

Building Trust in Emissions Reporting*

Global Trends in
Emissions Trading Schemes

February 2007

*connectedthinking

PRICEWATERHOUSECOOPERS 

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“It no longer makes sense for us to debate whether or not the earth is warming at an alarming rate, and it doesn’t make sense for us to sit back and wait for others to act. The fate of the planet that our children and grandchildren will inherit is in our hands, and it our responsibility to do something about this crisis.”

President William J. Clinton on www.clintonfoundation.org

“Emissions trading is one of the main policy tools for addressing climate change. It is vitally important that the framework for reporting and compliance in this new global market is built on trust. There are many parallels with financial reporting, where trust is at the heart of corporate transparency.”

Sam DiPiazza, Global CEO of PricewaterhouseCoopers

Foreword

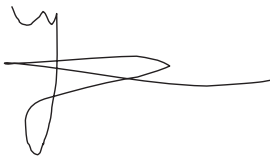
Climate change is now at the top of the political and business agenda. Al Gore's "Inconvenient Truth", the Stern Review and the now almost daily press coverage of climate change science and impacts have engaged many of the global leaders in government and in business.

Emissions trading is increasingly seen as a central plank of the response to climate change – by governments as regulators and by business as polluters but also as innovators.

Market mechanisms like emissions trading depend on trust and confidence – in systems and processes, in markets and market participants, in regulators and regulated. Key to this trust are the three central criteria of transparency, accountability and integrity. But to be effective, systems and processes also need to be simple and efficient.

How do the many schemes that are emerging around the globe stack up against these criteria? This report looks at the experience from a number of the leading emissions trading schemes and highlights some of the strengths and weaknesses of the current piecemeal approach to emissions trading.

Despite good intentions across the board, the general picture is one of new and immature markets, inconsistent and complex compliance frameworks and, consequently, risk. We make the case for urgent and coordinated action to develop a framework of generally accepted principles and practice which will underpin trust and efficiency in these new markets - in effect, a new Global Emissions Compliance Language.



Hans Schoolderman
Director, Climate Change Services
PricewaterhouseCoopers



Richard Gledhill
Global Leader, Carbon Market Services
PricewaterhouseCoopers

“Economic efficiency points to the advantages of a common global carbon price: emission reductions will then take place wherever they are cheapest.”

Stern Review Executive Summary

“Local solutions, linked together via a common international framework to allow international trading and expanded flexibility, will likely be the way forward on climate change, rather than a top-down driven approach.”

David Hone, Climate Change Advisor, Shell International

“Clear assignment of liability is fundamental for efficient risk transfer and insurance. The tighter and more consistent a compliance framework is, the less likely claims will arise under professional indemnity policies.”

Charles Eyre, senior consultant to Zurich Global Corporate



A call for action on the global emissions compliance

Differences in principle and in practice

The last few years have seen the emergence of a patchwork of market-based schemes designed to reduce emissions for environmental purposes, to address climate change, acid rain and other environmental challenges.

These schemes share a common heritage (the cap and trade approach was first developed to address acid rain in the US in the 1990s and this is the role model for most trading schemes) and a number of common features. In particular, emissions trading seeks to harness the creativity and energy of the private sector to find lower cost solutions to achieve environmental objectives, in marked contrast to the more traditional, command-and-control approach, where regulators tell firms what they must do, how they must do it, and by when.

The players in these schemes are also the same in many cases – big international companies that are the target of the caps, the finance community that provides much of the liquidity to these new markets and, of course, the governments and regulators.

But the differences between the schemes, in principle and in practice, are often more marked than the similarities. For example, the EU scheme is mandatory;

the Chicago Climate Exchange is voluntary. The New South Wales scheme targets emissions related to the production and use of electricity; the EU scheme covers five industry sectors and will be expanded in the second phase. Some schemes cover a range of greenhouse gases, some focus on CO₂, whilst others target SO_x and NO_x.

There are, of course, many good reasons for these differences. The schemes have developed against very different policy backgrounds and often conflicting goals and concerns. Some markets are particularly exposed to external competition, so unilateral action is more difficult; others are more open to radical new initiatives.

This experimentation can bring benefits, with new ideas and innovation. However, the consequential differences in systems and structures are at odds with the global and shared nature of the environmental problems that the schemes are designed to address. They also militate against the efficient operation of international environmental markets.

In the following paragraphs we explore the differences in the approach to reporting and compliance and the possible implications of this for trust in these new markets and mechanisms.

Voluntary reduction programs

Besides the voluntary schemes in this report - the California Climate Action Registry, the Chicago Climate Exchange, the Regional Greenhouse Gas Initiative and Japan's Voluntary Emissions Trading Scheme - several other voluntary initiatives have emerged over the past few years.

Examples are: the World Wildlife Fund's (WWF) Climate Savers Program, the EPA Climate Leaders Program and the Climate RESOLVE initiative by the Business Roundtable in the US.

Through the Climate Savers Program, the WWF invites companies to reduce their greenhouse gas emissions voluntarily. Together with the Center for Energy and Climate Solutions, the WWF offers support in developing strategic climate and energy management plans and helps to communicate and promote these efforts to the public, policymakers and to the wider business community. Twelve companies have joined the Program and they have committed themselves to reducing their greenhouse gas emissions by over ten million tons each year.

“Linking domestic emissions trading systems would bolster the top-down Kyoto process with a bottom-up process and might even serve as a fallback mechanism in case the international post-2012 negotiations don’t move forward.”

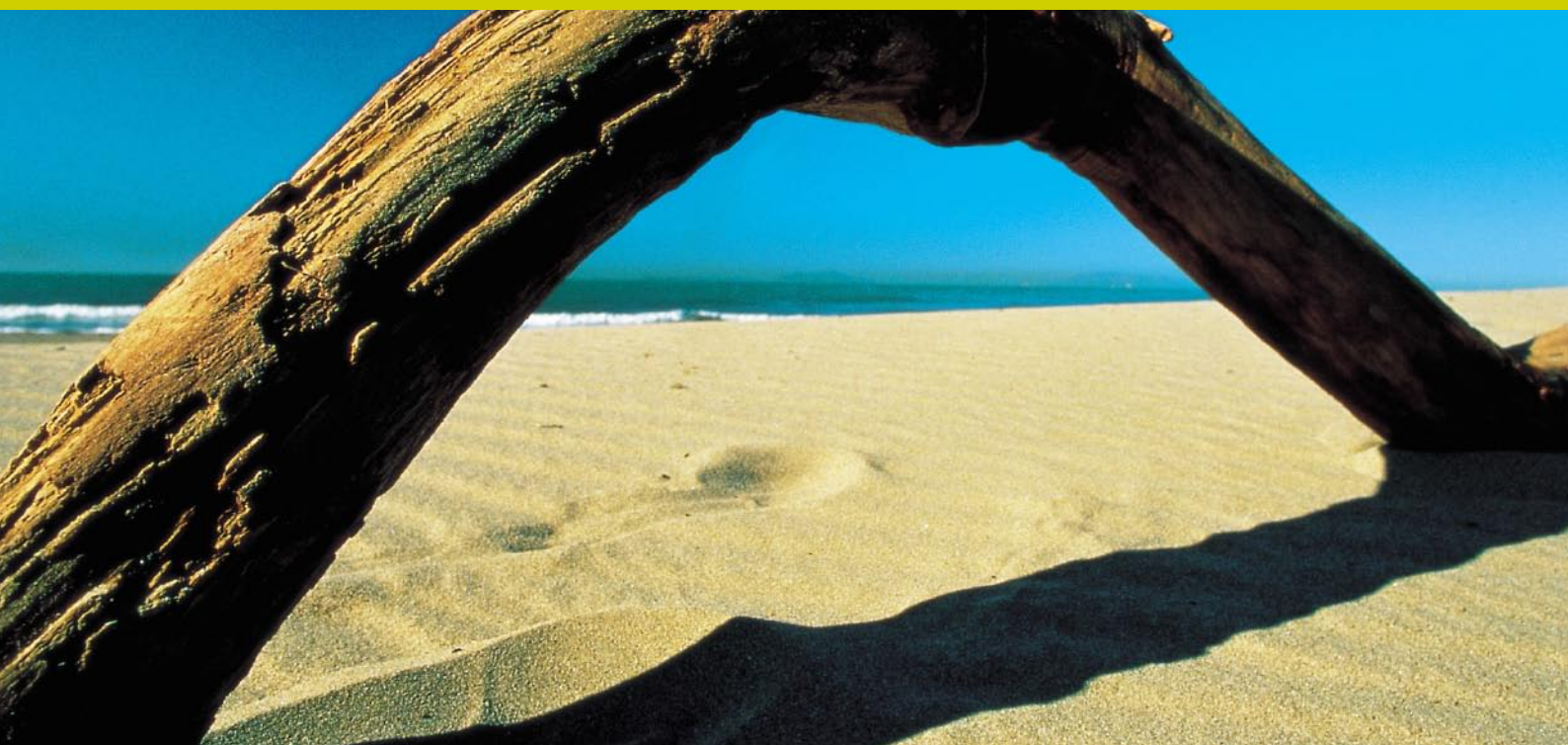
Wolfgang Sterk, Wuppertal Institute

“We see a global system of emissions trading as inevitable.”

Steve Lennon, chair of the environment and energy commission of the International Chamber of Commerce, Financial Times, 10 June 2006, p. 1

“Emissions trading in Europe must succeed. It is the biggest bet world is making for reducing carbon and curtailing climate change. Only through effective compliance systems will we build the strong and credible institutions required for the long-term success of ETS on regional and global levels through the establishment of fair, open, efficient, accountable and consistent markets in which a “tonne” is truly a “tonne” in all counties and markets.”

Durwood Zaelke, President of the International Network on Environmental Compliance and Enforcement (INECE)



Differences in reporting and compliance

The effective operation of these markets and mechanisms depends on the timely reporting of complete and accurate emissions data and on rigorous and transparent compliance arrangements.

There are many examples of good practice in the emerging emissions markets around the world. For example, in New South Wales (Australia) the administration contracts directly with the independent verifiers, requiring them to report on specific elements of the projects in question, using a risk based approach. In the EU, third party verifiers require accreditation before they can be hired by companies, while in many EU Member States the verifier's performance is also scrutinized after delivery of their statements. In the US, EPA's Acid Rain Program and NO_x Budget Trading Program analyse large amounts of data using information technology to reduce the administrative burden and at the same time increase the reliability of emissions reporting. In the US and the EU, detailed standards are established for monitoring, reporting and field audits. In California and the EU, there are even sector based monitoring requirements.

These good practices also highlight differences in reporting and compliance. They reflect a range of different local circumstances and concerns and, in

many cases, well intentioned attempts to experiment with new ideas and to contribute to merging best practice. However, from the perspective of multi-national companies governed by schemes in multiple jurisdictions and/or participating in emissions markets around the world, these differences in standards and procedures add complexity and cost, and are likely to increase risk – risk of non-compliance, of unintended misreporting, of fraud and, ultimately, of market failure.

