

An Overview of the Main Climate Change Agreements and the Process that Led to Their Formation

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The goal of this article is to introduce the four main international agreements on climate change. We start by tracing the evolution in international climate cooperation. This process begins in the 1950s with the accumulation of scientific evidence and culminates decades later with the ratification of important international treaties. Then, we look in greater detail at the content of the main environmental agreements on climate change. How are they structured? What are the main obligations they set for ratifiers? These questions will be answered in the second half of the article.

From scientific evidence to political action

The first step in the international cooperation over climate change has its roots in the growing scientific evidence on the linkage between Greenhouse Gases (GHGs) and global warming. The acquisition of scientific knowledge on climate change was a slow process that started in the second half of the twentieth century. The first consistent measurements of CO₂ concentration in the atmosphere began in the 1950s in Hawaii.¹ Nonetheless, the scientific awareness of the effects of human CO₂ emissions and the magnitude of their impact emerged gradually over the '60s and '70s.² At the time, a lot of confusion and many misconceptions

¹ Weart, S. (1997). The discovery of the risk of global warming. *Physics Today*, 50, 34-50.

² Hecht, A. D. & Tirpak, D. (1995). Framework agreement on climate change:

urrounded the phenomenon of climate change. In the US, a climate change programme was established in response to extreme weather events experienced in the 1970s.³ There were even allegations that these were the effects of deliberate climate modification operated by the USSR.⁴

As a response to the growing concern for environmental conditions, the UN conference on Human Environment was organised in 1972. The conference, held in Stockholm, led to the formulation of the Declaration of the UN Conference on Human Environment, also known as the Stockholm Declaration. The declaration institutes the UN Environment Programme (UNEP) and kickstarts an influential environmental movement within international diplomacy. In 1979 the World Meteorological Organisation (WMO) organised the First World Climate Conference to assess 'existing knowledge of how higher atmospheric GHG concentration could lead to temperature increase.'⁵ Many participants considered global anthropogenic warming only a theoretical possibility. Therefore, the conference concluded that it was paramount to intensify international research on the issue.⁶ This research initiative is among the first examples of international cooperation on climate change.

The first global agreements on climate change

In the 1980s the depletion of the ozone layer by chlorofluorocarbons (CFCs) stimulated the interest of the public

a scientific and policy history. *Climate Change*, 29, 371–402.

³ In particular, the drought of 1972 and the extremely cold winter of 1976.

⁴ Hecht & Tirpak, 1995.

⁵ IPCC (2014). *Climate Change 2014: Synthesis report Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: IPCC.

⁶ Weart, 1997.

over environmental issues.⁷ This contributed in raising the awareness of the effect of human emissions on the climate. The issue of the depletion of the ozone layer, and in particular the control of ozone layer depleting substances such as CFCs, has been addressed by the Vienna Convention for the Protection of Stratospheric Ozone in 1985,⁸ which was complemented two years later by the Montreal Protocol on Substances that Deplete the Ozone Layer.⁹ The protocol is a legally binding document that obliges the parties to gradually reduce the production and use of CFCs, until total phase-out. These two agreements were enormously influential in shaping all subsequent environmental diplomacy. They are some of the first truly global environmental agreements. Because of their success, they constitute a model for all following agreements on climate change.¹⁰

The Montreal Protocol is not traditionally associated with climate change, but it should be. First of all, most of the substances regulated by the Montreal Protocol are also potent GHGs. All later agreements on climate change refer directly to the Montreal Protocol for regulating the emission of these substances.

⁷ World Bank (2010). *World Development Report 2010: Development and Climate Change*. Washington D.C.: World Bank.

⁸ Vienna Convention (1985). Vienna Convention on the Protection of the Ozone Layer Vienna, *United Nations Ozone Secretariat*. (Accessed at: <http://ozone.unep.org/en/treaties-and-decisions/vienna-convention-protection-ozone-layer>).

⁹ Montreal Protocol (1987). The Montreal Protocol on Substances that Deplete the Ozone Layer, *United Nations Ozone Secretariat*. Montreal. (Accessed at: <http://ozone.unep.org/en/treaties-and-decisions/montreal-protocol-substances-deplete-ozone-layer>).

¹⁰ Oberthur, S. (2001). Linkages between the Montreal and Kyoto Protocols; Enhancing Synergies between Protecting the Ozone Layer and the Global Climate. *International Environmental Agreements: Politics Law and Economics*, 1, 357–377.

