CLIMATE CHANGE
58/2021

Final report

Offset approaches in existing compliance mechanisms – Adding value and upholding environmental integrity?

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publisher:

German Environment Agency

German Environment Agency

Umwelt Bundesamt

CLIMATE CHANGE 58/2021

Ressortforschungsplan of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

Project No. (FKZ) 3719 42 507 0

Report No. (UBA-FB) FB000681/ENG

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On behalf of the German Environment Agency

Imprint

Publisher
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Report completed in:
August 2021

Edited by:
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Publication as pdf:
http://www.umweltbundesamt.de/publikationen

ISSN 1862-4359

Dessau-Roßlau, May 2022

Abstract: Offset approaches in existing compliance mechanisms – Adding value and upholding environmental integrity?

The objective of this report is to use historical analysis to identify conditions that determine when offsets add value to compliance schemes while upholding environmental integrity. The indicators of success include: increased acceptance of introducing compliance schemes; raising ambition in subsequent compliance periods; the possibility to drive emission reductions outside the compliance sectors; promoting investments in sustainable development; and avoiding perverse incentives that undermine the stringency of the compliance scheme or compliance actors' efforts in reducing their own emissions. Through undertaking in-depth case study analyzes on the effects of offsets in the European Union, Alberta, Australia, Colombia and Japan, the report identifies common conditions that explain why offsets were successful (or not) in achieving individual indicators. The report further identifies two common conditions that can help explain when offsets achieve all five indicators of success. The first is that policymakers need to be willing to design the compliance scheme to set and maintain a strong compliance price signal that justifies the need for incorporating cost containment measures, such as offsets, to avert negative political and economic ramifications. Relatedly, the second condition requires institutions, processes and infrastructure that govern both the compliance scheme and offsets to be well developed so that they can ensure offsets uphold the principles of environmental integrity, achieve sustainable development benefits, and act as a reliable cost containment measure to high compliance prices. The findings also highlight how difficult it is to achieve both conditions, as both domestic and international political economy factors determine whether policymakers and voters are willing to introduce and maintain compliance schemes that deliver effective action on climate.

Kurzbeschreibung: Kompensationsansätze in bestehenden Verpflichtungssystemen – Erzielung eines Mehrwerts unter Wahrung der Umweltintegrität?

Ziel dieses Berichts ist es, anhand einer empirischen Analyse bestehender Verpflichtungssysteme die Bedingungen zu identifizieren, unter denen Offsets in einem Verpflichtungssystem einen Mehrwert erzielen können, ohne dabei die Umweltintegrität zu untergraben. Zu den identifizierten Erfolgsindikatoren gehören: die Erhöhung der Akzeptanz für die Einführung von Verpflichtungssystemen; die Steigerung des Ambitionsniveaus in den nachfolgenden Erfüllungsperioden; die Möglichkeit, Emissionsreduktionen außerhalb der vom Verpflichtungssystem erfassten Sektoren zu erzielen; die Förderung von Investitionen in die nachhaltige Entwicklung sowie die Vermeidung von Fehlanreizen, die die Strenge des Verpflichtungssystems oder die Bemühungen der Akteure zur Reduzierung ihrer eigenen Emissionen untergraben. Durch die Durchführung eingehender Fallanalysen über die Auswirkungen von Offsets in der Europäischen Union, in Alberta, Australien, Kolumbien und Japan identifiziert der Bericht jene Bedingungen, die erklären, warum Offsets bei der Erreichung einzelner Indikatoren erfolgreich waren bzw. warum sie dies nicht waren. Der Bericht identifiziert zudem zwei übergeordnete Bedingungen, die dabei helfen können zu erklären, wann Offsets alle Erfolgsindikatoren erfüllen. Die erste Bedingung ist, dass die politischen Entscheidungsträger*innen bereit sein müssen, das Verpflichtungssystem so zu gestalten, dass ein starkes Preissignal gesetzt und aufrechterhalten wird, welches die Notwendigkeit von Kostendämpfungsmaßnahmen, wie z.B. Offsets, rechtfertigt, um negative politische und wirtschaftliche Auswirkungen abzuwenden. Die zweite damit zusammenhängende Bedingung ist, dass jene Institutionen, Prozesse und die Infrastruktur, die sowohl das Verpflichtungssystem als auch die Offsets regeln, so gut entwickelt sein müssen, dass sichergestellt werden kann, dass die Offsets das Prinzip der Umweltintegrität aufrechterhalten, Beiträge für nachhaltige

Entwicklung erzielen und als verlässliche Kostendämpfungsmaßnahme für hohe Preise in Verpflichtungssystemen dienen. Die Ergebnisse zeigen darüber hinaus, wie schwierig es ist, beide Bedingungen zu erreichen, da sowohl nationale als auch internationale politökonomische Faktoren bestimmen, ob Politiker*innen und Wähler*innen bereit sind, Verpflichtungssysteme einzuführen und aufrechtzuerhalten, die zu effektivem Klimaschutz führen.

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ACFA	Alberta Cattle Feeders Association
ACCUs	Australian Carbon Credit Units
BAU	Business As Usual
CARB	California Air Resource Board
CAPP	Canadian Association of Petroleum Producers
CCEMA	Climate Change and Emissions Management Act
CCIR	Carbon Competitiveness Incentive Regulation
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
COP	Conference of the Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPM	Carbon Pricing Mechanism
CSF	Climate Solutions Fund
DG CLIMA	Directorate General of Climate Action (as part of the European Commission)
DNA	Designated National Authorities
EB	Executive Board
EC	European Commission
EPC	Emission Performance Credit
ERF	Emission Reduction Fund
ERUs	Emission Reduction Units
ETS	Emissions Trading Scheme
EU	European Union
EUAs	European Union Allowances
EU ETS	European Union Emissions Trading System
FARC-EP	The Revolutionary Armed Forces of Colombia
FSB	Facility-Specific Benchmarks
FEPC	Federation of Electric Power Companies
F-gas	Fluorinated greenhouse gas
FCPF	Forestry Carbon Partnership Facility
FVA	Funding Valuation Adjustment
GHG	Greenhouse Gas
HFC	hydrofluorocarbon
HPB	High-Performance Benchmarks
IETA	International Emissions Trading Association
IFAP	International Federation of Agricultural Producers
ISO	International Organisation for Standardisation
ITMOs	Internationally Transferred Mitigation Outcomes
JCM	Joint Crediting Mechanism

ACFA	Alberta Cattle Feeders Association
LDCs	Least developed countries
LPG	liquefied petroleum gas
LULUCF	Land use, land-use change, and forestry
MRV	Measuring, Reporting and Verification
MSR	Market Stability Reserve
NDC	Nationally Determined Contributions
NDP	New Democratic Party
NZ ETS	New Zealand Emissions Trading Scheme
NZUs	New Zealand Units
PFC	perfluorocarbon
PoA	Programme of Activities
RENARE	National Registry of Reduction of Greenhouse Gas Emissions
RGGI	Regional Greenhouse Gas Initiative
SD	Sustainable Development
SDGs	Sustainable Development Goals
SGER	Specified Gas Emitters Regulation Act
tCO_2e	Tonnes of carbon dioxide equivalent
TIER	Technology Innovation and Emissions Reduction
UN	United Nations
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard

Summary

Parties to the Paris Agreement are encouraged to implement stringent climate action in order to avert disastrous climate change. Though the scientific community has provided significant warnings on the short and long-term consequences of climate change, policymakers still find it difficult to introduce and maintain climate policies to meet greenhouse gas (GHG) reduction targets and put a price on carbon. The primary concerns that some influential and vocal firms and voters have about climate policies are the possible negative impacts on the economy, employment, and low-income households.

Aim

This report postulates the need for decisive ambitious climate action. However, it acknowledges that the given political, economic and social realities constitute the framework in which climate policies need to be implemented and maintained. Therefore, in its analysis this report will focus on the perspective of policymakers who need to design climate policies to accommodate the dynamics of the domestic political economy in order for these policies to be implemented, being fully aware that the subsequent policy design will fall short of what is to be aspired as ideal climate action. This report is part of the research project "Analysis of the advantages and disadvantages of offset approaches in selected sectors – FKZ 3719 42 507 0", the final results of which were recorded in three separate reports. This report provides the basis for the conceptual approach developed in the report *Suitability and Success Factors of Offsets post 2020* (Kreibich et al. 2021) and the sectoral analysis whose findings are included in *Potentials for Offset Approaches in Selected Sectors after 2020* (Carvalho et al. 2021). Policymakers are considering different design features that can help overcome the political resistance to introducing and implementing climate policies. Offsets could be an attractive mechanism to incorporate into compliance schemes as it could have the potential to introduce and raise ambition of climate policies by acting as a cost containment option to potentially high compliance costs. Offsets could also provide carbon financing to reduce emissions in sectors, technologies and geographies that are not currently covered under the compliance scheme. This feature can be attractive to policymakers, as offsets can mobilize carbon financing to reduce emission in sectors outside the scope of the compliance scheme that are otherwise difficult to impose climate policies. Furthermore, offsets could promote investments into projects that achieve sustainable development contributions, thereby achieving additional policy goals of policymakers.

Though offsets have the potential to provide such added value to a compliance scheme, the generation and use of offsets could also hinder the steering effect of the compliance scheme to mitigate emissions through creating perverse incentives and undermine the environmental integrity of climate action. Specifically, compliance actors could be disincentivized to reduce their own emissions by either overly relying on offsets to meet compliance; or the increased supply of offsets dilutes the carbon price signal set by compliance schemes such as emissions trading schemes (ETS), which disincentivizes actors from reducing a larger magnitude of emissions with a stronger compliance price signal. Therefore, policymakers need to ensure how to avoid perverse incentives when offsets are incorporated into compliance schemes.

Given these risks and opportunities, it would be important to identify the conditions that determine when offsets can add value to compliance schemes without undermining its environmental integrity. This report undertakes in-depth analysis on the impact of offsets in meeting climate policy goals in the European Union, Alberta, Australia, Colombia and Japan. In synthesizing the findings, it identifies the common conditions that explain whether or not offsets can support the compliance scheme to meet its objective, and the factors that can explain why these conditions emerge.

Results

Based on the synthesis of findings from the case studies, offsets achieved the following goals (referred to as indicators of success in the Report) when the following conditions occurred:

1. Offsets increased the acceptability of introducing the compliance scheme when policymakers were sensitive to the political economy factors that could affect the scheme's acceptance. There are two main political economy factors that influenced policymakers' decisions to incorporate offsets into the compliance scheme. The first were the compliance actors – and broader voter's - concerns that the economic costs of the introducing compliance schemes could penalize the competitiveness of domestic sectors. Therefore, policymakers were willing to incorporate offsets as a cost containment measure. The second reason that offsets were incorporated into compliance schemes was that it created a mechanism to finance emission reductions in the sectors that were chosen to supply offsets, thereby gaining support from sectoral actors who benefited from the scheme, and the broader voting society who supported financing being driven into these sectors.
2. Clearer evidence is needed on whether offsets played a role in raising compliance ambition. In three case studies (Colombia, Japan and Australia) policymakers were not willing to raise ambition of the compliance scheme itself. The European Union's Emissions Trading Scheme (EU ETS) and Albertan case studies suggest that offsets could enable the ambition of the compliance scheme to be increased if policymakers and compliance actors saw offsets as a reliable and necessary cost containment option under the more ambitious scheme. The EU did not need offsets as a cost containment measure to raise its ambition, and therefore restricted its use in the third compliance period and did a complete phase out in the fourth compliance period. In contrast, the Albertan government expanded use of flexible mechanisms (including offsets) when the carbon price was forced to increase.
3. Offsets provided policymakers with flexible options to achieve emission reductions when policymakers were interested in achieving emission reductions in sectors and technologies that were within or outside the scope of the compliance scheme, that could also align with meeting broader political or societal goals.
4. Offsets promoted investment in sustainable development when offsets with high sustainable development benefits were cost competitive to other compliance measures; and when certifying standards required the measurement of Sustainable Development Goals (SDGs) as part of the certification process.
5. Offsets avoided perverse incentives to have compliance actors reduce their own emissions when compliance schemes themselves set and maintained a strong price signal, including restricting the use of offsets to quantitative limits and high-quality criteria (including promoting sustainable development).

Though none of the compliance schemes looked at in the case studies met all five indicators of success, the analysis identifies two main conditions that have to be met in order to achieve all five indicators. **First, the compliance scheme has to set and maintain a strong compliance price signal that justifies the need for incorporating cost containment measures, such as offsets.** The strong compliance price signal therefore can incentivize compliance actors to achieve short and long-term cost savings by reducing their own emissions and buy offset credits. Therefore, compliance schemes that allow for offsets to be used but can set and maintain a strong compliance price signal can drive achieving emission reductions within and outside the scope of the compliance scheme. **Second, the institutions, processes and infrastructure that govern both the compliance scheme and offsets needs to be well established in order to ensure offsets uphold the principles of environmental integrity, achieve sustainable development co-benefits and act as a reliable cost containment measure to high**

compliance prices. The analysis suggests that if both of these conditions are met, offsets can add value and uphold the environmental integrity of compliance schemes. The findings also highlight how difficult it is to achieve both conditions, as both domestic and international political economy factors determine whether policymakers and voters are willing to introduce and maintain compliance schemes that deliver strong action on climate.