This issue is perhaps most marked in the EU scheme. Despite its portrayal as an EU-wide scheme, at least in the first phase of the scheme there are significant variations in rules and approach between member states.

Differences between schemes are, as expected, even bigger. The way in which companies are required to design and implement an internal control system to ensure reliable reporting are almost incomparable between Japan, the US, New South Wales and the EU. For example, the California Climate Action Registry is a voluntary program, with very flexible and open compliance requirements; however, the planned mandatory emission trading scheme in California should help to improve reliable and comparable reporting there.

The Clinton Climate Initiative

The first project of the new Clinton Climate Initiative is a partnership with the existing Large Cities Climate Leadership Group, comprising the largest cities in the world. According to the CCI, 75% of the world's carbon emissions are from cities. The Large Cities are committed to reducing greenhouse gas emissions. The Clinton Climate Initiative intends to support the participating cities by: (i) pooling purchasing power in order to accelerate the development and deployment of new energy saving and greenhouse gas reducing technologies and products; (ii) mobilizing experts to provide technical assistance; and (iii) delivering improved access to common measurement tools and relevant internet based communications.

Source: <http://www.clintonfoundation.org/cf-pgm-cci-home.htm>

Convergence and linking initiatives

The European Commission is already seeking greater harmonisation between member states through its review of member state allocations for the second phase of the EU ETS (from 2008-12) and harmonising and strengthening the compliance and enforcement regimes are a key priority in the revision process of the legislation that has just commenced (although, unfortunately, the legislative changes will only become into effect in 2013).

California and the EU have also begun talks on linking the EU Scheme to the binding scheme which is to be introduced in California in 2008. Key to the success of these linking plans will be the adoption of minimum standards for monitoring, reporting, verification and compliance processes, to underpin the necessary mutual trust in the respective schemes.

Other initiatives to develop and implement best practice are being driven by the private sector, through industry representative bodies and standard setters. IETA and its members have developed a Verification Protocol; ISO has produced ISO 14064 (standards for emissions monitoring, reporting and verification) and ISO 14065 (standard for the accreditation of GHG verifiers); and IASB has issued ISAE 3000 (standard for non-financial reporting used by accountants, but also underlying IETA's Verification Protocol).

Another initiative is the Greenhouse Gas Protocol Initiative, a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments and others convened by the World Resources Institute (WRI), a U.S.-based environmental NGO, and the World Business Council for Sustainable Development (WBCSD).

Some of these initiatives have been embraced by legislators and regulators. However, this still tends to be the exception, rather than the rule. For example, whilst ISAE 3000 and ISO 14064-3, which are very carefully drafted and useful standards, could be excellent tools for harmonizing verification, they are not commonly accepted.

At the same time, new schemes are emerging (for example the emission trading schemes in Chile, Australia, Japan and the US) with their own local flavours, and voluntary programs (for example the Clinton Climate Initiative and the WWF Climate Savers) are growing in popularity, with the consequent increased risk of double or optimistic counting.

The patchwork remains as varied as ever and the challenge for scheme participants, to play a constructive role in these new carbon markets, but also to run successful businesses, grows ever more complex.

More must be done to link schemes and to develop congruent systems, structures, policies and procedures. With careful planning, this can be achieved without sacrificing wider policy goals, sovereignty or control; and it can deliver a significant incremental environmental benefit.

Recommendations for action

The credibility of carbon markets and emission trading schemes is crucial. Any widespread or systemic failure, as a result of deficient monitoring and reporting, flawed compliance processes or fraud, could undermine confidence in markets and regulation and jeopardise the crucial policy goals that they are designed to address.

Greater harmonisation of systems and processes, and the development and implementation of a generally accepted approach to monitoring, reporting and compliance, would reduce risks in carbon markets for all involved – for the regulators, the scheme participants, financial investors and intermediaries.

Standardisation will also facilitate the effective linking of disparate schemes and help to keep linked schemes in balance. Linkage will involve substantial data flows and mutual reliance on systems, procedures and information.

We believe that a new ‘Global Emissions Compliance Language’ is required to achieve these goals. This could be modelled after the world’s financial reporting frameworks. This compliance language should include: the establishment of new global institutional leadership to sustain trust in emissions trading and carbon markets; adherence to a consistent terminology; the development and implementation of generally accepted standards for monitoring, reporting, verification and other compliance processes; and, potentially, the adoption of standard enabling technologies.

In the next section we explore in more detail what a Global Emissions Compliance Language might involve.

Combating climate change while sustaining economic growth

Sir Nicolas Stern has published the “Stern Review Report on the Economics of Climate Change”. This report suggests how climate change can be combated without significantly compromising long-term economic growth. In the same line of argument, PricewaterhouseCoopers proposes in its report “The World in 2050: implications of global growth for carbon emissions and climate change policy” how a progressive ‘Green Growth Plus’ scenario could reduce global warming to an acceptable level. This scenario would incorporate a large variety of measures. Besides energy efficiency improvements and fuel mix changes, the scenario also relies on widespread application of carbon capture and storage (CCS) technologies.

The Stern Review Report is available at <http://www.hm-treasury.gov.uk>. The PwC report can be downloaded from <http://www.pwc.com>.



“To be able to build trust in global emissions trading schemes, a Global Emissions Compliance Language is needed to ensure transparency, accountability and integrity.”

Hans Schoolderman, Climate Change Services, PricewaterhouseCoopers

“A low carbon economy requires a degree of communication between the private sector and government that is simply not yet happening.”

John Ashton, UK Foreign Secretary’s special representative for climate change

A Global Emissions Compliance Language

Trust and cost-effectiveness

Emissions trading systems¹ are emerging across the world, as regulators respond to the growing political and public concern about climate change. The key characteristics of these schemes reflect many differences, as well as many similarities.

Does this matter? No, not necessarily. However, trust is a crucial element in the mix. Stakeholders need to understand the quality and reliability of emissions reported under the scheme and to be able to rely on the compliance processes. At the same time, participants in the schemes and in the associated markets face a growing bureaucracy of overlapping rules and regulations, which act as a disincentive to active engagement with the schemes and a constraint on the operation of efficient and effective markets.

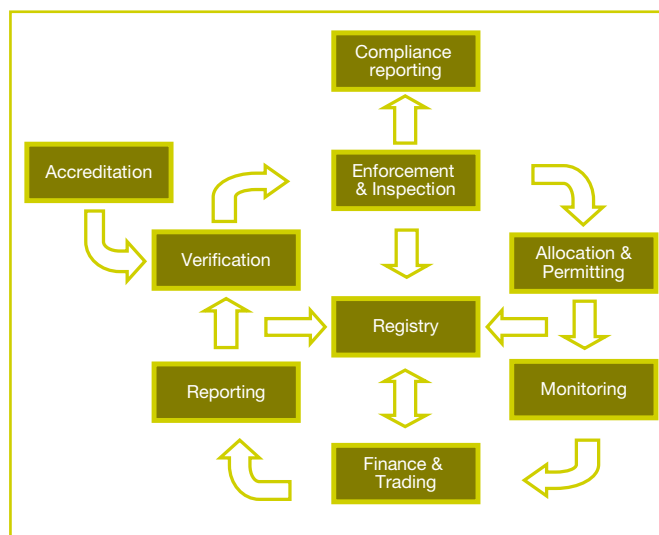
Trust and cost-effectiveness are both highly dependent on the design and operation of a scheme's compliance framework. Establishing a common "language" around the compliance framework for emission trading would help to underpin this trust, cut through unnecessary bureaucracy and support the development of efficient and liquid carbon markets. This language would encompass the design, implementation, evaluation and assurance of compliance frameworks in emissions trading schemes and carbon markets around the world.

Parallels with financial accounting and auditing

There are many parallels between the need for trust in these compliance frameworks and the critical importance of financial accounting and auditing in maintaining trust in the broader capital markets. In many respects, the regulation of reporting in financial markets provides a role model for a Global Emissions Compliance Language in the new emissions markets. As with financial accounting and auditing², this language must be underpinned by three basic themes - a spirit of transparency, a culture of accountability and individual integrity:

A reference model for emissions compliance processes


The chart overleaf sets out a reference model for compliance processes in emissions trading schemes. Compliance processes need to be designed in the context of the political and environmental objectives of the scheme and the local regulatory context within which it must operate; but by applying the principles underpinning the reference model, the transparency and credibility of the compliance framework will be enhanced, helping to ensure trust in the scheme.



Emissions Compliance Processes Reference Model

¹ While this report focuses on emissions trading schemes, much of this chapter applies to emissions reporting in general.

² As described in "Building Public Trust" by Samuel A. DiPiazza, Jr. & Robert G. Eccles. For an abstract of this book on the future of corporate reporting, please log on to <http://www.pwc.com>



“The global market is emerging and project based investments estimated to produce emission reductions in excess of 2 Gt before 2012 has already taken place. Whether the post 2012 carbon markets develop as a bottom-up or top-down structure, transparency, standardization and regulatory stability will be among the key factors for the successful development of a global carbon market.”

Per-Otto Wold, CEO PointCarbon

“To make appropriate use of information technology in emissions trading we have to take into account the available resources and legal traditions of countries.”

Jochen Harnisch, Manager Energy and Climate Strategy, Ecofys Germany

“Emissions trading has proven to be a powerful policy tool to combat environmental problems. The private sector has an unmatched capacity to provide resources and manpower: if governments design the right policy framework, then the private sector will deliver results.”

Gerhard Mulder, Vice-president of commodity derivatives ABN AMRO

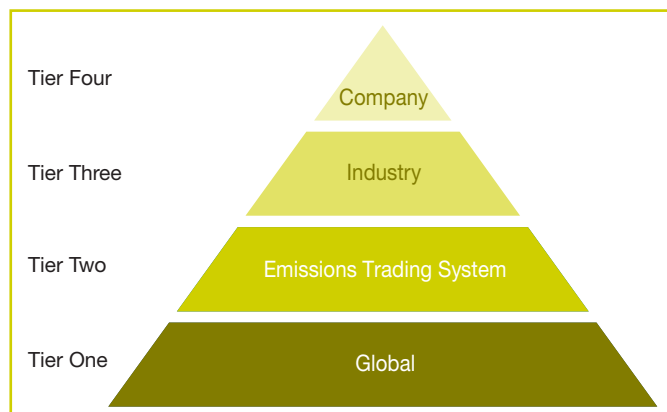
Institutional leadership

The establishment of effective linkages between or mutual evaluation of regional schemes will require some form of global or multi-lateral regulatory compact to provide leadership and direction. To be successful, these international arrangements will need to embrace a common language, consistent standards and central coordination of market operation, ensuring transparency in all aspects of the schemes and the linkage arrangements. It should build on the good work being undertaken by existing initiatives³, but requires stronger political and regulatory backing to achieve rapid progress. Important is the will to change political and technical positions and procedures.

