10

Verification and compliance systems in the climate change regime

Clare Tenner

At the end of the nineteenth century, the Swedish scientist Svante August Arrhenius postulated that the growing volume of carbon dioxide emitted by the factories of the industrial revolution was changing the composition of the atmosphere, and that this would cause the earth's surface temperature to rise. But it was not until 1990 that scientific consensus on this so-called 'greenhouse effect' was reached. The First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)[1] stated that rising concentrations of carbon dioxide and other greenhouse gases (GHGs) in the atmosphere were caused by human activities and would result in increased global temperatures with accompanying climate changes. The IPCC report, together with rising public concern about environmental issues, provided the impetus for states to negotiate a global treaty to mitigate climate change.[2]

The United Nations Framework Convention on Climate Change (UNFCCC) was opened for signature in June 1992 at the United Nations Conference on Environment and Development ('Earth Summit') in Rio de Janeiro, Brazil.[3] The Convention entered into force in 1994. Its objective is the 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. The Convention does not contain legally binding greenhouse gas emissions reduction targets, but it does include other obligations that provide the basis for the subsequent development of such objectives.[4] All parties agreed to:

- develop national inventories of anthropogenic GHG emissions and removals;
- elaborate and implement programmes to mitigate and facilitate adaptation to climate change;
- promote sustainable management of GHG sinks and reservoirs;[5]
- co-operate in preparing for adaptation to climate change;

- promote and co-operate in relevant research, technology development and transfer, information exchange, education programmes, and in integrating climate considerations into other policy areas; and
- report GHG inventories and information related to implementation.

In December 1997 in Kyoto, Japan, a Protocol for the Convention was adopted, under which developed countries—listed in Annex I of the Convention—agreed to reduce their overall emissions of six GHGs by 5.2 percent below 1990 levels between 2008 and 2012. This overall target is the sum of individual emissions reduction and limitation commitments negotiated by the parties. These obligations are given as a percentage of base year emissions, and may be multiplied by five to produce an 'assigned amount' of emissions for the five-year commitment period.[6] The inclusion of six gases in a so-called 'basket approach' means that parties may offset increases in emissions of some gases with deeper cuts in others.

The Protocol contains unique mechanisms to help Annex I parties meet their targets: International Emissions Trading (IET); Joint Implementation (JI); and the Clean Development Mechanism (CDM). Trading will allow parties that are struggling to meet their targets to buy extra assigned amount units from states that are able to reduce their emissions below their assigned amount. Under the JI mechanism, parties will be able to claim 'emission reduction units' (ERUs) for projects carried out in another Annex I nation—again a portion of the assigned amount will be transferred. Finally, the CDM will allow Annex I parties to set up and gain credit from emission reduction projects in developing countries.

Despite this flexibility, many parties believe that the Protocol will be costly to implement. If they are to ratify it, and to implement their commitments, they want to be sure that other states are also meeting their obligations. Otherwise they fear that their industrial competitiveness could be jeopardised. Probably for this reason, the Protocol is littered with references to verification. But, like much of the rest of the document, many important details were left unresolved. A deadline for making decisions on outstanding matters related to implementation of the Protocol was agreed at the Fourth Conference of the Parties to the Convention in 1998. The deadline is the Sixth Conference of the Parties, which is to take place in November 2000 in The Hague, Netherlands. It is vital to the success of the Protocol that effective verification and compliance systems are agreed by the deadline to allow ratification and entry into force to proceed, and to provide experience with new systems before the start of the first commitment period.

The purpose of this chapter is to describe the verification regime that has evolved under the UNFCCC and to indicate how this is developing to meet the new obligations on parties contained in the Kyoto Protocol.

Verification under the Convention

Given that the Convention aims to prepare parties for future emissions reduction commitments, its verification and compliance systems are geared towards monitoring and facilitating parties' implementation of the agreement, rather than enforcing compliance. Nevertheless, processes and institutions have evolved that will provide a solid basis for more stringent verification under the Protocol.

Verification is based on self-reporting by parties. All states are required to submit to the Conference of the Parties, via the Secretariat, a national communication consisting of an inventory of GHG emissions and removals, and a general description of steps taken or envisaged by the party to implement their commitments under the Convention. Annex I states also have to provide a detailed description of the policies and measures they have adopted and an estimate of the effects that these will have on their emissions.

