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ARTICLE

The 1979 Convention on Long-Range Transboundary Air Pollution: Assessing its Effectiveness as a Multilateral Environmental Regime after 35 Years

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Abstract

There is no definitive approach to assessing the effectiveness of international environmental regimes. In order to explore the regime established by the 1979 Geneva Convention on Long-Range Transboundary Air Pollution this article broadly integrates the approach to effectiveness taken by Peter H. Sand in *The Effectiveness of International Environmental Agreements*, and Daniel Bodansky in *The Art and Craft of International Environmental Law*. The article finds that compliance, institutional, and normative effectiveness can be evaluated relatively confidently. An effectiveness assessment of the long-range transboundary air pollution (LRTAP) regime indicates that, on the whole, it has helped states to reach agreement on contentious issues and achieve results in air pollution reduction. However, it faces significant challenges with regard to participation, implementation procedures, empowerment of domestic stakeholders, and funding. The article provides an in-depth and up-to-date look at the LRTAP regime, including the most recent amendments and its relationship with European Union and international law.

Keywords: Long-range transboundary air pollution, Effectiveness, Compliance, Implementation, Participation, European Union

1. INTRODUCTION

November 2014 marked the 35th anniversary of the adoption of the 1979 Convention on Long-Range Transboundary Air Pollution (CLRTAP),[1] negotiated under the auspices of the United Nations Economic Commission for Europe (UNECE). This major regional

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1 Geneva (Switzerland), 13 Nov. 1979, in force 16 Mar. 1983, available at: http://www.unece.org/env/lrtap/lrtap_h1.html.

multilateral environmental agreement (MEA), with its eight Protocols, has evolved into a notable environmental regime.[2] The long-range transboundary air pollution (LRTAP) regime attempts to address a number of environmental and health problems caused by industrialization, agricultural modernization, and fossil fuel consumption.[3] This includes the effects of acidification, photochemical smog, ground-level ozone, eutrophication, fine particulate matter ($PM_{2.5}$, particularly black carbon, a short-lived climate forcer), and contamination by toxic chemicals.

Scholarly opinions on the effectiveness of the LRTAP regime have varied.[4] This article has three major objectives: to give an overview of the regime, to assess its effectiveness from the standpoint of current thinking in international environmental law, and to think critically about how the effectiveness of regimes is assessed. The current effectiveness discourse is based on interconnected yet separate groupings: legal, normative, problem-solving, institutional, political, and economic effectiveness.[5] Given this fragmentation, it has been argued that the positivist approach to effectiveness is the most suitable, with normative considerations less relevant, and approaches based on quantitative methods suffering from reductionism.[6] Two decades ago, Sand's criteria for effectiveness focused

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2 Regime is understood as the '*norms, rules, and procedures agreed to in order to regulate an issue-area*', as per E.B. Haas, 'Why Collaborate?: Issue-Linkage and International Regimes Source' (1980) 32(3) *World Politics*, pp. 357–405, at 358.

3 The CLRTAP defines air pollution as 'the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment'. LRTAP is 'air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources': Art. 1(a) and (b) CLRTAP.

4 M.A. Levy, 'International Co-operation to Combat Acid Rain', in H.O. Bergesen & G. Parmann (eds), *Green Globe Yearbook of International Co-operation on Environment and Development 1995* (Oxford University Press, 1995), pp. 59–68, at 64; D. Munton et al., 'Acid Rain in Europe and North America', in O.R. Young (ed.), *The Effectiveness of International Environmental Regimes: Causal Connections and Behavioral Mechanisms* (The MIT Press, 1999), pp. 155–248, at 235; J. Wettestad, *Designing Effective Environmental Regimes: The Key Conditions* (Edward Elgar, 1999), at p. 95; J. Wettestad, 'The Convention on Long-Range Transboundary Air Pollution (CLRTAP)', in E.M. Miles et al. (eds), *Environmental Regime Effectiveness: Confronting Theory with Evidence* (The MIT Press, 2002), pp. 197–222, at 197; P.W. Birnie, A. Boyle & C. Redgwell, *International Law and the Environment* (Oxford University Press, 2009), at p. 344; P.N. Okowa, 'The Legal Framework for the Protection of the Environment Against Transboundary Air Pollution: A Reflection on Customary and Treaty Law', in H. Post (ed.), *The Protection of Ambient Air in International and European Law* (Eleven International, 2009), pp. 53–71, at 71; J. Wettestad, 'The Improving Effectiveness of CLRTAP: Due to Clever Design?', in R. Lidskog & G. Sundqvist (eds), *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction* (The MIT Press, 2011), pp. 39–60, at 49; P. Sands & J. Peel, *Principles of International Environmental Law*, 3rd edn (Cambridge University Press, 2012), at pp. 246–7.

5 O.R. Young & M.A. Levy, 'The Effectiveness of International Environmental Regimes', in Young (ed.), ibid., pp. 1–32; see also M.A. Mehling, 'Betwixt Scylla and Charybdis: The Concept of Effectiveness in International Environmental Law' (2002) 13 *Finnish Yearbook of International Law*, pp. 129–82; C. McGrath, *Does Environmental Law Really Work? How to Evaluate the Effectiveness of an Environmental Legal System* (Lambert Academic, 2010).

6 See W.B. Chambers, 'Towards an Improved Understanding of Legal Effectiveness of International Environmental Treaties' (2003–04) 16 *Georgetown International Environmental Law Review*, pp. 501–32, at 518. For empirical and quantitative approaches see Miles et al. (eds), n. 4 above; and H. Breitmeier, A. Underdal & O. Young, 'The Effectiveness of International Environmental Regimes: Comparing and Contrasting Findings from Quantitative Research' (2011) 13 *International Studies Review*, pp. 579–605. For an exploration of the counterfactual scenario using the LRTAP regime as a case study, see C. Helm & D. Sprinz, 'Measuring the Effectiveness of International Environmental Regimes' (2000) 14(5) *Journal of*

on the treaty objectives and their achievement, the rules and processes concerning state participation, implementation, information sharing, the provisions for operation, review and adjustment, and codification programming (including both formal and informal instruments).[7] The conceptual approach has subsequently been broadened. Bodansky has identified four major determining factors of effectiveness: (i) the nature of the problem; (ii) the international political system; (iii) the characteristics of the countries involved; and (iv) the design of the regime. As Bodansky notes, there is a belief that regime design (the 'institutional and legal characteristics' of a regime) plays an important role in determining effectiveness.[8] Bodansky cautions, however, that in light of 'the extent that states trade off different design elements against one another, we cannot analyze these elements in isolation; we need to consider them as a whole'.[9] The current inability to resolve how the trade-offs should be made, with each problem having its own particular dynamics and the end product reflecting a necessary compromise, is suggestive to Bodansky of international environmental law being 'an art and a craft', rather than a panacea.[10] The respective approaches of Sand and Bodansky overlap considerably. This article merges the two to analyze the effectiveness of the LRTAP regime and test the robustness of Sand's and Bodansky's criteria, focusing on three main areas.[11]

Legal effectiveness

Legal effectiveness relates to compliance and to what is being complied with. High levels of compliance are indicative of behavioural change and, by association, effectiveness.[12] This approach can engage with ideas such as ambitiousness, treaty content, the environmental outcomes, and even the 'spirit' of the instrument.[13] Legally precise rules reduce ambiguity and highlight cases of non-compliance more easily, while the types of commitment (or regulatory framework) will exert a strong influence over whether the problem is resolved. Related to the issue of content, the legality of the instruments also

Conflict Resolution, pp. 630–52, at 644. This approach has been widely critiqued: see McGrath, n. 5 above, at pp. 45–54; G. Shaffer & T. Ginsburg, 'The Empirical Turn in International Legal Scholarship' (2012) 106(1) *American Journal of International Law*, pp. 1–46, at 11.

7 P.H. Sand (ed.), *The Effectiveness of International Environmental Agreements: A Survey of Existing Legal Instruments* (Grotius, 1992), at pp. 4–7. This was part of the preparatory work for the United Nations 1992 Rio Conference on Environment and Development (UNCED), undertaken by the UNCED Secretariat at the request of Working Group III of the Preparatory Committee, and followed the evaluation criteria set out in Decision 3/25 (A/46/48, vol. II, Annex I and II), available at: http://www.un.org/ga/search/view_doc.asp?symbol = A/46/48%28Vol.II%29%28SUPP%29.

8 D. Bodansky, *The Art and Craft of International Environmental Law* (Harvard University Press, 2011), at pp. 262–4.

9 Ibid., at p. 271. Here, Bodansky draws on S. Barrett, *Environment and Statecraft: The Strategy of Environmental Treaty-Making* (Oxford University Press, 2003); and K. Raustiala, 'Form and Substance in International Agreements' (2005) 99(3) *American Journal of International Law*, pp. 581–614.

10 Bodansky, n. 8 above, at p. 271. See also O.R. Young, 'Effectiveness of International Environmental Regimes: Existing Knowledge, Cutting-edge Themes, and Research Strategies' (2011) 108(50) *Proceedings of the National Academy of Sciences of the United States of America*, pp. 19853–60, at 19857–8.

11 Bodansky, n. 8 above, at pp. 264–5; and Sand, n. 7 above. This article uses the organizing labels of legal, institutional, and normative effectiveness in Young & Levy, n. 5 above.

12 See Chambers, n. 6 above, at p. 504.

13 E.B. Weiss, 'Understanding Compliance with International Environmental Agreements: The Baker's Dozen Myths' (1998–99) 32 *University of Richmond Law Review*, pp. 1555–89, at 1563. See also Chambers, n. 6 above.

contributes to effectiveness. Binding instruments are generally considered the most effective. However, soft law instruments have political and legal significance, allowing states to participate in times of uncertainty (lack of political agreement, for example), thereby increasing the potential for behavioural change.[14]

Institutional effectiveness

Institutional effectiveness focuses on the ability of the regime to create a cooperative approach, which promotes and assists states in reaching compliance.[15] Lack of cooperation, and inadequate means to increase compliance through rules, procedures, and institutions for reporting, monitoring and review, dispute settlement, and non-compliance, will ultimately undermine effectiveness.[16]

Normative effectiveness

The normative approach is an assessment of the regime's achievement in, or reflection of, normative principles such as justice, fairness and participation.[17] Procedural justice is viewed as the basis for legitimacy, which should produce greater compliance.[18] Such an analysis can consider the legitimacy and fairness of the rules concerning participation and decision making, the participation of all the relevant states, the assignment of implementation responsibilities, the degree of burden sharing, and financial assistance.[19] Included in this is the extent to which the regime empowers domestic supporters through, for example, a role in decision making or the policy process. This is a way of increasing legitimacy, improving the quality of decisions, and achieving a greater degree of consensus.[20]

2. EXAMINING THE LEGAL EFFECTIVENESS OF THE LRTAP REGIME

2.1. *The Commitments and Compliance*

During the negotiations for the CLRTAP, polluting states staunchly opposed the sulphur dioxide (SO_2) reduction targets that were needed to control acid rain.[21]

14 Bodansky, n. 8 above, at pp. 156 and 264; see J. Friedrich, *International Environmental "Soft Law": The Functions and Limits of Nonbinding Instruments in International Environmental Governance and Law* (Springer, 2013).

15 Bodansky, ibid., at p. 265. See W.J. Aceves, 'Institutionalist Theory and International Legal Scholarship' (1997) 12 *American University International Law Review*, pp. 227–66, at 240–56.

16 Bodansky, ibid. See G. Ulfstein (ed.), *Making Treaties Work: Human Rights, Environment and Arms Control* (Cambridge University Press, 2007); and A.E. Boyle, 'Saving the World? Implementation and Enforcement of International Environmental Law through International Institutions' (1991) 3 *Journal of Environmental Law*, pp. 229–46.

17 Young & Levy, n. 5 above, at p. 5.

18 T.R. Tyler, *Why People Obey the Law* (Princeton University Press, 2006), at p. 272; Chambers, n. 6 above, at p. 512.

19 Bodansky, n. 8 above, pp. 264–5.

20 Ibid., at p. 128.

21 E.g., the United Kingdom (UK) and West Germany; J. McCormick, *Acid Earth: The Global Threat of Acid Pollution* (Earthscan, 1990), at p. 76.

The compromise reached to ensure their participation resulted in a 'loose' framework convention[22] that, as Rosencranz noted, contained 'no numerical goals, limits, timetables, abatement measures or enforcement provisions'.[23] Instead, the Convention laid out the procedural framework, with significant provisions on 'notification and consultation, research, use of control technology, monitoring of pollutants and rainfall'.[24] In Article 2, the contracting parties agreed in vague and flexible language that 'taking due account of the facts and problems involved', they were 'determined to protect man and his environment against air pollution and shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution'.[25]

As a significant 'first step' towards firm obligations to control and reduce air pollution and LRTAP,[26] the majority of the original parties have adhered to the vague general obligation expressed in Article 2 – but assessing compliance poses some difficult analytical problems. Ultimately, the successful adoption of the Protocols has determined the significance and effectiveness of the Convention.[27] The Protocols are characterized by good levels of compliance (see Table 1 in the Appendix to this article).[28] From a simple compliance perspective, the regime is effective because the contracting parties in general have fulfilled their commitments, bar a few cases of non-compliance concerning data reporting and the reduction of individual pollutants. The commitments on nitrogen oxide (NO_X), volatile organic compounds (VOCs), and persistent organic pollutants (POPs) have proved difficult for some states to achieve.[29] The Protocols were recently amended; this is addressed in Section 2.4.