As a first step in this process, we recommend the establishment of a truly Global Forum of Emission Trading Scheme Regulators. This should be supported by technical forums on specific issues, such as Monitoring & Reporting, Verification, Accreditation, Inspection & Enforcement, Accounting and Registries. This global framework should be mirrored at a scheme and national level.

Standards for emissions compliance transparency

In the future, stakeholders are likely to require a much broader range of information than current emissions reporting regulations require. Emission trading schemes should not only deliver information on reported emissions, but be transparent in all their aspects. This new vision advocates making a much broader range of information available, based on a Four-Tier Model of Emissions Compliance Transparency.



Four-Tier Model of Emissions Compliance Transparency

Tier One: Global Generally Accepted Standards. The development of single set of global generally accepted standards and terminology which are adopted by all the world's emissions trading schemes will help to underpin trust in the schemes, will remove unnecessary obstacles to greater linkage and, potentially, will lay the foundations for the development of more global schemes. Regulators will benefit, scheme participants will benefit, markets will benefit - and, as a result, the environment will benefit.

Tier Two: Emissions Trading Scheme-based Rules. The Global Tier One standards will not necessarily address all aspects of a local scheme's requirements. For legal or local policy reasons, there may need to be additional, scheme-based rules. For example, schemes may set different requirements for smaller installations or companies or expand the number of greenhouse gasses.

Tier Three: Industry-based Standards or Guidance. Because emission drivers differ so greatly among industries, different approaches are likely to be required. Industry bodies, working together with the regulators, may wish to develop industry-based standards to support transparency and to help manage compliance costs in a particular sector. This will be particularly important if a more sectorally-based approach is adopted in the future.

Tier Four: Company-specific Information. Every company in an emissions reporting supply chain should be transparent about their strategy, projections and plans, risk management practices and emissions data. At Tier Four, companies decide the standards for themselves, but based on the principles given by Tier One, Two and Three. This will help to relieve the administrative burden significantly, especially where companies are allowed to use advanced enabling technologies.

The Four-Tier Model applies to all processes in the Emissions Compliance Processes Reference Model.

³ Including ISO, the IAASB, the World Business Council for Sustainable Development, the International Emissions Trading Association (IETA) and all local, regional, and national emissions scheme legislators

“Climate change is in need of more ambitious internationally agreed reduction targets. These stronger targets will have to have an impact on the quality of compliance frameworks within emissions trading systems.”

Matthias Düwe, Director Climate Action Network (CAN) Europe



European Commission proposes an integrated energy and climate change package to cut emissions for the 21st Century

The European Commission today proposes a comprehensive package of measures to establish a new Energy Policy for Europe to combat climate change and boost the EU's energy security and competitiveness. The package of proposals set a series of ambitious targets on greenhouse gas emissions and renewable energy and aim to create a true internal market for energy and strengthen effective regulation. The Commission believes that when an international agreement is reached on the post-2012 framework this should lead to a 30% cut in emissions from developed countries by 2020. To further underline its commitment the Commission proposes that the European Union commits now to cut greenhouse gas emissions by at least 20% by 2020, in particular through energy measures.

European Commission Press Release IP/07/29, Brussels, 10 January 2007

XETL as a technology enabler for improving efficiency

Users require timely, complete and accurate information and analysis from many sources for their decision-making, investment or policymaking. Despite advances in electronic technology, most emissions data is still reported in formats that are little more than electronic versions of paper. There is scope for significant improvements in efficiency and confidence levels through greater use of Information Technology, by companies, verifiers and regulators.

We believe that tomorrow's companies, verifiers, legislators and stakeholders will be able to communicate using a new Internet-based technology, an eXtensible Emissions Trading Language or XETL. XETL will be an XML dialect, just as XBRL⁴ already is for financial reporting⁵. XETL also opens the door to linking different reporting systems, which now use different standards and methods, and to connecting reported data with other databases to ensure reliable and consistent reporting.

Developments in Information Technology should follow the Four-Tier Model and cover all emissions compliance processes, thus ensuring well-aligned, connectable and high-quality, transparent and cost-effective solutions.

The verification profession's role in closing the expectations gap

We believe that a specific skills set is required for assurance on emissions reporting. Currently, however, the industry is a long way from a crystal clear set of

requirements for verification competences in emissions reporting supply chains. This has led to many different types of verifiers. This can result in misunderstandings over the value of the verification outcome, with an expectation gap between what an individual verifier actually assures and what the other actors in the reporting chain assume. This increases the risk of errors and abuse and could undermine trust in the schemes.

A new global set of generally accepted emissions verification standards need to be established to address these concerns. These standards and related liabilities should be arranged according to the Four-Tier Model.

Making it happen

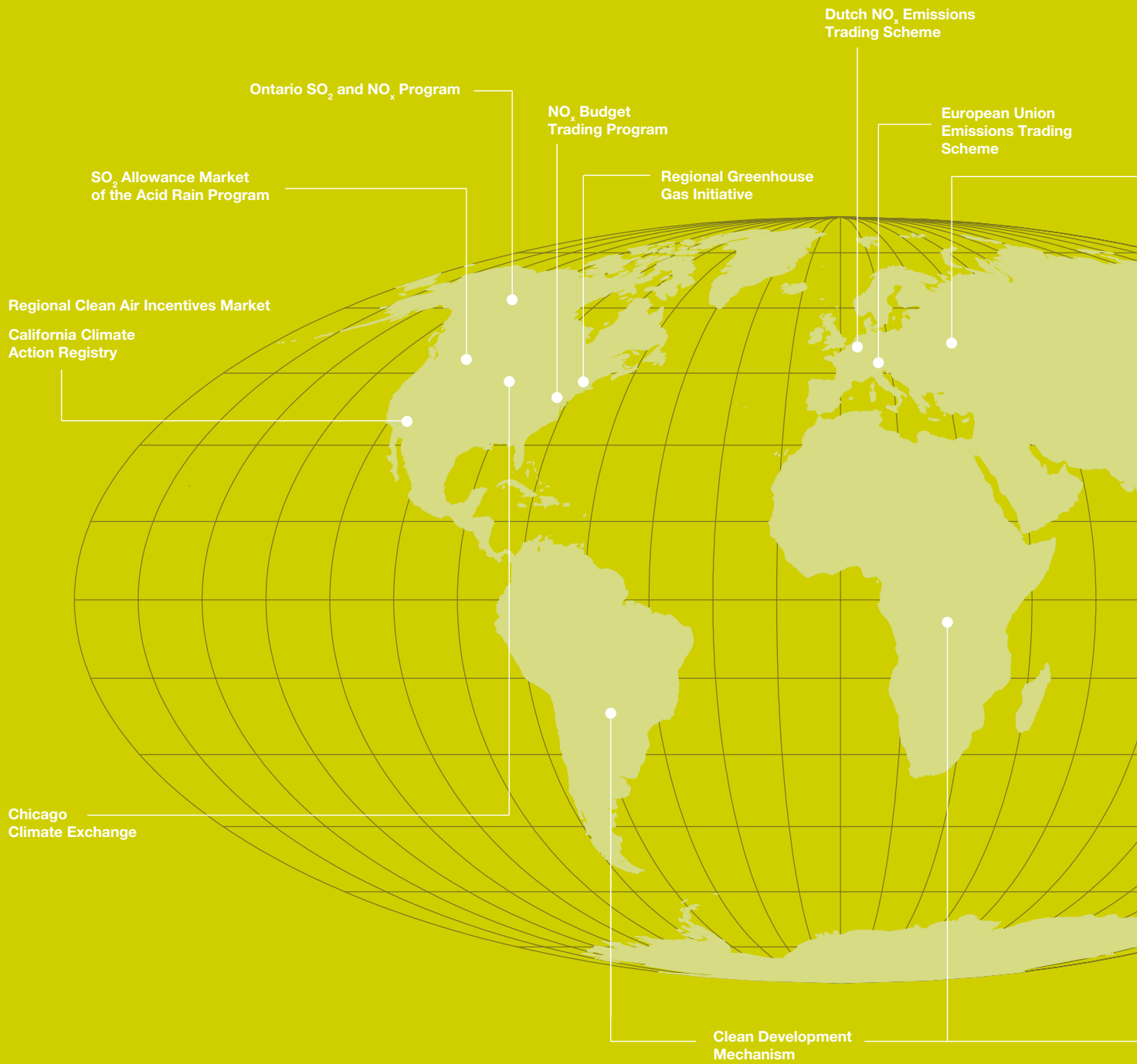
There is a growing body of experience across the world in emissions trading. At the same time there is a general recognition that we need to do more to address the threats posed by climate change and the other environmental issues associated with emissions.

We hope that the Global Emissions Compliance Language outlined here will provide inspiration for a wider debate in the stakeholder community on the trustworthiness of emissions reporting and compliance processes. There are many ways to bring the elements of our proposals to life. The ultimate effect should be a more transparent, simple and principle-based environment for emissions trading, with less bureaucracy and reduced risk for all parties. This can only help to deliver the environmental benefits that we seek through emissions trading schemes.

⁴ XBRL means eXtensible Business Reporting Language, see www.xbrl.org

⁵ The US have already developed their standard for air emissions data exchange (AirDEX)

Emission Reduction Programs covered in this report



Overview of Emissions Trading Schemes



The concept of emissions trading is based on the premise that a market-based mechanism for emissions trading is likely to provide the most cost-effective policy instrument to address emissions related environmental problems, encouraging reductions in emissions at the least cost.

A trade in emission allowances typically occurs when a nation or a company seeking to reduce its emissions purchases emissions credits from a nation or company that has reduced its emissions beyond its requirements to do so. This transaction can benefit both participants. Purchasers are able to reach goals that require more emissions reductions than they can cost-effectively achieve through their own operational adjustments. Sellers are rewarded financially for their investments in emission reductions.

Emissions trading is gaining ground worldwide. However, there is no fully integrated global market for carbon or other emissions. Multiple markets exist at multiple levels, each with their own drivers and prices. The emissions covered by the schemes are diverse.

“Cap-and-trade” is the favoured scheme design. Cap-and-trade schemes impose absolute targets on emission sources. As an alternative, relative targets are imposed.

Emissions trading is typically just one of a number of policy instruments used by governments to address climate change and other emissions related environmental problems. Implementing an emissions trading scheme will therefore normally require adaptations to already existing regulations for the market forces and other instruments to work effectively.

The United States was the first to develop emissions trading schemes and hosts the majority of ETS programs against local environmental problems (acid rain and smog). However, the European Union Emissions Trading Scheme is the largest emissions market to date.

All programs have established compliance frameworks, to ensure emissions reported are reliable. However, the frameworks differ widely and do not share all the same principles.

