

Unpacking Pre-2020 Climate Commitments

Who Delivered, How Much, and
How will the Gaps be Addressed?

Sumit Prasad, Spandan Pandey, and Shikha Bhasin

Report | July 2021



Any additional consumption of carbon space in the pre-2020 period will be required to be addressed in order to limit the temperature below 1.5 degrees by 2100.

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The methodology and preliminary outcomes of the pre-2020 research and ranking framework were also discussed in a stakeholder consultation involving domain experts across the globe. The feedback from the experts related to approach, assumptions, and findings were duly considered and incorporated in the report.

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Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, climate change mitigation and clean energy finance.

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The Council has a footprint in 22 Indian states, working extensively with state governments and grassroots NGOs. It is supporting power sector reforms in Uttar Pradesh and Tamil Nadu, scaling up solar-powered irrigation in Chhattisgarh, supporting climate action plans in Gujarat and Madhya Pradesh, evaluating community-based natural farming in Andhra Pradesh, examining crop residue burning in Punjab, promoting and deploying solar rooftops in Delhi, Bihar and Meghalaya.

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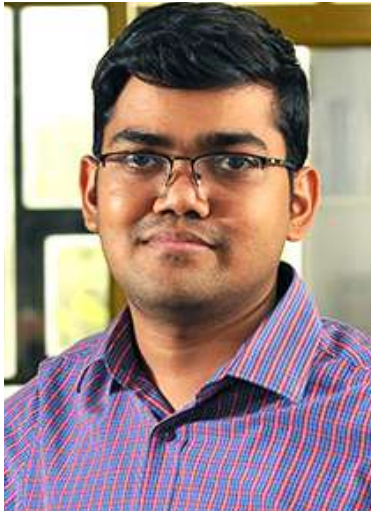
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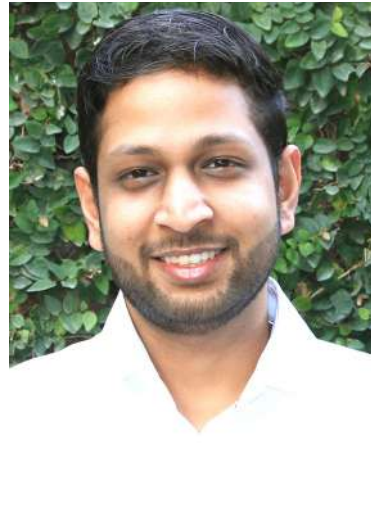


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"As long as the issues from the pre-2020 period remain unaddressed, it would be difficult to trust the commitments made by developed countries for the post-2020 period."



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"The burden of the gaps emerging from the pre-2020 period should not be transferred to developing countries but distributed among developed countries."



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"2021 is a critical year in enabling a stronger, more effective, climate regime. For the regime to succeed in solving climate change, it must aim to epitomise transparency, leadership, and trust. This study is an effort to nudge the global community to this end."



The fate of the post-2020 climate negotiations critically hinges upon the achievements, gaps, and issues recognised in the pre-2020 period.

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Acronyms

AAU	assigned amount units
BAU	business as usual
CBDR-RC	common but differentiated responsibilities and respective capabilities
CDM	clean development mechanism
CER	certified emission reduction
COP	Conference of the Parties
CP1	first commitment period
CP2	second commitment period
CPR	commitment period reserve
CRF	common reporting format
ECBI	European capacity building initiative
EIT	economies in transition
ERU	emission reduction unit
ESD	effort-sharing decision
ET	emissions trading
ETS	emissions trading system
EU	European Union
IET	international emissions trading
ITL	international transaction log
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
JI	joint implementation
LCER	long-term certified emission reductions
LULUCF	land use, land-use change, and forestry
OECD	Organisation for Economic Co-operation and Development
QELRC	quantified emission limitation or reduction commitments
QELRO	quantified emission limitation or reduction objectives
RMU	removal units
SEF	standard electronic format
tCER	temporary certified emission reductions
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
USD	US dollar



The easy exit of countries from climate agreements undermines the trust in the process of climate negotiations itself and dissuades other nations from undertaking ambitious targets.

Executive summary

In the last few years, the discussions on climate ambition have primarily focused on either nationally determined contribution (NDC) targets committed within the framework of the Paris Agreement, or respective countries' net-zero commitments. While these mid-century ambitions are essential for achieving the 1.5°C global warming target set in the Paris Agreement, it is equally important to study the outcomes of the emission reduction pledges made by developed countries *before* the Paris Agreement, in the pre-2020 climate regime. The fate of post-2020 negotiations for climate change crucially hinge upon the achievements, gaps, and issues recognised in the pre-2020 period.

However, post-2020 ambitions announced by developed countries have been set without due consideration of their past performance. Concerns continue to be expressed about the implementation of pre-2020 commitments by developing countries and were most recently emphasised in decision 1/CP.23. The issue was also discussed at the 25th Conference of Parties (COP 25) to the United Nations Framework Convention on Climate Change (UNFCCC).



Post-2020 climate ambitions announced by developed countries have been set without due consideration of their past performance

The cost of unmet climate commitments by developed countries

The significance of pre-2020 climate actions by developed countries can be broadly encapsulated across three dimensions: environmental, political, and economic.

- *Environmental:* The World Meteorological Organization highlighted that the global carbon dioxide concentration has already exceeded 410 parts per million (ppm), impacting our ecosystems, marine life, and increasing the global average temperature to record high levels (WMO 2021). There is a 40 per cent chance that the annual average global temperature would exceed 1.5°C above pre-industrial levels in the next five years (WMO 2021). This 1.5°C marker is identified as a key tipping point¹ by the Intergovernmental Panel on Climate Change (IPCC) beyond which environmental risks are likely to be extreme (IPCC 2018).
- *Political:* The gaps in pre-2020 climate actions are also of grave concern from an equity perspective. The developing countries have concerns of bearing the burden of tackling the mitigation gaps from the pre-2020 period in the future. Furthermore, it has caused a further fissure between the developed and developing country groupings, contributing to a mistrust on the next set of ambitions that were tabled in the negotiations.

1. Tipping points are critical thresholds existing in any system, exceeding which can lead to an irreversible change in the state of the system. In this context, we are concerned with the physical climate system, ecosystems, and human systems, which are crucial to understand the different levels of climate change-related risks.

- **Economic:** The cost of mitigation efforts is expected to increase significantly in the future compared to the pre-2020 period. According to the World Economic Forum, inactions towards climate change would cost the world USD 1.7 trillion per year by 2050 (Janata 2021).

Based on the principle of equity and common but differentiated responsibilities and respective capabilities (CBDR-RC), the onus to reduce greenhouse gas emissions for a long time was placed on developed countries (also referred to as Annex I Parties). This principle was operationalised within the UNFCCC through two international climate agreements: the Kyoto Protocol (1997) and the Doha Amendment to the Kyoto Protocol (2012). Both these agreements assigned quantified emission reduction targets to developed countries, based on their 1990 emission levels. Under the Kyoto Protocol, an emission reduction target of 5 per cent, based on 1990 levels, was set to be achieved by developed countries in the first commitment period (2008–2012). In contrast, under the Doha Amendment, it was agreed that an emission reduction target of at least 18 per cent would be met by developed countries in the second commitment period (2013–2020).

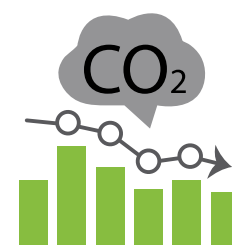
Mapping emission mitigation achieved by developed countries in the pre-2020 period

Research focusing on emission reductions in the pre-2020 period has been scarce. As a result, there is little clarity on the performance of developed countries under the Kyoto Protocol and the Doha Amendment. To fill this gap, CEEW has undertaken a review of mitigation outcomes for all developed countries vis-a-vis their overall commitment under the Kyoto Protocol and the Doha Amendment and the results are presented in this report. This first-of-its-kind accounting evaluation conducted in a developing country seeks to provide a clear picture of the performance of developed countries in the pre-2020 era. It does so by identifying areas of accounting concerns, gaps in achievements vis-à-vis set targets, and based on these, sets forth a framework for easy comparisons among mitigation achievements of developed countries. The key findings of our study are highlighted below.

Pre-2020 outcomes characterised by poor participation and performance

The implementation of the Kyoto Protocol and the Doha Amendment witnessed several setbacks. Several developed countries did not participate in these climate agreement discussions. The lack of participation resulted in the Doha Amendment to the Kyoto Protocol not coming into force for almost its entire duration (before 31 December 2020).

In the first commitment period (2008–2012), a total of 36 Annex I countries and the European Union pledged emission reduction targets. Some of the notable exceptions were the United States and Canada. Furthermore, Cyprus, Malta, and Kazakhstan were not included among Annex I countries during the first commitment period and so have been mentioned among the non-participating countries in Table ES1. In the second commitment period (2013–2020), the participation fell significantly as other large emitters like Japan and the Russian Federation did not accept the new emission reduction targets of at least 18 per cent compared to their base year levels.



Both Kyoto Protocol (1997) and the Doha Amendment to the Kyoto Protocol (2012), assigned quantified emission reduction targets to developed countries

Table ES1 Participation of countries in the Kyoto Protocol and the Doha Amendment

Annex I countries	Kyoto Protocol (2008–2012)	Doha Amendment (2013–2020)
Participating countries	Australia, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Norway, New Zealand, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, UK	Australia, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK
Non-participating countries	Belarus, Canada, Turkey, United States, Kazakhstan, Cyprus, Malta	Belarus, Canada, Japan, Kazakhstan, New Zealand, Russian Federation, Ukraine, Turkey, United States

Source: UNFCCC (2021)

Furthermore, the countries that participated in the discussions on these two agreements also misused the existing accounting provisions to achieve their targets. The outcomes of our study provide a grim picture of the emission reductions that have been achieved by developed countries since 1990. The greenhouse gas emissions from Annex A sources² for all Annex I Parties (both industrialised and economies in transition [EIT] countries³) declined only by about 14.8 per cent in 2019 compared to their base year emissions levels. This reduction is quite low considering the emission reduction targets were set at a *minimum* of 18 per cent below the 1990 levels to be achieved by 2020 under the Doha Amendment. More dramatically, **the non-EIT Annex I Parties (majorly comprising industrialised countries) witnessed a meagre emission reduction of 3.7 per cent by 2019 compared to their base year emissions levels.** Thus, the 14.8 per cent emission reduction was made possible largely due to the contribution of EIT countries, which collectively showed a decline of about 39 per cent below the base year emissions levels.

The impressive 39 per cent reduction in emissions achieved by the EIT countries is not due to emission reduction measures undertaken by them but were due to the economic downturn in the 1990–1997 period, during which the emissions declined by 38 per cent. The economic shock suffered by these countries was the outcome of their transition from a centrally planned economy to a market-based economy. This led to the generation of unearned

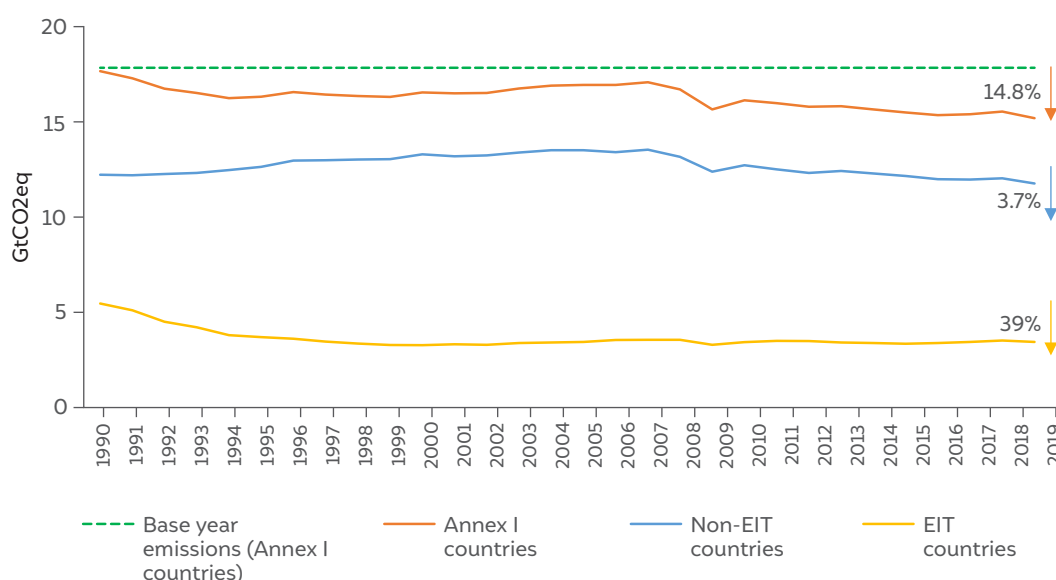


Figure ES1
Greenhouse gas emissions of Annex I countries without LULUCF (1990–2019)

Source: Authors' analysis

2. The Annex A of the Kyoto Protocol enumerates the emission sources to be considered for compliance. These sources are energy, agriculture, industrial processes and products use, and waste. It does not include emissions from the land use, land-use change, and forestry (LULUCF) sector.
3. Economies in transition (EIT) countries are the countries whose economies are changing from previously being under government control to being a market economy. Some countries were part of the erstwhile Soviet Bloc and others were Central European countries with centrally planned economies.

emissions allowance⁴ (equivalent to about 28.4 GtCO₂eq) acquired by these countries in the 2008–2020 period. These unearned emissions allowances are also referred to as ‘hot air’, resulting from inflated base year emissions.

Also, the non-participation of the United States in both the commitment periods adversely affected the global climate action in more than one way. The United States emitted about 11 and 26 per cent more than their estimated emission allowance in the Kyoto Protocol and the Doha Amendment,⁵ respectively. Citing US non-participation as the reason, Canada and Japan also withdrew from the climate agreements. New Zealand and the Russian Federation also did not accept new targets in the Doha Amendment. This led to additional usage of carbon space of about 10.9 GtCO₂eq by non-participating countries than their estimated emission allowance in the Kyoto Protocol and the Doha Amendment.² Also, **Annex A emissions from the non-participating countries represented about 47 per cent (41.3 GtCO₂eq) in the first commitment period and 71 per cent (96.1 GtCO₂eq) in the second commitment period of the total commitment period emissions by all developed countries (Table ES2).**

Table ES2 Outcomes of the pre-2020 regime

Agreements	Aspects	Annex I countries	Annex I countries		Annex I countries	
			Participating countries	Non-participating countries	Non-EIT countries	EIT countries
Kyoto Protocol (2008–2012)	Emissions (GtCO ₂ eq)	88.0	46.7	41.3	68.3	19.8
	Emission allowances (billion AAUs)	94.7	57.7	37.0	64.7	29.9
	Unused/additional usage of carbon space (GtCO ₂ eq)	6.6	10.9	-4.3	-3.5	10.1
	Unearned emission allowance (GtCO ₂ eq)	12.4	11.1	1.2	0.5	11.9
	Net unused/additional usage of carbon space (GtCO ₂ eq)	-5.8	-0.2	-5.5	-4.0	-1.8
Doha Amendment (2012–2020)	Emissions (GtCO ₂ eq)	135.1	39.0	96.1	105.3	29.8
	Emission allowances (billion AAUs)	133.2	42.9	90.2	91.2	41.9
	Unused/additional usage of carbon space (GtCO ₂ eq)	-2.0	3.9	-5.9	-14.1	12.1
	Unearned emission allowance (GtCO ₂ eq)	17.4	3.3	14.1	1.0	16.4
	Net unused/additional usage of carbon space (GtCO ₂ eq)	-19.4	0.6	-20.0	-15.1	-4.3
Pre-2020 regime (2008–2020)	Emissions (GtCO ₂ eq)	223.2	85.8	137.4	173.6	49.6
	Emission allowances (billion AAUs)	227.8	100.6	127.2	156.0	71.9
	Unused/additional usage of carbon space (GtCO ₂ eq)	4.7	14.8	-10.2	-17.6	22.3
	Unearned emission allowance (GtCO ₂ eq)	29.8	14.4	15.4	1.4	28.4
	Net unused/additional usage of carbon space (GtCO ₂ eq)	-25.1	0.4	-25.5	-19.1	-6.1

Source: Authors' analysis

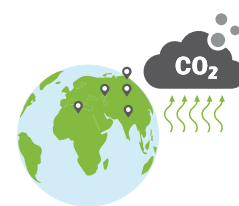
Note: Numbers in red indicate additional usage of carbon space, while green represents unused carbon space. Assigned amount units (AAUs) represent the emissions allowance issued to a Party for a given commitment period. Each assigned amount unit is equivalent to 1 tCO₂eq.

4. Unearned emission allowances are the additional emission allowances a country receives by taking advantage of accounting provisions.

5. Consider the overall target of climate agreement for non-participating countries: 5 per cent reduction in the Kyoto Protocol and 18 per cent reduction in the Doha Amendment.

In contrast, the participating countries, especially the European countries, seem to have performed well and emitted significantly less than their emission allowances in the aggregated pre-2020 period. France, Spain, Italy, and the UK collectively are estimated to have unused (left-over) emissions allowance of about 2.3 GtCO₂eq by the end of 2020. And collectively, the participating countries have unused carbon space of about 14.4 GtCO₂eq. However, these apparent overachievements (14.8 GtCO₂eq) of the participating countries are the outcome of unearned emission allowance due to the selection of inflated base year and inclusion of deforestation emissions in their base year emissions. Australia primarily benefitted from adding deforestation emissions to its base year emissions and gained unearned emissions allowance equivalent to 1.4 GtCO₂eq.

If the total unearned emissions allowance (14.4 GtCO₂eq) of the participating countries is considered, then the overachievement of the participating countries in the 2008–2020 period is almost nullified. On extending these accounting criteria to the non-participating Annex I countries, under the Kyoto Protocol and the Doha Amendment, have emitted about 25.1 GtCO₂eq more than their estimated emission allowances in the 2008–2020 period.



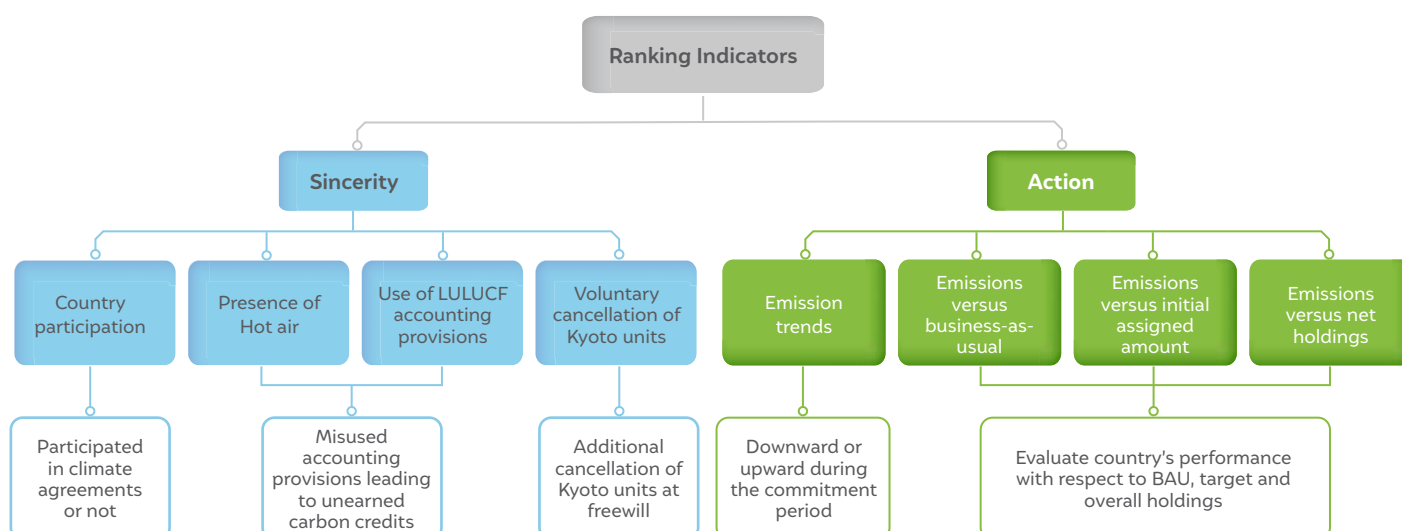
The overachievement of participating countries in the 2008–2020 period is largely due to the unearned emissions allowance

Pre-2020 climate actions: ranking the developed countries

As an extension of the pre-2020 analysis, The Council has ranked all the 43 developed countries based on its sincerity and performance in mitigation efforts during the pre-2020 period. This ranking system developed by The Council is unique as it explicitly focuses on the pre-2020 climate agreements: the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol. The purpose of this ranking is threefold: (1) to provide an independent and comprehensive evaluation of the efforts undertaken by developed countries towards meeting their pre-2020 targets; (2) to enhance transparency by enabling an easy comparison of pre-2020 performance among developed countries; and (3) to identify developed countries that have been climate champions in the pre-2020 period.