Zusammenfassung

Die Vertragsstaaten des Übereinkommens von Paris sind aufgefordert, ambitionierte Klimaschutzmaßnahmen umzusetzen, um den fortschreitenden Klimawandel abzuwenden. Obwohl die Wissenschaft deutliche Warnungen zu den kurz- und langfristigen Folgen des Klimawandels ausgesprochen hat, fällt es den politischen Entscheidungsträgern*innen noch immer schwer, Klimapolitiken einzuführen und aufrechtzuerhalten, um die Ziele zur Reduzierung von Treibhausgasen (THG) zu erreichen und einen Preis für Kohlenstoff festzulegen. Die Hauptbedenken, die einige einflussreiche Unternehmen und auch Wähler gegenüber der Klimapolitik äußern, sind die negativen Auswirkungen, die diese Maßnahmen auf die Wirtschaft, die Beschäftigung und die Haushalte mit niedrigem Einkommen haben könnten.

Ziel

Dieser Bericht postuliert die Notwendigkeit entschlossener, ambitionierter Klimaschutzmaßnahmen. Er erkennt zugleich jedoch an, dass die gegebenen politischen, wirtschaftlichen und sozialen Realitäten den Rahmen bilden, in dem Klimapolitik umgesetzt und aufrechterhalten werden muss. Daher konzentriert sich dieser Bericht in seiner Analyse auf die Perspektive der politischen Entscheidungsträger*innen, die die Klimapolitik derart gestalten müssen, dass sie den Dynamiken der heimischen politischen Ökonomie gerecht wird, damit diese Politik auch umgesetzt werden kann. Dabei wird anerkannt, dass die Ausgestaltung der Politik hinter dem zurückbleibt, was als ideales klimapolitisches Handeln angestrebt werden sollte. Dieser Bericht ist Teil des Forschungsprojekts "Analyse der Vor- und Nachteile von Offset-Ansätzen in ausgewählten Sektoren - FKZ 3719 42 507 0", dessen Endergebnisse in drei separaten Berichten festgehalten wurden. Der Bericht liefert die Grundlagen für den konzeptionellen Ansatz, der in der parallelen Veröffentlichung mit dem Titel *Suitability and Success Factors of Offsets post 2020* (Kreibich et al. 2021) festgehalten ist, sowie für sektorspezifischen analysen, deren Ergebnisse in dem Bericht *Potentials for Offset Approaches in Selected Sectors after 2020* (Carvalho et al. 2021) zusammengetragen sind.

Politische Entscheidungsträger*innen ziehen verschiedene Ausgestaltungsmerkmale in Betracht, die dabei helfen können, den politischen Widerstand gegen die Einführung und die Umsetzung von Klimapolitiken zu überwinden. Offsets können einen attraktiven Mechanismus darstellen, wenn sie die Einführung von Klimapolitiken unterstützen und die Steigerung ihrer Ambition ermöglichen, indem sie als Kostendämpfungsoption für potenziell hohe Erfüllungskosten dienen. Offsets könnten auch die Finanzierung von Emissionsreduktionen in Sektoren, Technologien und Regionen ermöglichen, die derzeit nicht unter das Verpflichtungssystem fallen. Diese Eigenschaft kann für politische Entscheidungsträger*innen attraktiv sein, da Offsets Kohlenstofffinanzierung mobilisieren können, um Emissionen in Sektoren außerhalb des Geltungsbereichs des Verpflichtungssystems zu reduzieren, in denen es ansonsten schwierig ist, klimapolitische Maßnahmen zur Emissionsreduzierung durchzusetzen. Darüber hinaus könnten Offsets Investitionen in Projekte fördern, die Beiträge für eine nachhaltige Entwicklung erzielen und damit zusätzliche politische Ziele der Entscheidungsträger*innen erreichen.

Obwohl Offsets das Potenzial haben, einen solchen Mehrwert für ein Verpflichtungssystem zu bieten, könnte die Erzeugung und Verwendung von Offsets auch die Lenkungswirkung des Verpflichtungssystems behindern, indem sie kontraproduktive Anreize schaffen und die ökologische Integrität untergraben. Insbesondere könnten die Akteure*Akteurinnen davon abgehalten werden, ihre eigenen Emissionen zu reduzieren, indem sie sich bei der Erfüllung ihrer Verpflichtungen zu sehr auf Offsets verlassen. Das erhöhte Angebot an Offsets könnte auch das Kohlenstoffpreissignal untergraben, das durch Verpflichtungssysteme wie

Emissionshandelssysteme (ETS) gesetzt wird. Dies könnte verpflichtete Unternehmen davon abhalten, eine größere Menge an Emissionen zu reduzieren. Daher müssen die politischen Entscheidungsträger*innen sicherstellen, dass kontraproduktive Anreize vermieden werden können, wenn Offsets in Verpflichtungssysteme integriert werden.

Angesichts dieser Risiken und Chancen ist es wichtig, die Bedingungen zu identifizieren, die bestimmen, wann Offsets einen Mehrwert für Verpflichtungssysteme schaffen können, ohne deren Umweltintegrität zu untergraben. In diesem Bericht werden die Auswirkungen von Offsets auf die Erreichung klimapolitischer Ziele in der Europäischen Union, Alberta, Australien, Kolumbien und Japan eingehend analysiert. Bei der Synthese der Ergebnisse werden die gemeinsamen Bedingungen identifiziert, die erklären, ob Offsets das Erreichen der Ziele eines Verpflichtungssystems unterstützen können oder nicht, sowie die Faktoren, die erklären können, warum diese Bedingungen auftreten.

Ergebnisse

Basierend auf der Synthese der Ergebnisse aus den Fallstudien, erreichten Offsets die folgenden Ziele (im Bericht als Erfolgsindikatoren bezeichnet), wenn die folgenden Bedingungen eintraten:

1. Offsets haben geholfen die Akzeptanz eines Compliance-Systems zu steigern, wenn politische Entscheidungsträger sensibel über die politökonomischen Folgen der Einführung eines solchen Systems sein mussten. Es gibt zwei wesentliche politökonomische Faktoren, die die Entscheidung der politischen Entscheidungsträger für die Einbeziehung von Offsets in das Compliance-System beeinflusst haben: Der erste Faktor bezieht sich auf die Sorge der regulierten Unternehmen - und ebenfalls der Wähler im Allgemeinen -, dass die wirtschaftlichen Kosten der Einführung eines Compliance-Systems die Wettbewerbsfähigkeit der heimischen Sektoren beeinträchtigen könnten. Aufgrund dessen, waren die politischen Entscheidungsträger bereit, Kompensationen als Kostendämpfungsmaßnahme einzuführen. Der zweite Grund für die Einbeziehung von Offsets in das Compliance-System war die Schaffung eines Mechanismus zur Finanzierung von Emissionsreduzierungen in ausgewählten Sektoren, die für die Bereitstellung von Kompensationen ernannt wurden. Somit konnte die Unterstützung dieser Sektoren, und ebenfalls die Gunst der Wählerschaft eingeholt werden.
2. Es sind eindeutigere Belege erforderlich, um die Frage zu beantworten, ob Offsets eine Rolle bei der Anhebung des Ambitionsniveaus von Verpflichtungssystemen spielen. In drei Fallstudien (Kolumbien, Japan und Australien) waren die politischen Entscheidungsträger*innen nicht bereit, das Ambitionsniveau des Verpflichtungssystems zu erhöhen. Das Emissionshandelssystem der Europäischen Union (EU ETS) und die Fallstudie aus Alberta deuten darauf hin, dass Offsets es ermöglichen könnten, die Ambition des Verpflichtungssystems zu erhöhen, wenn die politischen Entscheidungsträger*innen und die betroffenen Unternehmen Offsets als eine verlässliche und notwendige Kostendämpfungsoption im Rahmen des ambitionierten Systems ansehen. Die EU benötigte beim Erhöhen ihrer klimabezogenen Ambitionen keine Offsets als Kostendämpfungsmaßnahme, und nutze diese daher lediglich in der dritten Compliance Periode, und stellte letztendlich die Nutzung in der vieren Periode ein. Im Gegensatz dazu hat die Regierung von Alberta die Nutzung flexibler Mechanismen (einschließlich Offsets) ausgeweitet, als der Kohlenstoffpreis erhöht werden musste.
3. Offsets boten den politischen Entscheidungsträgern* Entscheidungsträgerinnen flexible Optionen, um Emissionsreduzierungen zu erreichen, wenn sie daran interessiert waren, Emissionsreduzierungen in Sektoren und Technologien zu erreichen, die innerhalb oder außerhalb des Geltungsbereichs des Verpflichtungssystems lagen, und die auch mit der Erfüllung breiterer politischer oder gesellschaftlicher Ziele in Einklang standen.

4. Die Förderung von Investitionen in nachhaltige Entwicklung konnte dann erreicht werden, wenn Offsets mit hohen Beiträgen zu nachhaltiger Entwicklung im Vergleich zu anderen Erfüllungsmaßnahmen kostenmäßig wettbewerbsfähig waren und die Messung der Beiträge zu den Zielen für nachhaltige Entwicklung (SDGs) durch Zertifizierungsstandards gefordert war.
5. Der kontraproduktive Anreiz, dass vom Verpflichtungssystem betroffene Unternehmen ihre eigenen Emissionen in geringerem Maße reduzieren, kann vermieden werden, indem die Verpflichtungssysteme selbst ein starkes Preissignal setzen und aufrechterhalten sowie die Offset-Nutzung durch quantitative Grenzen und hohe Qualitätskriterien (einschließlich der Förderung einer nachhaltigen Entwicklung) einschränken.

Obwohl keines der in den Fallstudien untersuchten Compliance-Systemen alle fünf Erfolgsindikatoren erfüllte, identifiziert die Analyse zwei Hauptbedingungen, die erfüllt sein müssen, um alle fünf Indikatoren zu erreichen. **Erstens muss das Verpflichtungssystem ein starkes Preissignal setzen und aufrechterhalten, welches die Notwendigkeit der Einbeziehung von Kostendämpfungsmaßnahmen, wie z. B. Offsets, rechtfertigt.** Das starke Preissignal kann daher Anreize für die Akteure schaffen, kurz- und langfristige Kosteneinsparungen zu erzielen, indem sie ihre eigenen Emissionen reduzieren und Offsets ankaufen. Daher können Verpflichtungssysteme, die die Verwendung von Offsets zulassen, aber ein starkes Preissignal setzen und aufrechterhalten können, das Erreichen von Emissionsreduktionen innerhalb und außerhalb des Geltungsbereichs vorantreiben. **Zweitens müssen die Institutionen, Prozesse und die Infrastruktur, die das Verpflichtungssystem und die Offsets regeln, gut etabliert sein, um sicherzustellen, dass die Offsets die Prinzipien der Umweltintegrität einhalten, einen Zusatznutzen für die nachhaltige Entwicklung erzielen und als zuverlässige Kostendämpfungsmaßnahme für hohe Preise von Verpflichtungssystemen dienen.** Die Analyse legt nahe, dass Offsets, wenn diese beiden Bedingungen erfüllt sind, einen Mehrwert schaffen und die ökologische Integrität von Verpflichtungssystemen aufrechterhalten können. Die Ergebnisse verdeutlichen zugleich, wie schwierig es ist, beide Bedingungen zu erfüllen, da sowohl innenpolitische als auch internationale Faktoren der politischen Ökonomie bestimmen, ob Politiker*innen und Wähler*innen dazu bereit sind, Verpflichtungssysteme einzuführen und aufrechtzuerhalten, die zu starkem Klimaschutz führen.

1 Introduction

1.1 Motivation: The role and potential benefits of offsets in accelerating climate action

Accelerating greenhouse gas (GHG) mitigation efforts is needed to meet the Paris Agreement goal of holding the increase in the global average temperature to well below 2°C. The Paris Agreement provides the basis for global collective action to address climate change. The 190 countries which ratified the Paris Agreement are required to submit plans, referred to as Nationally Determined Contributions (NDCs), on how they will mitigate and adapt to climate change (UNFCCC, 2019a). These plans are meant to be updated every five years, however only 112 Parties (accounting for about 50% of global emissions) have submitted updated NDCs, with only 67of these Parties (accounting for about 32% of global emissions) providing new or updated NDCs that have more stringent reduction targets (ClimateWatch, n.d). The United Nations Environmental Programme (UNEP) Emissions Gap report clearly shows that global collective efforts so far are insufficient, as it projects that global average temperatures are likely to increase to 3°C (UNEP, 2020).

