8

Climate Change

CHAPTER OUTLINE

This chapter addresses the international rules on climate change, now a substantial and complex area. The chapter is divided into four parts:

1. the nature of the climate change problem and the challenges that it poses for international regulation;
2. development of the international climate change regime, including:
   (a) the 1992 United Nations Framework Convention on Climate Change;
   (b) the 1997 Kyoto Protocol; and
   (c) negotiations for a new climate change agreement;
3. key provisions of the 2015 Paris Agreement, which establishes arrangements for international governance and regulation of climate change post 2020; and
4. intersectoral linkages between international climate change law and other treaty regimes and organisations dealing with climate change.

INTRODUCTION

In the first three editions of this book, the problem of climate change and the international legal arrangements developed to address it, were included in the chapter on atmospheric protection.[1] Today, however, international law on climate change constitutes a vast field in its own right. It incorporates not only regulation of atmospheric pollution resulting from the release of greenhouse gases from human activities, but also a range of other issues, including impacts and adaptation, loss and damage, finance, deforestation and forest degradation (REDD+), carbon markets, and linkages with other areas of international law, such as human rights and trade. Moreover, with the conclusion and entry into force of the 2015 Paris Agreement,[2] the structures and processes of rules relating to climate change differ significantly from certain other areas of international environmental law. The Paris Agreement signals a tectonic shift, away from a top-down international

[1] P. Sands and J. Peel, *Principles of International Environmental Law* (Cambridge: Cambridge University Press, 2012, 3rd edn), ch. 7.

[2] As of August 2017, the Paris Agreement has 159 parties, including the United States, although the Trump administration has submitted a communication to the UN stating the intent of the United States to withdraw from the Paris Agreement as soon as it is eligible to do so under Article 28 of the Agreement.

standard-setting approach (as in the ozone regime),[3] to a bottom-up regulatory model by which states determine their national contributions to the global response to climate change.[4]

This chapter provides an introduction to the field of international climate change law, with a focus on the requirements of the Paris Agreement. It begins with a discussion of the climate change problem, summarising the latest scientific findings and highlighting some of the complexities of the issue that have precipitated a substantially different international legal response to that seen in other environmental areas. A brief overview is then provided of the two treaty instruments that preceded, and underpin, the 2015 Paris Agreement: the 1992 Framework Convention on Climate Change and the 1997 Kyoto Protocol. While important in putting climate change on the international agenda, and effecting a shift in consciousness, these treaties failed to slow emissions growth sufficiently or bring about the substantial reorientation in states' economic policies concerned with energy production, industrial activity, transportation and forestry, necessary to achieve a sustainable climate future.[5] After an international negotiations process spanning more than a decade, the Paris Agreement was concluded at the twenty-first conference of the parties to the Framework Convention held in Paris in December 2015. The Agreement's 'long-term temperature goal' is to hold 'the increase in the global average temperature to well below 2 °C above pre-industrial levels'[6] – the temperature threshold that the vast majority of climate scientists have designated as the maximum safe level of global warming[7] – and to 'pursue efforts' to limit the temperature increase to the lower level of 1.5 °C above pre-industrial levels, 'recognizing that this would significantly reduce the risks and impacts of climate change.'[8] Parties also aim to achieve net zero carbon emissions in the second half of the twenty-first century,[9] an objective that will require the eventual phase out of fossil fuels.

Whether the Paris Agreement turns out to be a 'historic breakthrough or high stakes experiment',[10] will depend to a large degree on the extent to which states and other actors put forward robust domestic mitigation measures, engage in the review processes, and strengthen their commitments progressively over time.

Regardless of how effective states' mitigation measures are, delays in putting in place strong emissions controls have 'locked in' some level of climate change impact and increased the prospects for climate disaster in many vulnerable areas around the world. Enhanced need for measures to manage climate change effects (adaptation) and to deal with unavoidable climate harms (loss and damage), as well as the technology, capacity-building and finance arrangements required to support this, has seen these aspects receive increasing attention in the international climate change regime and in the provisions of the Paris Agreement. Climate change is no longer solely or even mostly a problem of atmospheric pollution, but rather a complex,

[3] Initial negotiations for a climate treaty sought to follow the Montreal Protocol model. See R. Benedick, 'The Montreal Ozone Treaty: Implications for Global Warming', 5 *American University Journal of International Law and Policy* 217 (1990).

[4] See also R. Stewart, M. Oppenheimer and B. Rudyk, 'Building Blocks for Global Climate Protection', 32 *Stanford Environmental Law Journal* 341 (2013).

[5] See D. Clarke, 'Has the Kyoto Protocol Made Any Difference to Carbon Emissions?', *The Guardian*, 26 November 2012, at www.theguardian.com/environment/blog/2012/nov/26/kyoto-protocol-carbon-emissions; S. Marcacci, 'Was the Kyoto a Success or Failure?', *Clean Technica*, 29 December 2011.

[6] Paris Agreement, Art. 2.1(a).

[7] IPCC, 'Climate Change 2007: The Synthesis Report', in *Fourth Assessment Report: Climate Change 2007* (2007).

[8] Paris Agreement, Art. 2.1(a).

[9] *Ibid*., Art. 4.1.

[10] M. Doelle, 'The Paris Agreement: Historic Breakthrough or High Stakes Experiment?', 6 *Climate Law* 1 (2016).

multidimensional issue that penetrates deeply into the social and economic fabric of nation states and interfaces with a multitude of other areas of international law. In this respect, climate change poses a critical test for the utility and effectiveness of international environmental regulation more generally and its commitment to advancing sustainable development.

THE CLIMATE CHANGE PROBLEM

The Earth's climate is determined in large part by the presence in the atmosphere of naturally occurring greenhouse gases, including, in particular, water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and tropospheric ozone (O_3). These are transparent to incoming short-wave solar radiation but absorb and trap longwave radiation emitted by the Earth's surface. Their presence exerts a warming influence on the Earth. Scientific evidence suggests 'unequivocally' that continued increases in atmospheric concentrations of selected greenhouse gases due to human activities leads to an enhanced 'greenhouse effect' and global climatic change.[11] Carbon dioxide in emissions from the combustion of fossil fuels, the production of cement, and agricultural and other land use (including deforestation and forest degradation) is widely considered to be the most substantial contribution to the threat of climate change, but global emissions of CFC-11 and 12, methane and nitrous oxide also pose a significant risk.

In 1988, UNEP and the WMO established the Intergovernmental Panel on Climate Change (IPCC) to provide the scientific guidance necessary to take further action.[12] The fifth IPCC report, published in 2014, predicted that, under various 'business-as-usual' emissions scenarios, global mean temperatures could rise by between 3.7 °C and 4.8 °C over the twenty-first century.[13] Such a rate of increase would be expected to lead to a massive decrease in the areas of sea ice and snow cover, a rise in global mean sea level of between 45 cm and 82 cm by the end of the twenty-first century (not taking into account future rapid dynamic changes in ice flow), more frequent hot and fewer cold temperature extremes and an increased frequency of extreme weather events.[14] In addition, the IPCC report discussed a range of other risks from climate change for natural and human systems, including increased species extinction risk, threats to food security, exacerbation of existing human health risks, reduced water security, heightened risks of conflict, and increased displacement of people.[15] The IPCC concluded:

> Without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread and irreversible impacts globally (high confidence).[16]

[11] IPCC, 'Climate Change 2014: The Synthesis Report', in *Fifth Assessment Report: Climate Change 2014* (2014), 2–3. The 1992 Climate Change Convention defines 'greenhouse gases' as 'those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infra-red radiation' (Art. 1(5)).

[12] The IPCC has produced five reports: in 1990, 1992, 2001, 2007 and 2014. The next report is due in 2021, however, the IPCC has agreed to produce a special report in 2018 on the impacts of global warming of 1. 5 °C above pre-industrial levels and related global greenhouse gas emission pathways.

[13] IPCC, Summary for Policy Makers in 'Climate Change 2014: The Synthesis Report', in *Fifth Assessment Report: Climate Change 2014*, 20. This is for scenarios without additional efforts to constrain emissions. When climate uncertainty is included, the temperature range is between 2.5 °C and 7.8 °C.

[14] Scenarios modelled using different assumptions about economic growth, implementation of climate policies, etc. (*ibid.*).

[15] *Ibid.*, 13–16. [16] *Ibid.*, 17.

As indicated in the introduction, an increase in global mean temperature of more than 2 °C above that occurring in pre-industrial times is thought to constitute dangerous global warming, although many scientists and small island states have argued for more precautionary levels of a maximum 1.5 °C increase (now formally recognised in the Paris Agreement) in order to safeguard low-lying areas and to prevent extensive species loss.[17] In its fifth assessment report, the IPCC quantified the 'carbon budget' associated with the 2 °C threshold finding that:

> limiting total human-induced warming to less than 2 °C relative to the period 1861–1880 with a probability of >66% would require cumulative CO_2 emissions from all anthropogenic sources since 1870 to remain below about 2900 Gt CO_2 (with a range of 2550 to 3150 Gt CO_2 depending on non-CO_2 drivers). About 1900 Gt CO_2 had already been emitted by 2011.[18]

This leaves a remaining global carbon budget of approximately 1000 Gt CO_2, which on current emission rates, could be exhausted before the middle of the century.[19] Consequently, successive IPCC reports have called for 'substantial cuts' in greenhouse gas emissions in the order of 40 to 70 per cent below 2010 levels by 2050, with global net emissions of CO_2 decreasing to near or below zero by the end of the century.[20]

Although scientific understanding of the greenhouse effect dates back more than two centuries, with the link to harmful climate change discussed since the mid 1950s,[21] the climate change problem is one that has proved particularly intractable for international law and policy. Part of the difficulty lies in the multiple, diverse sources, and widespread nature of emissions of greenhouse gases that contribute to global warming and consequent climate change.[22] Every state, as well as numerous entities within states, including companies, farms, households and individuals, emit some level of greenhouse gases and thereby contribute to the problem.[23] Moreover, emitting activities are highly diverse and take place in many important sectors of national economies; energy production, industrial activities, transportation and agriculture/forestry being among them. Historically, developed countries were the principal emitters of greenhouse gases, however, more recently, some large developing countries, such as China, India, Brazil, Indonesia and South Africa, have emerged as major emitters. In 2007, for instance, China's domestic emissions surpassed those of the United States, which remains the leading developed country emitter.[24] Nonetheless, global mixing of greenhouse gases such as CO_2 in the upper atmosphere leads to concentrations that are roughly equivalent worldwide. Hence the effects of climate change will be experienced everywhere and not just at locations of highest

[17] The IPCC has calculated that stabilisation of atmospheric carbon dioxide concentrations at about 450 ppm is necessary to have a 50:50 chance of avoiding a 2 °C warming.

[18] IPCC, Summary for Policy Makers in 'Climate Change 2014: The Synthesis Report', in *Fifth Assessment Report: Climate Change 2014*, 10.

[19] See World Resources Institute, Infographic: The Global Carbon Budget, March 2014, at www.wri.org/resources/data-visualizations/infographic-global-carbon-budget. This is based on the IPCC's high emissions scenario, RCP 8.5.

[20] IPCC, Summary for Policy Makers in 'Climate Change 2014: The Synthesis Report', in *Fifth Assessment Report: Climate Change 2014*, 20.

[21] See S. Weart, *The Discovery of Global Warming* (Cambridge, MA/London: Harvard University Press, 2008).

[22] Data by country and sector can be found at http://unfccc.int/ghg_data/items/3800.php

[23] See http://unfccc.int/di/DetailedByParty.do for detailed data for each Convention party.

[24] See World Resources Institute CAIT Climate Data Explorer at http://cait.wri.org; J. Vidal and D. Adam, 'China Overtakes US as World's Biggest CO_2 Emitter', *The Guardian*, 20 June 2007.

emissions. Indeed, some of the severest impacts of climate change are likely to be experienced in states and by communities that have made the least contribution to the global problem in terms of their own emissions,[25] a situation that has been characterised as one of 'climate injustice'.[26]

DEVELOPMENT OF THE CLIMATE CHANGE REGIME[27]

Having determined that 'climate change is a common concern of mankind' in 1988 and 1989, the negotiation of a treaty to address climate change and its effects was formally set in motion by the UN General Assembly and the specialised agencies.[28] The UN Framework Convention on Climate Change (1992 Climate Change Convention) was signed by 155 states and the EU in June 1992 at UNCED. It comprised a package that contained elements for almost all the negotiating states but left none entirely satisfied.[29] Instead, the Convention reflected a compromise between those states which were seeking specific targets and timetables for emission reductions, and those which wanted only a 'bare-bones' skeleton treaty which could serve as the basis for future Protocols, like the 1985 Vienna Convention. In 1997, the Kyoto Protocol was adopted, establishing more detailed commitments for developed parties for the first commitment period, 2008–12. Delays in states' ratification of the Protocol, coupled with the rejection of the treaty by the United States, meant that it only came into force in 2005. In 2011, parties to the Kyoto Protocol agreed to extend it to a second commitment period, running from 2013 to 2020, however, the necessary amendment for this extension has not yet come into force.

Between 2005 and 2015, the international climate change regime was in a process of lengthy negotiation as parties to the Climate Change Convention and the Kyoto Protocol sought to agree on arrangements to govern, initially, the post-2012 and post-2015 periods, and then the post-2020 period. The 2015 Paris Agreement represents the culmination of this negotiation process and lays down a framework for the management of climate change from 2020 onwards. Unlike the time-limited Kyoto Protocol, the Paris Agreement provides for an ongoing process of national submission of climate actions, review and progressive revision that will continue

[25] IPCC, *Climate Change 2014: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2014).

[26] International Bar Association, 'Achieving Justice and Human Rights in an era of Climate Disruption' *Climate Change Justice and Human Rights Task Force Report*, 5 July 2014.

[27] See, generally, UNFCCC website at http://unfccc.int

[28] UNGA Res. 43/53 (1988); UNGA Res. 44/207 (1989). The political process leading to the negotiation of a legal instrument was given further impetus by the 1990 Ministerial Declaration of the Second World Climate Conference, UN Doc. A/45/696/Add.1, Annex III (1990), which called for negotiations on an effective framework convention on climate change containing appropriate commitments to begin without delay. In December 1990, the UN General Assembly established a single intergovernmental negotiating process under the auspices of the General Assembly, supported by UNEP and WMO, for the preparation by an Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) (UNGA Res. 45/221 (1990)). The INC/FCCC held five sessions, and the Framework Convention was adopted at the close of the resumed fifth session in May 1992. For further details of the history of the Convention's negotiating process, see P. Sands, 'The United Nations Framework Convention on Climate Change', 1 *Review of European Community and International Environmental Law* 270 (1992); D. Bodansky, 'The United Nations Framework Climate Change Convention: A Commentary', 18 *Yale Journal of International Law* 451 (1993); I. Mintzer and J. Leonard (eds.), *Negotiating Climate Change: The Inside Story of the Rio Convention* (Cambridge: Cambridge University Press, 1994); D. Bodansky, 'The United Nations Framework Convention on Climate Change: A Commentary on a Commentary', 25(2) *Yale Journal of International Law* 315 (2000).

