

Improving Efficiency, Effectiveness, & International Harmonization of Compliance Activities in Emissions Trading

Dublin, Ireland

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Conference Report

Abbreviations and Acronyms	2
1 EXECUTIVE SUMMARY	3
2 INTRODUCTION AND BACKGROUND	4
3 PLENARY PRESENTATIONS	4
3.1 Opening Keynote	4
3.2 Panel 1: Applying Lessons Learned from the Financial Community to the Carbon Markets Regulators	5
3.3 Panel 2: Critical Issues, Practical Aspects and Minimum Compliance Issues Needed to Allow Different Emission Trading Systems to Cooperate	7
3.4 Keynote Address: Laying the Foundation for Trading Systems to Cooperate	10
3.5 Panel 3: Integration of Compliance Mechanisms in CDM and JI Projects, and Other Markets	11
4 WORKING GROUP SESSIONS AND DISCUSSIONS	12
4.1 Special Topic Discussion: Update on US Federal Legislation and Development	12
4.2 Technical Working Groups on Best Practices	13
4.2.1 Compliance Process under the Kyoto Protocol	13
4.2.2 Emerging Monitoring, Reporting and Verification Technologies and Methodologies to Ensure Integrity across Regimes	14
4.2.3 Relationships Among Regulated and Voluntary Markets across Borders	15
4.3 Question and Answer Forum	15
4.4 Open Forum Discussion and Recommendations	17
ANNEXES	
ANNEX 1: SPEAKER BIOGRAPHIES	18
ANNEX 2: CONFERENCE PARTICIPANTS	24

Abbreviations and Acronyms

AAU	--	Assigned Amount Units
AB32	--	California's Assembly Bill 32, the Global Warming Solutions Act
CARB	--	California Air Resources Board
CDM	--	Clean Development Mechanism
CEMS	--	Continuous Emissions Monitoring System
CER	--	Certified Emission Reduction
CESR	--	Committee of European Securities Regulators
CITL	--	Community Independent Transaction Log
CO2	--	Carbon Dioxide, a greenhouse gas
EATS	--	Emissions & Allowance Tracking System
EPA	--	Environmental Protection Agency
EU ETS	--	European Union Emissions Trading Scheme
F-Gas	--	Fluorinated Greenhouse Gases
GHG	--	Greenhouse Gas
IETA	--	International Emissions Trading Association
INECE	--	International Network for Environmental Compliance and Enforcement
HFC23	--	Trifluoromethane, a potent greenhouse gas
IPCC	--	Intergovernmental Panel on Climate Change
Irish EPA	--	Ireland's Environmental Protection Agency
IT	--	Information Technology
ITL	--	International Transaction Log
JI	--	Joint Implementation
JVETS	--	Japan's Voluntary Emissions Trading Scheme
MRV	--	Monitoring, Reporting, and Verification
N2O	--	Nitrous Oxide, a greenhouse gas
QA/QC	--	Quality Assurance / Quality Control
RGGI	--	Northeast Regional Greenhouse Gas Initiative
RPS	--	Renewable Portfolio Standard
SEC	--	Securities and Exchange Commission
SO2	--	Sulfur Dioxide, a chemical compound that causes acid rain
DEFRA	--	UK Department for Environment, Food, and Rural Affairs
UNFCCC	--	United Nations Framework Convention on Climate Change
US EPA	--	United States Environmental Protection Agency
VROM	--	Netherlands Ministry of Housing, Spatial Planning and the Environment
XETL	--	eXtensible Emissions Reporting Language

1 EXECUTIVE SUMMARY

The International Network for Environmental Compliance and Enforcement (INECE) advanced the global effort to build environmental integrity in emissions trading systems through a workshop on "Improving Efficiency, Effectiveness & International Harmonization of Compliance Activities in Emissions Trading," held in Dublin, Ireland, on 8-9 March 2007.¹

Conference participants discussed the role of compliance in assuring trust and integrity within and among emissions reductions platforms and the importance of developing both a common set of procedures for monitoring, reporting, and verification and a standardize language for use in registries. Harmonizing compliance activities will increase transparency, integrity, and accountability and will build confidence that the market is robust, stable, and effective in reducing greenhouse gas emissions.

The meeting resulted in recommendations for INECE to develop and facilitate technical working groups on three key topics: Registries, Verification & Accreditation, and Monitoring & Reporting. The expert groups will seek to develop an independent assessment of best practices, metrics, and terminology; extract lessons from the global trade systems, securities trading, accounting, certificate programs, ISO standards, and the US systems designed to reduce SO_x and NO_x; and provide recommendations applicable to existing and emerging emissions trading schemes. Representatives from governments, industry, international organizations, and non-governmental organizations will be invited to join the specialist groups and to work together to build a broad consensus and to share lessons learned. Common principles could have broad application to processes including, but not limited to, the EU Emissions Trading Scheme, Clean Development Mechanism and Joint Implementation projects, voluntary offsets programs, and other emissions reduction schemes.

Participants further recommended that INECE develop appropriate capacity building tools, such as a web-based inventory of articles and resources, to facilitate communication, discussion, and dialogue, as well as to ensure access to relevant expertise. INECE should also seek to actively promote the recommendations of the technical working groups, and to target and engage interested stakeholders beyond government and academia (e.g., the private sector, civil society, international organizations).

In a plausible future environment where multiple mandatory emissions reductions systems exist and are linked, common principles and an existing framework for open dialogue among stakeholders will allow industry to more efficiently comply with market requirements, knowing that emissions reductions will be recognized across schemes. Similarly, regulators will be more able to effectively enforce program requirements, knowing that practices among trading systems are compatible.

Regardless of the ultimate substantive requirements of future climate change agreements, common monitoring, reporting, and verification standards, as well as accounting and registry practices, will be necessary to link emissions reductions systems. Establishing a standard language and set of procedural guidelines now will increase compliance and simply enforcement in the current systems, and will create a basis for formally linking trading systems in the future.

¹ These Proceedings were compiled by Kenneth Markowitz, Machtelt Oudenes, Meredith Reeves, and Michael Akman.

2 INTRODUCTION AND BACKGROUND

In order to build consensus on responses to the most pressing challenges facing compliance aspects of emissions trading, INECE organized international conferences and workshops at Oxford University in March 2004, Marrakech, Morocco in April 2005, Washington, D.C., in November 2005 and Brussels, Belgium, in February and May 2006.

The "Improving Efficiency, Effectiveness & International Harmonization of Compliance Activities in Emissions Trading," workshop, held in Dublin, Ireland, on 8-9 March 2007, provided an opportunity for experts to discuss challenges and responses necessary for different emissions trading systems to function effectively, as well as to explore methods to raise awareness of the shared responsibilities of regulatory, industrial, and financial communities within such systems. Participants identified opportunities for INECE to improve the efficiency, effectiveness, and harmonization of compliance activities and defined strategies to engage new partners in assuring compliance.

Over 65 experts participated in the workshop, including representatives of the European emissions trading system, the U.S. Regional Greenhouse Gas Initiative, Japanese Volunteer Emissions Trading Scheme, international institutions, industry, academia, and non-governmental organizations. The workshop was hosted by INECE, in cooperation with the Ireland Environmental Protection Agency, the Netherlands' Ministry for Housing, Spatial Planning and the Environment, the United States Environmental Protection Agency, the Environment Agency for England and Wales, and Ireland's Department of Environment, Heritage, and Local Government.

Background papers and presentations are available on the INECE website, at <http://inece.org/emissions/dublin/>.

3 PLENARY PRESENTATIONS

The meeting featured the following plenary presentations.

3.1 Opening Keynote

Dr. Mary Kelly, Director General of Ireland's Environmental Protection Agency, delivered introductory remarks on *Emissions Trading: Ensuring Compliance and Environmental Integrity in Climate Markets*.

Dr. Kelly began her presentation by describing the role of networks, including INECE and Ireland's Environmental Enforcement Network, in working towards consistency and integrity in responding to climate change. Networks can be an important factor in raising awareness of compliance and enforcement; ensuring that compliance and enforcement are carried out in a consistent manner; enhancing cooperation among stakeholders; and strengthening the ability to implement and enforce environmental requirements. Sharing knowledge and experience via networks is crucial to develop and strengthen compliance further.