In order to compare their pre-2020 mitigation performances, Annex I countries were analysed and rated on their seriousness and faithfulness towards climate action (sincerity), as well as the overall mitigation performance (action) in the pre-2020 period. Figure ES2 highlights the indicators and broad categories against which Annex I countries were analysed and rated.

Figure ES2 Snapshot of ranking indicators



The ranking reveals that European countries have performed relatively better than non-European countries. Sweden leads the overall action indicator performance with a score of 95 per cent, followed by the UK, Belgium, Denmark, Finland, France, and the Netherlands. While most of the EIT countries fall in the middle of the ranking order, the non-participating developed countries are placed at the bottom. Some major economies such as the Russian Federation, Turkey, Canada, and the United States have scored around 50 per cent and less.

Table ES3 Overall pre-2020 climate action ranking

Rank	Country	Sincerity indicators		Action indicators		Overall		
		Max	Score	Max	Score	Max	Score	%
1	Sweden ^{de}	8	7.5	8	7.75	16	15.25	95%
2	UK ^{de}	8	6.5	8	7.75	16	14.25	89%
3	Belgium ^{de}	8	6.5	8	7.50	16	14	88%
3	Denmark ^{de}	8	6.75	8	7.25	16	14	88%
4	Finland ^{de}	8	6.5	8	7.25	16	13.75	86%
4	France ^{de}	8	6.5	8	7.25	16	13.75	86%
4	Netherlands ^{de}	8	6.5	8	7.25	16	13.75	86%
5	Switzerland ^{de}	8	7.25	8	6.25	16	13.5	84%
6	Greece ^{de}	8	6.25	8	7.00	16	13.25	83%
6	Italy ^{de}	8	6.5	8	6.75	16	13.25	83%
7	Liechtenstein	8	7	8	6.00	16	13	81%
8	Germany ^{de}	8	6.5	8	6.25	16	12.75	80%
9	Spain ^{de}	8	6.5	8	5.75	16	12.25	77%
10	Austria ^{de}	8	6.5	8	5.25	16	11.75	73%
10	Norway	8	7.25	8	4.50	16	11.75	73%
11	Monaco	8	6	8	5.50	16	11.5	72%
11	Luxembourg ^{de}	8	5.25	8	6.25	16	11.5	72%
12	Hungary ^{cde}	8	4.5	8	6.25	16	10.75	67%
12	Romania ^{cde}	8	4.5	8	6.25	16	10.75	67%
12	Czechia ^{cde}	8	4.25	8	6.50	16	10.75	67%
13	Slovenia ^{cde}	8	4	8	6.50	16	10.5	66%
13	Slovakia ^{cde}	8	4.25	8	6.25	16	10.5	66%
13	Portugal ^{de}	8	5.25	8	5.25	16	10.5	66%
14	Ukraine ^{bc}	6	2	7	6.50	13	8.5	65%
15	Ireland ^{de}	8	6.25	8	3.75	16	10	63%
15	Bulgaria ^{cde}	8	4.25	8	5.75	16	10	63%
16	Japan ^b	6	4.25	7	3.75	13	8	62%
17	Estonia ^{cde}	8	4.25	8	5.25	16	9.5	59%
18	Lithuania ^{cde}	8	4.5	8	4.75	16	9.25	58%
18	Croatia ^{cde}	8	4	8	5.25	16	9.25	58%
19	Latvia ^{cde}	8	4	8	4.75	16	8.75	55%

Rank	Country	Sincerity indicators		Action indicators		Overall		
		Max	Score	Max	Score	Max	Score	%
20	Cyprus ^{ae}	6	4	7	3.00	13	7	54%
21	USA ^{ab}	4	2	6	3.25	10	5.25	53%
22	New Zealand ^b	6	4.5	7	2.25	13	6.75	52%
23	Poland ^{cde}	8	4.5	8	3.25	16	7.75	48%
24	Australia	8	4.5	8	2.75	16	7.25	45%
24	Iceland ^{de}	8	6	8	1.25	16	7.25	45%
25	Malta ^{ae}	6	4	7	1.75	13	5.75	44%
26	Russian Federation ^{bc}	6	2	7	2.75	13	4.75	37%
27	Canada ^{ab}	4	2	6	1.00	10	3	30%
27	Belarus ^{abc}	4	0	6	3.00	10	3	30%
28	Turkey ^{ab}	4	2	6	0.00	10	2	20%
29	Kazakhstan ^{abc}	4	0	6	0.00	10	0	0%

Source: Authors' analysis

Note:

a Countries that did not participate in the Kyoto Protocol,
b Countries that did not participate in the Doha Amendment,
c Economies in transition countries,
d Part of European Union in the Kyoto Protocol,
e Part of European Union in the Doha Amendment

	Scoring percentage > 70%
	50% <= Scoring percentage < 70%
	Scoring percentage < 50%

Our ranking makes it clear that developed countries have performed at various levels with respect to their emission reduction targets in the pre-2020 period. Also, the additional consumption of carbon space (25.1 GtCO₂eq) is quite significant and needs to be addressed in order to limit the temperature below 1.5°C by 2100. However, the burden of these gaps emerging from the pre-2020 period should not be transferred to developing countries but distributed among developed countries themselves. Hence, the non-EIT Annex I countries, especially the non-participating countries, should consider revising or enhancing their future targets.

Another way to bridge this pre-2020 gap would be developed countries, which did not participate in the Kyoto Protocol and the Doha Amendment, purchasing the unsold certified emission reductions (CERs) and voluntarily cancel the unearned carbon emission allowance. This would be a win-win decision for both developing and developed countries because it would not only increase the demand of CERs in the sluggish market but also help developed countries comply with their pre-2020 targets without carrying them forward (post-2020 period).

Further, it is imperative to strengthen the accounting and compliance mechanism to fill the existing loopholes and ensure misuse of accounting does not occur in the post-2020 climate regimes. The accounting provisions should reflect environmental integrity and should not be curtailed at the convenience of the participating countries.

Finally, the easy exit of countries from climate agreement should be restricted as it not only results in additional burden but also undermines the trust in the process of negotiations itself and dissuades other nations from undertaking ambitious targets.



The delay in undertaking climate actions would make it impossible to meet the Paris Agreement goals.

1. Introduction

The response to the ongoing COVID-19 pandemic brought the global economic activities in 2020 to a complete standstill (World Bank 2020). As expected, this economic slowdown led to the largest fall in greenhouse gas emissions since the Second World War (IEA 2021). The last time the world witnessed a decline (in terms of annual percentage) in greenhouse gas emissions was the 1.3 per cent drop in global temperatures in 2009 due to the Global Financial Crisis (Friedlingstein, P; Houghton, R; Marland, G. et al. 2010). In 2020, the overall decline in emissions has been estimated to be around 4–7 per cent below the 2019 levels (World Meteorological Organization 2020). From the perspective of the Paris Agreement goals—limiting the global temperature to 2°C and restricting it to 1.5°C above the pre-industrial levels—this decline has no significant impact. As per the latest Emissions Gap Report (UNEP 2020), the overall reduction in emissions in 2020, at most, would result in 0.01°C decrease in global warming by 2050.

Meanwhile, the average concentration of greenhouse gas emissions continued to rise to record levels in 2020. As a result, 2020 became the third warmest year (2016 and 2019 being the top two) in the last decade (WMO 2021). Based on the current trajectory, it is expected that the global temperature would rise by 3.2°C compared to the pre-industrial levels by 2100 (UNEP 2020). This alarming projection calls for urgent action by all the countries to enhance and implement mitigation actions.

In the past few years, several countries have announced ambitious net-zero targets by 2050 (UNEP 2020) as a step towards mitigating adverse effects of climate change. Currently, 124 countries, which account for 61 per cent of global emissions, have made some kind of commitment towards a net-zero future (Black et al. 2021).

As the current climate negotiations discourse seems to be centred on either nationally determined contributions (NDCs) in accordance with the Paris Agreement or the 2050 net-zero targets, it is important not to lose focus on the outcomes of the emission reduction pledges made by developed countries under the pre-2020 regime. The targets currently announced by developed countries do not reflect their pre-2020 climate action performance and the additional gaps that emerged from it.

However, for post-2020 climate negotiations to move ahead collectively, it is imperative to resolve the unaddressed issues (e.g., emission gaps, unsold CERs, and others) of the pre-2020 period. Even the key negotiated outcome of COP 25—‘Chile Madrid Time of Action’—reiterated the relevance of the pre-2020 implementation and ambition (Streck 2020).



The current discussion on climate negotiations is centred on future commitments with little focus on pre-2020 implementation or achievements

Before discussing the socioeconomic, environmental, and political importance of pre-2020 climate actions, it is important to provide a context to the pre-2020 regime within the broader history of international climate negotiations. The next section provides a brief overview of the history of the pre-2020 regime; participation and non-participation of developed countries; timeline of the commitments; and finally, the purpose of conducting analysis of the pre-2020 climate action.

1.1 History of the pre-2020 regime

In 1992, 154 nations came together to create a common legal framework to address climate change with the adoption of the United Nations Framework Convention on Climate Change (UNFCCC). Even after the framework was adopted, the negotiations lasted for over a year and UNFCCC entered into force only in March 1994.⁶ A total of 197 countries (also referred to as Parties to the Convention) are signatories to this framework so far (UNFCCC 2012b).

Contrary to expectations, the establishment of the UNFCCC did not expedite global progress towards climate action. It was not before the third session of the Conference of the Parties (COP) in 1997 that a consensus was finally reached on an agreement that set, for the first time, binding and quantified emission reduction targets for developed countries, also referred to as 'Annex I Parties' (both industrialised and economies in transition [EIT] countries⁷). This agreement, known as the Kyoto Protocol, also assigned a specific commitment period to Annex I Parties to meet their targets. Despite following a top-down approach, the Kyoto Protocol provided several flexible provisions to Annex I Parties to achieve their compliance. These provisions ranged from selection of the base year, making joint commitments, and market mechanisms.⁸ However, the guidelines for accounting, monitoring, and compliance procedures to enforce various provisions, compliance issues, and market mechanisms required for the implementation of the Kyoto Protocol could not be finalised before COP-7 (2001) at Marrakesh (UNFCCC 2001).

Eight years after its adoption, the Kyoto Protocol finally entered into force⁹ in February 2005 (BBC 2005). The first commitment period of the Protocol was set for five years (2008–2012) in which 37 Annex I participating countries were obligated to reduce their emissions by 5 per cent on an average below the 1990 levels (UNFCCC 2012a). However, this overall emission reduction target was criticised from the beginning as it was considered insufficient. In 2007, the Intergovernmental Panel on Climate Change's (IPCC) fourth assessment report had already stated that the emission reduction target needs to be as high as 40 per cent by 2020 compared to 1990 levels in order to limit the global temperature increase to 2°C (Rosen 2015).

After the completion of the first commitment period, the Doha Amendment to the Kyoto Protocol was adopted for the next eight-year period (2013–2020). The average emission reduction target was further increased to at least 18 per cent by 2020 below the 1990 levels. However, even the new reduction targets (although much higher than the first commitment period) were not consistent with the findings of the IPCC report of limiting the average global temperature to 2°C above pre-industrial levels. As a result, developed countries were requested to revisit their pledges in 2014 and were given voluntary option to enhance their



In 2007, the Intergovernmental Panel on Climate Change's (IPCC) fourth assessment report had already stated that the emission reduction target needs to be as high as 40% by 2020 compared to 1990 levels in order to limit the global temperature increase to 2°C

6. In order to enter into force, the Convention required at least 50 countries to submit the instrument of ratification, acceptance, approval, or accession. This condition was met with the ratification by the 50th country in 1994.

7. Economies in transition countries are the countries whose economies are changing from being under government control to becoming a market economy.

8. The three market-based mechanisms included: (i) international emissions trading (IET) under Article 17; (ii) joint implementation (JI) under Article 6; and (iii) the clean development mechanism (CDM) under Article 12 of the Kyoto Protocol.

9. The Protocol came into force after the ratification of the treaty by the Russian Federation. It needed ratification by countries representing 55 per cent of the total greenhouse gas emissions.

targets by at least 25–40 per cent below the 1990 levels by 2020.¹⁰ The Doha Amendment did not come into force for almost its entire duration of commitment (2013–2020) and not before 31 December 2020 due to it not being ratified by at least three-fourths of the Parties to the Kyoto Protocol (144 countries).¹¹

Between the Kyoto Protocol (1997) and the Doha Amendment (2012), the Copenhagen Accord was introduced in December 2009. In contrast to the Kyoto Protocol, the Copenhagen Accord used a bottom-up approach and was aimed at making emission reduction pledges to prevent the rise of average global temperature above 2°C compared to pre-industrial levels. Voluntary pledges were made by both developed as well as developing countries in the Accord. Major emitters such as the United States and Canada, who did not participate in the first and second commitment periods of the Kyoto Protocol, pledged for 17 per cent economy-wide emission reduction target below the 2005 levels in the Copenhagen Accord.

Soon after its adoption, the non-transparent and undemocratic approach adopted for the formulation of the Accord was questioned (IISD 2009). Further, the UNFCCC only took note of (acknowledged) the Copenhagen Accord, and no formal process was adopted. However, the Copenhagen Accord commitments were formally recognised under the Cancun Agreements (2010) as non-binding emission reduction measures by the Parties to the Convention. Furthermore, the Cancun Agreements also ensured greater transparency by all the countries and led to establishing the green climate fund (GCF) to support climate action in developing countries (NRDC 2010).

Thus, the pre-2020 regime primarily incorporates three international climate agreements—the Kyoto Protocol, the Doha Amendment, and the Copenhagen Accord—comprising emission reduction commitments made by developed countries in the pre-2020 period.



Copenhagen Accord commitments were formally recognised under the Cancun Agreements as non-binding emission reduction measures

1.2 Participation and non-participation of Annex I countries

In the first commitment period (2008–2012), a total of 36 Annex I countries and the European Union pledged emission reduction targets. Some of the notable exceptions were the United States and Canada. Furthermore, Cyprus, Malta, and Kazakhstan were not included among Annex I countries during the first commitment period and so have been mentioned among the non-participating countries in Table 1.

Table 1 Participation of countries in the Kyoto Protocol and the Doha Amendment

Annex I countries	Kyoto Protocol (2008–2012)	Doha Amendment (2013–2020)
Participating countries	Australia, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Norway, New Zealand, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, UK	Australia, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK
Non-participating countries	Belarus, Canada, Turkey, United States, Kazakhstan, Cyprus, Malta	Belarus, Canada, Japan, Kazakhstan, New Zealand, Russian Federation, Ukraine, Turkey, United States

Source: UNFCCC (2021); Authors' analysis

10. Decision 1/CMP 8, paragraph 7.

11. Nigeria became the 144th nation to ratify the Doha Amendment on 2 October 2020. It ratified a day before the agreement was due to expire (Department of Climate Change, Nigeria 2020).

Unlike the United States, Canada had initially ratified the Kyoto Protocol in 2002 but decided to eventually withdraw from the agreement in 2011, stating the penalties for not achieving compliance (amounting to \$14 billion) would cripple its economy (*The Guardian* 2011). Also, the Canadian government argued that the Kyoto Protocol was an outdated agreement and an impediment to a global solution to climate change as it did not include participation from large emitters like the United States and China (BBC 2011).

In comparison to the first commitment period, the number of Annex I countries participating in the second commitment period fell significantly. Major emitters such as Japan, Ukraine, New Zealand, and the Russian Federation did not accept the new reduction targets of a minimum of 18 per cent. Similar to Canada, Japan too justified its withdrawal by stating that the second commitment period (2013–2020) was inadequate as it didn't include the United States and China, which share more than half of the carbon space between them (Vidal 2010). On the other hand, New Zealand decided to commit for this period under the Convention instead of the Kyoto Protocol. By choosing not to be part of the Doha Amendment, New Zealand was able to commit a voluntary emission reduction target of 5 per cent for the 2013–2020 period as well. It also avoided the risk of penalties associated with non-compliance under the Doha Amendment to the Kyoto Protocol (New Zealand Parliament 2015). However, in 2015, New Zealand ratified the agreement in order to help the Doha Amendment come into force without taking the burden of quantified emission reduction commitments upon itself (Ministry for the Environment, New Zealand 2015).

Some countries chose not to participate and did not ratify the agreement, even after being assigned emission reduction targets. For example, the Annex I countries such as Ukraine, Belarus, and Kazakhstan had participated in the negotiations of the Doha Amendment and so were given emission reduction targets for the second commitment period (2013–2020). However, they decided not to ratify the Amendment due to their disagreement with the new provisions (particularly Article 3.7 pertaining to cancellation¹²) that were brought in to restrict the accumulation of surplus emissions allowance or 'hot air' (Kollmus 2013).



Compared to the first commitment period, the number of Annex I countries participating in the second commitment period fell drastically

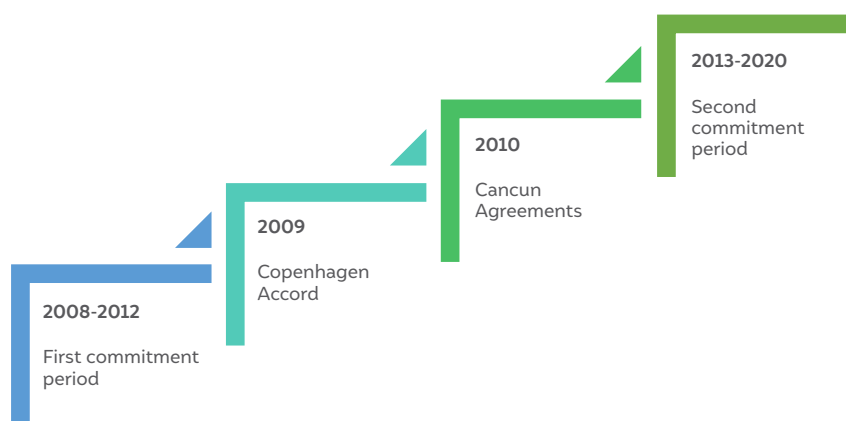


Figure 1
Pre-2020 climate regime

Source: UNFCCC (2021)

12. As per this rule, the country having made a commitment under the Doha Amendment can have an initial assigned amount units for the 2013–2020 period equal to the average emissions between 2008 and 2010 times the number of years in the commitment period. Any country having assigned emissions allowance above this limit will have to transfer them in their cancellation account.

Apart from showcasing lack of seriousness to combat climate change, the non-participation of developed countries in the pre-2020 climate agreements had other significant implications as well. For example, the clean development mechanism (CDM), one of the market mechanisms under the Kyoto Protocol, was adversely affected due to non-participation. The basic premise of CDM is to help developed countries earn certified emission reductions (CERs) by investing in emission reduction or removal projects (also referred to as CDM projects) in developing countries. The CERs earned by developed countries through these CDM projects can be used by them to achieve compliance under the Kyoto Protocol and the Doha Amendment.

The non-participation of countries was one of the reasons¹³ for the reduction in demand for CERs from the industrialised countries. The price of one unit of CER fell from €23 in the early 2008 to less than €0.50 in 2012 (GiZ 2012). The resultant disparity between the supply and demand of the CERs led to the accumulation of millions of unsold CERs. Furthermore, it is estimated that about 3.2 billion additional CERs will be generated between 2020 and 2030 from various CDM projects, which have already been registered or at the validation stage (UNEP 2021).

1.3 Purpose of this research

Under the UNFCCC, all the Parties (countries) recognised the historical responsibility of developed countries for their contribution to the high concentration of greenhouse gas emissions in the atmosphere. As a result, it was stated in Article 3.4 of the Convention that any climate action should necessary be guided on the principle of equity and common but differentiated responsibilities and respective capabilities (CBDR-RC). Based on their capabilities and responsibilities, developed countries were supposed to take the initiative in mitigation efforts and thus were also given quantified emission reduction targets under the Kyoto Protocol (1997) and Doha Amendment to the Kyoto Protocol (2012). Hence, the scope of this pre-2020 climate action analysis focuses on the commitments and performance of only developed countries.

The importance of analysing pre-2020 climate action of developed countries is manifold.