To ensure global collective action reduces the emissions gap to meet the 2°C or 1.5°C goals (referred to as science-based targets), all Parties to the Paris Agreement will need to drastically scale up the ambition of their NDCs, depending on their current NDC timeframe (see: GIZ 2019). 52 countries that have yet to submit updated NDCs (accounting for about 31% of global emissions) have reported they will submit updated NDCs that demonstrate enhanced ambition (ClimateWatch, n.d). It is still unclear what form this scaled up ambition will take. Updated and new NDCs can reflect enhanced climate ambition through adopting more stringent emission reduction targets, which can be met by introducing policy instruments such as carbon pricing.

However, the past 20 years – and particularly the last two years – have demonstrated how the politics of scaling action on climate are often stymied due to political concerns about the economic and social costs of climate action, particularly to domestic industries, labour, and impoverished groups. Recent examples include the *gilets jaunes* protests in France in 2018, and the judicial challenges to the Canadian federal carbon tax in provinces such as Saskatchewan, Ontario, and most recently Alberta. Additionally, the 2018 Katowice Declaration ensures that international and national climate policy enable a 'just transition' with increasing climate action, particularly focusing on plans to address communities and labor vulnerable to the costs of a low-carbon transition (UN COP24 Presidency, 2018). Similarly, the financing needed for projects, services and climate-resilient infrastructure that would lead to reduced emissions aligning to science-based targets are insufficient, particularly in developing countries (Whitley et al., 2018; OECD, The World Bank, & UN Environment, 2018).

Offsets can play an important role in enabling the financing of emission reduction activities to help countries meet their mitigation goals. Offsets represent real emission reductions that have been certified to have sequestered or avoided the release of GHGs into the atmosphere, due to a particular intervention (UNEP, 2019). The supply of offsets can thus be generated from a range of activities – from nature-based solutions (NBS) to renewable energy projects that displace fossil fuel consumption, to the capture of methane emissions from anaerobic digesters or oil and gas infrastructure.

Nevertheless, in order to be certified, offsets have to uphold the environmental integrity principle of being additional. The additionality principle consists of proving the emission reductions from carbon projects go beyond a Business-As-Usual (BAU) baseline and beyond the

country policy context where the carbon projects occur. However, in the early years of the Kyoto Protocol's Clean Development Mechanism (CDM), along with activities certified under other voluntary standards (particularly in the early 2000s), several bad practices of offset certification occurred (Harvey, 2007; Cames, 2016), leading to the development of more robust standards and practices for offset certification. Examples of bad practices were emission reductions being certified under offset standards that had low thresholds to prove additionality (in other words, projects were not actually additional); the verification processes were not necessarily carried out by independent verifiers (thereby undermining the credibility of offsets); and emission reduction projects could potentially undermine sustainable development (e.g. large hydro displacing communities). In light of these controversies, there is now more emphasis that the certification of offsets is well governed to prove that the emission reductions are real, measurable, verifiable and additional in order to uphold their environmental integrity, and to make sure that the project does not undermine sustainable development.

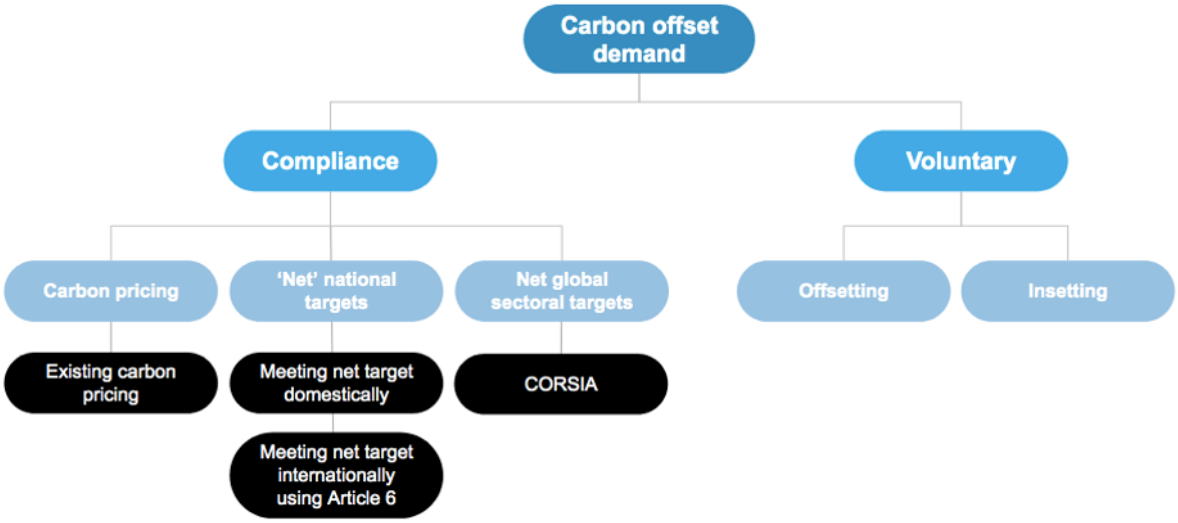
The demand for offsets originates from actors who want to compensate for emissions from their own activities, either voluntarily or for compliance purposes (see Figure 1 below). Voluntary action refers to when actors are not obligated by government policy to buy offsets. In this case, offsets could be used to demonstrate corporate social responsibility and climate leadership, or to enhance mitigation activities in sectors outside the scope of a compliance market. These offsets can be bought from outside of their operations and supply chains, or increasingly, companies certify emission reductions from one part of their supply chain to compensate for emissions in other parts of their supply chain – a practice referred to as in-setting.

By contrast, actors that buy offsets for compliance purposes are responding to two types of government policies. The first type is carbon pricing, where a compliance actor can use offsets in lieu of paying the carbon price imposed on their emissions. This carbon price can be directly set through a carbon tax rate, or indirectly determined through an emissions trading scheme (ETS). Currently, there are 11 national (including the EU Emissions Trading Scheme) and 23 subnational states that allow offsets to be used as part of their compliance schemes, with at least 3 more countries confirming they will incorporate offsets as part of new carbon pricing initiatives (The World Bank, n.d).

The second policy type is through compliance actors needing to meet a 'net' emission reduction target or baseline, in which case offsets can be used to compensate for emissions that go beyond these target levels. Net targets are commonly ascribed to national or subnational emission reduction targets. So far, at least 51 countries have net zero targets mentioned in policies, with 12 of these countries having passed legislation with net targets (Energy & Climate Intelligence Unit, n.d). Four more countries are proposing legislation with a net zero target, and another 79 countries are having net zero targets under discussion (Energy & Climate Intelligence Unit, n.d). Some of these countries - such as Japan, Norway, New Zealand, and Sweden - allow their respective governments to procure international offsets to meet their net zero targets (Darby, 2016; Darby, 2019; Swedish Energy Agency, 2018; Government of Japan, 2020). An example of a sectoral initiative where GHG reduction targets will be achieved through a combination of reducing its own emissions and buying offsets is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which requires the international aviation sector to keep total emissions to the 2019 baseline (International Aviation Trading Association, 2020).[1]

[1]The impacts of the corona virus pandemic on reducing the number of international flights had the international aviation industry call for the baseline to be restricted only to the 2019 levels, though the original baseline was an average of 2019 and 2020 emissions levels. The proposal to restrict the baseline to only 2019 levels was adopted, however, research shows that this change would considerably cut airline's offsetting requirements and delay climate action in the sector for several years (Schneider & Graichen 2020).

Figure 1: Categories of offset demand



Source: Own illustration (South Pole and Wuppertal Institute)

In principle, the integration of offsets into the design of compliance schemes could bring added value to the compliance scheme. Offsets could **enable political acceptability** of introducing the compliance scheme as a cost containment measure, therefore addressing compliance actors and voters' concern that the costs of compliance will be high enough to undermine the competitiveness of domestic firms, leading to reduced growth and potential unemployment. Offsets could also be attractive to actors and sectors that would like to supply offsets to the compliance scheme. Addressing political acceptability pertains not only to **introducing the compliance scheme** in the first place, but also to **raising the ambition of the compliance scheme in subsequent periods**. Offsets could also provide **policymakers with the flexibility** to incentivize additional emission reductions outside of the compliance scheme by making non-compliance sectors and facilities the source of offsets or supporting other government priorities. If policymakers are interested in supporting emission reductions in other countries, they have the flexibility to source offsets from foreign jurisdictions. Depending on which types of emission reduction activities are eligible for compliance, offsets could also **promote sustainable development** by directing carbon finance to projects that achieve several of the United Nations' (UN) Sustainable Development Goals (SDGs).

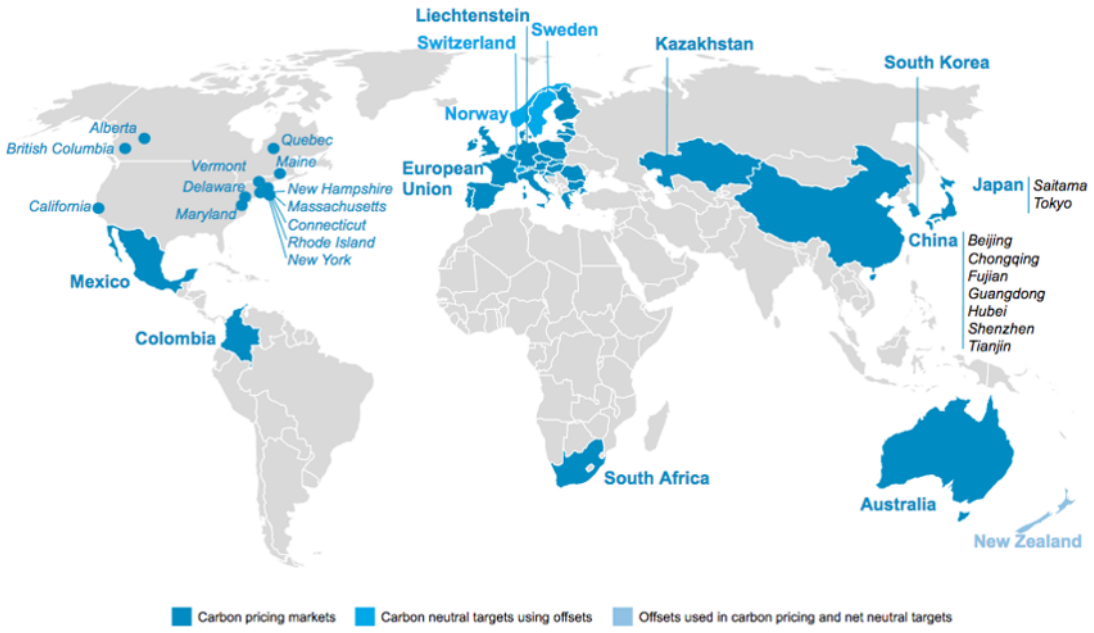
Despite these potential benefits, the generation and use of offsets could also undermine the **environmental integrity** of climate action. Specifically, offsets could offer perverse incentives to compliance actors by having them solely on rely on offsets to meet compliance, rather than reducing their own emissions. Offsets can dilute the carbon price in emissions trading schemes, as offsets increase the supply of permits that are allowed to be surrendered for compliance. A diluted carbon price signal can reduce the magnitude of emissions that compliance actors could have been willing to achieve if they faced a stronger carbon price signal. Therefore, offsets could also hinder the steering effect of compliance targets to drive emission reductions within the scope of the compliance scheme.

1.2 Objective and methodology of the report

The past 20 years have provided a wealth of experience on the performance of offsets within compliance schemes and the voluntary markets. As can be seen in Figure 2, at least 34 national and subnational jurisdictions currently allow offsets to be used as part of their carbon pricing

schemes, while two countries allow international offsets as part of their carbon neutral targets, and New Zealand allows offsets as part of their carbon pricing and net zero targets.

Figure 2: Map of compliance markets that have used offsets, either currently or historically



Source: Own illustration (South Pole) based on The World Bank, n.d.

Drawing on this wealth of historical experience, the objective of this report is to identify the conditions under which offsets add value to the compliance scheme without undermining its environmental integrity. To undertake this analysis, the report will first provide a longlist of mechanisms where offsets have been used to enable compliance. The purpose is to demonstrate the diversity of:

- countries with compliance schemes that use offsets (different economic, political and social characteristics);
- the type of compliance mechanisms that use offsets;
- the ways in which offsets are incorporated within the compliance mechanisms; and
- the interaction between public governance and capacity of the private sector to enable the supply and demand of offsets.