Regional, national and state schemes

The table below summarises key data in relation to the regional, national and state-level emissions trading schemes covered in this publication. We have focused on the most prominent schemes and those with the potential to have the greatest impact. It does not purport to be a comprehensive survey.

We distinguish between ‘schemes aimed at reducing global warming’ and ‘schemes aimed at reducing smog and/or acid rain’. Due to their unique status and special relevance, the project-based flexibility mechanisms of the Kyoto Protocol are treated in a separate subsection.

In the following sections we provide more information on the schemes, including comments on expected future developments.

Scheme	Emissions covered	Geographical reach	Emission sources targeted	Number of sources	Absolute or relative targets?	Start
EU ETS	CO ₂	European Union	Large industrial and energy-intensive installations	~10,000 units	Absolute targets	2005
NSW GGAS	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, SF ₆	New South Wales (Australia)	Power generation, energy efficiency, industrial processes and carbon sequestration in forests	>160 projects so far and 32 benchmark participants	Relative targets	2003 (NSW) & 2005 (ACT)
JVETS	CO ₂	Japan	Direct emissions from combustion of fuels and waste materials; direct emissions from processing chemicals and materials; and indirect emissions (e.g. use of grid-electricity)	90 entities	Absolute targets	2006/2007 (participant-dependent)
RGGI	CO ₂	A group of Northeast and Mid-Atlantic US states	Electricity generating units that have a nameplate capacity equal to or larger than 25 MW and burn more than 50 per cent fossil fuels	Between a few and a few hundred units per state	Absolute targets	Compliance starts in 2009
CCX	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, SF ₆	US, Canada, Mexico, Brazil	Sources in the electric power sector and fossil fuel combustion and process emissions in the manufacturing sectors	43 entities (“Members”)	Absolute targets	2003
CCAR	CO ₂ (other GHGs still optional)	California	A wide range of sources	>90 participants	No targets	2002

Scheme	Emissions covered	Geographical reach	Emission sources targeted	Number of sources	Absolute or relative targets?	Start
CDM & JI	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, SF ₆	Global involvement	A wide range of activities	467 registered CDM projects, >100 JI projects in the pipeline	No targets	2005 (CDM) & 2008 (JI)
SO ₂ allowance market of the ARP	SO ₂	Continental US	Fossil-fuel burning units serving electric generating units greater than 25MW	~3,000 units	Absolute targets	1995
NO _x Budget Trading Program	NO _x	Most eastern US states	Fossil fuel-fired electric generating units connected to a generator with a name-plate capacity >25 MW (in some states >15MW) and fossil fuel-fired industrial boilers and turbines with a maximum design heat input capacity >250 million British thermal units per hour	~2,500 units	Absolute targets	2003/2004 (state-dependent)
RECLAIM	NO _x , SO ₂	Los Angeles Basin Area of Southern California (US)	Facilities that emit at least 4 tonnes per year of either NO _x or SO ₂	NO _x only: ~300 facilities; NO _x and SO ₂ : 33 facilities (mostly refineries)	Absolute targets	1994
Ontario NO _x & SO ₂ Program	NO _x , SO ₂	Ontario (Canada) – and 12 US States and the District of Columbia for offset projects	Facilities in 7 industrial sectors plus all fossil-fired electricity generators with >25MW capacity that generate >20,000MWh of electricity per year and emit more than trace amounts of NOx and SO2	67 facilities	Absolute targets	2001 (electricity sector) & 2006 (additional sectors)
Dutch NO _x ETS	NO _x	The Netherlands	Installations exceeding a 20 MW thermal capacity threshold and installations generating NOx emissions in the production process	148 units	Relative targets	2005

Emissions trading
schemes aimed
at reducing
global warming





The European Union Emissions Trading Scheme



KEY DATA	
Emissions covered	CO ₂
Geographical reach	European Union
Emission sources targeted	Large industrial and energy-intensive installations
Number of sources	10,000 units
Absolute or relative targets?	Absolute targets
Start	2005
Website	http://ec.europa.eu/environment/climat/emission.htm

Objective and background

1. What is the main objective of the scheme?

The national governments in the European Union are both independently and jointly tied to greenhouse gas emission reduction targets under the Kyoto Protocol. Under the Kyoto Protocol, the EU has to reduce its collective greenhouse gas emissions by 8% below 1990 levels during 2008-2012. This target is shared among the Member States under a legally binding burden-sharing agreement. In order to share the burden and to be able to tackle this burden in a cost effective manner, the The European Union Emissions Trading Scheme (EU ETS) provides energy-intensive industries across the European Union with incentives to reduce their greenhouse gas emissions.

2. What is the background of the scheme?

The EU ETS functions as an internal market for CO₂ emission reduction certificates, covering all Member States. The national targets are spelled out, for each individual plant, in National Allocation Plans approved by the European Commission. Under the scheme, companies exceeding their quotas are allowed to buy unused allowances from those doing better at cutting their emissions.

Design elements

3. What allowance allocation methodology is used?

European Union Member States have laid down national targets and policies in National Allocation Plans. These plans also contain the allocation methods used to distribute the allowances under the scheme. National allocation plans also contain reserves for new entrants in order to

allocate allowances to new or not yet operating installations. Grandfathering is the most commonly used methodology. Some Member States use benchmarks in addition to grandfathering (e.g. the Netherlands), whilst others use benchmarking for new entrants only (United Kingdom and Germany). Ireland, Denmark and Hungary have auctioned off modest amounts of allowances.

4. What are compliance requirements?

The so-called Monitoring & Reporting Guidelines contain a set of binding rules but also leave substantial decision making power to the autonomy of the individual Member States. Although most Member States require third-party verification, EU-wide standards for verification and the accreditation of verifiers have not been implemented. The fine for each tonne of CO₂ emitted in excess of an installation's allocated quota has been set at €40, rising to €100 three years after the entry-into-force of the directive.

5. In what way is IT used in the scheme?

IT applications are currently being developed by some Member States. Best practices and other experiences are shared among Member States.

6. Is access to data public?

The Community Independent Transaction Log (CITL) is accessible at <http://ec.europa.eu/environment/ets/welcome.do> and offers installation-specific data on annually verified emissions and allocated and surrendered allowances.

7. **Can surplus allowances be banked?**

Yes, between years within commitment periods, but it will not be possible to transfer allowances acquired in the first commitment phase (2005-2007) to the second phase (2008-2012).

8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**

There is a plan to consider extending arrangements for linking the EU ETS to other mandatory emissions trading schemes in order to form a global emissions trading network. Schemes to link with should have absolute caps and reduction commitments.

9. **Does the scheme allow for project-based offsets?**

The so-called Linking Directive allows participants under the EU ETS to offset their emissions using carbon credits from the Clean Development Mechanism and Joint Implementation.

Market elements

10. **What can be said of price development?**

This is a new market. Prices have experienced periods of considerable volatility, with Phase 1 allowances reaching a peak of €30 per metric tonne of CO₂ in the first half of 2006, compared with current levels of less than €2*. Phase 2 allowances are currently trading in the teens, reflecting expectations of a shorter market in the second commitment period.

* On the day of publication the price was € 1,28
Source: www.pointcarbon.com

11. **What is the trading volume?**

Trading volumes have grown rapidly on both the OTC market and the exchanges. During 2005, the market saw transactions of more than 200 million EU allowances. This corresponds to an estimated financial volume of EUR 8.2 billion. Point Carbon estimated that the direct bilateral market (company-to-company, not through brokers or exchanges) was some 100 Mt, €1.8 billion in 2005. The EU ETS is the dominant carbon market segment, with 440 Million traded in the first half of 2006; close to 65 per cent of the total traded volume worldwide. The financial value of the EU ETS, however, showed a significant decline compared to Point Carbon's expectations due to the drop in EUA prices in April/May, and was at EUR 9.9 billion in the first half of 2006. The price drop took place after the publication of verified emission reports.

12. **What can be expected in the future?**

The European Commission proposed to include aviation into emissions trading. The Council and Parliament have yet to approve the formal proposal presented by the Commission on 20 December 2006.

The EU is looking at extending the Emissions Trading Scheme to cover more sectors and more gases.

“The EU is committed to build a global carbon market, and to share its experience in monitoring and verifying emissions as well as in developing electronic registry systems. As other countries and regions develop emissions trading as a cost-effective means to tackle climate change, the Commission is keen to maintain a dialogue which enables the EU's experience to be taken into account, so that emissions trading systems are built to be compatible and a global response is taken to address climate change.”

Damien Meadows, EU Emissions Trading Unit, European Commission DG Environment

The Chicago Climate Exchange



KEY DATA	
Emissions covered	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, and SF ₆
Geographical reach	World
Emission sources targeted	Sources in the electric power sector and fossil fuel combustion and process emissions in the manufacturing sectors
Number of sources	43 entities ("Members")
Absolute or relative targets?	Absolute targets
Start	2003
Website	http://www.chicagoclimatex.com

Objective and background

1. What is the main objective of the scheme?

The Chicago Climate Exchange (CCX) aims (i) to build the skills and institutions needed to cost-effectively manage greenhouse gas emissions; (ii) to facilitate capacity-building in both public and private sectors to facilitate greenhouse gas mitigation; (iii) to strengthen the intellectual framework required for cost-effective and valid greenhouse gas reduction; and (iv) to help inform the public debate on managing the risk of global climate change. The Phase I (program years 2003-2006) emission reduction target for each Member was 4% below baseline by 2006. The Phase II (program years 2007-2010) emission reduction target will require all Members to reduce 6% below baseline by 2010. The baseline for each CCX Member is its average emissions during 1998 through 2001 (New CCX Phase II Members may use a 2000 baseline). During the first three years of the program (2003-2005) CCX Members have reduced their emissions by 53,412,200 tons of CO₂ equivalent.⁶

2. What is the background of the scheme?

The CCX is a voluntary greenhouse gas emissions registry and a reduction and trading scheme. It is a self-regulatory exchange designed and governed by CCX Members.

⁶ Source: CCX website

Design elements

3. What allowance allocation methodology is used?

Participants take on an emissions reduction target relative to a base year's emissions. Hence, allowance allocation is based on historical emissions data.

4. What are compliance requirements?

Emissions must be reported on a quarterly basis. Emissions from electricity generating plants are quantified using Continuous Emission Monitoring Systems or an alternative approved measurement method.

5. In what way is IT used in the scheme?

The CCX has developed an electronic trading platform for sources to buy and sell allowances. The allowance transactions are recorded in an internal system. All transactions must be processed through the exchange. At this time, there are no IT systems for monitoring. Monitoring reports are verified by auditors at the National Association of Securities Dealers using an internally designed protocol (confidential business information).

6. Is access to emissions data public?

No.

7. Can surplus allowances (and/or credits) be banked?

Yes.

8. Is the scheme (envisaged to be) linked to other emissions trading schemes?

Credits from the Clean Development Mechanism of the Kyoto Protocol may be counted toward the commitments of CCX Members. The CCX has been actively seeking partners to link with their programs.