Implementation and the importance of the European Union

European Union (EU) air pollution law was partly adopted to fulfil the commitments under the LRTAP regime.[30] The EU (formerly the European (Economic) Community

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22 J. Wettestad, 'The 1999 Multi-Pollutant Protocol: A Neglected Break-Through in Solving Europe's Air Pollution Problems?', in O.S. Stokke & O.B. Thommessen (eds), *Yearbook of International Co-operation on Environment and Development 2001–02* (Earthscan, 2001), pp. 35–41, at 35.

23 A. Rosencranz, 'The ECE Convention of 1979 on Long-Range Transboundary Air Pollution' (1981) 75(4) *American Journal of International Law*, pp. 975–82, at 980; see also J. Brunnée, *Acid Rain and Ozone Layer Depletion: International Law and Regulation* (Transnational, 1988), at pp. 177–80; L. Gündling, 'Multi-lateral Co-operation of States under the ECE Convention on Long-range Transboundary Air Pollution', in C. Flinterman, B. Kwiatkowska & J.G. Lammers (eds), *Transboundary Air Pollution* (Martinus Nijhoff, 1986), pp. 19–32, at 22; G. Wetstone & A. Rosencranz, *Acid Rain in Europe and North America: National Responses to an International Problem* (Environmental Law Institute, 1983), pp. 140–3.

24 Rosencranz, ibid., at p. 977; Sands & Peel, n. 4 above, at p. 247.

25 Art. 2 CLRTAP.

26 T.A. Heywood, 'Environmental Modification: Convention on Long-Range Transboundary Air Pollution' (1980) 21 *Harvard International Law Journal*, pp. 536–40, at 536, citing UN Doc. ECE/HLM.1/R.1 (1979), reprinted in (1979) 18 *International Legal Materials* 1442.

27 Ibid., at p. 540; G. Wetstone & A. Rosencranz, 'Transboundary Air Pollution: The Search for an International Response' (1984) 8 *Harvard Environmental Law Review*, pp. 89–138, at 107.

28 J. Wettestad, 'Acid Lessons? Assessing and Explaining LRTAP Implementation and Effectiveness', Working Paper 96-18 (International Institute for Applied Systems Analysis, 1996), at p. 63.

29 In the case of NO_X, this is because of its diffuse origin (road transport and coastal/inland water transport).

30 See J.H. Jans & H.B. Vedder, *European Environmental Law After Lisbon* (Europa Law, 2012), pp. 419–28, at 419.

(EEC/EC)) acceded to the majority of the Protocols, but lacked the required support to approve the 1985 Sulphur Protocol I[31] and the 1991 VOCs Protocol.[32] After the 1992 Maastricht Treaty,[33] EU policy on the environment became the driving force in the internal EU context, with the LRTAP instruments supplementing this process.

Law and policy relevant to LRTAP did exist in the EU prior to the adoption of the CLRTAP in 1979[34] and, during the period 1980 to 1992, the EU legislated on a broad range of pollutants, with a focus on pollution sources.[35] Two Directives from this period were specifically linked to the LRTAP regime: Directive 84/360/EEC on the Combating of Air Pollution from Industrial Plants (Air Framework Directive),[36] which created emission limit values for new plants, and Directive 88/609/EEC on the Limitation of Emissions of certain Pollutants into the Air from Large Combustion Plants (Large Combustion Plants Directive),[37] which set reduction targets for existing plants. The decentralized approach taken in these Directives was in keeping with the 1985 Sulphur Protocol I,[38] and was a progenitor to national emissions ceilings.[39] After the major milestone of Directive 96/62/EC on Ambient Air Quality Assessment and Management (Air Quality Framework Directive),[40] there was a notable growth in EU air pollution legislation. Four daughter Directives to the Air Quality Framework Directive created limit values and target values for a range of pollutants (1999–2004),[41] and Directive 2001/81/EC established National Emission Ceilings for Certain Atmospheric Pollutants.[42] In 2001, the Commission launched the Clean Air for Europe (CAFE) Programme,[43] which produced a Thematic Strategy on Air Pollution.[44]

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31 Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, Helsinki (Finland), 8 July 1985, in force 2 Sept. 1987, available at: http://www.unece.org/env/lrtap/sulf_h1.html.

32 Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes, Geneva (Switzerland), 18 Nov. 1991, in force 29 Sept. 1997, available at: http://www.unece.org/env/lrtap/vola_h1.html.

33 Treaty on European Union, Maastricht (Netherlands), 7 Feb. 1992, in force 1 Nov. 1993, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:11992M/TXT.

34 Beginning with Directive 70/220/EEC on the Approximation of the Laws of the Member States relating to Measures to be taken against Air Pollution by Gases from Positive-Ignition Engines of Motor Vehicles [1970] OJ L 76/1. See the Directives listed at: http://ec.europa.eu/enterprise/sectors/automotive/documents/directives/directive-70-220-eec_en.htm.

35 For a summary see S. Heise, 'The Regulatory Approach of the EEC to Air Quality' (1990) 93 *The Science of the Total Environment*, pp. 81–94. See also http://ec.europa.eu/environment/air/legis.htm.

36 [1984] OJ L 188/20.

37 [1988] OJ L 336/1.

38 N. 31 above.

39 See M. Eames, 'The Large Combustion Plant Directive (88/609/EEC): An Effective Instrument for SO_2 Pollution Abatement?', in M. Glachant (ed.), *Implementing European Environmental Policy: The Impacts of Directives in the Member States* (Edward Elgar, 2001), pp. 59–98.

40 [1996] OJ L 296/55; see J. Wettestad, 'The EU Air Quality Framework Directive: Shaped and Saved by Interaction?', in S. Oberthür & T. Gehring (eds), *Institutional Interaction in Global Environmental Governance: Synergy and Conflict among International and EU Policies* (The MIT Press, 2006), pp. 285–306, at 285.

41 See the Directives listed at: http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm.

42 [2001] OJ L 309/22.

43 COM(2001)0245 final.

44 COM(2005)446 final, 21 Sept. 2005.

Consistent with this strategy was Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe,[45] and Directive 2008/1/EC concerning Integrated Pollution Prevention and Control (IPPC Directive).[46]

EU law has certainly gone beyond the boundaries of the LRTAP regime, but its developments still reflect the spirit of the regime, particularly the 1999 Gothenburg Protocol[47] in the recent period.[48] There is a significant degree of overlap and linkage between the EU and the LRTAP regime in terms of the institutions, participating states, the actors involved, and the norms and rules.[49] The latter still has a significant advantage in terms of its broader international membership.[50] Nonetheless, the EU has made substantial contributions to the effectiveness of the LRTAP regime.

2.2. *The Use of Binding/Non-binding Instruments*

Non-binding instruments played a key role in the regime's early formation. For example, Sweden and a group of like-minded states agreed to reduce their sulphur emissions by 30% (the '30% Club') in the Declaration on Acid Rain 1984.[51] Motivated by the slow progress at the international level and their desire to move forward on the effects of acid rain, the 30% Club gained political leverage and shamed uncooperative states. It significantly influenced the development of the 1985 Sulphur Protocol I,[52] which replicated the 30% commitment.[53] However, when a similar approach was taken four years later with the Sofia Declaration on 30% Reduction of NO_X Emissions,[54] adopted concurrently with the 1988 NO_X Protocol,[55] the limitations of non-binding instruments became apparent. Only three of the 12 states that adopted the Sofia Declaration achieved the 30% reduction in NO_X emissions by 1998, and the Declaration had little effect on NO_X reductions. Furthermore, it did not influence the regime's implementation strategies, which were advancing towards national emissions ceilings (NECs) by the early 1990s and no longer required generic across-the-board reductions for NO_X.[56] The difference in

45 [2008] OJ L 152/1. This replaced Directive 96/62/EC and incorporated the four daughter Directives.

46 (Codified version) [2008] OJ L 24/8.

47 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, Gothenburg (Sweden), 30 Nov. 1999, in force 15 May 2005, available at: http://www.unece.org/env/lrtap/multi_h1.html.

48 See Jans & Vedder, n. 30 above, at p. 423; C. Ågren, 'The Role and Views of Environmental Organizations', in J. Sliggers & W. Kakebeeke (eds), *Clearing the Air: 25 Years of the Convention on Long-range Transboundary Air Pollution* (UNECE, 2004), pp. 133–48, at 137.

49 H. Selin & S.D. VanDeever, 'Institutional Linkages and European Air Pollution Politics', in Lidskog & Sundqvist, n. 4 above, pp. 61–91, at pp. 61–7.

50 Ågren, n. 48 above.

51 Canada–Europe Ministerial Conference on Acid Rain, Ottawa (Canada), 21 Mar. 1984, (1984) 23 *International Legal Materials* 662.

52 N. 31 above.

53 See Brunnée, n. 23 above, at pp. 180–82; McCormick, n. 21 above, at pp. 79–80.

54 Sofia (Bulgaria), 31 Oct. 1988.

55 Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes, Sofia (Bulgaria), 31 Oct. 1988, in force 14 Feb. 1991, available at: http://www.unece.org/env/lrtap/nitr_h1.html.

56 J.B. Skjærseth, O.S. Stokke & J. Wettestad, 'Soft Law, Hard Law, and Effective Implementation of International Environmental Norms' (2006) 6 *Global Environmental Politics*, pp. 104–20, at 109–11. See also J. Wettestad, 'Participation in NO_X Policy-Making and Implementation in the Netherlands,

impact between the Declaration on Acid Rain and the Declaration on 30% Reduction of NO_X Emissions may well be explained by their different origins. The former was an attempt led by Scandinavian states to move the regime towards binding commitments, whereas the latter was heavily backed by non-governmental organizations (NGOs). This may explain why state incentives to comply were low.[57]

In terms of effectiveness, the LRTAP regime conforms with Bodansky's assertion that non-binding instruments tend to be used at regime formation, and can contribute to 'learning by doing'.[58] However, there is evidently a trade-off between legality and participation. As the regime has evolved, binding instruments have produced the more sophisticated elements (NECs, for example). EU law has also firmed up the LRTAP commitments, for the EU Member States at least. Contrasted to this is the lack of participation by some of the countries of Eastern Europe, the Caucasus and Central Asia (EECCA), which may be better served by soft law instruments. These could maintain the regime's profile and provide the states with political leverage to gain financial and technical support from the advanced economies. To some extent, this is now occurring through the establishment of the EECCA Coordinating Group.[59] Each case is singular and involves specific trade-offs, which makes it extremely problematic to evaluate how effectively a regime uses non-binding instruments, or whether the binding/non-binding ratio is optimal. Nevertheless, it would appear that, on balance, the regime has benefited from the use of binding instruments, although there is scope to use non-binding instruments more effectively to foster participation in the regime.

2.3. *The Precision of the Rules*

The Convention and its Protocols moved from vagueness to precision as the regime matured. The Convention's substantive provisions are mandatory, yet represent general principles as opposed to firm commitments as a result of the presence of qualifying clauses and soft law expressions. This generates vagueness: it is difficult to ascertain specific cases of non-compliance.[60] However, imprecision is also an asset, for it provides flexibility and facilitates participation in the Convention process. From this perspective, the Convention arguably is effective not *despite* but *because* of its vagueness.[61]

The Protocols contain precise rules and fewer qualifying expressions. The 30% Club viewed binding commitments as providing the best outcome for the

UK, and Norway: Different Approaches but Similar Results?', in D.G. Victor, K. Raustiala & E. Skolnikoff (eds), *The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice* (The MIT Press, 1998), pp. 381–429.

57 Levy, n. 4 above, at p. 60.

58 Bodansky, n. 8 above, at p. 264.

59 Report of the 1st session of the Coordinating Group on Promotion of Actions towards Implementation of the CLRTAP in EECCA, Working Group of Strategies and Review, 48th Session, 11–15 Apr. 2011, Geneva (Switzerland), Informal Doc. No. 21.