[29] *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 31 ILM 849 (entered into force on 24 March 1994) (1992 Climate Change Convention), Art. 23(1). The Convention attracted twenty-six ratifications within a year of its adoption, and it currently enjoys near universal participation with 197 parties.

indefinitely into the future. Rather than targets and timetables for emissions reductions enshrined in international law, the hallmark of the Paris Agreement is its 'bottom-up approach', with the scope of mitigation and adaptation actions to be determined by individual parties according to their domestic political and economic priorities.

While the Paris Agreement establishes a new regime for the future management of climate change, this regime rests on the foundations of – and is intended to extend – the provisions of the Climate Change Convention. Decisions taken by the Conference of the Parties (COP) to the Climate Change Convention, as well as provisions of the Kyoto Protocol in respect of parties to it, continue to govern parties' actions, especially in the pre-2020 period. Moreover, as the Paris Agreement indicates, its processes of review and transparency, as well as the scope it provides for 'voluntary cooperation in the implementation' of national climate actions, are intended to build on the experience developed with similar mechanisms under the Convention and Kyoto Protocol. The following sections therefore provide a brief overview of the 1992 Climate Change Convention and 1997 Kyoto Protocol before turning to discuss the new requirements that will apply from 2020 under the 2015 Paris Agreement.

1992 Climate Change Convention

The 1992 Climate Change Convention went beyond the scope of the 1985 Vienna Convention, which took nearly three times as long to negotiate among a smaller group of states. Indeed, the word 'Framework' in the title is something of a misnomer, since the 1992 Convention established:

(1) a general commitment to stabilise greenhouse gas concentrations in the atmosphere at a safe level, over the long term, and to limit emissions of greenhouse gases by developed countries in accordance with soft targets and timetables;
(2) a financial mechanism and a commitment by certain developed country parties to provide financial resources for meeting certain incremental costs and adaptation measures;
(3) two subsidiary bodies to the Conference of the Parties; and
(4) a number of important guiding 'Principles'.

There were 143 states participating in the final negotiating session for the Convention, which was unprecedented in the potential scope of its direct and indirect consequences. Affecting the vital economic interests of almost all states, it attempted to adopt a comprehensive approach to integrating environmental considerations into economic development and defined, in legal terms, rights and obligations of different members of the international community in the quest for 'sustainable development' and the protection of the global climate.[30] The differing economic capacities of developed countries, and, in particular, the problems faced by the former socialist countries of central and eastern Europe, led to a novel distinction being drawn in the Convention: for the purposes of differentiating specific commitments relating to sources and sinks,[31]

[30] The relationship between the Climate Change Convention and vital national economic, social and environmental interests was evident from the different interest groups of states which emerged during the negotiations. For a discussion of the various country groupings and their interests, see the second edition of this book (pp. 360–1).

[31] Under the Convention, a 'source' is 'any process or activity which releases a greenhouse gas, aerosol or precursor of a greenhouse gas into the atmosphere' (Art. 1(9)); a 'sink' is 'any process, activity or mechanism which removes a greenhouse gas or a precursor of a greenhouse gas from the atmosphere' (Art. 1(8)).

and those relating to finance, a distinction was drawn between all developing country parties and developed country parties (included in Annex I)[32] and those developed country parties and developed parties not 'undergoing the process of transition to a market economy' (listed in Annex II).[33]

Preamble, Definitions, Objective and Principles

The Convention's Preamble reflects a wide range of interests, including matters jettisoned from the 'Principles' due to lack of consensus. For instance, it expressly recognises 'the principle of sovereignty', that the largest share of historical and current global emissions originated in developed countries, and included (for the first time in a treaty) Principle 2 of the Rio Declaration (rather than Principle 21 of the Stockholm Declaration). The Preamble also refers to the concepts of 'per capita emissions' and 'energy efficiency', matters that did not receive sufficient support to be included in the operational part of the Convention. Of note in the definitions Article is the omission of the concept of 'net emissions' (sources minus sinks, but no agreement was possible on whether to include natural sinks such as oceans), and a footnote to the title of the first Article (Article 1, 'Definitions') which states that: 'Titles of articles are included solely to assist the reader.'[34]

The ultimate objective of the Climate Change Convention is to stabilise greenhouse gas concentrations in the atmosphere 'at a level that would prevent dangerous anthropogenic interference with the climate system'.[35] Although 'dangerous anthropogenic interference' is not defined in the Convention, as discussed above, scientific evidence has increasingly converged on 2 °C warming (or a lower figure such as 1.5 °C) above pre-industrial levels as the best indicator in this regard.[36] This statement of the Convention's objective emphasises that prevention of climate change is the primary goal. However, the Convention implicitly recognised that some climate change is inevitable, since the objective is to be achieved within a timeframe sufficient to allow 'ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner'.[37] Moreover, the Convention includes numerous references to the 'effects' and 'adverse

[32] Annex I lists all the OECD countries as at 1992 and the EU, together with Liechtenstein and Monaco (designated by the term 'developed party', apparently for the first time in international law), plus several former socialist countries: Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and Ukraine. Albania, Yugoslavia and certain members of the Commonwealth of Independent States appear in neither Annex and must therefore be deemed to be developing countries within the meaning of the Convention. See also Decision 4/CP.3, Report of the Conference of the Parties on Its 3rd Session, Kyoto, 1–10 December 1997, FCCC/CP/1997/7/Add.1.

[33] Annex II lists all OECD member countries as at 1992 (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States) and the EU. At COP7, the parties removed Turkey from Annex II: see Decision 26/CP.7, Report of the Conference of the Parties on Its 7th Session, 29 October to 10 November 2001, Marrakech, FCCC/CP/2001/13/Add.4.

[34] On the possible legal consequences of this footnote, see Chapter 4, p. 111. The Paris Agreement provides that the definitions contained in Article 1 of the Convention apply also to the Agreement, Paris Agreement, Art. 1.

[35] Art. 2. The 'climate system' is defined as 'the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions' (Art. 1(3)); 'climate change' is 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods' (Art. 1(2)).

[36] See Decision 1/CP.16, Cancún Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention, FCCC/CP/2010/7/Add.1, I.4.

[37] Art. 2.

effects' of climate change (twenty-two times), and to 'vulnerability' and 'impacts' (seven times), suggesting that it also has the additional, but unstated, objective of establishing an instrument to address the adverse effects of climate change and ensure that countries, particularly those most vulnerable, are able to prepare adequately for adaptation to the adverse effects of climate change.[38] The objective of the Climate Change Convention remains relevant for the post-2020 period given the Paris Agreement's declared intent of 'enhancing the implementation of the Convention, including its objective.'[39]

Article 3 of the Convention sets out a number of 'Principles' to guide the parties in achieving the objective and implementing the provisions of the Convention. The obligation of parties to protect the climate system is 'on the basis of equity' and 'in accordance with their common but differentiated responsibilities and respective capabilities', in accordance with which developed country parties should take the lead.[40] Parties were also directed to adopt measures and policies which are 'precautionary', 'cost-effective' and 'comprehensive', and which take into account different 'socio-economic contexts'.[41] Climate change policies were also to be integrated with national development programmes, and measures to combat climate change 'should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade'.[42] Finally, throughout the 'Principles' section, and elsewhere in the Convention, reference is made to the need to ensure 'sustainable economic growth' in order to address the problems of climate change.

The continuing relevance of the Convention's Principles for the post-2020 period is left unclear by the Paris Agreement, although the preamble to the Agreement refers to 'pursuit of the objective of the Convention, and being guided by its principles'. The Agreement also provides that it 'will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.'[43] The significance of the addition of the phrase 'in the light of different national circumstances' is uncertain, although some commentators have suggested it introduces greater flexibility to the concept.[44]

General Commitments

To achieve the objectives of the Convention, all parties committed under Article 4(1) to take certain measures, taking into account their common but differentiated responsibilities and priorities, objectives and circumstances. These general commitments included the development of national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol,[45] and the formulation and implementation of national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing emissions and removals of these gases and by facilitation of adequate adaptation to climate change.[46] All parties were also required: to promote, and cooperate in the diffusion of, technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol;

[38] 'Adverse effects of climate change' means 'changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare' (Art. 1(1)).
[39] Paris Agreement, Art. 2(1). [40] Art. 3(1). [41] Art. 3(3). [42] Art. 3(5). [43] Art. 2(2).
[44] See Doelle, 'Paris Agreement'. [45] Art. 4(1)(a). [46] Art. 4(1)(b).

to promote sustainable management, conservation and enhancement of sinks and reservoirs of these greenhouse gases; and to cooperate in preparing for adaptation to the impacts of climate change.[47] All parties were directed to take climate change into account, to the extent feasible, in their social, economic and environmental policies; to promote and cooperate in research, systematic observation and development of data archives to the further understanding of climate change and response strategies; to promote and cooperate in full, open and prompt exchange of relevant information, and to promote and cooperate in education, training and public awareness.[48]

Reporting

The Convention established broad reporting requirements for the communication of certain information, with specific provision for financial resources to be made available to developed country parties. All parties were required to communicate, to the Conference of the Parties: information on implementation; a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol; a general description of steps taken or envisaged to implement the Convention; and any other relevant information including that relevant for calculating global emissions trends.[49] The effective implementation by developing country parties of their communication commitments was linked to the effective implementation by developed country parties of their financial commitments, including the need for adequacy and predictability in the flow of funds.[50] Annex I parties were to include information relating to measures and policies to fulfil commitments under Article 4(2)(a) and (b), and a specific estimate of the effects of those policies and measures on emissions and removals by the year 2000.[51] Annex II parties were required to provide details of measures taken in accordance with Article 4(3), (4) and (5).[52]

Initial communications for each Annex I party were required within six months of the entry into force of the Convention for that party, and most have now reported six times.[53] For all other parties, reports were to be made within three years of entry into force for that party, or upon the availability of financial resources under Article 4(3), and least developed country parties could make their initial communications at their discretion. The timetable for subsequent communications is set by the Conference of the Parties.[54] Article 12 also provides for joint communication by a group of parties, for the protection of confidential information, and for making communications public.[55] The new 'enhanced transparency framework for action and support' established under the Paris Agreement is intended to draw on the transparency arrangements under the Convention and to build on this experience.[56]

[47] Art. 4(1)(c)–(e); a 'reservoir' is defined as 'a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored' (Art. 1(7)).
[48] Art. 4(1)(f)–(i). [49] Arts. 4(1)(j) and 12(1). [50] Art. 4(3) and (7). [51] Art. 12(2). [52] Art. 12(3).
[53] National reports available at: http://unfccc.int/national_reports/items/1408.php
[54] Art. 12(5). Decisions 9/CP.2 and 10/CP.2 of the second Conference of the Parties established guidelines, a schedule and a process for consideration of communications from Annex I and non-Annex I parties (see Report of the Conference of the Parties on Its 2nd Session, Geneva, 8–19 July 1996, FCCC/CP/1996/15/Add.1, 29 October 1996). The reporting guidelines were substantially revised by the fifth Conference of the Parties (see Decisions 3/CP.5 and 4/CP.5, Report of the Conference of the Parties on Its 5th Session, Bonn, 25 October–5 November 1999, FCCC/CP/1999/6/Add.1, 17 January 2000). Most developing country parties had submitted at least one national communication by January 2009: see UNFCCC, Fact Sheet: UNFCCC Emissions Reporting, https://unfccc.int/files/press/backgrounders/application/pdf/fact_sheet_unfccc_emissions_reporting.pdf
[55] Art. 12(8)–(10). [56] Paris Agreement, Art. 13(1) and (3).

Specific Commitments: Sources and Sinks

At the heart of the Convention were its specific commitments relating to sources and sinks of greenhouse gases binding on all developed country parties and the EU under Article 4(2). However, the extent of these commitments was unclear as a result of the convoluted language agreed to by way of compromise between various OECD members, and the different interests in and between developed and developing countries. Their importance, nonetheless, lay in their being the only source of emission reduction commitments binding on non-parties to the Kyoto Protocol, such as the United States. The relevant provisions of the opaque language of Article 4 (2) provided:

> (a) Each [Annex I party] shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of this Convention, recognising that the return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification; and taking into account the differences in these parties' starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances, as well as the need for equitable and appropriate contributions by each of these parties to the global effort regarding that objective. These parties may implement such policies and measures jointly with other parties and may assist other parties in contributing to the achievement of the Convention and, in particular, that of this sub-paragraph;
>
> (b) In order to promote progress to this end, each [Annex I party] shall communicate, within six months of the entry into force of the Convention for it and periodically thereafter, and in accordance with Article 12, detailed information on its policies and measures referred to in sub-paragraph (a) above, as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for the period referred to in sub-paragraph (a), with the aim of returning individually or jointly to their 1990 levels of these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol.

Even when read together, these two paragraphs did not reflect a clear commitment to stabilise carbon dioxide and other greenhouse gas emissions by the year 2000 at 1990 levels, as advocated by the EU and others during the negotiations. The most that could reasonably be said of these provisions was that they established soft targets and timetables with many loopholes. At the first Conference of the Parties, the adequacy of Article 4(2)(a) and (b) was reviewed with agreement 'to begin a process to enable [the Conference of the Parties] to take appropriate action for the period beyond 2000, including the strengthening of the commitments of the Parties included in Annex I to the Convention (Annex I Parties) in Article 4, paragraph 2(a) and (b), through the adoption of a protocol or another legal instrument'.[57] This process led to the adoption of a

[57] In accordance with Art. 2(4)(d), a second review of the adequacy of Art. 4(2)(a) and (b) took place during the fourth Conference of the Parties at Buenos Aires in 1998. The parties failed to reach a decision on the review and subsequent consideration of the matter at the fifth and sixth Conferences of the Parties has similarly produced no agreed result.

Protocol to the Convention at the third Conference of the Parties in Kyoto in 1997 (discussed further below).[58]

The Convention provided for 'joint implementation' by Annex I parties of their policies and measures, subject to further decisions to be taken by the Conference of the Parties regarding criteria for such 'joint implementation'.[59] The Convention additionally required that 'a certain degree of flexibility' should be allowed to developed country parties 'undergoing the process of transition to a market economy'.[60] Parties were also to take into consideration in the implementation of commitments the situation of parties, particularly developing country parties, with economies vulnerable to the adverse effects of implementation of response measures.[61]

The calculation of emissions by sources and removal by sinks was to take into account the best available scientific knowledge, in accordance with the common methodologies determined by the Conference of the Parties.[62] Each developed country party was also required to coordinate relevant economic and administrative instruments and identify and periodically review its own policies and practices that encourage activities that lead to greater levels of anthropogenic emissions.[63]

Commitments: Financial Resources and Technology Transfer

Annex II parties (the developed countries that form a subset of the parties listed in Annex I) undertook specific financial commitments. They agreed to provide 'new and additional' financial resources to meet the 'agreed full costs' incurred by developing country parties in fulfilling their commitment to communicate information relating to implementation,[64] and to provide such financial resources needed by developing country parties 'to meet the agreed full incremental costs of implementing measures' relating to their general commitments under Article 4(1) and which are agreed between the developing country party and the entity responsible for the financial mechanism.[65] Annex II parties also agreed to assist developing country parties 'particularly vulnerable to the adverse effects' of climate change in meeting the costs of adaptation to those adverse effects,[66] in what amounted to an implicit acceptance by developed country parties of responsibility for causing climate change.

The second review of the adequacy of Art. 4(2)(a) and (b) was 'held in abeyance' at COP 16, Report of the Conference of the Parties on Its 16th Session, Cancún, 29 November to 10 December 2010, FCCC/CP/2010/7/Add.1.