9. Does the scheme's design allow for project-based offsets?

Yes (see 8.), but pre-specified limits apply.

Market elements

10. What can be said of price development?

Up to US\$4 per metric ton of CO₂ equivalent.

11. What is the trading volume?

Volume for May 2006 was 3 million metric tons of CO₂ equivalent (also see <http://www.chicagoclimatex.com/trading/marketData.html>).

“Linking Europe to other emissions trading schemes and allowing companies to trade CERs and ERUs as exchange-traded fungible products will be important steps in the creation of a global carbon market.”

Peter Koster, CEO of European Climate Exchange

The New South Wales Greenhouse Gas Abatement Scheme



KEY DATA	
Emissions covered	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, and SF ₆
Geographical reach	New South Wales – Power generation projects also in Queensland, South Australia, Victoria, and Tasmania (Australia)
Emission sources targeted	Power generation, energy efficiency, industrial processes, and carbon sequestration in forests
Number of sources	>160 projects so far and 32 benchmark participants
Absolute or relative targets?	Relative targets
Start	2003 (NSW) & 2005 (ACT)
Website	http://www.greenhousegas.nsw.gov.au

Objective and background

1. What is the main objective of the scheme?

The New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS) aims to reduce greenhouse gas emissions associated with the production and use of electricity in New South Wales, Australia. During the first three years of the program (2003-2005) Benchmark Participants have surrendered certificates that amount to an emission reduction of 16,747,724 tons of CO₂ equivalent. A state-wide benchmark of reducing greenhouse gas emissions from electricity generation and use in NSW has been set to 7.27 tonnes of CO₂ equivalent per capita by 2007. This target is five per cent below the equivalent NSW per capita emissions in 1990, which is the baseline measurement year used in the Kyoto Protocol.⁷

2. What is the background of the scheme?

The NSW GGAS establishes an annual state-wide greenhouse gas benchmark for the local electricity sector. In contrast to regular emissions trading schemes, the NSW GGAS attributes greenhouse gas emissions primarily to electricity retailers rather than to the actual producers of electricity. The retailers are made liable. They are expected to use their established trading skills to acquire abatement certificates, which serve to offset a portion of the greenhouse gas emissions associated with their electricity purchases.

Effectively, the retailers have a strong financial incentive to encourage the owners of emission sources and carbon sinks to deliver sufficient amounts of such abatement certificates.

Design elements

3. What allowance allocation methodology is used?

Benchmarking.

4. What are compliance requirements?

Benchmark participants face a regular annual audit of their compliance reporting. Abatement certificate providers are audited prior to project registration and a risk assessment determines the frequency and stringency of audits of individual projects.

In case of non-compliance by benchmark participants, a penalty will apply. When taking into account taxes, the rate is approximately A\$16 per surplus tonne of CO₂ equivalent.

5. In what way is IT used in the scheme?

An online registry manages the ownership, creation, and surrender of certificates. See the website of the scheme's Registry: <http://www.ggas-registry.nsw.gov.au>, which is operated by LogicaCMG.

⁷ Source: website greenhouse gas NSW completed with information from regulators

6. **Is access to emissions data public?**

The Registry's website <http://www.ggas-registry.nsw.gov.au> offers data on abatement projects and certificates. The scheme's website <http://www.greenhousegas.nsw.gov.au> offers demand and supply forecasts. The governmental website <http://www.greenhouseinfo.nsw.gov.au> offers information on greenhouse gas emissions in New South Wales.

7. **Can surplus allowances (and/or credits) be banked?**

Once registered, certificates are bankable without any discounting or an expiry date.

8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**

The NSW GGAS is linked to a scheme in the Australia Capital Territory (ACT), which mirrors the NSW scheme. In addition, GGAS benchmark participants are allowed to use Renewable Energy Certificates from the Commonwealth's Mandatory Renewable Energy Target to assist in their annual compliance obligations under the GGAS.

9. **Does the scheme's design allow for project-based offsets?**

The NSW GGAS is fundamentally a project-based scheme where the compliance obligation on electricity retailers creates a demand for the creation of abatement certificates through project development.

Market elements

10. **What can be said of price development?**

The spot market price is approximately AUS\$14 per certificate. (Corrected for taxes payable, this price has effectively been lower than the non-compliance penalty rate.) Both the supply of, and the demand for, certificates are growing.

11. **What is the trading volume?**

Trades range between a few hundred certificates to tens of thousands of certificates. The smaller trades are mostly concluded by elective benchmark participants.

12. **What can be expected in the future?**

The NSW GGAS is legislated to operate until 2020. If there are no further developments in GHG emission regulation within Australia by then, there is the prospect that it may be extended. However, it is notable that the national emissions trading model currently being developed by a joint Taskforce representing all State Governments (including NSW) is significantly different in structure to NSW GGAS. Also, the NSW Government has stated that if a national emissions trading scheme is implemented, the scheme may be curtailed.

“There are no physical boundaries for the operation and interaction of carbon markets, and if the “recognition” trends shown by the EU ETS, RGGI and the Australian NSW system continue, the interplay of domestic and international credit and permit frameworks should evolve into a workable harmony.”

Rob Fowler, Abatement Solutions-Asia Pacific, formerly regulator for the NSW abatement scheme

Japan's Voluntary Emissions Trading Scheme



KEY DATA	
Emissions covered	CO ₂
Geographical reach	Japan
Emission sources targeted	Direct emissions from combustion of fuels and waste materials; direct emissions from processing chemicals and materials; and indirect emissions (e.g. use of grid-electricity)
Number of sources	90 entities
Absolute or relative targets?	Absolute targets
Start	2006/2007 (participant-dependent)
Website	http://www.et.chikyukankyo.com/english/

Objective and background

- What is the main objective of the scheme?**
 Japan's Voluntary Emissions Trading Scheme (JVETS) aims to achieve a cost-effective and substantial reduction in CO₂ emissions and to accumulate knowledge and experience relating to domestic CO₂ emissions trading.
 The present commitments will lead to an emission reduction of 276,380 tons of CO₂.⁸
- What is the background of the scheme?**
 Under the scheme, the ministry subsidizes the installation cost of CO₂ emission reduction equipment to help businesses that are actively attempting to reduce greenhouse gas emissions. In exchange for the subsidy, the participants are required to commit to a certain reduction in their CO₂ emissions. In order to improve the cost effectiveness of the scheme, participants may trade allowances among each other toward compliance.

Design elements

- What allowance allocation methodology is used?**
 Grandfathering method (an average over the past three year's emissions minus the reduction target as committed).
- What are compliance requirements?**
 Participants have to submit CO₂ monitoring reports (for both the past three years and the commitment period). Verification will be conducted by reviewing the monitoring report and on-site visiting by the qualified members of the Operational Entity Association of Japan.
- In what way is IT used in the scheme?**
 Trading of allowances entirely depends on IT. A web-based exchange market has been established at <https://www.greenhouse-gas-trade.com/> (in Japanese and for registered users only). Actual trading of the allowances has to be done through the web-based electric registry system (which is equivalent to national registry system under the Kyoto Protocol).

⁸ <http://www.et.chikyukankyo.com/english/>

- 6 Is access to emissions data public?
Yes, partially (some are classified as 'confidential').
- 7 Can surplus allowances (or credits) be banked? If so, do any restrictions apply?
Yes. No restrictions apply.
- 8 Is the scheme (envisaged to be) linked to other trading schemes?
Yes, credits from the Clean Development Mechanism can be used toward compliance under this scheme.
- 9 Does the scheme's design allow for project-based offsets?
Currently no. However, it might be incorporated in the future.

Market elements

- 10 What can be said of price development?
Because of the immature character of the trading scheme in Japan it is difficult to say something about price development at this stage.
- 11 What is the trading volume?
This information is not yet available.
- 12 What can be expected in the future?
A dedicated government-industry taskforce will soon be created in order to develop a binding ETS in Japan.

"I believe that emissions trading is one of the most cost effective methods to reduce GHG emissions. Japan's current system - Japanese Voluntary Emissions Trading Scheme (JVETS) - is regarded as the test case for a future cap and trade scheme. Global linkage among existing emissions trading schemes based on a global common language is an essential key to mitigate climate change most economically."

Kunihiko Shimada, Japan

The Regional Greenhouse Gas Initiative



KEY DATA	
Emissions covered	CO ₂
Geographical reach	A group of seven Northeast and Mid-Atlantic US states
Emission sources targeted	Electricity generating units that have a nameplate capacity equal to or larger than 25 MW and burn more than 50 per cent fossil fuels
Number of sources	Between a few and a few hundred units per state
Absolute or relative targets?	Absolute targets
Start	Compliance starts in 2009.
Website	http://www.rggi.org

Objective and background

- 1. What is the main objective of the scheme?**
 The objective of the Regional Greenhouse Gas Initiative (RGGI) is to develop a multi-state cap-and-trade program covering greenhouse gas emissions. No emission reductions have been realised so far and it is not yet clear how much reduction will be realized in the future. The intention is to reduce emissions 10 percent below 1990 levels by 2017.⁹
- 2. What is the background of the scheme?**
 The RGGI started as a cooperative effort by a group of Northeast and Mid-Atlantic US states to discuss the design of a regional cap-and-trade program. So far, seven states (Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont) have agreed to implement the cap-and-trade program.

Design elements

- 3. What allowance allocation methodology is used?**
 Individual state decision, but states are required to set aside 25% of the allocations for the “public benefit”.
- 4. What are compliance requirements?**
 See the Acid Rain Program description.
- 5. In what way is IT used in the scheme?**
 The RGGI makes use of the software platform EATS, the Emissions and Allowance Tracking System. This is a comprehensive greenhouse gas emissions and allowance tracking registry.
- 6. Is access to emissions data public?**
 Yes, see the “Documents & Data” section of the RGGI website.

⁹ Source: RGGI website

7. Can surplus allowances (and/or credits) be banked?
Yes.
8. Is the scheme (envisaged to be) linked to other emissions trading schemes?
Yes. The RGGI is assessing the feasibility of linking with other emissions trading schemes.
9. Does the scheme's design allow for project-based offsets?
Project-based emissions reductions achieved outside of the capped electric power sector may be used for compliance. Installation owners subject to the RGGI face limits with regard to the use of offsets. These limits are loosened if allowance prices pass pre-defined thresholds.

Market elements

10. What can be said of price development?
The program is not yet running, so there is no trading activity.
11. What is the trading volume?
See above.
12. What can be expected in the future?
The RGGI may be extended to include other sources of greenhouse gas emissions and greenhouse gases other than CO₂. Moreover, additional US states may agree to become full participants in the Initiative.

Maryland is to become a full participant in the process by June 30, 2007. The District of Columbia, Massachusetts, Pennsylvania, Rhode Island, the Eastern Canadian Provinces, and New Brunswick are observers in the process.

