is the commercial arena and outreach to U.S. industry. It is a two-way flow. DOC needs to know what their needs are, their interests, and their concerns, and also learn about the industry. Industry needs to know what DOC can do to help them target international markets of opportunity and what are the dos and don'ts. DOC provides information on the opportunities, the faster growing markets, and the faster growing areas of opportunities within sub-sectors of the environmental industry. The DOC also provides in-depth research about markets and opportunities. DOC focuses on markets in Brazil, India, China, Thailand, and Mexico, where growth is occurring.

DOC also does advocacy for individual U.S. companies that are pursuing specific projects overseas. Many of the projects that take place in the environmental sector are government-led projects, such as major water and wastewater treatment plants, and major plans and initiatives to clean up the air or reduce solid and hazardous wastes. DOC is competing head-to-head with their counterparts in some of the other major exporting countries, such as the United Kingdom, Germany, France, and Japan. The DOC and these countries all do advocacy on behalf of their companies that are competing for the major procurement projects overseas.

A large amount of the work that DOC does is in the area of matchmaking, which is the area most closely related to verification. Their work is to figure out how to bring more effectively U.S. suppliers of environmental goods and services together with foreign buyers of those goods and services, whether the buyers are in the private or public sector. In the context of helping to expand commercial opportunities for U.S. environmental companies, DOC consistently runs into the issue of verification. First, the environmental problem is defined. Second, the technologies or services available to deal with that problem are identified. Third, the suppliers of those goods and services are identified. Once you get to the third stage, the logical next question DOC gets from the overseas buyers is: Does this do what it says it does? Will this technology or process help them meet the environmental goals or standards that they have to meet for regulatory or economic reasons. They are going beyond the stage of just remediating an environmental problem, more often the investment is up front in preventing the problem, accumulating economic savings, greater efficiencies in processes, eliminating use of water and water that needs to be treated, and eliminating hazardous materials that have to be disposed of. The whole issue of clean energy and energy efficiency is becoming much more important as the price of oil increases.

DOC is continuously hearing this question: Can you verify that this technology works? This question is asked most frequently from two types of buyers. One group is those buyers who are in the lesser developed countries that have less experience in

environmental investment and in environmental applications. They need greater assurance that a technology does do what it says it does. The second group is those buyers who are looking at state-of-the-art technologies, newer emerging technologies that everyone has some questions about. They want to know if a technology really works in the application that a buyer wants to use it for. DOC needs to be able to answer these questions for policy, technical and commercial reasons. Also, they need to answer these questions to help U.S. companies be more competitively internationally. There is a necessity to guarantee the delivery of the service and the efficiency of a product that is being sold. Reducing the risk of a particular project becomes increasingly important in the environmental sector. It also is increasingly important for social reasons. Many of these projects are projects that are not just for economic or environmental reasons; they have major social and health benefits that accrue from them. The demand from the public sector in developing countries is increasing tremendously to show results, to deliver what was promised when investing perhaps hundreds of millions of dollars or billions of dollars to clean air, treat water, and reduce waste. Those who are supplying goods and services to government officials or private sector companies are very well armed when they have verification conducted on their product or process and they can show that it does what it claims to do.

Mr. Montoulieu supports the work that EPA has been doing through the ETV Program. He endorses the need for greater international complementary programs to the extent that they all have relatively similar efforts and standards and activities to enhance the verification of environmental technologies. He commended EPA and other countries for their work on verification and encouraged expanded use of any of these programs.

3. Environmental Business International – Perspective on International Opportunities

Andrew Paterson has been working with technology enterprises and engineering firms for 20 years, primarily in market, financial and technical analysis of innovative technologies and commercial issues in bringing them to market. For more than 10 years he has worked with Environmental Business International (EBI), a leading publisher and research group for market intelligence and strategic information related to environmental and energy markets.

Mr. Paterson's presentation focused on the environmental market outlook to 2010. Environmental technology is unfolding in a local political context, not just a national context. Markets do not buy technologies, customers do. Often, they are buying not a technology, but a solution. Environmental legislation in the 1970s and 1980s helped drive the growth of the U.S. environmental market, but economic recovery and manufacturing excellence in the 1980s became larger drivers as cleanup markets topped out. Exports comprise about 10% of the total market and are concentrated in air and water equipment. The U.S. environmental market growth trends from 1970 to 2010 show that the market is beginning to crest.