Secondly, the ozone layer is tightly linked to global warming. In fact, the ozone layer bounces incoming radiation from the sun. Hence, depletion of the ozone layer increases the greenhouse effect.

In 1985 at a WMO and UNEP scientific conference in Villach, the impact of other gases (other than CO₂) on global temperature was ascertained.¹¹ The need for further scientific inquiry on the issue of climate change prompted the creation of an independent scientific body: the Intergovernmental Panel on Climate Change (IPCC). The IPCC was established in 1988 by the UNEP and the WMO to investigate climate change and provide an independent scientific basis for policy and international cooperation. The IPCC plays a crucial role in gathering scientific evidence for political decisions. It is responsible for compiling a report on climate change that is used as a scientific basis for international climate agreements.

At this stage, there was a solid consensus in the scientific community over the causes of climate change. The second World Climate Conference of 1990, recognising the threat of anthropogenic global warming, called for a global agreement on climate change. Soon the general assembly of the UN established a negotiation committee that, in five sessions from 1990 to 1992, drafted the bases of a convention on climate change.¹² They opted for a framework-protocol structure, in which basic principles and goals are first expressed in a framework agreement. These principles are then implemented through precise targets set in subsequent protocols. This structure follows the blueprint of the successful Vienna Convention/Montreal Protocol on ozone depleting substances.¹³ A critical point in the negotiation was to agree on the responsibilities for climate change and on how responsibilities should be distinguished on the grounds of

¹¹ Weart, 1997.

¹² Hecht & Tirpak, 1995.

¹³ Oberthur, 2001.

historical emissions and economic income. The consultations resulted in the formulation of the principle of common but differentiated responsibilities, which underpins all later climate agreements. This principle recognises a shared responsibility in climate change, but it also asserts the obligation of developed nations to lead the way in climate action, reflecting the difference in income and their historical contribution to the emissions of GHGs.¹⁴

The text produced during the negotiations was adopted in 1992 in Rio de Janeiro at the UN Conference on Environment and Development (UNCED, better known as Rio Earth Summit). It is called the UN Framework Convention on Climate Change (UNFCCC). During the summit two other conventions were signed: the UN Convention on Biological Diversity and the Convention to Combat Desertification. The UNFCCC entered into force on March the 21st of 1994 after receiving the 50th ratification —by Portugal. The UNFCCC is instrumental in framing all future dialogue on climate change. This agreement served as a platform for negotiation and led to the formation of the other two large agreements on climate change: the Kyoto Protocol (1997) and the Paris Agreement (2015).

An overview of the main climate agreements

Climate change is a global problem. The effort of a single country, on its own, is not enough to tackle global problems: that is why international cooperation is essential for success. Climate diplomacy is responsible for the coordination and promotion of climate action among nations. Given the nature of climate change, most of the activity occurs multilaterally rather than bilaterally, during regional and international summits (e.g. G7/G20, WEF)

¹⁴ Hecht & Tirpak, 1995.

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and within the framework of climate agreements. The process of international cooperation, so far, has delivered four important agreements under the UN negotiations (the Montreal Protocol, the UN Framework Convention on Climate Change, the Kyoto Protocol and the Paris Agreement) and a set of smaller and related treaties.¹⁵ A notable example of smaller agreements related to climate change is the agreement on aviation emissions sealed in October 2016 under the International Civil Aviation Organisation. These smaller agreements often refer to more specific and technical matters not regulated in the key treaties (for instance, maritime and air transport are not covered by the Paris Agreement and Kyoto Protocol). In this section, we introduce in chronological order the four most important agreements related to climate change: the Montreal Protocol, the UNFCCC, the Kyoto Protocol and the Paris Agreement.

Montreal Protocol

The goal of the Montreal Protocol (1987) is to contain the production and consumption of CFCs and halons, which are two ozone depleting substances (ODS). The parties agreed to a gradual reduction in the use of ODS, with the prospect of leading to a phase-out of the substances in the future. Today the protocol covers more than 90 ODS such as carbon tetrachloride, methyl chloroform, partially halogenated CFCs, methyl bromine and bromochloromethane. Some of the gases covered by the Montreal Protocol — such as carbon tetrachloride, methyl chloroform, hydrochlorofluorocarbons (HCFCs) and methyl bromine — are also potent GHGs. The Kyoto protocol and Paris Agreement only regulate GHGs not covered by the Montreal protocol.