Out of the longlist of compliance mechanisms (which will be covered in Section 2), the following five case studies have been chosen for in-depth analysis in order to cover a range of characteristics and outcomes:

1. European Union Emissions Trading Scheme's (EU ETS) use of offsets from the CDM and Joint Implementation (JI) mechanism;
2. Alberta's ETS under the Specified Gas Emitters Regulation (SGER), Carbon Competitiveness Incentives Regulation (CCIR), and preliminary analysis of the Technology Innovation and Emissions Reduction (TIER) Regulation;
3. Australia Emission Reduction Fund (ERF) and Safeguard Mechanism;
4. Colombia's carbon tax; and

5. Japan's Joint Crediting Mechanism (JCM)

Each case study analysis will consider whether and how offsets have added value while upholding the environmental integrity of the compliance scheme, as discussed in Section 1.1. To determine whether offsets have achieved this dual purpose, each case study investigates the indicators of success summarized in Table 1 and further explained in Section 3. To determine how each case study has performed under each indicator, desk-based research was undertaken, with the findings corroborated by reviews from country experts.

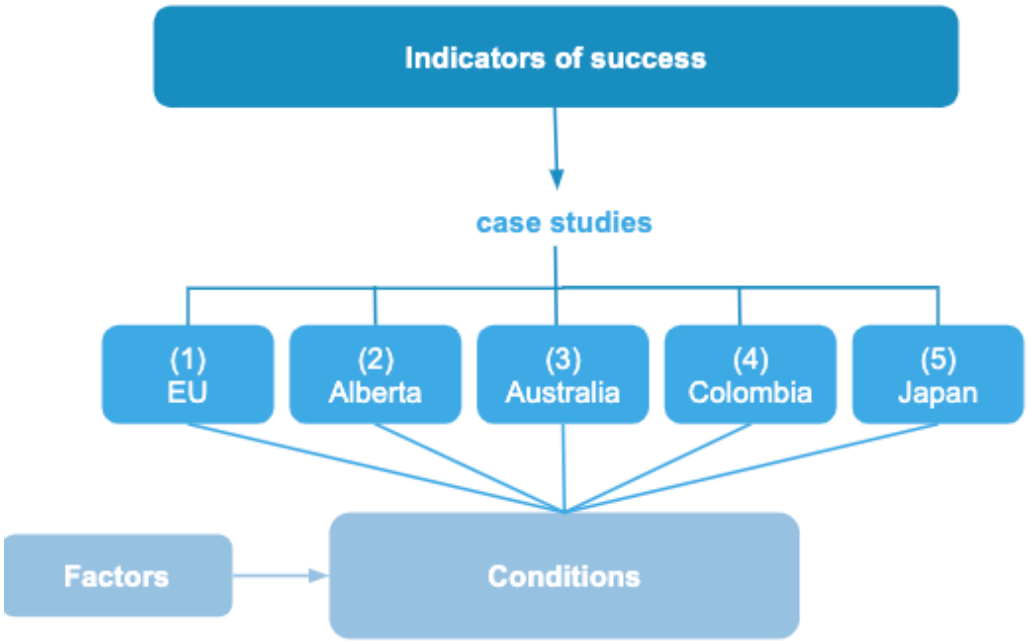
Table 1: Indicators of success: potential benefits to the compliance scheme

Indicator of success of offsets	Benefit to compliance scheme
Increases acceptability of compliance schemes	Adds value by increasing buy-in for compliance scheme to be implemented
Enables ambition of the compliance scheme	Adds value to help increase the size of the compliance scheme's steering effect in reducing emissions
Provides policymaker flexibility	Adds value to expand the scope of the compliance scheme's steering effect to sectors that would otherwise be difficult to reduce emissions
Promotes investments in sustainable development	Adds value to domestic or international policy objectives to support broader SDGs.
Avoids perverse incentives	Does not hinder the steering effect to drive emission reductions by upholding the environmental integrity of the of the compliance scheme and the offset mechanism

Source: South Pole and Wuppertal Institute

Section 5 synthesizes the results of the case study analysis to identify the conditions when offsets have achieved the indicator of success in some case studies rather than others (as illustrated in Figure 3). Section 5 also identifies the types of factors that influence when these conditions arise for each case study (as listed in Table 2).

Figure 3: Methodology for identifying conditions and factors for determining performance of offsets in compliance schemes



Source: Own illustration (South Pole and Wuppertal Institute).

Table 2: Categories of relevant factors

Factors	Explanation
Political economy	How the interrelation of politics and the economy affect the perception of whether specific groups, and the wider public, to support (or block) the imposition of a compliance mechanism on proposed sectors due to concerns on how mitigation action affects economic growth, and employment effects
Policy design	Rules determining: • scope of compliance facilities; • rules regulating the compliance costs for sectors (including other cost containment measures) • rules on the use of offsets for compliance actors; and • rules determining which sectors/technologies/geographies are eligible for offset supply
Economic case	Economic fundamentals that determine whether it would be more cost-effective to: • pay the compliance cost; • meet compliance obligations by abating emissions within compliance facilities; • procure offsets as a cost-saving measure; or • use other available cost containment measures.
Public governance	How public institutions: • set and modify the compliance scheme to meet its policy objective; and

Factors	Explanation
	• regulate the supply and demand of offsets to uphold principles of environmental integrity of the compliance scheme
Private sector capacity	Private sector includes actors that can fulfil one or multiple roles, such as: • ability to influence policymakers in the design of the compliance scheme; • ability to develop, finance and certify offsets, and to enable offset trading and delivery to final buyers; • ability of private sector buyers to reduce emissions and engage with trading; or • capacity of private sector entities to engage with governance of offsets (assuming the government has assigned this role to the private sector).

Source: South Pole and Wuppertal Institute

2 Survey of how offsets have been used in compliance and voluntary schemes

The following section provides a survey of how offsets have been incorporated into compliance schemes and voluntary carbon markets. This survey considers how different compliance schemes are designed to include offsets, including consideration of the offset certification protocols, origin and time period in which offsets were incorporated into the compliance scheme.

2.1 Compliance schemes

2.1.1 Cap-and-trade system (at the international, supra-regional, national, and subnational level)

A cap-and-trade system is a type of ETS where the government sets an overall emissions level (or cap) that limits the quantity of GHGs that can be emitted within the sectors covered by the scheme. The size of the cap thus determines the number of emissions allowances that can be distributed to compliance facilities, either through auctioning the allowances or free allocation. cap-and-trade systems that incorporate offsets as part of compliance allow facilities covered by the cap to buy specified percentage or quantity of offsets from eligible mitigation activities. Buying offsets provides facilities the option to procure sufficient credits to meet their obligations under the scheme. By allowing offsets to be included in the cap-and-trade system, the overall cap increases by the number of offsets that facilities surrender for compliance, as each offset allows the facility to pollute an additional tonne of GHG under the cap. To avoid the cap to be increased, policy makers may adopt a more stringent cap level that takes into account the expected inflow of offsets.

Regulated entities can use offsets as a cost containment measure to pay the allowance price, since the costs for buying offsets are theoretically lower than the price of traded allowances. The use of offsets in this system could not only lower overall compliance costs, but also support additional emission reductions in sectors that are within or outside the scope of compliance schemes, depending on which mitigation activities are eligible for compliance use. This scenario would compromise the incentive for compliance actors to undertake efforts to reduce their own emissions by diluting the price signal of the compliance scheme. To avoid this situation, most cap-and-trade systems have implemented quantitative and qualitative restrictions on the use of offsets.

Table 3 shows the current offset programmes used for compliance by cap-and-trade schemes. The EU ETS, the New Zealand Emissions Trading Scheme (NZ ETS) and China recognized the CDM and JI from the Kyoto Protocol for the use of offsets. Nevertheless, the use of Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) is restricted to certain conditions and time periods. On the other hand, New Zealand, the Regional Greenhouse Gas Initiative (RGGI) and the Western Climate Initiative (WCI) have developed their own offset protocols.

Table 3: Cap-and-trade system (at an international, supra-regional, national and subnational level)

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
Kyoto Protocol	CDM	CERs from developing countries	**Time.** CERs allowed from 2008 to meet countries' targets. **Methodologies.** Offsets from methodologies within the following sectors/activities are eligible: Renewable electricity, renewable energy, less-carbon-intensive fossil fuel power plants, fuel switch, biofuels, industrial energy efficiency, household & building energy efficiency, gas flaring and gas leak reduction, feedstock switch (industry), waste management and wastewater, industrial gases, transport, other methodologies (e.g. afforestation and reforestation; charcoal production).	No limitations
	JI	ERUs from developed countries	**Time.** ERUs allowed from 2008 to meet countries' targets. **Methodologies and vintages.** Offsets from the following projects/activities are eligible: installations based on renewable energy source, fuel switch to lower carbon intensive fuels, energy efficiency at supply side, energy efficiency at demand side, combined heat and power projects, agricultural sector projects (excl. land-use change), transport sector, reduction in methane emissions and reforestation/afforestation projects. ERUs may only be issued for a crediting period starting after the beginning of 2008.	
EU ETS	CDM	CERs from developing countries	**Time.** CERs and ERUs allowed for compliance from phase 2 (2008-2012). **Vintages and methodologies.** Credits from the following CDM projects are ineligible: nuclear energy, LULUCF, and industrial-gas-destroying projects. In addition, carbon credits from hydroelectric projects exceeding 20 megawatts (MW) of installed capacity are accepted only under certain conditions. Credits with 2007 vintages and older were no accepted after March 2015. CERs issued after 2012 can only be issued from LDCs in order to be used for compliance from 2013 to 2020.	The total use of credits for phase 2 (2008-2012) and phase 3 (2013-2020) was based on proportional percentages by National Allocation Plans for each Member State, which then determined limits for each facility. The use of offsets is not allowed for phase 4 (2021-2030).
	JI	ERUs from developed countries		

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
NZ ETS	New Zealand Protocol producing offsets	New Zealand Units (NZUs) from New Zealand	**Time.** NZUs allowed for compliance from 2008 onwards. **Methodologies.** Offsets from the following projects are eligible: forestry, embedding of global warming gases in a product (i.e. production of methanol), storage of carbon dioxide after capture, export of liquefied petroleum gas (LPG), export or destruction of bulk Synthetic Greenhouse Gases such as hydrofluorocarbon (HFC) or perfluorocarbon (PFC) gases, export of Synthetic Greenhouse Gases such as HFCs or PFCs in pre-charged equipment or motor vehicles and destruction of Synthetic GHG such as HFCs or PFCs in New Zealand.	No quantitative limits but, international units might be capped in the future.
	CDM/JI	CERs/ERUs from developing countries and also Kyoto credits from developed countries (called assigned amount units [AAUs])	**Time.** CER/ERUs allowed for compliance from 2008 to 2014. **Methodologies.** Some types of offsets as those coming from nuclear projects or CERs from HFC-23 and N2O industrial gas destruction projects (from 2011) were not eligible.	
RGGI	RGGI Offset Protocol, producing RGGI CO2 offset allowances	Offset from Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont and, from 1 January 2021, Virginia	**Time.** RGGI CO2 offset allowed for compliance from 2009 onwards. **Methodologies.** Offsets from the following activities are eligible: capture and destruction of CH4 at solid waste landfills, capture and destruction of CH4 from animal manure and organic food waste via anaerobic digesters, reduction in SF6 emissions, the sequestration of carbon through reforestation, IFM and avoided conversion and the reduction in building-sector CO2 emissions through a reduction in the on-site combustion of natural gas, oil or propane for end-use in existing or new commercial or residential buildings. The latter three project types will not be eligible to be issued carbon credits beginning in 2021.	3.3% of an entity's liability. No changes are expected in the quantitative limit for the next decade.

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
Western Climate Initiative (WCI)	California Air Resource Board (CARB) compliance and early action offset protocols	Registry Offset Credits and Early Action Offset Credits from California and other US states that comply with CARB (American Carbon Registry, Climate Action Reserve and Verra)	**Time.** offsets allowed for compliance from 2013 onwards. **Methodologies.** Offsets from the following projects are eligible: US forest projects, urban forest projects, livestock projects (i.e., methane management), ozone-depleting substances projects, mine methane capture projects; and rice cultivation projects.	8% of an entity's compliance obligation until 2020 emissions, 4% between 2021-2025 and 6% from 2026 onwards.
	Quebec Ministry of Environment	Offsets from Quebec	**Time.** offsets allowed for compliance from 2013 onwards. **Methodologies.** Offsets from the following activities are eligible: methane destruction as part of products, to cover manure storage facilities, capture of gas from specified landfill sites, destruction of certain ozone-depleting, substances contained in insulating foam and of certain refrigerant gases recovered from domestic appliances in Canada, capture and destruction of methane from a methane drainage system at an active underground or surface coal mine, except a mountaintop removal mine and capture and destruction of methane from the ventilation system of an active underground coal mine.	8% of an entity's compliance obligation.
China (8 ETS pilots)	China's National Development and Reform Commission (NDRC)	Chinese Certified Emission Reductions (CCERs) from China. Some of the pilots allow additional units to be surrendered for compliance.	**Time.** CCERs allowed for compliance from 2013 or 2014 onwards (depending on start date of pilot ETS). **Methodologies and vintages.** CCERs eligible offsets were based on CDM rules. Several methodologies with a focus on renewable energy, energy efficiency and fuel switching, and methane and includes methodologies for HFC-23 and N2O. Different vintage restrictions apply in each pilot.	The limitation in the use of CCERs differs among the pilots oscillating between 1-10% of the annual allocation or of the annual compliance obligation.