Annex I parties were required to make their first communication within six months of the Convention's entry into force in 1994.[7] A second communication was due on 15 April 1997—on 15 April 1998 for countries with so-called economies in transition.[8] The third communication is due on 30 November 2001.[9] In addition, Annex I parties have been required since 1996 to submit national inventories on an annual basis.[10]

In common with other multilateral environmental agreements, reporting under the Convention has often been late and incomplete. Only nine parties provided their second national communications on time.[11] By January 2000, however, 35 countries had satisfied this commitment, leaving only six to report.[12] These are all countries with economies in transition, which have had particular reporting difficulties owing to the collapse of their institutional structures in the 1990s. Likewise, only five Annex I parties met the deadline of 15 April 1999 for their annual GHG inventory—22 had reported by October 1999.[13]

Non-Annex I parties were required to submit their first national communication within three years of the Convention's entry into force for that country, although the least developed states were allowed to make their communication at their discretion. To date, 26 national communications have been received from non-

Annex I states, and 113 have yet to report.[14] According to the Convention, Annex I parties should bear the full cost of non-Annex I party reporting. While funding is formally arranged through the Global Environment Facility, developing countries also receive financial and technical support via alternative bilateral and multilateral channels, such as the US Country Study Program and the UN Institute for Training and Research (UNITAR).[15] However, there appear to be unresolved problems relating to the provision of such assistance. At the Fifth Conference of the Parties, the developing countries called for the provision of adequate financial resources, technical assistance and capacity building to help them collect data and to identify national emissions factors.[16]

In fact, reporting under the Convention is difficult for all parties, given that GHG emissions come from a large number of sources, most of which are not under government control. This makes it hard for parties to monitor emissions and to predict the impact of measures taken to reduce them. It would be impossible to measure directly emissions, at least from the many sources that are small, mobile or diffuse. Inventories are thus based on estimates calculated by multiplying activity data (for example the quantity of a certain type of automobile) by emissions factors (the volume of gas emitted by that car). Guidelines for preparing GHG inventories were published by the IPCC in 1995 and revised in 1996. All parties must compile their inventory according to these guidelines or a comparable national method.[17]

By adopting guidelines for preparation and reporting, the Convention attempts to ensure that all parties produce comparable inventories. But this is not easy, given that each country has a different institutional structure from which to collect data. Consequently, IPCC guidelines provide two or three alternative methods that range in complexity. States are encouraged to use the most sophisticated procedures and local data wherever possible, although simple methods and default emissions factors are provided. This system improves the accuracy of inventories but reduces transparency, especially when parties do not describe the method they are using. Moreover, it is reasonably accurate for carbon dioxide emissions from fossil fuel burning, but even the most sophisticated methods produce highly uncertain estimates for other emissions. The IPCC suggests a default uncertainty value of 10 percent for carbon dioxide emissions from the energy sector. Uncertainties of more than 60 percent are suggested for other sources and gases.[18] This could be a problem in the Protocol, since the uncertainties are larger than the required emissions cuts.[19]

Given that verification under the Convention rests on self-reporting, preliminary systems have evolved for reviewing the quality of information supplied by the parties. The Convention's Secretariat, based in Bonn, Germany, produces 'compilation and synthesis reports' for the Conference of the Parties and the Subsidiary Body for Implementation. These reports summarise the content of national communications, including GHG inventories.[20] The Secretariat also reports on the information contained in annual GHG inventories.[21] These reports serve to assess overall progress in meeting the aims of the Convention. The Secretariat does not attempt to check the data in national communications and inventories, but it does highlight late, incomplete or inconsistent reporting.

In addition, the parties have developed an 'in-depth review' procedure, co-ordinated by the Secretariat, to cover all aspects of national communications.[22] The objective is to:

> review in a facilitative, non-confrontational, open and transparent manner, the information contained in the communications from Annex I parties to ensure that the Conference of the Parties has accurate, consistent and relevant information at its disposal to assist it in carrying out its responsibilities.

The review is carried out by a team selected by the Secretariat from experts nominated by parties and inter-governmental organisations (IGOs). They assess national communications for accurate policy information and examine the transparency and methodology of the inventory. They conduct country visits to clarify aspects requiring further investigation, although (again) they verify neither the accuracy of the activity data and emissions factors, nor the overall verity of the inventory. A report is produced for each in-depth review and submitted to the Subsidiary Body for Implementation and the Subsidiary Body for Scientific and Technical Advice.