The protocol underwent a substantial evolution over time with the aim of promoting increasingly tighter objectives for the

¹⁵ World Bank, 2010.

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participants. The protocol was amended eight times (in 1990, 1991, 1992, 1995, 1997, 1998, 1999 and 2016). On top of the amendments, the protocol was also adjusted two times — in 1995 and 2007 — in response to new scientific evidence. Unlike amendments, adjustments do not need to be ratified by the countries; they automatically become effective.¹⁶ The Kigali Amendment of 2016 is particularly important for climate change. The amendment entails stronger commitments in curbing the use of HCFCs, a very strong GHG, which had partially been used as a less nocive substitute to CFC. However, the amendment was criticised because it sets a delayed entry into force for developing countries. The amendment is only partially satisfactory, many of the largest consumers of HCFCs are in fact not covered by the current agreement. For example, India, which has a vast air conditioning market, resisted the agreement and obtained a delayed entry into force in 2024.

The members of the Montreal protocol meet annually to negotiate and manage the implementation of the treaty. The protocol has financial mechanisms to support developing countries in implementing the agreement. Furthermore, the protocol establishes trade sanctions for states that do not meet their ODS emission targets and imposes trade restrictions with countries that did not ratify the protocol. This carrot-and-stick approach proved to be very effective in promoting participation and compliance with the protocol.¹⁷ So far, the trade sanctions have never been enforced.

The Protocol is deemed to be one of the most successful international environmental agreements. It secured universal ratification and delivered excellent environmental results:

¹⁶ UNEP (2010). *A Success in the Making: The Montreal Protocol on Substance that Deplete the Ozone Layer*, The United Nations Ozone Secretariat, UNEP, Nairobi.

¹⁷ Oberthur, 2001.

compared to the initial levels of consumption and production of ODS, levels in 2010 were reduced by 98%.¹⁸ Thanks to the Montreal protocol the ozone levels in the stratosphere are now starting to recover. In addition, the protocol contributed to reducing global warming by curbing the emission of GHGs and protecting the ozone layer.

UNFCCC

The UN Framework Convention on Climate Change (UNFCCC)¹⁹ was signed during the 1992 Rio Earth summit together with two sister conventions: the UN Convention on Biological Diversity and the Convention to Combat Desertification. The UNFCCC entered into force in 1994 after receiving the 50th ratification. The objective of the convention is to stabilise GHG concentration at levels that would 'prevent dangerous anthropogenic interference with the climate system',²⁰ where the definition of 'dangerous' must be informed by natural, technical, and social science. However, no binding emission target is set by this agreement, it merely establishes the principles and goals for future cooperation on climate change. The objectives of the UNFCCC would then have to be implemented through subsequent protocols (i.e. the Kyoto Protocol).

The Convention recognises important principles, such as the precautionary principle, the principle of common but differentiated responsibilities and the right of developing countries to economic development. According to these, reduction in emissions should be achieved 'on the basis of equity and in

¹⁸ UNEP, 2010.

¹⁹ UNFCCC (1992) United Nations Framework Convention on Climate Change, *UNFCCC Secretariat*. Rio de Janeiro. (Accessed at: http://unfccc.int/essential_background/convention/items/6036.php)

²⁰ Article 2, UNFCCC 1992.

accordance with common but differentiated capabilities,²¹ and scientific uncertainty cannot justify postponing environmental measures. On the other hand, developing countries are allowed to be temporarily exempted from formal commitments as it is recognised that developed countries have a greater responsibility for current GHG concentration and that developing countries face urgent priorities such as, among other things, eradication of poverty and sustainable economic development. To this end, the UNFCCC includes a list of nations that commit to stricter environmental policies — the so-called Annex I countries. In addition, the convention establishes the Conference of the Parties (COP)²² and lays some basic rules for future negotiation. This is an attempt to concentrate, under the banner of the UN, the international debate on climate change and avoid parallel agreements on the same subject.²³

In conclusion, the convention delineates the principles of international climate change cooperation and urges for environmental action. The only binding obligation of the Convention refers to the reporting of information related to GHGs. Notably, countries must communicate national inventories of GHGs and report all the national implemented policies to combat climate change. The information requirements are slightly different for Annex I and non-Annex I countries.

²¹ Article 3, UNFCCC 1992.