The market is comprised of three broad categories: (1) services, which is populated with engineering firms; (2) equipment, which is technology providers; and (3) resources such as water and recycled goods. These categories were developed in part with the U.S. EPA and with the Department of Commerce. Success has been part of the story behind the cresting of some markets. On the one hand, it is bad news that the markets are cresting if you are in environmental sales; on the other hand, there has been success in the reduction of lead emissions in air and the reduction of some pollutants in the wake of

the onset of technologies in the energy sector. There still are global challenges such as clean air, safe water, and land restoration.

There are several service sectors that are declining in the United States, while the water and energy sectors are growing. The backend treatment services (e.g., remediation, hazardous waste management, analytical laboratories, and related consulting) peaked in the 1980s and will continue to decline. In the remediation and hazardous waste sector in the United States, particularly with the huge success by EPA in cleaning up underground storage tanks, much of the work has been done. Therefore, there is a cresting in those markets. Whereas water and their process and prevention technologies are growing, as we move from end-of-pipe treatment in the manufacturing sector to the process of using catalysts and substituting materials. In the last 5 years, a segment called environmental energy sources (i.e., alternative energy sources, wind, solar) has been added and it will be a big trend globally. Some sectors are growing and some sectors are cresting.

Mr. Paterson discussed the 2010 forecast for the U.S. environmental markets in terms of growth versus size. There are three groups of environmental markets where spending and selling is occurring. There are smaller markets, such as the prevention process technologies and the environmental energy technologies, which are growing fast. There are some large markets, such as infrastructure, hazardous waste and wastewater treatment services segments, which tend to grow with the economy and population. The third group is the shrinking or cresting markets that includes the traditional backend cleanup and consulting sectors.

In developing countries, the backend services (e.g., remediation, land restoration) are often tied to finance and development projects, rather than a standalone program. The different market traits (growth rate, competitive dominance, nature of purchasing decisions) call for different export development approaches and affect the issues related to technology verification. Clean energy and process technologies offer much higher growth rates (>20% per year) to allow recovery of equity investments. The larger markets, such as water treatment and resource recovery, have steadier growth rates that match the economy and demographic trends and allow for some debt funding and project finance (often with some public finance). Municipal ownership is high in these sectors precluding venture capital; tax exempt bonds and international lending are more typical. Declining markets, such as remediation and consulting, must rely on asset conversion (e.g., brownfield development or facility turnaround) to generate returns because losses on operations are common. For international markets, project debt financing is a paramount factor in driving purchasing decisions because markets and enforcement mechanisms are not well developed.

In looking at the global market by geographic region, developing countries offer higher growth markets, but environmental spending is still dominated by industrialized, high per capita income countries. The United States is almost 40% of the global market, with Western Europe comprising 30%, and Japan at 17%. The lack of enforcement, funding problems, and economic instability are major issues. The global markets are driven by demographics and energy needs. Energy and water niches will grow worldwide to meet the demands of surging populations. More than 25 "mega-cities" (>10 million people) will appear by 2020, up from 12 now. The percentage of environmental exports in some segments is highly variable. Instrumentation and air and water equipment are the leading sectors for export from the United States, and these sectors also are top

priorities for EPA. Export of services poses more difficulties and is more often connected with specific projects.

In the United States, there are regional differences that make it difficult to frame national solutions. The energy use patterns, the levels of urbanization and air pollution, availability of renewable resources, and use water and land are all issues that differ markedly by region and have an impact on technology purchasing decisions. Some states tend to be concentrated around common themes, such as transportation, energy exploration, clean coal, water and drought management. Other states are concentrated around other themes, such as mass transit, transportation planning, water infrastructure makeovers (rather than expanding a water treatment plant for a suburb), and restoration. The regional differences are important in terms of the market opportunities.

Different market segments see different growth rates and demographic drivers. Economics is a key driver (versus enforcement). The regional political differences lead to different environmental and energy policies, which have a direct bearing on market opportunities for innovative products and technologies. Financing is paramount for exports, because some of the growing overseas environmental markets are less developed. EPA should consider focusing on some of the missing links for technology implementation, such as validation with stronger links to real projects, resolving policy conflicts, and mechanisms for international regulatory acceptance. Verification of technology must also involve training of regulators.