Dr. Kelly then described the benefits of using market-based instruments, including emissions trading, to respond to climate change. She briefly described the successful Acid Rain Program in the US and the evolution of the European Union Emissions Trading Scheme (EU ETS), which,

with more than 11,500 installations, is the largest multi-country, multi-sector greenhouse gas trading system. The EU ETS is a classic cap-and-trade program, in which a cap on the total number of allowances creates scarcity, thereby making allowance trading both possible and necessary. The EU ETS is currently operating in its pilot phase (2005-2007); after 2007, it will enter the Kyoto phase (2008-2012).

Next, Dr. Kelly outlined some of the possible challenges facing emissions trading programs, including the wide range of approaches in carrying out program requirements among EU member states; the variability in reporting and compliance among member states; and the continual need to ensure public and internal credibility.

Finally, Dr. Kelly underlined the importance of strengthening compliance schemes and promoting integrity to ensure that a tonne of CO₂ is a tonne of CO₂ everywhere. To make this possible at the international level, programs must prioritize the development of clear and achievable monitoring and reporting requirements, the implementation of robust verification standards, and the harmonization of rules and program structures to avoid the lowest common denominator dictating the environmental outcome. Furthermore, harmonizing the application of tools to promote compliance among member states (e.g., penalties; naming and shaming; public information disclosure; and close oversight of reporting and data management plans, verifiers, and accreditation bodies) could help ensure uniformity in requirements throughout Europe.

3.2 Panel 1: Applying Lessons Learned from the Financial Community to the Carbon Markets Regulators

This panel was moderated by Dr. Frank Convery of the University College Dublin, and included presentations by Professor Hans Gortemaker, Erasmus University Rotterdam; Robin Smale, VividEconomics; and Xueman Wang, World Bank Carbon Finance Unit.

Professor Gortemaker opened the panel with an accountant's perspective on building trust in corporate reporting through "monitored self-regulation" and exploring how this perspective can inform the EU ETS.

The accountant's role is to build trust into corporate reporting and minimize the risks to stakeholders. To accomplish this, it is essential that there is transparency, accountability, and market integrity. Scandals like Enron, which are caused by insufficient information or expectation gaps between different stakeholders, must be avoided. Building trust in markets requires regulation (global accounting standards) and regulators (Securities and Exchange Commission (SEC)/Committee of European Securities Regulators (CESR)/Financial Market Authority) to supervise the private sector. Independently developed accounting standards as well as standards for internal control and auditing are used to build trust in corporate reporting. Supervision by market regulators like CESR and the European Commission ensures compliance and enforcement in corporate reporting. When implementing trust-building structures, standards, and procedures, it is essential to delineate the roles and responsibilities of the different stakeholders involved and to make sure that the private and public domains are separated.

A patchwork of mandatory and voluntary initiatives currently exists in emissions trading reporting and will have a negative influence on the reliability of data, while also increasing the administrative burden on companies. Streamlining reporting schemes is of the utmost importance to achieve transparency, accountability, and market integrity as well as efficient and effective reporting.

Such a streamlining can be realized by introducing one global emissions compliance language that would enable reporting under different schemes and enhance the quality of information. The recent PricewaterhouseCoopers report, *Building Trust in Emissions Reporting*,² recommends moving towards a global emissions compliance language and shows why the introduction of such a language is inevitable and crucial to enhance the public's confidence in the market.

A global design of layered and aligned structures, standards, processes and enabling technologies will build transparency, accountability, and integrity into emissions reporting. This requires structures containing global institutions with local mirroring; a reference model for emissions compliance processes; a four-tier model for monitoring, reporting, verification and compliance standards (from global standards to industry specific standards for some sectors); and an enhanced use of enabling technologies that includes workflow management between all actors and advanced data acquisition software that makes it possible to connect systems within companies and to link data from multiple sources by competent authorities. The enabling technologies would also require advanced auditing and inspection tools as well as public availability of data. Effective and efficient data exchange in all of this requires a standard and eXtensible Emissions Reporting Language (XETL).

Robin Smale discussed risks associated with the climate change markets, and asserted that the main risks are political, specifically: conflicting domestic interests, the impact of the market on public accounts, and lobbying pressure from affected companies. Inadequate energy security and energy poverty policies, as well as undecided unwillingness to pay, are additional risks that could affect the functioning of the carbon market.

Mr. Smale asserted that, in order for a market to function properly, the institutional organization should be well managed. Separate monetary control that is completely distinct from governmental influence as well as inflation targets through which trade interests can be controlled are prerequisites for a properly functioning market.

As emissions allowances are market-based instruments, similarities can be drawn between emissions trading and the financial market, and the aforementioned requirements also apply to emissions trading. EU ETS is a predictable market containing very large windfall profits. When the credibility in a market is damaged, there is a huge impact on the investment community, and an increase in the risk to revenues. In EU ETS, the price of emission allowances is low and the allocation process did not run smoothly. This has all led to an information and expectation gap.

The question now is how to restore the public's confidence in the market. Separate control by an independent regulator could be the solution.

The surplus of emission allowances in EU ETS will not be solved in the second emission trading period. Price signals indicate that the market will still be too large in 2008-2012, and adding to the number of allowances are Certified Emission Reductions (CERs) from Joint Implementation (JI) projects and the Clean Development Mechanism (CDM). This could cause eight years of energy-efficiency to be lost.

The compliance market can be influenced by giving price signals. For example, the JI and CDM markets are impacted by the market for allowances. Substantial prices and substantial costs require a change in the infrastructure.

² PricewaterhouseCoopers, *Building Trust in Emissions Reporting* (2007). Available online at <http://www.pwc.com/extweb/pwcpublishings.nsf/docid/8DF4237F6B2F7FCF8525728300503B70>.

The voluntary markets should also be watched to see if it is sufficient to rely on the consumer and self-regulation or whether regulatory intervention is necessary. Currently, more and more standards are emerging and there seems to be a shift towards regulatory intervention.

Xueman Wang presented her experience at the World Bank Carbon Finance Unit and compared China and India as suppliers to the project-based market. Ms. Wang noted that the carbon market is mainly driven by EU ETS, which covers 74% of the market. Although CDM and JI projects are following, dominance could be shifting in the near future through enlarged participation of other member states in those programs.

In the project-based market, the UK is buying the most (45%), whereas China is the number one selling country. There are different approaches to attracting CDM projects. China has a completely different approval process and CDM regulatory framework compared to India. In China the national authority has central control over the CDM market and is allowed to do price intervention. Price policy for industry is centralized, and projects are channeled to priority energy efficiency areas through taxation (65% tax on CER revenue from HFC23 projects; 30% tax from N2O projects). India has a completely different approach and does not allow market intervention by the national authority. Sellers and buyers determine market prices and, as a result, the private sector is much more active in India than in China.

The current project-based mechanisms have some constraints. While the project-based market is growing, it remains small compared to resources needed to help countries switch to low carbon economies. Current CDM operation is too moderate in scale because it predominantly concerns a sector with limited impact and with low technology (e.g. F-gas destruction). The growth of project-based mechanisms is further limited by the uncertainty in the post-2012 regime. Whether China and India will commit themselves to Kyoto is not certain, and influences the functioning of the market. The World Bank is initiating new activities to overcome some of these constraints, such as carbon finance as an important vehicle for a clean energy investment framework.

3.3 Panel 2: Critical Issues, Practical Aspects and Minimum Compliance Issues Needed to Allow Different Emission Trading Systems to Cooperate

This panel was moderated by Kelley Kizzier of the Ireland EPA Registry, and included presentations by Franz Litz, New York, Regional Greenhouse Gas Initiative; Michael McMahon, BP; Derik Broekhoff, World Resources Institute; and Jill Duggan, UK Department for Environment, Food and Rural Affairs (DEFRA).

Franz Litz described the emerging mandatory carbon markets program in the United States, including the Northeast Regional Greenhouse Gas Initiative (RGGI), California Global Warming Solutions Act (AB32), and the Western Regional Climate Action Initiative.