²² The Conference of Parties (COP) is an annual meeting of the delegates from each ratifying nation. It is responsible for supervising the implementation of the agreement and negotiating all changes to the text of the treaty.

²³ Hecht & Tirpak, 1995.

Kyoto Protocol

The Kyoto Protocol²⁴ was signed in 1997 by more than 150 countries. However, many of the rules regarding its implementation had yet to be defined. For several years, negotiations followed practical implementation issues, ending on a stalemate.²⁵ Moreover, the protocol was not yet effective because it required ratification by countries representing at least 55% of world emissions in 1990. In 2000 — when the US rejected altogether the Kyoto Protocol — there seemed to be no way out of this impasse since the US accounted for a large share of world's emissions.²⁶ Eventually, a compromised solution was found thanks to the introduction of more flexible compliance measures (the criteria determining if a country has met its obligations), which reduced the participation costs for several large countries.²⁷ This change secured the participation of important emitters such as Russia, Japan, Australia and Canada, and allowed the protocol to enter into force in 2005.

The parties to the protocol meet each year at the meeting of the parties to the Kyoto Protocol (CMP), which is always held jointly to the COP. The countries that joined the UNFCCC, but not

²⁴ Kyoto Protocol (1997). Kyoto Protocol to the United Nations Framework Convention on Climate Change, *UNFCCC Secretariat*. Kyoto. (Accessed at: http://unfccc.int/kyoto_protocol/items/2830.php)

²⁵ Pearson, C. S. (2011). *Economics and the Challenge of Global Warming*. Cambridge: Cambridge University Press.

²⁶ Babiker, M. H., Jacoby, H. D., Reilly, J. M., & Reiner, D. M. (2002). The evolution of a climate regime: Kyoto to Marrakech and beyond. *Environment Science and Policy*, 5, 195–206.

²⁷ Dessai, S., Schipper, E. L., Corbera, E., Kjellen, B., Gutierrez, M., & Haxeltine, A. (2005). Challenges and Outcomes at the Ninth Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change. *International Environmental Agreements*, 5, 105–124.

the Kyoto Protocol, have the right to participate as observers. The protocol covers the emissions of six different GHGs: carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), hydrofluorocarbon, perfluorocarbon and sulfur hexafluoride (SF₆). Additional GHGs gases such as CFCs and HCFCs are also ozone depleting substances; thus, they are regulated by the Montreal Protocol.

The protocol sets precise emission reduction targets averaging about 5% below 1990 levels for a small group of nations. The group of countries with binding reduction targets — mainly composed of OECD countries and former Soviet Union nations — is listed in Annex B of the Kyoto Protocol, which coincides almost exactly with the list of countries in Annex I of the UNFCCC.²⁸ The targets had to be achieved within the commitment period of 2008–2012.

At the end of the commitment period, Canada was the only country that officially did not meet the emission targets — hence its withdrawal from the protocol in 2012. However, the success of the other countries in meeting their objectives is mostly artificial. Their success is linked to the economic recession of 2008, which slowed economic activity, and the use of the flexibility mechanisms of the protocol.²⁹

The protocol stipulates that the reductions in GHG emissions should be achieved through national environmental measures. Nevertheless, the protocol also admits three flexibility mechanisms to meet the emission targets:

EMISSION TRADING. The Annex B countries are assigned emissions allowances called Assigned Amount Units

²⁸ Annex B includes Turkey and Belarus while Annex I does not.

²⁹ Aichele, R. & Felbermayr, G. (2012). Kyoto and the carbon footprints of nations. *Journal of Environmental Economics and Management*, 63, 336–354.

(AAU). Countries can trade them as a commodity. If the country emits more than it is supposed to, it can simply buy more allowances from a country that has an excess of AAU. This system is called cap-and-trade because a limit on emissions is set with the AAU, then the emitters distribute the emission permits through trade. The emission trading mechanism effectively allowed developed nations to "buy" into the emissions assigned to Central and Eastern European countries, which received a number of AAU larger than their emissions to support economic growth.³⁰

CLEAN DEVELOPING MECHANISM (CDM). In addition to emission trading, countries obtain additional carbon credits by collaborating with developing countries in projects that reduce emissions. With CDM, developed nations can introduce emission-reduction projects in developing countries — where emission reductions cost less — in order to meet their own emission targets. At the same time, this mechanism has the added advantage of transferring technological knowledge to developing nations.³¹

JOINT IMPLEMENTATION (JI). The JI is the equivalent of CDM for collaborations between industrialised countries (both need to be in Annex B). The JI allows countries to earn emission credits for projects undertaken in other countries with binding targets.