60 See Gündling, n. 23 above; Brunnée, n. 23 above, at pp. 175–85.

61 See the conclusions of P.H. Sand, 'Regional Approaches to Transboundary Air Pollution', in J.L. Helm (ed.), *Energy: Production, Consumption, and Consequences* (National Academy Press, 1990), pp. 246–64, at 257.

environment. In Article 2 of the 1985 Sulphur Protocol I[62] states agreed to reduce 'national annual sulphur emissions or their transboundary fluxes by at least 30 per cent' of 1980 levels.[63] The shift to firm reduction commitments raised the stakes and resulted in parties deciding not to accede to the Protocol, including a number of key states such as Poland, Spain, the United Kingdom (UK), the United States (US), and Yugoslavia. However, although legally precise, scholars have questioned the Protocol's real impact. It has been suggested that the 30% target was achieved primarily through de-industrialization and changes in energy policy unrelated to the parties' implementation efforts.[64]

Subsequent Protocols developed specification standards in the form of recommendatory Annexes. These became progressively mandatory and stringent in nature. The regime has attempted to prioritize precision over vagueness but, inevitably, flexible standards have been deployed when negotiating parties could not agree on firm rules. Yet, overall, greater precision has increased effectiveness by reducing uncertainty and making cases of non-compliance more readily observable.[65] The regime conforms to the idea of trade-offs, with a core group prepared to move forward on emissions reductions even though a sizeable number of states may not ratify the Protocols. This may be a better outcome for the environment than the alternative – namely the possibility that no international standards are adopted.

The regime adopts a cautious approach towards the application of international environmental law principles to LRTAP. The Trail Smelter Arbitration is a precedent;[66] the emergence of the 'no harm' principle contained in Principle 21 of the Stockholm Declaration 1972[67] had a clear influence (repeated in the CLRTAP Preamble), but more recent principles feature less prominently. The principle of common but differentiated responsibilities[68] and the concept of sustainable

62 N. 31 above.

63 The participation of the USSR was only secured with the inclusion of 'transboundary fluxes', as the majority of its emissions did not affect neighbouring countries because of the 'prevailing westerly winds': McCormick, n. 21 above, at p. 80.

64 E.J. Ringquist & T. Kostadinova, 'Assessing the Effectiveness of International Environmental Agreements: The Case of the 1985 Helsinki Protocol' (2005) 49 *American Journal of Political Science*, pp. 86–102, at 99; Birnie, Boyle & Redgwell, n. 4 above, pp. 348–49; L. Björkbom, 'Thoughts about the Dynamics behind the Process: The Role of Externalities', in Sliggers & Kakebeeke, n. 48 above, pp. 20–4, at 24.

65 See D. Bodansky, 'Rules vs. Standards in International Environmental Law' (2004) 98 *Proceedings of the Annual Meeting* (*American Society of International Law*), pp. 275–80, at 277.

66 *Trail Smelter Arbitration (United States* v. *Canada)*, (1941) 3 *Reports of International Arbitration Awards* 1905, reprinted in (1941) 35 *American Journal of International Law*, pp. 684–736, at 716. See R.M. Bratspies & R.A. Miller (eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press, 2006).

67 Declaration of the United Nations Conference on the Human Environment, Stockholm (Sweden), 16 June 1972, (1972) 11 *International Legal Materials,* pp. 1416–20. See L.B. Sohn, 'The Stockholm Declaration on the Human Environment' (1973) 14 *Harvard International Law Journal*, pp. 423–515. The 'no harm' principle was further strengthened by Principle 2, Rio Declaration on Environment and Development, UNCED, Rio de Janeiro (Brazil), 3–14 June 1992, UN Doc. A/CONF.151/26/Rev.1 (Vol. I), 14 June 1992, available at: http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.

68 Rio Declaration, ibid., Principle 7. A weaker version of this principle is included, however, in the form of differentiated responsibilities for the economies in transition (EIT) countries: see F. Biermann, *Saving*

development[69] are under-represented in the legal agreements. The provisions on information exchange and consultation notwithstanding, formal obligations to undertake environmental impact assessments are absent.[70] The regime has incorporated precautionary approaches in the Preambles to the Protocols from 1994 onwards.[71] Because the science is well established for the specified pollutants, scientific uncertainty is now rarely cited as a reason for delaying action on LRTAP.[72]

Environmental principles mostly emerged after the CLRTAP was adopted. Later Protocols failed to integrate them substantially. This results in a significant degree of ambiguity concerning their role, and influences implementation strategies. Nonetheless, the regime has been relatively successful in using precise rules and a narrow understanding of environmental principles. However, it is argued that the incorporation of the remaining environmental principles would reduce ambiguity and therefore increase effectiveness.

2.4. *Implementation Strategies*

The LRTAP regime has developed a firm basis in command-and-control techniques.[73] In the 1979 Convention, states could only agree on a generic performance standard for national control measures based on the concept of best available technology economically feasible (the BATEF standard).[74] The 30% reduction target applicable to all states in the 1985 Sulphur Protocol I[75] was considered too inflexible to achieve higher sulphur emissions reductions, although the target was achieved.[76] Technology-specific and environmental quality requirements were necessary, but politically difficult to achieve. Signatory states needed to balance sovereignty concerns and the accommodation of national industries and interests with the need for a level playing field and a greater focus on environmental vulnerability. The argument shifted in favour of standardization and environmental quality, but the tension has never been fully resolved.

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the Atmosphere: International Law, Developing Countries and Air Pollution (Peter Lang, 1995), at pp. 38–40.

69 Mentioned only in the Preamble to the Protocol on Further Reduction of Sulphur Emissions, Oslo (Norway), 14 June 1994, in force 5 Aug. 1998 (1994 Sulphur Protocol II), available at: http://www.unece.org/env/lrtap/fsulf_h1.html.

70 According to L.A. Kimball ('Treaty Implementation: Scientific and Technical Advice Enters a New Stage', American Society of International Law Studies in Transnational Legal Policy No. 28 (ASIL, 1996), at p. 246) Art. 8(b) CLRTAP is 'a form of EIA notification'. However, the exact parameters of the obligation to consult were never defined. See Heywood, n. 26 above, at p. 539; Rosencranz, n. 23 above, at p. 977; and Gündling, n. 23 above, at p. 24.

71 Rio Declaration, n. 67 above, Principle 15.

72 On the political uses of science, see C.C. Parks, *Acid Rain: Rhetoric and Reality* (Routledge, 2013). It has been estimated that there are 'about 3000 anthropogenic air pollutants', but only a few hundred have been adequately studied: J. Fenger, 'Air Pollution in the Last 50 Years – From Local to Global' (2009) 43 *Atmospheric Environment*, pp. 13–22, at 16.

73 There are three major types of command-and-control: specification standards (e.g. requiring the use of a particular technology), performance standards (e.g. national emissions ceilings), and environmental quality standards concerned with environmental vulnerability: see Bodansky, n. 8 above, pp. 75–80.

74 Arts 6–9 CLRTAP.

75 N. 31 above.

76 Sands and Peel, n. 4 above, at p. 249.

The 1988 NO_X Protocol[77] included the 'critical loads' concept, whereby European areas are given a 'quantitative estimate of the exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge'.[78] The 1994 Sulphur Protocol II[79] and the 1999 Gothenburg Protocol[80] integrated these environmental quality standards and introduced a general commitment not to exceed critical loads in the long term.[81] Critical loads are applied to the management of acidity and nutrient nitrogen (sulphur and nitrogen). The 'critical levels' concept was also developed. This focuses on the health and environmental effects of exposure to pollutant concentrations in the atmosphere, an approach used for ground-level ozone, particulate matter, and ammonia.[82] For the remaining pollutants, the regime has used traditional approaches of bans, phase-outs, limits, and restricted use, mainly as a result of the availability of alternatives.[83]

Haas and McCabe argue that the critical loads approach was 'virtually revolutionary in diplomacy',[84] because it attempted to assign national targets according to environmental vulnerability. The translation into policy occurred through integrated assessment models, such as the Regional Acidification Information System (RAINS) models.[85] The models were developed in close cooperation with scientists and policy makers, and had 'considerable credibility'.[86] Institutional support through workshops of the Working Group on Strategies, together with the use of three models, fostered respect for the process and contributed to an impression of flexibility.[87]

However, although RAINS modelled least cost-reduction scenarios, and the 5% most sensitive areas in each grid of the critical loads map were excluded from the reduction targets on the ground of costs,[88] the states negotiated a weaker general emissions reduction target in the 1994 Sulphur Protocol II, again citing costs.

77 N. 55 above.

78 Ibid., Art. 1(7).

79 N. 69 above.

80 N. 47 above.

81 1994 Sulphur Protocol II, n. 69 above, Art. 2(1). See K.R. Bull, 'Critical Loads – Possibilities and Constraints' (1995) 85(1) *Water, Air and Soil Pollution*, pp. 201–12.

82 1994 Sulphur Protocol II, ibid., Art. 1(9). The World Health Organization (WHO) Air Quality Guidelines influenced the determination of these levels: for the most recent version see 'WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide: Global Update 2005 – Summary of Risk Assessment', available at: http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg/en.

83 See Fenger (n. 72 above, at p. 16) for the problems that arise using the substitution approach.

84 P.M. Haas and D. McCabe, 'Amplifiers and Dampeners: International Institutions and Social Learning in the Management of Global Environmental Risks', in W.C. Clark (ed.), *Learning to Manage Global Environment Risks, Volume 1: Comparative History of Social Responses to Climate Change, Ozone Depletion, and Acid Rain* (The MIT Press, 2001), pp. 323–48, at 327.

85 J. Alcamo et al. (eds), *The RAINS Model of Acidification: Science and Strategies in Europe* (Kluwer, 1990); A. Patt, 'Analytic Frameworks and Politics: The Case of Acid Rain in Europe', ENRP Discussion Paper E-98-20, (Harvard, 1998), at p. 9; W. Tuinstra, L. Hordijk & M. Amann, 'Using Computer Models in International Negotiations: The Case of Acidification in Europe' (1999) 41(9) *Environment*, pp. 33–42, at 36. See also G. Sundqvist, M. Letell & R. Lidskog, 'Science and Policy in Air Pollution Abatement Strategies' (2002) 5(2) *Environmental Science & Policy*, pp. 147–56.

86 Tuinstra, Hordijk & Amann, ibid., at p. 38; B. Siebenhüner, 'Transboundary Science for Transnational Air Pollution Policies in Europe', in Lidskog & Sundqvist, n. 4 above, pp. 93–122, at 100.

87 Tuinstra, Hordijk & Amann, ibid., pp. 38–9.

88 Levy, n. 4 above, at p. 62.

The Protocol aimed to reduce the gap between critical loads and emissions by 60% (60% gap closure).[89] Gap closure was referred to again in the 1999 Gothenburg Protocol. Because of these compromises, the regime could be criticized for being biased towards economic concerns, rather than achieving optimal environmental outcomes.[90] The European Commission was so dissatisfied with the Gothenburg Protocol's emissions reduction commitments, for example, that it did not sign it.[91] The EU acceded in 2003, after the adoption of more stringent NECs in Directive 2001/81/EC,[92] reasoning that implementation of the Gothenburg Protocol would 'contribute to achieving Community goals for protection of the environment and human health'.[93] Scientific uncertainty regarding critical loads also remains an issue, and precaution is needed when considering the exceedance boundaries.[94] Despite these concerns, the critical loads approach remains a superior method to the politically unpalatable across-the-board imposition of emissions reduction. If the gap between emissions and critical loads is successfully closed, it will be a remarkable achievement.

The 1988 NO_X Protocol had a non-mandatory Technical Annex on Control Technologies. Subsequent Protocols attempted to develop mandatory standards on control technologies and measures, alongside the mandatory emissions limits and content levels. Many of these were based on what states had agreed to elsewhere,[95] or on domestic/EU legislation. The BATEF standard, which integrates cost effectiveness and technology, moulded these developments. A tangible impact of the standard is the regime's preference for end-of-pipe technical solutions (for example, the catalytic converter).[96]

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89 R.R. Churchill, G. Kütting & L.M. Warren, 'The 1994 UN ECE Sulphur Protocol' (1995) 7(2) *Journal of Environmental Law,* pp. 169–97, at 196.

90 G. Kütting, 'A Critical Approach to Institutional and Environmental Effectiveness: Lessons from the Convention on Long-Range Transboundary Air Pollution', in D. Stevis & V.J. Assetto (eds), *The International Political Economy of the Environment: Critical Perspectives* (Lynne Rienner, 2001), pp. 181–98, at p. 191.

91 H. Selin & S.D. VanDeveer, 'Mapping Institutional Linkages in European Air Pollution Politics' (2003) 3(3) *Global Environmental Politics*, pp. 14–46, at 36.

92 COM(2001)0245 final; Directive 2001/81/EC on National Emission Ceilings for Certain Atmospheric Pollutants [2001] OJ L 309/22.

93 2003/507/EC: Council Decision on the Accession of the European Community to the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-Level Ozone [2003] OJ L 179/1, recital 3.

94 See R.A. Skeffington, 'Quantifying Uncertainty in Critical Loads: (a) Literature Review' (2006) 169 *Water, Air, and Soil Pollution,* pp. 3–24. The European Monitoring and Evaluation Programme (EMEP) has gradually increased the critical load map resolution from 150 x 150 km² to 6 x 11 km². This will require an increase in data quality and should improve knowledge on exceedances: Decision 2012/13, ECE/EB.AIR/113/Add.1. Note all Executive Body Decisions referenced in this article are available at: http://www.unece.org/env/lrtap/executivebody/eb_decision.html.