[58] See Decision 1/CP.3, Report of the Conference of the Parties on Its 3rd Session, Kyoto, 1–11 December 1997, FCCC/CP/1997/7/Add.1.

[59] Art. 4(2)(a) and (d). At its first session, the Conference of the Parties launched a 'pilot phase of activities implemented jointly' (AIJ) (see Decision 5/CP.1, Report of the Conference of the Parties on Its First Session, Berlin, 28 March–7 April 1995, FCCC/CP/1995/7/Add.1). Under the pilot phase, parties could implement projects that reduce greenhouse gas emissions, or enhance removals of greenhouse gases by 'sinks', in the territories of other parties, although no credits could accrue to any party for greenhouse gas emission reductions or removals. In 2000, COP 5 decided to continue the pilot phase beyond 2000 (see Decision 13/CP.5) and in 2006, at its twelfth session, the Conference of the Parties agreed on the continuation of the AIJ under the pilot phase. See http://unfccc.int/cooperation_support/activities_implemented_jointly/items/2307.php

[60] Art. 4(6). [61] Art. 4(10).

[62] Art. 4(2)(c). See also Decision 4/CP.1 on Methodological Issues, Report of the Conference of the Parties on Its First Session, Berlin, 28 March–7 April 1995, FCCC/CP/1995/7/Add.1. Since then, the UNFCCC Secretariat has prepared a note on methodological issues: UNFCCC, Methodological Issues. Review of Methodological Work under the Convention and the Kyoto Protocol: Note by the Secretariat (2002). There have also been several workshops: see e.g. UNFCCC, Report on the Workshop on Methodological Issues Relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries: Note by the Secretariat (2008), http://unfccc.int/resource/docs/2008/sbsta/eng/11.pdf

[63] Art. 4(2)(e). [64] Art. 12. [65] Art. 4(3). [66] Art. 4(4).

In the implementation of Article 4, the parties were required to give full consideration to the actions necessary to meet the specific needs and concerns of developing country parties arising from the adverse effects of climate change, and/or the impact of implementing response measures, including actions related to funding, insurance and the transfer of technology.[67] Certain categories of countries were identified, including small island countries, countries with low-lying coastal areas, countries with areas liable to drought and desertification, and countries whose economies are highly dependent on income generated from, or the consumption of, fossil fuels.

Annex II parties were required to take all practicable steps to promote, facilitate and finance the transfer of, or access to, environmentally sound technologies and know-how, and to support the development of endogenous capacities and technologies of developing country parties.[68]

Institutional Arrangements

The Climate Change Convention established a Conference of the Parties, a secretariat, two subsidiary bodies and a financial mechanism.[69] The Conference of the Parties (COP) is the supreme body of the Convention, entrusted with keeping the implementation of the Convention under regular review and making decisions to promote its effective implementation.[70] It met for the first time in 1995 and has subsequently met annually.[71] The Conference of the Parties also served as the primary negotiating forum for the international climate negotiations process that led to conclusion of the Paris Agreement. The functions of the Conference of the Parties include:

- to examine periodically the obligations of the parties;
- to facilitate the coordination of measures;
- to promote and guide comparable methodologies for preparing inventories of greenhouse gas emissions;
- to assess the implementation of the Convention by all parties and the overall effect of measures; and
- to adopt regular reports on the implementation of the Convention.

A multidisciplinary Subsidiary Body for Scientific and Technological Advice was established to provide information on scientific and technological matters to the Conference of the Parties.[72] A Subsidiary Body for Implementation was established to assist the Conference of the Parties in the assessment and review of the implementation of the Convention.[73] Although some states wanted to limit participation, both subsidiary bodies are open to participation by all parties.

The Convention defined a financial mechanism for the provision of financial resources on a grant or concessional basis, including for the transfer of technology.[74] After specific commitments this was the most disputed aspect of the Convention. The mechanism functions under the guidance of, and is accountable to, the Conference of the Parties, which is responsible for its policies, programme priorities and eligibility criteria.[75] The mechanism is required to have an

[67] Art. 4(8) and (9). [68] Art. 4(5).

[69] Arts. 7–11. Several expert groups also exist to support work under the Convention. These include: a Consultative Group of Experts on National Communications from Non-Annex I Parties; a Least Developed Country Expert Group; and an Expert Group on Technology Transfer.

[70] Art. 7(2). [71] Art. 7(4). [72] Art. 9(1). [73] Art. 10(1). [74] Art. 11(1).

[75] Art. 11(1)–(3). In 1998, the fourth Conference of the Parties entrusted the GEF with the operation of the financial mechanism on a long-term basis, subject to review every four years. See Decision 3/CP.4, Report of the Conference of the Parties on Its 4th Session, Buenos Aires, 2–14 November 1998, FCCC/CP/1998/16/Add.1. Four reviews of the

equitable and balanced representation of all parties within a transparent system of governance.[76] Operation of the mechanism was originally entrusted to the Global Environmental Facility (GEF) but now operates under the auspices of the Green Climate Fund. The Convention's Financial Mechanism remains central to the post-2020 arrangements as the designated financial mechanism of the Paris Agreement.[77]

Implementation and Dispute Settlement

Apart from the role of the Conference of the Parties and the Subsidiary Body for Implementation, the Convention provided for the possibility of establishing a 'multilateral consultative process' for the resolution of implementation questions, to be available to parties on their request.[78] Although potentially innovative, no agreement was ever reached by Convention parties on the elements of this process.[79] Additionally, a dispute settlement Article provided for possible compulsory recourse to arbitration or the International Court of Justice with the consent of the relevant parties to a dispute, as well as the possibility for the compulsory establishment of a conciliation commission, with the power to make a recommendatory award, at the request of one of the parties to a dispute twelve months after notification of the dispute.[80] The Convention provided for amendment, the adoption and amendment of Annexes, and the adoption of Protocols.[81] No reservations were permitted.[82]

The 1997 Kyoto Protocol

The Kyoto Protocol to the Climate Change Convention was adopted by the third Conference of the Parties in December 1997.[83] Negotiations for a Protocol to the Convention commenced in 1995 after the first Conference of the Parties, meeting in Berlin, determined that the commitments provided for in Article 4(2)(a) and (b) of the Convention were 'not adequate' and decided to launch a process to strengthen the commitments of Annex I parties through the adoption of a protocol or another legal instrument.[84] The 'Berlin Mandate' was to:

> [a]im, as the priority in the process of strengthening the commitments in Article 4.2(a) and (b) of the Convention, for developed country/other Parties included in Annex I, both to elaborate policies and measures, as well as to set quantified limitation and reduction objectives within specified timeframes, such as 2005, 2010 and 2020, for their anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol.[85]

financial mechanism have been undertaken, with the last review being adopted by COP 16: Decision 2/CP.16. The GEF remains an operating entity.

[76] Art. 11(2). [77] Paris Agreement, Art. 9.8. [78] Art. 13.

[79] Draft terms of reference were proposed in 1998, see Decision 10/CP.4, Report of the Conference of the Parties on Its 4th Session, Buenos Aires, 2–14 November 1998, FCCC/CP/1998/16/Add.1.

[80] Art. 14. [81] Art. 24. [82] Art. 24.

[83] *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, signed 10 December 1997, 37 ILM 22 (entered into force 16 February 2005) ('Kyoto Protocol').

[84] See Decision 1/CP.3, Report of the Conference of the Parties on Its 3rd Session, Kyoto, 1–11 December 1997, FCCC/CP/1997/7/Add.1.

[85] Decision 1/CP.1, Report of the Conference of the Parties on Its 1st Session, Berlin, 28 March–7 April 1995, FCCC/CP/1995/7/Add.1, para. 2(a).

Key to the negotiating process was that it was not intended to introduce any new commitments for non-Annex I parties, but merely to 'reaffirm existing commitments in Article 4.1 and continue to advance the implementation of these commitments'.[86] This 'firewall' between the commitments of developed and developing countries though ultimately proved unsustainable in light of opposition from major developed country emitters (such as the United States, which subsequently refused to ratify the Protocol)[87] and rapid emissions growth in a number of large developing countries (such as China). In the Paris Agreement, the 'firewall' has been replaced by a commitment on behalf of *all* parties to contribute to the global response to climate change.[88]

While the Kyoto Protocol eventually entered into force in February 2005, without the participation of the United States and major developing country emitters it delivered only modest emissions reductions during its first commitment period (2008–12) and failed to limit global emissions growth.[89] In international legal terms, the achievements of the Kyoto Protocol were more significant. In particular, Kyoto Protocol parties agreed on a detailed set of rules for implementation of the treaty – known as the 'Marrakesh Accords'[90] – that are likely to form the basis for implementation arrangements in many areas under the Paris Agreement. Key provisions of the Marrakesh Accords concerned the rules for implementation of the Kyoto Protocol's 'flexibility mechanisms', elaboration of permissible activities regarding carbon sinks (known as land-use, land-use change and forestry (LULUCF) activities) and the establishment of an innovative compliance mechanism.[91] In addition, the Accords provided guidelines on national systems for the estimation of anthropogenic sources of greenhouse gas emissions, the preparation of information required for fulfilment of the reporting obligations under the Protocol, and performance of reviews by expert review teams under Article 8;[92] experience that will be highly relevant to the design of similar mechanisms under the Paris Agreement.

Emission Reduction Targets and Timetable

The major achievement of the Kyoto Protocol was the commitment of Annex I parties to quantified emission reduction targets and a timetable for their achievement. The basic obligation accepted by the Annex I parties was set out in Article 3(1), providing that Annex I parties 'shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts'.[93] The 'assigned amounts' were calculated pursuant to each party's quantified emissions limitation and reduction commitment set out in Annex B. Annex I parties were required to implement their

[86] *Ibid*., para. 2(b).

[87] See Transcript, Bush Press Conference at White House, 28 March 2001, available at https://georgewbush-whitehouse.archives.gov/news/briefings/20010328.html

[88] Paris Agreement, Art. 3. [89] Clark, 'Has the Kyoto Protocol Made any Difference to Carbon Emissions?'.

[90] The Marrakesh Accords are reproduced in four volumes of the report of the seventh Conference of the Parties, Marrakesh, 29 October–9 November 2001, FCCC/CP/2001/13/Add.1–Add.4 ('Marrakesh Accords'). For a useful summary of the Kyoto Protocol provisions as supplemented by the Marrakesh Accords, see Climate Change Secretariat, *A Guide to the Climate Change Process* (2002), available at http://unfccc.int/resource/process/guideprocess-p.pdf

[91] See Decision 27/CMP.1, Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, 28 November to 9 December 2005, Montreal, FCCC/KP/CMP/2005/8/Add.3 (see Chapter 4).

[92] See Decisions 19/CMP.1, 15/CMP.1 and 22/CMP.1, Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol (n. 91).

[93] The gases covered by the Protocol are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

obligation under Article 3(1) 'with a view to reducing their overall emissions of [Annex A] gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012'. Annex I parties with economies in transition were permitted to use a base year other than 1990, calculated in accordance with Article 3(5). Banking of assigned amounts for future commitment periods was permitted as any Annex I party with emissions in a commitment period, which were less than its assigned amount, could request that the difference be added to its assigned amount for subsequent commitment periods.[94] The emission reduction commitments made in the Protocol were estimated at the time to represent a reduction of about 30 per cent below 'business-as-usual' emissions levels. While developed country parties managed to cut emissions collectively by 16 per cent in the first commitment period from 1990 levels, globally emissions surged by 50 per cent over the same period due to emissions growth in many parts of the developing world.[95]

The determination of emissions targets for the Annex I parties was a difficult issue. Annex B listed differentiated targets for individual countries and regional economic organisations. For example, the EU and its member states agreed to an emissions limitation of 92 per cent of the 1990 base year, or an 8 per cent reduction in the first commitment period of 2008–12. The United States agreed to a 7 per cent reduction. Japan and Canada each accepted a 6 per cent reduction, while Australia and Iceland were permitted to make increases of respectively 8 per cent and 10 per cent. Russia, the largest emitter of the Eastern bloc countries, agreed to stabilise its emissions at 100 per cent of 1990 levels.

Six gases were covered by the emission reduction commitments of the Annex I parties: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.[96] The number of gases covered by the Protocol was also a controversial issue with strong disagreement during the negotiations as to whether only three (carbon dioxide, methane and nitrous oxide) or six (adding hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) gases should be covered. In the end, all six gases were listed in Annex A. However, Article 3(8) provided that any Annex I party could use 1995 as its base year for the latter three gases.

Policies and Measures

Article 2 of the Protocol contains a list of policies and measures that parties could implement in order to achieve their quantified limitation and emission reduction targets. During negotiations for the Protocol, the EU pushed for the adoption of mandatory and coordinated 'policies and measures', but this was resisted by the United States, Canada, Australia and some other Annex I parties who sought a more flexible approach, with policies and measures to be determined principally by each individual party. This latter approach was largely adopted in Article 2, which provides that each Annex I party, in achieving its emissions limitation and reduction commitments under Article 3, shall implement policies and measures 'in accordance with its national circumstances'. A list of indicative measures follows, which includes enhancement of energy efficiency, the protection and enhancement of sinks, the promotion of sustainable forms of agriculture, increased research on and use of new and renewable forms of energy, measures to

[94] Kyoto Protocol, Art. 3(3). However, borrowing assigned amounts from future commitment periods is not permitted.
[95] Q. Schiermeier, 'The Kyoto Protocol: Hot Air', *Nature*, 28 November 2012, at www.nature.com/news/the-kyoto-protocol-hot-air-1.11882
[96] Kyoto Protocol, Annex A.

limit or reduce emissions in the transport sector and the limitation or reduction of methane emissions.[97] Parties are required to cooperate 'to enhance the individual and combined effectiveness of their policies and measures' through taking steps to share relevant experience and information, including developing ways of improving the compatibility, transparency and effectiveness of policies and measures.[98] Parties were also instructed to pursue limitation and reduction of emissions from aviation and bunker fuels in efforts outside the scope of the Protocol, by working through the ICAO and IMO, respectively.[99]

Flexibility Mechanisms: Emissions Trading, Joint Implementation and the CDM

By far the most innovative (and controversial) aspect of the Kyoto Protocol negotiations was the proposal to enable Annex I parties to meet their commitments under the Protocol via various 'flexibility mechanisms' that involve purchasing or acquiring credits representing greenhouse gas reductions in other countries. Although these flexibility mechanisms are not specifically replicated in the Paris Agreement, they remain relevant given the Agreement's recognition of voluntary 'cooperative approaches' that may involve 'internationally transferred mitigation outcomes'.[100] It is likely that such approaches, including the contemplated new mechanism to be established under Article 6 of the Agreement, will build on the Protocol's experience with the use of flexibility mechanisms.

Emissions trading under the Protocol permitted an Annex B party to 'buy' emission reduction credits, in the form of assigned amount units (AAUs), from another Annex B party where more cost-effective for it to do so rather than to undertake the reduction domestically. The inclusion of emissions trading in the Protocol was strongly supported by the United States, which has domestic experience with similar schemes (although in more discrete areas such as sulphur dioxide emissions)[101] and advocated their adoption internationally as cost-effective means of achieving reductions of emissions in greenhouse gases. However, emissions trading was strongly opposed by many parties, particularly China and the Group of 77 developing countries. An eleventh-hour compromise text was included in the Protocol as Article 17. This allowed Annex B parties to 'participate in emissions trading for the purposes of fulfilling their commitments under Article 3', but provided that any such trading must be 'supplemental' to domestic actions taken to achieve emission reductions.