³⁰ Hepburn, C. (2007). Carbon Trading: A Review of the Kyoto Mechanism. *Annual Review of Environment and Resources*, 32, 375–393.

³¹ Fancioni, F. & Bakker, C. (2013). The Evolution of Global Environmental System. *Transworld; The Transatlantic Relationship and the Future Global Governance*, Working Paper 7. (Accessed at: http://www.transworld-fp7.eu/wp-content/uploads/2013/01/TW_WP_08.pdf).

The Doha Amendment revised the protocol in 2012. The amendment institutes a **second commitment period** (2013–2020) to the Kyoto Protocol (KP2), although only for a smaller number of countries. Japan, Russia, and New Zealand opted out and Canada had already withdrawn from the Kyoto Protocol in 2012. In total these countries only represented 13% of the world's annual carbon dioxide emissions in 2010. The remaining parties committed to a reduction of 18% of their emissions compared to 1990 levels as a transition period to the entering into force of the Paris Agreement. In addition to the basket of six GHGs of the first commitment period, nitrogen trifluoride (NF₃) was included in KP2. Sadly, the Doha amendments never entered into force because they did not receive enough ratifications.

Paris Agreement

Overall the experience of the Kyoto Protocol was rather negative. Negotiations were arduous, the protocol engaged only a small number of countries, the commencement was extremely slow, and its effectiveness in curbing emissions is debatable. Therefore, negotiators decided to opt for an altogether different approach for the Paris Agreement.

The Paris Agreement³² is the biggest multilateral agreement on the issue of climate change, with 195 countries signing the agreement in 2015. The target of the agreement is to limit the increase in average temperature to levels 'well below 2°C' and it admits the need to aim for an increase lower than 1.5°C above pre-industrial levels. Furthermore, the agreement

³² Paris Agreement (2015). Paris Agreement on Climate Change, UNFCCC Secretariat. Paris. (Accessed at: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>).

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acknowledges the need for immediate action and urges the signatories to make emissions peak as soon as possible. The Paris Agreement also calls for action from non-party agents such as civil society, NGOs and subnational authorities.

The system introduced by the Paris agreement consists of a structure divided in two layers:

- 1) A common binding ground that regulates the assessment process and basic formal requirements such as the communication of GHG inventories;
- 2) A flexible target setting for participants, in which each party is free to establish its objectives and the way it proposes to achieve them. The goals are called Nationally Determined Contribution (NDC). This structure breaks the Annex 1/non-Annex 1 subdivision of countries of previous agreements and creates self-differentiation through national commitments.

The agreement sets no binding emission targets for the participants and the ratifiers incur no sanction if they do not fulfil their NDC. However, the monitoring and reporting process is binding. In addition, every five years the parties have to update their NDCs objectives, which must represent a progress toward the target of the agreement and reflect the 'highest possible ambition.'³³ As of now, the reduction in emissions implied by the sum of all pledges is unable to ensure that the objective of 'well below 2°C' is met.

Just like the Kyoto Protocol, the Paris agreement institutes a market for emission permits known as Internationally Transferred Mitigation Outcomes (ITMO) so that any country can buy or sell ITMOs to comply with national targets. The agreement also creates financial mechanisms to support developing countries in meeting their goals. The Global Environmental

³³ Article 4, Paris Agreement, 2015.

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Facility (GEF) and the Global Climate Fund (GCF) are the two entities that operate the Financial Mechanism of the agreement. During the last three COP meetings, negotiations focused on the endowments and rules of the financial mechanisms. Initially, developed nations had pledged 100 billion dollars to support the agreement. This financial target currently seems harder to achieve.

In October 2016, the international community signalled a strong political engagement by allowing the treaty to enter into force before the COP22 of Marrakech (this is impressive given that it took eight years for the ratification and entry into force of the Kyoto Protocol). A crucial role in its early adoption was played by the prompt ratification of the United States — which later decided to pull-out of the agreement — and China during a joint ceremony. Despite the strong display of political will, many practical implementation aspects will have to be determined in the upcoming conferences of the parties. The environmental success of the agreement will inevitably depend on the outcome of these technical negotiations. As always, the devil is in the detail.