95 A key influence were regs 15, 40 and 96 of the UNECE Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions 1958/1994, Geneva (Switzerland), 20 Mar. 1958, in force 20 June 1959 (amended 18 Aug. 1994, in force 16 Oct. 1995), available at: http://www.unece.org/trans/main/wp29/wp29regs.html. The Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles 1998 (Geneva (Switzerland), 25 June 1998, in force 25 Aug. 2000, available at: http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob.html) globalized the 1958/1994 Agreement.

96 See L. Lindau, A. Jagusiewicz & E. Kovacs, 'Software and Hardware, No Protocols Without Technologies', in Sliggers & Kakebeeke, n. 48 above, pp. 45–58, at 50.

During the early period of the regime, this standard offered a viable route to achieving reductions, but the limits are being reached.[97] The BATEF standard has attracted criticism because it enables states to prioritize economic considerations over environmental outcomes, depending on the weighting. It may thus serve to justify inaction by those unwilling to invest in pollution abatement measures.[98] The shift to the term 'best available techniques' (BAT) has somewhat diffused this criticism, and commitments to promote renewable energy were finally included in the 1994 Sulphur Protocol II.[99] Kelly and his co-authors suggest that to remain effective, the LRTAP regime is likely to need to embrace 'alternative approaches to emission reductions'.[100] Furthermore, as Kütting has noted, the 'predominance of fossil fuels' in the UNECE economies has not been significantly questioned.[101]

The 1999 Gothenburg Protocol expanded implementation strategies by simultaneously attempting to regulate sulphur, NO_X, VOCs and ammonia emissions (hence, it has been described as the Multi-Effect Protocol). Flexible approaches to reductions were tentatively included, such as the recommended VOC reduction-offsetting scheme.[102] There are no provisions for international emissions trading, although some states have implemented national schemes.[103] The Executive Body (EB) has issued guidance on the various options, including the possibility of achieving co-benefits on climate change with the EU emissions trading scheme.[104] The Protocol requires states to phase out market-based incentives for the regulated pollutants (such as tax exemptions and subsidies).[105] Thus, to an extent, structural issues are now being addressed.

The recent Protocol amendments have not diverged from this regulatory approach. The 2009 POPs Protocol amendments put in place further restrictions and regulate additional POPs, provide new emission limit values for waste incineration, and provide BAT guidance to control emissions.[106] The 2012 Heavy Metals Protocol

97 A. Kelly et al., 'Setting National Emission Ceilings for Air Pollutants: Policy Lessons from an Ex-post Evaluation of the Gothenburg Protocol' (2010) 13(1) *Environmental Science & Policy*, pp. 28–41, at 40.

98 E.g., Poland refused to ratify the 1985 SO_2 Protocol I (n. 31 above) on the grounds of economic feasibility: Gündling, n. 23 above, at p. 22; McCormick, n. 21 above, at p. 85.

99 N. 69 above, Art. 2(4).

100 Kelly et al., n. 97 above, at p. 40.

101 Kütting, n. 90 above, at p. 195.

102 1999 Gothenburg Protocol, n. 47 above, Appendix II.

103 E.g. the US Acid Rain Program: see R. Schmalensee et al., 'An Interim Evaluation of Sulfur Dioxide Emissions Trading' (1998) 12 *The Journal of Economic Perspectives*, pp. 53–68, at 54–6.

104 Decision 2012/9, ECE/EB.AIR/113/Add.1, Adoption of Guidance Document on Economic Instruments to Reduce Emissions of Regional Air Pollutants to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone; see the Guidance Document on Economic Instruments, 19 July 2013, available at: http://www.unece.org/fileadmin/DAM/env/documents/2013/air/eb/ECE_EB.AIR_118_ENG_01.pdf.

105 1999 Gothenburg Protocol, n. 47 above, Art. 6(h).

106 Decision 2009/1, Amendment of the Text of and Annexes I, II, III, IV, VI and VIII to the 1998 Protocol on Persistent Organic Pollutants; Decision 2009/2, Listing of Short-Chain Chlorinated Paraffins and Polychlorinated Naphtalenes in Annexes I and II to the 1998 Protocol on Persistent Organic Pollutants; Decision 2009/3, Amendment of Annexes V and VII to the 1998 Protocol on

amendments provide stricter emission limit values for the specified sources, and extend the source categories.[107] The 2012 Gothenburg Protocol amendments set new 2020 emissions ceilings for existing pollutants as well as for PM and black soot.[108] Economic uncertainty and austerity, however, led states to water down their commitments in line with economic projections to 2020. The 2012 Gothenburg Protocol amendments do not appear to have gone much further than business-as-usual.[109] As Ågren notes, it is 'a great disappointment that the overall level of ambition is still far from sufficient to adequately protect health and the environment'.[110]

There is no definitive answer to which regulatory approach is more effective (command-and-control or market-based), nor whether it is better to have a regulatory mix. As Bodansky notes, the problem 'lies less in formulating desirable policy options than in getting these policies adopted and implemented'.[111] For this reason, assessing the effectiveness of the commitments is difficult because ultimately their success relies on political will. This analysis points to a certain degree of muddling through, and highlights the trade-offs made to achieve agreement. States cannot be prevented from negotiating weaker reduction commitments, and the effects-based approach to LRTAP was not a complete solution to state ambivalence. The regime has an unfortunate dynamic whereby the required emissions reductions are perhaps too lenient for developed states, but are perceived by the states with economies in transition (EIT) as complex and costly to implement.[112] This is particularly concerning if we recall that the LRTAP regime is weak in terms of recognizing common but differentiated responsibilities. Thus, in adopting relatively advanced implementation strategies, a degree of state participation may have been sacrificed.

Persistent Organic Pollutants, ECE/EB.AIR/99/ADD.1, Geneva (Switzerland), 18 Dec. 2009, not yet in force, available at: http://www.unece.org/env/lrtap/pops_h1.html.

107 Decision 2012/6, Amendment of Annex III to the 1998 Protocol on Heavy Metals, in force; Decision 2012/5, Amendments to the Text of and Annexes Other than III and VII to the 1998 Protocol on Heavy Metals, ECE/EB.AIR/113/Add.1, Geneva (Switzerland), 13 Dec. 2012, not yet in force. Consolidated text available at: http://www.unece.org/env/lrtap/hm_h1.html.

108 1999 Gothenburg Protocol, n. 47 above, Art. 18 *bis*. See Decision 2012/1, Amendment of Annex I to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (in force 19 Sept. 2013) and Decision 2012/2, Amendment of the Text of and Annexes II to IX to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone and the Addition of New Annexes X and XI, ECE/EB.AIR/111/Add.1, not yet in force. For a consolidated text, see http://www.unece.org/env/lrtap/multi_h1.html. Once in force, the amended Gothenburg Protocol will supersede and replace the 1985 Sulphur Protocol I, 1988 NO_X Protocol, 1991 VOCs Protocol, and 1994 Sulphur Protocol II.

109 S. Reis et al., 'From Acid Rain to Climate Change' (2012) 338 (6111) *Science*, pp. 1153–4, at 1154. See also J.-P. Hettelingh et al., 'Assessing Effects of the Revised Gothenburg Protocol', in M. Posch, J.Slootweg & J.-P. Hettelingh (eds), *Modelling and Mapping of Atmospherically-Induced Ecosystem Impacts in Europe*, CCE Status Report 2012 (RIVM, 2012), pp. 13–20.

110 C. Ågren, 'Editorial' (June 2012 No. 2) *Acid News*, at p. 2, available at: http://www.airclim.org/acidnews/2012/AN2-12.

111 Bodansky, n. 8 above, p. 84.

112 L.B. Andonova, 'Acid Rain in a Wider Europe: The Post-Communist Transition and the Future European Acid Rain Policies', in G.R. Visgilio & D.M. Whitelaw (eds), *Acid in the Environment: Lessons Learned and Future Prospects* (Springer, 2007), pp. 151–74, at 165–7.

3. EFFECTIVENESS AND INSTITUTIONAL DESIGN OF THE LRTAP REGIME

3.1. *The Core Institutions*

The core institutional feature established by the CLRTAP was the EB, with its subsidiary bodies and Bureau (an inter-sessional forum).[113] The European Monitoring and Evaluation Programme (EMEP) has also been a key supporting body.[114] The Executive Secretary of the UNECE is designated the Secretariat, with the Secretariat functions provided by the Air Pollution Section of the UNECE Environment and Human Settlement Division.[115] Currently there are three subsidiary bodies to the EB: (i) the Working Group on Effects (WGE);[116] (ii) the EMEP Steering Body,[117] with four task forces and four EMEP Centres;[118] and (iii) the Working Group on Strategies and Review (WGSR), the principal negotiating body.[119] The regime has a well-developed institutional framework, is supported by a range of subsidiary bodies, and has established links with international institutions.

Studies focusing on the regime's early period (the 1980s and 1990s) have viewed it as institutionally effective and dynamic.[120] Indeed, the initial institutional framework contributed to the regime's later successes. The institutions are viewed as having aided state cooperation, consensus, and the negotiation of the Protocols.[121] The WGSR has been particularly important for the interaction of science and policy.[122] The subsidiary bodies have benefited from a relatively good exchange of information through national reporting, which has aided transparency. This has enabled

113 Art. 10 CLRTAP. The EB is composed of representatives of the parties to the Convention, and meets at least annually. It is responsible for implementation and review: see http://www.unece.org/env/lrtap/executivebody/welcome.html. The Bureau consists of the EB Chair and seven Vice-Chairs (including the Chairs of the subsidiary bodies). Its focus is on strategy, coordination and cooperation, and it may submit policy proposals to the EB: see http://www.unece.org/env/lrtap/executivebody/ebbureauhome.html.

114 See UNECE, 'EMEP: The Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe' (1982) *Economic Bulletin for Europe*, pp. 29–40; H. Dovland, 'Monitoring European Transboundary Air Pollution' (1987) 29(10) *Environment*, pp. 10–28.

115 Art. 11 CLRTAP; the Secretariat convenes and prepares meetings of the EB and communicates information among the parties.

116 Consisting of six International Cooperative Programmes (ICPs) and their research centres, focusing on environmental issues, materials, integrated monitoring, modelling and mapping. The WHO leads a task force on health. There is also a joint expert group on dynamic modelling. For details on state participation with the programmes, see http://www.unece.org/env/lrtap/WorkingGroups/wge/participation.html.

117 Consisting of representatives from the parties to the Convention, the four EMEP Centres, the World Meteorological Organization (WMO), and the European Environment Agency (EEA).

118 These focus on emissions inventories and projections, measurements and modelling, integrated assessment modelling, meteorology, chemicals, and hemispheric air pollution.

119 The WGSR undertakes preparatory work (e.g. scientific and technical assessments) and negotiates revisions of the Protocols, promotes technological exchange, and makes proposals for strategic development: see http://www.unece.org/environmental-policy/treaties/air-pollution/about-us/organization-chart.html; and http://www.unece.org/env/lrtap/workinggroups/wgs/welcome.html.

120 T. Gehring, *Dynamic International Regimes: Institutions for International Environmental Governance* (Peter Lang, 1994), at pp. 193–4; Kütting, n. 90 above, at p. 183.

121 Munton et al., n. 4 above, at pp. 221–3.

122 Wettestad (2011), n. 4 above, at p. 52. See Siebenhüner, n. 86 above, at p. 104.

methodological harmonization and the development and implementation of the critical loads/levels approach.[123] The regime is considered one of the most 'science-based' in existence, and could be held up as a 'model' in this regard.[124]

A limitation of the regime is that no central funding mechanism exists. This arrangement has not kept pace with the regime's evolution and possibly jeopardizes its institutional effectiveness. EMEP has a skewed funding system that relies mainly on mandatory contributions from a few lead states (such as France, Germany, and the UK). The majority of non-EMEP activities have been funded by donor countries, or through the UNECE's limited resources. The Secretariat relies on these resources.[125] It has been 'overworked' and has struggled at times to attend meetings in host states.[126] Despite these limitations, it has reportedly performed its functions relatively successfully.[127] The funding issue reflects the reluctant agreement reached during the Convention negotiations and the state-centric approach taken by the parties.[128] Although aware of this weakness, in the early 2000s the parties failed to create a centralized funding mechanism to distribute costs more fairly;[129] instead, all parties were asked to contribute to the non-EMEP core activities.[130] To this end, the EB provided guidelines that followed the allocation methods for the revised contributions to the 1984 EMEP Protocol.[131] However, these measures were inadequate and, in 2010, the new CLRTAP Long-term Strategy and Implementation Action Plan reiterated the need for adequate funding of non-EMEP core activities and of the Secretariat.[132] Estimates in the 2014–15 Implementation

123 Munton et al., n. 4 above, at pp. 221–3; see L. Nordberg et al., 'The Role of the Secretariat: Building the Protocol Tree', in Sliggers & Kakebeeke, n. 48 above, pp. 97–117, at 103–4. The critical loads approach was developed primarily by the WGE and its ICPs, initially through workshops sponsored by the Nordic Council of Ministers, and continued through the Task Force on Mapping at the LRTAP Coordination Centre for Effects (CCE): see J. Nilsson & P. Grennfelt (eds), *Critical Loads for Sulphur and Nitrogen* (Nord, 1988); J.P. Hettelingh et al. (eds), *Mapping Critical Loads for Europe* (RIVM, 1991).