A further economic incentive mechanism included in the Protocol allowed joint implementation by Annex I parties of their emission reduction commitments. Article 6 provided that, for the purpose of meeting its commitments under Article 3, any Annex I party could transfer to, or acquire from, any other Annex I party 'emission reduction credits resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy'.[102] An Annex I party was permitted to authorise private legal entities, under its responsibility, to participate in actions leading to the generation, transfer or acquisition of emission reduction units (ERUs) from joint implementation.[103] However, any such joint implementation was required to result in a reduction in

[97] Art. 2(1)(a). [98] Art. 2(1)(b).
[99] For further information on the work of ICAO and IMO in addressing greenhouse gas emissions from air travel and shipping respectively, see pp. 332–4.
[100] Art. 6.2.
[101] For example, its sulphur dioxide emissions trading scheme under Title IV of the Clean Air Act, 42 USC 7651.
[102] Art. 6(1). [103] Art. 6(3).

emissions by sources, or an enhancement of removals by sinks, that was additional to any that would otherwise occur and had to be supplemental to domestic actions.[104]

The Clean Development Mechanism (CDM) defined by Article 12 provided a further innovation, establishing a means for Annex I parties to gain emission reductions credits to assist them in achieving compliance with their quantified emissions limitation and reduction commitments under Article 3. As part of the CDM, Annex I parties invest in emission reduction projects in non-Annex I parties and use the certified emission reductions (CERs) accruing from such project activities 'to contribute to compliance with part of their quantified emission limitation and reduction commitments under Article 3'.[105] However, the CDM served a broader purpose: it was also designed 'to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention'.[106] Certified emission reductions obtained between 2000 and 2005 could be used to assist in achieving compliance in the first commitment period.[107] A share of the proceeds from certified project activities was required to cover administrative expenses 'as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation'.[108]

The CDM is subject to the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Protocol and is supervised by an Executive Board.[109] Emission reductions resulting from project activities require certification by operational entities designated by the Conference of the Parties serving as the Meeting of the Parties to the Protocol on the basis of various factors, including that the reductions in emissions are additional to any that would occur in the absence of the certified project activity and that there are real, measurable and long-term benefits related to the mitigation of climate change.[110] As with joint implementation, participation in the CDM may involve private and/or public entities, subject to the guidance of the Executive Board.[111]

The Marrakesh Accords contained a number of decisions relating to implementation of the Protocol's flexibility mechanisms that were subsequently adopted by the first Meeting of the Parties. As a whole, the Marrakesh Accords do not place a numerical cap on the use of the flexibility mechanisms to fulfil emission reduction commitments, as was urged by the EU, developing countries and many environmental NGOs; instead, it was provided that the use of these mechanisms is to be 'supplemental to domestic action' and that domestic action must constitute a 'significant element' of the effort made by Annex I parties in meeting their commitments under Article 3(1) of the Protocol.[112] While there was thus no quantitative limit on *acquiring* credits to use towards fulfilling emission reduction commitments, the parties did agree to adopt a safeguard against the *over-selling* of emission reduction credits by participating countries. All Annex I parties were required to keep a 'Commitment Period Reserve' at all times, which consisted of either 90 per cent of their originally assigned AAUs, or five times the emissions of the most recently reviewed emissions inventory, whichever was the lower.[113]

Emission reduction credits, in the form of AAUs, ERUs and CERs, gained through use of the flexibility mechanisms, as well as 'removal units' (RMUs) generated by sink activities (see further

[104] Art. 6(1)(b) and (d). [105] Art. 12(3)(b). [106] Art. 12(2). [107] Art. 12(10). [108] Art. 12(8).
[109] Art. 12(4). [110] Art. 12(5). [111] Art. 12(9).
[112] Marrakesh Accords, FCCC/KP/CMP/2005/8/Add.2, Decision 15/CMP.1, para. 1.
[113] *Ibid.*, Add.3, Decision 18/CMP.1, Annex, para. 6. The commitment period reserve consisted of holdings of ERUs, CERs, AAUs and/or RMUs for the relevant commitment period, which had not been acquired by an Annex I party.

below), were able to be used to meet the emission reduction commitments of Annex I parties under Article 3(1).[114] Transfers and acquisitions of credits take place between national registries under the responsibility of the parties, and each national registry maintains electronic accounts of a party's AAUs, ERUs, CERs and RMUs, as well as accounts for holdings of any legal entities authorised by the party to engage in the acquisition and transfer of credits.[115]

Eligibility to participate in the flexibility mechanisms was limited to Annex I parties which had ratified the Protocol and complied with the methodological and reporting requirements specified under Articles 5 and 7 of the Protocol.[116] Japanese and Russian resistance prevented agreement on a strict link between acceptance of the arrangements for dealing with non-compliance under the Protocol and eligibility to participate in the Protocol's flexibility mechanisms.[117]

Decisions of the Marrakesh Accords adopted by the Meeting of the Parties established detailed modalities and guidelines for each of the flexibility mechanisms.[118] In relation to the CDM, it was affirmed that it was the host party's prerogative to confirm whether a CDM project activity assists it in achieving sustainable development, although Annex I parties were required to 'refrain from using certified emission reductions generated from nuclear facilities' to meet their commitments under Article 3(1).[119] Afforestation and reafforestation are the only eligible land-use and forestry projects allowed under the CDM,[120] and for the first commitment period the total additions to a party's assigned amount resulting from such activities were not to exceed 1 per cent of the base year emissions of the party multiplied by five. While the hope was that this provision would facilitate CDM projects in least developed countries in regions such as Africa, only a few such projects received certification. The failure of the CDM to generate significant project activity in the forestry sector in developing countries led to the consideration of new incentives that would provide credits for reductions in deforestation and forest degradation in developing countries (REDD+), discussed further below.

The parties agreed upon the composition and functioning of the Executive Board of the CDM.[121] Two initial tasks for the Executive Board included the development of a simplified procedure for small-scale projects under the CDM, and the accreditation of independent organisations, known as operational entities, which play a central role in the validation of proposed CDM project activities and the verification and certification of the 'additionality' of emission reductions.[122] The issue of a certification report by a designated operational entity is the basis for

[114] *Ibid*., Add.1, Decision 2/CMP.1, para. 6.

[115] *Ibid*., Add.2, Decision 12/CMP.1, paras. 30–7. The Climate Change Secretariat established a transaction log to verify transactions of credits as they were proposed and to halt any transactions where a discrepancy was detected.

[116] *Ibid*., Add.1, Decision 2/CMP.1, para. 5.

[117] Decision 2/CMP.1, para. 5, requires the enforcement branch of the compliance committee to provide oversight of eligibility to participate in the flexibility mechanisms. See also the decisions relating to each of the flexibility mechanisms: Decision 9/CMP.1, Annex, para. 22(b) (joint implementation); Decision 3/CMP.1, Annex, para. 32(b) (CDM); Decision 11/CMP.1, Annex, para. 3(b) (emissions trading).

[118] See Decision 9/CMP.1 (joint implementation); Decision 3/CMP.1 (CDM); and Decision 11/CMP.1 (emissions trading).

[119] Decision 5/CP.6, 'Implementation of the Buenos Aires Plan of Action', FCCC/CP/2001/L.7, 24 July 2001, Annex VI, para. 11.

[120] The Subsidiary Body for Scientific and Technical Advice was requested by the Conference of the Parties to develop definitions and modalities for including afforestation and reafforestation project activities under the CDM. A decision was adopted on this matter at the ninth Conference of the Parties (Decision 19/CP.9).

[121] *Ibid*., Annex, paras. 7, 12 and 13.

[122] *Ibid*., Annex, paras. 27 and 43. 'Validation' involves the independent evaluation of a project activity by a designated operational entity against the requirements of the CDM set out in Decision 17/CP.7 and other relevant decisions of the

the Executive Board's issuing CERs equal to the verified amount of emission reductions.[123] The Accords also provided that public funding for CDM project activities must not result in a diversion in official development assistance and must be separate from and not counted towards the financial obligations of Annex I parties under the Protocol. The parties agreed that 2 per cent of the certified emission reductions issued for CDM project activities would go towards assisting developing country parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.[124]

The Marrakesh Accords' decisions concerning joint implementation under Article 6 were less elaborate than those for the CDM. An Article 6 supervisory committee was established to supervise the verification of ERUs from joint implementation activities,[125] which followed a two-track procedure. Where a host party met the eligibility requirements for participation in the flexibility mechanisms, it was able itself to certify ERUs generated by activities within its territory as being additional to reductions that would otherwise be made. If the host party did not meet the eligibility requirements, it could still host joint implementation projects; however, any resulting ERUs had to be verified by the Article 6 supervisory committee under a procedure comparable to the CDM procedure.[126] Projects starting from 2000 were eligible to qualify as joint implementation activities, but the resulting ERUs were only issued for crediting periods starting after 2008.[127]

Sinks

The inclusion of carbon sinks within the Protocol remained controversial up to the final stages of the negotiations. Some countries, particularly the United States and Australia, were strongly in favour of allowing activities that resulted in carbon sequestration (e.g. afforestation, reafforestation and land-use changes) to count towards their quantified commitments. The inclusion of carbon sinks was strongly opposed by other countries, particularly the members of the EU. The final text adopted in Article 3(3) allowed for commitments to be met by 'net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reafforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period'. A last-minute proposal to include additional sinks resulted in the inclusion of Article 3(4), which required the Conference of the Parties serving as the Meeting of the Parties to the Protocol to, at its first session or as soon as practicable thereafter, 'decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in

COP/MOP. A validated project then becomes 'registered' when it is formally accepted by the Executive Board as a CDM project activity. 'Verification' involves periodic independent review and *ex post* determination by the designated operational entity of the monitored reductions in anthropogenic emissions by sources that have occurred as a result of the registered CDM project activity and are 'additional' to any that would have occurred in the absence of the project. 'Additionality' is determined by reference to project-specific baselines and monitoring plans devised according to methodologies specified in the Marrakesh Accords. 'Certification' is the written assurance by the operational entity that the project activity achieved the verified reductions within a specified period of time.

[123] *Ibid*., Annex, para. 64. CERs are issued automatically by the Executive Board unless a party involved in the project activity or at least three members of the Executive Board request a review of the proposed issuance; any review of proposed issues of CERs is limited to matters of fraud, malfeasance or incompetence of the designated operational entity (para. 65).

[124] Decision 10/CP.7, 'Funding under the Kyoto Protocol'. See also Decision 1/CMP.3 establishing the Adaptation Fund Board as the operating entity of the fund financed by a share of proceeds from the CDM (the Adaptation Fund).

[125] Decision 9/CMP.1, para. 3; and Annex, paras. 4 and 15. [126] Annex, paras. 23 and 24. [127] *Ibid*., para. 5.

greenhouse gas emissions by sources and removals by sinks in the agricultural soils and land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for parties included in Annex I'.

At Marrakesh, the parties agreed on a number of new provisions regarding land-use, land-use change and forestry (LULUCF) activities eligible to be credited against the assigned amounts for Annex I parties in accordance with Article 3(4) of the Protocol. These rules were subsequently affirmed in Decision 16/CMP.1 adopted by the first Meeting of the Parties to the Protocol.[128] Eligible activities included forest management, cropland management, grazing land management and revegetation.[129] Various governing principles for the inclusion of LULUCF activities were also articulated, namely that:

- the treatment of such activities is to be based on 'sound science';
- consistent methodologies are to be used for estimation and reporting of these activities;
- the mere presence of carbon stocks is to be excluded from accounting, as is increased removals due to faster growth caused by increasing concentrations of atmospheric carbon dioxide and indirect nitrogen deposition associated with climate change;
- any reversals of LULUCF removals are to be accounted for at the appropriate time; and
- the implementation of LULUCF activities must contribute to biodiversity conservation and sustainable use of natural resources.[130]

When LULUCF activities under Article 3(3) and (4) resulted in a net removal of greenhouse gases, an Annex I party could issue removal units (RMUs) on the basis of these activities as part of meeting its commitment under Article 3(1). To be available for credit against an Annex I party's emission reduction commitments, RMUs were required to be verified by the expert review teams established by the Protocol (see below). Use of RMUs to meet emission reduction targets during the first commitment period was also subject to several conditions.[131]

Another area where progress was achieved on sinks was with regard to measures for reducing emissions from deforestation and forest degradation in developing countries (REDD+), activities which contribute around 17 per cent of global greenhouse gas emissions.[132] The Copenhagen Accord, agreed at the Conference of the Parties in 2009, called for incentives to be provided to developing countries to reduce deforestation through the 'immediate establishment' of a mechanism including REDD+ to mobilise financial resources from developed countries.[133] While not actually establishing such a mechanism,[134] the Accord noted that a 'substantial' part of the mitigation and adaptation finance should be provided to REDD+.[135] A separate decision of the parties at Copenhagen outlined methodological guidance for REDD+ activities,[136] and was

[128] Annex, para. 6. [129] *Ibid*. Definitions are in Decision 16/CMP.1, Annex, para. 1.
[130] Decision 16/CMP.1, para. 1. [131] *Ibid*., Annex, paras. 4, 10, 11 and Appendix.
[132] REDD+ extends beyond deforestation and forest degradation to also recognise the role of conservation, sustainable forest management and the enhancement of forest carbon stocks in reducing emissions.
[133] *Ibid*., para. 6.
[134] *Ibid*. A detailed proposal from the REDD+ negotiations had been developed prior to Copenhagen, but was never formally adopted, see *Policy Approaches and Positive Incentives on Issues Relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries; and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries*, Draft Decision –/CP.15/FCCC/AWGLCA/2009/L.7/Add.6, available at http://unfccc.int/resource/docs/2009/awglca8/eng/l07a06.pdf
[135] Copenhagen Accord, para. 8.
[136] Decision 4/CP15, Report of the Conference of the Parties on Its 15th Session, Copenhagen, 7–19 December 2009, FCCC/CP/2009/11/Add.1 (30 March 2010).

supplemented by a series of decisions known as the Warsaw Framework for REDD+ adopted in 2013.[137] These decisions built on previous endorsements for REDD+ activities made in the 2007 Bali Action Plan. The UN-REDD Programme, launched in 2008, currently provides financial support to nationally led REDD+ activities in sixty-four developing countries.[138] These activities form part of broader efforts undertaken by countries with the support of multilateral or bilateral initiatives to enhance their 'REDD+ readiness'; that is, to build their capacity in order to be ready for the introduction of a REDD+ mechanism.[139] The World Bank Forest Carbon Partnership Facility also provides funding to assist developing countries to be eligible for involvement in a future incentive system under REDD+.[140]

The role for REDD+ under the Paris Agreement, as well as the fate of the Protocol's detailed LULUCF rules, remains uncertain. However, the Agreement does reference parties' obligation to 'take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases', as well as forest conservation efforts, opening the door for a continuing role for LULUCF methodologies and REDD+ activities in the post-2020 period.[141]

Developing Countries

Article 10 of the Kyoto Protocol dealt with that part of the 'Berlin Mandate' that called for the advancement of the implementation of commitments by all parties, including developing country parties. The Preamble to Article 10 affirmed that the provision did not 'introduc[e] any new commitments for Parties not included in Annex I' but merely reaffirmed existing commitments under Article 4(1) of the Convention while 'continuing to advance the implementation of these commitments in order to achieve sustainable development'. A number of measures were listed in Article 10 which cover areas such as the formulation of 'cost-effective national, and where appropriate regional, programmes to improve the quality of local emission factors, activity data and/or models which reflect the socioeconomic conditions of each Party for the preparation and periodic updating of national inventories' of emissions of greenhouse gases and the formulation, implementation, publication and updating of 'national and, where appropriate, regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaption to climate change'. Other measures included the provision of information on programmes that contain measures addressing climate change and its adverse impacts, and the promotion of effective modalities relating to the transfer of environmentally sound technologies pertinent to climate change.