Source: South Pole and Wuppertal Institute, based on World Bank. n.d., ICAP, n.d, 2020.

2.1.2 Baseline-and-credit mechanism

A baseline and credit mechanism is another type of ETS (OECD, 2013). However, unlike a cap-and-trade system, this type of ETS does not have a fixed cap of allowances that it splits to distribute to compliance facilities. Instead it sets the baseline at the facility level – that is, it determines the amount of emissions that each facility is allowed to emit each year. Examples of baselines include historical levels, BAU scenarios, or industry standards. If facilities emit below their baseline, the Government can reward them by issuing a performance credit that the facility can use for future compliance or sell to other facilities (e.g. in Alberta). If facilities exceed their emissions baseline, they must buy performance credits from other facilities, or eligible offsets (see Table 4).

Table 4: Baseline and credit mechanism

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
Technology Innovation and Emissions Reduction (TIER) (replacing the Carbon Competitiveness Incentive Regulation (CCIR) in 2020)	Alberta Environment and Parks – Climate Change and Implementation Branch	Offsets from Alberta	**Time.** Offsets are allowed for compliance from 2007 onwards. **Methodologies and vintages.** Offsets from the following protocols are eligible: aerobic composting, aerobic landfill bioreactor, agricultural nitrous oxide emission reductions, biofuel production and usage, biogas production and combustion, CO2 capture and permanent storage in deep saline aquifers, distributed renewable energy generation, energy efficiency projects, energy generation from the combustion of biomass Waste, greenhouse gas emission reductions from pneumatic devices, landfill gas capture and combustion, reducing greenhouse gas emissions from fed cattle, selection for low residual feed intake markers in beef cattle, solar electricity generation, waste heat recovery, wind-powered electricity generation. Vintages limitations apply.	60% of a facility's total compliance obligation per year (combining both emissions performance credits and emissions offsets).
British Columbia Greenhouse Gas Industrial Reporting and Control Act (GGIRCA)	British Columbia Ministry of Environment and Climate Change Strategy - Climate Action Secretariat	Offsets from British Columbia	**Time.** Offsets are allowed for compliance from 2016 onwards. **Methodologies.** Offsets from the following protocols are eligible**:** fuel switch protocol	No available information.
Australia ERF and Safeguard Mechanism	Protocols by Australian Clean Energy Regulator	Australian Carbon Credit Units (ACCUs) from Australia	**Time.** Offsets are allowed for compliance from 2016 onwards. **Methodologies.** Offsets from the following sectors/activities are eligible: a generic method for emissions reductions at facilities reporting under the National Greenhouse and Energy Reporting Scheme, the capture and destruction of coal mine fugitive emissions, reductions in the emissions-intensity of transportation, commercial, industrial, and aggregated energy efficiency, the capture and combustion of landfill gas and agricultural waste, the alternative treatment of organic waste, the	No limitations.

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
			capture and combustion of biogas from wastewater and methods for the land sector, including increasing soil carbon, reducing livestock emissions, expanding opportunities for environmental and carbon sink plantings, and reforestation.	
Tokyo Cap and Trade, linked with Saitama ETS	Tokyo Cap and Trade, linked with Saitama ETS	Offsets from Tokyo	**Time.** Offsets are allowed for compliance from 2010 onwards. **Methodologies.** Offsets from the following activities and issuers are eligible: small and mid-size facilities in Tokyo non-covered by the ETS, big facilities from outside Tokyo area and renewable energy projects.	Quantitative limits exist for the use of offsets originated outside the Tokyo area: 1/3 of a facility obligations.
		Offsets from Saitama (via linking)	**Time.** Offsets are allowed for compliance from 2011 onwards. **Methodologies and vintages.** Offsets from Saitama small and mid-size facilities and large facilities. Vintages limitations apply.	

Source: South Pole and Wuppertal Institute, 2020, based on World Bank. n.d., ICAP, 2020.

2.1.3 Carbon tax

The introduction of offsets in carbon taxes is a recent trend in jurisdictions such as Colombia, Mexico, and South Africa (see Table 5). Offsets were included as a way to increase mitigation opportunities in such jurisdictions, mainly to reduce the cost of compliance with a fiscal instrument. Depending on the design of the carbon tax, offsets can be allowed to compensate the total tax obligations, or just a certain percentage. The offsetting option of Mexico's carbon tax allows taxpayers (who are the producers and importers of fossil fuels) to use CERs from Mexican CDM projects to pay a share of their carbon tax. The Mexican carbon tax differs from other schemes (e.g. Colombia or South Africa) on how the value of the carbon tax liability changes with the surrender of offsets. Notably, it will not be possible to use CERs directly to reduce the overall volume of taxed carbon. Instead, the taxpayer can pay part of the tax amount using CERs. According to the law, the value of the CERs is to correspond to the market value at the moment of paying the tax, and therefore the compliance actor would have to surrender the volume of CERs whose amalgamated value is the equivalent of the actor's total carbon tax liability (Wang-Helmreich and Kreibich, 2019). From 2018, only up to 20% of the tax on fossil fuels could be paid with credits. However, this quantitative limitation was removed in 2019 (Oronoz and Piquero, 2019).

Table 5: Carbon tax

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
Mexico	CDM	CERs from Mexico and CERs that were eligible under the EU ETS	**Time.** Offsets are allowed for compliance from 2014 onwards but the administrative process was not in place until 2017. **Methodologies.** No restrictions on CDM methodologies.	No limitations since 2019.
Colombia	CDM and voluntary carbon offsets from similar methodologies (recognized by Decree 926, which establishes the carbon offset program)	Offsets from Colombia	**Time.** Offsets are allowed for compliance from 2017 onwards. **Methodologies.** No restrictions on methodologies from accepted standards.	No limitations.
	Cercarbono and ProClima	Offsets from Colombia	**Time.** Offsets are allowed for compliance from 2018 onwards. **Methodologies.** No restrictions on methodologies from local standards.	
South Africa	CDM, VCS, GS and considering developing local standards (with a focus on the AFOLU sector)	South Africa	**Time.** Offsets are allowed for compliance from 2019 onwards. **Methodologies and vintages.** Offsets from the following sectors/activities are eligible: AFOLU, waste, transportation and some renewable energy and energy efficiency projects. After 2022, only sectors not covered by the tax will be eligible to generate offsets. Some vintages limitations apply for offsets issued before 2019.	5% or 10%, depending on the sector.

Source: South Pole and Wuppertal Institute based on World Bank. n.d., ICAP, 2020.

2.1.4 Bilateral credit mechanism

A bilateral credit scheme is implemented jointly by two countries, where one country acts as a buyer and another as a host country. The host country will credit the emissions reduced by the project proponents, provided these reductions meet the mechanism's criteria.

Until now, the only bilateral crediting mechanism that has existed is the Japanese Joint Crediting Mechanism (JCM), implemented through bilateral agreements between Japan and each participating country (see Table 6).

Table 6: Bilateral crediting mechanism

Name of compliance scheme	Certification standard of offsets	Name of certificates and geographic origin of offsets	Offsets use qualitative restrictions (time, vintages and methodologies)	Offsets use quantitative restrictions (quantity of offsets)
Japanese JCM	JCM Methodology	Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand and the Philippines	**Time.** 2013 onwards **Methodologies.** Several approved methodologies mainly in the energy efficiency and renewable energy sectors.	The Japanese government procures 50% of the offsets that are achieved by the JCM project, with the remainder split between host country and project partners.

Source: South Pole and Wuppertal Institute based on JCM, 2019.

2.2 Voluntary markets

The demand for offsets in a voluntary carbon market responds to the willingness of entities to compensate for their direct or indirect emissions. Corporate social responsibility, demonstrating climate leadership by setting ambitious corporate targets, and preparedness for future compliance targets are among the main drivers for triggering the voluntary use of offsets. Offsets thus represent the company's contributions towards accelerating global reductions outside of their operations. Companies – particularly agro-food companies – are also increasingly interested in supporting emission reductions from their suppliers. Insetting provides a carbon finance business model where companies can use carbon credits generated from emission reduction projects generated within the company's supply chain to offset emissions within the company's own operations.

The voluntary carbon market size is considerably smaller than the compliance market. However, activity in the voluntary market has increased in recent years. From 2005 to April 2018, more than 2,000 voluntary carbon projects issued over 430 $MtCO_2e$ of voluntary credits (Hamrick & Gallant, 2018). In 2017, voluntary carbon projects issued 62.9 $MtCO_2e$. On the demand side, 42.8 $MtCO_2e$ of voluntary credits were retired in 2017 (ibid.). As noted in previous subsections, some compliance markets (e.g. China, initially Colombia, Mexico, and South Africa) allow credits certified under certain voluntary standards to be surrendered for compliance. To ensure that a company cannot claim the same credit for voluntary and compliance purposes, compliance

schemes require companies to surrender cancellation certificates of credits. These cancellation certificates ensure offsets are out of circulation and cannot be used for voluntary purposes.

According to Ecosystem Marketplace (Hamrick & Gallant, 2018), the volume of offsets from activities in the forestry and land use sector rose from 13.9 $MtCO_2e$ in 2016 to 50.7 $MtCO_2e$ in 2018, an increase of 264%. In contrast, offsets in other sectors showed an increase of only 21% over the same period. Table 7 shows the standards used in voluntary and compliance markets.

Table 7: Offsets used in voluntary and compliance markets

Name of compliance scheme (current or historical)	Certification standard of offsets	Geographical origin of offsets
CDM	CDM Executive Board (EB)	Developing countries
Gold Standard	Gold Standard	International
Verified Carbon Standard (VCS)	Verra	International
American Carbon Registry (ACR)	Winrock International	International
Climate Action Reserve (CAR)	Climate Action Reserve	USA, with developing protocols in other countries, notably Mexico
Plan Vivo	Plan Vivo Foundation	International

Source: South Pole and Wuppertal Institute

3 Indicators to evaluate offset's success in supporting compliance schemes

This report postulates the need for decisive ambitious climate action. However, it acknowledges that policymakers need to implement and maintain climate policies that are subject to political, economic and social realities of the domestic political economy. Therefore, in its analysis this report will focus on the perspective of policymakers to help design climate policies within the framework of their domestic political economy, being fully aware, that the resulting policy design will fall short of what is to be aspired as ideal climate action.

The reason policymakers would consider incorporating offsets is to add value to a compliance scheme by helping the compliance scheme achieve its steering effect in mitigating emissions. Conversely, policymakers need to consider whether offsets could potentially hinder compliance schemes from achieving their mitigation target through undermining its environmental integrity. The following indicators provide a framework to evaluate the potential impacts offsets could achieve for the compliance scheme (as defined in Table 1).

In order to evaluate whether offsets have added value without undermining the environmental integrity of compliance schemes for the five case studies, the following five indicators are considered in this report:

1. increased the acceptability of the introduction of the compliance scheme
2. enabled the ambition of the compliance scheme to be increased in subsequent periods
3. provided the policymaker with flexible design options to achieve emission reductions within and outside of the jurisdiction, that can also support wider policy priorities beyond climate mitigation
4. promoted investments in sustainable development
5. avoided perverse incentives that hinders or overestimates emission reductions

Table 8 summarizes how the indicators demonstrates how offsets could potentially add value while maintaining the environmental integrity of compliance schemes to different participating stakeholders.

Table 8: Potential value-added and environmental integrity safeguards of offsets to compliance schemes

Indicators of success of offsets	Offset suppliers	Offset buyers	Policymakers
Adding value to the compliance scheme	Creates financial incentives to promote further emission reductions in eligible sectors that the policymaker has chosen, particularly supporting sustainable development	Provides a potential cost containment measure to high compliance costs, that can help increase the compliance scheme acceptance amongst buyers	Could increase the acceptance of the compliance system among committed companies, the wider political economy and civil society, along with raising the ambition of the compliance scheme. Also provides the policymakers with the flexibility to reduce emissions outside the scope of the compliance scheme.

Indicators of success of offsets	Offset suppliers	Offset buyers	Policymakers
Ensuring the integrity of the compliance scheme through avoiding perverse incentives	Offsets represent emission reductions that are real, measurable, verifiable and additional	Maintains the incentive for compliance actors to reduce their own emissions	Ensures the legitimacy and credibility of including offsets in the compliance scheme, particularly from critics of offsets.