124 Sundqvist, Letell & Lidskog, n. 85 above, at p. 149; M.A. Levy, 'European Acid Rain: The Power of Tote-Board Diplomacy', in P.M. Haas, R. Keohane & M. Levy (eds), *Institutions for the Earth: Sources of Effective International Environmental Protection* (The MIT Press, 1993), pp. 75–132, at 110; Wettestad (2002), n. 4 above, pp. 213–14; and Wettestad (2011), n. 4 above, at p. 52.

125 Wettestad (2002), ibid., at p. 212.

126 Levy, n. 124 above, at p. 84; a voluntary travel trust fund for the Secretariat was created by Decision 2006/12, Funding for Secretariat Travel, ECE/EB.AIR/89/Add.1.

127 Wettestad (2002), n. 4 above, at p. 213; see generally Nordberg et al., n. 123 above, pp. 97–117. For an early account, see A. Tollan, 'The Convention on Long-Range Transboundary Air Pollution' (1985) 19(6) *Journal of World Trade Law*, pp. 615–21.

128 See Wettestad (2002), ibid., at p. 215.

129 See Decision 2002/1, Financing of Core Activities (Annex I), ECE/EB.AIR/77/Add.1.

130 J.-P. Hettelingh et al., 'Air Pollution Effects Drive Abatement Strategies', in Sliggers & Kakebeeke (eds), n. 48 above, pp. 59–84, at 73.

131 Amended Annex referred to in Article 4 of the 1984 Protocol on Long-term Financing of the Cooperative Programme for EMEP, ECE/EB.AIR/91/Add.1, Annex II; Revised Scale of Contributions to the Trust Fund for Core Activities not Covered by the EMEP Protocol 1984, referred to in para. 5 of Decision 2002/1, ECE/EB.AIR/91/Add.1, Annex III.

132 Decision 2010/18, Long-term strategy for the Convention on Long-range Transboundary Air Pollution and Action Plan for its Implementation, ECE/EB.AIR/106/Add.1, Annex, Chapter V(16)(n)–(o); Decision 2011/14, Action Plan for the Implementation of the Long-term Strategy for the Convention, ECE/EB.AIR/109/Add.1.

Work Plan[133] indicated a budget shortfall of at least US$1 million. The regime remains underfunded, and is arguably less effective consequently.

Funding weaknesses may be problematic if the regime attempts to create institutional connections between other MEAs, or conduct outreach and knowledge-sharing activities in the wider UNECE area/developing world (as promoted by the Global Atmospheric Pollution (GAP) Forum).[134] With regard to Europe, this issue has created fewer difficulties. For example, in 1989 the UNECE and the Baltic Marine Environment Protection Commission (HELCOM) entered into a Memorandum of Understanding for cooperation with regard to data on airborne pollution.[135] Furthermore, scientific collaboration has occurred through involvement in the Task Force on Hemispheric Air Pollution, the United Nations Environment Programme (UNEP), and the GAP Forum.[136] According to Reis and his co-authors, the Task Force on Reactive Nitrogen has developed 'partnerships with UNEP and the Organization for Economic Cooperation and Development, as well as the biodiversity and water conventions'.[137] Such efforts need to be intensified; this will require enhanced cooperation at a high institutional level and, consequently, better funding.

When considering the criteria for effectiveness, the CLRTAP highlights that although we can take a holistic approach, not all criteria are equal – successfully formed and functioning institutions are crucial. On a basic level the institutions function well; however, opportunities for expanded activities are limited, and this may reduce effectiveness in the long term.

3.2. *International Implementation Procedures*

Dispute settlement

The Convention contained no process for third-party settlement, and only required parties to seek a solution by negotiation or by any other acceptable method.[138] This formulation was repeated verbatim in the Protocols up to the 1994 Sulphur Protocol II, which added the possibility of submitting disputes to the International Court of Justice (ICJ). If states cannot agree on the mode of dispute settlement, they are required to submit the dispute to a conciliation commission if requested by a party to

133 Executive Body, 32nd session, Geneva (Switzerland), 9–13 Dec. 2013, ECE/EB.AIR/122/Add.2.

134 E.g., 'Strengthening Cooperation with Regional Air Pollution Networks and Initiatives outside the Convention', submitted by the Secretariat of the GAP Forum, Executive Body, 29th session, 12–16 Dec. 2011, Geneva (Switzerland), Informal Doc. No.12, available at: http://www.unece.org/fileadmin/DAM/env/documents/2011/eb/eb/n_12.pdf.

135 See J.A. Brunnée, 'Jigsaw Puzzle of International Environmental Protection: International Approaches to Atmospheric Pollution and the Baltic Sea Area' (1992) 20 *International Journal of Legal Information*, pp. 1–17, at 7.

136 Reis et al., n. 109 above, at p. 1154. The Convention is represented on the GAP Forum Steering Committee: see http://www.sei-international.org/gapforum/participants.php.

137 Reis et al., ibid., at p. 1154; see the Task Force on Reactive Nitrogen (terms of reference Decision 2007/1, ECE/EB.AIR/91/Add.1), available at: http://www.unece.org/env/lrtap/taskforce/tfrn/welcome.html. See also the Edinburgh Declaration on Reactive Nitrogen, Nitrogen & Global Change Conference, Edinburgh (Scotland), 14 Apr. 2011, available at: http://www.nitrogen2011.org/publications.html.

138 Art. 13 CLRTAP; Rosencranz, n. 23 above, at p. 980.

the dispute. The commission may make a recommendatory award if appropriate, to be respected in good faith.[139] However, as is the case with numerous MEAs, no formal disputes have arisen.[140] The procedure possibly acts as an incentive to avoid disputes and contributes to the culture of consensus. Alternatively, it may be that dispute settlement provisions play a minimal role in determining the effectiveness of the regime.[141]

Reporting, review, and non-compliance procedures

Reporting contributes to the regime's effectiveness as it promotes transparency and is an integral component of the compliance procedures. Initially framed as a requirement to exchange available information in Article 8 of the Convention, the 1985 Sulphur Protocol I established dual reporting commitments with regard to national emissions data and information on the programmes, policies and strategies undertaken to achieve the Protocol's commitments.[142] As implementation strategies became more complex, states were required to report on the implementation of their commitments under the Protocols in general.[143] The annual national reports and the 'major reviews' of Strategies and Policies for Air Pollution Abatement, which are undertaken every four years, can be used for naming-and-shaming, although they are not intended for this purpose.[144] Data transparency is further aided by the collaboration between the EMEP Centre on Emission Inventories and Projections and the EEA, which enables the publication of the Air Pollutant Emission Inventory Guidebook (formally CORe INventory AIR),[145] and also through the European Pollutant Release and Transfer Register (E-PRTR).[146] The register collects data for a range of pollutants (such as those resulting in LRTAP and climate change) by industrial source.

The Convention provided no clear non-compliance procedures. A major development was the establishment of the Implementation Committee (IC) by the 1994 Sulphur Protocol II, which became the compliance procedure for

139 1994 Sulphur Protocol II, n. 69 above, Art. 9.

140 J. Sliggers, 'Blue Skies Forever', in Sliggers & Kakebeeke, n. 48 above, pp. 149–67, at 165.

141 For a general discussion see P. Sands & R. Mackenzie, 'Annex 1: Guidelines for Negotiating and Drafting Dispute Settlement Clauses for International Environmental Agreements', in International Bureau of the Permanent Court of Arbitration (ed), *International Investments and Protection of the Environment: The Role of Dispute Resolution Mechanisms: Papers Emanating from the Second Permanent Court of Arbitration International Law Seminar, May 17, 2000* (Kluwer Law International, 2000).

142 N. 31 above, Arts 4 and 6.

143 Established by Art. 5 of the 1994 Sulphur Protocol II, n. 69 above, and repeated in subsequent Protocols. The reporting method is via questionnaire: see Nordberg et al., n. 123 above, at p. 107.

144 See Levy, n. 124 above, at p. 91; see also UNECE, *Strategies and Policies for Air Pollution Abatement: 2010 Review*, ECE/EB.AIR/123 (United Nations, 2013).

145 Available at: http://www.eea.europa.eu/themes/air/emep-eea-air-pollutant-emission-inventory-guidebook/emep.

146 Available at: http://prtr.ec.europa.eu. See Regulation (EC) No. 166/2006 concerning the Establishment of a European Pollutant Release and Transfer Register and Amending Directives 91/689/EEC and 96/61/EC [2006] OJ L 33/1. This was created in part to fulfil the requirements of the Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Kiev (Ukraine), 21 May 2003, in force 8 Oct. 2009, available at: http://www.unece.org/env/pp/prtr/docs/prtrtext.html.

all Protocols.[147] It was modelled on the IC of the Montreal Protocol on Substances that Deplete the Ozone Layer,[148] which was developed in 1990–92.[149] Its functions include (i) the review of compliance with reporting obligations; (ii) consideration of submissions or referrals,[150] with the adoption of any necessary reports or recommendations; (iii) the preparation of detailed compliance reports on specific obligations; (iv) consideration of systemic compliance issues; and (v) the production of annual compliance reports for the EB, with recommendations if necessary. The EB may then adopt a decision on the non-compliance.[151]

The IC takes a facilitative and cooperative approach to non-compliance. Naming-and-shaming happens in the EB decisions, which adopt language such as 'express disappointment' and 'note with concern'.[152] EB decisions are likely to have the most impact at state level, while the use of official international diplomatic routes and publicity on the UNECE website may have a broader, if modest, outreach to the public and the media. The activities of the IC notably improved the levels of reporting after its first compliance review[153] – for example, reporting for the 1988 NO_X Protocol increased from 82% in 1998 to 99% in 2003.[154]

Serious cases of non-compliance have been rare, although the IC has dealt with some lengthy periods of non-compliance by individual states, which have attracted repeated EB decisions (see Table 1 at Appendix below). It is highly unlikely that the naming-and-shaming approach will harden to include sanctions,[155] while a further strengthening of the reporting requirements will only go so far in achieving compliance with the reduction commitments.[156] In Eastern Europe, EU expansion is bringing greater indirect incentives for compliance, as states that do not comply with the LRTAP-related Directives may be referred to the European Court of Justice (ECJ).[157] Most scholars have concluded that the IC is

147 Sulphur Protocol II, n. 69 above, Art. 7. The IC's structure, functioning and procedures were established by Decision 1997/2, ECE/EB.AIR/53 and Decision 1998/3, EB.AIR/WG.5/52, Annex III; these were amended in Decision 2006/2, ECE/EB.AIR/2006/2; and Decision 2012/25, ECE/EB.AIR/113/Add.1. See T. Kuokkanen, 'The Convention on Long-range Transboundary Air Pollution', in Ulfstein, n. 16 above, pp. 161–78.

148 Montreal (Canada), 16 Sept. 1987, in force 1 Jan. 1989, available at: http://ozone.unep.org/new_site/en/montreal_protocol.php.

149 Patrick Széll, UK Department of the Environment, was the principal drafter for both procedures. See P. Széll, 'The Montreal Protocol: A New Legal Model for Compliance Control', in P.G. Le Prestre, J. Reid & T. Morehouse Jr (eds), *Protecting the Ozone Layer: Lessons, Models, and Prospects* (Kluwer, 1998), at pp. 91–8.

150 This can occur through self-submission, submission by another party, a referral by the Secretariat, or a referral though the Secretariat on the advice of the IC.

151 For details of states found in non-compliance, see Table 1 below.

152 P. Széll, V. Keizer & T. Kuokkanen, 'Compliance and Consensus', in Sliggers & Kakebeeke, n. 48 above, pp. 119–32, at 124.

153 Nordberg et al., n. 123 above, at pp. 106–7.

154 Széll, Keizer & Kuokkanen, n. 152 above, at p. 120. For the 'Status of Reporting under CLRTAP', see http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting.

155 As the most recent EB Decisions on the Committee attest, see Decision 2012/25, n. 147 above.

156 See Sliggers, n. 140 above, at p. 165.

157 J. Wettestad, 'Reducing Long-range Transport of Air Pollutants in Europe', in S. Andresen, E.L. Boasson & G. Hønneland (eds), *International Environmental Agreements: An Introduction* (Routledge, 2011), pp. 23–37, at 33.

effective, compliance levels have improved, and most states implement the IC's recommendations.[158]

4. THE NORMATIVE EFFECTIVENESS OF THE LRTAP REGIME

4.1. *Legitimacy – Rules on Decision Making and Participation*

According to Bodansky, the legitimacy of international environmental law is derived through consensus, with states negotiating rules that they believe are fair and 'in their self-interest', rather than through a recognition of 'the rulemaking authority of international institutions'.[159] Based on state practice, the regime has high legitimacy because states have been committed to the process for the past 35 years, during which time significant legal codification has occurred.