First, the gaps emerging from the pre-2020 era have economic, environmental, as well as political implications. The mitigation efforts are expected to be costlier in the future, and a further delay in undertaking adequate mitigation efforts would make it quite difficult to limit the average global temperature by 1.5°C above the pre-industrial levels. The political significance is also quite clear when we consider the concerns of developing countries who fear they may be overburdened with the emission reduction gaps from the pre-2020 period.

Second, the future of post-2020 climate negotiations depends on how transparent developed countries have been about their climate change mitigation achievements and gaps in the pre-2020 period. It is important to underline that a measurement, reporting, and verification (MRV) system for the pre-2020 period under the UNFCCC exists. It comprises annual and biennial reporting and review involving experts from both Annex I and non-Annex I countries. However, an independent comprehensive analysis of pre-2020 climate action would further help in recognising the extent to which developed countries have performed so far. As long as the issues from the pre-2020 period remain unaddressed, it would be difficult to trust



An independent comprehensive analysis of pre-2020 climate action would further help in recognising the extent to which developed countries have performed so far

13. Other reasons for reduction in demand include the global financial crisis, lack of ambitious emissions reduction commitments, and import restriction of CERs by the EU and other industrialised countries.

the commitments made by the developed countries for the post-2020 period. This analysis is aimed at enhancing transparency as well as help in increasing trust on the guiding principle of equity and CBDR-RC.

Third, a comprehensive evaluation of the progress made by the Annex I Parties in meeting their respective emissions reduction targets would be useful in providing recommendations for the post-2020 climate regime. The recommendations can support the formulation of negotiation positions for both developed and developing countries. It can also provide critical inputs to the round table at intersessional COP and other relevant climate change conferences, where countries, along with non-party stakeholders, deliberate on the implementation and ambitions of pre-2020 efforts. Fourth, the outcomes of this research can also provide insights to the upcoming global stocktaking process in the Paris Agreement.

In the subsequent section, the study's methodology is discussed, which covers the accounting process, data sources, and key assumptions. This is followed by the discussion on each of the accounting components (base and target), analysis on emissions, and Kyoto market mechanisms. The impact of loopholes and the overall achievements or gaps in the pre-2020 period is discussed in detail. Finally, the developed countries are compared and ranked on the basis of their performance in the pre-2020 regime.



Outcomes of the pre-2020 research will be critical inputs to the round table at the climate change conferences

In order to evaluate the mitigation performance of the developed countries in the pre-2020 period, it is important to closely analyse the various components of the accounting mechanisms and its provisions. This sections highlights the existing methodology used to evaluate the countries performance towards its climate commitments. It summarises the accounting process of the UNFCCC along with various data sources, important assumptions and limitations.

2.1 Literature review

The performance of developed countries in the pre-2020 period has been scarcely covered by research. In 2018, the European Capacity Building Initiative (ECBI) published a report on the progress made by developed countries on the pre-2020 emission reduction targets with respect to mitigation and finance (Averchenkova 2018). ECBI's analysis was based on the comparison of mitigation efforts of Annex I countries with the scenarios presented in the annual *Emissions Gap Report* published by the United Nations Environment Programme (UNEP). Few other reports also focused on the problems within the Kyoto Protocol regime (Rosen 2015) and analysed the outcomes after the end of the first commitment period (Morel and Shislov 2014). Rosen's report blamed the design of the Kyoto Protocol to be responsible for its failures. It argued that the features of the Kyoto Protocol like the short time frame, binding emissions reduction targets, and the provisions for subsequent commitment period resulted in short-sighted policies from the participating countries. In comparison, the ex-post analysis of the Kyoto Protocol by Morel and Shislov (2014) stated that the over achievement of emission reduction at 24 per cent below the 1990 levels by the participating countries was primarily due to the "hot air" or the emission reductions that occurred in EIT countries between 1990 and 1997.

The UNFCCC also publishes compilation and synthesis reports based on the information provided by the Parties in their biennial reports and national communications. This report captures various kinds of information such as the emission trends, projections, progress against the target, and other climate-related data for the Annex I Parties. Apart from this report, the UNFCCC has also developed the *Kyoto Protocol Reference Manual on Accounting of Emissions and Assigned Amount* (UNFCCC 2008a). This manual lays down the steps to evaluate the performance of Annex I Parties under Kyoto Protocol and the Doha Amendment to the Kyoto Protocol. Its methodology helps in establishing the compliance of any Party with respect to its target.

The methodology adopted for **this study builds upon the reference manual developed by the UNFCCC**. It also captures the learning from the other research pieces, such as the failures and issues under the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol, to highlight the issues and actual climate actions by individual developed countries in the pre-2020 period. The analysis of the research was done on the most recent data sets (2021 submissions). Also, the non-participating countries were analysed on how they performed against the overall target of the Kyoto Protocol and the Doha Amendment. The next section summarises the accounting mechanism developed by the UNFCCC.

2.2 Summary of the accounting mechanism under the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol

The Kyoto Protocol developed an accounting mechanism that defines a set of rules and regulations to establish a Party's compliance against its target. In the accounting mechanism, emissions from sources such as energy, industrial processes and product use, waste, and agriculture are termed as Annex A emissions. And because of complexity in calculating emissions/removal from the land use, land-use change, and forestry (LULUCF) sector,



The methodology adopted for this study builds upon the reference manual developed by the UNFCCC

it is treated (accounted) differently from the Annex A emissions. Following are the key components of the accounting mechanisms:

- **Base year:** It is the reference year for a country or Party based on which its emission reduction target is set.
- **Base year emissions:** It is the emission in the base (reference) year on which the target is set. Majorly, base year emission comprises of Annex A emissions only. However, in some cases, a Party may also include emissions from deforestation activities coming from the LULUCF sector if the Party has gathered data on net emissions from the LULUCF sector in its base year.
- **Target:** It is the limitation of quantified emissions and reduction objectives/commitments¹⁴ vis-à-vis each country's base year emissions.
- **Commitment period:** It is the duration within which a Party has to achieve its limitation and reduction objectives/commitments.
- **Business-as-usual (BAU) emissions:** It is a projection of a Party's emissions from its base year emissions without considering any of its emission reduction measures. It serves as a reference level or baseline to compare with the existing policy scenario, which includes mitigation policies adopted by the Party under the pre-2020 regime.
- **Initial assigned amount units (AAUs):** It is the allocated carbon credits or emission allowance issued to a Party for a given commitment period. It is expressed in the form of assigned amount units (AAU), and each AAU is equivalent to 1 tCO₂eq (UNFCCC 2008). It is derived from the base year emissions multiplied by the target and number of years in the commitment period. Parties are considered to have complied with their target if their overall emissions at the end of the commitment period are equal to or less than the initial AAUs.
- **Kyoto Mechanism:** In case a Party emits more than their initial amount unit, it could purchase additional emission allowance (carbon credits) from the market or through flexible mechanisms and meet the difference to comply with its target. The three market mechanisms under the Kyoto Protocol are emissions trading (ET), joint implementation (JI), and clean development mechanism (CDM). These market or flexible mechanisms generate Kyoto units such as certified emission reductions (CERs) from the CDM, emissions reduction units (ERUs) from JI, removal units (RMUs) from voluntary and elected LULUCF activities, and trading of the AAUs. A Party can opt to trade (buy or sell), cancel, or use (retire) these Kyoto units, that is, CERs, ERUs, RMUs, and AAUs.



In the Kyoto Protocol's accounting mechanism, emissions from sources such as energy, industrial processes and product use, waste, and agriculture are termed as Annex A emissions

14. The emission reduction targets are referred to as quantified emission limitations or reduction objectives (QELRO) for the first commitment period and quantified emission limitations or reduction commitments (QELRC) for the second commitment period.

Each participating Party should have a registry at the national level to track the holdings and transactions of these Kyoto units. This registry is linked to the international transaction log (ITL) administered by the UNFCCC secretariat for additional verification of the transactions. A Party's national registry has to meet the requirements for facilitating different types of transactions and to maintain specific types of accounts for the Kyoto units. The national registry may hold Kyoto units in its one or more accounts. Following are the different types of accounts a Party should maintain to track of transactions of Kyoto units:

- **Issuance:** This refers to the initial creation of a Kyoto unit (AAU, CER, RMU) by the registry. For ERU, the issuance process does not generate a new unit but converts it from an existing AAU or RMU.
- **Addition:** This transaction happens when Kyoto units are purchased or acquired by the Party from flexible mechanisms.
- **Subtraction:** This transaction happens when the Kyoto units are sold or cancelled by the Party.
- **External transfer:** This transaction refers to the transfer of Kyoto units from the national registry of one party to another.
- **Cancellation:** This transaction is for the Kyoto units, which are cancelled and can no longer be used to achieve compliance. The cancellation of Kyoto units can be of different types and are internally done by the Party's national registry. The Kyoto units can be voluntarily cancelled if they are not needed for use under the existing rules and then are internally transferred to the voluntary cancellation account. The Kyoto units whose validity has expired or that are now invalid are transferred to the mandatory cancellation account. The units can also be cancelled by the Party to account for net emissions from its LULUCF activities under Articles 3.3 and 3.4 by transferring them to their net source cancellation account. Finally, the Kyoto units of a Party can be cancelled by the Compliance Committee in case of non-compliance and transferred to non-compliance cancellation account.
- **Retirement:** This transaction occurs when the Kyoto units are used by the Party to meet its emission reduction commitments. As per Article 3.1 of the Kyoto Protocol, in order to achieve compliance, a Party has to retire Kyoto units equivalent to its overall Annex A emissions in the commitment period. This is done by transferring the units to the Party's retirement account.
- **Carry over:** This transaction results in the transfer of Kyoto units that were issued and valid in the first commitment period to remain valid and be carried over to the next commitment period.

After the completion of a particular commitment period, the compliance of a participating Party is ascertained by comparing its emissions from Annex A sources during the commitment period with its net holdings of Kyoto units. The net holdings are the Kyoto units held by a Party to be used for compliance purposes after taking into account all the external transfers and cancellation of units. In this study as well, the same compliance rules are used to evaluate country-wise performance in the pre-2020 period.



At the end of the commitment period, a Party's compliance is ascertained based on the comparison of its emissions (except LULUCF) against the total number of Kyoto units it can retire

BOX 1 Formula associated with key components of accounting mechanism

Annex A emissions = Emissions from energy, industrial processes and product use, agriculture, and waste sources

Base year emissions = Annex A emissions in base year + deforestation emissions in base year (in case LULUCF emissions are net positive in base year)

Business-as-usual (BAU) = Base year emissions × Commitment period

Initial assigned amount units (AAUs) = Base year emissions × Target × Commitment period

1 Kyoto unit = 1 AAU = 1 ERU = 1 RMU = 1 CER = 1 tCO₂eq

Net Kyoto units = (Total issued and purchased/acquired Kyoto units – Sum of all external transactions of Kyoto units – Sum of all cancelled Kyoto units) = (Sum of all retired Kyoto units + Sum of all Kyoto units that are carried forward)

Condition for compliance with the target: Net holdings of Kyoto units ≥ Overall Annex A emissions during the commitment period

BOX 2 Illustration of the accounting process

Figure 2 is an illustration for the accounting process used under the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol.

Let us assume that the base year emissions of Party X is 20 ktCO₂eq, of which 18 ktCO₂eq comes from Annex A emission sources and 2 ktCO₂eq is contributed by the deforestation emissions. Furthermore, if we assume the commitment period to be five years, then business-as-usual emissions for the commitment period of the Party is 100 ktCO₂eq.

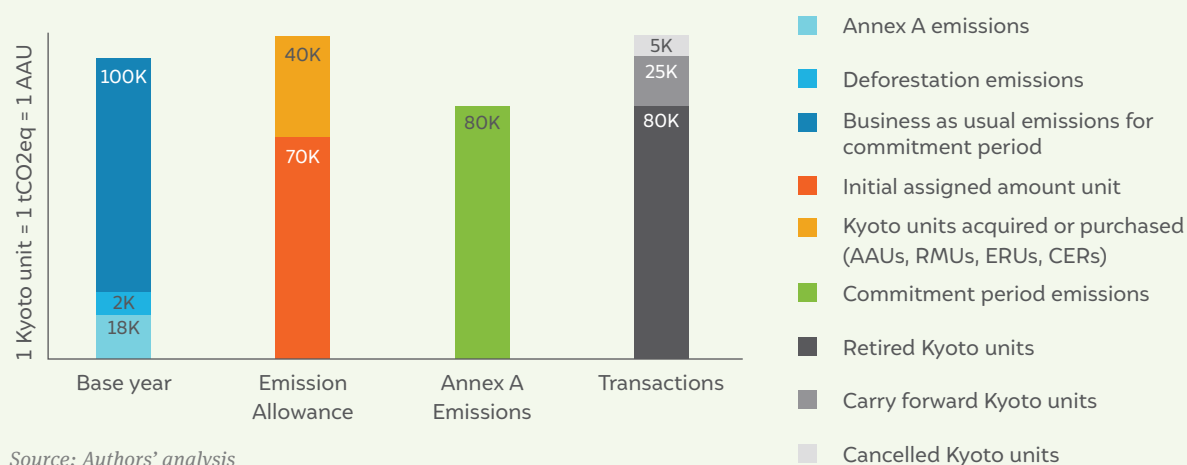
If the target of Party X is to limit its emissions to 70 per cent of its base year emissions (or reduce 30 per cent of its base year emissions), then the initial assignment amount units (emissions allowance) is estimated to be 70 kAAUs (equivalent to 70 ktCO₂eq) for the five-year commitment period.

In case the cumulative Annex A emissions of the Party at the end of the commitment period is 80 ktCO₂eq, then the Party will have to purchase additional emissions allowance of at least 10k Kyoto units (equivalent to 10 ktCO₂eq) and retire all the Kyoto units (purchased and initially assigned) to meet its compliance.

In the illustration (Figure 2), the Party acquires additional 40k Kyoto units (equivalent to 40 ktCO₂eq) from the market mechanism and has cumulative holdings of 130k Kyoto units. These additional Kyoto units could be in form of CERs, RMUs, or AAUs.

From this, if the Party voluntary cancels 5k Kyoto units and its net holding is 125k Kyoto units, which the Party uses to comply with its targets by retiring 80k Kyoto units, as well as requests for carry-over of 25k Kyoto units to the next commitment period.

Figure 2 Illustration of the accounting process



2.2.1 Kyoto Protocol LULUCF accounting

The LULUCF sector is not included in the Annex A emissions accounting in the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol. This is because of significant uncertainties and different procedural challenges in the accounting of the LULUCF sector (Krug 2018). However, it is accounted for and reported separately for the specific LULUCF activities. These incorporate the emissions and removals from direct human-induced LULUCF activities, mentioned in Articles 3.3 and 3.4 of the Kyoto Protocol. Table 2 showcases mandatory as well as voluntary Kyoto Protocol (KP) LULUCF activities. Parties can opt to report the change in the carbon stock or greenhouse gas emissions for LULUCF activities annually or at the end of the commitment period. If Party elects to report a voluntary LULUCF activity in the first commitment period, it is also required to be reported in the second commitment periods as well.

KP-LULUCF activities	First commitment period	Second commitment period
Afforestation	Mandatory (Article 3.3)	Mandatory (Article 3.3)
Reforestation		
Deforestation		
Forest management	Voluntary (Article 3.4)	Voluntary (Article 3.4)*
Cropland management		
Grazing land management		
Revegetation		
Wetland drainage and rewetting	Not specified	

Table 2
KP-LULUCF activities
in the Kyoto Protocol
and the Doha
Amendment

Source: UNFCCC

*Mandatory if elected
in the first commitment
period

If a Party's KP-LULUCF activities result in net removals, it is issued a corresponding amount of removal units (RMUs).¹⁵ In contrast, a Party's net emissions due to KP-LULUCF activities result in an equivalent cancellation of other Kyoto units (AAUs, ERUs, and CERs). The accounting of net removals and net emissions resulting from the above-mentioned LULUCF activities are based on the rules stated in decision 2/CMP.7¹⁶. This generally involves a comparison of greenhouse gas emissions and removals from activity occurring on land during a particular commitment period relative to a reference. This reference level can be zero, base year, or a selected reference level (UNFCCC 2018).

2.3 Data sources

All the Parties included in the Annex I of the Convention are obligated to submit their emissions data to UNFCCC. These data are submitted in the form of reports, such as a Biennial Report or national communications, and in Excel files termed as common reporting format (CRF). Furthermore, the Annex I Parties participating under the Kyoto Protocol and the Doha Amendment are also required to annually report supplementary data on KP-LULUCF activities and the transactions (addition, subtraction, cancellation, or retirement) of the different Kyoto units (CERs, RMUs, ERUs, and AAUs). The information related to emissions and transaction of different Kyoto units comes from national systems of greenhouse gas inventory and national registry, respectively, for each Annex I country.

15. RMU is equivalent to allowance of 1 tCO₂e.

16. Decision taken in the seventh session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol held in 2011.

In order to undertake a comprehensive evaluation of the past efforts of developed countries, The Council compiled all these data points from the UNFCCC database and country-wise reports such as the initial review report, true-up review reports, and the national inventory report. Apart from the submissions made to the UNFCCC, for EU, various studies related to effort-sharing decision and emission trading system were explored to establish individual EU member target in the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol. For analysing the performance of the Annex I countries as stated under the Cancun Agreements, the study considered the latest available emissions data—2021 national inventory submissions—from their respective base year emissions till 2019. An Excel database was created where all these data sets were compiled and analysed.

2.4 Assumptions regarding data and limitations

We observed that the emissions data for the historical years does not remain static and is recalculated with every iteration of a Party's annual inventory submission due to methodological improvements, activity data updates, and expert review recommendations. So, even if a Party had the same base year for both the commitment periods, its value will be different across various inventory submissions. The study considers the inventory submission data selected by the Party while submitting their initial report¹⁷ for the first and second commitment periods. For the overall emissions from 1990 till 2019, latest data from the 2021 national inventory submissions are considered. Since data for 2020 was not available, a 4 per cent emission reduction is considered below the 2019 levels. This is based on estimates from the World Meteorological Organization, which has estimated the emission decline in 2020 to be around 4–7 per cent below the 2019 levels.

In the second commitment period, the transaction data of Kyoto units was not complete. As the Doha Amendment was not enforced for almost the entire duration of its commitment period, the data related to RMU units and related transactions of Kyoto units was not available. These include data on issued RMUs due to net removals and the cancelled Kyoto units as a result of net source emissions from the mandatory and elected LULUCF activities. Further, most of the Parties have selected the commitment period for accounting the LULUCF activities, so the data would be available only after the true-up period review in 2021–22.

For the purpose of our analysis, the base year is considered as 1990 for all the greenhouse gases (in both the commitment periods) for the non-participating Annex I Parties whose base year is not given. And their target is considered as per the overall emission reduction objectives of the agreement, that is, 5 and 18 per cent in the Kyoto Protocol and the Doha Amendment, respectively. Also, the data related to CERs, ERUs, and RMUs for non-participating countries is not available (as they are not obligated to report) and they are considered as zero.

In order to validate these assumptions and solicit critical feedback on the pre-2020 research, The Council organised a stakeholder consultation. This was a closed-door virtual consultation where experts from across the globe participated and shared their views on the approach, assumptions, and findings. The feedback of the experts were duly considered and are incorporated in the report. The details of the consultation are given in the Annexure I.



For the overall emissions from 1990 till 2019, the latest data from the 2021 national inventory submissions are considered

17. Initial reports contain base year emissions, which are considered by the UNFCCC for establishing AAUs.

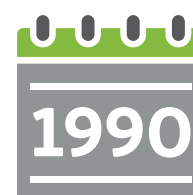


The overall emission reduction targets were set at a minimum of 5% and 18% below the 1990 levels under the Kyoto Protocol (2008-2012) and Doha Amendment (2013-2020), respectively.

3. Base year and targets under the Kyoto Protocol and the Doha Amendment

The base year is the historical reference year for the Party with which present emissions¹⁸ are compared. For the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol, the base year is primarily 1990. But there are some flexibilities to EIT countries (Article 3.5). For carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), most Annex I Parties have selected 1990 as the base year except the EIT countries, namely Bulgaria (1988), Hungary (1985–87), Slovenia (1986), Poland (1988), and Romania (1989).

Also, the Parties were allowed to choose 1995 as a base year for the F-gases—hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). So, most Annex I Parties opted for 1995 as the base year for F-gases except Austria, Croatia, France, Italy, and Slovakia, which selected 1990 as the base year for F-gases, and Romania, which selected 1989 as the base year for F-gases.