These review procedures identify problems in implementation by individual parties, but there is no system for responding to non-compliance. To date the Conference of the Parties and the Subsidiary Body for Implementation have only considered the performance of the parties as a whole in implementing the Convention. Article 13 provides for the establishment of a Multilateral Consultative Process (MCP), which parties can use to help resolve implementation problems. The terms of reference for the MCP were agreed in June 1998 and envisage an advisory function on technical and financial issues and on problems relating to compiling and communicating information.[23] However, the rules for determining

the composition of the standing body, which was to be the core of the process, have not been agreed. As a result, the MCP is not yet operational.

Although there is no formal system for dealing with non-compliance, the wide availability of progress reports makes informal public debate on national performance possible. Non-governmental organisations (NGOs) and IGOs have made great use of this documentation and frequently publish papers on the performance of individual countries.[24]

Additional verification needs under the Protocol

The Convention's existing processes and institutions will form the basis of a verification system for the Kyoto Protocol. These will need to be strengthened, though, so that compliance with new commitments under the Protocol—notably binding emission reduction and limitation commitments for Annex I parties outlined in Article 3—may be verified. A number of new procedures and institutions will be required to deal successfully with the following:

- provision of timely GHG inventories of the highest possible quality;
- tracking changes in the assigned amount held by each party;
- verifying inventory and assigned amount data;
- verifying that emissions reductions claimed under the mechanisms meet agreed criteria; and
- assessing compliance and dealing with non-compliance.

In theory these new systems and institutions will not have to be in place until the start of the first commitment period in 2008. But it makes sense to start 'learning by doing' immediately, and, besides, there is a provision in the Protocol for parties to show 'demonstrable progress' by 2005. Moreover, the CDM can start operating any time from 2000.

Provision of timely GHG inventories of the highest possible quality

Since self-reporting of inventories will continue to be the basis of the verification regime, capable national systems for estimating emissions and removals of GHGs are vital. Parties have agreed that inventories should be accurate, consistent, comparable, complete and transparent. Accordingly, Article 5.1 states that national systems for estimating emissions (and removals by sinks) must be in place by 2007 and that guidelines will be defined. Because every party has a different institutional

structure and approach to inventory compilation, these guidelines will not be prescriptive. But states have noted that 'common elements will be specified which are considered necessary to produce a high quality inventory, regardless of the approach or methodology used'.[25] These elements are likely to include both institutional and technical details.

It has been suggested that a good national monitoring system will consist of sound technical functions, management processes and institutional frameworks.[26] The former includes methods for data collection, handling and reporting and choice of emission factors. The management process covers documentation and planning, quality assurance and control procedures, as well as organisation and staffing—which should all be implemented so as to minimise the risk of error and inconsistencies in performing technical functions. Efficient management standards already exist and these could be adapted for emissions inventories.[27] The institutional framework should be clearly defined in order to improve the quality of monitoring activities and to establish an efficient management process.

The IPCC National Greenhouse Gas Inventories Programme is preparing a report on *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*—to be completed in mid-2000. (Good practice refers to the way in which the inventory is compiled and managed.) The report is likely to include advice on the choice of method, emission factors, activity data and quantifying uncertainties, and quality assurance/control procedures. The aim is to ensure that, whatever method is chosen to calculate emissions, uncertainties and bias are minimised, and the inventory is transparent. This will ensure that inventory estimates are of the best quality for assessing compliance.[28] At some point the guidance will probably be incorporated into guidelines for national systems and reporting.

With regard to reporting, Article 7 of the Protocol confirms that annual inventories and national communications submitted under the Convention will be the basis for verification of the Protocol. Parties to the Protocol, though, must incorporate in these submissions the 'necessary supplemental information' to permit compliance to be assessed. This will include information on assigned amounts and use of the mechanisms covered in the following sections of this chapter.