RGGI, which will be the first mandatory carbon cap-and-trade program in the U.S., is expected to formally launch in 2009. The model rule containing monitoring and verification protocol has been completed and a Memorandum of Understanding was signed by seven states in December 2005. Three more states have joined or are expected to join in 2007.

Mr. Litz noted important innovations in the RGGI program included identifying five categories of offset “valves” (Natural Gas, Propane, Heating Oil Efficiency; Land to Forest; Landfill Gas Capture & Combustion; Methane Capture from Animal Operations; and SF6 Leak Prevention) and the recognition of Clean Development Mechanism offset credits.

The next steps for RGGI, as it moves towards full implementation, include developing an Auction Platform and Emissions & Allowance Tracking System (EATS); holding an initial auction, possibly in 2008; and linking to the Western Regional Climate Action Initiative.

California introduced the California Global Warming Solution Act in 2006 and the possible introduction of a cap and trade program for 2012. The law, known as “AB32,” requires that the state’s “global warming” emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on “global warming” emissions that will be phased in starting in 2012. The California Air Resources Board (CARB) is responsible for developing appropriate regulations and for establishing a mandatory reporting system to track and monitor emissions levels.

The Western Regional Climate Action Initiative is another recent program that sets regional reduction goals among five western states, including California. The Initiative calls for the design of a regional market-based multi-sector mechanism, such as a load-based cap and trade program, to achieve the regional GHG reduction goal and for participation in a multi-state GHG registry to enable tracking, management, and crediting for entities that reduce GHG emissions

Mr. Litz asserted that, to successfully link these systems, it is essential that one tonne of CO₂ is truly one tonne of CO₂ everywhere. He outlined the issues that influence linking emissions trading schemes, including coverage of the program, whether the scheme is source-based or load-based, and the stringency and integrity of the measurement, monitoring, reporting, and enforcement protocols. When linking, it is also necessary to determine whether to use a hard cap or a soft cap and whether to put a limit on offsets.

Mr. Litz concluded by discussing whether to set international standards for linking. A prerequisite for linking is that schemes involved should have robust standards for measurement, monitoring, reporting, and enforceability. In particular, Mr. Litz noted that offset requirements would involve numerous challenges. Mr. Litz highlighted the current opportunity in the US for communication and information sharing during the program design phase, in order to avoid conflicts among schemes in the future.

Michael McMahon’s presentation focused on critical issues and practical aspects for linking emissions programs. Mr. McMahon emphasized the global nature of the challenge of regulating carbon emissions, in terms of the environmental impact, the necessary links to energy policies, and the scale of the economic implications, but noted that solutions are likely to be built up from national and regional initiatives. He asserted that establishing a global carbon price is essential, but not sufficient, and that more targeted measures are needed to incentivize the development of key technologies.

National and regional governments will develop energy policy and climate change mitigation policy together. National long-term targets will have to be established to set direction. Furthermore, an economy-wide carbon price via trading, taxation and direct regulation should be established. To invigorate new technologies and to bring down the cost curve, transitional incentives are needed and barriers to the diffusion of cost effective technology should be removed. This would require the use of regulation in the form of performance standards, e.g., building regulations, vehicle efficiency standards, etc.

Possible models of linking include: (1) establishing a global regulator (such as UNFCCC) with all allowances in national trading systems backed by a common currency of Assigned Amount Units

(AAUs); (2) mutual recognition of other schemes' allowances through bilateral or multilateral agreements; and (3) indirect linking by recognition of a common allowance such as CERs from the CDM.

When developing a global market, the key principles of transparency, accountability, and market integrity should be met. Market-sensitive information should be handled with care so as not to upset the market. Challenges when linking systems may include strategic challenges (e.g., equity issues, sectoral coverage, the method of allocation, and price caps/safety valves) and harmonization challenges (e.g., registry design). To enable harmonization and linkages, uniformity has to be reached about the meaning of one tonne of CO₂, double counting has to be avoided in registries, and common procedures and processes should be installed. IT could be a helpful tool to align and facilitate processes.

Derik Broekhoff also addressed the challenges of linking carbon offset markets. It is important to define criteria for carbon offsets. A “carbon offset” can be defined as a tradable instrument representing a verified reduction in GHG emissions. Carbon offsets originate from specific projects or activities (“offset projects”) designed to reduce GHG emissions.

Mr. Broekhoff outlined five defining criteria for carbon offsets:

1. Offsets should represent actual emission reductions and not artifacts of emissions accounting.
2. Offset reductions should be a response to the buyer's purchase, not reductions that would have happened anyway (i.e., they should be “additional”).
3. Offset reductions should result from projects whose performance can be readily monitored and verified.
4. Offset reductions should be permanent, or be compensated by further reductions if they are reversed (e.g., through forest fires).
5. Offset reductions should be backed by contracts or legal instruments that define their creation and ensure exclusive ownership.

Three types of standards are required for a functional offset market: procedural standards (e.g., project validation, monitoring and verification of project performance and GHG reductions, certification of GHG reductions); contractual standards (e.g., terms for payment and delivery of offsets, project risk allocation, avoidance of double counting); and accounting standards (e.g., project baseline identification, additionality, ensuring a “tonne is a tonne”).

From the linkages standpoint, accounting standards are the most important. The World Resources Institute developed the GHG Protocol for Project Accounting, which contains accounting concepts and definitions, is program and policy neutral, and provides for general requirements on estimating baseline emissions, accounting for secondary effects, and monitoring as well as quantifying and reporting GHG reductions.³ Offset project baselines are forward-looking and hypothetical. Two options can be applied: project-specific baseline scenarios and performance standards. Each of these options can lead to different results.

When developing linkages among carbon offset systems, the focus should be on contractual standards and the creation of common registries. Then the compatibility of procedural standards should be assessed. Finally, ways to accommodate different accounting methods should be identified.

³ World Resources Institute, GHG Protocol for Project Accounting. Available online at <http://www.ghgprotocol.org/>.

Jill Duggan described linkage issues from the European Union perspective, noting that 2007 will be a critical year for climate change policy. The EU ETS Directive is under review, providing opportunities to consider lessons learned and look to the future. Globally, and in the US in particular, there is a greater awareness and urgency; the Intergovernmental Panel on Climate Change's (IPCC) new report states that it is now certain that climate change is happening and that there is a 90 percent certainty that humans play a significant role. There are numerous calls from industry for action through market mechanisms. Therefore, it is now critical to ensure that US and EU schemes do not diverge widely, since this could pre-empt them from linking in the future.

Ms. Duggan outlined four basic requirements for linking: trust (baselines and assumptions, additionality of offsets, robust compliance and enforcement), fairness (equivalence of effort), scarcity, and secure communication and data exchange standards. Different units should be mutually recognized which will require changes to the Community Independent Transaction Log (CITL) and International Transaction Log (ITL), as well as to national registry systems.

Next steps include communicating and sharing lessons and experiences, identifying potential obstacles (e.g., registries, inventories, MRV, compliance, penalties) and seeking appropriate responses, and developing real solutions and timeframes to deliver them. Potential bottlenecks and commonalities should be addressed and shared by all in order to come to solutions and enable linking in the future.

3.4 Keynote Address: Laying the Foundation for Trading Systems to Cooperate

A. Denny Ellerman, Senior Lecturer at Massachusetts Institute of Technology (MIT) Sloan School of Management, delivered a keynote address that explored where we may be headed with monitoring, reporting, and verification (MRV) systems to support emissions trading.⁴ Dr. Ellerman began his talk by stating that the EU ETS is a prototype for a future global system. He noted that the EU ETS MRV is a pioneering system providing the largest constructed market, and that it is analogous to MRV systems in world trade.

MRV procedures of the CO₂ EU ETS scheme are different from the SO₂ ETS scheme in the US, which uses a continuous emissions monitoring system (CEMS). The US CEMS approach is a gold standard for emissions monitoring but is not feasible for small sources, and leaves the question of how to capture mobile and household sources unanswered. The EU ETS approach is based on a self-reporting mechanism with verification of carbon content of fuel use and process emissions. The EU approach can therefore be more easily generalized to all sources and, theoretically, is readily extensible to individual use (and would likely be no more complicated than income tax reporting).