In the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol, the base year is primarily 1990

Annex I Parties	Base year for CO ₂ , CH ₄ , and N ₂ O	Base year for HFCs, PFCs, and SF ₆	Base year for NF ₃
Australia, Liechtenstein, Switzerland, Ukraine	1990	1990	1990
Austria, Croatia, Norway, Slovakia	1990	1990	2000
Belarus, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Spain, Sweden, United Kingdom of Great Britain and Northern Ireland	1990	1995	1995
Bulgaria	1988	1995	1995
France, Iceland, Italy, Malta	1990	1990	1995
Greece, Kazakhstan, Portugal	1990	1995	2000
Hungary	1985–87	1995	1995
Monaco	1990	1995	1990
Poland	1988	1995	2000
Romania	1989	1989	2000
Slovenia	1986	1995	1995
Japan, Russian Federation	1990	1995	1995
Canada, New Zealand, United States, Turkey*	1990	1990	1990

Table 3
Base years of
Annex I Parties for
greenhouse gases

Source: UNFCCC

*Turkey was included in both Annex I and Annex II list of countries under the Convention as a result of it being an Organisation for Economic Co-operation and Development (OECD member). While Turkey is no longer a part of Annex II country list as per decision 26/CP.7 but for the purpose of this analysis, we have considered Turkey as a non-EIT country.

18. In the Kyoto Protocol, the emissions comprise of six greenhouse gases: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) and the F-gases (hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride). The Doha Amendment to the Kyoto Protocol had a revision with the addition of nitrogen trifluoride (NF₃) gas for the second commitment period (2013–2020).

For the second commitment period, another F-gas, nitrogen trifluoride (NF₃), was incorporated for which the Parties can choose 1995 or 2000 as the base year. The Annex I Parties that chose 1995 as the base year for NF₃ include Norway, Austria, Croatia, Greece, Poland, Portugal, Romania, Slovakia, and Kazakhstan while the remaining ones selected 2000. For the purpose of our analysis, the base year for non-participating Annex I Parties in the both the commitment periods is selected as 1990 for all the greenhouse gases.

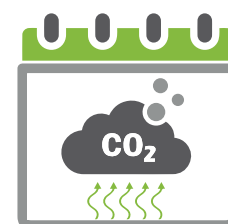
The base year selection is significant because it determines the value of a Party's base year emissions, which in turn is used in the estimation of its emission allowance (initial assigned amount unit) for a given commitment period. The base year emissions for a Party were supposed to only consist of emissions from the Annex A sources. However, Australia pushed for the accommodation of provisions to include emissions from the LULUCF activities (deforestation) in the base year estimation. This resulted in the inclusion of Article 3.7(2), also colloquially referred to as the 'Australia clause' (Macintosh 2011), which enabled the Parties to include deforestation emissions in their base year emissions, provided they can prove net emissions from the LULUCF sector for that year. Thus, the base year emissions for an Annex I Party is a sum of Annex A emissions and (if condition of net emissions is met) emissions from deforestation activities from the selected base year.

Apart from Australia, the other Annex I Parties that have used this provision in order to increase their base year emissions were Denmark, Ireland, Liechtenstein, Netherlands, Luxembourg, Portugal, and the United Kingdom of the Great Britain and the Northern Ireland. Out of these Annex I Parties, Denmark, Liechtenstein, and Luxembourg used these provisions only during the second commitment period (2013–2020).

Annex B of the Kyoto Protocol as well as the Doha Amendment lists Annex I Parties together with their quantified emission targets. These targets are expressed in the form of percentage of emissions of their corresponding selected base year emissions. The emission targets for the first commitment period (CP₁) were referred to as the quantified emission limitation or reduction objectives (QELRO) and those for the second commitment period were referred to as the quantified emission limitation or reduction commitments (QELRC).

Both the base year emissions as well as the emissions target (QELRO or QELRC) were used to calculate the Party's initial assigned amount or emission allowance for the five years (first commitment period) and the eight-year period (second commitment period). This initial assigned amount is represented in assigned amount units (AAUs), each of which is equivalent to emission allowance of 1 tCO₂e. The estimation of the initial assigned amount or emission allowance for all the Annex I Parties based on the commitment period and emissions target is given in Table 4.

The emission targets for the members of the EU differ from the one mentioned in Annex B of the Kyoto Protocol (or revised Annex B for the Doha Amendment) due to their internal effort-sharing mechanism and emissions trading system (ETS). For example, the joint emissions reduction target of the EU for the second commitment period (CP₂) is mentioned as 80 per cent of its base year emissions. This can also be understood as a decrease in the total greenhouse gas emissions by 20 per cent from the 1990 levels. However, the emission reduction targets for the individual EU member states are allocated differently based on the



The base year selected by a Party determines the value of its GHG emissions as a benchmark to estimate emissions' allowance for a given commitment period

emission targets under effort-sharing decision (ESD) and their allowances under the EU ETS cap and trade scheme (European Commission 2016). The ESD legislation was established by the EU as part of its 2020 climate energy package. It aimed to assign emission reduction targets for the sectors not covered in the EU ETS such as agriculture, transport, and buildings. The targets under the ESD were set up on the basis of GDP per capita of the EU member states (European Commission 2016).

So, the actual emission targets for EU member states like Austria and Czechia are 116 and 71 per cent, respectively, against their Doha Amendment base year emissions (generally emissions in 1990) instead of the joint 80 per cent target mentioned in the amended Annex B of the Kyoto Protocol (see Table 4). It is these adjusted emission reduction targets for the EU member states that are used in our analysis. Annexure II showcases the distribution of the internal effort-sharing mechanism and ETS among the EU countries.

In the first commitment period, Australia was one of the few Annex I Parties that had an emission target of 108 per cent, which means it was allowed to exceed its 1990 emissions level by 8 per cent. Several EU member states such as Greece, Iceland, Ireland, Spain, and Portugal too were allocated their targets in a manner that allowed them to exceed their own 1990 levels by 2012. However, the allocation was distributed in a manner such that it results in an overall joint reduction target of over 5 per cent for the first commitment period. Even, in the second commitment period (2013–2020), several EU member states are estimated to have been allocated targets that exceeded their 1990 emission levels. EU member states like Cyprus, Spain, and Portugal were given quantified emission reduction targets of 78, 36, and 32 per cent, respectively, above the 1990 levels. For the purpose of our analysis, the target for non-participating Annex I Parties was selected as 5 and 18 per cent as per the Kyoto Protocol and the Doha Amendment, respectively.



For analysis, the target for non-participating Annex I Parties was selected as 5% and 18% as per the Kyoto Protocol and the Doha Amendment, respectively

Table 4 Base year emissions, target, and initial assigned amount units (MtCO2eq)

S. No	Country	KYOTO PROTOCOL						DOHA AMENDMENT						
		Base year emission (MtCO2eq)			BAU (MtCO2eq)	Target	AAU (10^6 AAUs)	Base year emission (MtCO2eq)		BAU (MtCO2eq)	Total	Target	AAU (10^6 AAUs)	
		Annex A emissions	Deforestation emissions	Total				Annex A emissions	Deforestation emissions					
1	Australia	416.16	131.54	547.70	2738.50	108%	2957.58	418.62	148.16	566.79	4534.29	99.5%	4511.62	
2	Austria ^{de}	79.05	0.00	79.05	395.25	87%	343.87	78.86	0.00	78.86	630.84	116%	732.58	
3	Belarus ^{abc}	137.77	0.00	137.77	688.83	92%	633.73	133.46	0.00	133.46	1067.66	82%	875.48	
4	Belgium ^{de}	145.73	0.00	145.73	728.64	93%	674.00	147.81	0.00	147.81	1182.49	97%	1146.53	
5	Bulgaria ^{cde}	132.62	0.00	132.62	663.09	92%	610.05	114.11	0.00	114.11	912.84	59%	542.62	
6	Canada ^{ab}	594.00	0.00	594.00	2969.99	94%	2791.79	612.87	0.00	612.87	4902.93	82%	4020.40	
7	Croatia ^{cde}	31.32	0.00	31.32	156.61	95%	148.78	31.20	0.00	31.20	249.64	100%	250.33	
8	Cyprus ^{ae}	5.69	0.00	5.69	28.45	95%	27.03	5.63	0.00	5.63	45.02	178%	80.14	
9	Czechia ^{cde}	194.25	0.00	194.25	971.24	92%	893.54	198.32	0.00	198.32	1586.53	71%	1119.47	
10	Denmark ^{de}	69.98	0.00	69.98	349.89	79%	276.41	70.79	0.01	70.80	566.42	82%	463.99	
11	Estonia ^{cde}	42.62	0.00	42.62	213.11	92%	196.06	40.00	0.00	40.00	319.97	48%	155.18	
12	Finland ^{de}	71.00	0.00	71.00	355.02	100%	355.02	71.35	0.00	71.35	570.80	100%	571.24	
13	France ^{de}	563.93	0.00	563.93	2819.63	100%	2819.63	548.06	0.00	548.06	4384.45	96%	4229.59	
14	Germany ^{de}	1232.43	0.00	1232.43	6162.15	79%	4868.10	1253.60	0.00	1253.60	10028.79	68%	6786.80	
15	Greece ^{de}	106.99	0.00	106.99	534.94	125%	668.67	107.56	0.00	107.56	860.51	105%	903.37	
16	Hungary ^{cde}	115.40	0.00	115.40	576.99	94%	542.37	109.57	0.00	109.57	876.60	75%	659.44	
17	Iceland ^{de}	3.37	0.00	3.37	16.84	110%	18.52	3.63	0.00	3.63	29.07	111%	32.24	
18	Ireland ^{de}	55.60	0.00	55.61	278.04	113%	314.18	56.42	0.01	56.43	451.41	104%	470.05	
19	Italy ^{de}	516.85	0.00	516.85	2584.25	94%	2416.28	521.92	0.00	521.92	4175.36	94%	3918.97	
20	Japan ^b	1261.33	0.00	1261.33	6306.66	94%	5928.26	1294.86	0.00	1294.86	10358.89	82%	8494.29	
21	Kazakhstan ^{abc}	401.87	0.00	401.87	2009.36	95%	1908.89	392.84	0.00	392.84	3142.71	90%	2821.84	
22	Latvia ^{cde}	25.91	0.00	25.91	129.55	92%	119.18	26.41	0.00	26.41	211.27	56%	118.30	
23	Liechtenstein	0.23	0.00	0.23	1.15	92%	1.06	0.23	0.00	0.23	1.85	84%	1.56	
24	Lithuania ^{cde}	49.41	0.00	49.41	247.07	92%	227.31	48.20	0.00	48.20	385.57	57%	217.95	
25	Luxembourg ^{de}	13.17	0.00	13.17	65.84	72%	47.40	12.87	0.27	13.14	105.13	91%	95.41	
26	Malta ^{ae}	2.57	0.00	2.57	12.85	95%	12.21	1.97	0.00	1.97	15.80	109%	17.25	
27	Monaco	0.11	0.00	0.11	0.54	92%	0.50	0.10	0.00	0.10	0.79	78%	0.62	
28	Netherlands ^{de}	213.44	0.04	213.03	1065.17	94%	1001.26	223.20	0.75	223.95	1791.61	93%	1671.26	
29	New Zealand ^b	61.91	0.00	61.91	309.56	100%	309.56	65.83	0.00	65.83	526.63	82%	431.83	
30	Norway	49.62	0.00	49.62	248.10	101%	250.58	51.92	0.00	51.92	415.37	84%	348.91	
31	Poland ^{cde}	563.44	0.00	563.44	2817.21	94%	2648.18	580.02	0.00	580.02	4640.16	65%	3017.54	

S. No	Country	KYOTO PROTOCOL						DOHA AMENDMENT						
		Base year emission (MtCO2eq)			BAU (MtCO2eq)	Target	AAU (10^6 AAUs)	Base year emission (MtCO2eq)		BAU (MtCO2eq)	Total	Target	AAU (10^6 AAUs)	
		Annex A emissions	Deforestation emissions	Total				Annex A emissions	Deforestation emissions					
32	Portugal ^{de}	59.17	0.98	60.15	300.74	127%	381.94	60.75	4.28	65.03	520.22	132%	687.72	
33	Romania ^{cde}	278.23	0.00	278.23	1391.13	92%	1279.84	304.92	0.00	304.92	2439.36	52%	1268.16	
34	Russian Federation ^{bc}	3323.42	0.00	3323.42	16617.10	100%	16617.10	3744.65	0.00	3744.65	29957.19	82%	24564.90	
35	Slovakia ^{cde}	72.05	0.00	72.05	360.25	92%	331.43	74.27	0.00	74.27	594.17	81%	480.08	
36	Slovenia ^{cde}	20.35	0.00	20.35	101.77	92%	93.63	20.33	0.00	20.33	162.62	95%	154.93	
37	Spain ^{de}	289.77	0.00	289.77	1448.87	115%	1666.20	283.36	0.00	283.36	2266.89	136%	3082.71	
38	Sweden ^{de}	72.15	0.00	72.15	360.76	104%	375.19	72.06	0.00	72.06	576.46	112%	643.22	
39	Switzerland	52.79	0.00	52.79	263.95	92%	242.84	53.71	0.00	53.71	429.65	84%	361.77	
40	Turkey ^{ab}	219.37	0.00	219.37	1096.84	95%	1042.00	207.77	0.00	207.77	1662.19	82%	1362.99	
41	Ukraine ^{ebc}	920.84	0.00	920.84	4604.18	100%	4604.18	937.95	0.00	937.95	7503.63	76%	5702.76	
42	UK ^{de}	779.54	0.37	779.90	3899.52	88%	3412.08	802.95	0.25	803.19	6425.53	64%	4087.35	
43	USA ^{ab}	6437.00	0.00	6437.00	32185.00	95%	30575.75	6397.14	0.00	6397.14	51177.16	82%	41965.27	
Annex I countries		19682.44	132.93	19814.92	99074.62	96%	94632.14	20182.09	153.73	20335.81	162686.49	82%	133068.68	
Non-EIT countries		13372.94	132.93	13505.43	67527.13	94%	63777.88	13425.84	153.73	13579.57	108636.55	84%	91119.69	
EIT countries		6309.50	0.00	6309.50	31547.49	98%	30854.26	6756.24	0.00	6756.24	54049.94	78%	41948.99	
EU countries		5806.03	1.39	5806.97	29034.86	92%	26768.34	5870.13	5.56	5875.69	47005.54	80%	37604.43	
Participating countries		11884.17	132.93	12016.66	60083.29	96%	57640.75	6394.71	153.73	6548.44	52387.51	82%	42828.91	
Non-participating countries		7798.27	0.00	7798.27	38991.33	95%	36991.39	13787.37	0.00	13787.37	110298.98	82%	90239.77	

Source: Authors' analysis

Note:
a Countries that did not participate in the Kyoto Protocol;
b Countries that did not participate in the Doha Amendment;
c Economies in transition countries;
d Part of the European Union in the Kyoto Protocol;
e Part of the European Union in the Doha Amendment



United Nations Climate Change Conference

29 Nov. - 10 Dec. 2010
Cancun, Mexico

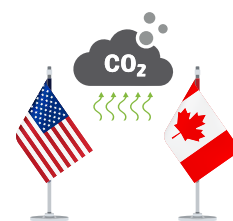


Cancun Agreements included both the minimum unconditional target and ambitious conditional target for countries.

4. Base year and targets under the Cancun Agreements

The emissions reduction targets submitted by Annex I countries in the Cancun Agreements were quite diverse and include both the minimum unconditional target and a more ambitious conditional target that depends on similar emission reduction commitments undertaken by all the other developed countries. Further, the countries were offered flexibilities in terms of selection of their respective base years as well their own emissions targets for 2020. Australia selected 2000 as its base year, while both the United States and Canada chose 2005 as their base year. Most of the Annex I countries including the EU member states, EIT countries (except Kazakhstan¹⁹), Japan, Iceland, the Russian Federation, New Zealand, and Norway chose 1990 as their base year.

The EU and its members states pledged emission reduction targets of 20 per cent (unconditional) and 30 per cent (conditional) below the 1990 levels. These targets were similar to the ones made by them for the second commitment period under the Doha Amendment to the Kyoto Protocol (UNFCCC 2012a). Iceland committed to a 30 per cent reduction in emissions jointly with the EU and its member states. Other countries like Japan and the Russian Federation pledged for emission reduction targets of about 15–25 per cent. Both the United States and Canada had set an emission reduction target of 17 per cent below the 2005 levels by 2020. Annexure II presents the targets stated by the countries that were part of the Cancun Agreements.



Under the Cancun Agreements, the United States and Canada had set emissions target of 17% below 2005 levels by 2020

19. Kazakhstan is the only EIT country to select 1992 as its base year.



The non-EIT Annex I countries showed emissions decline of only 3.7 per cent by 2019 compared to their 1990 levels.

5. Analysis of emissions

The Annex A emission trends for all the Annex I countries for the 1990–2019 period show an overall decline of 14.8 per cent of emissions. The non-EIT countries witnessed only a 3.7 per cent reduction in emissions by 2019 over their base year emissions levels while the EIT countries, which were part of the erstwhile Soviet Bloc and other Central and Eastern European countries with centrally planned economies, showed a drop of 39 per cent in emissions by 2019. Therefore, the emission trends clearly indicate that the 14.8 per cent overall emission reduction for the Annex I countries between 1990 and 2019 is primarily contributed by the EIT countries.

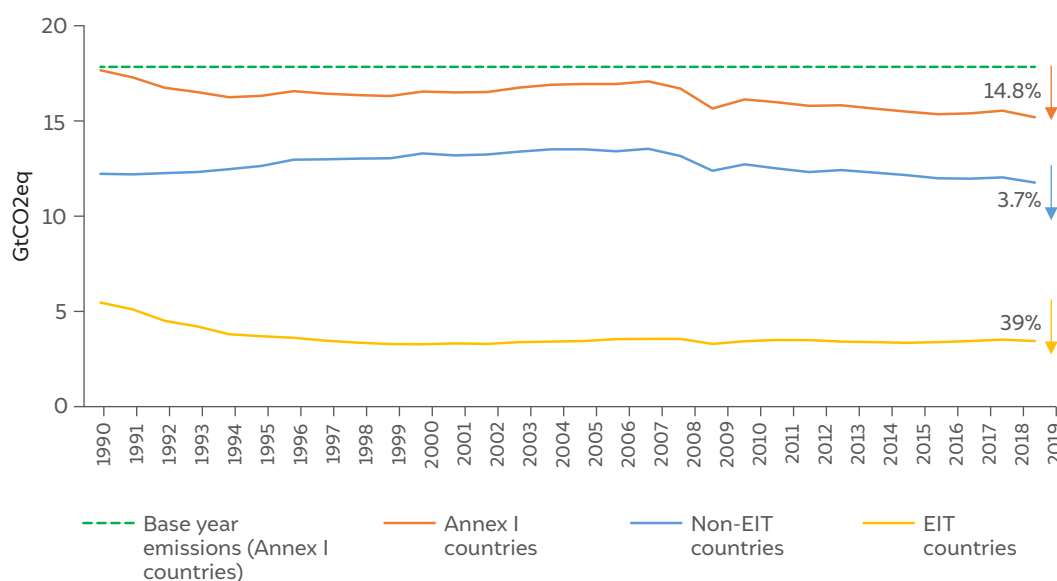


Figure 3
Greenhouse gas emissions of Annex I countries without LULUCF (1990–2019)

Source: Authors' analysis

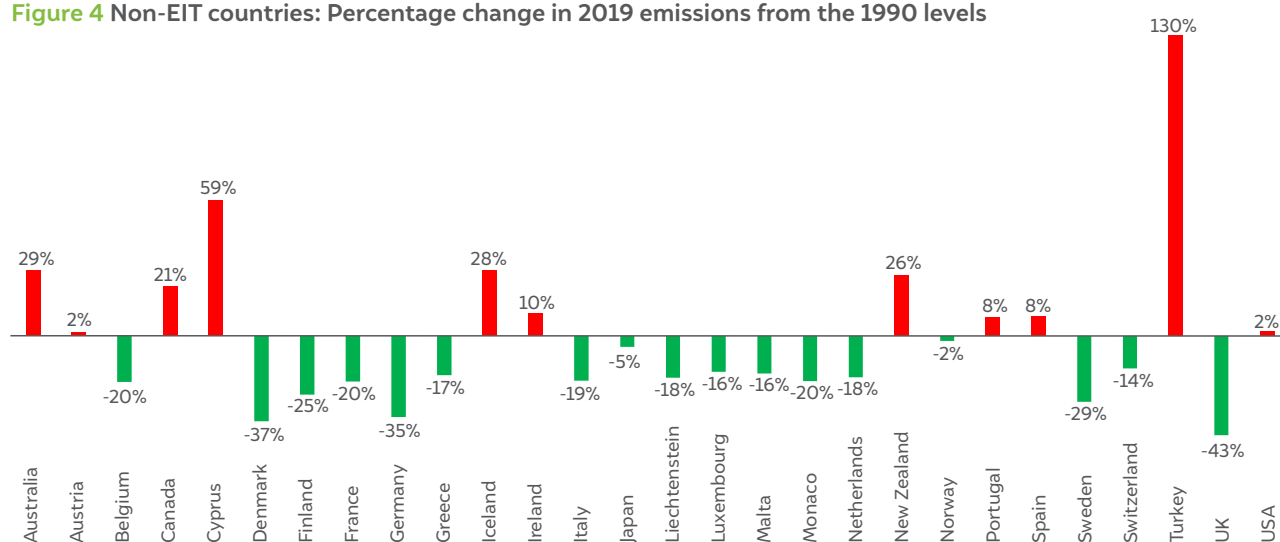
By including the LULUCF sector, the total aggregate emissions of Annex I countries is seen to decline by around 18.6 per cent till 2019 below their base year emission levels. The non-EIT countries were able to achieve an emission reduction (including LULUCF) of only 5 per cent by 2019 below the base year emission levels. On the other hand, the EIT countries achieved a reduction (including LULUCF) of about 47 per cent in emissions till 2019.