Decision making is a key determinant of whether states view the process as legitimate.[160] Decision making by consensus provides greater legitimacy than majority voting as common ground between states is found. However, it may slow the rate of response to new developments and may lead to lowest-common-denominator agreements, which are unambitious or ambiguous if they attempt to include a range of competing state positions.[161] Majority voting provides greater flexibility, but can lead to states opting out if allowed to.[162] The CLRTAP resulted from consensus-based decision making, and embedded this approach.[163] Although the EB decided to adopt the UNECE rules of procedure, which operate by majority vote, for most of their history the Convention bodies have decided by consensus to further the spirit of cooperation (although unanimity is not required).[164] This approach did not achieve full ratification levels, but it secured the participation of the willing, avoided conflict and therefore increased legitimacy.[165] It did not prevent the 1980s Protocols from being considered lowest-common-denominator agreements, although this is understandable given the Cold War context and the reluctance by the polluting states to undertake international commitments.[166] In 2010, the EB adopted

158 Sliggers, n. 140 above, at p. 165; Széll, Keizer & Kuokkanen, n. 152 above, at p. 125; T. Kuokkanen, 'Practice of the Implementation Committee under the Convention on Long-range Air Pollution', in U. Beyerlin, P.-T. Stoll & R. Wolfrum (eds), *Ensuring Compliance with Multilateral Environmental Agreements: A Dialogue between Practitioners and Academia* (Martinus Nijhoff, 2006), pp. 39–52, at 47; E. Milano, 'Procedures and Mechanisms for Review of Compliance under the 1979 Long-Range Transboundary Air Pollution Convention and its Protocols', in T. Treves et al. (eds), *Non-Compliance Procedures and Mechanisms and the Effectiveness of International Environmental Agreements* (TMC Asser Press, 2009), pp. 169–80, at 180.

159 D. Bodansky, 'The Legitimacy of International Governance: A Coming Challenge for International Environmental Law?' (1999) 93 *American Journal of International Law*, pp. 596–624, at 604; Bodansky, n. 8 above, at p. 89–90.

160 Bodansky, ibid., at p. 264.

161 Bodansky, ibid., at p. 170; see L.E. Susskind, *Environmental Diplomacy: Negotiating More Effective Global Agreements* (Oxford University Press, 1994), at p. 14.

162 Bodansky, ibid., at p. 103.

163 Art. 12(3) CLRTAP.

164 Széll, Keizer & Kuokkanen, n. 152 above, at pp. 129–30.

165 Ibid.; Wettestad (2002), n. 4 above, at p. 212; see also Wettestad (2011), n. 4 above, at p. 52.

166 Levy, n. 4 above, at p. 59. For example, Sokolovsky describes the Convention negotiation as acrimonious: V. Sokolovsky, 'Fruits of a Cold War', in Sliggers & Kakebeeke, n. 48 above, pp. 7–30, at 11.

new rules of procedure for its sessions, which suggest that majority voting may play an increased role in the regime.[167]

Participation is limited to the Member States and states with consultative status to the UNECE.[168] States must be a party to the CLRTAP to participate in the Protocols. UNECE plays an important facilitative role and arguably provides a greater sense of legitimacy and support to the Convention process.[169] The symbolic and political value of the East–West membership was a great asset.[170] The recognition of the EU (then the EEC) as a signatory to CLRTAP and subsequent Protocols was considered a diplomatic breakthrough and a significant episode of *détente* in the Cold War.[171]

From the 1990s onwards, as the problem of hemispheric air pollution (POPs, mercury, ozone, and particulate matter) gained prominence,[172] the possibility was mooted to amend the legal instruments so that states outside the UNECE region (such as the Eastern Asia states) could participate in the regime. However, achieving consensus on this issue was viewed as unlikely and time-intensive.[173] The UNECE membership criterion has possibly been a limiting factor in the post-Cold war era, and highlights the need for global rather than regional approaches.[174] The 1998 POPs Protocol[175] had a substantial awareness-raising impact and was a contributing factor to the successful adoption, in 2001, of the Stockholm Convention on Persistent Organic Pollutants.[176] The 1998 Heavy Metals Protocol[177] influenced the 2013

See the detailed analysis by E.M. Chossudovsky, *'East–West' Diplomacy for Environment in the United Nations* (UN Institute for Training and Research, 1988).

167 Decision 2010/19, ECE/EB.AIR/106/Add.1, rule 29.

168 Art. 14 CLRTAP.

169 The UNECE was chosen as the appropriate forum for the Convention process because of its East–West membership and was referred to in the 1975 Helsinki Final Act of the 1973–75 Helsinki Conference on Security and Co-operation in Europe, itself a Cold War forum: Final Act (Co-operation in the Field of Economics, of Science and Technology and of the Environment), Helsinki (Finland), 1 Aug. 1975, (1975) 14 *International Legal Materials*, pp. 1293–8, Ch. 5; see Chossudovsky, n. 166 above; Wetstone & Rosencranz, n. 23 above, at p. 140; and R.G. Darst, *Smokestack Diplomacy: Cooperation and Conflict in East-West Environmental Politics* (The MIT Press, 2001), at p. 95.

170 Wetstone & Rosencranz, n. 27 above, at pp. 105–6.

171 Arts 14(1) and 15 CLRTAP. See Chossudovsky, n. 166 above, pp. 93–8; Gehring, n. 120 above, pp. 124–7.

172 See UNECE Air Pollution Studies Nos 16–20, Hemispheric Transport of Air Pollution (HTAP), prepared by the Task Force on HTAP (UN Geneva, 2007–10), available at: http://www.htap.org; see also Hemispheric Transport of Air Pollution 2010 Executive Summary, ECE/EB.AIR/2010/10 Corrected.

173 Art. 12 CLRTAP; Possibilities for Opening the Convention: Note by the Bureau in Consultation with the Secretariat, Item 8 of the Provisional Agenda, 29 Sept. 2006, ECE/EB.AIR/2006/8, available at: http://www.unece.org/fileadmin/DAM/env/documents/2006/eb/EB/ece.eb.air.2006.8.e.pdf.

174 For a general discussion of global vs. regional options, see GAP Forum, 'Atmospheric Pollution: Developing a Global Approach', Discussion Paper 2 (Stockholm Environment Institute, 2010).

175 Protocol on Persistent Organic Pollutants, Aarhus (Denmark), 24 June 1998, in force 23 Oct. 2003, available at: http://www.unece.org/env/lrtap/pops_h1.html.

176 Stockholm (Sweden), 22 May 2001, in force 17 May 2004, available at: http://www.pops.int. See H. Selin, *Global Governance of Hazardous Chemicals: Challenges of Multilevel Management* (The MIT Press, 2010), pp. 111–62.

177 Protocol on Heavy Metals, Aarhus (Denmark), 24 June 1998, in force 29 Dec. 2003, available at: http://www.unece.org/env/lrtap/hm_h1.html.

Minamata Convention on Mercury, which addresses the intercontinental transport of mercury.[178] The regional agreements, programmes and action plans that were developed through UNEP in Asia, Africa, Latin America, and the Caribbean, after the 1992 United Nations Conference on Environment and Development (UNCED or Rio Earth Summit)[179] have broadly treated the CLRTAP as an exemplary system. The main components for emulation are cooperation and the need for adequate air pollution monitoring.[180] The UN International Law Commission (ILC) has recently begun preparatory work for global draft articles on the 'protection of the atmosphere'; the CLRTAP features in this work.[181] If the CLRTAP participation rules are a limitation, they have not precluded the parties from promulgating international law in other forums. As a precedent, the regime has contributed to the adoption of global treaties and rules on air pollution.

4.2. *State Participation*

Not all parties to the CLRTAP have ratified every Protocol. By 1988, the Convention had 35 signatories and 32 parties.[182] An important event in the regime's history was the string of accessions to the Convention by the newly independent states (NIS) in Eastern Europe during the early 1990s. With the break-up of the Soviet Union (USSR) and Yugoslavia, there are now 51 parties, including nearly every Western European state, Turkey, the majority of the EECCA states, the US, and Canada.[183] A smaller group has ratified the Protocols. The advanced economies of Western Europe have ratified all, or nearly all, of the Protocols. The smaller economies have selectively ratified, primarily because of concerns over their stringency, the cost of compliance, and the impact on their industrial development (Ireland and Greece, for example). A small number of states (such as Turkey) have not ratified any pollution-specific Protocols. However, all of the Protocols have entered into force, which is an exceptional achievement. Hopefully, the recent amendments will achieve a similar level of support.

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178 Minamata (Japan), 10 Oct. 2013, not yet in force, available at: http://www.mercuryconvention.org.

179 Rio de Janeiro (Brazil), 3–14 June 1992, available at: http://www.un.org/geninfo/bp/enviro.html.

180 See L. Nordberg, *Air Pollution: Promoting Regional Cooperation* (UNEP, 2010); UNEP, 'Montevideo Programme', available at: http://www.unep.org/delc/MontevideoProgramme/tabid/54416/Default.aspx. See also GAP Forum, 'International Cooperation', available at: http://www.sei-international.org/gapforum/regions.php; N. Silva-Send, 'Preventing Regional Air Pollution in Asia: The Potential Role of the European Convention on Long Range Transboundary Air Pollution in Asian Regions', doctoral thesis, Kiel University Faculty of Law, 2007, pp. 163–5. Outside the UNEP process is the Association of Southeast Asian Nations Agreement on Transboundary Haze, Kuala Lumpur (Malaysia), 10 June 2002, in force 25 Nov. 2003, available at: http://haze.asean.org/?wpfb_dl=32.

181 See Item 11 of the Provisional Agenda for the 66th session of the ILC, 8 Jan. 2014, A/CN.4/665; the preliminary outline and bibliography by S. Murase, 'Protection of the Atmosphere: Syllabus', A/66/10/Add.1/Annex B (2011), pp. 315–29; S. Murase, 'First Report on the Protection of the Atmosphere', A/CN.4/667.

182 A.A. Fraenkel, 'The Convention on Long-Range Transboundary Air Pollution: Meeting the Challenge of International Cooperation' (1989) 30(2) *Harvard International Law Journal*, pp. 447–76, at 448.

183 Andorra, Israel, Tajikistan, Turkmenistan, Uzbekistan, and San Marino have not ratified (the Holy See is an observer and has not ratified).

There is a distinct North American approach to LRTAP because of the continent's geography, of which the CLRTAP is a component.[184] The US and Canada have selectively ratified the Protocols, preferring to find bilateral solutions.[185] The US has also engaged in agreements with Mexico.[186] In general, US domestic politics dictated action on LRTAP in North America, although the regime may have contributed to awareness raising.[187] Bilateral agreements exist also in Europe, for example, between Finland and Russia.[188] Moreover, the development of EU environmental law has created overlapping obligations for the Member States (see Section 2.1 above). Participation in the regime therefore should be seen as nested within a framework of international and European bilateral law and policy, driven by the national context.

Efforts to include the EIT/EECCA countries have achieved mixed results. The EU has had some influence on participation levels with regard to the Protocols. Evidence suggests that ratification by Eastern European countries is often influenced by impending EU membership.[189] Turkey, a long-standing candidate country, has barely engaged with the regime. In its view, 'due regard' should be given to its status as a developing country, a position whereby it exempts itself from accepting international standards.[190] Russia, Belarus and Ukraine ceased to ratify the Protocols created after 1990, while Kazakhstan, Kyrgyzstan and the states of the Southern Caucasus have only ratified the Convention. The end of Cold War diplomacy, which had secured Soviet participation, partly explains these outcomes. They are also a legacy of the USSR's sole focus on controlling emissions near the European border. Furthermore, LRTAP was of minor importance to the NIS, and the leading European states were indifferent to LRTAP contained in the Eastern UNECE regions. Consequently, the less developed states in the Eastern region did not receive adequate financial

184 See A. Szekely, 'Establishing a Region for Ecological Cooperation in North America' (1992) 32 *Natural Resources Journal*, pp. 563–632.

185 The Memorandum of Intent concerning Transboundary Air Pollution, Washington (US), 5 Aug. 1980, Canada–United States, (1981) 20 *International Legal Materials* 690; Agreement between the Government of the United States of America and the Government of Canada on Air Quality, Ottawa (Canada), 13 Mar. 1991, (1991) 30 *International Legal Materials* 678; Annex 3 – Ozone Annex (December 2000) amending the 'Agreement between the Government of Canada and the Government of the United States of America on Air Quality', available at: http://www.ijc.org/en_/Air_Quality__Agreement. See J.L. Roelofs, 'United States–Canada Air Quality Agreement: A Framework for Addressing Transboundary Air Pollution Problems' (1993) 26 *Cornell International Law Journal*, pp. 421–54.

186 See D.M. Liverman et al., 'Environmental Issues Along the United States-Mexico Border: Drivers of Change and Responses of Citizens and Institutions (1999) 24 *Annual Review of Energy and the Environment*, pp. 607–43.