However, individual monitoring of household level sources would be costly and has little political appeal. The question then becomes whether we should move to an "upstream fuel content approach." The advantages of such a system include knowing that carbon content is already measured (e.g., for coal) and that extensive reporting protocols already exist. Carbon content is measured for energy supplies coming from countries with little institutional capability and can be accomplished by private parties with little government involvement. Furthermore, the upstream fuel approach leaves room for differences between schemes' MRV. It makes the

⁴ See also, Eds. A. Denny Ellerman, Barbara Buchner, Carlo Carraro, *Allocation in the European Emissions Trading Scheme* (2007). Available from [Cambridge University Press](http://www.cambridge.org/9780521855511).

question of whether one tonne of CO₂ somewhere is one tonne of CO₂ anywhere inconsequential, and allows the market to drive the solution.

There are two distinct but convergent aspects when transposing to emissions trading. There has to be economy-wide MRV and enforcement, which is dependent on having the institutional capability to provide these functions and having a long enough timeframe to allow the system to develop. Another aspect is the development of the project MRV (a demand driven institutional carve-out).

In conclusion, Dr. Ellerman encouraged participants to recognize the dual roles and importance of the clean development mechanism MRV, which builds capacity in the countries involved and is building in-roads for indirect linking; to be cognizant of the value of maintaining a good reputation; to share experiences and recognize other systems; and to remember the value of having private parties operate MRV systems, which allows the structures to become more easily generalizable and more similar to the systems that underlie global trade.

3.5 Panel 3: Integration of Compliance Mechanisms in CDM and JI Projects, and Other Markets

This panel was moderated by Kunihiko Shimada, Ministry of Environment, Japan, and included presentations by Conor Barry, UNFCCC Secretariat; Einar Telnes, DNV; and Bob Shults, APX, Inc.

Conor Barry described the mission and goals of the Clean Development Mechanism Executive Board and its role in ensuring project integrity. The 10-member Executive Board is responsible for supervising the CDM, under the authority and guidance of the Conference of the Parties to the Kyoto Protocol, including registering project activities, issuing certified emission reductions (CERs), accrediting operational entities, approving new methodologies, and maintaining the CDM registry.

The Board is supported by expert panels on Accreditation and on Methodologies, and by working groups (e.g., Afforestation and Reforestation, Registration and Issuance Team).

Once registered by the Executive Board, CDM projects are verified by independent verifiers. The Board retains the ability to assess projects and may stop them if necessary. Although objective criteria exist, project assessment is partly subjective. There are currently 690 registered CDM projects.

When linking emissions trading systems, it is necessary to recognize and make space for inherent differences among systems, and strong oversight is necessary to ensure equitability, transparency, and integrity.

Einar Telnes began by noting that the integration of compliance mechanisms requires mutual recognition of the different systems. Discrepancies between systems can undermine the credibility of the market; clear and uniform rules are not sufficient to solve these discrepancies. It is necessary for an overarching body to oversee the market and the quality of third-party verifiers.

Initially, enforcement in the CDM and JI markets did not receive the attention that was needed. Verifiers were not experienced enough and their performance differed enormously, reducing the quality of verification and compliance. Therefore, robust accreditation schemes and rigorous

compliance are necessary to provide credibility in the market and enhance its integrity. This will eventually be a prerequisite for aligning different national systems. Transparency and accountability of the parties involved will increase understanding of the rationale for decisions and increase consumer awareness of the functionality of the market. It is important to avoid scandals like Enron, which harm the public's confidence in the market.

CDM, JI, and EU ETS are all instruments designed to meet the emissions reduction targets set by the Kyoto protocol. Member States should not be too hesitant to make political decisions and to organize common platforms in which these decisions can be made.

Bob Shults discussed the lessons that can be learned from the success of the US mandatory Renewable Portfolio Standard (RPS) markets, and which are relevant for integrating CDM and JI projects with other environmental markets.

The RPS market uses a certificate-based approach, which has been implemented by all mandatory North American clean energy markets. Attributes may be traded independently of the market barriers and physical constraints of the base product. Data is validated and reported in a simple manner, with a system flexible enough to accommodate changes in regulations and rules. One unit will generate one certificate that can contain a varying number of attributes.

Throughout the US, regulations and markets differ from each other (federal legislation, RGGI, etc.). Certifications are validated and then created. This process ensures the integrity of the system. A depository tracks certificates, enables trading between parties, and ultimately ensures the retirement of certificates to avoid double counting.

The success of RPS markets and certificate systems is influenced by several factors. First, the integrity of the market is a determining factor. Stakeholders must be confident that the attribute is actually available to the market, and the market cannot allow the certificate to be sold more than once. A second factor is the quality of information. Stakeholders need accurate information to manage their risk, information on supply and demand must be readily available, and regulators need compliance information so that they can take efficient enforcement action. Another factor is the development of technologically advanced, systematic web-based management of information. Finally, as a market based approach, RPS enables stakeholders to manage their obligations as they see fit.

The experiences of certificate-based systems can be applied to GHG markets, although challenges may arise due to differing regulations and verification and monitoring requirements among markets. RPS and a certificate-based program can help integrate carbon markets. Such a program has proven effective in the administration of US RPS programs and is indifferent to emissions source or point of regulation. Certificate systems are capable of defining attributes at the lowest level and create verifiable, serialized certificates that can be traded and retired. They are efficient and cost effective and provide sufficient flexibility to accommodate changes in regulations.

4 WORKING GROUP SESSIONS AND DISCUSSIONS

4.1 Special Topic Discussion: Update on US Federal Legislation and Development

Joe Kruger, Policy Director at the National Commission on Energy Policy (US), facilitated a discussion on the current political climate in the United States towards emissions trading.

Mr. Kruger opened the session by providing background information on the political context for legislative support for emissions trading in the US, noting the growing public awareness and support, the developments in Europe, the Democrat-controlled Congress, the increasing involvement of industry groups, and the emerging state efforts which put pressure on federal legislators. However, Mr. Kruger balanced this optimism by identifying challenges to the development of a mandatory federal emissions trading system, including the opposition by the Bush Administration, regional differences (e.g., coal versus non-coal), competitiveness concerns, and the need for a super-majority in the Senate.

The three main legislative proposals that have been introduced (Bingaman-Specter, Lieberman-McCain, and Sanders-Boxer) vary widely in terms of targets and timings, scope, allowance distribution, mechanisms to limit price uncertainty, additional incentives for research and development, and international and competitiveness issues.

Mr. Kruger concluded by identifying five major areas that will shape the emergence of a mandatory emissions program in the US, including: (1) the position of organized labor (e.g., AFL-CIO); (2) key Republican senators who could tip the balance (e.g., John Warner, Pete Domenici); (3) the influence of state programs, particularly California; (4) the 2008 presidential campaigns; and (5) an economic analysis of senate bills that will be published by the US EPA and the Energy Information Agency.

During the discussion session, Mr. Kruger identified the Lieberman-McCain proposal, which requires emissions to gradually decrease to approximately a third of 2004 levels by 2050, as the most likely to be adopted. However, he stated that the legislative proposals will likely not be adopted until after the 2008 presidential election.

Mr. Kruger noted that the US will have an opportunity to learn from the EU ETS to pay greater attention to initial monitoring and verification procedures. MRV and enforcement requirements are not detailed in the legislative proposals, and instead would be delegated to the US EPA as the competent authority. He also noted that, in the US, coordination between the federal and state levels is much easier than in Europe where legal systems and procedures differ between Member States.

4.2 Technical Working Groups on Best Practices

The afternoon of the first day of the workshop was dedicated to three simultaneous technical working group sessions on best practices for international harmonization of compliance activities in emissions trading. These sessions were (1) Compliance Process under the Kyoto Protocol; (2) Emerging Monitoring, Reporting and Verification Technologies and Methodologies to Ensure Integrity across Regimes; and (3) Relationships Among Regulated and Voluntary Markets across Borders.