Assuming emissions for 2020, for Annex I countries, the emissions (without LULUCF) would reduce by 18.2 per cent by 2020 of their base year emissions levels. The emission reduction in non-EIT Annex I countries is estimated to be around 7.6 per cent by 2020 compared to their base year emissions levels. The EIT countries would witness a decline of about 41 per cent in emissions in the same year.

5.1 Country-wise scenario

Among the non-EIT countries, we observed that 11 developed countries had a positive increase in emissions in the period 1990–2019. Turkey recorded the highest increase in emissions of 130 per cent above the 1990 levels, followed by Cyprus at 59 per cent, Australia at 29 per cent, and Iceland at 28 per cent. Apart from Turkey, the United States and Canada (which did not participate in either of the two commitment periods under the Kyoto Protocol) exceeded their 1990 emissions levels by 2 per cent and 21 per cent, respectively. It is important to underline that 2 per cent increase in emissions for the United States amounts to 128 MtCO₂eq and 130 per cent increase in Turkey's emissions adds up to 285 MtCO₂eq.

Figure 4 Non-EIT countries: Percentage change in 2019 emissions from the 1990 levels



Source: Authors' analysis

Further, the emissions in UK show a decline of 43 per cent in 2019 below the 1990 levels. Germany and Sweden also recorded a reduction of 35 and 29 per cent in emissions, respectively, from their 1990 levels. The EIT countries witnessed the highest decline below the 1990 levels (Figure 4). Ukraine achieved the highest decline in emissions of 65 per cent by 2019. The Baltic countries—Latvia, Lithuania, and Estonia—also witnessed a significantly high emission reduction between 55 and 65 per cent compared to their 1990 emission levels. In absolute terms, the Russian Federation achieved the highest emission reduction of 1,039 MtCO₂eq.

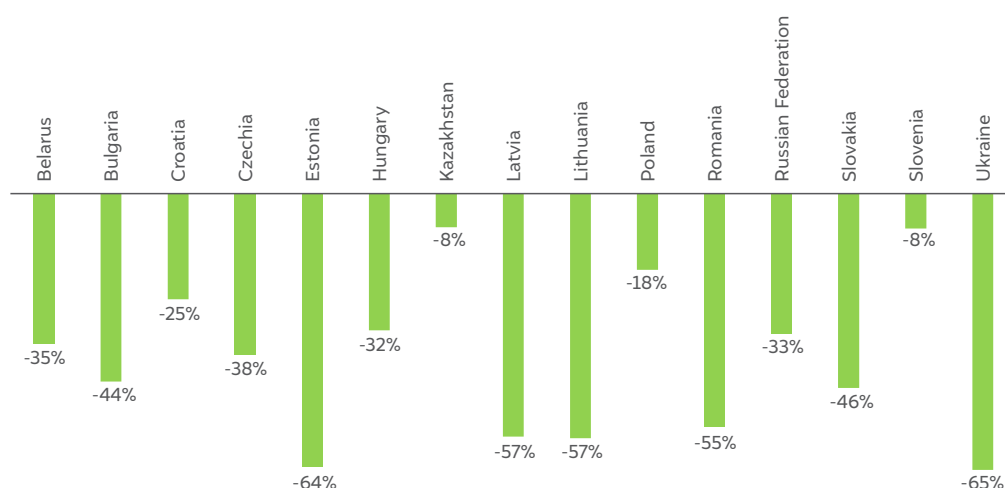


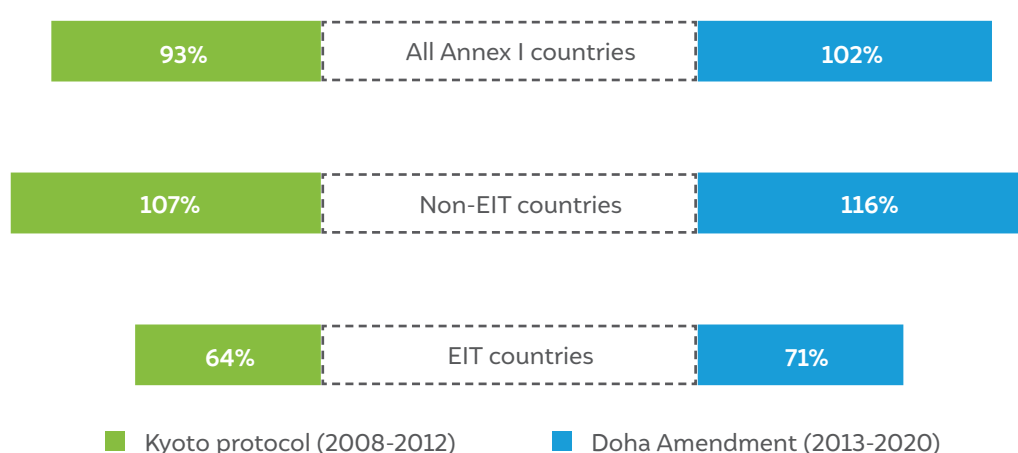
Figure 5
EIT countries:
Percentage change
in 2019 emissions
from the 1990 levels

Source: Authors' analysis

5.2 Emissions in the commitment periods

The overall Annex A emissions (without LULUCF) for all Annex I countries was about 88 GtCO₂eq in the first commitment period. In the second commitment period, the emissions are estimated to be around 135.1 GtCO₂eq. Non-EIT countries emitted 68.3 GtCO₂eq in the first commitment period and estimated to emit around 105.3 GtCO₂eq in the second commitment period. In contrast, the EIT countries emitted about 19.8 GtCO₂eq in the first commitment period and are expected to emit 29.8 GtCO₂eq in the second commitment period. The country with the highest emissions in both the commitment periods was the United States, representing almost 39 per cent of the total emissions. This was followed by the Russian Federation (12 per cent), Japan (7–8 per cent), Germany (5 per cent), and Canada (4 per cent).

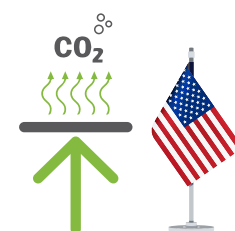
Figure 6 Commitment period emissions versus initial assigned amount units



Source: Authors' analysis

Figure 6 depicts the ratio of Annex A emissions in developed countries with respect to their initial AAUs, that is, initial emission allowance for the given commitment period. We observed that collectively the Annex I countries seem to have emitted less than their emission allowance in the first commitment (93 per cent), but they are estimated to exceed the allowance in the second commitment period by almost 2 per cent. Also, the non-EIT countries emitted more than their initially assigned emission allowance in the both the commitment periods (107 per cent in the first commitment period and 116 per cent in the second commitment period). The EIT countries have emitted significantly less with respect to their assigned emission allowances (64 per cent in the first commitment period and 71 per cent in the second commitment period).

The non-EIT countries such as Australia, Belgium, Finland, France, Greece, Netherlands, Portugal, and UK emitted less than their emission allowances in the both the commitment periods (see Table 5). While Canada, Iceland, Japan, Malta, New Zealand, Norway, Switzerland, Turkey, and the United States have emitted more than their emission allowances in both the commitment periods. All the EIT countries have emitted less than their estimated emission allowance in the first commitment period. While in the second commitment period, Poland is the only EIT that is expected to emit more than its estimated emission allowance.



The country with the highest emissions in both the commitment periods was the United States, representing almost 39% of the total emissions

Table 5 Emissions during the commitment period

Country	KYOTO PROTOCOL				DOHA AMENDMENT				
	Commitment period emissions		Annex A emissions versus BAU	Annex A emissions versus Initial AAUs	Commitment period emissions**		Annex A emissions versus BAU	Annex A emissions versus Initial AAUs	
	Annex A emission**	KP-LULUCF			Annex A emission	KP-LULUCF			
Australia	2711.2	145.0	99%	92%	4297.9	154.2	95%	95%	
Austria ^{de}	414.7	−6.8	105%	121%	631.0	-42.0	100%	86%	
Belarus ^{abc}	444.7		65%	70%	711.3		67%	81%	
Belgium ^{de}	626.3	1.1	86%	93%	935.8	-13.0	79%	82%	
Bulgaria ^{cde}	312.9	−3.6	47%	51%	461.1	-81.2	51%	85%	
Canada ^{ab}	3519.5		119%	126%	5753.8		117%	143%	
Croatia ^{cde}	144.8	−40.4	92%	97%	190.3	-51.9	76%	76%	
Cyprus ^{ae}	47.6		167%	176%	68.4	-1.2	152%	85%	
Czechia ^{cde}	680.1	−29.3	70%	76%	1012.2	-1.5	64%	90%	
Denmark ^{de}	297.9	−2.6	85%	108%	386.7	15.1	68%	83%	
Estonia ^{cde}	95.3	2.4	45%	49%	151.2	-28.7	47%	97%	
Finland ^{de}	338.4	−175.2	95%	95%	450.0	-270.9	79%	79%	
France ^{de}	2538.9	−258.6	90%	90%	3620.7	-365.8	83%	86%	
Germany ^{de}	4706.6	−250.3	76%	97%	6989.1	-214.9	70%	103%	
Greece ^{de}	598.5	−9.2	112%	90%	745.0	-16.1	87%	82%	
Hungary ^{cde}	336.0	−15.8	58%	62%	496.0	-30.9	57%	75%	
Iceland ^{de}	23.4	−3.3	139%	126%	37.7	-7.7	130%	117%	
Ireland ^{de}	308.5	−16.3	111%	98%	481.3	16.0	107%	102%	
Italy ^{de}	2479.6	−160.4	96%	103%	3436.3	-311.7	82%	88%	
Japan ^b	6392.4	−246.7	101%	108%	10287.0	-327.1	99%	121%	
Kazakhstan ^{abc}	1462.6		73%	77%	2755.1	-70.3	88%	98%	
Latvia ^{cde}	56.5	−61.9	44%	47%	86.7	-17.8	41%	73%	
Liechtenstein	1.2		102%	111%	1.6	0.1	84%	100%	
Lithuania ^{cde}	109.8	−52.0	44%	48%	161.2	-52.1	42%	74%	
Luxembourg ^{de}	60.1	−0.4	91%	127%	84.4	-3.3	80%	88%	
Malta ^{ae}	15.2		118%	125%	18.3		116%	106%	
Monaco	0.5		88%	95%	0.7		86%	110%	
Netherlands ^{de}	997.1	2.1	94%	100%	1495.1	-4.0	83%	89%	
New Zealand ^b	372.8	−70.7	120%	120%	642.1	-263.0	122%	149%	
Norway	266.8	−145.3	108%	106%	418.0	-142.9	101%	120%	
Poland ^{cde}	2006.3	−192.8	71%	76%	3174.3	-259.7	68%	105%	

Country	KYOTO PROTOCOL				DOHA AMENDMENT				
	Commitment period emissions		Annex A emissions versus BAU	Annex A emissions versus Initial AAUs	Commitment period emissions**		Annex A emissions versus BAU	Annex A emissions versus Initial AAUs	
	Annex A emission**	KP-LULUCF			Annex A emission	KP-LULUCF			
Portugal ^{de}	362.1	−59.0	120%	95%	522.6	-45.8	100%	76%	
Romania ^{cde}	615.9	−106.2	44%	48%	896.7	-254.3	37%	71%	
Russian Federation ^{bc}	11187.5	−2520.7	67%	67%	16508.1		55%	67%	
Slovakia ^{cde}	227.7	−1.4	63%	69%	326.2	-47.0	55%	68%	
Slovenia ^{cde}	98.5	−30.1	97%	105%	137.8	6.0	85%	89%	
Spain ^{de}	1792.0	−164.5	124%	108%	2600.1	-299.8	115%	84%	
Sweden ^{de}	305.6	−188.1	85%	81%	422.1	-329.0	73%	66%	
Switzerland	261.7	−8.1	99%	108%	383.4	-19.3	89%	106%	
Turkey ^{ab}	2007.3		183%	193%	3910.2		235%	287%	
Ukraine ^{bc}	1999.4	−290.4	43%	43%	2742.0	-408.4	37%	48%	
UK ^{de}	3017.2	−83.6	77%	88%	3908.3	16.0	61%	96%	
USA ^{ab}	33792.6		105%	111%	52790.2		103%	126%	
Annex I countries	88033.7	-3773.8	89%	93%	135128.1	-3773.8	83%	102%	
Non-EIT countries	68255.7	−1700.9	101%	107%	105317.8	-2476.1	97%	116%	
EIT countries	19778.0	−3342.1	63%	64%	29810.3	-1297.7	55%	71%	
EU countries	23613.4	−1906.1	81%	88%	33926.6	-2697.1	72%	90%	
Participating countries	46744.1	−5042.9	78%	81%	39028.3	-2705.0	74%	91%	
Non-participating countries	41289.6	0.0	106%	112%	96099.8	-1068.8	87%	106%	

Source: Authors’ analysis

Note:
a Countries that did not participate in the Kyoto Protocol;
b Countries that did not participate in the Doha Amendment;
c Economies in transition countries;
d Part of the European Union in the Kyoto Protocol;
e Part of the European Union in the Doha Amendment

*For the 2020 emissions, a 4 per cent reduction is considered below 2019 levels.

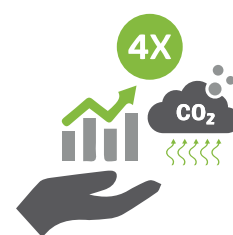
6. Analysis of the Kyoto Protocol flexibilities

All the participating Parties took advantage of the Kyoto mechanisms or the flexible (market) mechanisms such as emissions trading (ET), joint implementation (JI), and clean development mechanism (CDM) to achieve compliance in both the first (2008–2012) and second commitment periods (2013–2020).²⁰

At the end of the first commitment period, in 2012, the participating Annex I Parties had total net holdings of about 54.2 billion assigned amount units (AAUs), 1.4 billion removal units (RMUs), 1.2 billion certified emissions reductions (CERs), and 838 million emission removal units (ERUs). The total net holdings related to CERs, RMUs, and ERUs (3.4 billion units) was equivalent to four times the total base year emissions of Annex I countries that participated in the first commitment period.

The countries that have generated the highest number of RMUs through net removals from LULUCF activities in the first commitment period were the Russian Federation (626 million), Japan (243 million), and New Zealand (80 million). The country that had the highest number of CERs at the end of first commitment period was Germany at 226 million units, followed by Japan (145 million), Spain (124 million), and Italy (101 million). Germany also had the highest amount of ERUs at 195 million units. Other countries that had high amount of ERUs at the end of the first commitment period include the UK (123 million), New Zealand (97 million), and Spain (67 million). The ERUs were sold primarily by the Russian Federation and Eastern European countries to the Western European countries even before the beginning of the first commitment period.

To comply with the target, most of the Parties had retired their AAUs in the first commitment period. In addition to AAUs, some Parties also retired CERs, RMUs, and ERUs in comply with their commitments. Parties such as Liechtenstein, Luxembourg, and Austria retired 18, 10, and 8 per cent CERs of the total retirement needed for compliance, respectively, while New Zealand, Portugal, and Iceland retired 16, 11, and 8 per cent RMUs of the total retirement needed for compliance, respectively. In case of ERUs, New Zealand retired 19 per cent, Slovenia and Denmark retired 5 per cent of the total retirement needed for compliance in the first commitment period.

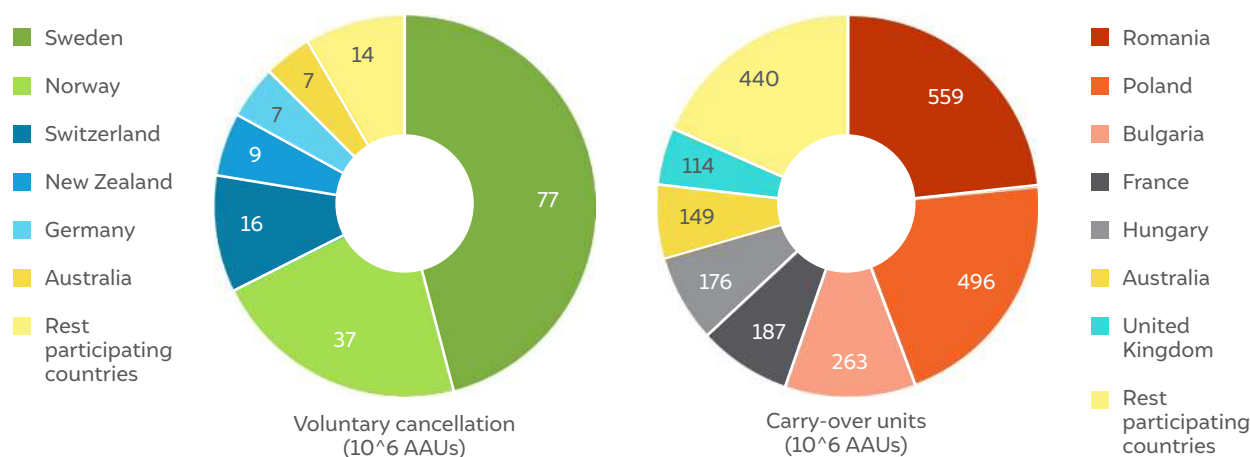


The net holdings related to CERs, RMUs, and ERUs (3.4 billion units) was equivalent to four times the total base year emissions of Annex I countries that participated in the first commitment period

20. The use of the Kyoto mechanisms in the second commitment period has not been confirmed yet.

6.1 Voluntary cancellation and carry-over units

Figure 7 Share of voluntary cancellation and carry-over units under Kyoto Protocol (2008-2012)



Source: Authors' analysis

A compliance review at the end of the first commitment period showed that many participating Annex I Parties did request to carry-over Kyoto units²¹ (except for the RMUs) for the subsequent commitment period. The total carry-over by participating countries in the second commitment period was equivalent to about 2.4 GtCO₂eq. Few EIT countries such as Bulgaria, Romania, Ukraine, Lithuania have carried over units equal to 48, 44, 35, and 34 per cent of their initial emissions allowance, respectively, for the second commitment period.

Some countries also voluntarily cancelled their Kyoto units that were in addition of what was required to achieve compliance. In the first commitment period, overall voluntary cancellation of Kyoto units was equivalent to 168 MtCO₂eq. It was observed that Sweden voluntarily cancelled the highest number of Kyoto units, equivalent to about 77 MtCO₂eq (making up 21 per cent of its initial AAUs). Sweden treated this voluntary cancellation as contribution to climate finance. This was followed by Norway, Switzerland, and New Zealand, which cancelled Kyoto units equivalent to 37, 16, and 9 MtCO₂eq, respectively.

The voluntary cancellation of Kyoto units was relatively lower for the second commitment period, which might be because of the delayed enforcement (entry into the force) of the Doha Amendment. The overall voluntary cancellation in the second commitment done so far is equivalent to 62 MtCO₂eq. Switzerland and Sweden have made the highest voluntary cancellations, equivalent to about 13 MtCO₂eq, followed by Australia, UK, and Germany, which have made voluntary cancellation in the range of about 9–13 MtCO₂eq individually. The cancellations units comprise primarily of CERs and a small amount of ERUs.