187 L.R. Cass, 'Air Pollution and Acid Rain', in P.G. Harris (ed.), *Routledge Handbook of Global Environmental Politics* (Routledge, 2014), pp. 388–99, at 396.

188 See http://www.ym.fi/en-US/International_cooperation/International_environmental_agreements; V. Kotov & E. Kikitina, 'Regime and Enterprise: Norilsk Nickel and Transboundary Air Pollution', in Victor, Raustiala & Skolnikoff, n. 56 above, pp. 549–74; G. Hønneland & A.-K. Jørgensen, *Implementing International Environmental Agreements in Russia* (Manchester University Press, 2003), pp. 145–62; see also J. Sommer, 'Transboundary Cooperation between Poland and its Neighbouring States', in Flinterman, Kwiatkowska & Lammers, n. 23 above, pp. 205–33.

189 See Selin & VanDeever, n. 49 above, at p. 81. Poland is an exception to this, having only ratified the 1988 NO_X Protocol, n. 55 above.

190 Organisation for Economic Co-operation and Development (OECD), *Environmental Performance Reviews: Turkey* (OECD, 2008), at p. 207.

assistance, technology transfer or joint implementation.[191] Despite gaining around 15 new parties to the CLRTAP, a third of UNECE members have not engaged with the Protocols; however, their decision not to participate has come at a price: a loss of influence in the regime, particularly in the case of Russia.[192] State participation is a key area where the regime needs to make substantial improvements. This issue has undermined environmental effectiveness, as these states are subject only to minimal obligations to control, reduce and prevent LRTAP.

4.3. *Assignment of Implementation Responsibilities and the Degree of Burden Sharing*

The CLRTAP was intentionally liability-neutral and the extent to which responsibility has been addressed is open to interpretation.[193] A key point for investigation is whether states with the highest capacity and inclination to comply carry the greatest burden, as this arguably strengthens the regime's effectiveness.[194] Initially this was not the case: the early Protocols allocated the same emissions reduction percentage to all states. As the regime developed, the emergence of differentiated targets attempted to reconcile economic considerations with environmental vulnerability and political will. The development of flexible emissions management areas for VOCs and sulphur fostered participation by Canada and Norway, and enabled them to focus on LRTAP with less stringent commitments for the rest of their territories. Although the development of NECs enabled greater implementation responsibilities to be assigned to Western European states, the commitments for the highly polluting EIT states do not conform with the idea of burden sharing, as the latter lack both the capacity and the inclination to comply.[195]

The 1991 VOCs Protocol[196] and the 1994 Sulphur Protocol II[197] introduced differentiated targets. For example, those states with the greatest inclination and capacity to reduce sulphur emissions, such as Germany and the Nordic states, took an ambitious NEC equivalent to a reduction of around 80% of 1980 levels by 2000. France and the UK obtained a ten-year extension to achieve a similar reduction. Highly polluting EIT states also received additional time, but cost efficiency and environmental criteria apparently overrode considerations of capacity and inclination.

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191 Darst, n. 169 above, pp. 109–16; Levy, n. 4 above, at p. 65; See S. Stec, A. Antypas & T. Steger, 'Transition and Governance: The Case of Post-Communist States', in G. Winter (ed.), *Multilevel Governance of Global Environmental Change* (Cambridge University Press, 2006), pp. 358–83.

192 A.E. Farrell and T.J. Keating, 'Dissent and Trust in Multilateral Assessments: Comparing LRTAP and OTAG', in A.E. Farrell and J. Jäger (eds), *Assessments of Regional and Global Environmental Risks* (RFF Press, 2006), pp. 64–83, at 79.

193 See the footnote inserted to Art. 8(f) CLRTAP. This has been described as a 'disclaimer of State responsibility': F.C. Eisenstein, 'Economic Implications of European Transfrontier Pollution: National Prerogative and Attribution of Responsibility' (1981) 11 *Georgia Journal of International and Comparative Law*, pp. 519–61, at 555. See M. Pallemaerts, 'International Legal Aspects of Long-range Transboundary Air Pollution' (1988) 1 *Hague Yearbook of International Law*, pp. 189–224.

194 Bodansky, n. 8 above, p. 264.

195 J. Gupta, 'Effectiveness of Air Pollution Treaties: The Role of Knowledge, Power and Participation', in M. Hisschemöller et al. (eds), *Policy Studies Review Annual Vol. 12: Knowledge, Power, and Participation in Environmental Policy Analysis* (Transaction, 2001), pp. 145–74, at 160.

196 N. 32 above.

197 N. 69 above.

For example, Poland needed to reduce emissions by around 66% to reach its 2010 ceiling. RAINS modelling had demonstrated that large reductions in Poland would achieve the greatest cost efficiency.[198] However, in the early 1990s, the Polish economy was relatively weak (as were most of the NIS), whilst the post-Communist government faced significant governance challenges[199] and would have struggled to invest more in order to reach its target without increased donor support. The fairness of the targets was therefore questionable, and many highly polluting EIT countries chose not to participate. Whether this justifies Poland's continued ambivalence to the LRTAP regime in 2014, after ten years of EU membership, is a different matter.

Differentiated targets have become a feature of the regime, with mixed results in terms of ratification. The 1998 Heavy Metals Protocol[200] allowed the EIT countries ten instead of five years in which to achieve compliance with the product control measures.[201] The 2012 amendments of the Heavy Metals Protocol[202] and the 1999 Gothenburg Protocol[203] introduced further differentials to appeal specifically to new parties to the Protocol. The Gothenburg Protocol affords new parties an extension for the development of implementation plans with a final implementation deadline of 31 December 2030.[204] The 2012 amendments to the Heavy Metals Protocol contained similar extensions for the implementation of BAT and limit values to existing stationary sources.[205] Such differential targets may produce better environmental outcomes in the long term if these measures are sufficiently attractive to prospective parties.

Financial assistance

A cost-sharing mechanism or specific provisions on the transfer of technology to the non-EU EECCA countries could offset the weaknesses of the regime's regulatory approach, increase ratification and the implementation of the Protocols, and produce better environmental outcomes.[206] These have not been established, even though the EB has explored the possibility of financial mechanisms. There is a limit to the regime's ability to foster cooperation. Since the mid-1990s, the parties have been invited to contribute to the Trust Fund so that the participation of one government representative from each of the EIT states can be funded;[207] this appears to have

198 C. Albin, 'Rethinking Justice and Fairness: The Case of Acid Rain Emission Reductions' (1995) 21(2) *Review of International Studies* pp. 119–43, at 131. Belarus was similarly given a large emissions reduction commitment of 50%.

199 See F. Millard, 'Environmental Policy in Poland' (1998) 7(1) *Environmental Politics*, pp. 145–61.

200 N. 177 above.

201 Ibid., Annex VI(5).

202 2012 Heavy Metals Protocol Amendments, n. 107 above.

203 2012 Gothenburg Protocol Amendments, n. 108 above.

204 Ibid., Art. 3 *bis*.

205 2012 Heavy Metals Protocol Amendments, n. 107 above, Art. 3 *bis*.

206 J. Sliggers & G. Klaassen, 'Cost Sharing for the Abatement of Acidification in Europe: The Missing Link in the New Sulphur Protocol' (1994) 4(1) *European Environment*, pp. 5–11; Albin, n. 198 above, at p. 135.

207 Decision 1997/4, Facilitation of Participation of Countries with Economies in Transition, ECE/EB. AIR/53, Annex VII, p. 55; Decision 2001/6, ECE/EB.AIR/75, Annex X; Decision 2003/11, ECE/EB.

increased their participation in the negotiations.[208] The 2010 Long-term Strategy reiterated the need for adequate funding to improve participation, and Decision 2012/26 called for a high-level meeting on actions to promote better air quality within the countries of EECCA.[209] The creation of the EECCA Coordinating Group in 2011, which focuses on the Russian sphere of influence, is a significant step towards creating a dual process that may lead to greater participation. Belarus, Russia, Kazakhstan, and Moldova have signalled their intention to become parties to the later Protocols,[210] but Azerbaijan, Uzbekistan, Tajikistan and Kyrgyzstan are unlikely to do so in the short term.[211]

Donor countries, EU-sponsored projects, and the UN Development Account (UNDA) provide support for projects in the EECCA countries. These projects have concentrated on the creation of emissions inventories, monitoring, and the ratification of the most recent Protocols.[212] Although a useful first step, programmes with greater ambition are needed. The absence of burden sharing through a funding mechanism or a formal system of joint implementation to aid the least developed states in the UNECE area has reduced effectiveness.[213]

4.4. *The Empowerment of Domestic Stakeholders*

Prior to the 1999 Gothenburg Protocol, the regime contained no specific provisions on public access to information. This Protocol required states to 'promote' the provision of information to the general public on issues such as national annual emissions, compliance information, pollution levels, and the health and environmental effects of the pollutants.[214] While this was a significant development, it is somewhat undermined by its weak phraseology. The deficiency in provisions on public access to information arises partly out of the East–West politics of the early period of the LRTAP regime and the culture of industrial secrecy of the USSR. Moreover, environmental issues are politically sensitive and states may wish to control the flow of information. Nonetheless, as a result of the activities of the regime and the current emphasis on transparency – as embodied by the 1998 Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters[215]

AIR/79/Add.1, Annex XI; Decision 2005/9, ECE/EB.AIR/87/Add.1, Annex IX; Decision 2006/13, ECE/EB.AIR/89/Add.1. Members of the EU or OECD do not qualify.

208 Wettestad (2011), n. 4 above, at p. 51.

209 Decision 2010/18, n. 132 above; Decision 2012/26 ECE/EB.AIR/113/Add.1.

210 Moldova is a party to the POPs Protocol 1998, n. 175 above.

211 EECCA Coordinating Group, 1st Report, n. 59 above.

212 See UNECE, 'Capacity Building Activities', available at: http://www.unece.org/environmental-policy/treaties/air-pollution/capacity-building-activities.html. E.g., the project on 'Capacity Building for Air Quality Management and the Application of Clean Coal Combustion Technologies in Central Asia' received $680,000 from the UN Development Account: see http://www.un.org/esa/devaccount/projects/2004/0405C.html.

213 See Gupta, n. 195 above, at p. 162.

214 1999 Gothenburg Protocol, n. 47 above, Art. 5.

215 Aarhus (Denmark), 25 June 1998, in force 29 Oct. 2001, available at: http://www.unece.org/env/pp/treatytext.html.

and its implementation in UNECE Member States including the EU – there is now a large amount of reported emissions data publically available.

Intergovernmental organizations, NGOs[216] and industrial groups may attend meetings as observers, whilst NGOs must have consultative status with the UNECE to attend working group meetings.[217] The unofficial Heads of Delegations meetings that take place during the negotiations of the Protocols have been 'exclusive',[218] and NGOs do not appear to have participated as observers of the work of the IC.[219] NGOs have a limited influence and no role in decision making. However, their involvement in the final negotiations might not produce better outcomes; it could slow the negotiation process or reduce the opportunities for diplomacy.[220] Domestic successes for NGOs occurred mainly in the early years of the regime, and some NGOs lobbied intensely for the ratification of the legal agreements.[221] The limited resources of NGOs, combined with the emergence of other environmental problems (such as climate change) and the increased role of the EU, saw NGOs switch their focus, although they have maintained an interest.[222] There is very little public participation in the regime.[223]

The regime's engagement with industry groups in respect of the BATEF standard has produced some notable outcomes. Technical seminars brought together members of the industrial, scientific and policy-making communities, and enabled innovative technologies to be demonstrated as technically and economically feasible, thus aiding their deployment.[224] Industry groups have also been regular observers at LRTAP meetings and seminars.

The regime was the major source of information on LRTAP in the 1980s, although much of this information was inaccessible to the public. The internet may have increased accessibility, particularly in highly developed European states where internet usage is higher.[225] However, awareness of the Convention and LRTAP in general has declined across key stakeholder groups (the public, politicians and

216 E.g. the Air Pollution and Climate Secretariat: see http://www.airclim.org.

217 Wettestad (1999), n. 4 above, at p. 105.

218 Ibid.

219 Milano, n. 158 above, at p. 173.

220 L. Björkbom, 'Negotiations over Transboundary Air Pollution: The Case of Europe' (1999) 4(3) *International Negotiation*, pp. 389–411, at 407.

221 E.g., the Environmental Law Institute in Washington, DC (US) contributed to the signature and ratification of the 1988 NO_X Protocol by the US government: see R.N. Mott, 'An Environmental Accord the US Should Support', *Chicago Tribune*, 12 July 1988, available at: http://articles.chicagotribune.com/1988-07-12/news/8801140554_1_global-warming-acid-rain-emissions. See also C. Ågren, 'The UNECE Convention: Implications for the NGOs', in the report of the 1989 NGO Strategy Seminar on Air Pollution, H. Smit (ed.), *Nature Demands Stricter Limits* (Stichting Natuur en Milieu, 1989), pp. 23–7.