4.2.1 Compliance Process under the Kyoto Protocol

Xueman Wang, World Bank Carbon Financing Unit, and Conor Barry, UN Framework Convention on Climate Change Secretariat, moderated this working session. The session explored the comprehensive implementation and compliance system established under the Kyoto Protocol, which includes reporting, verification, and compliance procedures. Participants discussed how the Kyoto compliance regime could affect emissions trading markets.

4.2.2 Emerging Monitoring, Reporting and Verification Technologies and Methodologies to Ensure Integrity across Regimes

Bill Irving, US EPA, and Jeroen Kruijd, PricewaterhouseCoopers, moderated this session, which explored how IT can help to ensure transparency, accountability, and market integrity, increase the efficiency of reporting and the accurateness of data, and facilitate harmonization. The session concluded that:

- **Uniformity in measuring CO2 cannot be realized** without harmonized monitoring and reporting requirements.
- There are **multiple ways to use IT** (data acquisition, common formats, automating or analysing the workflow). The decision on how far to integrate IT-based solutions is dependent on a number of factors, including existing technical and legal infrastructure and cultural background. The US, for example, has a different perspective on transparency and accountability of data and corporate reporting than the EU. Within the EU, companies will be more reluctant to share information with the competent authority. At this stage, the EU is probably not ready for hourly and automatic reporting from companies, but opportunities may arise in the future.
- Although it is **not the end solution**, IT can definitely help in harmonizing monitoring, reporting, and verification.

Participants discussed different countries' approaches to integrating IT in emissions trading programs. The US has an advanced electronic monitoring and reporting system that uses different calculation functionalities and IT in risk analysis. For example, site visits are planned based on results that are electronically and automatically submitted. Austria has an Excel-based system using common formats for reporting and some control elements which check the completeness of the data and uses simple calculations. Italy has developed a web-based system and applies IT in controls and checks on the verifier. The UK and Netherlands are not as advanced. The Netherlands has one internal system, while the UK uses several internal systems that are not linked.

For that reason, the Netherlands, Ireland, UK, and Finland are participating in a project that aims to automate the workflow on monitoring, permitting, reporting, and verification and to potentially develop common software. Developing common software, requires mapping the different processes, the requirements related to those processes, and the functional control requirements. When mapping these elements, differences between participating Member States are tracked. These differences can be overcome by finding commonalities in order to achieve a harmonization. One of the goals of this project is to develop a mutual understanding document.

IT is not the ultimate solution to everything, and will not guarantee the complete accuracy of the data. It will remain difficult to assess how to process qualitative information and what to do with the underlying meta-data. Furthermore it does not relieve operators of their responsibility to obtain accurate data and to put the correct emissions data in the registry.

This is why it is essential not to forget about the operator's role in the process. Data accuracy can be enhanced by utilizing IT within a company's internal control. Johan Pype from Electrabel mentioned that they are trying to use IT in internal control and to go beyond a data capture system. In that way, the status of the data, its origin, and its path through the company can easily be tracked. IT will also make verification easier because the risk for errors is lower.

4.2.3 Relationships Among Regulated and Voluntary Markets across Borders

Kunihiko Shimada, Environmental Ministry of Japan, and Pierre Boileau, Canadian Standards Association, moderated this session, which gave participants an overview of current activities of Japan's Voluntary Emissions Trading Scheme (JVETS) and looked at how ISO 14064 standards and other voluntary standards can be used to link markets.

Under JVETS, which currently includes 110 companies, each company makes their own (voluntary) pledge. Verifiers, including Point Carbon Japan, NatSource Japan, and JQA, are accredited by the Ministry of the Environment. The current price in the voluntary market is approximately \$6-\$7/tonne, using the jCER price. JVETS is still in its pilot phase, but hopefully a mandatory cap-and-trade program will be established in 2010, with linkages beginning in 2013. Although there are mixed signals towards a mandatory program, there is a high level of optimism that one will be feasible. An expert group is currently working on designing a mandatory system.

Voluntary standards serve two different purposes: (1) they facilitate meeting technical requirements and (2) inform the policy making process. Although there is skepticism among regulators about using voluntary standards for regulation, there is great potential in their use. Although, industry groups may drive the use of voluntary standards, reaching a consensus between government and industry for standards setting can only happen over a long time frame. Because of the immediate need for common standards, regulators should look to ISO 14064 and other voluntary standards which already exist and which have been tested in various situations.

4.3 Question and Answer Forum

The question and answer forum, which explored trends in best practices for monitoring, reporting, verification, and compliance in emissions trading, was moderated by Ken Macken, Irish EPA. Panelists included Chris Dekkers, Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM), Johan Pype, Tractebel Engineering, Jeremy Schreiffels, US EPA, and Anne Marie Warris, Lloyd's Register Quality Assurance.

Question 1: *From an industrial perspective, what are the most critical issues in the MRV process and how can they be dealt with?*

Solutions suggested included:

- Change from an engineering approach to an accounting approach, ensure data sharing and access for harmonization, and better define uncertainty so that risks can be calculated accurately.
- Seek to lower the administrative burden to industry and explore methods to simplify/standardize MRV requirements. Allow industry to define best practices.
- The ultimate goal of MRV is accuracy, and while it is important to have a complete accounting, it can be expensive and may not always make the most sense. Using continuous monitoring with built-in overestimation can avoid this issue.
- Ensure transparency of process to all stakeholders.
- Provide clear regulatory guidance on elements such as uncertainty.
- Use IT to enhance the quality of information and enable administrative feasibility and efficient data transfer.

Question 2: *Can verification help streamline the monitoring and reporting process?*

- Yes, if done properly. Verification should happen throughout the reporting period.
- Software and data standards are necessary to streamline the process. In the US, data on quality assurance/quality control (QA/QC) is submitted automatically and electronically on a quarterly basis. Software enables statistical analysis, then the EPA reviews the data for anomalies. Refer to US EPA's Electronic Data and Reporting Standards.
- There need to be separate protocols – one for monitoring/reporting and one for verification.
- It is important to control verifiers and to enable a comparison between them so that their quality is guaranteed. Good supervision by an accreditation body is necessary. Furthermore, enhancing the efficiency of internal controls within the company can replace verification efforts and make the job of the verifier easier.

Question 3: *What are the minimum requirements for linking, as far as MRV is concerned, both now and 2015 and beyond?*

- Equivalency and stringency of standards. Every tonne of CO₂ must be accounted for, even if this requires overestimates.
- Strong enforcement for MRV
- Harmonization of MRV requirements
- Standard methodology for distributing allowances
- Comparable levels of assurance and materiality for linked systems
- Trust and transparency

Question 4: *How can IT systems support or constrain the compliance process?*

IT systems can speed up the process and serve as an effective tool to ensure compliance by:

- Managing workflow, supporting QA/QC
- Aiding the transfer of information
- Ensuring uniformity of requirements
- Diminishing risk to the system
- Supporting the verifier by making the evaluation of compliance more straightforward

However, in a small system, IT may be less appropriate; some countries may not have sufficiently sophisticated systems. It is important that the input of the data in the registry and system must be correct and accurate.

Question 5: *Can regulators carry out the verifiers' function?*

No, the role of the verifier and the role of the regulator should be kept separate, as their roles and responsibilities are different.

Question 6: *What level of assurance should we aim for?*

The baseline assurance should be that uncertainties in the program do not negatively affect the environment. Beyond that, the level of assurance depends on the stringency of the scheme. Common definitions and levels of assurance are necessary in view of linking.

Question 7: *Harmonization is necessary in future global systems. What problems occur when harmonizing MRV standards? What differences are tolerable?*

Some differences among national systems are tolerable as long as the end results of accuracy and correctness are the same and the integrity of the total system is not hampered. It is necessary to understand what the key elements and acceptable differences may be and how to achieve them.

4.4 Open Forum Discussion and Recommendations

Ken Markowitz of the INECE Secretariat led an open forum discussion to explore opportunities for INECE to improve compliance aspects of emissions trading. Participants at the meeting recommended that INECE should focus on the technical issues of monitoring, reporting, verification, and registries and should build on its prominence as an international network of experts.