It was observed that Sweden voluntarily cancelled the highest number of Kyoto units, equivalent to about 77 MtCO₂eq (making up 21 per cent of its initial AAUs)

21. The type and quantity of Kyoto units that can be carried over to the next period depends on certain rules and restrictions. RMUs and temporary certified emission reductions (tCERs), long-term certified emission reductions (LCERs), and ERUs from LULUCF projects cannot be carried over to the next commitment period. AAUs can be carried over without any limits. CERs and ERUs can be carried over up to a quantity equal to 2.5 per cent of the Party's initial assigned amount.

7. Failures and loopholes under the Kyoto Protocol and the Doha Amendment



The analysis on pre-2020 climate actions is incomplete without considering the impact of the failures or the accounting loop holes. In the Kyoto Protocol and the Doha Amendment, major emitters did not participate, which is considered as one of its major failures. Also, literature suggests that countries have misused the accounting process to get unearned carbon credits. Hence, it becomes important to reflect on these issues and then discuss the overall achievement and progress made in the pre-2020 era.

7.1 Impact of non-participating countries

As stated previously, many major emitters such as the United States, Canada,²² and Turkey did not participate in the Kyoto Protocol and the Doha Amendment. In addition, Japan, Ukraine, New Zealand, and the Russian Federation did not accept the new reduction targets under the Doha Amendment.

Based on the total base year emissions of Annex I Parties, the proportion of emissions of the participating Parties in the first commitment period amounted to 61 per cent (12 GtCO₂eq). This proportion declined significantly in the second commitment period to 32 per cent (6.5 GtCO₂eq) of the total emissions (20.3 GtCO₂eq) of the Annex I Parties. In contrast, the share of non-participating Annex I countries rose to 68 per cent (13.8 GtCO₂eq) for the second commitment period compared to 40 per cent (7.8 GtCO₂eq) during the first commitment period.

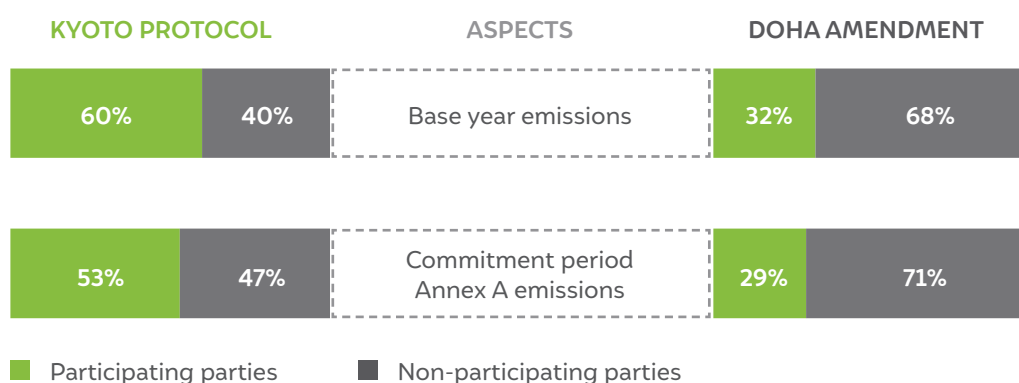


Figure 8

Annex A emission share of participating and non-participating Parties in the base year and commitment period

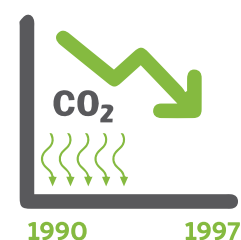
Source: Authors' analysis

In our analysis, we observed that the non-participating countries emitted more than their base emission levels. Turkey's 2019 emissions were about 130 per cent more than its 1990 levels, while New Zealand, Canada, and the United States exceeded their 1990 emission levels by 26, 21, and 2 per cent, respectively, in 2019. In actual terms, the United States emitted the most in both the commitment period (86 GtCO₂eq), which was about 39 per cent of the total Annex A emissions by all Annex I Parties in both the commitment periods.

The overall Annex A emissions of the non-participating countries constitute nearly 47 per cent (41.2 GtCO₂eq) in the first commitment period and 70 per cent (96 GtCO₂eq) in the second commitment period of the total commitment period emissions²³ of all the Annex I countries. Considering the overall emission reduction targets under the Kyoto Protocol and the Doha Amendment of 5 and 18 per cent, respectively, we observed that the non-participating countries emitted around 10.9 GtCO₂eq more than their estimated emission allowance (AAUs).

7.2 Presence of hot air

The overall emission trends of the Annex I Parties reveal that the emission reductions were significantly contributed by the EIT countries, which registered a decline of 39 per cent in emissions below the 1990 levels by 2019. Also, in the both the commitment periods, the EIT countries emitted 25–35 per cent lower than their initial AAUs or emission allowances.



A steep decline in emissions of the EIT countries was observed in the period between 1990 and 1997 during which these countries were making a transition from a centrally planned economy to a free market economy

22. Canada left the Kyoto Protocol in 2011 fearing penalty due to non-compliance.

23. Overall Annex A emissions for all Annex I countries in the first commitment period was about 88 GtCO₂eq and in the second commitment period, the emissions are estimated to be around 135.1 GtCO₂eq.

We also record that much of the decline in emissions for the EIT countries occurred well before the start of the Kyoto Protocol. A steep decline in emissions of the EIT countries was observed in the period between 1990 and 1997 during which these countries were making a transition from a centrally planned economy to a free market economy. So, the emission reductions that occurred during this period was not an outcome of any climate action undertaken by the EIT countries under the Kyoto Protocol or the Doha Amendment (Morel and Shislov 2014).

Table 6 Hot air analysis

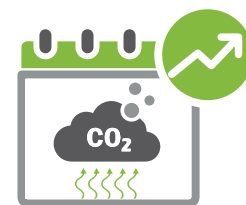
Countries	KYOTO PROTOCOL			DOHA AMENDMENT		
	% decrease from base year to 1997	Difference base year and 1997 (MtCO ₂ eq)	Surplus emission allowance (MtCO ₂ eq)	% decrease from base year to 1997	Difference base year and 1997 (MtCO ₂ eq)	Surplus emission allowance (MtCO ₂ eq)
Belarus	44%	60.05	276.2	35%	47.2	309.47
Bulgaria	38%	50.71	233.2	38%	43.2	205.63
Croatia	23%	7.23	34.4	23%	7.1	56.78
Czechia	18%	34.38	158.2	23%	44.7	252.15
Estonia	46%	19.63	90.3	49%	19.4	75.35
Hungary	26%	30.57	143.7	30%	33.0	198.73
Kazakhstan	51%	203.98	968.9	50%	194.9	1400.31
Latvia	54%	14.04	64.6	53%	14.1	63.15
Lithuania	54%	26.70	122.8	52%	25.2	114.07
Poland	21%	119.16	560.0	23%	131.2	682.38
Romania	38%	105.38	484.8	42%	129.4	538.29
Russian Federation	38%	1269.90	6349.5	40%	1483.5	9731.54
Slovakia	25%	18.07	83.1	27%	19.9	128.47
Slovenia	4%	0.81	3.7	3%	0.5	4.06
Ukraine	51%	469.39	2346.9	47%	441.7	2685.74
Total	39%	2430.00	11920.3	39%	2635.07	16446.11

Source: Authors' analysis

The choice of late 1980s or 1990s as base years for the EIT countries provides these Parties with inflated base year emissions, resulting in weaker targets that are easily overachieved. This issue of inflated base year is responsible for the generation of unearned carbon credits or emission allowance without any additional emission reductions efforts and following a business-as-usual scenario. Such unearned carbon credits are also referred to as the 'hot air' (Dufrasne 2019). The presence of 'hot air' credits impedes future mitigation measures because using it results in net emissions, exacerbating the climate change issue.

It is argued that the effect of hot air can be negated by not including the emission reduction that took place before 1997. The reasoning given is that after 1997, the economy of the EIT countries had started to recover from its initial shocks (Morel and Shislov 2014). An analysis of hot air emissions (see Table 6) by selecting 1997 as the base year for the EIT countries and comparing its emissions with the emissions of existing base year under the Kyoto Protocol and the Doha Amendment provides notable insights. The 1997 base year emissions for all the EIT Parties amount to 61 and 57 per cent of the existing base year emissions for the first commitment period and second commitment periods, respectively. In other words, the emissions between 1990 and 1997 had declined around 39–43 per cent for the EIT countries. For countries like Estonia, Latvia, Lithuania, Kazakhstan, Ukraine, and Belarus, the drop in emission is between 45 and 55 per cent. The EIT countries with the least inflated base year are Slovenia, Czechia, Croatia, and Poland.

The existing base year emissions of the EIT countries in the Kyoto Protocol itself exceed their 1997 emissions by 2.4 GtCO₂eq, resulting in surplus carbon credits amounting to about 12 GtCO₂eq in the entire first commitment period. By making a similar comparison of emissions with the base year emissions of the EIT countries as reported in the Doha Amendment, a surplus of 16.4 GtCO₂eq of unearned carbon credits is estimated. The EIT countries, with the most surplus hot air credits, include the Russian Federation, Ukraine, and Kazakhstan.



The existing base year emissions of the EIT countries in the Kyoto Protocol itself exceed their 1997 emissions by 2.4 GtCO₂eq

7.3 Inclusion of deforestation emissions in the base year

Article 3.7(2) of the Kyoto Protocol enabled any Annex I participating country to include deforestation emissions in their base year emissions, provided it can prove net emissions from its LULUCF sector in the base year. This provision was contentious as it gave additional unearned emission allowance to the countries that had more emissions from the LULUCF sector in their respective base years. Also, the windfall or unearned credits due to the inclusion of deforestation emissions helped a country in achieving compliance in a given commitment period without any significant climate action or mitigation efforts.

In the first commitment period, there were five Annex I countries that opted for inclusion of deforestation emissions in their base year including Australia, Ireland, Netherlands, Portugal, and the UK. The participation increased in the second commitment period with eight Annex I countries using this provision including new countries like Liechtenstein, Luxembourg, and Denmark.

We note that Australia, which pushed for this clause, benefitted significantly from this provision as it gained surplus emission allowance up to 24 per cent of its initial AAUs in the first commitment period and 26 per cent of its initial AAUs in the second commitment period. In absolute terms, these emission allowances amount to 468 MtCO₂eq in the first commitment period and 949 MtCO₂eq in the second commitment period. However, the cancellation of Kyoto units due to the deforestation emissions was around 8 per cent of its assigned amount in the first commitment period and 5 per cent in the second commitment period. By using Article 3.7(2), Australia gained surplus emission allowance of about 24 and 26 per cent of its initial assigned amount units in the first and second commitment periods, respectively.

Apart from Australia, Portugal was also found to have acquired surplus emission allowance from this provision to the extent of 4 per cent of its initial emission allowance in the second commitment period.

8. Achievements of developed countries in the pre-2020 phase



Image: iStock

In this section, the achievement of developed countries with respect to the Kyoto Protocol, the Doha Amendment, and the Cancun Agreements is discussed. Also, at the end, developed countries are ranked based on their performance in the pre-2020 regime.

8.1 Performance of developed countries in the Kyoto Protocol and the Doha Amendment

In the Kyoto Protocol, the Annex I Parties collectively complied with the overall target and in addition ended up with surplus emission allowances of about 6.6 billion AAUs.²⁴ But in the Doha Amendment, without considering the carry-over units from the Kyoto Protocol, the Annex I Parties are estimated to fall short by 2 billion AAUs (emission allowance) from meeting the overall emission reduction target (minimum of 18 per cent from the 1990 levels).

The participating Annex I Parties complied with their targets and are estimated to have left-over emissions allowance of 10.9 and 3.9 billion AAUs at the end of first and second commitment periods, respectively. On the other hand, the non-participating Annex I Parties have emitted more and would need additional emission allowance of about 10.2 billion AAUs (4.3 billion AAUs in the Kyoto Protocol and 5.9 billion AAUs in the Doha Amendment) towards adhering to the overall emission reduction commitments under the pre-2020 regime.

It is important to highlight that the overachievement (left-over emission allowance) from the participating Annex I Parties in both the commitment periods are a result of unearned emission allowance arising from hot air and inclusion of deforestation emissions in the base year. This unearned emission allowance to the participating Annex I Parties were about 11.1 billion AAUs and 3.3 billion AAUs in the first and second commitment periods, respectively. Also, for the non-participating countries, the surplus emission allowance is estimated to be around 1.2 billion AAUs and 14.1 billion AAUs at the end of first and second commitment periods, respectively.

Hence, the overall overachievement (left-over emission allowance) of about 4.7 billion AAUs by Annex I Parties at the end of pre-2020 period is at the cost of the unearned emission allowance of about 29.8 billion AAUs from hot air and inclusion of deforestation emissions in base year.

8.1.1 Non-EIT countries

We observed that the non-EIT countries have emitted more than their estimated emission allowance in both the commitment periods. Collectively, the non-EIT countries fall short by about 3.5 billion AAUs in the first commitment period and this gap swells to four times (about 14.1 billion AAUs) in the second commitment period.

The non-participating countries²⁵ are primarily responsible for the shortfall of developing countries in achieving their targets. Countries such as the United States, Turkey, and Canada emitted significantly higher than their estimated emission allowances and would need additional emission allowance of about 14, 3.5, and 2.5 billion AAUs, respectively, to meet their overall target of the Kyoto Protocol and the Doha Amendment. Also, Japan, which did not participate in the second commitment period, would need an additional emission allowance of about 1.6 billion AAUs to meet its overall reduction target in the pre-2020 period.

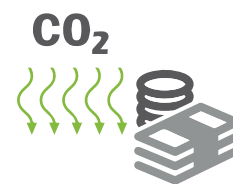


The participating Annex I Parties are estimated to achieve compliance against their targets at the end of both the commitment periods

24. 1 billion AAUs is equivalent to 1 GtCO₂eq.

25. Non-participating countries do not have any target under the Kyoto Protocol and the Doha Amendment. However, for the purpose of our analysis, the overall reduction target of the Kyoto Protocol and the Doha Amendment, that is, 5 and 18 per cent, respectively, is considered to evaluate their performance.

The European countries have emitted less than their emission allowances. France, Spain, Italy, and UK collectively would have left-over emission allowance of about 2.3 billion AAUs at the end of pre-2020. Australia is also estimated to have left-over emission allowance of about 0.4 billion units, but this is at the cost of surplus emissions allowance of about 1.4 billion AAUs from the inclusion of deforestation emission in the base year.



8.1.2 Economies in transition countries

It is estimated that the EIT countries would collectively have left-over emission allowance of about 10.1 and 12.1 billion AAUs at the end of the first and second commitment periods, respectively. But these countries have also received unearned emission allowance from hot air of about 12 and 16.4 billion AAUs in the first and second commitment periods, respectively.

The EIT countries received unearned carbon credits of about 12 and 16.4 billion AAUs in the first and second commitment periods, respectively

The Russia Federation gained the most from -it and is estimated to have more than 50 per cent of the total unearned emissions allowance from hot air, which is about 16 billion AAUs for both the commitment periods. This is followed by Ukraine, Kazakhstan, Poland, and Romania, which collectively have about 9.6 billion units of unearned emission allowance from hot air. If we negate the impact of the unearned emission allowance, only Slovenia would be complying with the emission reduction target in the pre-2020 period and the Russia Federation, Poland, and Kazakhstan would need additional emission allowance of almost 5 billion AAUs for meeting their targeted emission reductions.

Table 7 Pre-2020 outcomes (in MtCO2eq)

Group/Country		KYOTO PROTOCOL				DOHA AMENDMENT				PRE 2020			
		Emissions	Net holdings	Achievements	Inflated AAUs	Emissions*	Net holdings	Achievements	Inflated AAUs	Emissions	Net holdings	Achievements	Inflated AAUs
Annex I countries		88033.7	94650.2	−6616.5	12388.2	135128.1	133176.3	1951.8	17420.1	223161.7	227826.4	-4664.6	29808.2
Non-EIT countries		68255.7	64727.7	3528.0	467.8	105317.8	91228.7	14089.1	974.0	173573.4	155956.4	17617.0	1441.8
EIT countries		19778.0	29922.4	−10144.5	11920.3	29810.3	41947.6	-12137.3	16446.1	49588.3	71870.0	-22281.7	28366.4
EU countries		23613.4	26322.2	−2708.8	1978.8	33926.6	37560.5	-3633.9	2344.4	57540.0	63882.7	-6342.7	4323.2
Participating countries		46744.1	57658.4	−10914.3	11143.0	39028.3	42933.6	-3905.3	3293.1	85772.3	100592.0	-14819.6	14436.0
Non-participating countries		41289.6	36991.7	4297.8	1245.1	96099.8	90242.7	5857.1	14127.1	137389.3	127234.4	10154.9	15372.1
	Australia	2711.2	2860.6	−149.4	468	4297.9	4526.5	-228.6	949	7009.1	7387.1	-378.0	1416.4
	Austria ^{de}	414.7	417.0	−2.3	0	631.0	732.7	-101.7	0	1045.6	1149.7	-104.0	0.0
	Belarus ^{abc}	444.7	633.7	−189.1	276	711.3	875.5	-164.2	309	1155.9	1509.2	-353.3	585.7
	Belgium ^{de}	626.3	648.1	−21.8	0	935.8	1147.8	-212.0	0	1562.1	1796.0	-233.9	0.0
	Bulgaria ^{cde}	312.9	573.2	−260.4	233	461.1	542.6	-81.5	206	774.0	1115.8	-341.8	438.9
	Canada ^{ab}	3519.5	2792.1	727.4	0	5753.8	4020.4	1733.4	0	9273.3	6812.5	2460.8	0.0
	Croatia ^{cde}	144.8	153.9	−9.0	34	190.3	250.3	-60.1	57	335.1	404.2	-69.1	91.1
	Cyprus ^{ae}	47.6	27.0	20.6	0	68.4	80.1	-11.7	0	116.0	107.2	8.9	0.0
	Czechia ^{cde}	680.1	728.4	−48.3	158	1012.2	1119.5	-107.3	252	1692.3	1847.9	-155.6	410.3
	Denmark ^{de}	297.9	298.1	-0.1	0	386.7	468.1	-81.4	0	684.6	766.1	-81.5	0.0
	Estonia ^{cde}	95.3	117.7	−22.4	90	151.2	155.2	-4.0	75	246.5	272.9	-26.4	165.7
	Finland ^{de}	338.4	362.1	−23.8	0	450.0	574.4	-124.5	0	788.3	936.5	-148.2	0.0
	France ^{de}	2538.9	2726.4	−187.5	0	3620.7	4231.2	-610.5	0	6159.5	6957.6	-798.0	0.0
	Germany ^{de}	4706.6	4934.9	−228.3	0	6989.1	6792.8	196.3	0	11695.7	11727.7	-32.0	0.0
	Greece ^{de}	598.5	643.6	−45.1	0	745.0	903.4	-158.4	0	1343.5	1547.0	-203.5	0.0
	Hungary ^{cde}	336.0	512.2	−176.2	144	496.0	659.4	-163.4	199	831.9	1171.6	-339.7	342.4
	Iceland ^{de}	23.4	20.1	3.3	0	37.7	32.2	5.5	0	61.1	52.3	8.7	0.0
	Ireland ^{de}	308.5	320.4	−11.9	0	481.3	472.2	9.1	0	789.9	792.6	-2.8	0.0
	Italy ^{de}	2479.6	2483.7	−4.0	0	3436.3	3921.9	-485.5	0	5916.0	6405.5	-489.6	0.0
	Japan ^b	6392.4	6567.3	−174.9	0	10287.0	8497.3	1789.7	0	16679.4	15064.6	1614.8	0.0
	Kazakhstan ^{abc}	1462.6	1908.9	−446.3	969	2755.1	2821.8	-66.7	1400	4217.7	4730.7	-513.0	2369.2
	Latvia ^{cde}	56.5	84.7	−28.3	65	86.7	118.3	-31.6	63	143.2	203.0	-59.9	127.7
	Liechtenstein	1.2	1.2	0.0	0	1.6	1.9	-0.3	0	2.7	3.1	-0.4	0.0
	Lithuania ^{cde}	109.8	184.2	−74.4	123	161.2	216.6	-55.4	114	271.0	400.8	-129.8	236.9
	Luxembourg ^{de}	60.1	60.7	-0.6	0	84.4	96.7	-12.3	2	144.5	157.4	-13.0	1.7
	Malta ^{ae}	15.2	12.2	3.0	0	18.3	17.3	1.0	0	33.5	29.5	4.0	0.0