Source: South Pole and Wuppertal Institute

3.1 Increases acceptability of introducing the compliance scheme

It is well recognized introducing compliance schemes that aim to reduce GHG emissions, either through a carbon price or a stringent target, can face significant political opposition from domestic firms and citizens (Klenert et. al, 2018). Firms argue against the introduction of a compliance scheme on the grounds of maintaining their competitiveness, particularly against foreign competition who do not face similar compliance costs (Dechezleprêtre & Sato, 2017). The potential negative consequences for such trade exposed sectors are to shut down domestic facilities permanently or shift their facilities to jurisdictions without similar compliance schemes (the latter result being referred to as carbon leakage). In both scenarios, economic growth reduces while unemployment increases in the jurisdiction of the compliance scheme. For sectors that are not trade exposed, compliance actors can pass through the compliance costs downstream to domestic consumers (e.g. electricity, heat and transport fuels). Domestic citizens can therefore also be against the introduction of the compliance scheme, on the grounds that it could potentially increase personal costs, have regressive effects against low-income households, and also hurt the domestic economy generally (Carattini et al., 2018).

Policymakers are not immune to the political and economic ramifications of introducing a carbon price and would thus try to address these concerns by incorporating cost containment measures (e.g. phasing in the carbon price through a pre-determined schedule, exempting certain sectors or facilities, providing free allowances in an ETS, or incorporating offsets).

The inclusion of offsets for proposed compliance schemes could potentially reduce the political resistance to its introduction by providing an option to contain costs. Offsets sourced domestically, and for specific sectors, can also increase acceptance of the compliance scheme by eligible sectors and the broader public. Policymakers could, therefore, be open to implement a compliance scheme incorporating offsets as a cost containment measure if it addresses key concerns about the compliance scheme, and therefore allows it to be passed and accepted.

3.2 Enables policymakers to increase the ambition of the emission reduction target in subsequent periods

With regards to the scientific evidence, policymakers need to be interested in increasing the ambition of a compliance scheme in successive periods. The following ways suggest how the ambition of compliance schemes could increase (GIZ, 2019):

- Setting an ambitious new target for a timeframe beyond the existing one
- Tightening the existing target
- Expanding the scope of the target to cover more sectors or gases

- Changing a conditional target to an unconditional target
- Changing the emphasis of an existing target, for example making the target 'at least' or 'well below' the previously agreed level.

The proposal for a more stringent target can be met with the same political resistance, similar to as when the original target was introduced. Specifically, compliance actors perceive that compliance costs will also increase to the detriment of their competitiveness against domestic and international firms. Offset suppliers could also be more supportive of a more stringent target as it provides a stronger business case for the use of offsets in the future. Keeping offsets in the future scheme as a continued cost containment measure can therefore be considered as to enable more stringent targets to be implemented.

It is noted that within the context of raising ambition offsets can not only serve as cost containment measure, but also as a possibility to widen the impact of the compliance scheme by allowing offsets from outside the scope of the scheme itself to be used within. These aspects will be address within the next indicator.

3.3 Provides policymakers with flexible options to achieve emission reductions within and outside of jurisdiction

The inclusion of offsets into a compliance scheme provides a flexible design feature to policymakers that could be more interesting than other cost containment measures, such as free allocation of allowances. The policymaker can incentivize emission reductions outside the scope of the compliance scheme through allowing eligible offsets to be sourced from non-compliance sectors or foreign jurisdictions. Policymakers can find this option attractive as it can serve broader policy goals and can even widen the public support of the compliance scheme.

Incorporating offsets into compliance schemes can allow policymakers to create policy and financial incentives to reduce emissions in hard-to-abate sectors within or outside of their jurisdiction. The lack of financing and knowledge, along with political sensitivities of the sector, are often cited as being the main reasons that it is hard to implement stringent climate action in the hard-to-abate sectors (Cevallos et. al, 2019). Offsets provide a financing model to incentivize emission reductions in these sectors. Offset projects could also incentivize the uptake of less emissions-intensive technologies and processes in reducing emissions in these sectors without imposing mandatory regulations. Sectors that are eligible for offsets will also have the opportunity to gain knowledge and experience in undertaking carbon mitigation through offset projects. The data from offset projects can also help policymakers assess the real costs of reducing emissions in these sectors, that could be helpful if policymakers would like to consider introducing climate policy on these sectors in the future.

3.4 Promotes investments in sustainable development

Another advantage offsets have over other cost containment measures is that they can finance projects that achieve sustainable co-benefits beyond emission reductions. This feature could align with policymaker's priorities as well (as discussed in Section 3.3.). The variety of co-benefits that could be achieved are best defined under the UN's Sustainable Development Goals (SDGs) (Day et al., 2020; Kachi et al., 2020). Though offset projects could have benefits beyond emission reductions, different project types provide different levels and types of benefits. As an example, the benefits associated to clean cook stoves are represented in Figure 4 below.

Figure 4: Clean cookstove impacts on SDGs

Source: Clean Cooking Alliance, 2020.

However, there is a risk that offset projects could also undermine sustainable development (Broekhoff et al., 2019). As mentioned in the introduction, offsets have received criticism due to the negative effects to communities and environments, such as large hydro flooding villages and ruining original ecosystems. Certain risks for the sustainable development are also associated with nature-based solutions (NBS), which involves any projects involved with the conservation or rehabilitation of natural environments, or more sustainable agricultural practices. The box below highlights advantages and risks of NBS projects, along with risk management strategies that stakeholders have engaged with to ensure sustainable development of NBS projects.

Main concerns around offsets from nature-based solutions (NBS)

NBS projects are widely used for offsetting obligations in compliance and voluntary markets. Currently, there are seven national and four subnational schemes that allow credits from NBS to be eligible for compliance markets. Colombia, for example, recognizes NBS credits to be surrendered in lieu of carbon obligations. NBS credits could also be eligible for the Carbon Offset and Reduction Scheme for International Aviation (CORSIA) that starts in 2021, as long as these offsets are certified under one of the International Civil Aviation Organization (ICAO)-approved standards and methodologies for CORSIA.

NBS projects could achieve a wide variety of co-benefits such as protecting biodiversity, enabling climate adaptation, and improving livelihoods of poor communities that live in forests or have incomes dependent on agriculture. NBS however does face some criticisms, such as the lack of engagement of indigenous communities, permanence of the emission reduction and carbon leakage, as further defined here:

- Permanence of emissions: any NBS project could release emissions due to fires or the eventual decay of associated biomass, some NBS projects may not lead to permanent emission reductions (conversely referred to as reversals) unless safeguard mechanisms are put in place to compensate for incidence of reversals.
- Community engagement: NBS projects must assure that indigenous communities who live in the habitats in which NBS activities express their free, prior and informed consent to the project activity. They must be engaged with the NBS project development and implementation process, and benefit from the share of proceeds from the sale of NBS credits.
- Project leakage: NBS projects that avoid emissions from being released by undertaking forest conservation and improved forest management are referred to as Reduced Emissions from Deforestation and Degradation (REDD+) projects. While these REDD+ projects ensure the forest protection of a certain area, it could mean that actors choose to cut down other areas instead, leading to potential 'leakage' of deforestation activities.

Some schemes and standards have deployed different risk management strategies. For example, for addressing permanence risks, voluntary carbon offset standards such as Plan Vivo, VCS and ACR use a "risk buffer" approach, according to which a certain portion of the issued credits are retained separately to ensure coverage against potential future reversals. If a reversal is to occur, credits in the buffer are retired to the equivalent volume of emissions that were reversed. For ensuring community engagement, Verra (the certification organization for the VCS standard) paired with the Climate, Community and Biodiversity Alliance (CCBA) to develop a label to certify NBS projects that reduce poverty and improve the wellbeing of local communities, and conserve biodiversity. Obtaining the VCS Community and Biodiversity Standard (VCS+CCBS) label requires the NBS project to be certified under both the VCS and CCBA. To manage the project leakage risk, national and subnational governments are developing comprehensive REDD+ programs to protect forests within their jurisdictions. One part of this jurisdictional REDD+ programs is to develop GHG inventories of the emissions coming from land use and land-use change, to track the progress of the jurisdiction towards managing carbon emissions and storage from preventing destructive land-use change. These jurisdictions can be rewarded for stemming deforestation rates, and even reducing emissions, through public-private funds such as the World Bank's Forestry Carbon Partnership Facility (FCPF).

3.5 Avoids perverse incentives

Offsets can create perverse incentives that essentially hinders the steering effect of the compliance scheme to reduce emissions in different ways and thereby undermine the environmental integrity of the compliance scheme. One of the major criticisms on the use of offsets is that it gives compliance actors an 'easy option' of meeting part or all of their compliance obligation by using offsets instead of reducing emissions within their own operations. Offsets provide compliance actors an opportunity to pollute more than what they originally would have if this 'cheaper' option was not in place.

Furthermore, in the case of ETSs, the supply of offsets into the market can lower the price of traded allowances by essentially increasing the total supply of credits that are eligible for compliance and thereby reducing the price signal. Therefore, offsets could create perverse incentives that diminish the steering effect of the compliance mechanism to mitigate emissions by diluting the price signal set by the compliance scheme.

To successfully introduce offsets in a compliance scheme these perverse incentives need to be avoided and the respective risks addressed. This could be done by specific design features within the compliance scheme. To ensure that compliance parties do not rely overly on offsets and to keep a strong price signal, the use of offsets could be limited quantitively and qualitatively or the compliance scheme has a mechanism to lower the cap or raise the carbon price in accordance with the number of offsets used.

With regard to the offsets themselves, they need to be generated in compliance with environmental integrity (especially with regard to additionality, monitoring, reporting and verifying). Furthermore, robust accounting needs to be in place to avoid any kind of double counting. Offset transactions could otherwise jeopardize the environmental integrity of the jurisdiction's mitigation target, leading to an overestimation of emission reductions achieved by the compliance scheme. Both aspects, if not observed, can undermine the environmental integrity of a compliance scheme. These two aspects are a prerequisite for incorporating offsets in a compliance scheme. They can, however, not be addressed in detail in this report.

4 Case study analysis

This section contains a deep-dive analysis of the five selected case studies. Each case study contains a brief background of the compliance scheme, followed by an evaluation of how offsets performed in the compliance scheme according to each principle of success. The findings of the individual case studies will be synthesized in Section 5 to identify the salient conditions and factors that ensure offsets can support the compliance scheme in achieving each indicator of success.

4.1 EU ETS and the CDM/JI

The European Union Emissions Trading Scheme (EU ETS) was launched on 1 January 2005, following the passage of an EU Directive in 2003 to establish a cap-and-trade scheme to incentivize emission reductions in the power, heat and emission-intensive industries. In 2012, domestic flights within the European Union (EU) were also included as part of the EU ETS. The EU ETS is currently the largest emissions trading system in the world, applied to about 11,000 emissions-intensive installations that cover about 45% of the EU's current emissions (EU, 2019). The EU ETS includes the mandatory participation of EU member states, along with Iceland, Norway, Liechtenstein. In January 2020, Switzerland linked its own national ETS to the EU ETS.

In the second (2008-2012) and third (2013-2020) phases of the scheme, the EU ETS did allow for the use of international offsets certified under the Kyoto Protocol's CDM and JI mechanism. Credits from the CDM are referred to as Certified Emission Reductions (CERs) and those from the JI are referred to as Emission Reduction Units (ERUs). While there were quantitative and qualitative restrictions on compliance actors' use of CERs/ERUs since the start of the EU ETS, these rules were increasingly restricted in subsequent phases, as shown in Table 9 below (Kossoy & Ambrosi, 2010). The eligibility of any international offsets was eliminated by the EU in Phase IV of the scheme (2021 to 2030).

Table 9: Emission reduction targets for the EU ETS

	Phase I: 2005 to 2007	Phase II: 2008 to 2012	Phase III: 2013 to 2020	Phase IV: 2021 to 2030
EU ETS reduction target	Undetermined in total (based on country submissions)	6.5% below 2005 levels	21% below 2005 levels	43% below 2005 levels
Rules on offset use	No use of international offsets (CER/ERU not available yet)	Quantitative restriction for the use of CER/ERU set by a firm specific offset quota that is determined by EU Member State allocations. Qualitative restriction of not allowing CERs/ERUs from nuclear facilities, or forestry projects (such as	Qualitative restrictions that only allowed CERs/ERUS that were issued prior to 2013 could only be used until 2015; and any CERs that were issued from 2013 onwards could only be generated from CDM projects registered in least developed	No use of CER/ERU

	Phase I: 2005 to 2007	Phase II: 2008 to 2012	Phase III: 2013 to 2020	Phase IV: 2021 to 2030
		afforestation and reforestation).	countries (LDCs). CERs from industrial gas destruction projects were not allowed.	

Source: South Pole and Wuppertal Institute based on EU, 2019, and Naegele, 2019.