Parties have already begun strengthening reporting guidelines under the Convention in anticipation of the needs of the Protocol. In 1999, the Fifth Conference of the Parties adopted new guidelines for Annex I states reporting both annual inventories and national communications.[29] The objective is to improve reporting

and facilitate effective review of the information. Parties are still required to use IPCC guidelines to estimate emissions, but inventories must now be reported using a Common Reporting Format (CRF). Inventories must be filed in both hard and electronic form, along with a national report containing all inventories back to the base year, plus supporting background information. The report must also be published on the Internet or in hard copy.[30] The CRF aims to enhance the transparency, comparability, consistency, accuracy and completeness of inventories. The CRP will make it easier for the Secretariat and others to identify missing or inconsistent entries and to compare activity data and emissions factors among parties. These guidelines will be used on a trial basis between 2000 and 2002, although revisions may be made at the Seventh Conference of the Parties in 2001.

Similarly, the new guidelines for reporting Annex I national communications outline mandatory elements and the format in which data should be reported.[31] Parties will use these guidelines to compile their third national communication, due in 2001.

Parties have also started to tackle the problem of poor reporting by developing countries and states with economies in transition. The Fifth Conference of the Parties urged Annex II nations—essentially member states of the Paris-based Organization for Economic Cooperation and Development (OECD) states in 1992—to assist countries with economies in transition with technical aspects of preparing national communications. As a first step, Switzerland and UNITAR hosted a workshop in Geneva in late 1999 to discuss these nations' special needs.[32] With regard to developing states, the Fifth Conference of the Parties decided to establish a consultative group of experts on non-Annex I national communications, which will meet twice in 2000. The group will help identify non-Annex I parties' technical and financial needs, discern the difficulties they face, and facilitate the preparation of their national communications.

Tracking changes in the assigned amount held by each party

Assigned amounts provide the standard against which compliance with emissions reductions and limitation commitments will be assessed. A vital task over the next few years will be calculating, reporting and reviewing assigned amounts using base year data.

Article 3 states that parties can use human induced land-use change and forestry (LUCF) activities to meet their emissions reduction obligations. Parties have yet to

agree exactly which activities will be included and how they will be added to, or subtracted from, assigned amounts. This will be a crucial decision for the Sixth Conference of the Parties, as it will determine actual targets for Annex I states.

Once assigned amounts are calculated, systems will be needed at the national and international level to track changes due to transfers and acquisitions under the Kyoto mechanisms and to modifications in LUCF activities. The parties need to agree how to undertake 'accounting of assigned amounts'.[33] National registries will be required to account for transfers and acquisitions between parties, as well as transfers involving registered private entities that are taking part in the mechanisms. This will allow states to account for their own assigned amount and to report this alongside inventory data.[34] An international system could also be introduced to allow cross-checking of national information, which could work by linking national electronic registries via the Internet.[35] While this would provide publicly accessible, near real-time accounting of assigned amounts, it would be dependent on compatibility between national systems. Alternatively, an international registry system could be developed.

Verifying inventory and assigned amount data

Article 8 of the Protocol provides for a strengthened review process, consisting of annual assessments of national inventories and assigned amount data by expert teams, and a review of the less frequently submitted national communications. The aim is to 'provide a thorough and comprehensive technical assessment of all aspects of the implementation by a party of the Protocol'.

Article 8 gives expert review teams and the Secretariat critical roles in verifying the Protocol. Expert review teams will be obliged to report to the Conference of the Parties to the Convention, serving as the Meeting of the Parties to the Protocol (COP/MOP),[36] on each party's implementation of its obligations, identifying 'problems in, and factors influencing, the fulfilment of commitments'. The Secretariat is specifically tasked with listing the 'questions of implementation' raised by the expert reports for further consideration by the COP/MOP. These provisions will give the review a clear focus and ensure that the relevant bodies discuss problems. A potentially important component of the review is the 'adjustment process' outlined in Article 5.2. This states that, if inventories are not completed according to the 1996 IPCC guidelines, then appropriate adjustments may be applied. Parties need to decide on a number of issues relating to this

provision. For example, who decides whether adjustments are called for, how they are to be made and if they are appealable. In addition, it is unclear whether adjustment will save parties from being in non-compliance with Articles 5 and 7.

A major problem will be how best to use the limited time available for each review to sift through the huge volume of information that will be presented by each state. A second problem will be ensuring consistency in reviews, given that the same experts will not be able to assess all parties.