4. ETV Programs

United States

Sally Gutierrez, Director, U.S. EPA National Risk Management Research Laboratory (NRMRL) in Cincinnati, Ohio (one of three national laboratories within U.S. EPA's Office of Research and Development), made the opening presentation. She noted that the United States has long recognized the need and the value of determining the efficacy of treatment technologies designed to control environmental contaminants and the monitoring devices that collect data for process control and overall environmental condition assessment and compliance with regulatory standards. She emphasized that many of the tough environmental challenges of the past 30 years in air and water pollution and land remediation have been overcome by conducting high quality verification and demonstration of technologies. A key part of these evaluations has been to determine both the capital and operating and maintenance costs and the level of expertise that is required to operate these technologies. EPA has achieved its desired public health and environmental goals through the effective use of technologies.

The U.S. EPA Environmental Technology Verification Program was created in 1995 to accelerate the entrance and adoption of new and innovative technologies to the marketplace. To date more than 300 different technologies have been verified and more than 80 testing protocols have been developed. One of the unique dimensions of the program is that these protocols have been developed through a volunteer stakeholder consensus process. The program has verified technologies for treatment of various contaminants in drinking water, such as arsenic and cryptosporidium. Verifications also have been done of technologies for particulate matter, sulfur and ammonia control in air; onsite sewage disposal systems; wet weather flow contaminant control devices; and devices and technologies that have been applicable in the area homeland security.

The homeland security verifications are a good example of why this verification process is important. When the United States was first faced with the potential for intentional contamination of the environment, EPA received calls from the public and others with questions regarding vendors and whether their technologies were effective or the performance claims were true. There was little information that could be provided to the public and others on how effective certain devices were. Since then, a number of verifications have been completed for various devices in the homeland security area.

Monitoring technologies are a priority in the U.S. EPA ETV Program. There have been many recent advances in real time and continuous monitors for pollutants in air such as ammonia, particulate matter, and hydrogen sulfide. In water, there has been success with the verification of multi-parameter probes and nutrient detection. For surfaces, verifications have been completed for monitors that can help do faster determinations of dangerous lead levels that may be present on surfaces.

The value of this information also has been recognized by many regulators and entities responsible for environmental permitting actions, such as states that implement drinking water protection programs. ETV verified technologies are now allowed to be installed in some states without additional pilot testing. The savings from this is tremendous, because pilot testing is no longer required in some states before the technology can be used. It saves a tremendous amount of money in site-specific pilot testing and it allows for more expeditious installation of these technologies. There are many benefits to vendors. Vendors use the verification results in their marketing and sales activities and they now have independent high quality data to present to their potential clients.

It was also noted that the U.S. EPA recognizes that the verification program is a good place to introduce and advance the concept of sustainability as it relates to technology. This is a new dimension that is being added to the U.S. ETV Program and there is interest in formulating sustainability metrics that can be applied to the technology verification process.

U.S. EPA sees a great need for collaboration across the globe. The Agency has interacted with many interested countries including Japan, Korea, Canada, and Singapore. Further collaboration is needed and there would be value in adopting standards (e.g., an ISO type framework) that we could apply globally that would allow for better exchange of accepted technologies.

Teresa Harten is Director of U.S. EPA's Environmental Technology Verification Program (ETV), U.S. EPA National Risk Management Research Laboratory, Office of Research and Development. She provided an overview of how the U.S. Program operates. The details are outlined in the ETV International Forum Report.

Canada

John Neate spoke on behalf of ETV Canada, the not-for-profit organization that manages the Canadian Environmental Technology Verification Program. He commented that in 1999, there was a great effort on the part of the U.S. EPA and other organizations, including Environment Canada, to stimulate dialogue in this area because of the importance of ensuring that environmental performance information is reported clearly and in a transparent manner. He stated that there are large differences between the U.S. EPA ETV Program and Environment Canada's ETV Program, but they have

learned a lot from the U.S. EPA ETV Program. It is that type of sharing of information that is going to allow everyone to find common ground going forward. Mr. Neate then described the rationale and operational features of the Canadian ETV Program. The details of this are provided in the ETV International Forum Report.

Mr. Neate stated that, as a result of this meeting, he would like to see the acceleration of environmentally sound technology implementation and deployment through credible environmental performance verification of technologies. This meeting is a great opportunity to build a dialogue, develop and implement agreements and cooperative initiatives, and to establish an international platform. There are many opportunities for synergy, including performance verification of technologies of national and international importance, development of relevant performance benchmarks and verification protocols, and establishment of mechanisms for fostering international cooperation and harmonization of performance verification and reporting.