Specifically, INECE should:

- Draft a list of priority issues for each relevant timeframe (e.g., next two years, next five years, post-2012)
- Form technical working groups on (1) monitoring and reporting; (2) verification and accreditation; and (3) registries. These working groups could share knowledge and experience and provide expertise needed on these subjects.
 - Opportunities for the verification group include: ensuring reliable verification processes, assessing verification roles with respect to CDM and JI processes, proposing guidelines for the development of MRV rules and accreditation, assessing how to control verifiers and how to ensure that verifiers work properly.
 - Opportunities for the registries group include assessing how and to what extent existing registries will need to be changed to create a global registry that would support future linkages.
- Publish articles on their website and provide for a clearinghouse. This clearinghouse could facilitate communication, discussion, and dialogue, as well as bring expertise together.
- Organize expert-level topical workshops
- Assess how to engage others (regulators, private sector, International Emissions Trading Association (IETA), academics, civil society, international organizations and other experts).

ANNEX 1: SPEAKER BIOGRAPHIES

Conor Barry, UN Framework Convention on Climate Change Secretariat

Conor Barry is a Programme Officer in the Clean Development Mechanism Registration and Issuance Unit at the UN Framework Convention on Climate Change Secretariat.

Pierre Boileau, Canadian Standards Association

Pierre Boileau is the Manager for Climate Change for the Canadian Standards Association (CSA), a not-for-profit standards development organization. His role is to raise awareness of new international standards for GHG monitoring and reporting and new GHG registries products that are offered by CSA. Mr. Boileau has worked for the Canadian government on GHG inventories and project-level quantification. He has also participated on UNFCCC inventory expert review teams and managed a program on GHG verification.

Derik Broekhoff, World Resources Institute

Derik Broekhoff is a senior member of the Greenhouse Gas Protocol team at the World Resources Institute (WRI), and manages WRI work on carbon offset project accounting, emissions trading, and carbon market policy development. He is a primary author of the GHG Protocol for Project Accounting and currently leads a multi-stakeholder workgroup developing GHG accounting guidelines for projects in the electricity sector. Prior to joining WRI he worked for ten years in the fields of energy and climate change consulting, where he developed financial and economic analytical tools for GHG market forecasting, risk management, project evaluation, and business strategy development for a wide range of private and public sector clients. Mr. Broekhoff has a B.A. in International Relations from Stanford University and a Masters degree in Public Policy from the University of California at Berkeley.

Frank Convery, University College Dublin

Professor Frank Convery is Chairman of Sustainable Energy Ireland, Ireland's energy agency, and is Heritage Trust Professor of Environmental Studies at University College Dublin. He was formerly Research Professor at the Economic and Social Research Institute, and has also worked in the USA. Frank is active on a number of EU-wide investigations and bodies, and is a member of the Science Committee of the European Environment Agency. He has written extensively on resource and environmental issues and his current research relates to European Union environmental policy.

Chris Dekkers, The Netherlands Ministry of Housing, Spatial Planning and the Environment

Chris Dekkers is the Coordinator of the NOx Emission Trading Programme within the Directorate General for the Environment at The Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM). Mr. Dekkers has a University Degree in Mathematical Economics at the Erasmus University of Rotterdam. Mr. Dekkers' professional career includes corporate planning in industry, development work in Africa for the United Nations, and policy development for the oil industry in the Ministry of Economics.

Mr. Dekkers joined the Ministry of Environment in 1990 as environmental coordinator for the refining industry and became responsible for the Development of Strategy and Policy Decisions

on Air Emission Reductions from Refineries and other Large Combustion Plants. Since 1997, Mr. Dekkers has been charged with defining the Dutch NOx Emission Trading Programme. Since early 2001, he has been responsible for the coordination of the various Task Forces and Working Groups in the NOx Emissions Trading Programme.

Jill Duggan, UK Department for Environment, Food, and Rural Affairs

Jill Duggan is Head of Phase II EU ETS and Registry Development for the National Climate Change Policy Division at the Department for Environment, Food, and Rural Affairs (DEFRA). Ms. Duggan has led the development of UK policy for the Second Phase of the EU Emissions Trading Scheme. She also headed the team developing the UK software for the Emissions Trading Registry, which has now been licensed to 17 states in Europe. Prior to this, Ms. Duggan headed the team that was responsible for the voluntary UK Emissions Trading Scheme that has been running since 2002.

Denny Ellerman, Massachusetts Institute of Technology

Dr. Denny Ellerman is a Senior Lecturer at the Sloan School of Management at the Massachusetts Institute of Technology. He is an internationally recognized expert on energy and environmental economics with a particular focus on emissions trading. He is a co-author of the leading book on the US SO₂ Trading Program and of the soon-to-appear Allocation in the European CO₂ Emissions Trading Scheme: Rights, Rents, and Fairness. Before his appointment at MIT in 1992, Dr. Ellerman worked for the US government, an energy trade association and in consulting. He is a past President of the International Association for Energy Economics and his Ph.D. is from Harvard University.

Professor J.C.A. Gortemaker CA, Erasmus University Rotterdam

Hans Gortemaker is a professor of accountancy at the Rotterdam Erasmus University. Until mid 2005, Prof. Gortemaker led PricewaterhouseCoopers' accountancy practice in continental Europe. In that position, he was a member of the Global Leadership Team Audit. Today, he is still a consultant to PricewaterhouseCoopers. He also participated in several international accountancy activities for the IAASB (Global Standard Setter), Committee on Auditing (European Commission) and the European Contact Group. He is a board member for several institutions related to his work for the University, and some charitable institutions, and is also a member of two audit-committees. His client portfolio included mostly large audit and consultancy assignments.

Bill Irving, US Environmental Protection Agency

Bill Irving is a senior policy analyst and inventory team leader with US EPA's Climate Change Division. In addition to working on emission trading policy and managing EPA's greenhouse gas inventory program, he is a regular member of the US delegation to the United Nations Framework Convention on Climate Change discussions, manages capacity building programs in Central America, and was a Steering Group member for the 2006 Intergovernmental Panel Climate Change Guidelines for National Greenhouse Gas Inventories. In addition to ten years at US EPA, he was awarded an Atlantic Fellowship in Public Policy by the British Council in 2001 to study the interaction between the UK Emissions Trading Scheme and the then proposed EU Emissions Trading Scheme. Bill Irving has a Master of International Affairs from Columbia University and a Bachelor of Arts from Queen's University at Kingston, Canada.

Mary Kelly, Director General, Ireland's Environmental Protection Agency

Dr. Mary Kelly is Director General of Ireland's Environmental Protection Agency. Dr. Kelly holds a Ph.D. in Chemistry from Trinity College Dublin, and an MBA from Dublin City University. She previously worked with the Irish Business and Employers' Confederation (IBEC). While with IBEC she was involved in policy development in the environmental area. She was involved in setting up REPAK, the industry packaging recycling initiative. She was also a member of Comhar, the National Sustainable Development Partnership and the Advisory Committee of the Environmental Protection Agency.

Kelley Kizzier, Ireland EPA Registry

Kelley Kizzier works with the Regional Inspectorate of Ireland's Environmental Protection Agency.

Joe Kruger, National Commission on Energy Policy

Joe Kruger is Policy Director at the National Commission on Energy Policy, a bipartisan and non-governmental commission of energy experts from industry, government, labor, academia, and environmental and consumer groups. Previously, he was a Visiting Scholar at Resources for the Future where his work focused on analysis of the European Union Emissions Trading Scheme and other cap and trade programs. Joe began working on cap and trade in December 1990, when he was one of the first people hired by the US EPA to implement the US SO₂ trading program. He subsequently managed a group responsible for the initial economic and environmental assessment of the landmark sulfur dioxide trading program. He also led a branch within EPA's Clean Air Markets Division that was responsible for analyzing greenhouse gas trading proposals and for producing the U.S. Greenhouse Gas Emissions Inventory.

Joe is a lead author of the forthcoming Intergovernmental Panel on Climate Change Fourth Assessment Report (Working Group III) and was a member of the Resource Panel for the Regional Greenhouse Gas Initiative. He holds a Master's degree from the Goldman School of Public Policy, University of California, Berkeley, and an A.B. in Government and Economics from Cornell University.