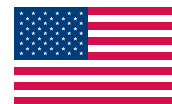
A National Greenhouse Gas Emissions Trading Scheme in the USA

On January 12, 2007, a renewed bill was announced by the republican senator John McCain, democrat Barack Obama and the independent Joe Lieberman on cutting US emissions by 2 percent a year. The bill aims at reducing 2050 carbon emissions to be only one third of the number for 2004.

Adoption of the bill will lead to mandatory caps on greenhouse emissions for power plants, industry and oil refineries. Companies will be allowed to trade their allowances. This would mean an introduction of an emission trading system.

Senator Bingaman announced a 'softer' bill, seen by some as a compromise, with less stringent caps in a cap and trade system.

The California Climate Action Registry



KEY DATA	
Emissions covered	For the first three years of participation, the Registry only requires the reporting of CO ₂ emissions, although participants are encouraged to report the remaining five greenhouse gases covered in the Kyoto protocol (CH ₄ , N ₂ O, HFCs, PFCs, and SF ₆). The reporting of all six gases is required after three years.
Geographical reach	Although the reporting requirements are limited to emissions in California, participants are encouraged to report their total US emissions.
Emission sources targeted	Participants report both direct and indirect emissions of greenhouse gases. Direct emissions include those from onsite combustion, manufacturing processes, fugitive sources and from company-owned transportation fleets. Emissions associated with electricity and steam consumption are the only indirect emissions required to be reported by the Registry. However, participants are also encouraged to report additional indirect emissions.
Number of sources	Over 90 participants have registered 200 MtCO ₂ e for the years 2000-2005.
Absolute or relative targets?	The CCAR is a voluntary reporting initiative and does not comprise targets.
Start	2002
Website	http://www.climateregistry.org

Objective and background

- 1. What is the main objective of the scheme?**

The main purpose is to encourage voluntary actions to increase energy efficiency and reduce greenhouse gas emissions. The Registry helps companies and organizations with operations in the state to establish greenhouse gas emissions baselines against which any future greenhouse gas emission reduction requirements may be applied. The California Climate Action Registry (CCAR) is primarily a reporting initiative. Emission reductions are encouraged but no formal targets are set. However, the new Assembly Bill 32 will lead to the imposition of binding targets in California from 2008.¹⁰
- 2. What is the background of the scheme?**

The CCAR was established by California statute as a non-profit voluntary registry for greenhouse gas emissions.

Design elements

- 3. What allowance allocation methodology is used?**

The Registry encourages voluntary actions to increase energy efficiency and decrease greenhouse gas emissions. Using any year from 1990 forward as a base year, participants may record their greenhouse gas emissions inventory. The Registry does not allocate emission allowances.
- 4. What are compliance requirements?**

The Registry has developed a General Protocol and additional industry-specific protocols which give guidance on how to inventory greenhouse gas emissions for participation in the Registry. When organizations become participants, they agree to register their greenhouse gas emissions for all operations in California, and are encouraged to report their total emissions in the US or even

¹⁰ Source: CCAR website

their global emissions. The Registry requires the inclusion of all direct greenhouse gas emissions, along with indirect greenhouse gas emissions from electricity and steam consumption.

5. **In what way is IT used in the scheme?**

All participants must report their emissions through the Climate Action Registry Reporting Online Tool, CARROT. CARROT also provides a number of calculation tools to assist companies in calculating their greenhouse gas inventory. In a forthcoming version of CARROT (3.0), reporters will be able to upload bulk data files and export data to other schemes.

6. **Is access to data public?**

All aggregated entity-level emissions data reported to the Registry are available to the public at www.climateregistry.org once they have been third-party verified. However, all reported emissions and activity data with a higher granularity (at facility, project, or source levels) is kept confidential. Calculation methodologies and emission factors are published in the Registry's protocols and are available at www.climateregistry.org/protocols. Confidential information will only be accessible to the participant, the Registry, and the participant's chosen certifier, unless the participant allows others to access such information.

7. **Can surplus allowances be banked?**

No allowances are being issued.

8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**

The California Registry is working with other US states to develop harmonized greenhouse gas reporting standards and tools.

9. **Does the scheme allow for project-based offsets?**

The Registry allows for registration of project-based offsets from three types of forest projects: conservation, conservation-based management, and reforestation. The Registry is continuing to develop additional guidance for project-based offsets in other areas. Certification standards may be adopted for offsets in the future.

Market elements

10. **What can be said of price development?**

Not applicable.

11. **What is the trading volume?**

Not applicable.

12. **What can be expected in the future?**

The 'California Global Warming Solutions Act of 2006' (Assembly Bill 32) imposes binding targets on 'significant' greenhouse gas emitters in California from 1 January 2008. This new bill establishes annual mandatory reporting and sets emission limits to cut California's greenhouse gas emissions to 1990 levels by 2020.

“The California Climate Action Registry is the centre of responsible progressive business thinking on climate change. The Registry is working with many stakeholders on the state, regional and international fronts to create a “common currency” for GHG reporting. An accounting infrastructure with integrity is a key foundation for any GHG policy option.

Diane Wittenberg, President California Climate Action Registry



The project-based flexibility mechanisms of the Kyoto Protocol



The Clean Development Mechanism and Joint Implementation



KEY DATA	
Emissions covered	CO ₂ , CH ₄ , N ₂ O, PFCs, HFCs, and SF ₆
Geographical reach	Global involvement
Emission sources targeted	A wide range of activities
Number of sources	467 registered CDM projects, >100 JI projects in the pipeline
Absolute or relative targets?	Not applicable
Start	2005 (CDM) & 2008 (JI)
Website	http://cdm.unfccc.int and http://ji.unfccc.int

Objective and background

- 1. What is the main objective of the scheme?**

The Clean Development Mechanism (CDM) and Joint Implementation (JI) have been established to facilitate more cost-effective solutions towards meeting the binding greenhouse gas emission reduction targets of the Kyoto Protocol. Besides that these flexible instruments are key in transferring knowledge and technology.
- 2. What is the background of the scheme?**

Both the CDM and JI serve as so-called ‘flexibility mechanisms’ under the Kyoto Protocol. In general, countries that face a cap under the Kyoto Protocol may host JI projects and countries without such a cap may host CDM projects. Credits accruing from projects can be used toward compliance by countries capped under the Kyoto Protocol. Furthermore, other, “non-Kyoto” emissions trading schemes regularly allow for the use of these credits in order to provide their participants with additional cost-effective compliance options.

Design elements

- 3. What allowance allocation methodology is used?**

A project idea must undergo a number of procedural steps in order to be recognised as a CDM or JI project and to generate carbon credits eligible under the Kyoto Protocol. Small-scale projects may follow simplified procedures, and JI projects may follow either Track 1 or Track 2 procedures, depending on the eligibility of the host country. Key steps in the CDM and JI project cycles are found on the respective scheme websites.
- 4. What are compliance requirements?**

Once a CDM project has been registered, it is generally the responsibility of the project developer to carry out monitoring in accordance with the monitoring methodology of the so called Project Design Document. The project’s monitored emission reductions are periodically verified and certified. On the basis of a certification report, the CDM Executive Board issues Certified emissions Reductions via the CDM registry and forwards them into the account(s) specified by project participants. Under JI, successfully determined projects are implemented and monitored. The monitored emission reductions are periodically verified. On the basis of a verification report, the host country issues Emission Reduction Units and transfers them into the account(s) specified by project participants.

5. **In what way is IT used in the scheme?**
Registered CDM and JI projects and approved methodologies are logged on the UNFCCC website.
 6. **Is access to emissions data public?**
Although price information is mostly kept secret, emissions data can be retrieved relatively easy (e.g. see <http://www.unfccc.int> and <http://www.cd4cdm.org>).
 7. **Can surplus allowances (and/or credits) be banked?**
Yes, credits may be banked.
 8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**
Various greenhouse gas emissions trading schemes facilitate linkages with the CDM and/or JI.
 9. **Does the scheme's design allow for project-based offsets?**
The credits resulting from CDM and JI projects can often be used to offset a portion of the greenhouse gas emissions of participants in any ETS that allows for credit transfer from CDM and JI projects.
- Market elements**
10. **What can be said of price development?**
In the early years of the CDM, the majority of trading was pre-registration, by early stage projects. Prices were typically very low relative to, for example, EU allowances, reflecting a range of project, regulatory and other risks. A market for issued credits is now slowly developing.
 11. **What is the trading volume?**
Nearly 500 CDM projects have been formally registered by the CDM Executive Board. Altogether, these projects will yield over 700 million certified emission reduction credits – equivalent to 700 million tons of CO₂ equivalent in reductions.

“Both the scale and coverage of the CDM project pipeline needs to expand. Creating a secure post-2012 market and enabling the full range of CDM projects to be eligible under the EU emissions trading system would provide a significant boost to the CDM market and reduce the level of uncertainty and risk faced by CDM project developers.”

Brian Dawson, UN Development Programme



Emissions trading schemes
aimed at reducing smog
and/or acid rain



The SO₂ Allowance Market of the Acid Rain Program



KEY DATA	
Emissions covered	SO ₂
Geographical reach	Continental US (48 states, excluding Alaska and Hawaii)
Emission sources targeted	Fossil-fuel burning units serving electric generating units greater than 25MW
Number of sources	~3,500 units
Absolute or relative targets?	Absolute targets
Start	1995
Website	http://www.epa.gov/airmarkets/arp

Objective and background

1. What is the main objective of the scheme?

The overall objective of the Acid Rain Program (ARP) is to mitigate acid rain by enforcing mandatory reductions in the SO₂ and NO_x emissions of the power sector. The SO₂ emissions are governed by a cap-and-trade program. An allowance trading mechanism enables ARP sources of SO₂ emissions to pursue a variety of lower-cost compliance options. The NO_x emissions are restricted by performance standard rates but no allowances are issued. Since this publication focuses on emissions trading, it only includes the SO₂ segment of the Acid Rain Program. In 2005, SO₂ emissions from all Acid Rain Program units totalled 10.2 million tons, a 35 percent decrease from 1990 levels (15.7 million tons).¹¹

2. What is the background of the scheme?

The ARP was designed to address acid rain problems in the eastern United States. The program was drafted into law by Congress as part of the 1990 Clean Air Act Amendments. Since the program started in 1995, emissions have declined significantly, compliance approximates 100%, and acid rain has declined by more than 40%.

Design elements

3. What allowance allocation methodology is used?

Benchmarking, auctioning (2.8% of allowances), and opt-in.

4. What are compliance requirements?

Coal-fired combustion units are required to use Continuous Emission Monitoring Systems (CEMS) or an approved alternative measurement method for SO₂, NO_x, and CO₂. Other sources can use alternative measurement methods such as fuel-flow meters with periodic fuel sampling. Approximately 36% of the affected units use CEMS for SO₂, but they are responsible for approximately 96% of total SO₂ emissions. All affected sources report hourly emissions data in electronic reports (submitted quarterly) and the US Environmental Protection Agency (EPA) conducts automated software audits and periodic on-site audits. The penalty for each excess tonne of emissions is US\$ 2,963 (compliance year 2004) and one future year allowance.