Group/Country		KYOTO PROTOCOL				DOHA AMENDMENT				PRE 2020			
		Emissions	Net holdings	Achievements	Inflated AAUs	Emissions*	Net holdings	Achievements	Inflated AAUs	Emissions	Net holdings	Achievements	Inflated AAUs
	Monaco	0.5	0.5	0.0	0	0.7	0.7	0.0	0	1.2	1.2	0.0	0.0
	Netherlands ^{de}	997.1	1031.9	−34.8	0	1495.1	1676.0	-180.9	0	2492.2	2707.9	-215.7	0.0
	New Zealand ^b	372.8	402.2	−29.4	0	642.1	431.8	210.3	0	1014.9	834.0	180.9	0.0
	Norway	266.8	282.7	−15.9	0	418.0	375.1	42.9	0	684.9	657.9	27.0	0.0
	Poland ^{cde}	2006.3	2502.7	−496.5	560	3174.3	3017.5	156.8	682	5180.6	5520.2	-339.6	1242.4
	Portugal ^{de}	362.1	407.4	−45.3	0	522.6	687.7	-165.1	24	884.7	1095.2	-210.4	23.7
	Romania ^{cde}	615.9	1175.1	−559.2	485	896.7	1268.1	-371.4	538	1512.7	2443.2	-930.5	1023.0
	Russian Federation ^{bc}	11187.5	16967.7	−5780.1	6349	16508.1	24564.9	-8056.8	9732	27695.6	41532.6	-13837.0	16081.0
	Slovakia ^{cde}	227.7	256.3	−28.6	83	326.2	480.1	-153.8	128	553.9	736.4	-182.5	211.6
	Slovenia ^{cde}	98.5	99.8	−1.2	4	137.8	154.9	-17.1	4	236.4	254.7	-18.3	7.8
	Spain ^{de}	1792.0	1828.3	−36.3	0	2600.1	3087.1	-487.0	0	4392.0	4915.4	-523.4	0.0
	Sweden ^{de}	305.6	305.6	0.0	0	422.1	653.6	-231.5	0	727.7	959.2	-231.5	0.0
	Switzerland	261.7	269.3	−7.6	0	383.4	468.8	-85.4	0	645.2	738.1	-93.0	0.0
	Turkey ^{ab}	2007.3	1042.0	965.3	0	3910.2	1363.0	2547.3	0	5917.6	2405.0	3512.6	0.0
	Ukraine ^{bc}	1999.4	4023.9	−2024.5	2347	2742.0	5702.8	-2960.7	2686	4741.5	9726.7	-4985.2	5032.7
	UK ^{de}	3017.2	3406.4	−389.2	0	3908.3	4002.6	-94.4	0	6925.5	7409.0	-483.6	0.0
	USA ^{ab}	33792.6	30575.8	3216.9	0	52790.2	41965.3	10824.9	0	86582.8	72541.0	14041.8	0.0

Source: Authors’ analysis

Note:
a Countries that did not participate in the Kyoto Protocol;
b Countries that did not participate in the Doha Amendment;
c Economies in transition countries;
d Part of the European Union in the Kyoto Protocol;
e Part of the European Union in the Doha Amendment

*For the 2020 emissions, a 4 per cent reduction is considered below 2019 levels.

8.2 Progress of developed countries towards Cancun pledges

Table 8 Progress against Cancun pledges

Countries	Base year	Unconditional pledges (minimum target with respect to base year)	LINEAR APPROACH	BUDGETARY APPROACH		
			Percent change in emissions of 2019 levels with respect base year	Assigned emission allowance (MtCO ₂ eq)	Emissions* (MtCO ₂ eq)	Achievement (MtCO ₂ eq)
Australia	2000	-5%	(+)12%	3707.11	4297.93	-590.82
Belarus	1990	-5%	-35%	1057.56	711.26	346.30
Canada	2005	-17%	-1%	4905.09	5753.81	-848.72
Croatia	1990	-5%	-25%	238.54	190.26	48.29
EU	1990	-20%	-28%	36130.50	33926.62	2203.88
Iceland	1990	-15%	(+)28%	25.04	37.69	-12.65
Japan	2005	-4%	-12%	10604.42	10287.01	317.41
Kazakhstan	1990	-15%	-8%	2618.15	2755.13	-136.98
Liechtenstein	1990	-20%	-18%	1.46	1.56	-0.09
Monaco	1990	-30%	-20%	0.58	0.68	-0.11
New Zealand	1990	-5%	(+)26%	494.98	642.11	-147.13
Norway	1990	-30%	-2%	288.26	418.03	-129.77
Russian Federation	1990	-15%	-33%	21479.87	16508.05	4971.82
Switzerland	1990	-20%	-14%	343.24	383.44	-40.20
Ukraine	1990	-20%	-65%	6032.47	2742.04	3290.44
USA	2005	-17%	-12%	49288.93	52790.17	-3501.25

Source: Author's analysis

Note:

Figures in **green** represents countries which are on track to achieve their target while **red** represents non-performer against the target

*Emissions for 2020 are assumed as a four per cent reduction below 2019 levels

It is important to highlight that the accounting of Cancun pledges could follow the budgetary as well as the linear approach.²⁶ On analysing the unconditional Cancun pledges (minimum target) made by countries via a linear approach as well as a budgetary approach, it is observed that not only most of the Annex I countries are significantly far from meeting their agreed-upon targets but also, in 2019, several countries actually have emissions higher than their base year emissions (see Table 8). The Annex I countries like Iceland, New Zealand, and Australia recorded an increase in their emissions by 28, 26, and 12 per cent, respectively. Further, some countries did achieve a reduction but are still far away from meeting their

26. The linear approach directly compares the country's per cent emissions change in 2019 against their respective base year levels to determine whether they have met their minimum targets or not. On the other hand, the budgetary approach involves comparing the emission allowance assigned to each of the country based on their unconditional pledges against their cumulative emissions between 2012 and 2020.

Cancun pledges such as Kazakhstan, Monaco, Norway, and the United States. But countries such as Ukraine, the Russian Federation, Japan, the EU, Croatia, and Belarus appear to be on track to achieve their Cancun pledges.

8.3 Performance ranking of developed countries in the pre-2020 phase

In order to evaluate how developed countries have performed individually, they were analysed on eight indicators that capture their mitigation (action) performance as well as their seriousness (sincerity) towards climate action. Each indicator has multiple options, and a scoring system similar to a Likert scale²⁷ is employed to differentiate a country's performance. The developed countries are analysed across these indicators during the commitment period under the Kyoto Protocol (2008–2012) and the Doha Amendment to the Kyoto Protocol (2013–2020). Our evaluation results in a single meaningful score (a composite score or sum of scores across all the indicators), indicating the pre-2020 performance of the developed country. Ultimately, the countries are ranked based on their estimated overall scores across all the indicators. Details of the indicators, the associated multiple options, and scoring scale are provided in Table 9.



The performance of developed countries are analysed across two categories of indicators during the commitment period under the Kyoto Protocol and the Doha Amendment to the Kyoto Protocol



Image: iStock

27. Likert scale helps to measure opinions, perceptions, and behaviours. It also provides flexibility to have a 5-point or 7-point scoring scale.

Table 9 Indicators: options and scoring scale

Sincerity indicators	Options	Score
1. Country participation in pre-2020 climate agreements	Yes	1
	No	0
2. Presence of Hot air	Yes	0
	No	1
3. Misuse of LULUCF accounting provisions [#]	Yes	0
	No	1
4. Voluntary cancellation of Kyoto units [#]	Cancellation percentage w.r.t initial AAU > 10%	1
	5% < Cancellation percentage w.r.t initial AAU ≤ 10%	0.75
	1% < Cancellation percentage w.r.t initial AAU ≤ 5%	0.5
	0% < Cancellation percentage w.r.t initial AAU ≤ 1%	0.25
	No voluntary cancellation	0
Action indicators	Options	Score
1. Annex A emissions trend	Downwards	1
	Upwards	0
2. Annex A emissions versus business as usual (BAUs)*	80%	1
	80–95%	0.75
	95–105%	0.5
	105–115%	0.25
	115%	0
3. Annex A emissions versus initial assigned amount units (AAUs)*	90%	1
	90–100%	0.75
	100–110%	0.5
	110–125%	0.25
	125%	0
4. Annex A emissions versus holdings ***	≤100%	1
	>100%	0

Source: Authors' formulation

Note:

*Business as usual (BAU) and initial assigned amount units (AAUs) are calculated on the basis of adjusted/preferred base year emissions, eliminating the effect of surplus emission allowance from hot air and LULUCF accounting.

**Holdings are based on the base year emissions decided under the Convention and cancelling surplus emission allowance from hot air and LULUCF accounting provisions are not considered.

[#]Indicators which are not applicable to non-participating countries.

Indicators and assumptions

- For the 2020 emissions, a 4 per cent reduction is considered below 2019 levels.
- To calculate the Annex A emissions trend (upward/downward) in the Doha Amendment, emissions from 2013 till 2019 are considered.

Based on country-wise evaluation, we observe that European countries have performed relatively better than other non-European countries. Sweden leads the pre-2020 climate action ranking, followed by the UK, Belgium, and Denmark, which have scored 88 per cent and above. Seventeen countries out of the 43 developed countries have scored more than 70 per cent, displaying their seriousness towards climate action and ambitious mitigation efforts in particular. These well-performing countries are majorly from the European Union, including Switzerland, Liechtenstein, Monaco, and Norway. Six countries, namely Malta, the Russian Federation, Canada, Belarus, Turkey, and Kazakhstan, are among the least performing countries.

Some countries did quite well on sincerity indicators but not necessarily on the action indicators. The countries with higher sincerity indicator scores than their action indicator ones include Norway, Liechtenstein, Germany, Austria, Ireland, Iceland, Spain, and Switzerland. Similarly, the countries that score high on action indicators compared to their respective sincerity indicator scores include Ukraine, Hungary, Slovenia, Slovakia, Romania, and Bulgaria. To check whether there exists any correlation between the two indicators, the Pearson's correlation coefficient was employed. A coefficient of 0.64 was obtained, suggesting only a moderately strong correlation between the two sets of indicators.



From the country-wise performance ranking, we observe that the European countries have performed relatively better than other non-European countries

Table 10 Performance ranking of developed countries in the pre-2020 phase

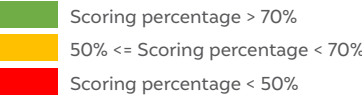
Rank	Country	SINCERITY INDICATORS								ACTION INDICATORS								SCORING		
		Country's participation in climate agreement		Presence of Hot air		Misuse of LULUCF accounting provisions		Voluntary cancellation of Kyoto Units		Country's participation in climate agreement		Presence of Hot air		Misuse of LULUCF accounting provisions		Voluntary cancellation of Kyoto Units				
		KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	Actual Score	Max	Percentage
1	Sweden ^{de}	Yes	Yes	No	No	No	No	21%	2%	Downward	Downward	85%	73%	81%	66%	100%	65%	16	15.25	95%
2	UK ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	77%	61%	88%	96%	89%	98%	16	14.25	89%
3	Belgium ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	86%	79%	93%	82%	97%	82%	16	14	88%
3	Denmark ^{de}	Yes	Yes	No	No	No	No	1%	0%	Downward	Downward	85%	68%	108%	83%	100%	83%	16	14	88%
4	Finland ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	95%	79%	95%	79%	93%	78%	16	13.75	86%
4	France ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	90%	83%	90%	86%	93%	86%	16	13.75	86%
4	Netherlands ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	94%	83%	100%	89%	97%	89%	16	13.75	86%
5	Switzerland ^{de}	Yes	Yes	No	No	No	No	7%	4%	Downward	Downward	99%	89%	108%	106%	97%	82%	16	13.5	84%
6	Greece ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	110%	87%	88%	82%	93%	82%	16	13.25	83%
6	Italy ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	96%	82%	103%	88%	100%	88%	16	13.25	83%
7	Liechtenstein	Yes	Yes	No	No	No	No	20%	0%	Downward	Downward	102%	84%	111%	100%	96%	83%	16	13	81%
8	Germany ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	76%	70%	97%	103%	95%	103%	16	12.75	80%
9	Spain ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	124%	115%	108%	84%	98%	84%	16	12.25	77%
10	Austria ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Upward	105%	100%	121%	86%	99%	86%	16	11.75	73%
10	Norway	Yes	Yes	No	No	No	No	15%	0%	Downward	Downward	108%	101%	106%	120%	94%	111%	16	11.75	73%
11	Monaco	Yes	Yes	No	No	No	No	0%	0%	Downward	Downward	88%	86%	95%	110%	95%	102%	16	11.5	72%
11	Luxembourg ^{de}	Yes	Yes	No	No	No	Yes	0%	0%	Downward	Downward	91%	82%	127%	90%	99%	87%	16	11.5	72%
12	Hungary ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	79%	81%	84%	108%	66%	75%	16	10.75	67%
12	Romania ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	71%	64%	77%	123%	52%	71%	16	10.75	67%
12	Czechia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Downward	85%	82%	92%	117%	93%	90%	16	10.75	67%
13	Slovenia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Downward	101%	87%	110%	91%	99%	89%	16	10.5	66%
13	Slovakia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	84%	75%	92%	93%	89%	68%	16	10.5	66%
13	Portugal ^{de}	Yes	Yes	No	No	No	Yes	0%	0%	Downward	Upward	120%	104%	95%	79%	89%	76%	16	10.5	66%
14	Ukraine ^{bc}	Yes	No	Yes	Yes	No	NA	0%	NA	Downward	Downward	89%	69%	89%	91%	50%	NA	13	8.5	65%
15	Ireland ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Upward	111%	107%	98%	102%	96%	102%	16	10	63%
15	Bulgaria ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	76%	81%	83%	137%	55%	85%	16	10	63%
16	Japan ^b	Yes	No	No	No	No	NA	0%	NA	Upward	Downward	101%	99%	108%	121%	97%	NA	13	8	62%
17	Estonia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Upward	Downward	83%	92%	90%	189%	81%	97%	16	9.5	59%
18	Lithuania ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	97%	88%	105%	155%	60%	74%	16	9.25	58%
18	Croatia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Downward	120%	99%	127%	98%	94%	76%	16	9.25	58%
19	Latvia ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Downward	Upward	95%	88%	103%	157%	67%	73%	16	8.75	55%

Rank	Country	SINCERITY INDICATORS								ACTION INDICATORS								SCORING		
		Country's participation in climate agreement		Presence of Hot air		Misuse of LULUCF accounting provisions		Voluntary cancellation of Kyoto Units		Country's participation in climate agreement		Presence of Hot air		Misuse of LULUCF accounting provisions		Voluntary cancellation of Kyoto Units				
		KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	KP	DA	Actual Score	Max	Percentage
20	Cyprus ^{ae}	No	Yes	No	No	NA	No	NA	0%	Downward	Upward	167%	152%	176%	85%	NA	85%	13	7	54%
21	USA ^{ab}	No	No	No	No	NA	NA	NA	NA	Downward	Downward	105%	103%	111%	126%	NA	NA	10	5.25	53%
22	New Zealand ^b	Yes	No	No	No	No	NA	3%	NA	Downward	Upward	120%	122%	120%	149%	93%	NA	13	6.75	52%
23	Poland ^{cde}	Yes	Yes	Yes	Yes	No	No	0%	0%	Upward	Upward	90%	88%	96%	136%	80%	105%	16	7.75	48%
24	Australia	Yes	Yes	No	No	Yes	Yes	0%	0%	Upward	Upward	118%	120%	109%	121%	95%	95%	16	7.25	45%
24	Iceland ^{de}	Yes	Yes	No	No	No	No	0%	0%	Downward	Upward	139%	130%	126%	117%	116%	117%	16	7.25	45%
25	Malta ^{ae}	No	Yes	No	No	NA	No	NA	0%	Upward	Downward	118%	116%	125%	106%	NA	106%	13	5.75	44%
26	Russian Federation ^{bc}	Yes	No	Yes	Yes	No	NA	0%	NA	Upward	Upward	109%	91%	109%	111%	66%	NA	13	4.75	37%
27	Canada ^{ab}	No	No	No	No	NA	NA	NA	NA	Downward	Upward	119%	117%	126%	143%	NA	NA	10	3	30%
27	Belarus ^{abc}	No	No	Yes	Yes	NA	NA	NA	NA	Downward	Downward	114%	103%	124%	126%	NA	NA	10	3	30%
28	Turkey ^{ab}	No	No	No	No	NA	NA	NA	NA	Upward	Upward	183%	235%	193%	287%	NA	NA	10	2	20%
29	Kazakhstan ^{abc}	No	No	Yes	Yes	NA	NA	NA	NA	Upward	Upward	148%	174%	156%	194%	NA	NA	10	0	0%

KP: KYOTO PROTOCOL DA: DOHA AMENDMENT

Source: Authors’ analysis

Note:
a Countries that did not participate in the Kyoto Protocol,
b Countries that did not participate in the Doha Amendment,
c Economies in transition countries,
d Part of European Union in the Kyoto Protocol,
e Part of European Union in the Doha Amendment





Accounting provisions related to the inclusion of deforestation emissions or flexibility towards the selection of base year provide a leeway to budget more emission allowances and conceal the real picture.

Image: iStock

9. Conclusion

A comprehensive review of the pre-2020 climate regime reveals that the efforts of developed countries to reduce emissions were limited. Major emitters did not participate in the legally binding agreements, and the overachievement of participating countries was negated by the unearned emission allowances generated due to ‘hot air’ for the EIT countries. The non-EIT countries witnessed an emission reduction of only about 3.7 per cent by 2019 below the 1990 levels and are set to use around 17.6 GtCO₂eq of additional carbon space than their estimated emission allowance for the pre-2020 period. Further, the unearned emission allowance from hot air (of the EIT countries) and inclusion of deforestation emissions in the base year emissions would increase this additional usage of carbon space by 7.5 GtCO₂eq. Hence, in real terms, collectively, developed countries have used an additional carbon space of about 25.1 GtCO₂eq than their estimated emission allowances for the pre-2020 period. This is about close to 34 GtCO₂eq (74 per cent), which is the estimated emissions gap in 2030 based on current policies for achieving the 1.5°C goal (UNEP,2020).

It is clear the mitigation efforts of some of the developed countries in the pre-2020 period were unsatisfactory as they had used additional emission allowance against what was assigned to them. Also, some developed countries took advantage of the existing loopholes in the accounting mechanism to gain unearned emission allowances to achieve compliance, while other countries like Canada and Japan withdrew from the agreement to avoid non-compliance and emit freely without any legal constraints. As these unaddressed issues exist in the pre-2020 period, it becomes difficult to trust the commitments made by developed countries for the post-2020 period. Also, developing countries have reasonable concerns that these gaps from the pre-2020 period would be passed on to them as an additional burden in the future. Hence, it is important to address such gaps in efforts in future negotiations and also strengthen the accounting and compliance mechanisms as the world moves ahead under the Paris Agreement.

Utilising the unsold CERs

One way to minimise the pre-2020 gaps is to utilise the unsold CERs from the CDM. Currently, there are ongoing discussions for transferring these CERs under the Paris Agreement. This can possibly result in an increase in the availability of cheaper emission allowances and reduction in the overall mitigation efforts of countries in the post-2020 period. A better option is the non-participating countries from the pre-2020 period exploring the possibility of purchasing these unsold CERs, thereby increasing their emission allowances. This would help



It is important to address the pre-2020 gaps in future negotiations and strengthen the accounting and compliance mechanisms of the post-2020 climate regime

20. The use of the Kyoto mechanisms in the second commitment period has not been confirmed yet.

in reducing their pre-2020 gaps and achievement of compliance with the overall objectives of the Kyoto Protocol and the Doha Amendment. This also has the potential to address various interdependent issues, as it can boost the demand for CERs, which in turn could restore the faith of private investors who have invested in CDM projects. Ultimately, the question of the transition of CERs from the Kyoto Protocol to the Paris Agreement would not occur, leading to an overall enhancement of ambition in the post-2020 period. Moreover, all developed countries, especially the EIT countries, should also consider voluntary cancellation of surplus emission allowance after complying with their target.