4.1.1 Increases acceptability of compliance scheme

Though the EU ETS was the first mandatory carbon market that was introduced globally, there was little political resistance as both policymakers and industrial groups agreed that an ETS was preferable to a carbon tax in setting a carbon price. After the signing of the Kyoto Protocol, the EU was determined to introduce a carbon price as a way to cost-effectively reduce emissions (Stavins & Delbeke, 2020). However, the original carbon pricing instrument that was explored by the EU was the carbon tax, which industrial actors were adamantly against introducing. The EU also does not have the fiscal authority to impose a carbon tax on Member States. Both the EU and European industry were more open to setting up an ETS, particularly after seeing the US success of reducing sulphur dioxide and nitrogen oxides through an ETS mechanism (Stavins and Delbeke, 2020). EU industrial actors recognized that while they could not prevent the imposition of a carbon price, they lobbied and supported the adoption of an ETS as it provided more flexibility than other types of climate policies (e.g. regulations or a carbon tax) (Forrister, 2020).

Consequently, the inclusion of offsets was not a key feature to ensuring the EU ETS was passed. Nevertheless, market player's main concern with the introduction of the ETS were carbon prices reaching prohibitively high levels due to the belief that demand for European Union Allowances (EUAs) would exceed the supply issued under the cap. According to the early issues of the World Bank's State and Trend of Carbon Markets Reports (Lecocq & Capoor, 2003; Lecocq, 2004; Lecocq & Capoor, 2005), the inclusion of international offsets from the CDM and JI was considered to be an important cost containment measure to potentially high EUA prices (Lecocq & Capoor, 2003). Therefore, the inclusion of CERs/ERUs was especially welcome, as it was expected that international credits, particularly from developing countries, would be cheaper than EUAs and penalties for non-compliance. By the same argument, the distribution of free allowances in the pilot phase was also lobbied for and welcomed as a 'phase in' measure. The EU accepted the importance of including cost containment measures to compliance buyers in the introduction of the scheme.

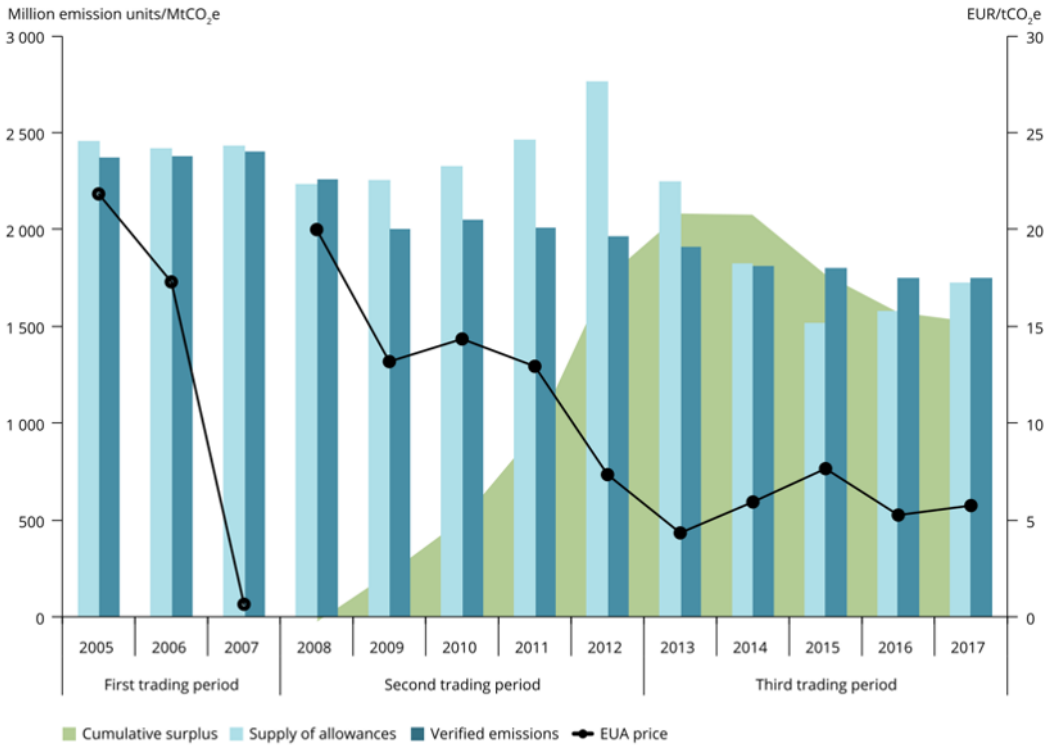
4.1.2 Enables ambition of the compliance scheme to be increased

The economic recession that started in 2008 led to a slowdown in the economy, industrial output, and a reduction in associated emissions across much of Europe which consequently affected the EUA price signal (European Environment Agency, 2015). This meant that the allowances that were released each year under the cap exceeded the amount of verified emissions – leading to a surplus of EUA allowances. The surrender of international offsets instead of EUA allowances also increased the surplus of EUA allowances, though to a more limited effect. The design of the EU ETS did not include measures to adjust the cap due to these kinds of external shocks, as the cap is set on a linear reduction from a historical baseline. As the economic recession continued, this surplus of EUAs grew to a point at which it started to affect

the market price of EUAs (as can be seen in Figure 5 below). As surplus EUAs were allowed to be banked into Phase III, there was less need for additional compliance flexibility from CERs/ERU in Phase III.

Furthermore, the EU Commission and market players had unfavourable experiences of the CDM/JI mechanism. First, the process of certifying offsets under either mechanism was delayed due to limited capacity and immaturity of institutions, which led to significant delays in the issuance and delivery of credits (Capoor & Ambrosi, 2008). This delay frustrated compliance buyers who wanted to use CERs/ERUs to arbitrage against high EUA prices. While compliance buyers were willing to undertake this risk when EUA prices were high, their appetite for CERs/ERUs diminished when the EUA price signal reduced (Capoor & Ambrosi, 2008; Capoor & Ambrosi, 2009; Capoor & Ambrosi, 2010). Second, the EU Commission also wanted to restrict the use of CERs/ERUs in future time periods, as they perceived the eventual influx of CERs/ERUs drove the price of EUAs further down (Capoor & Ambrosi, 2009; Capoor & Ambrosi, 2010; Stavins & Delbeke, 2020).

Figure 5: Reduced EUA price signal due to cumulative surplus of EUA allowances



Source: European Environment Agency, 2018.

The surplus of EUAs that was building up since 2008, along with the perception it contributed to a weak EUA price signal, meant that CERs/ERUs were no longer needed as a cost containment measure in future periods (Capoor & Ambrosi, 2010; Stavins & Delbeke, 2020). This made it relatively easier to pass the EU Climate and Energy Package for Phase IV, where a more ambitious target could be set in the future with excluding the use of CER/ERUs.

4.1.3 Provides policymakers with flexible options to achieve emission reductions

According to Grubb (2012), while the primary objective of implementing the EU ETS was to establish a carbon price for large emissions-intensive facilities, a secondary objective was to enable financing of emission reductions in emerging and developing countries through accepting CER/ERU eligibility for the EU ETS. The EU also recognized its leadership role as an Annex I party to the Kyoto Protocol, which required supporting developing countries in undertaking emission reductions through providing finance and enabling technology transfer. Through the offset mechanism, the EU had the flexibility to incentivize emission reductions in these economies. Interestingly, EU policymakers were initially more interested in driving emission reductions in eastern European countries through the JI mechanism when setting up the EU ETS, particularly for those that were finalising their accession into the European Community (Forrister, 2020).

EU policymakers also tried to leverage its power on determining future eligibility rules of CER/ERUs for the EU ETS to influence international climate negotiations in 2009 (Capoor & Ambrosi, 2009). The EU threatened that if the international community refused to adopt a higher global reduction target as part of the Copenhagen Accord in 2009, it would restrict and phase out the use of CERs/ERUs in future compliance periods (Capoor & Ambrosi, 2009). Due to the disappointing outcome of the Copenhagen climate conference, along with the reduced need to use CERs/ERUs as a cost containment measure, the EU decided to restrict and phase out offsets in future compliance periods.

4.1.4 Promotes investments in sustainable development

With the decision to allow CERs/ERUs to be used for compliance, the basis for the EU ETS emerging as the largest source of demand for credits from the Kyoto Protocol's project-based mechanisms was established (Capoor & Ambrosi, 2006; Capoor & Ambrosi, 2007; Capoor & Ambrosi, 2008). The EU ETS was a strong driver in enabling carbon finance flows to developing countries through the CDM. The CDM was introduced with the dual goal of assisting developing countries in achieving sustainable development while helping industrialized countries in achieving compliance with their mitigation targets (Kyoto Protocol, Art. 12.2). JI projects were implemented in industrialized countries where much of the sustainable development impacts (e.g. reducing poverty through job creation) were realized within these countries. But since the JI does not have the objective of contributing to sustainable development, the focus of the analysis will be the CDM.

While a number of CDM projects have contributed to the sustainable development of their host countries, the mechanism has been widely criticized for not enfolding more impact and better incentivising investments in sustainable development (e.g. Olsen, 2007) for two main reasons.

The first main criticism is that the goal of contributing to sustainable development has been operationalized only weakly. The CDM Executive Board (CDM EB) is responsible for tasks such as the registration of projects and the issuance of certificates, as well as assessing the mitigation benefit of projects. However, activities' contributions to sustainable development, and any potential adverse impacts, are not within the scope of the CDM EB's governance tasks. At the national level, CDM projects must be approved by the Designated National Authorities (DNAs), which are also responsible for assessing each project's contributions to sustainable development. This is done according to the assessment criteria of the host country, in the

absence of internationally agreed standards (e.g. common definitions or criteria)[2], what cannot guarantee a robust evaluation.

The most relevant achievement in developing a system for assessing sustainable development in the CDM was the Sustainable Development Tool, launched in 2014. This tool, displays significant shortcomings as it mainly consists of a voluntary declaration of activities' sustainable development benefits and does not contain any safeguards to address negative impacts (Arens et al., 2015; Olsen et al., 2018). Another criticism is that there are no mechanisms to address problems that may arise after a project has been registered, such as a grievance mechanism which would allow stakeholders to raise their concerns about projects' operational impacts (Obergassel et al., 2017). These operational impacts could include issues that put sustainable development at risk.

The second reason for the CDM's limited contribution to sustainable development relates to the project-based nature of the mechanism. While this seems well suited for targeting emissions stemming from single large facilities, such as industrial gas and large-scale renewable energy projects, the conventional CDM modalities are less effective at reaching small and dispersed emission sources through projects that are often associated with strong sustainable development benefits. To address this, an approach was introduced that would allow single individual activities to be bundled and registered as part of a Programme of Activities (PoA). The uptake of PoAs was initially slow (Kreibich et al., 2011) but later gained momentum, including in regions with a smaller pipeline of CDM projects, such as Africa. While continuing demand could have fostered investments in PoAs in underrepresented regions and with high sustainable development contributions, this momentum was hindered by the lack of demand for CERs, in particular from the EU ETS. The oversupply in the EU ETS also reduced the impact of the EU's decision to accept only CERs from LDCs for compliance under the EU ETS from 2013 onwards. While focusing on such activities could have strengthened sustainable development contributions of the CDM, the effect of this regulation was limited (Kreibich et al., 2017).

4.1.5 Avoids perverse incentives

There are two important ways in which CERs/ERUs are perceived to have created perverse incentives with the EU ETS – though actual empirical evidence is mixed.

The first contention is that firms chose to surrender CERs/ERUs instead of reducing their own emissions. However, the EU put specific policy design measures in place to avoid this perverse incentive for compliance actors to rely solely on using CERs/ERUs, by setting restrictions on the number of CERs/ERUs that could be surrendered by each installation (Koch et al., 2014).[3] Though this varied by country and installation, on average, installations could surrender a maximum of 13.5% of allocations under Phase II of the scheme (Trotignon, 2012). The total number of international offsets that can be surrendered decreases each year as the allowances under the EU ETS cap is reduced under Phase III.

Even with this restriction, empirical studies demonstrate firms did not use the maximum amount of CERs/ERUs they were allowed to use, despite availability of CERs/ERUs at a discounted price to EUAs (Naegele, 2017; Sato et al, 2016). Trotignon (2012) demonstrates the surrender of CERs was infrequent over the course of Phase II and was concentrated right before the EU ETS restricted the use of CERs in Phase III in 2012. This result suggests that EU ETS firms behaved rationally, as surrendering CERs at the end of Phase II allowed them to bank a greater

[2] Attempts to strengthen the role of sustainable development under the CDM were challenged by developing Parties, which argued that sustainable development must be considered a national prerogative.