222 Ågren, n. 48 above, at p. 135.

223 Debate over exactly what public participation is or should be is unresolved. See J. Forrester et al., 'Governance of Air Quality and Stakeholder Engagement: Lessons and Experience from International Cases', in Lidskog & Sundqvist (eds), n. 4 above, pp. 293–320.

224 Sand, n. 61 above, at p. 256. Not all states were laggards in this sense; for the supporting role of the US government see Taylor et al., 'Effect of Government Actions on Technological Innovation for SO_2 Control' (2003) 37(20) *Environmental Science & Technology*, pp. 4527–34.

225 Nordberg et al., n. 123 above, at p. 106.

local NGOs, for example).[226] As Ågren has noted, the regime needs to improve communication to increase domestic knowledge and awareness of air pollution, while simultaneously raising its profile. Solutions for this problem, such as an effective communications strategy and a travel fund to aid the participation of NGOs, will require additional funding.[227] The 2010 Long-term Strategy and 2011 Action Plan has included the need for an improved communications strategy.[228] With the implementation of higher pollution reduction requirements in the next decade, success will depend more on public opinion and support.[229] It will be interesting to see whether the regime can avoid controversy, particularly in the context of European budget austerity.

Evaluating the empowerment of stakeholders is extremely difficult as much is out of the control of the LRTAP regime. However, beyond the provision of information, effective empowerment in the domestic process remains problematic.

5. CONCLUSION

The combined approaches to effectiveness taken by Sand and Bodansky constitute a useful basis for the exploration of the LRTAP regime. This study has shown that compliance, institutional, and normative effectiveness can be measured reasonably well. In general, the LRTAP regime conforms to Bodansky's notion of 'trade-offs' and 'art and craft'.

The regime faces significant challenges concerning participation, implementation procedures, empowerment of domestic stakeholders, and funding. The most recent EMEP Status Reports indicate that,[230] although there is much to be optimistic about regarding the remarkable reductions in acidification, lead pollution, and certain POPs, significant progress still needs to made on eutrophication, ground level ozone, photochemical smog, PM, and heavy metals and POPs more generally.

With the increased role of the EU and the somewhat autonomous North American framework, it is difficult to ascribe an overall level of effectiveness to the regime as there is a significant degree of overlap. Nonetheless, the regime has shown that states can agree on contentious issues and achieve results. As a model regional MEA, the regime's replication in other regions may be problematic, especially for developing countries. States must have the necessary financial and administrative capacities to comply with this type of regime. The Convention's basic method of creating sound institutions, and its engagement with science, has nevertheless provided a model for subsequent international treaties.

226 Ågren, n. 48 above, at p. 137.
227 Ibid., at pp. 138 and 141.
228 N. 132 above.
229 Ågren, n. 48 above, at p. 141.
230 See http://emep.int/publ/common_publications.html.

APPENDIX

Table 1: Compliance with the Protocols' Major Objectives

Protocol	No. of Parties	Major Objectives	Compliance Status
Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (1984 EMEP Protocol).[1]	46	Set mandatory and voluntary contributions,[2] determined in terms of percentages (budget reviewed and approved by Executive Body on a continuing basis).	Good levels of compliance. Notable case of arrears: Ukraine 1996–2001 (in kind contributions, $175,205 outstanding in 2013).[3]
Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent (1985 Sulphur Protocol I).[4]	25	30% reduction in sulphur emissions by 1993, using 1980 as the base year.	High levels of compliance: by 1993, the overall reduction was ~50%; 11 parties reduced by at least 60%.[5]
Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes (1988 NO_X Protocol).[6]	35	Stabilize emissions or transboundary fluxes of NO_X so they do not exceed 1987 levels by 1994. Unleaded fuel to be made available to allow the use of catalytic converters.[7]	Moderate to high levels of compliance: the overall reduction was 9%.[8] Cases of non-compliance:[9] Ireland (1995–2003);[10] Spain (1997–2011);[11] Greece (1998–2013);[12] and Cyprus (2008–present).[13]
Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes (1991 VOCs Protocol).[14]	24	20 parties to reduce non-methane VOC emissions by 30% on the base-year (a choice from 1984 to 1990) by 1999. Canada and Norway to reduce by 30% in their Tropospheric Ozone Management Areas and, along with Bulgaria and Hungary, to limit national emissions to 1988 levels.	Moderate levels of compliance: 7 parties compliant by the deadline; 4 states reduced emissions by 16–21%;[15] by 2006, the EU had reduced by 41%.[16] Cases of non-compliance: Italy (1999–2002);[17] Norway (1999-2006);[18] and Spain (1999–2013).[19]
Protocol on Further Reduction of Sulphur Emissions (1994 Sulphur Protocol II).[20]	29	Parties to ensure, as far as possible, that critical loads are not exceeded in the long-term. Parties had differentiated targets for 2000, 2005 and 2010. The Canadian target applied only in the sulphur oxides management area, South-East Canada.	All parties met their targets.[21]
Protocol on Heavy Metals (1998 Heavy Metals Protocol).[22]	33	Cadmium, lead, and mercury emissions to be controlled and reduced to the reference year (1990, or between 1985 and 1995). Emission limit values and best available techniques (BAT) to be applied, within set time-scales, to new and existing major stationary sources. Leaded petrol to be phased out.	Final deadline was end of 2011. Cyprus found in non-compliance with cadmium obligations.[23] From national reported data (1990–2011), lead emissions reduced by 90%, cadmium and mercury emissions by ~60%. Deposition of lead reduced by 75%, cadmium by 51%, and mercury by 37%.[24] The difference between mercury emissions and deposition is as a result of intercontinental transport and natural sources.

Table 1: Continued

Protocol	No. of Parties	Major Objectives	Compliance Status
Protocol on Persistent Organic Pollutants (1998 POPs Protocol).[25]	33	Parties to control, reduce or eliminate the specified POPs; 8 were banned (e.g. toxaphene), 4 scheduled for elimination, 4 had severe restrictions placed on them (including DDT and PCBs). Parties were required to reduce dioxins, furans, polycyclic aromatic hydrocarbons (PAHs), and hexachlorobenzene (HCB) emissions to 1990 levels, or an alternative year between 1985 and 1995. Deadline created for the introduction of emission limit values for incineration. Set rules for the disposal of the banned substances.	The objectives were partially achieved: in the EMEP region (1990–2012), polychlorinated biphenyl (PCB)-153 air concentrations decreased by 80%; PAH pollution levels decreased by 30%; dioxin and furan pollution levels decreased by 50%; and HCB pollution levels decreased by almost 90%.[26] Cases of non-compliance: Denmark (PAHs, 2006–present);[27] Germany (PAHs, 2010–12); Italy (PAHs, 2010–present); Estonia (dioxins/furans, PAHs, HCB, 2010–present); Latvia (dioxins/furans, PAHs, HCB, 2010–present);[28] and Moldova (missing emissions data for dioxins/furans and PAH emissions, 2011–present).[29]
Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (1999 Gothenburg Protocol).[30]	26	Parties to control and reduce emissions of sulphur, NO_X, VOCs and ammonia. The 2010 emission ceilings/targets are based on critical loads. The differentiated reduction targets used 1990 as the base year. Created comprehensive emission limit values for a range of sources; obligation to use BAT. Particulate matter (PM), carbon monoxide (CO), and methane (CH_4) were included in the limit values for fuels and new mobile sources.	The EB has not yet dealt with compliance with this Protocol. The reductions estimated by EMEP from reported data (1990–2011) was 42% for NO_X. Parties exceeding the 2010 target: Denmark (by 20%); Belgium (16%); France (17%); Spain (8%); and Luxembourg (100%).[31] Non-methane VOC emissions decreased by 53%. Target not reached by Germany and Luxembourg (by ~1%). SO_X emissions decreased by ~70% and all parties achieved their target in 2010–11. Ammonia (NH_3) emissions decreased by 31%. Six parties exceeded their targets in 2011: Denmark (7%); Croatia (23%); Germany (2%); Finland (20%); Norway (14%); and Spain (8%). CO emissions in the EMEP area decreased by 57%.[32]

Notes:

[1] Geneva (Switzerland), 28 Sept. 1984, in force 28 Jan. 1988, available at: http://www.unece.org/env/lrtap/emep_h1.html.
[2] The EMEP area includes Europe, Turkey and the Southern Caucasus, and the Central Asian states: see http://www.ceip.at/ms/ceip_home1/ceip_home/new_emep-grid.
[3] Chapter XI, para. 73(f), Report of the Executive Body on its 32nd session, Geneva (Switzerland), 9–13 Dec. 2013, ECE/EB.AIR/122, available at: http://www.unece.org/index.php?id = 33605#.
[4] Helsinki (Finland), 8 July 1985, in force 2 Sept. 1987, available at: http://www.unece.org/env/lrtap/sulf_h1.html.
[5] Ibid.
[6] Sofia (Bulgaria), 31 Oct. 1988, in force 14 Feb. 1991, available at: http://www.unece.org/env/lrtap/nitr_h1.html.
[7] Catalytic converters convert NO_X into CO_2, nitrogen, and water.
[8] See http://www.unece.org/env/lrtap/nitr_h1.html.
[9] Note all Executive Body Decisions referenced in this table are available at: http://www.unece.org/env/lrtap/executivebody/eb_decision.html.
[10] Decision 2005/5 (ref. 3/02), ECE/EB.AIR/87/Add.1, p. 8, Annex V.
[11] Decision 2011/3 (ref. 4/02), ECE/EB.AIR/109/Add.1.

[12] Decision 2013/6 (ref. 2/02), ECE/EB.AIR/122/Add.1.
[13] Decision 2013/5 (ref. 1/08 and ref. 1/10 (Cd)), ECE/EB.AIR/122/Add.1 (Cyprus acceded to the Protocol in Sept. 2004).
[14] Geneva (Switzerland), 18 Nov. 1991, in force 29 Sept. 1997, available at: http://www.unece.org/env/lrtap/vola_h1.html.
[15] H. Selin & S.D. VanDeveer, 'Mapping Institutional Linkages in European Air Pollution Politics' (2003) 3(3) *Global Environmental Politics*, pp. 14–46, at 25.
[16] See http://www.unece.org/env/lrtap/30anniversary.html.
[17] Decision 2005/3 (ref. 3/01), ECE/EB.AIR/87/Add.1, p. 5, Annex III.
[18] Decision 2008/2 (ref. 1/01), ECE/EB.AIR/96/Add.1.
[19] Decision 2013/7 (ref. 6/02), ECE/EB.AIR/122/Add.1.
[20] Oslo (Norway), 14 June 1994, in force 5 Aug. 1998, available at: http://www.unece.org/env/lrtap/fsulf_h1.html.
[21] UNECE, 'Strategies and Policies for Air Pollution Abatement: 2006 Review', ECE/EB.AIR/93 (UN, 2007), at p. 29.
[22] Aarhus (Denmark), 24 June 1998, in force 29 Dec. 2003, available at: http://www.unece.org/env/lrtap/hm_h1.html.
[23] Decision 2013/5, n. 13 above.
[24] I. Ilyin et al., *Heavy Metals: Transboundary Pollution of the Environment*, EMEP Status Report 2/2013 (Meteorological Synthesizing Centre–East (MSC-E)/Chemical Co-ordinating Centre (CCC), 2013), pp. 5–6.
[25] Aarhus (Denmark), 24 June 1998, in force 23 Oct. 2003, available at: http://www.unece.org/env/lrtap/pops_h1.html.
[26] A. Gusev et al., *Persistent Organic Pollutants in the Environment*, EMEP Status Report 3/2014 (MSC-E/CCC, 2014), at p. 4.
[27] Decision 2013/8 (ref. 1/06 (PAH)), ECE/EB.AIR/122/Add.1.
[28] Decision 2012/17 (refs. 2/10, 5/10, 10/10, 3/10 and 11/10), ECE/EB.AIR/113/Add.1.
[29] Decision 2013/11 (ref. 14/10 (PAH; dioxin/furan)), ECE/EB.AIR/122/Add.1. Iceland had been held to be non-compliant with its obligations concerning PAHs, but Decision 2013/9 (ref. 6/10 (PAH)), ECE/EB.AIR/122/Add.1 found that Iceland qualified for a conditional exemption under Art. 3(7), having followed the process set out in Art. 3(5)(b) (i.e. applied the specified best available techniques, limit values, and effective control measures to the appropriate sources).
[30] Gothenburg (Sweden), 30 Nov. 1999, in force 15 May 2005, available at: http://www.unece.org/env/lrtap/multi_h1.html.
[31] The signatories who exceeded their reduction target included Liechtenstein (76%), Austria (71%), Ireland (9%).
[32] M. Gauss et al., 'Status of Transboundary Pollution in 2011', in M. Schulz et al. (eds), *Transboundary Acidification, Eutrophication and Ground Level Ozone in Europe in 2011*, EMEP Status Report 1/2013 (Norwegian Meteorological Institute, 2013), pp. 17–42, at 24–6. National PM data may have significant uncertainty associated with it.