Korea

Yeom Sang-Ug is a chief manager of "Technology Verification Team" at the Environmental Management Corporation (EMC) in Korea. The Korean ETV Program is intended to expand the environmental technology choices for public and private decision makers who usually prefer existing technologies to new ones. This allows the consumers to have the confidence in the verified technology and developers to rapidly apply the verified technologies in the field. To meet its ultimate goal to promote new technology development, the Government has let the EMC perform the ETV Program, which provides validation and independent verification of environmental technology performance claims. The details of the Korean ETV Program are provided in the ETV International Forum Report.

Mr. Nam Yong, making the presentation on behalf of Mr. Yeom Sang-Ug, stated that cooperation is needed to apply the ETV framework to each nation to extend the ETV network and performance of technology, thereby achieving the increasing demand for verified environmental technologies. These verified environmental technologies will be applied on site to enhance the efficiency and economical effects. The profits gained from the ETV Program will be reinvested in environmental related industries resulting in more new environmental technologies that can be developed. If more excellent environmental technologies are developed, then industries will develop further, resulting in promoting the quality of life and strengthening industry competitiveness.

Japan

Kenji Kamita is Deputy Director of the Office of Environmental Research and Technology at the Ministry of the Environment (MOE), Japan. In this role, he oversees the Japanese Environmental Technology Verification program (J-ETV). Mr. Kamita described the rationale and operational features of the Japanese ETV Program. The details of this are provided in the ETV International Forum Report.

The five-year program pilot period will end in FY08, followed by full program implementation. They are addressing two issues. Do they expand the target technologies for verification in the future? (If so, it will be even more important to streamline the overall operations.) How do they address the problem of disparities between regions in verification activity? (If small Verification Organizations are unevenly distributed, it will be difficult for companies in other regions to apply for verification.)

Singapore

Professor Tay Joo Hwa is the Director and Chief Executive Officer of the Institute for Environmental Science and Engineering (IESE) in Singapore. He stated that there is no ETV program in Singapore, but they have an ETV-like initiative. Professor Tay then described the rationale and operational features of this initiative. The details are provided in the ETV International Forum Report.

In closing, Professor Tay stated that Singapore aims to be the environmental hub for Asia. Singapore is the gateway to Asia, which is one of the biggest markets in the future. ISES is the environmental technology receptacle for Singapore. They wish to develop more collaborations with other countries.

European Union

Ian Clark is head of the unit “Research, Science & Innovation” in the Environment Directorate General of the European Commission. One of the unit’s key tasks is to coordinate implementation of the European Union’s Action Plan for Environmental Technology.

Mr. Clark provided a brief overview of the political and technical issues that need to be addressed in developing an ETV system. The aim of the EU Environmental Technologies Action Plan (ETAP) is to improve the use and wider development of environmental technologies, particularly by removing the obstacles to development. ETAP has strong political support in the EU and it is closely related to their economic policy and competitiveness strategy. ETAP has three fields of action: (1) getting from research to markets, (2) improving market conditions, and (3) acting globally. The action plan includes a request that the EU develop a verification system, which should be based on existing European centers and structures. The assessments should verify environmental technology performance claims from an economic and environmental viewpoint and taking into account the life cycle of the technology; therefore, the sustainability dimension has been included. Commonly agreed protocols would be developed and common certificates may be developed at a later stage.

There is no EU ETV program, but there are a number of voluntary initiatives in the environmental field that include third-party verification. Mr. Clark then described these initiatives. The details are provided in the ETV International Forum Report.

Dr. Andrea Tilche is Head of the Unit “Environmental Technologies and Pollution Prevention” within the Environment Directorate of DG Research. He provided a presentation on their first ideas for building an EU-ETV system. The scope of an EU-ETV system includes the development and promotion of new and innovative (product and process related) environmentally sound technologies (EsT) through an European verification and testing program, which would give confidence to buyers, attract vendors, and facilitate the access of the technology to the market. Further details of the planned program are provided in the ETV International Forum Report.