At the Fifth Conference of the Parties, guidelines were adopted for the review of Annex I states' inventories in anticipation of the Protocol.[37] They will be used for a trial period (2000–02) alongside the new reporting guidelines. National communication review guidelines also need to be developed.

According to the new guidelines, inventory review will comprise three stages: initial check; synthesis and assessment; and expert review of individual inventories.

The initial check will be performed by the Secretariat and will determine if the inventory is complete and in the correct format. The results will be posted on the UNFCCC website. The Secretariat will also carry out, in two stages, synthesis and assessment. The first stage will consist of compiling and comparing information across parties. In the second stage, the Secretariat, with the help of experts, will compare the data with previous years' submissions and, where feasible, with independent information. They will also examine states' use of good practice guidance and national self-verification or independent review in preparing their inventories. The aim is to highlight issues for further investigation by the expert review teams. The results of the synthesis and assessment will also be published on the UNFCCC website. Finally, the expert review teams will engage in a detailed examination of procedures and institutional arrangements used in preparation of inventories. Their report will be published by the UNFCCC in hard and electronic format. During the trial period, the teams will test three operating styles: desk studies and correspondence; a meeting in one location; and country visits.

Verifying that emissions reductions claimed under the mechanisms meet agreed criteria

To be credible, the CDM and JI projects, as well as the private entities that are participating in emissions trading, should be subject to rigorous procedures to verify that they produce real emissions reductions. Articles 6, 12 and 17 all state, therefore, that the parties must agree on verification procedures in the mechanisms. Systems will also be required to check that parties satisfy any additional rules.

A new type of verification regime looks likely to evolve under the mechanisms, with much of the responsibility devolved to operational entities, such as private sector consultants, NGOs, or government agencies. In emissions trading, for example, independent auditors may be responsible for verifying emissions inventories and certifying permits as valid.[38] Parties need to think about how this might work. Businesses interested in emissions trading have already started to consider how to monitor and verify their GHG inventories. For instance, BP–Amoco has commissioned an independent audit and assessment of its greenhouse gas accounting and reporting systems to support its internal emissions trading scheme.[39] BP–Amoco is also part of a larger partnership between NGOs and the private sector, which is aimed at developing an international protocol for measuring and reporting GHG emissions from business.[40]

Under the CDM and JI, an initial estimate of emissions reductions will probably be made as part of a project approval process. During the lifetime of the project, actual emissions should be monitored and reported. *Ex-post* verification will need to be conducted by an independent body, leading to certification of emission reductions (possibly by another entity). Verification and certification would probably take place annually.

A baseline scenario is required to measure and verify additional emissions reductions under a CDM or JI project.[41] This is a quantitative projection of emissions that would have occurred in the absence of the project. A key issue facing parties is how to establish this baseline. Under the experimental Activities Implemented Jointly phase, a new 'project specific' baseline has been created for each programme. This allows the developer to choose what externalities to include in the baseline scenario, and what value to allocate to them. Although this can allow the baseline to be tailored to individual circumstances, it also means that developers can inflate the baseline to generate a greater number of emissions reduction credits—a procedure known as 'gaming'. Project-specific baselines can also be hard to verify if reporting is not transparent.

Parties could limit gaming by providing clear rules on how to choose the assumptions in the baseline calculation. Furthermore, parties could insist on the use of standardised (benchmarked) input data. Default emissions values can be used for projects with broadly the same characteristics, operating under similar circumstances. The default value might be based on current practice in the host country, or, ideally, international best practice. It is unclear whether this approach provides

a less accurate baseline, but it does reduce the possibility of gaming and offers a standard for verifying baselines.[42]

Whatever methods are chosen, parties need to ensure that the baselines are transparent. Parameters and methods must be referenced and traceable, and a third party should be able to reconstruct the baseline. This might be enforced by implementing some kind of good practice guidance, such as that being developed by the IPCC for inventories.

Assessing compliance and dealing with non-compliance

Under the Convention, the multilateral consultative process should function in an advisory manner in order to deal with implementation problems. But parties agree that binding commitments in the Protocol demand a more supervisory approach to compliance.

Article 18 marks the need to create further procedures and mechanisms to determine and address non-compliance. No additional details are given, except that states must establish a list of consequences in the event of non-compliance, and that any procedures and mechanisms that entail binding ramifications must be adopted through an amendment to the Protocol. The latter is a potentially serious problem, since any amendment would have to be ratified by the parties.