5. In what way is IT used in the scheme?

The EPA uses IT to collect, verify, manage, and disseminate information about allowances and emissions. The EPA uses a web-based registry that allows market participants to update information and transfer allowances. The EPA uses a set of IT tools to collect and verify emissions data. At the end of each compliance year, the EPA's IT systems reconcile allowances and emissions to assess compliance.

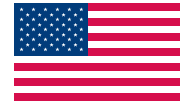
¹¹ Source: ARP website

6. **Is access to emissions data public?**
Detailed emissions data for Acid Rain Program sources are available on the Data and Maps portion of EPA's Clean Air Markets Web site at <http://www.epa.gov/airmarkets>. The EPA collects hourly emission data on a quarterly basis.
7. **Can surplus certificates be banked?**
Yes, there are no limits to banking in the SO₂ program.
8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**
No, there is no linking mechanism. However, EPA and Environment Canada have conducted a feasibility study to link US and Canadian SO₂ cap-and-trade programs. Such a link would require US and Canadian congressional approval.
9. **Does the scheme's design allow for project-based offsets?**
No.

Market elements

10. **What can be said of price development?**
Between 1995 and 2003 the price fluctuated between roughly US\$100 and 200 per metric tonne of SO₂. However, since the introduction of new regulations in 2004 that will require further reductions of approximately 70%, the price has risen sharply to over US\$700. On June 29, 2006, the price was US\$621.
11. **What is the trading volume?**
Of the roughly 15.3 million allowances transferred in 2004, 7.5 million (49%) were transferred between economically unrelated parties.
12. **What can be expected in the future?**
The EPA has drafted regulations for new SO₂ and NO_x cap-and-trade programs. The Clean Air Interstate Rule (CAIR) will use the infrastructure and allowances already in place for the ARP to cut emissions by a further 70%. This will be accomplished by requiring sources in the eastern half of the US to submit two allowances for each ton of SO₂ emissions from 2010 to 2014 and 2.86 allowances for each ton of SO₂ emissions from 2015 onward.

The NO_x Budget Trading Program



KEY DATA	
Emissions covered	NO _x
Geographical reach	Most eastern US states
Emission sources targeted	Fossil fuel-fired electric generating units connected to a generator with a nameplate capacity >25 MW (in some states >15MW) and fossil fuel-fired industrial boilers and turbines with a maximum design heat input capacity >250 million British thermal units per hour
Number of sources	2,500 units
Absolute or relative targets?	Absolute targets
Start	2003/2004 (state-dependent)
Website	http://www.epa.gov/airmarkets/fednox

Objective and background

- 1. What is the main objective of the scheme?**

The NO_x Budget Trading Program aims to provide a cost-effective strategy for meeting existing US Environmental Protection Agency (EPA) regulation to reduce the regional transport of ground-level ozone (leading to smog). In 2005, ozone season NO_x emissions from all units in the Budget Trading Program totalled 530,000 tons, a 72 percent decrease from 1990 levels (1,860,000 tons).¹²
- 2. What is the background of the scheme?**

In 1998, the EPA issued a regulation to reduce the regional transport of ground-level ozone. This rule, commonly called the NO_x State Implementation Plan (SIP) Call, did not mandate which sources must reduce emissions; rather, it required states to meet an overall emissions budget and gave them flexibility to develop control strategies to meet that budget. One option for the states was to participate in the EPA-operated NO_x Budget Trading Program. All affected states opted to meet their NO_x SIP Call requirements by participating in the NO_x Budget Trading Program.

Design elements

- 3. What allowance allocation methodology is used?**

The EPA provided broad discretion to states as to how they could allocate allowances from their trading budget to affected sources. One option was to allocate allowances based on each source's share of state-wide ozone season heat input. Another option was based on each source's share of ozone season output to reward sources that generate more energy with less fuel input. States could also set-aside allowances for new sources or as incentives for energy efficiency and renewable energy programs.
- 4. What are compliance requirements?**

Participants are required to use Continuous Emission Monitoring Systems or an approved alternative measurement method. If a source does not have enough allowances to cover its emissions, the EPA automatically deducts allowances from the following year's allocation at a 3:1 ratio.

¹² Source: EPA website

5. **In what way is IT used in the scheme?**
The EPA uses IT to collect, verify, manage, and disseminate information about allowances and emissions. The EPA uses a web-based registry that allows market participants to update information and transfer allowances. The EPA uses a set of IT tools to collect and verify emissions data. At the end of each compliance year, the EPA's IT systems reconcile allowances and emissions to assess compliance.
6. **Is access to emissions data public?**
Detailed emissions data for Acid Rain Program sources are available on the Data and Maps portion of EPA's Clean Air Markets Web site at <http://www.epa.gov/airmarkets>. The EPA collects hourly emission data on a quarterly basis.
7. **Can surplus allowances (and/or credits) be banked?**
Banking is allowed. However, in order to discourage excessive use of banked allowances during any particular ozone season, a provision exists to discount a percentage of each source's banked allowances by half (i.e. two allowances for each tonne of emissions) if the bank exceeds established benchmarks. The percentage is recalculated each year.

8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**
No.
9. **Does the scheme's design allow for project-based offsets?**
No.

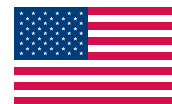
Market elements

10. **What can be said of price development?**
Roughly between US\$2,000 and US\$4,000 per tonne.
11. **What is the trading volume?**
There were more than 230,000 allowances involved in economically significant trades in 2004.
12. **What can be expected in the future?**
The EPA has drafted regulations for new SO₂ and NO_x cap and trade programs. The Clean Air Interstate Rule (CAIR) will require sources in the Eastern half of the US to reduce NO_x emissions even further than the NO_x Budget Trading Program.

“The US Acid Rain and NO_x Budget Trading Programs have demonstrated that cap and trade programs built on complete and accurate emissions monitoring, reporting, and verification; information and data transparency; and strong enforcement are more credible, environmentally effective and operationally efficient.”

Brian McLean, Director, EPA's Office of Atmospheric Programs

The Regional Clean Air Incentives Market



KEY DATA	
Emissions covered	SO ₂ and NO _x
Geographical reach	Los Angeles Basin Area of Southern California (US)
Emission sources targeted	Facilities that emit at least 4 tonnes per year of either NO _x or SO ₂
Number of sources	NO _x only: ~300 facilities; NO _x and SO ₂ : 33 facilities (mostly refineries)
Absolute or relative targets?	Absolute targets
Start	1994
Website	http://www.aqmd.gov/reclaim

Objective and background

1. What is the main objective of the scheme?

As a trading scheme, the Regional Clean Air Incentives Market (RECLAIM) is designed to facilitate cost-effective and flexible reductions of SO₂ and NO_x emissions in Southern California. The reduction target set in 2005 is a 20 percent reduction of (NO_x) from all RECLAIM facilities by 2011.¹³

2. What is the background of the scheme?

The South Coast Air Quality Management District (SCAQMD) has established RECLAIM in order to contribute to compliance with federal clean air health standards by 2010. Acid rain and smog can be tackled by reducing SO₂ and NO_x emissions.

Design elements

3. What allowance allocation methodology is used?

Free allocation based on actual facility activity.

4. What are compliance requirements?

To monitor emissions at larger sources, RECLAIM requires the use of Continuous Emission Monitoring Systems to determine actual mass emissions from these sources. These emissions are reported to the SCAQMD on a daily basis.

5. In what way is IT used in the scheme?

Allowance balances and transactions can be tracked in the registry. Allowance holdings cannot be tracked because allowances are not serialized.

6. Is access to emissions data public?

Yes. Emissions data are posted on the website at the end of the compliance cycle along with compliance information.

7. Can surplus allowances be banked?

No. There is, however, a narrow loophole that allows surplus allowances from one compliance cycle to be used in the first half of another compliance cycle, thereby allowing limited banking. For example, a facility with surplus allowances at the end of the 31 December compliance period could sell the surplus to a facility which uses a fiscal year compliance period (i.e. 30 June). The buyer could use the allowances to offset any emissions that occurred prior to 31 December.

8. Is the scheme (envisaged to be) linked to other emissions trading schemes?

No.

9. Does the scheme's design allow for project-based offsets?

No.

¹³ Source: January 7, 2005, AQWD Governing Board change to the scheme

Market elements

10. What can be said of price development?

Prior to 2000, prices were low due to the fact that emission levels were substantially lower than the allowance allocations. Later, the restrained power sector could only meet its targets by acquiring allowances, which temporarily drove up the market price of NO_x allowances from US\$1,800 per tonne in 1999 to over US\$15,000 per tonne in 2000. Due to its reliance on natural gas, the power sector is not active in the SO₂ allowance market segment. For this reason, the SO₂ segment has been less volatile than the NO_x segment.

11. What is the trading volume?

Primarily due to reductions in allocations, prices have been rising and trading volume has been relatively low. In 2005, there were 740 trades for over 17,000 tons of SO₂ and NO_x.

12. Any other relevant issues?

Providing opportunities to opt-in for uncapped sources that can reduce emissions at lower cost than those within the cap has proven to be of strategic value beyond the potential cost savings. The initial cap for the program was set above the business-as-usual emissions. As a result, few facilities took major steps to reduce emissions. However, as the cap declined, fuel prices increased, electricity demand increased, and deregulation issues surfaced, the situation created a “perfect storm” that caused the program to fail. SCAQMD amended to program in an attempt to stabilize prices, including segregating the power producers from the other sectors.

The Ontario SO₂ and NO_x Program



KEY DATA	
Emissions covered	NO _x and SO ₂
Geographical reach	Ontario (Canada) – and 12 US States and the District of Columbia for offset projects
Emission sources targeted	NO _x and SO ₂
Absolute or relative targets?	Facilities in 7 industrial sectors (base metal smelting, iron and steel, cement, petroleum refining, pulp and paper, glass, and carbon black), plus all fossil-fired electricity generators with >25MW capacity that generate >20,000MWh of electricity per year and emit more than trace amounts of NO _x and SO ₂
Number of sources	67 facilities
Start	2001 (electricity sector) & 2006 (additional sectors)
Website	http://www.oetr.on.ca

Objective and background

1. What is the main objective of the scheme?

The Ontario SO₂ and NO_x Program aims to reduce industrial SO₂ and NO_x emissions in Ontario at the lowest possible cost, by creating a financial incentive for both capped and uncapped emitters.