5. International Panel Discussion

Dennis Cunningham, Southeast Asia Program Manager, U.S. EPA Office of International Affairs, introduced the following panel members:

- United States – Joseph Ayoub, Team Leader, U.S. Department of Commerce (substituting for Carlos Montouliou)

- Canada – Abe Finkelstein, Chief, Innovation Solutions Division, Environment Canada
- Korea – Yeom Sang-Ug, Chief Manager, EMC, Korea Ministry of the Environment
- Japan – Kenji Kamita, Deputy Director, Office of Environmental Research and Technology, Environmental Policy Bureau, Japan Ministry of the Environment
- Singapore – Professor Tay Joo Hwa, Head of the Unit, Institute of Environmental Science & Engineering
- Teresa Harten – Director, U.S. EPA ETV Program
- European Union – Dr. Andrea Tilche, Head of the Unit “Environmental Technologies and Pollution Prevention,” European Commission, Directorate General for Research

The three topics for discussion were:

- Identifying technologies of mutual interest and international relevance.
- Developing internationally relevant verification protocols.
- Other mechanisms for fostering international verification efforts.

The following key points were made in the round table discussion.

Dr. Tilche commented that in order to achieve credibility of a system, a certain level of complexity must be introduced. However, if the system is too complex, it may discourage the participation in the program or raise the costs and make the system unsustainable in the long term.

Mr. Kamita suggested that atrazine monitoring could be a good place to start in comparing testing protocols with other ETV programs as the beginning of information exchange. There were no other technology categories that were close enough to the technologies categories used by J-ETV. Mutual participation in each other’s stakeholder meetings would promote collaborations among the different ETV programs; however, for Japan, it would be very difficult because of the language barrier.

Mr. Finkelstein pointed out that the area of greenhouse gas capture and reduction technologies including renewables is a national priority, and has about \$800 million budgeted for the next few years and tax incentives of \$1 billion for renewables. Another key area is water and wastewater technologies where two programs, Sustainable Development Technology Canada and the Green Municipal Fund, are providing \$250 million for technology innovation. Over the next three years, \$250 million is also allocated for research, technology demonstration, and commercialization for clean soils technology for contaminated sites and brownfields remediation. Another important area is clean air technologies, including transboundary area issues between Canada, United States, and globally, looking at mercury, and acid rain; and Canada has allocated \$100 million to support technology demonstrations in this area.

Mr. Finkelstein also addressed the need to develop internationally relevant verification protocols. Some of the criteria could include: demonstrate environmental benefits based on sound scientific and technical principles, be supported by peer review, be independent and third-party witnessed, conform to all health and safety standards, use chain-of-custody, and reflects operational realities. Technology-specific protocols could

be stakeholder based in areas of priority interest. Another key area is the examination of environmental issues using a multi-media approach.

Mr. Finkelstein suggested establishing an international working group of ETV program organizations to share protocols, test methods, and data. This working group could be used to explore criteria for establishing an international network of mutually accredited verification entities and reciprocal agreements. It might be possible to establish, through a recognized world body such as UNEP or the World Bank, a Website of ETV verified technologies to facilitate the transfer of technology solutions to address global and environmental priorities, especially for use by developing countries. The U.S. ETV International Forum initiative can be built upon by organizing annual information exchanges.

Mr. Finkelstein stated that Canada developed a reciprocal agreement with California EPA. They conducted pilot verifications whereby ETV Canada verified some of the technologies verified by California EPA, and California EPA verified some of the technologies verified by ETV Canada. Each government had specific criteria that are important to that jurisdiction. Through the process, they determined that approximately 80% of the evaluations were useful to both jurisdictions. A technology going from Canada to California would not require a 100% reassessment of all of the data, only a portion of the information had to be reassessed. That reduced the cost and time for a company to go reciprocally between Canada and California.

Ms. Harten commented that there were potential collaborations in the areas of air, water, and greenhouse gas. The U.S. EPA ETV Program is being more closely linked with the high priority Agency needs, such as the new Environmental and Sustainable Technology Evaluation (ESTE) Program. She noted that a number of the items on the list that Mr. Finkelstein mentioned would be of interest to the U.S. EPA ETV Program. The question on protocols is very closely related to the question on the technologies of interest, and the protocols for those technologies of interest would be prioritized by the EPA ETV Program. They would like to get feedback from vendors about how valuable the ISO process might be to them, given that it might take a long time. Is it valuable to have an internationally recognized verification if it would come through an ISO-like process? One of the barriers of the U.S. EPA ETV Program is accreditation for laboratories. One of things that has been limiting in the number of verifications that can be completed, especially in the diesel retrofit area, is that there is only one test laboratory that is used. It is very expensive for the program to qualify another testing laboratory. Having an external body accrediting the laboratories is something that would help in the EPA ETV Program and help in the ability to work with programs in other countries.