Reporting and Compliance

Detailed reporting obligations for Annex I parties were established by Articles 5, 7 and 8 of the Protocol. These built upon the reporting and review procedures developed under the Convention, particularly the in-depth review process, and are likely to be a model drawn on in developing similar rules under the Paris Agreement. Article 5(1) provided that each Annex I party was

[137] Decisions 9/CP.19 –15/CP.19, Report of the Conference of the Parties on Its 19th Session, Warsaw, 11–22 November 2013, FCCC/CP/2013/10/Add.1.

[138] See www.un-redd.org

[139] For an overview of REDD+ readiness and demonstration activities, see G. A. Cerbu, B. M. Swallow and D. Y. Thompson, 'Locating REDD: A Global Survey and Analysis of REDD Readiness and Demonstration Activities', 14 *Environmental Science and Policy* 168 (2011).

[140] Available at: www.forestcarbonpartnership.org

[141] Paris Agreement, Art. 5.

required to have in place, by no later than 2007, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of greenhouse gases. Guidelines for such national systems were decided upon by the Conference of the Parties serving as the Meeting of the Parties to the Protocol at its first session. Under Article 7(1), each Annex I party was required to incorporate in its annual inventory of anthropogenic emissions by sources and removals by sinks, 'the necessary supplementary information for the purposes of ensuring compliance with Article 3'. Annex I parties were also required to include supplementary information to demonstrate compliance with commitments under the Protocol.[142]

The information submitted under Article 7 by Annex I parties is reviewed by 'expert review teams' in accordance with guidelines adopted by the Meeting of the Parties at its first session.[143] The review process is to provide 'a thorough and comprehensive technical assessment of all aspects of the implementation by a Party' of the Protocol.[144] The expert review teams report to the Meeting of the Parties on the implementation of commitments by the party, identifying any potential problems in, and factors influencing, the fulfilment of commitments.[145] The reports of the expert review teams are circulated to all parties to the Convention, and the Conference of the Parties considers the information submitted under Article 7 and the expert review reports and 'take[s] decisions on any matter required for the implementation of [the] Protocol'.[146]

Apart from the review of information submitted by parties, the Protocol contemplated a further mechanism for ensuring compliance with commitments under the Protocol. Article 18 provided that the Meeting of the Parties, at its first session, should 'approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the cause, type, degree and frequency of non-compliance'. Decisions reached as part of the Marrakesh Accords, and subsequently adopted by the first Meeting of the Parties to the Protocol, elaborated a sophisticated and detailed non-compliance mechanism consisting of Facilitative and Enforcement Branches.[147] This mechanism has been fully operational since 2006 and has been described as constituting 'a landmark in international climate policy and global environmental governance more broadly'.[148] Nevertheless, it has not been replicated in the Paris Agreement, which opted instead for a soft 'facilitative' compliance mechanism.[149]

Negotiations for a New Climate Treaty Agreement

Under the Kyoto Protocol, commitments for subsequent periods were to be established by amendments to Annex B adopted in accordance with the provisions of Article 21(7).[150] The Meeting of the Parties to the Protocol was required to initiate reconsideration of the commitments in Annex B by 2005.[151] Discussions were conducted in two negotiating tracks: one

[142] Art. 7(2). [143] Art. 8(1). [144] Art. 8(3). [145] *Ibid.* [146] Art. 8(5) and (6).
[147] Decision 27/CPM.1. See also Rules of Procedure CMP.2 and CMP.4. For details, see Chapter 5.
[148] S. Oberthür and R. Lefeber, 'Holding Countries to Account: The Kyoto Protocol's Compliance System Revisited After Four Years of Experience', 1 *Climate Law* 133 (2010).
[149] Paris Agreement, Art. 15.
[150] Amendments to the Protocol can be adopted by a three-quarters majority vote of the parties present and voting at the meeting at which it is proposed for adoption, followed by its ratification or acceptance by at least three-fourths of the parties to the Protocol.
[151] Art. 3(9).

designed to negotiate amendments to the Protocol, including work on a second commitment period (Kyoto track), and the other aiming to negotiate long-term cooperative action under the Convention (Convention track).

At the Durban Conference of the Parties in 2011, an in-principle agreement was reached on a second commitment period, running from 2013 to 2017 or 2020. This Agreement was formalised at COP18, in Doha, Qatar with the adoption of the 'Doha Amendment to the Kyoto Protocol' (Doha Amendment). The Doha Amendment included new emissions reduction obligations for Annex I Parties to the Kyoto Protocol in a second commitment period from 1 January 2013 to 31 December 2020. It also stated that Parties in Annex B should strive to achieve overall emissions reductions of least 18 per cent below 1990 levels in the eight-year period from 2013 to 2020. However, as the Doha Amendment has not yet come into force, no second commitment period is presently in effect. The Amendment will enter into force on the ninetieth day after three-quarters of the Parties to the Kyoto Protocol have deposited their instruments of acceptance with the Depositary.[152]

The Durban Conference of the Parties was also important for the Convention track discussions, representing the start of a new phase in international climate negotiations. Agreement was reached to establish a new platform, known as the 'Durban Platform for Enhanced Action'. The platform provided for negotiations under the 1992 Climate Change Convention 'to deliver a new and universal greenhouse gas reduction protocol, legal instrument or other outcome with legal force by 2015 for the period beyond 2020'.[153] This wording reflected a compromise between parties' different negotiating positions: a broad coalition of developing and developed countries – including the EU, the Umbrella Group countries, small island states and least developed countries – pushed for a mandate to negotiate a new legal agreement to supplement or replace the Kyoto Protocol whereas, on the other side, India, in particular, insisted that the Durban Platform leave open the possibility of any new arrangements being adopted in a decision of the Conference of the Parties. An Ad Hoc Working Group (ADP) was launched as a subsidiary body to drive forward this work,[154] and negotiations were directed to include 'the areas of mitigation, adaptation, finance, technology development and transfer, transparency of action and support, and capacity-building'.[155] In the same decision, the Conference of the Parties launched a work plan on 'enhancing mitigation ambition to identify and to explore

[152] Based on the current number of Parties to the Kyoto Protocol (192), the Amendment will enter into force on the ninetieth day after the Depositary receives 144 instruments of acceptance. As of 29 December 2016, seventy-five countries have ratified the Doha Amendment.

[153] Decision 1/CP.17, Report of the Conference of the Parties on its 17th Session, Durban, 28 November–9 December 2011, FCCC/CP/2011/9/Add.1 ('Establishment of Durban Platform'). Following the Durban COP, the interpretation of 'protocol, legal instrument or other outcome with legal force by 2015' was discussed extensively by legal commentators, see for example, S. Maljean-Dubois, T. Spencer and M. Wemeare, 'The Legal Form of the Paris Climate Agreement; A Comprehensive Assessment of Options', 1 *Carbon and Climate Law Review* 1 (2015); R. Byrnes, and P. Lawrence, 'Can "Soft Law" Solve Hard Problems? Justice, Legal Form and the Durban-Mandated Climate Negotiations', 34(1) *University of Tasmania Law Review* 34 (2015); A. Celliers, 'The Scope of a 2015 Climate Change Agreement: A Mixed Top-Down/Bottom-Up Approach to Achieve Universal Participation', 32(1) *Environmental and Planning Law Journal* 46 (2015); E. Worthrop and D. Waskow, 'What's in a Name? Paris Agreement's Legal Form Explained in 7 Questions', *World Resources Institute*, December 2015, at www.wri.org/blog/2015/12/what%E2%80%99s-name-paris-agreements-legal-form-explained-7-questions

[154] In establishing the ADP, the parties agreed to terminate the prior Ad Hoc Working Group on Long-term Cooperative Action, which had been established as a broad negotiating platform under the Climate Change Convention in order to implement the Bali Action Plan (pursuant to decision 1/CP.13).

[155] Decision 1/CP.17, para. 5, Establishment of Durban Platform.

options for a range of actions that can close the ambition gap with a view to ensuring the highest possible mitigation efforts by all Parties'.[156]

Between COP18 in Doha in 2012 and COP21 in Paris in 2015, further negotiations fleshed out the elements and text of a new agreement. Importantly, at COP19 in Warsaw, Poland in December 2013, all parties were invited to prepare 'intended nationally determined contributions' (INDCs) towards achieving the objective of the Convention. At COP20, in 2014, in the 'Lima Call for Climate Action', the Conference of the Parties gave further guidance on the information requirements for the INDCs. To facilitate clarity, transparency and understanding, the types of information to be communicated in the INDCs was specified, including: quantifiable information on the reference point; time frames and/or periods for implementation; scope and coverage; planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals.[157] Parties could also clarify how they considered their INDCs to be fair and ambitious, in light of their national circumstances, and how they contributed towards achieving the objective as set out in Article 2 of the Convention.[158] Prior to the Paris Conference of the Parties, more than 180 countries, responsible for more than 90 per cent of global emissions submitted their interim INDCs.[159]

In the lead-up to COP21 in Paris, the French Government, as President of the Conference of the Parties, worked to engage a wide range of government and non-government stakeholders in order to build momentum ahead of the meeting. Other governments also made major bilateral announcements that spurred the negotiations, such as the United States–China Joint Presidential Statement on Climate Change[160] and the United Kingdom–China Joint Climate Change Statement.[161]

PARIS AGREEMENT

Concluding years of contentious negotiations, the Paris Agreement was adopted by COP21 on 12 December 2015, as an annex to a decision of the Conference of the Parties. This decision contains more detailed guidance on many aspects covered only briefly in the Agreement (such as arrangements for the pre-2020 period, climate finance and capacity-building) and sets forward a series of decisions to give effect to the Agreement.[162] The Agreement was rapidly ratified by Convention parties, and entered into force on 4 November 2016. As of March 2017, 133 of the

[156] *Ibid*., para. 7.

[157] Report of the Conference of the Parties on its 20th session, Lima, 1–14 December 2014, FCCC/CP/2014/10/Add.1, decision 1/CP.20, para. 14.

[158] *Ibid*. These INDCs formed the basis of Nationally Determined Contributions (NDCs) under the Paris Agreement as a country's first INDC became its first NDC when it ratified the Paris Agreement, unless it decided to submit a new NDC at that time.

[159] See Center for Climate and Energy Solutions, *Outcomes of the UN Climate Change Conference in Paris*, December 2015, www.c2es.org/internatinal/negotiations/cop21-paris/summary

[160] See White House, Office of the Press Secretary, US–China Joint Presidential Statement on Climate Change, 25 September 2015, at https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change

[161] See UK–China joint statement on climate change released during the visit of Chinese Premier Li Keqiang to the UK on the 17 June 2014 at www.gov.uk/government/publications/uk-china-joint-climate-change-statement

[162] Decision 1/CP.21, Report of the Parties on its 21st session, Paris, 30 November–11 December 2015, FCCC/CP/2015/10/Add.1 ('Adoption of the Paris Agreement').

197 parties to the Convention are party to the Paris Agreement. The first Meeting of the Parties to the Paris Agreement took place in Marrakesh, Morocco in November 2016.[163]

Questions over the legal form of the Agreement remained contentious over the course of the Paris negotiations. Despite some commentators questioning whether the Paris Agreement has any legal effect under international law,[164] there is now broad acceptance that the Paris Agreement is a treaty within the definition of the VCLT.[165] The Paris Agreement contains treaty-like clauses that include provisions on how states express their consent to be bound (through ratification, accession, acceptance or approval), the minimum requirements for entry into force, reservations, withdrawal and the depository. However, like the 1992 Convention, many of its provisions use ambiguous or permissive language that create only soft obligations,[166] to accommodate the interests of particular parties, such as the United States, allowing for participation by executive action.

Preamble and Objectives

The preamble to the Paris Agreement recognises a wide range of climate-change-related matters, a number of which did not achieve sufficient agreement to be included in the operative provisions of the treaty, including the relationship between climate change and human rights:

> *Acknowledging* that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.

Inclusion of a human rights perspective was heavily lobbied for by human rights advocates, and although this language did not appear in the objective of the Paris Agreement as originally hoped, it marks the first time that human rights references have been included in a climate change treaty.[167]

[163] Paris Agreement, Art. 16 provides: 'The Conference of the Parties, the supreme body of the Convention, shall serve as the meeting of the Parties to this Agreement.'

[164] See for example, A. M. Slaughter, 'The Paris Agreement to Global Governance', Project Syndicate (28 December 2015), at www.project-syndicate.org/commentary/paris-agreement-model-for-global-governance-by-anne-marie-slaughter-2015-12 and R. Falk, 'Voluntary International Law and the Paris Agreement' (16 January 2016) at https://richardfalk.wordpress.com/2016/01/16/voluntary-international-law-and-the-paris-agreement

[165] Vienna Convention on the Law of Treaties (Vienna, 23 May 1969; in force 27 January 1980). See D. Bodansky, 'The Legal Character of the Paris Agreement', 25(2) *Review of European Comparative & International Environmental Law* (2016), 142.

[166] For a detailed examination of the legal nature of key provisions in the Agreement, see Bodansky, 'Legal Character of the Paris Agreement', 142.

[167] J. Knox, United Nations Mandate on Human Rights and the Environment, 12 December 2015, available at http://srenvironment.org/2015/12/12/paris-agreement. See further, J. Knox, 'Linking Human Rights and the Environment at the United Nations', 33(2) *Harvard Environmental Law* 477 (2009); B. Mayer, 'Human Rights in the Paris Agreement' 6(1–2) *Climate Law* 109 (2016); UNEP and Sabin Center for Climate Change Law, *Climate Change and Human Rights* (2015), at http://columbiaclimatelaw.com/files/2016/06/Burger-and-Wentz-2015-12-Climate-Change-and-Human-Rights.pdf

Other novel concepts mentioned in the preamble include:

- the intrinsic relationship that climate change actions, responses and impacts have with equitable access to sustainable development and eradication of poverty;
- the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change;
- the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities;
- the importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognised by some cultures as Mother Earth;
- the importance for some of the concept of 'climate justice', when taking action to address climate change;
- the importance of the engagements of all levels of government and various actors, in accordance with respective national legislations of Parties, in addressing climate change; and
- that sustainable lifestyles and sustainable patterns of consumption and production, with developed country Parties taking the lead, play an important role in addressing climate change.