A working group is currently considering what form this compliance procedure might take. One potential model—favoured by many parties in the run-up to Kyoto—is the Montreal Protocol's compliance system.[43] Certainly, the indications are that the two systems will have much in common. Parties agree that the compliance system should take a facilitative approach to non-compliance, given the uncertainties and difficulties they face in implementing the Protocol. But there is also a general consensus that provision should be made for an enforcement approach. It is still unclear, though, how these two functions will work. Some parties are suggesting that enforcement and facilitative approaches could be applied sequentially, with a facilitative approach during the commitment period. After the parties' final inventories and assigned amounts have been submitted and reviewed, states in non-compliance could have a 'grace period' to move into compliance—using the trading system, for example. An enforcement approach might then be applied to parties not in compliance. Other states have suggested that enforcement and facilitative approaches should be applied in parallel, either by two separate bodies or by different 'branches' of the same body.

Current recommendations for the list of consequences reflect both of these potential approaches and range from facilitating assistance to financial penalties. Much depends on the system's coverage, whether it deals solely with compliance with emissions reduction commitments or with implementation of all obligations under the Protocol. A key issue is whether the compliance body should be responsible for assessing parties' eligibility to take part in the mechanisms. This could depend on states being in compliance with their other commitments, especially those relating to monitoring and to reporting emissions and assigned amount transfers.

In any case, the question arises as to the relationship between the multilateral consultative process operating under the Convention and the Protocol's non-compliance procedure. Article 16 of the Protocol states that parties should consider the application of the MCP to the Protocol.

One other matter concerns who will be able to initiate non-compliance procedures. The Secretariat and the expert review teams are potential candidates: since they will be assessing the information submitted by parties they are likely to be in a good position to suspect, or even know, which ones are having compliance problems. This would follow the examples of the Montreal Protocol and the 1994 Second Sulphur Protocol of the Convention on Long-Range Transboundary Air Pollution. It would also be logical, as the Secretariat is already responsible for listing problems of implementation (identified in the review process) for consideration by the COP/MOP. Other non-state actors could, in effect, also trigger the procedure by communicating information to the Secretariat.[44] Parties may also have the right to initiate the system, although some states are suggesting that this should be screened in some way, or that only the COP/MOP should be able to trigger it.[45]

Conclusion

Given the large number and variety of sources of GHG emissions and the uncertainty with which they can be estimated, building a strong verification regime for the Kyoto Protocol represents a considerable challenge. Parties to the Climate Convention have put in place a number of building blocks for a verification system, including reporting and review mechanisms. The process is highly transparent, with national communications, reviews and reports being freely available on the UNFCCC website. But the current system is inadequate to meet the verification needs of the Protocol.

As the start of the first commitment period (in 2008) moves closer, the verification system will need to shift emphasis from a review of parties' overall progress to assessing individual state compliance. Eventually, the non-compliance body developed under Article 18 will control this. Significant progress was made in this respect at the Fifth Conference of the Parties, with the adoption of guidelines both for reporting Annex I parties' inventories and national communications and for the review of inventories. Further guidelines will be required for reporting assigned amount information, including transfers and acquisitions under Kyoto mechanisms and changes in carbon stores in the LUCF sector, as well as for the review process, including the method of applying adjustments to inventories, and how to review national communications.

Clearly, verifying the Kyoto Protocol is going to be a mammoth task, requiring significant resources. Parties have responded to this issue by emphasising the importance of self-verification and quality assurance/control mechanisms in national systems. The potential role of private sector consultants and auditors is also under discussion. Despite these possibilities the Secretariat's and the expert review teams' workloads will be heavy. A key question over coming years will be whether the current framework for verification can cope, and, if not, what alternative models should be considered.