Jeroen Kruijd, PriceWaterhouseCoopers

Dr. Jeroen Kruijd is an EU ETS expert since 2000, and currently works mainly for the European Commission and the Dutch Ministry of VROM on emission trading issues related to monitoring, reporting, verification and compliance. Projects for the European Commission include knowledge sharing between the Member States, the verification sections of the Monitoring and Reporting Guidelines and an evaluation of the first reporting cycle. For the Dutch government, Dr. Kruijd assisted the Czech government in defining their EU ETS accreditation system and currently assists a joint project of five Member States in the development of a joint workflow system for the EU ETS. From 2000-2006, Dr. Kruijd was the manager of PricewaterhouseCoopers Certification, which did verifications, validations and certifications for EU ETS, UK ETS, CDM and JI.

Franz Litz, Regional Greenhouse Gas Initiative

Franz T. Litz is the Climate Change Policy Coordinator for the New York State Department of Environmental Conservation, a position he has held since 2003. In that capacity, Mr. Litz serves

as the chief policy advisor on climate change issues to New York's Commissioner of Environmental Conservation. He also heads the agency's executive-level climate change office. Franz has served as New York's principal representative to the Regional Greenhouse Gas Initiative, an effort by 8 Northeast states to implement the first flexible, market-based cap-and-trade program for carbon dioxide in the United States. Mr. Litz is a member of the Advisory Board of The Climate Group and a member of the California Environmental Protection Agency's Market Advisory Committee that will make recommendations on implementation of California's landmark Global Warming Solutions Act (a.k.a. "AB32"). He is also a member of INECE's Expert Working Group on Emissions Trading. Franz is a frequent contributor to and speaker at conferences on climate change policy and emission trading worldwide. Prior to entering public service in New York in 2001, Mr. Litz practiced environmental law with the Boston law firm Brown Rudnick. He is a graduate of Boston College Law School, *cum laude*, where he served as Executive Editor of the *Boston College Environmental Affairs Law Review*, and a graduate of Union College, *magna cum laude*.

Ken Macken, Ireland Environmental Protection Agency

Dr. Ken Macken works with the NAP Public Consultation, Emissions Trading Unit of Ireland's EPA. Dr. Macken joined the EPA in 1995 having previously worked as a consultant in air pollution and occupational hygiene with IIRS, Eolas and Forbairt. He is Programme Manager of the Emissions Trading Unit. His responsibilities include developing Ireland's National Allocation Plan in addition to overseeing the issuing of Greenhouse Gas Permits and establishing the National Emissions Trading Registry.

Kenneth Markowitz, INECE Secretariat/Earthpace

Ken Markowitz is the President of Earthpace LLC, a global advisory firm that specializes in environmental markets, emerging energy technologies, and regulatory systems in the United States and internationally. Ken serves as the principle consultant to the INECE Secretariat and is a member of INECE's Expert Working Group on Emissions Trading. He has delivered presentations on compliance aspects of emissions trading at the *6th IETA Forum on the State of the Greenhouse Gas Market*, UC Berkeley's *Cap-and-Trade as a Tool for Climate Change Policy*, and other venues. Ken earned a BBA in finance from Emory University's Goizueta Business School and a JD from the Washington College of Law, The American University.

Michael McMahon, BP

Michael McMahon has worked for BP for 29 years and is based at BP's technical/commercial centre at Sunbury just outside of London. In his current role, Mr. McMahon provides technical support and advice to senior management on policy issues relating to Climate Change, such as Emissions Trading, CDM, emerging voluntary and mandatory reporting and reduction initiatives, and the impact of possible future national and international policy instruments on BP's business.

Johan Pype, Tractebel Engineering

Johan Pype is a Senior Consultant on Carbon Management for Tractebel Engineering.

Jeremy Schreffels, US Environmental Protection Agency

Jeremy Schreffels is a Senior Policy Analyst with US EPA's Office of Atmospheric Programs. He works with domestic and foreign governments to design effective and credible emission

trading programs. He has also overseen the design and development of several tools to facilitate the operation of emission trading programs, including registries, emission reporting tools and data exchange standards.

Mr. Schreiffels has worked on the design of emission trading programs in Chile, China, the Czech Republic, the European Union, India, Mexico, New Zealand, Slovakia, and the United States. He also served as an Embassy Science Fellow in China, developing air quality management approaches for Southern China. He has authored more than a dozen papers on topics related to emission trading programs and *Tools of the Trade: A Guidebook for the Design and Operation of Cap and Trade Programs*.

Prior to joining US EPA, Mr. Schreiffels worked as a climate change coordinator at Intel Corporation and an IT consultant for Fortune 100 companies. He has a Master of Environmental Management from Duke University and a Bachelor of Science in finance from Minnesota State University.

Kunihiko Shimada, Environmental Ministry of Japan

Kunihiko Shimada is the Principle Negotiator and Chief Administrator of the Office of International Strategy on Climate Change of Japan's Ministry of Environment. He is also serving as a co-chair for technology transfer agenda item under the Subsidiary Body for Scientific and Technological Advice at UNFCCC and is an expert on adaptation, synergies among international environmental agreements, and the market mechanisms. Prior to his current position, he worked as the negotiation strategist on international peace and security issues as well as sustainable development issues at the United Nations. He has trained as an international law expert and international negotiation strategist covering a wide range of issues from international peace and security, human rights, to global environmental issues. In relation to global environment issues, he has worked extensively on climate change convention process, convention on biological diversity and the Montreal Protocol.

Bob Shults, APX Inc.

Bob Shults joined APX, Inc. in August 2002 and currently serves as Managing Director in Commercial Services and is a member of the Executive Management Committee. Mr. Shults also serves on the Board of Directors of the Environmental Markets Association. Mr. Shults is responsible for leveraging APX's leadership position in infrastructure development and program administration around the certification and banking of environmental market attributes. Mr. Shults has more than two decades of experience in the energy sector in disciplines that include trading, origination, risk management, technology, operations, accounting, regulatory, strategy, project management, and project development. Immediately prior to joining APX, Mr. Shults was a Senior Director for UBS Warburg Energy and Enron North America in the power and natural gas trading business. Mr. Shults has a Master of Business Administration degree in finance and international business and Bachelor of Science degree in accounting.

Robin Smale, VividEconomics

Robin Smale is the Director of VividEconomics Ltd. in London. He has worked with leading firms and their advisors in chemicals, construction, energy, finance, insurance, paper, private equity, renewable energy, transport, waste management and water. Mr. Smale has led policy development projects with departments for environment, energy, farming, public finance, health, reform of government and transport, and for economic regulators, environment regulators,

safety regulators, and government auditors. He holds a masters degree in economics from the University of London and a first class bachelors degree in natural sciences from the University of Oxford.

Einar Telnes, DNV

Einar Telnes, MSc, MBA, is Director of DNV Certification's international climate change services. Mr. Telnes has been active for many years with the early phases of the Kyoto mechanisms development, and consulted the UNFCCC as well as several governments and international organizations on issues related to monitoring, validation, verification and accreditation related to GHG projects. He has experience on hundreds of CDM and JI project validations or verifications and voluntary emission reduction projects as well as verification of corporate GHG inventories for a number of large international companies. Mr. Telnes was project manager for development of the PCF/IETA validation and verification manual and the first issue of the ERUPT guidelines in the Netherlands. He was also principal on the development of the Australian Greenhouse Friendly programme, and took part in the development of WBCSD's GHG protocols and the new ISO GHG 14064 standards.

Anne Marie Warris, Lloyd's Register Quality Assurance

Dr. Anne-Marie Warris is the Vice Chairman of the UK's Emissions Trading Group and the Global Product Manager of Climate Change for Lloyd's Register Quality Assurance. Dr. Warris holds an MBA from London Business School, a PhD in Combustion from Imperial Collage, and a Masters degree in Chemical Engineering from Chalmers University in Sweden.