Article 2 articulates the objective and goals of the Paris Agreement, which are designed to enhance the implementation of the 1992 Climate Change Convention, including its objective of preventing dangerous anthropogenic interference with the climate system.[168] The aims of the Agreement, set out in Article 2.1 are:

> to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
>
> (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
> (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
> (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

Article 2.1(a) – also known as the Agreement's 'long-term temperature goal' – represents the first time that states have agreed in a global treaty on a limit to global temperature increase. The commitment to aim for 'well below' a 2 °C rise and 'to pursue efforts to limit the temperature increase to 1.5 °C' was regarded as a victory for the High Ambition Coalition formed during the Paris negotiations, which included the small island states, African developing countries, the EU, Mexico, Canada, Brazil and the United States.[169] Other provisions of Article 2.1 have attracted

[168] A minimal list of definitions for the Agreement is set out in Article 1. The greenhouse gases covered by the Paris Agreement are the same as those covered by the Convention.

[169] See for example, M. Wilder, 'Well Below 2C', 20 *Law Society of New South Wales Journal* 34 (2016); D. Bodansky, 'Paris Climate Change Agreement: A New Hope', 110(2) *American Journal of International Law* 288 (2016); M. J. Mace, 'Mitigation Commitments under the Paris Agreement and the Way Forward', 6(1–2) *Climate Law* 21 (2016); C. Streck et al., 'Paris Agreement – A New Beginning' 13(1) *Journal for European Environmental and Planning Law* 3 (2016).

less commentary, but reflect equally critical commitments to adaptation, resilient, low carbon development pathways, and appropriate levels of financing for such development.

Article 2.1(a) is to be read in conjunction with Article 4.1, which provides an indicative timetable for peaking and decline of greenhouse gases in order to meet the long-term temperature goal of the Agreement. It states:

> In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.

Article 4.1 has two components. Under the first, parties aim to reach 'global peaking' (i.e. maximal emissions output) as soon as possible, with a longer timetable contemplated for developing country parties. As commentators have noted, the second half of Article 4.1, seeking 'a balance between anthropogenic emissions by sources and removals by sinks', requires net zero emissions after 2050; a goal that will not be achievable without a complete phase out of fossil fuels.[170] No specific mention is made of a commitment to cease fossil fuel use, or phase out fossil fuel subsidies. Some climate scientists have also pointed out that to prevent dangerous warming levels, emissions will need to be reduced below net zero, i.e. to negative emissions levels through increasing the capacity for carbon sequestration.[171] Net zero emissions is to be achieved 'on the basis of equity'.

The principle of common but differentiated responsibilities is specifically mentioned in Article 2.2, which provides that the Paris Agreement 'will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances'. The addition of the phrase, 'in the light of different national circumstances' appears designed to provide for a more flexible approach than the 'firewall' between developed and developing country obligations that characterised the Kyoto Protocol.[172]

Nationally Determined Contributions

Nationally determined contributions (NDCs) are the main technique used to meet the Agreement's objectives. Unlike quantified emission reduction limitations of the Kyoto Protocol specified in Annex B of that treaty, NDCs are arrived at through a nationally led, bottom-up process undertaken by each party. In the Paris Agreement, *all parties* (in contrast to only developed country parties under the Kyoto Protocol) are required to submit their nationally determined contributions to the global response to climate change 'with a view to achieving the purpose of

[170] M. Gerrard, 'Legal Implications of the Paris Agreement for Fossil Fuels', 19 December 2015, Climate Law Blog, Sabin Center for Climate Change Law, at http://blogs.law.columbia.edu/climatechange/2015/12/19/legal-implications-of-the-paris-agreement-for-fossil-fuels

[171] M. Meinhausen et al., 'Greenhouse-Gas Emission Targets for Limiting Global Warming to 2 °C', 458 *Nature* 1158 (2009).

[172] C. Voigt and F. Ferreira, 'Differentiation in the Paris Agreement' 5(1–2) *Climate Law* 58 (2016).

[the] Agreement as set out in Article 2'.[173] Such efforts are to be 'ambitious' and must 'represent a progression over time', while recognising the need to support the implementation efforts of developing country parties. This suggests a shift from the approach of the Kyoto Protocol and, arguably, a new understanding of the meaning of the common but differentiated responsibilities principle.[174]

Article 4.2 states that each party is required to 'prepare, communicate and maintain successive NDCs that it intends to achieve'.[175] While a party may adjust its existing NDC at any time 'with a view to enhancing its level of ambition', parties must communicate a new NDC every five years, and each NDC should be informed by the outcomes of the global stocktake process (described further below).[176] In addition, Article 4.3 requires each party's successive NDC to 'represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances'.

The content of NDCs is largely left to the discretion of each party, to cover proposed actions in relation to climate change mitigation and adaptation,[177] with information to be provided to assist on 'clarity, transparency and understanding'.[178] In preparing NDCs, parties shall promote 'environmental integrity, transparency, accuracy, completeness, comparability and consistency, and ensure the avoidance of double counting',[179] in accordance with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to the Agreement. NDCs will be kept in a public registry maintained by the Convention secretariat.[180]

Mitigation Commitments

Unlike the Kyoto Protocol, the Paris Agreement establishes no specific targets for emissions reductions by parties. Instead, the key obligation of all parties (as described above) is to 'prepare, communicate and maintain' successive NDCs. Parties are required to 'pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions'.[181] It is intended that each party's NDC should reflect increasing mitigation ambition (e.g. more stringent emissions reduction targets over time), to achieve the goal set out in Article 2. In a nod to the potential trade consequences of strict domestic mitigation measures where associated with tariffs on carbon-intensive foreign-produced goods, parties 'shall take into consideration in the implementation of this Agreement the concerns of Parties with economies most affected by the impacts' of such 'response measures', particularly developing country parties.[182]

[173] Paris Agreement, Art. 3.
[174] J. Peel, 'Foreword to the TEL Fifth Anniversary Issue Re-evaluating the Principle of Common But Differentiated Responsibilities in Transnational Climate Change Law', 5(2) *Transnational Environmental L.* 245, (2016).
[175] Paris Agreement, Art. 4(2). [176] Art. 4.9.
[177] Arts. 4(2) and 7(11). Article 4.7 also recognises mitigation-adaptation linkages specifying that: 'Mitigation co-benefits resulting from Parties' adaptation actions and/or economic diversification plans can contribute to mitigation outcomes under this Article.'
[178] Art. 4(13). Decision 1/CP.21 sets out the information that parties are to include in their NDCs.
[179] Paris Agreement, Art. 4(13).
[180] Paris Agreement, Art. 4(12). NDCs can be found on the UNFCCC interim NDC registry at: www4.unfccc.int/ndcregistry/Pages/Home.aspx
[181] *Ibid.* [182] Art. 4(15). See further, Chapter 18, pp. 843ff.

While all parties are required to submit NDCs, a distinction is drawn in the Paris Agreement between the commitments of developed, developing and least developed parties. Article 4.4 provides that 'developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets'.[183] Developing country parties are directed that they 'should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in light of different national circumstances'. The least developed countries and small island developing states 'may prepare and communicate strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances'.[184] This approach blurs country categories to take into account diverse national circumstances, capabilities and vulnerabilities, which change over time.[185] Article 4.5 of the Agreement recognises that 'enhanced support for developing country Parties will allow for higher ambition in their actions' but imposes only a soft, non-specific obligation for 'support' to be provided to developing country parties for the implementation of mitigation commitments under Article 4. In accordance with the focus of the Agreement on achieving a fundamental shift away from emissions intensive development, Article 4.19 requires that 'all Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies'.[186]

Parties, including regional economic organisations and their members, can agree to act jointly in implementing mitigation commitments and must notify the secretariat of the terms of that agreement when they communicate their NDCs, including the emission level allocated to each party within the relevant time period.[187] Each party to a joint implementation agreement, including parties acting jointly in the framework of a regional economic integration organisation (such as the EU), remains responsible for its emission level set out in the agreement.[188]

Sinks

In contrast to the detailed rules of the Kyoto Protocol and Marrakesh Accords on LULUCF activities, the provisions of the Paris Agreement regarding carbon sinks and forests are limited. The preamble of the Agreement recognises 'the importance of the conservation and enhancement, as appropriate, of sinks and reservoirs of the greenhouse gases', and Article 5.1 provides 'Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1(d), of the Convention, including forests.' In terms of recognising and implementing mitigation actions with respect to removals of carbon via sinks in NDCs, Article 4.14 provides that parties should take into account, as appropriate, existing methods and guidance under the Convention.

The Paris Agreement incorporates into a formal climate treaty instrument the concept of REDD+, which had previously existed outside the regime in COP decisions. However, the Agreement did not

[183] Art. 4(4). [184] Paris Agreement, Art. 4(6).

[185] For commentary on the distinction between developed and developing country Parties in the Paris Agreement, see Voigt and Ferreira, 'Differentiation in the Paris Agreement'; and S. Maljean-Dubois, 'The Paris Agreement: A New Step in the Gradual Evolution of Differential Treatment in the Climate Regime?', 25(2) *Review of Comparative, European and International Environmental Law* 161 (2016).

[186] A list of parties who have submitted their long-term plans in accordance with this paragraph is contained at: http://unfccc.int/focus/long-term_strategies/items/9971.php

[187] Art. 4(16). [188] Art. 4(17) and 4(18).

establish any new mechanism or framework on REDD+, merely endorsing the existing Warsaw Framework for REDD+, and other relevant decisions of the Conference of the Parties.[189]

Article 5.2 encourages parties 'to take action to implement and support, including through results-based payments', REDD+ activities and 'alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivizing, as appropriate, non-carbon benefits associated with such approaches'.[190]

Voluntary Cooperation and Carbon Markets

While the Paris Agreement makes no mention of 'carbon markets', it allows parties to pursue 'voluntary cooperation' in the implementation of their NDCs and to use 'international transferred mitigation outcomes' to help meet emissions reduction targets.[191] Such 'voluntary cooperation' is intended 'to allow for higher ambition' in parties' mitigation and adaptation actions and 'to promote sustainable development and environmental integrity'.[192] Article 6.2 further provides that where parties engage on a voluntary basis in cooperative approaches that involve the use of internationally transferred mitigation outcomes (i.e. carbon credits) towards NDCs, they 'shall . . . promote sustainable development and ensure environmental integrity and transparency, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement'.[193]

Article 6.4 of the Agreement establishes a new mechanism to 'contribute to the mitigation of greenhouse gas emissions and support sustainable development'. The voluntary mechanism allows for the participation of public and private sectors, and aims to deliver an overall reduction in global emissions (this is in contrast to the market mechanisms established under the Kyoto Protocol, which did not result in an overall reduction of emissions).

The new mechanism will operate under the 'authority and guidance' of a body to be designated by the Conference of the Parties serving as the Meeting of the Parties to the Agreement, and the

[189] See Decision 1/CP.16, Report of the Conference of the Parties on Its 16th Session, Cancun, 29 November–10 December 2010, FCCC/CP/2010/7/Add.1 ('Cancun Convention Agreement'), paras. 68–79, which provide for a framework for parties undertaking actions relating to reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks. This decision also launched a process for further work to be undertaken by the SBSTA and the AWG-LCA. COP 19, held in November 2013 in Warsaw, Poland, adopted the seven decisions of the Warsaw Framework for REDD+ (Report of the Conference of the Parties on Its 19th Session, Warsaw, 11–22 November 2013, FCCC//CP/2013/10/Add 1, decisions 9–13 inclusive). This Agreement built on the previous work of the COP and was widely recognized as a breakthrough in negotiations for providing clarity on a number of important issues related to REDD+ implementation. For a full list and text of UN decisions relating to REDD+, including the decisions comprising the Warsaw Framework, see Decision Booklet REDD+, at http://unfccc.int/land_use_and_climate_change/lulucf/items/6917.php

[190] For further literature on co-benefits (or not) of REDD+ for communities in which such activities take place, see S. Chapman et al., 'Defining the Legal Elements of Benefit Sharing in Context of REDD+', 8(14) *Carbon and Climate Law Review* 270 (2014); B. Horner, 'A Human Rights-Based Approach to Climate Change Lessons Learnt from CDM and REDD+', 19 *New Zealand Journal of Environmental Law* 79 (2015); I. J. Visseren-Hamakers et al., 'Trade-offs, Co-benefits and Safeguards: Current Debates on the Breadth of REDD+', 4(6) *Current Opinion in Environmental Sustainability* 646 (2012); A. Chatre et al., 'Social Safeguards and Co-benefits in REDD+: A Review of the Adjacent Possible', 4(6) *Current Opinion in Environmental Sustainability* 654 (2012); P. J. Kanowski, 'Implementing REDD+: Lessons from Analysis of Forest Governance', 14(2) *Environmental Science & Policy* 111 (2011).

[191] Paris Agreement, Arts. 6.1 and 6.2.

[192] Article 6.1.

[193] See also Art. 6.5, which specifically prohibits double counting of emissions reductions.

rules, modalities and procedures governing its operation will be developed, with the view to being adopted at the first meeting of the parties, after the Agreement's entry into force.[194] A share of the proceeds from activities under the new mechanism must be used to cover administrative expenses as well as to assist developing country parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.[195] This new mechanism to support carbon markets came as a surprise to many commentators.[196] To balance the inclusion of market-based approaches, Article 6.8 also recognises the importance of non-market approaches to be available to parties to assist in the implementation of their NDCs.[197]

Adaptation and Loss and Damage

A priority for many developing countries at the Paris COP21 was to strengthen adaptation efforts under the Climate Change Convention. Significantly, unlike in the Kyoto Protocol, the Paris Agreement elevates the importance of the need to adapt to climate change and places adaptation on an equal footing with mitigation.[198] It does this in two main ways.

First, the Paris Agreement establishes 'the global goal on adaptation' to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the Agreement's long-term temperature goal.[199] The problem is fundamental: the long-term temperature goal, which defined discussions on the mitigation of greenhouse gas emissions, can only be considered acceptable if societies can adapt to the inevitable impacts of this warming that will occur even with a 2 °C temperature rise.[200] The parties also record their recognition 'that the current need for adaptation is significant and that greater levels of mitigation can reduce the need for additional adaptation efforts, and that great adaptation needs can involve greater adaptation costs'.[201]

Second, the Agreement requires parties, as appropriate, to engage in adaptation planning processes and the implementation of actions, by a range of mechanisms.[202] Parties should also, as appropriate, submit and update periodically an adaptation communication, which may include its priorities, implementation and support needs, plans and actions.[203] Adaptation communications will be recorded in a public registry to be maintained by the secretariat.[204]

The Paris Agreement emphasises that while adaptation should follow a 'country-driven, gender-responsive, participatory and fully transparent approach',[205] at the same time parties should strengthen international cooperative efforts on enhancing adaptation action.[206] In such efforts, the needs of developing countries should be taken into account, especially those that are

[194] Paris Agreement, Article 6(7). [195] Paris Agreement, Art. 6(6).
[196] See for example, Wilder, 'Well below 2C'; C. Streck et al., 'Paris Agreement – A New Beginning', 13(1) *Journal for European Environmental and Planning Law* 3 (2016); K. Lake, 'How Will Carbon Markets Help the Paris Climate Agreement?', *The Conversation*, 13 December 2015, at https://theconversation.com/how-will-carbon-markets-help-the-paris-climate-agreement-52211
[197] Art. 8.9 defines a 'framework' to promote non-market approaches.
[198] Recognition of the need to adapt is integrated throughout the Paris Agreement in provisions beyond the main adaptation article, Art. 7. See, for example, Paris Agreement, Arts. 4, 5, 6, 9, 10, 11, 12, 14.
[199] Art. 7(1). [200] Art. 7.2.
[201] Art. 7.4. See *UNEP Adaptation Gap Report 2016* (2016), at: http://web.unep.org/adaptationgapreport/sites/unep.org.adaptationgapreport/files/documents/agr2016.pdf
[202] Art. 7.9. [203] Art. 7.10 [204] Art. 7.12. [205] Art. 7.5.
[206] Arts. 7.6 and 7.7. Art. 7.8 directs the UN specialised organisations and agencies to assist with these efforts.

particularly vulnerable to the adverse effects of climate change.[207] The Agreement also highlights the need for national adaptation plans to take into account vulnerable groups, communities and ecosystems, with a view to 'integrating adaptation into relevant socioeconomic and environmental policies and actions'.[208] By contrast, the Agreement's provisions regarding funding support for adaptation are minimal: Article 7.13 merely refers to the provision of 'continuous and enhanced international support to developing country parties' to assist with their implementation of obligations under the Article.