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Endnotes

[1] The IPCC was set up in 1988 by the United Nations Environment Programme and the World Meteorological Organization to review the state of scientific knowledge on climate change.
[2] See Michael Grubb with Christiaan Vrolijk and Duncan Brack, *The Kyoto Protocol: A Guide and Assessment,* The Royal Institute of International Affairs, London, 1999, pp. 3–5, and Sebastian Oberthur and Hermann Ott, *The Kyoto Protocol: International Climate Policy for the 21st Century,* Ecologic, Berlin, 1999, pp. 3–10.
[3] It was formally adopted in New York a few weeks later.
[4] Although Annex I parties were encouraged to return emissions to 1990 levels by 2000.
[5] It is possible to remove greenhouse gases from the atmosphere into so-called sinks or reservoirs. These include components of natural ecosystems, such as plants and soils, and oceans and geological structures.
[6] For example, the US has an emissions reduction commitment of 93 percent of 1990 levels. This quantity multiplied by five will be its assigned amount for 2008–12.
[7] Convention Article 12.5.
[8] Decision 9/CP.2 in FCCC/CP/1996/15/Add.1, p. 16. According to the Convention, countries with economies in transition are: Belarus; Bulgaria; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Poland; Romania; Russian Federation; Slovakia; Slovenia; and Ukraine.
[9] FCCC/CP/1998/16/Add.1, p. 47.
[10] Decision 9/CP.2 in CP/1996/15/Add.1, p. 15.
[11] FCCC/CP/1998/11, p. 3.
[12] United Nations Convention for Climate Change, Bonn, www.unfccc.org.de.
[13] FCCC/SBI/1999/12, p. 5.
[14] United Nations Convention for Climate Change, Bonn, www.unfccc.org.de.
[15] FCCC/SBI/1999/11, p. 19.
[16] *Earth Negotiations Bulletin,* vol. 12, no. 123, 8 November 1999.
[17] Decision 4/CP.1 in FCCC/CP/1995/7/Add.1, p. 15.
[18] Table AI-1, from the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reporting Instruction, p. AI.4.
[19] This problem has been compounded by the basket approach, as this requires all gases to be converted into 'carbon dioxide equivalents'. The global warming potentials, which are used to convert emissions to a carbon dioxide standard, are themselves uncertain.
[20] For example, FCCC/CP/1998/11/Add.1 and FCCC/SBI/1999/11.
[21] For example, FCCC/SBI/1999/5.
[22] Decision 2/CP.1 in FCCC/CP/1995/7/Add.1, p. 9.
[23] FCCC/AGI3/1998/2 and Annex 2.
[24] For instance, Climate Action Network has produced a series of 'Independent NGO Evaluations of National Plans for Climate Change Mitigation'. The International Energy Agency and the Organization for Economic Cooperation and Development have produced surveys of 'Climate Change Policy Initiatives'.
[25] FCCC/SBSTA/1999/L.14, p. 4.
[26] Stephane Willems, *Key Features of Domestic Monitoring Systems under the Kyoto Protocol,* Organization for Economic Cooperation and Development, Paris, 1999, p. 4.
[27] Such as International Standards Organization management systems.
[28] Sal Emmanueal and Thomas Martinsen, IPCC special event, Fifth Conference of the Parties to the UNFCCC, October 1999.
[29] Decisions 3/CP.5 and 4/CP.5 in FCCC/CP/1999/6 Add.1, pp. 6–10.
[30] FCCC/SBSTA/1999/L.5, p. 12.
[31] FCCC/SBSTA/1999/CRP.4.
[32] FCCC/SBSTA/1999/CRP.4, p. 1.
[33] Article 7.3 of the Kyoto Protocol.
[34] Willems, p. 3.
[35] US and New Zealand presentation at the meeting of UNFCCC subsidiary bodies, June 1999, Bonn.

[36] This will be the Protocol's governing body.
[37] FCCC/CP/1999/L.11/Add.1.
[38] Ged Jones, *Creating an efficient certification and verification framework,* Lloyds Register Industry Division, London, 1999, p. 6.
[39] BP–Amoco Press Release, *BP Amoco Commissions Independent Audit and Verification of GHG emissions,* 25 June 1997.
[40] World Resources Institute Press Release, *Group Announces Collaboration to Build an Internationally Accepted Approach for Measuring and Reporting Business GHG,* 11 June 1999.
[41] Articles 6 and 12 demand that emissions reductions are *additional* to any that would have occurred in the absence of the project.
[42] Jane Ellis and Martina Bosi, *Options for Project Emission Baselines,* Information Paper, OECD and IAE, Paris, October 1999, pp. 35–43.
[43] Oberthur and Ott, p. 217.
[44] Oberthur and Ott, p. 221.
[45] Jake Werkesman, personal communication with the author.