Xueman Wang, World Bank Carbon Finance Unit

Xueman Wang is the lead counsel on climate change for the Centre for International Sustainable Development Law. From 1997-2001, she was on the staff of the Secretariat of the UN Framework Convention on Climate Change, and was responsible for issues relating to preparation for the implementation of the Kyoto Protocol. She was deeply involved in developing the compliance mechanisms for the UNFCCC and its Kyoto Protocol. She held positions with the Ministry of Foreign Affairs of China from 1991 to 1997, and participated in the negotiation of the Kyoto Protocol as a member of the Chinese delegation. Ms. Wang holds a bachelors degree and masters degree of law from Wu Han University and an M.A. in international affairs from the Fletcher School of Law and Diplomacy at Tufts University.

ANNEX 2: CONFERENCE PARTICIPANTS

Austwick, Caroline

Environmental Policy Solutions
UK
caroline.austwick at sky.com
+44 191 284 4948

Banea Toma, Adrian

Commissioner, National Environmental Guard
Romania
cjsibiu at gnm.ro

Barry, Conor

UNFCCC
Germany
cbarry at unfccc.int
+49 228 815 1377

Bigg, Dr. Martin G.

Head of Industry Regulation, Environment Agency
Bristol
martin.bigg at environment-agency.gov.uk

Boileau, Pierre

Canadian Standards Association
Canada
Pierre.Boileau at csa.ca

Boyle, Stephen

Scottish Environment Protection Agency (SEPA)
Scotland
stephen.boyle at sepa.org.uk
+44 1786 455966

Broekhoff, Derik

World Resources Institute
United States
dbroekhoff at wri.org
+1 202 729-7628

Burke, Brid

Irish National Accreditation Board
Ireland
brid.burke at inab.ie
+353 1 607 3089

Chang, Dr. Chiung-Ting

UNESCO-IHE Institute for Water Education
The Netherlands
c.chang at unesco-ihe.org
+ 31 15 215 1880 (internal: 880)

Convery, Dr. Frank

University of Dublin
Ireland
frank.convery at ucd.ie
+353 1 716 2672

Cunningham, Mike

Scottish Environment Protection Agency
Scotland
mike.cunningham at sepa.org.uk

Dekkers, Chris

Ministry of Environment (VROM)
The Netherlands
chris.dekkers at minvrom.nl
+31 70 339 4418

Di Maria, Dr. Corrado

University College of Dublin
Ireland
corrado.dimaria at ucd.ie
+353 1 716 2714

Duggan, Jill

Department for Environment, Food and Rural Affairs (DEFRA)
UK
jill.duggan at defra.gsi.gov.uk
+44 207 238 4216

Ellerman, Dr. A. Denny

Massachusetts Institute for Technology
United States
ellerman at mit.edu
+1 617 253 3411

Fallmann, Hubert

Ministry of Environment
Austria
hubert.fallmann at umweltbundesamt.at
+43 1 31304 5970

Farrell, Elaine*Environmental Protection Agency*

Ireland

e.farrell at epa.ie

Fodor, Delia*National Environmental Guard*

Romania

cjsibiu at gnm.ro

+40 21 326 8980

Gallagher, Norbert*EEA Fund Management Ltd*

Ireland

norbert.gallagher at eefm.com

+353 87 244 9766

Godt, Christine*Bremen University*

Germany

cgodt at zerp.uni-bremen.de

+49 421 218 7465

Gortemaker, J.C.A.*Erasmus University*

Rotterdam

gortemaker at few.eur.nl

+31 10 408 1518

Grosjean, Ton*Netherlands Emission Authority*

Netherlands

Ton.Grosjean at minvrom.nl

+31 70 339 3820

Halper, Doris*Federal Ministry of Agriculture, Forestry,**Environment and Water Management*

Austria

Doris.Halper at lebensministerium.at

Hamel, Sonia*Center for Climate Strategies*

United States

soni.hamel at gmail.com

+1 617 529 3535

Harnisch, Jochen*Ecofys GmbH*

Germany

j.harnisch at ecofys.de

+49 911 994358-12

Harrop, David*DEFRA*

UK

david.harrop at defra.gsi.gov.uk

+44 20 7082 8903

Irving, Bill*Environmental Protection Agency*

United States

irving.bill at epa.gov

+1 202 343 9065

Jennische, Ulla*Environmental Protection Agency*

Sweden

Ulla.Jennische at naturvardsverket.se

+46 8 698 14 73

Karlsson, Geraldine*Environmental Protection Agency*

Ireland

g.karlsson at epa.ie

Kelly, Dr. Mary*Director General, Environmental Protection Agency*

Ireland

m.kelly at epa.ie

Kierans, Marc*Environmental Protection Agency*

Ireland

m.kierans at epa.ie

Kizzier, Kelley*Environmental Protection Agency*

Ireland

k.kizzier at epa.ie

Kruger, Joe*National Commission on Energy Policy*

United States

jkruger at energycommission.org

+1 202 637 0400

Kruijd, Dr. Jeroen*PWC*

Netherlands

jeroen.kruijd *at* nl.pwc.com

+31 30 219 1331

Litz, Franz*NY Department of Environmental Conservation*

United States

ftlitz *at* gw.dec.state.ny.us

+1 518 402 8547

Macken, Dr. Ken*Environmental Protection Agency*

Ireland

k.macken *at* epa.ie

+35 3 1 268 0167

Markowitz, Kenneth*Earthpace/INECE*

United States

kjm *at* earthpace.com

+1 202 338 4400

Martin, Maria*Environmental Protection Agency*

Ireland

m.martin *at* epa.ie**McMahon, Mike***BP*

UK

mcmahon *at* bp.com**Meerburg, Martine***Dutch Emissions Authority*

Netherlands

saida.asahad *at* minvrom.nl

+ 31 70 339 1580

Millar, Ilona*FIELD*

UK

ilona.millar *at* field.org.uk

+44 20 7388 2117

Morazzo, Mariano*Ministry for the Environment and Territory*

Italy

morazzo.mariano *at* minambiente.it

+39 6 572 28171

Ormerod, Lesley*Environment Agency (England & Wales)*

UK

lesley.ormerod *at* environment-

agency.gov.uk

+44 19 25 542046

Oudenes, Machtelt*Consultant to Ministry of Environment-VROM*

Netherlands

Machtelt.Oudenes *at* minvrom.nl**Prendergast, Annette***Environmental Protection Agency*

Ireland

a.prendergast *at* epa.ie**Pype, Johan***Tractabel*

Belgium

Johan.Pype *at* tractebel.com**Reeves, Meredith***INECE/Earthpace*

United States

mreeves *at* earthpace.com

+1 202 338 4400

Romani, Fabio*CIRCA network*

Italy

morazzo.mariano *at* minambiente.it**Rudin, Helena***Naturvårdsverket (Sweden's Environmental Protection Agency)*

Sweden

Helena.Rudin *at* naturvardsverket.se

+46 8 698 1262

Sands, Phelim*Northern Ireland Department of Environment*

Ireland

Phelim.Sands *at* doeni.gov.uk**Schreifels, Jeremy***Environmental Protection Agency*

United States

schreifels.jeremy *at* epa.gov

+1 202 343 9127

Schwarte, Christoph
FIELD
UK
christoph.schwarte *at* field.org.uk
+44 20 7872 7313

Shimada, Kunihiko
Ministry of Environment
Japan
kunihiko_shimada *at* env.go.jp
+81 3 5521 8330

Shults, Bob
APX
United States
bshults *at* apx.com
+1 713 825 6372

Smale, Robin
Vivid Economics
UK
robin.smale *at* vivideconomics.com
+44 7823 329 054

Telnes, Einar
Det Norske Veritas Certification (DNV)
Norway
Einar.Telnes *at* dnv.com
+47 67 577 817

Walker, Dr. Neil
University College of Dublin
Ireland
neil.walker *at* ucd.ie
+353 1 716 2794

Wang, Xueman
World Bank-Project Financing and Cofinancing
United States
xwang5 *at* worldbank.org
+1 202 458 5831

Warris, Dr. Anne-Marie
Lloyd's Register Quality Assurance
UK
anne-marie.warris *at* lrqa.com
+44 24 768 82391

Weber, Christian
Environment Canada
Canada
Christian.Weber *at* ec.gc.ca