Whereas adaptation concerns measures taken to ameliorate or respond to climate change impacts, 'loss and damage' refers to harms that cannot be prevented through climate change mitigation or managed through adaptation. Loss and damage has gained increasing importance in recent years,[209] a concept that connotes 'the actual and/or potential manifestation of impacts associated with climate change in developing countries that negatively affect human and natural systems', including impacts from extreme events (for example heatwaves, flooding and drought) and slow-onset events (for example, sea-level rise and glacial retreat).[210] Developing countries, particularly the small island developing states, have long pushed for formal recognition of loss and damage in the climate negotiations.[211] Some developed country parties, particularly the United States and Australia, have resisted recognition of the concept, due to its potential implications of compensation and liability.

In a significant step, the Paris Agreement recognises loss and damage for the first time in a climate change treaty in a separate article to adaptation. Article 8.1 of the Agreement states that 'Parties recognise the importance of averting, minimising and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage'.

The Agreement confirms that the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts, established at COP 19 in Warsaw,[212] will continue and be subject to the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement.[213] In exercising its numerous functions, the Warsaw International Mechanism has a number of specified objectives.[214]

It appears that loss and damage under the Paris Agreement extends beyond the Warsaw International Mechanism as the Agreement provides 'Parties should enhance understanding,

[207] Art. 7.6. [208] Art. 7.5.

[209] After intense pressure from developing countries on the issue, the Cancun Convention Agreement in 2010 initiated a work programme to explore approaches to addressing 'loss and damage' caused by climate change (paras. 25–9). For commentary on loss and damage in the UN climate negotiations, see I. Fry, 'The Paris Agreement – An Insider's Perspective – the Role of the Small Island Developing States', 46(2) *Environmental Policy & Law* 105 (2016); M. Burkett, 'Reading between the Red Lines: Loss and Damage and the Paris Outcome', 6(1) *Climate Law* 118 (2016); M. J. Mace and R. Verheyen, 'Loss, Damage and Responsibility after COP 21: All Options Open for the Paris Agreement', 25(2) *Review of European Comparative & International Environmental Law* 197 (2016).

[210] See Subsidiary Body for Implementation 37th Session Doha, 26 November to 1 December 2012, FCCC/SBI/2012/INF.14, *A literature review on the topics in the context of thematic area 2 of the work programme on loss and damage: a range of approaches to address loss and damage associated with the adverse effects of climate change.*

[211] See for example, Fry, 'Paris Agreement – An Insider's Perspective', 105; M. Burkett, 'Loss and Damage', 4(1–2) *Climate Law* (2014) 119.

[212] Report of the Conference of the Parties on its 19th Session, held in Warsaw from 11 to 23 November 2013, FCCC/CP/2013/10/Add.1, Decision 2/CP.19.

[213] Art. 8.2. [214] Art. 8.7.

action and support, *including* through the Warsaw International Mechanism, as appropriate, on a cooperative and facilitative basis with respect to loss and damage associated with the adverse effects of climate change'.[215] Moreover, there seems to be scope for the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement to enhance and strengthen the Warsaw International Mechanism over time.[216] Significantly, however, the decision adopting the Paris Agreement specifically provides that 'Article 8 of the Agreement does not involve or provide a basis for any liability or compensation'.[217]

Financial Resources, Technology Transfer and Capacity-Building

As for negotiations for previous international climate treaties, climate finance was a contentious issue at COP 21 in Paris.[218] Poorer countries sought strong assurances from developed countries that pledges for finance would be scaled up. Developed countries argued that wealthier developing countries, such as China, should make contributions to financial resourcing arrangements. These different negotiating positions were reflected in the final Agreement. The Paris Agreement calls for developed countries to provide developing countries finance for both mitigation and adaptation in continuance of their existing obligations under the 1992 Climate Change Convention.[219] Such parties, as part of a 'global effort', are also to 'continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels', and this mobilisation of climate finance 'should represent a progression beyond previous efforts'.[220] 'Other parties' – referring to wealthier developing countries – are encouraged to provide, or continue to provide, financial support on a voluntary basis.[221]

The required amount of 'scaled-up' climate finance flows is not specified in the Paris Agreement, although Article 9 states that the provision of financial resources 'should aim to provide a balance between mitigation and adaptation',[222] and sets out requirements for developed country parties around the provision of information about finance flows,[223] which will also be taken into account in the global stocktake process.[224] In practice, this means the previously agreed $100 billion USD per annum financial commitment that Convention parties made in the 2009 Copenhagen Accord will continue as a floor level of finance expected from developed countries until at least 2025.[225] The Paris Agreement nevertheless encourages greater

[215] Art. 8.3 (emphasis added). [216] Art. 8.2. [217] Decision 1/CP.21, para. 52.

[218] See Y. Yamineva, 'Climate Finance in the Paris Outcome – Why Do Today What You Can Put off Until Tomorrow?', 25(2) *Review of European Comparative & International Environmental Law* 174 (2016); A. Zahar, 'The Paris Agreement and the Gradual Development of a Law on Climate Finance', 6(1–2) *Climate Law* 75 (2016).

[219] Art. 9(1). [220] Art. 9(3). [221] Art. 9(2). [222] Art. 9(4).

[223] Art. 9(5). Other parties are 'encouraged' to also provide such information on a voluntary basis. See also Art. 9(7).

[224] Art. 9(6).

[225] At COP 15 in Copenhagen in 2009, developed country parties committed 'to a goal of mobilizing jointly $100 billion dollars a year by 2020 to address the needs of developing countries' (see Report of the Conference of the Parties on its 15th Session, held in Copenhagen, 7–19 December 2009, FCCC/CP/2009/11/Add.1, Decision 2/CP 15(8)). The parties agreed this funding would come from a 'wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance'. One year later, the parties endorsed the $100 billion USD goal at COP 16 in Cancun (see Cancun Convention Agreement), and the next year, at COP 17 in Durban, they established a work programme to analyse options for scaling up the mobilisation of climate finance (see Report of the Conference of the Parties on its 17th Session, held in Durban, 28 November–11 December 2011, FCCC/CP/2011/9/Add.1, Decision 1/CP.17). The decision adopting the Paris Agreement, para. 54 provides that 'developed countries intend to continue their existing collective mobilization goal through 2025 in the context of meaningful mitigation actions and transparency on implementation; prior to 2025 the Conference of the Parties serving as the meeting of the Parties to

coordination of support from public and private, bilateral and multilateral sources, such as the Green Climate Fund.[226] The Paris Agreement clarifies that the Financial Mechanism of the 1992 Climate Change Convention, including its operating entities (such as the Green Climate Fund) shall serve as the financial mechanism of the Agreement.[227]

Articles 10 and 11 of the Paris Agreement deal with technology transfer and capacity-building respectively.[228] Article 10 will be supported by a new 'technology framework' to guide the work of the 1992 Climate Change Convention's existing Technology Mechanism which will also serve the Paris Agreement.[229] The Paris Agreement puts a new focus on innovation as 'critical for an effective, long-term global response to climate change'.[230] It commits the 1992 Climate Change Convention's technology and financial bodies to support research and development and developing countries' access to technology, 'in particular for early stages of the technology cycle'.[231] Support, 'including financial support', is also to be provided to developing country parties for implementation of Article 10, 'including for strengthening cooperative action on technology development and transfer at different stages of the technology cycle, with a view to achieving a balance between support for mitigation and adaptation'.[232]

The Paris Agreement's provisions on capacity-building are less developed than those on technology transfer and financial resources. The principal obligation is for all parties to cooperate to enhance the capacity of developing country parties to implement the Agreement, with a specific direction that developed country parties should enhance support for capacity-building actions in developing country parties.[233]

Implementation and Compliance

As national measures set out in the NDCs are not legally binding under the Paris Agreement, the treaty's systems for review of implementation will be key to its effectiveness.

The Paris Agreement creates three different review processes, but leaves details regarding each to future decisions of the parties. In the first instance, review of implementation of individual NDCs will occur under an 'enhanced transparency framework' (Article 13), comprising a technical expert

the Paris Agreement shall set a new collective quantified goal from a floor of USD 100 billion per year, taking into account the needs and priorities of developing countries'.

[226] At COP 16 in Cancun, the Parties established the Green Climate Fund (GCF) as an operating entity of the Financial Mechanism of the Convention under Article 11. The Fund is governed by a Board comprising twenty-four members, as well as alternate members, with equal number of members from developing and developed country parties, and it is accountable to, and functions under the guidance of, the Conference of the Parties to support projects, programmes, policies and other activities in developing country parties using thematic funding windows. The structure of the GCF Board was considered a win for developing countries, who argued in the negotiations that the Global Environment Fund, had failed to provide adequate support to them in the past, due in part to its governing structure reflecting the interests of developed countries. At COP 17 in Durban, parties adopted and approved the Governing Instrument for the GCF: Report of the Conference of the Parties on its 17th Session, held in Durban, 28 November–11 December 2011, Addendum, FCCC/CP/2011/9/Add.1, Decision 3/CP.17.

[227] Paris Agreement, Art. 9(8). The COP also decided that the guidance to the entities entrusted with the operation of the Financial Mechanism of the Convention in relevant decisions of the COP, including those agreed before adoption of the Paris Agreement, shall apply *mutatis mutandis*. For information on the current activities and status of the GCF, see www.greenclimate.fund/home

[228] These provisions are further elaborated on by the COP decision adopting the Paris Agreement. See particularly, paras. 66–84.

[229] Paris Agreement, Art. 10(4). The Technology Mechanism was established at COP 16 in Cancun, see Cancun Convention Agreement, Article IV(B), para. 117.

[230] Paris Agreement, Art. 10(5). [231] *Ibid*. [232] Art. 10(6). [233] Art. 11(3).

review and multilateral consideration. Individual country review will be supplemented by a global stocktake process (Article 14) that will take place every five years to assess parties' collective progress towards achieving the purpose and long-term goals of the Agreement, preceded by a mitigation-focused facilitative dialogue in 2018. Finally, the Agreement establishes a mechanism to facilitate implementation and promote compliance through a committee that is expert-based, non-adversarial and non-punitive (Article 15). Decision 1/CP.21 of the Conference of the Parties requires the development of effective modalities, procedures and guidelines for each of these processes.

The transparency framework will build on and enhance the review mechanisms contained in the 1992 Climate Change Convention, discussed above. Based on the concerns of some parties that the review process could interfere with national sovereignty, and place further financial burdens on developing countries, the Agreement makes clear that the transparency framework will have 'built-in flexibility which takes into account Parties' different capacities'[234] and shall be implemented in a 'facilitative, non-intrusive, non-punitive manner, respectful of national sovereignty and avoid placing undue burden on Parties'.[235]

In contrast to the Kyoto Protocol, which only required Annex I (developed) parties to report, the Paris Agreement places reporting requirements on all parties, but recognises countries' varying abilities to report, based on differing national circumstances. Article 13.7 requires each party regularly to provide the following:

(a) a national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases; and
(b) information necessary to track progress made in implementing and achieving its NDC.

Each party should also provide information related to climate change impacts and adaptation,[236] and developed country parties must (and other parties that provide support should) provide information on financial, technology transfer and capacity-building support provided to developing country parties under the Agreement.[237] Information submitted under the Agreement is required to undergo a technical expert review.[238] The outcomes of individual party reviews will inform the global stocktake, established under Article 14.

The global stocktake is an innovation to be used to track progress towards the mitigation and adaptation goals in the Paris Agreement. The first stocktake, to be undertaken 'in the light of equity and the best available science', will be undertaken by the Conference of the Parties serving as the Meeting of the Parties in 2023 and will occur every five years thereafter, unless otherwise determined by the parties.[239]

The Agreement's compliance provisions are intended to be facilitative and non-punitive.[240] Article 15 establishes a mechanism to facilitate implementation and promote compliance, which shall consist of an expert committee along the lines of the Kyoto Protocol's Facilitative Branch. The COP decision that adopted the Paris Agreement set up a work programme for the Ad Hoc Working Group on the Paris Agreement to develop modalities and procedures to be adopted by the first meeting of the Conference of Parties serving as the Meeting of the Parties.[241]

[234] Art. 13(1). See also Art.13(2). [235] Art.13(3). [236] Art.13(8). [237] Art.13(9). [238] Art. 13(12).
[239] Art. 14(2).
[240] The Paris Agreement adopts no new provisions on dispute settlement. Instead, Art. 24 provides the provisions of Art. 14 of the Convention on settlement of disputes shall apply *mutatis mutandis* to the Agreement.
[241] Para. 103.

Institutional Arrangements

The Paris Agreement establishes institutional arrangements to enable its effective implementation and operation. It confirms that the Conference of the Parties – the supreme body of the Convention – will serve as the meeting of the Parties to the Paris Agreement and shall make the decisions necessary to promote its effective implementation, including to establish such subsidiary bodies as deemed necessary.[242] The Convention secretariat will serve as the secretariat under the Agreement,[243] and the rules and procedures of the Conference of the Parties and the financial procedures applied under the Convention apply *mutatis mutandis* under the Agreement.[244] Likewise, the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation established under the 1992 Climate Change Convention will serve respectively under the Agreement.[245]

Post-Paris Developments

The Paris Agreement entered into force on 4 November 2016, shortly ahead of the COP22 Meeting in Marrakesh, which also served as the first meeting of the parties to the Paris Agreement.[246] At the Marrakesh meeting, parties discussed the work programme arising from the Paris Agreement and agreed that a final version will be presented to the Conference of the Parties serving as the Meeting of the Parties for the Agreement for adoption at the twenty-fourth COP in 2018.[247] A range of decisions was also adopted on other work streams established prior to the Paris Agreement, including: the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts, long-term climate finance, the report of the Green Climate Fund to the COP and guidance to the Green Climate Fund, climate technology and development, and linkages between the technology mechanism and the financial mechanism.[248]

A key outcome of the Marrakesh meeting was the adoption of the 'Marrakesh Action Proclamation for our Climate and Sustainable Development'.[249] In bringing together the goals of the Paris Agreement and the Sustainable Development Goals, adopted by the UN General Assembly on 25 September 2015,[250] the Proclamation highlights that the task of the parties is to build rapidly on the momentum of the Paris Agreement and move 'forward purposefully to reduce greenhouse gas emissions and to foster adaptation efforts, thereby benefiting and supporting the 2030 Agenda for Sustainable Development and its Sustainable Development Goals'.[251]

[242] Art. 16(1). [243] Art. 17. [244] Art. 16(5). [245] Art. 18.