2. What is the background of the scheme?

The Ontario government has an action plan to reduce industrial emissions of harmful air pollutants as part of its commitment to clean up Ontario's air. The plan includes an initiative to reduce NO_x and SO₂ emissions. The government has introduced a number of tools to help industrial facilities reach their targets. Emissions trading is such a tool. The design of the scheme incorporates lessons learned from the experiences in NO_x and SO₂ trading schemes in the United States and also those from the Ontario-based Pilot Emissions Reduction Project, which preceded the present regulations.

Design elements

3. What allowance allocation methodology is used?

Ontario Power Generation (OPG) receives a predetermined guaranteed number of allowances up to and including 2007. Other electricity generators receive a share of an allowance

pool based on their projected share of power production in the upcoming year. Starting in 2008, Ontario Power Generation will compete for the available allowances in the electricity sector pool on the basis of projected power production along with the rest of the sector. All electricity generating facilities facing NO_x obligations will compete for allowances on the basis of their electricity production. The competitive allocation system for SO₂ allowances started in 2004. Petroleum sector participants will receive a predetermined number of allowances annually. The remainder of the industrial sector participants will compete for allowances on the basis of product output and predetermined intensity rates.

4. What are compliance requirements?

All electricity generators facing targets will be required to install Continuous Emission Monitoring Systems or an alternative approved measurement method. An emitter that is subject to the regulation and whose emissions exceed the sum of its allowances plus acceptable emission reduction credits presented for compliance, will face penalties. Emissions of capped emitters must be reported annually, and are subject to audits by the regulatory authority. Credits from offset projects must be verified by an independent third party.

5. **In what way is IT used in the scheme?**
The Ontario Emissions Trading Registry is currently being upgraded to service all targeted sectors online. All participants will be able to apply for allowances; to retire allowances and credits; to trade allowances and credits; to apply for offset credit creation; and to report annual emissions.
6. **Is access to emissions data public?**
Anyone may access emissions data from the Registry.
7. **Can surplus allowances (and/or credits) be banked?**
Allowances and credits may be banked indefinitely.
8. **Is the scheme (envisaged to be) linked to other emissions trading schemes?**
No.
9. **Does the scheme's design allow for project-based offsets?**
Yes, the project-based emission reduction credit system functions as an offset facility. Eligibility for emissions reduction credit creation is limited to emitters in an Eligibility Zone consisting of the 12 US states, the District of Columbia and Ontario. The regulation also allows for credits to be created based on emission reductions achieved beyond the Eligibility Zone. If acceptable evidence is produced to show that emissions reductions at places outside the Zone will improve Ontario's air quality, then credits created based on them can be used to toward compliance under the Ontario emissions trading regulation.
The maximum allowable use of emission reduction credits to an emitter will be limited to 33% of

allowances used for NO_x and 10% of allowances used for SO₂. In addition, there will be a 10% discount of all retired (used) credits for the benefit of the environment.

Market elements

10. **What can be said of price development?**
There is no requirement for traders to make prices public, nor to report prices to government. Price discovery is currently difficult because of the small number of trades, and very small number of buyers.
11. **What is the trading volume?**
Registry transactions may be trades between companies, or intra-company transfers, principally within OPG (among its 5 remaining emitting facilities; Lakeview GS was closed in 2005), and may be viewed by visiting the Registry at www.oetr.on.ca. Of the 47 transfers to date for 2006, 39 are OPG intra-company transfers.
12. **Any other relevant issues?**
Credits (not allowances) are designated either ozone season or non-ozone season, depending on the period in which the emission reductions, upon which they are based, were achieved. The ozone season is the five month period from 1 May to 30 September. The non-ozone season is the seven month period from 1 October to 30 April.
The ability of proponents in the US to create credits under the Ontario system enables Ontario to influence emissions behaviour upwind in its air shed through the use of a market mechanism, in jurisdictions in which it has no regulatory authority.

“The inclusion of project-based offsets extends the incentive for mitigating emissions to more stakeholders, and adds liquidity and competitive forces to the system.”

John Hutchison, Government of Ontario, Canada

Dutch NO_x Emissions Trading Scheme



KEY DATA	
Emissions covered	NO _x
Geographical reach	The Netherlands
Emission sources targeted	Installations exceeding a 20 MW thermal capacity threshold and installations generating NO _x emissions in the production process
Number of sources	148 units
Absolute or relative targets?	Relative targets
Start	2005
Website	http://www.sharedspaces.nl/pagina.html?id=10327

Objective and background

- 1. What is the main objective of the scheme?**
The Dutch NO_x Emissions Trading Scheme is meant to improve the cost effectiveness of the national goal to reduce the total annual industrial NO_x emissions in the Netherlands to 55 kilotons by 2010.
- 2. What is the background of the scheme?**
The scheme is embedded in national policy toward compliance with the National Emissions Ceilings Directive of the European Commission, which forces the Netherlands to reduce its overall NO_x emissions from 490 kilotons in 1995 to 260 kilotons in 2010. Under the scheme, major industrial installations are required to reduce their NO_x emissions from 210 kilotons in 1995 to 55 kilotons in 2010. Although the design of the scheme incorporates a number of features (registry, permitting) from the EU ETS, the Dutch NO_x ETS is unique in the sense that it assigns emission allowances at the end rather than at the beginning of each compliance year. In order to improve the liquidity and flexibility of the market, forward trading of allowances is permitted. Performance Standard Rates (PSRs) determine the amount of allowances that individual installations receive. These PSRs are tightened on a yearly basis. The number of allowances each installation receives is automatically determined through multiplication of the PSR for a particular year by the total fuel input or production.

Design elements

- 3. What allowance allocation methodology is used?**
The ex post allocation of allowances is based on the performance standard and the amount of energy used by an installation in the previous year. On the basis of the PSR companies can engage in forward trading on the basis of the emissions allowances expected for each future year.
- 4. What are compliance requirements?**
The monitoring and reporting obligations are comparable to the EU ETS obligations. Installations need to have a permit and monitoring plans, and hand over a verified emissions report to the competent authority. Fines are due if installations are non-compliant.
- 5. In what way is IT used in the scheme?**
The scheme follows the infrastructure of the EU ETS implementation in the Netherlands.
- 6. How is the registry of transactions organized?**
Although the national CO₂ registry has been used as an example, the NO_x registry has been specifically tailored to the NO_x allowance market.
- 7. Is access to data public?**
Yes, emissions data are publicly available.
- 8. Is the scheme (envisaged to be) linked to other emissions trading schemes?**
No.

9. Does the scheme allow for project-based offsets?
No.

Market elements

10. What can be said of price development?

In 2005, the price range was only €0.70-1.00 per kilogramme of NO_x, due to a deliberate overallocation of allowances. In the coming years, the amount of available allowances will decrease and the price level will primarily depend on the application of 'Selective Catalytic Reduction' technology in coal-fired power generation units.

11. What is the trading volume?

In 2005, 205 transactions were registered with a total volume of 17,000 metric tonnes.

12. What can be expected in the future?

An effort needs to be made to harmonize the Dutch NO_x ETS with the European directive concerning 'Integrated Pollution Prevention and Control' (IPPC) in order to take away the legal uncertainty faced by the owners of targeted installations. The IPPC directive does not allow emissions trading to the same extent as the Dutch NO_x ETS.

When, as expected, other EU member states also introduce NO_x emissions trading, clear, EU guidance on the monitoring, reporting and verification is needed.

“Compliance and enforcement are most important issues in any Emissions Trading Scheme: it has all to do with availability of information on how requirements are met, the detail and quality of the information provided, and the expertise of the organisation or competent authority charged with enforcing compliance.”

Chris Dekkers, Ministry of the Environment, the Netherlands



Documents and definitions

Term	Definition
Banking	Where participants in emissions trading schemes can hold excess allowances or credits from one commitment period for use in later commitment periods.
CEMS	Continuous Emission Monitoring System
EU ETS	European Union Emissions Trading Scheme.
ISAE 3000	International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements Other Than Audits or Reviews of Historical Financial Information.
ISAE 3000	International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements Other Than Audits or Reviews of Historical Financial Information.
ISO 14064	Set of standards, specifically providing guidance for: the quantification, monitoring and reporting of greenhouse gas emission reductions and removals at the organizational level (ISO 14064-1:2006) and the project level (ISO 14064-2:2006) and the validation and verification of greenhouse gas assertions (ISO 14064-3:2006)
ISO 14065	Standard specifying requirements to accredit or otherwise recognize bodies that undertake greenhouse gas validation or verification using ISO 14064-3:2006 or other relevant standards or specifications.
Kyoto Protocol	An international agreement that requires countries listed in its Annex B to reduce their GHG emissions by an average of 5.2% below 1990 levels by 2008-2012. It was adopted by all Parties to the UNFCCC in Kyoto, Japan, in December 1997. Despite the US and Australia subsequently withdrawing from the treaty, it entered into force in February 2005.
Linking Directive	An amendment to the EU ETS Directive allowing participants to offset their emissions using carbon credits from CDM and JI.
M&R Guidelines	Commission Decision of 29/01/2004 establishing Guidelines for the Monitoring and Reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and the Council C(2004)130 final
UNFCCC	United Nations Framework Convention on Climate Change

Greenhouse Gases	
CO ₂	carbon dioxide
CH ₄	methane
N ₂ O	nitrous oxide
HFCs	hydrofluorocarbons
PFCs	perfluorocarbons
SF ₆	sulfur hexafluoride

Websites

Scheme in this publication	URL
The European Union Emissions Trading Scheme (EU ETS)	www.ec.europa.eu/environment/climat/emission.htm
The Chicago Climate Exchange (CCX)	www.chicagoclimatex.com
The New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS)	www.greenhousegas.nsw.gov.au
Japan's Voluntary Emissions Trading Scheme (JVETS)	www.et.chikyukankyo.com/english/
The Regional Greenhouse Gas Initiative (RGGI)	www.rggi.org
The California Climate Action Registry (CCAR)	www.climateregistry.org
The Clean Development Mechanism (CDM)	www.cdm.unfccc.int
Joint Implementation (JI)	www.ji.unfccc.int
The SO ₂ Allowance Market of the Acid Rain Program (ARP)	www.epa.gov/airmarkets/arp
The NO _x Budget Trading Program	www.epa.gov/airmarkets/fednox
The Regional Clean Air Incentives Market (RECLAIM)	www.aqmd.gov/reclaim
The Ontario SO ₂ and NO _x Program	www.oetr.on.ca
Dutch NO _x Emissions Trading Scheme	www.sharedspaces.nl/pagina.html?id=10327

Other websites	URL
Climate RESOLVE	www.businessroundtable.org/climateresolve
Clinton Climate Initiative	www.clintonfoundation.org/cf-pgm-cci-home.htm
EPA Climate Leaders Program	www.epa.gov/climateleaders
INECE	www.inece.org
IETA	www.ieta.org
ISO	www.iso.ch
PointCarbon	www.pointcarbon.com
WWF Climate Savers Program	www.worldwildlife.org/climatesavers

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