Revisiting post-2020 commitments

The pre-2020 gap (25.1 GtCO₂eq) is quite significant and needs to be addressed in order to limit the temperature rise to 1.5°C above the pre-industrial levels by 2100. Hence, it is important that the global stocktaking process under the Paris Agreement considers the emission gaps by developed countries in the pre-2020 regime. Deliberations have to specifically address these gaps, for example, the distribution of emission over the targets among developed countries and especially the non-participating countries should consider revising or enhancing their future targets.

Strengthening transparency: accounting and compliance mechanisms

It is important to acknowledge the existing gaps and loopholes in the accounting mechanism. An easy exit from the climate agreement, with no punitive measures in place, not only leads to more emissions from a country but also undermines the trust in the process and discourages other nations from undertaking ambitious climate actions. Accounting provisions related to the inclusion of deforestation emissions or flexibility towards the selection of base year provide a leeway to budget more emission allowances and conceal the real picture. Hence, it is important that enhanced transparency is brought into the process to address these issues and steps taken to show the actual progress made by developed countries. This can be done when the accounting provisions are not curtailed according to the convenience of the participating countries but to reflect environmental integrity.

References

- Averchenkova, A., and D. Zenghelis. 2018. Pre-2020 Ambition on Climate Change—History, Status, Outlook. Policy Brief, London: European Capacity Building Initiative, 28. Accessed January 2021. https://ecbi.org/sites/default/files/Pre-2020%20Ambition_o.pdf
- BBC. 2005. “Kyoto Protocol Comes into Force.” BBC, February 16. Accessed March 1, 2021. <http://news.bbc.co.uk/2/hi/science/nature/4267245.stm>
- BBC. 2011. “Canada to Withdraw from Kyoto Protocol.” BBC, December 13. Accessed February 12, 2021. <https://www.bbc.com/news/world-us-canada-16151310>
- Black, R, K. Cullen, B. Fay, T. Hale, J. Lang, S. Mahmood, and S. M. Smith. 2021. Taking Stock: A Global Assessment of Net Zero Targets. Report, Energy and Climate Intelligence Unit and Oxford Net Zero, Oxford: Energy and Climate Intelligence Unit and Oxford Net Zero, 30. <https://eciu.net/analysis/reports/2021/taking-stock-assessment-net-zero-targets>
- Climate Action Tracker. 2009. Rating System. <https://climateactiontracker.org/countries/rating-system/>.
- Department of Climate Change, Nigeria. 2020. “Nigeria Became the 144th Country to Ratify the Doha Amendment.” October 2. Accessed March 13, 2021. <https://climatechange.gov.ng/2020/10/02/nigeria-became-the-144th-country-to-ratify-the-doha-amendment/>
- Dufasne, Gilles. 2019. Empty Targets? How to Avoid Trading of Hot Air under the Paris Agreement. Policy Brief. Brussels: Carbon Market Watch, 8. Accessed January 2021. <https://carbonmarketwatch.org/wp-content/uploads/2019/12/EMPTY-TARGETS-HOW-TO-AVOID-TRADING-OF-HOT-AIR-UNDER-THE-PARIS-AGREEMENT-2.pdf>
- European Commission. 2016a. Effort Sharing: Member States’ Emission Targets. November 23. Accessed December 1, 2020. https://ec.europa.eu/clima/policies/effort_en
- European Commission. 2016b. Effort Sharing 2021–2030: Targets and Flexibilities. November 23. Accessed March 24, 2021. https://ec.europa.eu/clima/policies/effort/regulation_en
- Friedlingstein, P., R. Houghton, G. Marland, et al. 2010. “Update on CO₂ Emissions.” *Nature Geoscience* 811–812.
- IEA. 2021. Global Energy Review: CO₂ Emissions in 2020. Report. Paris: IEA. Accessed March 2021. <https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020>
- IISD. 2009. Summary Report, 7–19 December 2009, Copenhagen Climate Change Conference—December 2009. December. Accessed March 30, 2021. <https://enb.iisd.org/events/copenhagen-climate-change-conference-december-2009/summary-report-7-19-december-2009>
- IPCC. 2018. IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways. Report. Geneva: IPCC, 630. <https://www.ipcc.ch/sr15/download/>
- Januta, Andrea. 2021. “Economists Support ‘Immediate and Drastic Action’ against Climate Change.” April 1. Accessed May 1, 2021. <https://www.weforum.org/agenda/2021/04/economists-global-action-climate-change-natural-disasters/>

- Kollmus, Anja. 2013. Doha Decisions on the Kyoto Surplus Explained. Policy Brief. Brussels: Carbon Market Watch, 15. Accessed 2020 November. https://carbonmarketwatch.org/wp-content/uploads/2013/03/CarbonMarketWatch-CO18-Surplus_decisions_explained_4March20131.pdf
- Krug, Joachim. 2018. "Accounting of GHG Emissions and Removals from Forest Management: A Long Road from Kyoto to Paris." *Carbon Balance and Management* (13): 11. doi:<https://doi.org/10.1186/s13021-017-0089-6>
- Macintosh, Andrew. 2011. LULUCF Offsets and Australia's 2020 Abatement Task. Centre for Law and Policy, Canberra: Baker and McKenzie, 34. Accessed January 2021. https://law.anu.edu.au/sites/all/files/coast/lulucfoffsets_17_feb_2011.pdf
- Ministry for the Environment, New Zealand. 2015. Report upon Expiration of the Additional Period for Fulfilling Commitments by New Zealand. True-up report, Wellington: Ministry for the Environment, New Zealand, 3. <https://environment.govt.nz/publications/report-upon-expiration-of-the-additional-period-for-fulfilling-commitments-by-new-zealand/>
- Morel, Romain, and Igor Shislov. 2014. Ex-post Evaluation of the Kyoto Protocol: Four Key Lessons for the 2015 Paris Agreement. Report, Paris: Institute for Climate Economics, 37. <https://www.i4ce.org/download/climate-report-n44-ex-post-evaluation-of-the-kyoto-protocol-four-key-lessons-for-the-2015-paris-agreement-2/>
- New Zealand Parliament. 2015. National Interest Analysis—Doha Amendment to the Kyoto Protocol. Report, Wellington: New Zealand Parliament, 8. https://www.parliament.nz/resource/en-nz/ooDBSCH_ITR_66164_1/94oce51dd897cfboba6c2492218eea49e09fcbbd
- NRDC. 2010. "How Are the Cancun Agreements Different than the Copenhagen Accord: Q&A." December. Accessed March 30, 2021. <https://www.nrdc.org/experts/jake-schmidt/how-are-cancun-agreements-different-copenhagen-accord-qa>
- Rosen, Amanda M. 2015. "The Wrong Solution at the Right Time: The Failure of the Kyoto Protocol on Climate Change." *Politics & Policy* 43 (1): 30–58. doi:10.1111/polp.12105.
- Streck, Charlotte. 2020. "The Mirage of Madrid: Elusive Ambition on the Horizon." *Climate Policy* 143–148. doi:10.1080/14693062.2020.1726564.
- The Guardian. 2011. "Canada Pulls Out of Kyoto Protocol." December 13. Accessed March 11, 2021. <https://www.theguardian.com/environment/2011/dec/13/canada-pulls-out-kyoto-protocol>
- UNEP. 2020. Emissions Gap Report 2020. Report, Nairobi: United Nations Environment Programme, 128. Accessed December 2020. <https://www.unep.org/emissions-gap-report-2020>
- UNEP. 2021. UNEP DTU CDM/JI Pipeline Analysis and Database. Accessed March 31, 2021. <http://cdmpipeline.org/index.htm>
- UNFCCC. 2000. Review of the Implementation of Commitments. Reporting Guidelines. Bonn: UNFCCC, 122. <https://unfccc.int/resource/docs/cop5/07.pdf>
- UNFCCC. 2001. Decisions—Marrakech Climate Change Conference—October 2001. Accessed March 1, 2021. <https://unfccc.int/process-and-meetings/conferences/past-conferences/marrakech-climate-change-conference-october-2001/decisions-marrakech-climate-change-conference-october-2001>
- UNFCCC. 2008. "On Accounting of Emissions and Assigned Amount." Kyoto Protocol Reference Manual. Bonn: UNFCCC, 130. November. Accessed May 24, 2021. https://unfccc.int/sites/default/files/o8_unfccc_kp_ref_manual.pdf
- UNFCCC. 2012a. What is the Kyoto Protocol? December 21. Accessed January 1, 2021. https://unfccc.int/kyoto_protocol

- UNFCCC. 2012b. What Is the United Nations Framework Convention on Climate Change? Bonn: UNFCCC. Accessed January 2021. <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>
- UNFCCC. 2018. Support Material for Non-LULUCF Experts—Accounting of Activities under Article 3, Paragraphs 3 and 4, of the Kyoto Protocol in the Second Commitment Period. Bonn: UNFCCC, 25. Accessed January 2020. https://unfccc.int/sites/default/files/resource/Supportive%20material_ver.2_final%20201807_posted.pdf
- UNFCCC. 2020. Compilation and Synthesis of Fourth Biennial Reports of Parties Included in Annex I to the Convention. Report. Bonn: UNFCCC, 22. <https://unfccc.int/documents/266353>
- Vidal, John. 2010. Cancún Climate Change Summit: Japan Accused of Threatening Kyoto Protocol. December 2. Accessed March 1, 2021. <https://www.theguardian.com/environment/2010/dec/02/japan-stance-kyoto-protocol>
- WMO. 2021. “2020 Was One of Three Warmest Years on Record.” January 15. <https://public.wmo.int/en/media/press-release/2020-was-one-of-three-warmest-years-record>
- WMO. 2021. State of the Global Climate 2020. Climate Report, Geneva: WMO, 56. <https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate>
- World Bank. 2020. The Global Economic Outlook during the COVID-19 Pandemic: A Changed World. June 8. <https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world>
- World Meteorological Organization. 2020. United in Science 2020 A Multi-Organization High-Level Compilation of the Latest. Geneva: World Meteorological Organization, 28. Accessed November 2020. https://public.wmo.int/en/resources/united_in_science

Annexure I Stakeholder consultation

Snapshot of stakeholder consultation on unpacking the pre-2020 climate actions



The Council on Energy, Environment and Water (CEEW), with support from Shakti Sustainable Energy Foundation (SSEF), organised a stakeholder consultation on 25 March 2021. This was a closed-door virtual consultation organised to solicit a critical feedback on pre-2020 research from the experts. During the meeting, The Council presented the research methodology and key findings on pre-2020 climate actions. Inputs were received from the stakeholders on the overall approach, assumptions, and results related to the emission scenario and inflated base year. Experts also deliberated on strengthening accountability in the Paris Agreement and on approaches to bridge the gaps in pre-2020 climate regime. The recommendations from the experts have helped in strengthening the research outcomes. The following experts participated in the discussion:

1. Aarti Gupta, Wageningen University
2. K. S. Aishwarya, Shakti Sustainable Foundation
3. Chisa Umemiya, IGES
4. Damandeep Singh, CDP
5. Davor Vesligaj, UNFCCC
6. Jihye Choi, UNFCCC
7. Joydeep Gupta, India Climate Dialogue
8. Nandakumar Janardhanan, IGES
9. Nidhi Madan, Shakti Sustainable Foundation
10. Shikha Bhasin, CEEW
11. Shubhashis Dey, Shakti Sustainable Foundation
12. Spandan Pandey, CEEW
13. Subrata Chakrabarty, WRI
14. Sumit Prasad, CEEW

Annexure II EU emission allowance distribution in the Doha Amendment

Individual target and emission allowance of EU countries in Doha Amendment (units in MtCO₂eq)

	Countries	EU-ETS allowance = Free Allocation + Auction	EU-ETS distribution (%)	Estimated EU-ETS distribution	Effort-sharing decision (ESD)	Total AAU = EU-ETS + ESD	CP2 (BAU)	CP2 Target
1	Austria	240.7	2.1%	327	405.7	733	631	116%
2	Belgium	414.1	3.6%	562	584.2	1147	1,182	97%
3	Bulgaria	235.4	2.0%	320	222.9	543	913	59%
4	Croatia	64.9	0.6%	88	162.3	250	250	100%
5	Cyprus	24.1	0.2%	33	47.5	80	45	178%
6	Czechia	441.1	3.8%	599	520.5	1119	1,587	71%
7	Denmark	143.3	1.2%	195	269.4	464	566	82%
8	Estonia	76.7	0.7%	104	51.1	155	320	48%
9	Finland	243.6	2.1%	331	240.5	571	571	100%
10	France	894.8	7.7%	1215	3014.7	4230	4,384	96%
11	Germany	2352.5	20.2%	3194	3592.7	6787	10,029	68%
12	Greece	311.2	2.7%	423	480.8	903	861	105%
13	Hungary	165.7	1.4%	225	434.5	659	877	75%
14	Iceland	12.5	0.1%	17	15.3	32	29	111%
15	Ireland	93.2	0.8%	127	343.5	470	451	104%
16	Italy	1111.2	9.5%	1509	2410.3	3919	4,175	94%
17	Latvia	30.7	0.3%	42	76.6	118	211	56%
18	Lithuania	76.9	0.7%	104	113.6	218	386	57%
19	Luxembourg	16.9	0.1%	23	72.5	95	105	91%
20	Malta	5.9	0.1%	8	9.3	17	16	109%
21	Netherlands	549.8	4.7%	746	924.8	1671	1,792	93%
22	Poland	1055.9	9.1%	1434	1583.9	3018	4,640	65%
23	Portugal	190.1	1.6%	258	429.6	688	520	132%
24	Romania	450.8	3.9%	612	656.1	1268	2,439	52%
25	Slovakia	204.6	1.8%	278	202.3	480	594	81%
26	Slovenia	40.9	0.4%	56	99.4	155	163	95%
27	Spain	969.1	8.3%	1316	1766.9	3083	2,267	136%
28	Sweden	241.3	2.1%	328	315.6	643	576	112%
29	UK	988.7	8.5%	1342	2744.9	4087	6,426	64%
	Total	11646.7	100.0%	15813	21,791	37,604	47,006	80%

Source: European Environment Agency (EEA) portal and authors' analysis

Annexure III Net holdings of Kyoto units

Net holding of Kyoto Units (units in 10 ⁶)									
Countries	KYOTO PROTOCOL					DOHA AMENDMENT			
	AAUs	ERUs	RMUs	CERs	Total	AAUs	ERUs	CERs	Total
Australia	2838.8	0.0	0.0	21.8	2860.6	4511.6	0.0	14.9	4526.5
Austria ^{de}	362.5	12.0	6.8	35.7	417.0	732.6	0.0	0.1	732.7
Belarus ^{abc}	633.7	0.0	0.0	0.0	633.7	875.5	0.0	0.0	875.5
Belgium ^{de}	592.4	12.7	0.0	43.0	648.1	1146.5	0.0	1.3	1147.8
Bulgaria ^{cde}	544.8	15.9	3.6	10.7	574.9	542.6	0.0	0.0	542.6
Canada ^{ab}	2791.8	0.0	0.0	0.3	2792.1	4020.4	0.0	0.0	4020.4
Croatia ^{cde}	148.1	0.5	5.1	0.2	153.9	250.3	0.0	0.0	250.3
Cyprus ^{ae}	27.0	0.0	0.0	0.0	27.0	80.1	0.0	0.0	80.1
Czechia ^{cde}	675.1	25.1	6.6	21.7	728.4	1119.5	0.0	0.0	1119.5
Denmark ^{de}	257.4	14.5	8.7	17.0	297.6	464.0	0.0	4.1	468.1
Estonia ^{cde}	110.7	6.4	0.0	0.7	117.7	155.2	0.0	0.0	155.2
Finland ^{de}	318.6	7.0	17.4	19.1	362.1	571.2	0.0	3.2	574.4
France ^{de}	2613.2	24.7	23.6	64.8	2726.4	4229.6	0.0	1.6	4231.2
Germany ^{de}	4473.9	194.9	39.7	226.4	4934.9	6786.8	0.0	6.0	6792.8
Greece ^{de}	616.8	14.8	2.1	21.0	654.6	903.4	0.0	0.0	903.4
Hungary ^{cde}	492.0	5.0	7.3	7.8	512.2	659.4	0.0	0.0	659.4
Iceland ^{de}	18.4	0.0	1.5	0.1	20.1	32.2	0.0	0.0	32.2
Ireland ^{de}	288.0	4.4	16.3	13.0	321.7	470.1	0.0	2.2	472.2
Italy ^{de}	2259.3	47.8	75.3	101.2	2483.7	3919.0	0.0	2.9	3921.9
Japan ^b	6155.4	22.4	243.6	145.0	6566.5	8494.3	0.0	3.0	8497.3
Kazakhstan ^{abc}	1908.9	0.0	0.0	0.0	1908.9	2821.8	0.0	0.0	2821.8
Latvia ^{cde}	76.7	0.5	6.2	1.3	84.7	118.3	0.0	0.0	118.3
Liechtenstein	1.0	0.0	0.0	0.2	1.2	1.6	0.0	0.3	1.9
Lithuania ^{cde}	168.9	5.8	5.9	3.6	184.2	218.0	-1.3	0.0	216.6
Luxembourg ^{de}	53.2	0.4	0.4	6.8	60.7	95.4	0.0	1.3	96.7
Malta ^{ae}	12.2	0.0	0.0	0.0	12.2	17.3	0.0	0.0	17.3
Monaco	0.5	0.0	0.0	0.0	0.5	0.6	0.0	0.1	0.7
Netherlands ^{de}	948.2	33.5	0.0	50.2	1031.9	1671.3	0.0	4.8	1676.0
New Zealand ^b	308.1	107.3	80.6	16.3	512.3	431.8	0.0	0.0	431.8
Norway	259.2	8.8	1.8	12.8	282.7	348.9	-5.4	31.6	375.1

Net holding of Kyoto Units (units in 10 ⁶)									
Countries	KYOTO PROTOCOL					DOHA AMENDMENT			
	AAUs	ERUs	RMUs	CERs	Total	AAUs	ERUs	CERs	Total
Poland ^{cde}	2358.7	44.5	27.8	71.8	2502.7	3017.5	0.0	0.0	3017.5
Portugal ^{de}	343.3	5.2	44.8	14.3	407.4	687.7	0.0	0.0	687.7
Romania ^{cde}	1117.4	22.4	18.0	17.3	1175.1	1268.2	0.0	0.0	1268.1
Russian Federation ^{bc}	16329.4	11.8	626.5	0.0	16967.7	24564.9	0.0	0.0	24564.9
Slovakia ^{cde}	238.1	2.3	1.4	14.5	256.3	480.1	0.0	0.0	480.1
Slovenia ^{cde}	86.8	4.7	6.6	1.7	99.8	154.9	0.0	0.0	154.9
Spain ^{de}	1584.4	67.2	52.8	123.9	1828.3	3082.7	0.0	4.4	3087.1
Sweden ^{de}	295.5	2.1	0.0	8.0	305.6	643.2	0.0	10.4	653.6
Switzerland	242.7	0.6	8.3	17.9	269.3	361.8	78.9	28.1	468.8
Turkey ^{ab}	1042.0	0.0	0.0	0.0	1042.0	1363.0	0.0	0.0	1363.0
Ukraine ^{bc}	4000.5	0.5	22.9	0.0	4023.9	5702.8	0.0	0.0	5702.8
UK ^{de}	3169.4	123.0	14.2	99.8	3406.4	4087.4	-75.3	-9.4	4002.6
USA ^{ab}	30575.8	0.0	0.0	0.0	30575.8	41965.3	0.0	0.0	41965.3
Annex I countries	91338.6	848.8	1375.6	1209.9	94772.9	133068.7	-3.0	110.7	133176.3
Participating countries	54347.2	848.8	1375.6	1209.5	57781.1	42828.9	-3.0	107.7	42933.6
Non-participating countries	36991.4	0.0	0.0	0.3	36991.7	90239.8	0.0	3.0	90242.7
Non-EIT countries	62448.9	703.4	637.8	1058.6	64848.7	91119.7	-1.7	110.7	91228.7
EIT	28889.8	145.4	737.8	151.3	29924.2	41949.0	-1.3	-0.1	41947.6
EU countries	24211.7	697.3	391.9	995.5	26296.5	37604.4	-76.6	32.7	37560.5

Source: Authors' analysis

Note:

- a* Countries that did not participate in the Kyoto Protocol,
b Countries that did not participate in the Doha Amendment,
c Economies in transition countries,
d Part of European Union in the Kyoto Protocol,
e Part of European Union in the Doha Amendment



The strengthening of the accounting and compliance mechanisms is crucial for the success of the post-2020 period.

SYSTEM
CHANGE



NOT
CLIMATE
CHANGE



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