[246] For a list of states that have ratified the Agreement, see http://unfccc.int/paris_agreement/items/9444.php

[247] The final report of the conference had not been released at time of writing, for a list of draft decisions taken at Marrakech COP, see http://unfccc.int/meetings/marrakech_nov_2016/session/9967.php

[248] *Ibid*.

[249] Marrakesh Action Proclamation for our Climate and Sustainable Development, available at http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567/php/view/reports.php#c

[250] See Resolution adopted by the General Assembly on 25 September 2015, 70th Session, Agenda items 15 and 116, A/RES/70/1.

[251] Marrakesh Action Proclamation for our Climate and Sustainable Development (see n. 249). Another significant development, focusing on the role of non-state actors in implementation of the Paris Agreement, was the Marrakesh Partnership for Global Climate Action. This Partnership developed from the work of two 'high-level champions' appointed in accordance with COP21 Decision 1/CP.21 in order to ensure a durable connection between the Convention and the many voluntary and collaborative actions taking place outside the Convention, and to maintain momentum and climate action in the 2016–20 period. The aim of the Partnership is to provide a

Parties have so far made steady progress in implementing the central commitments of the Paris Agreement, with submissions of NDCs filed by nearly every party with the Convention secretariat. Parties' NDCs range from economy-wide emissions targets, to mitigation policies and measures, with some also including adaptation components and some made partly conditional on the support provided by other parties.[252] While it is encouraging to see the almost universal support for the NDC process, countries' contributions currently fall short of achieving the mitigation goal in the Paris Agreement. It has been estimated that current pledges and climate action commitments made under the Paris Agreement will lead to a warming of 2.8 °C, with only a likely (50/50) chance of holding warming to below 3.1 °C.[253] An analysis of countries' pledges reveals that there has not been an increase in their ambition since the Paris Agreement was adopted in December 2015.

INTERSECTORAL LINKAGES

International climate change law has many significant linkages with other areas of international law, including human rights, humanitarian law and international trade law.[254] These linkages are explored further in Part IV of this book. In some cases, for particular sources or emissions of greenhouse gases, a division of responsibility exists between the international climate change regime and other treaties. For instance, as discussed in the previous chapter, the Montreal Protocol on ozone-depleting substances has recently introduced amendments for a phase-out of hydrofluorocarbons (HFCs), which are also potent greenhouse gases, but not ones listed under the 1992 Climate Change Convention. Efforts to control HFCs under the Montreal Protocol will therefore have beneficial flow on effects for climate change regulation. Another pollutant which makes a major contribution to climate change, but which is not a covered greenhouse substance under the Convention, is black carbon. International regulation for black carbon has been agreed in revisions to the 1999 Gothenburg Protocol to the LRTAP (although these are not yet in force) and is the subject of study in the Arctic Contaminants Action Program.

Under the Kyoto Protocol, specific arrangements were put in place for transport-related emissions from aircraft and maritime shipping. Article 2.2 directed Annex I parties to 'pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively'. The Paris Agreement makes no reference to international aviation and maritime shipping. As a consequence, rules governing these emission sources have been developed by ICAO and IMO in processes separate from those of the main climate change negotiations.

strong foundation for how the international climate change regime will catalyse and support climate action by parties and non-party stakeholders in the period 2017–20, giving effect to the existing arrangements as agreed by parties at COP21 in Paris.

[252] See the UN interim register for NDCs at www4.unfccc.int/ndcregistry/Pages/Home.aspx. For a summary of countries' INDCs and NDCs and a rating of their ambition, see http://climateactiontracker.org/indcs.html

[253] Climate Action Tracker, 'Effect of current pledges and policies', http://climateactiontracker.org/indcs.html

[254] See further, R. Rayfuse and S. V. Scott (eds.), *International Law in the Era of Climate Change* (Cheltenham, UK: Edward Elgar, 2012).

Emissions from International Aviation

International aviation is one of the fastest-growing sources of greenhouse gas emissions, accounting for more than 2 per cent of the global total.[255] Following conclusion of the Kyoto Protocol, the ICAO began work to address the impacts of the aviation industry on climate change though progress was slow.[256] In 2007, the ICAO Assembly called for the establishment of a new Group on International Aviation and Climate Change (GIACC) composed of senior government officials representative of all ICAO regions, for the purpose of developing and recommending to the Council an aggressive Programme of Action on International Aviation and Climate Change. This Programme was finalised and accepted by the Council in June 2009. It was followed by a High-Level Meeting on International Aviation and Climate Change in October 2009 that agreed on several key initiatives including a global goal of 2 per cent annual improvement in fuel efficiency until the year 2050, and further exploration of the feasibility of more ambitious medium- and long-term goals, including carbon-neutral growth and emission reductions; development of a global CO_2 Standard for aircraft and facilitation of further operational changes to reduce aviation emissions; and development of a framework for market-based measures in international aviation.

In October 2016, in the lead up to the Paris conference, a new agreement was reached through ICAO on a global market-based measure (MBM) to control CO_2 emissions from international aviation.[257] The ICAO action – after a long period of ineffective negotiations – seemed to be driven by a preference for a global approach rather than the emergence of a patchwork regulatory framework based on aviation emissions controls introduced by different countries and regions (e.g. under the EU emissions trading scheme).[258] The 'aspirational goal' of the MBM is to keep the global net CO_2 emissions from international aviation from 2020 at the same level.[259] The measure will take the form of a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to address any increase in total CO_2 emissions from international civil aviation (i.e. flights that depart in one country and arrive in another) above the 2020 levels 'taking into account special circumstances and respective capabilities'.[260] Offsetting will rely on the reduction of emissions outside the aviation sector through the purchase of emissions reduction units on the international carbon market, whether credits from mechanisms such as the Paris Agreement Article 6 mechanism, CDM or REDD+ activities, or allowances under emissions trading schemes.

CORSIA will be implemented in three phases. In the 'pilot' phase (from 2021 to 2023) and first phase (from 2024 to 2026) the scheme will apply to states that have volunteered to participate in the scheme. As of 12 October 2016, sixty-six states, representing more than 86.5 per cent of

[255] See the *Special Report on Aviation and the Global Atmosphere* (1999) prepared at the ICAO's request by the IPCC in collaboration with the Scientific Assessment Panel to the Montreal Protocol (available at www.grida.no/climate/ipcc/aviation/index.htm). At the request of the ICAO, the findings of this report were updated in the IPCC's 2007 Assessment Report: IPCC, *Climate Change 2007 – Impacts, Adaptation and Vulnerability* (2007).

[256] See IPCC, *Special Report on Aviation and the Global Atmosphere* (1999); see also ICAO Assembly Res. A33–7, resolving to promote scientific research aimed at addressing uncertainties and requesting the ICAO Council to continue to cooperate closely with the IPCC and other organisations involved in the definition of aviation's contribution to environmental problems in the atmosphere.

[257] ICAO Assembly Res. A39–3.

[258] See T. Spence, 'ICAO under Pressure to Forge Deal on Aviation Emissions', Euractiv, 18 July 2014, www.euractiv.com/section/transport/news/icao-under-pressure-to-forge-deal-on-aviation-emissions

[259] ICAO Assembly Res. A39–3, para. 3.

[260] *Ibid*., para. 5.

international aviation activity, have indicated that they intend to participate voluntarily in the global MBM scheme from its outset. CORSIA's second phase (from 2027 to 2035) will apply to all states that have an individual share of international aviation activities (measured in revenue tonne kilometres – RTKs) in year 2018 above 0.5 per cent of total RTKs or whose cumulative share in the list of states from the highest to the lowest amount of RTKs reaches 90 per cent of total RTKs. Least developed countries, small island developing states and landlocked developing states are excluded from this requirement, unless they volunteer to participate in this phase.[261]

In addition to the phased implementation, the coverage of the scheme is defined on the basis of routes between states: a route will be covered by the scheme only if both states connecting the route are participating in the scheme. Once participation of states and routes covered by the CORSIA is defined in a given year from 2021, and offsetting requirements in the given year (i.e. increased emissions beyond the average baseline emissions of 2019 and 2020) are set, the requirements are distributed among aircraft operators participating in the scheme according to a formula set out in paragraph 11 of the ICAO Assembly's resolution. This formula adopts a 'dynamic approach' with movement over time from use of a sectoral rate (that combines an operator's emissions with the sector's growth factor in a given year) to a 70 per cent individual rate (combining an operator's emissions with the aircraft operator's growth in a given year) by 2033. However, CORSIA does not apply to 'low levels of international aviation activity', namely aircraft operators emitting less than 10,000 metric tonnes of CO_2 emissions from international aviation per year; aircraft with less than 5,700 kg of Maximum Take Off Mass (MTOM); or humanitarian, medical and firefighting operations.[262]

The scheme will also be subject to a three-yearly review by the ICAO Council 'to contribute to the sustainable development of the international aviation sector and the effectiveness of the scheme'.[263]

Emissions from International Shipping

Together with aircraft emissions, emissions from international shipping – particularly from the combustion of bunker fuels – contribute significantly to global atmospheric problems, such as climate change.[264] Emissions from international shipping fall outside the international climate change regime, with efforts to pursue limitation or reduction of shipping-related bunker fuels emissions undertaken through the International Maritime Organization (IMO) since conclusion of the Kyoto Protocol.[265] After many years of inaction, the IMO has recently stepped up its efforts in respect of this issue. In July 2011, the IMO's Marine Environment Protection Committee adopted a package of technical and operational measures to reduce carbon dioxide and other greenhouse gas emissions from international shipping.[266] These measures – which took the form

[261] *Ibid*., para. 9 [262] *Ibid*., para. 13. [263] *Ibid*., para. 18.

[264] V. Eyring, H. W. Köhler, J. van Aardenne and A. Lauer, 'Emissions from International Shipping: 1. The Last 50 Years', 110 *Journal of Geophysical Research* D17305 (2005). Although international maritime transport contributes only around 3 per cent of global greenhouse gas emissions, the size of the sector means that its overall contribution to the quantity of greenhouse gases in the atmosphere is substantial.

[265] Kyoto Protocol, Art. 2(2).

[266] The Marine Environment Protection Committee (MEPC) of the IMO adopted mandatory measures to reduce greenhouse gas emissions from international shipping at its 62nd Session, held in London from 11 to 15 July 2011: IMO, 'Mandatory Energy Efficiency Measures for International Shipping Adopted at IMO Environment Meeting', IMO Press Briefing 42, 15 July 2011, available at www.imo.org/MediaCentre/PressBriefings/Pages/42-mepc-ghg.aspx

of a new chapter 4 entitled 'Regulations on energy efficiency for ships' added to MARPOL Annex VI, make mandatory the Energy Efficiency Design Index (EEDI) for new ships and the Ship Energy Efficiency Plan (SEEMP) for all ships. The regulations entered into force through the tacit acceptance procedure on 1 January 2013 and apply to all ships over 400 gross tonnage and above (existing ships are exempt from the requirements). Ships flagged by developing countries are able to delay implementation of the EEDI requirements for six-and-a-half years.[267] The EEDI applies performance-based standards for energy efficiency, requiring ships built after 2013 to increase their efficiency by 10 per cent, rising to 20 per cent between 2020 and 2024 and 30 per cent thereafter. The measures take a significant step towards reducing greenhouse gas emissions from international shipping and represented the first ever, mandatory greenhouse gas reduction regime for an international industry sector.

However, it is recognised that technical and operational measures dealing with energy efficiency will by themselves be insufficient to reduce greenhouse gas emissions from international shipping in light of population growth trends and increasing world trade. Proposals have therefore been under consideration since 2011 for a market mechanism, similar to that adopted by ICAO in the aviation context, which might provide an incentive for the maritime industry to invest in technology development to further reduce emissions although consensus has proved elusive.[268] Likewise, the issue of bunker fuel emissions, from both international aviation and international shipping, has also been a subject of discussion in the international climate change negotiations since late 2007, although no agreement on a way forward has yet been reached in this forum.[269]

CONCLUSIONS

After many years of lengthy negotiations with only limited progress, the conclusion of the 2015 Paris Agreement is seen by many as a significant turning point in global efforts to address climate change. The Paris Agreement's approach – based on nationally determined contributions to the global response to the problem – departs from the top-down structure of earlier climate change treaties, which failed to stem emissions growth. The hope is that the Agreement's bottom-up process, coupled with measures for transparency, reporting and review, could encourage ambitious, progressive action by states parties to meet the Agreement's objectives, including its long-term temperature goal.

While the Paris Agreement was speedily ratified and entered into force in November 2016, the issue of US participation has raised a question over its longer-term prospects. In this respect, a key difference between the Paris Agreement and the 1992 Climate Change Convention and its Kyoto Protocol may be critical: the 2015 Agreement applies to *all* parties rather than relying solely on developed country parties to make progress on climate change mitigation. This opens

[267] 'IMO Adopts Mandatory Energy Efficiency Standards', 11(14) *Bridges Trade BioRes* 4 (2011).

[268] R. Hildreth and A. Torbitt, 'International Treaties and US Laws as Tools to Regulate the Greenhouse Gas Emissions from Ships and Ports', 25(3) *International Journal of Marine and Coastal Law* 347 (2010); C. Pisani, 'Fair at Sea: The Design of a Future Legal Instrument on Marine Bunker Fuels Emissions within the Climate Change Regime', 33(1) *Ocean Development and International Law* 57 (2002).

[269] Such negotiations were undertaken in accordance with the mandate of the 2007 Bali Action Plan, para. (1)(b)(iv), to consider 'cooperative sectoral approaches and sector-specific actions' to enhance climate change mitigation but no agreement was reached in these negotiations and the agenda item on sectoral approaches was not included in Decision 1/CP.18, the agreed outcome pursuant to the Bali Action Plan.

up space for leadership on climate change from developing countries, such as China, even if some developed countries step away from full implementation of their obligations under the treaty.

Although the Paris Agreement sets a framework for ongoing management of climate change from 2020 onwards, the Agreement leaves many details of its implementation to future negotiation rounds. This includes further guidance on the operation of market- and non-market-based approaches for reducing emissions, the role of REDD+ activities, the development of the reporting and transparency framework, and the operation of the compliance mechanism. It is likely that the detailed rules worked out for similar mechanisms under the Convention and Kyoto Protocol will serve as a model here. Other international treaty regimes will also play a role in advancing action on climate change, including the Montreal Protocol through controls on synthetic greenhouse gases, and ICAO and IMO on transport-related emissions.

On the NDCs themselves, a critical gap remains between the level of ambition they embody and the long-term temperature stabilisation goals of the Paris Agreement. Unless the NDCs can be quickly ratcheted up there is the strong prospect of overshooting temperature thresholds with devastating levels of global warming the result. The Paris Agreement – in recognition of the fact that previous delays in implementing climate change measures has made some warming inevitable – pays increased attention to adaptation measures, climate finance and issues of loss and damage. In the first Meeting of the Parties to the Agreement in Marrakesh there was also recognition of the need for implementation of the Agreement to be closely tied to work on the 2030 UN Sustainable Development Goals, as well as actions being taken at all levels of government and by a range of different actors to address climate change. For the time being, the Paris Agreement contemplates that emissions reductions will be able to be achieved through NDCs in an ambitious and timely fashion to avert climate disaster.

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