Mr. Ayoub stated that when U.S. companies provide environmental technologies or goods and services that are verified, then the company will be more competitive in the international markets. Another important issue when it comes to trade relationships is the issue of standards. To the extent that standards can be agreed upon internationally and they are understood by our trading partners, it enables technologies that are of high quality to be appreciated by other trading partners. From a U.S. market perspective, 55% of environmental technologies go to markets in the European Union, Canada, and Mexico. If Japan is added, then it is 62% of all U.S. environmental technology exports. These countries continue to be the primary trading partners of the United States in this sector because there are developed markets and there is a strong emphasis on the need to address environmental issues. There are many growing markets, particularly in

Asia (China, Singapore, Taiwan, India, Korea), that recognize the need to address environmental issues and compare their development to the ability to remediate or reduce the environmental impact that the development is going to entail. Mr. Ayoub commented that the technology categories for which verification is important include water and wastewater treatment technologies, clean air, clean energy, energy efficiency, renewable energy and waste minimization

Mr. Yeom Sang-Ug stated that it is very important for the international verification organizations to cooperate with each other, not only for enhancement of each individual ETV program, but also for promotion of the effectiveness of international verification systems. An exploration of each ETV program should be conducted, including the intention of the program because the protocols are developed in response to the purpose of each ETV program. For example, the ETV program in Korea has been conducted to propagate environmental technologies and promote environment-related industry by the Government. There should be incentives or benefits to the member countries for participation.

Professor Tay stated that the interest in environmental technology should be generated from the needs of a particular country as well as the economic situation of the country. It is very difficult to generalize what the environmental technology requirements are worldwide. The United States and Canada have different requirements than the ones for China and India. The one technology that can generate interest worldwide is water technology. The development of an ISO process might be a good place to begin. The ISO procedure is lengthy, and it will take much time and effort to develop it. He suggested starting small, possibly with establishing an international working group to keep the forward momentum, and to begin working on the ISO system. There is great interest in developing an international ETV verification system.

Dr. Tilche commented that they are convinced of the need to go toward with some type of standardization mechanism. That may be the development of a generic guideline, which could define the framework conditions under which any protocol or testing has to be carried out. The ISO 14025 for product declarations already contains something similar as it describes how vendors have to produce data for environmental performance of products. This is seen under a life cycle framework. Once you have something like this as a starting point, this makes it easy for any verification organization to verify data that are produced by a vendor following a certain agreed standard. We need to obtain international mutual recognition of the system. There are other existing ISO standard systems that could be used.

Mr. Neate, ETV Canada, commented that there are some very complex issues that require a stakeholder process and that are not yet ready for an international standard. In some cases, there are methodologies and test methods being used that are already derived from ISO standards, or in many cases could be derived from ISO standards. There also are cases where the technology is innovative and we do not have a full understanding of it. On the other hand, there are developing countries that may not want to go as far as Western countries in meeting their needs. For example, there may be user groups who want to treat 80% of the problem at 20% of the cost versus 99% of the problem at a much higher cost. The verification concept supports new and innovative technologies, but once more is understood about the performance of the technology, the system should move toward the establishment of an international standard for that technology.

Ms. Harten, U.S. EPA ETV Program, asked whether the group wanted to establish a working group to develop a generic verification protocol. Mr. Finkelstein suggested starting small. The elements of a working group are at this meeting in the representative of the 14 countries that are here. There are probably other countries that might be interested in participating. He suggested that the first step should be to start putting together the working group through e-mails and other mechanisms. The ultimate end of the activities of this working group could be to generate a new ISO standard or use some of the existing ISO standards. Ms. Harten asked if there was a volunteer for a lead organization? As no one volunteered, she suggested that one alternative would be to alternate the lead country every couple of meetings. Mr. Ayoub, U.S. Department of Commerce, offered to work with Ms. Harten on setting up the working group.

Mr. Finkelstein stated that Canada will be hosting the GLOBE Conference and Trade Fair in Vancouver on March 29-31, 2006. ETV Canada and the U.S. EPA ETV Program will be attending. This would be an excellent forum to organize a follow-up meeting to further explore some of the issues discussed at the Washington meeting.