[3] The EU specified the maximum limit of CER/ERUs that could be surrendered by each Member State, which varied by Member State. Member State governments then specified the percentage restriction of CER/ERUs for each installation (Koch et al., 2014).

number of surplus EUAs into Phase III. Interestingly, Naegele (2017) and Sato et al (2016) finds that not all firms acted rationally. In fact, Naegele (2017) shows that only 50.5% of firms used their full offsets entitlement for the whole of Phase II, while 22% of firms *did not use any* of their offset entitlement. Sato et al (2016) confirms that only about 76% of the total entitlement of international credits that could be surrendered was used in Phase II, with 64% and 36% of offsets surrendered coming from CERs and ERUs respectively. Their paper also shows that companies that received an overallocation of free EUAs in Phase II were positively linked to offset usage, contradicting the idea that free allocation would deter the need to use offsets.

In terms of sectoral characteristics, Sato et al (2016) finds that the cement and iron and steel sectors used at least 90% of their offset quota, potentially due to finding cost-savings to mitigate potential competitiveness effects. Surprisingly, the energy sector (involving fuel combustion and oil refineries) used between 67%-71% of its offset usage, potentially due to their ability to pass costs downstream. Interestingly power companies had the most variation in their offset use, with Greek and Polish utilities using 100% of their offset quota, while Spanish and Italian utilities used about 50 to 60% of their offset quota. Interestingly, most German, French and Portuguese power companies had the most divergence amongst offset use in their companies, with certain companies using over 80% of their offset usage while others used 55% and less. Their paper shows that companies that had subsidiaries in the locations in which offsets were sourced were more likely to use offsets. This was particularly in the case of cement companies, but not necessarily for energy companies – pointing again to the importance of sectoral variation.

Naegele (2017) finds that transaction costs associated with trading allowances (regardless whether they were EUAs, CERs, or ERUs) was the main reason that firms did not realize the significant costs savings that they could have achieved if they surrendered CERs/ERUs instead of EUAs. Hintermann, Peterson, and Rickels' (2016) literature review on EUA price dynamics also confirms that the transaction costs of trading, and information asymmetries in accessing CER prices, played an important role in explaining whether or not firms sought arbitrage opportunities between EUAs and CERs to reduce their EU ETS costs. Interestingly, Sato et al (2016) is the only paper that finds smaller firms (in terms of turnover) tend to use a relatively higher percentage of their offset quota. Their paper also shows firm's willingness to trade is more likely determined from corporate culture and attitudes towards risk.

The second criticism of CERs/ERUs is that the influx of supply in the EU ETS diluted the EUA price signal by inflating the cap, creating the perverse incentive for compliance actors to pay the EUA price rather than reduce their own emissions. Trotignon (2012) findings of concentrated surrender of CERs in 2012 to allow for banking of EUAs into 2013 can thus explain why the EUA price reached its second lowest level in 2013 (European Environment Agency, 2018). However, Koch et al (2014) suggests that while the supply of CERs/ERUs did reduce the EUA price signal, on balance, reduced economic activity, increased renewable energy generation, and fuel switching options played a more significant role in explaining lowered EUA prices in Phase II. This conclusion is corroborated by Hintermann, Peterson, and Rickels' (2016) literature review of empirical studies that examine factors that affect EUA price dynamics. Nazifi (2020) suggests it was the crash in the EUA price signal that drove down the CER price, particularly with the quantity and qualitative restrictions on the use of CERs imposed by the EU in Phase III. Therefore, the empirical evidence suggests that other factors played a much stronger role in reducing the carbon price signal that the supply of CERs/ERUs.

While the evidence is mixed as to whether offsets present perverse incentives to compliance actors, the EU ETS example points to the importance of instituting safeguards to limit the potential for perverse incentives. Given the wide variation in offset use, it is prudent to institute

offset quotas on compliance actors to ensure emission reductions are actually reduced at the facility level. In the case of the EU ETS, the quantitative restrictions for the use of offsets were determined under the Linking Directive, which allowed member states to grant operators the right to use CERs/ERUs up to a defined percentage through their National Allocation Plans (Sate et al, 2016). Each member state could then define the limit of the use of CERs/ERUs for each facility level, taking heed to the Kyoto Protocol and Marrakech Accords that required offsets to be supplemental to domestic action.

Another mechanism to ensure the environmental integrity of the compliance scheme is to lower the cap of the EU ETS by an equivalent amount as the total offset quota, thereby ensuring the supply of external credits does not compromise the carbon price signal of the scheme. The EU increasingly restricted the use of offsets for Phase III of the scheme through qualitative restrictions, and an outright ban in Phase IV. However due to the persistent surplus of allowances in the early years of Phase III, the EU passed an amendment to the EU ETS Auctioning Regulation in 2014 that allowed EU policymakers to reduce the amount of allowances that was originally anticipated to be auctioned under the EU ETS cap between 2014 and 2016, that were held in a reserve so that it could be auctioned in 2019 and 2020. This safeguard mechanism is referred to as backloading. Between 2014 and 2016, a total volume of 900,000 million allowances were backloaded. While this was a temporary solution, the launch of the Market Stability Reserve in 2019 is the EU's more permanent solution to addressing the oversupply of allowances. The Market Stability reserve sets supply thresholds that adjusts the number of allowances that are released, or withheld, in the EU ETS (European Union, 2019).

4.1.6 Key observations

The linkages between the EU ETS and CDM/JI markets provided limited value to both mechanisms (as summarized in Table 10). First, while the incorporation of CERs/ERUs into the EU ETS did increase its acceptance as a cost containment option, there was little political resistance to the introduction of the EU ETS in the first place. CERs/ERUs were also not needed as a cost containment measure when the EU proposed increasing its mitigation targets, given the large surplus of EUAs. Though EU policymakers blame the influx of CER supply in compromising the EU ETS, empirical evidence suggests that CERs/ERUs played a limited role in depressing the EUA price signal, though the evidence is more mixed on compliance actors' willingness to use offsets to meet compliance.

EU policymakers originally did incorporate the CDM/JI into the EU ETS as a way to meet its international commitment to support climate mitigation and sustainable development in emerging and developing countries. While the EU ETS did create a large demand for CERs, this demand was skewed to large-scale projects that had fewer sustainable development co-benefits. The lack of a clear definition and measurement of sustainable development impacts in the CDM certification process makes it unclear to what extent the CDM itself achieved its objective regarding the sustainable development.

Table 10: Summary of the principles of success achieved under the EU ETS and CDM/JI mechanisms

Principles of success	EU ETS and CDM/JI mechanisms
Increases acceptability of compliance schemes	**Yes**. While there was little political resistance to the passing of the EU ETS as a preferred carbon pricing mechanism, the inclusion of international offsets further increased its acceptance as a cost containment option.

Principles of success	EU ETS and CDM/JI mechanisms
Enables ambition of the compliance scheme to be increased	**No**. Offsets have not led to an increase of the ambition level of the EU ETS.
Provides policymaker flexibility	**Yes**. Allowed EU policymakers a mechanism to meet their international commitments to supporting emissions reductions in developing and emerging economies as part of the Kyoto Protocol. EU policymakers decision-making on inclusion of the CDM/JI under the EU ETS also gave the EU negotiating leverage in international climate negotiations.
Promotes investments in sustainable development	(CDM only) **Unclear**. In Phase I and II of the EU ETS, the high EUA prices spurred investments into CDM/JI projects. While the EU ETS created a large demand for CERs, there are major critiques of whether it was able to achieve broader sustainable development co-benefits. Additionally, while supporting host countries in achieving sustainable development is one of the two objectives of the CDM, the lack of an international definition of sustainable development as well as respective criteria and Measuring, Reporting, and Verification (MRV) provisions limited the EU ETS' contribution in promoting sustainable development.
Avoids perverse incentives	**Limited and mixed effect.** Not all firms used their maximum limit of offsets despite the availability and low price of CERs, though there is variation by sector. Empirical evidence suggests that while the influx of CERs did play a role in depressing the EUA price signal, other factors played a more significant role.

Source: South Pole and Wuppertal Institute

4.2 Alberta's ETS

Alberta was the first province in Canada to introduce and implement an ETS, and indeed is one of the oldest carbon markets in the world (The World Bank, n.d.). Alberta first passed the Climate Change and Emissions Management Act (CCEMA) in 2003 that required the collecting of emissions data for large facilities. In 2007, the Albertan Government passed the Specified Gas Emitters Regulation (SGER) Act, which incentivized emission reductions through a baseline-and-crediting ETS scheme. The SGER, and subsequent versions of Alberta's ETS, required facilities to pay for the tonnes of emissions that went above their baseline through three different options (Sopher, Mansell, & Munnings, 2013):

- by buying offsets from emission reduction projects in Alberta that were certified under the International Organisation for Standardisation (ISO) 14064;
- by buying Emissions Performance Credits (EPCs) from other facilities, which had produced lower emissions than their benchmarks; or
- by paying a fixed fee into a technology fund.

The contentious politics of climate change in Alberta has been accompanied by the changes in the elected Government of Alberta. Each newly elected Government has changed the design features of the Albertan ETS itself to reflect its position on climate. Table 11 below summarizes how new versions of the Albertan ETS have been introduced with the change of governments.

Table 11: The evolution of climate regulation in Alberta: from monitoring to setting carbon prices

	Climate Change and Emissions Management Act (CCEMA)	Specified Gas Emitters Regulation Act (SGER)	Carbon Competitiveness and Incentive Regulation (CCIR)	Technology Innovation and Emissions Reduction (TIER)
Implementation	2003	2007	2018	2020
Political party involved	Introduced by Progressive Conservative Association (PCA)	Introduced by PCA and continued operation under the New Democratic Party (NDP) from 2015 to 2017	Introduced by NDP and continued under United Conservative Party (UCP) in 2019	Introduced by UCP
Size of affected facilities	>50,000 tCO_2e/year	>100,000 tCO_2e/year	>100,000 tCO_2e/year in 2003 or subsequent years	>100,000 tCO_2e/year in 2016 or subsequent years
Emissions reduction requirement and baseline definition	Monitoring only	12%, from 2003-2005 baseline emissions intensity that has Facility-Specific Benchmarks (FSB)	Variable, output-based allocation formula based on High-Performance Benchmarks (HPB) or 80% of the average	Variable, output-based allocation formula that integrates HPB with FSB
Technology Fund Fee*		2007 to 2015: CAD 15 (EUR 9.90); 2016: CAD 20 (EUR 13.20); 2017: CAD 30 (EUR 19.80)	2018 to 2019: CAD 30 (EUR 19.80)	2020: CAD 30 (EUR 19.80); 2021: CAD 40 (EUR 26.40); 2022: CAD 50 (EUR 33.00)
Maximum use of flexibility mechanisms (EPCs or offsets) by facility for compliance		30%	30%	60%

Source: Swallow & Goddard, 2016; Alberta Climate Change Office, 2018; Alberta Government, 2019; Alberta Environment and Sustainable Resource Development Climate Change Secretariat, 2012. *Exchange prices from Canadian dollars to Euros are all at exchange rates set in June 2020

4.2.1 Increases acceptability of compliance scheme

The introduction of the Alberta SGER was based on foreseeing and responding to international and federal calls to climate action (Swallow & Goddard, 2016). In the run up to Kyoto Protocol negotiations in 1997, the then Prime Minister of Canada, Jean Chretien, was a strong proponent

of Canada being a climate leader (Swallow & Goddard, 2016). He pledged for Canada to reduce its emissions by 6% based on 1990 levels as part of the Kyoto Protocol, which Canada ratified in 2002 (Swallow & Goddard, 2016). In contrast, the Premier of Alberta at the time, Ralph Klein, opposed such climate goals (Swallow & Goddard, 2016).

Nevertheless, in order to ensure that Alberta had the power to formulate provincial policies to meet federal targets, Alberta passed the Climate Change and Emissions Management Act (CCEMA) and the Specified Gas Emitters Regulation (SGER) (Swallow & Goddard, 2016). The manner of setting the baselines, as well as the cost containment measures to cover emissions that went over facilities' baselines, were key to gaining agreement to introduce the SGER. According to Swallow & Goddard (2016), the design of the scheme was influenced by heavy lobbying by the Canadian Association of Petroleum Producers (CAPP), who favoured the SGER as a means of providing emission intensity regulations, since it did not threaten the competitiveness of Alberta firms (particularly against their American competitors) and to ensure cost containment measures through the inclusion of offsets and the technology fund fee. The implementation of the SGER gave 'the appearance of decisive action' taken by the provincial government (Swallow & Goddard, 2016).

Another interest group that was heavily in favour of offset use in particular was agricultural producers, as some of the approved Alberta Protocols included reducing emissions from agricultural lands and biological methane from cattle. As agriculture and dairy are important industries in Alberta, the inclusion of offsets thus generated large support from interest groups such as the International Federation of Agricultural Producers (IFAP), the Alberta Cattle Feeders Association (ACFA), and the Soil Conservation society (Swallow & Goddard, 2016). The sale of offsets would provide additional revenue streams to these sectors.

In short, the Albertan Government and its interest groups did recognize the need to demonstrate action towards addressing climate change, as it was one of the most carbon-intensive provinces in Canada. Therefore, the motivation of introducing the SGER was to head-off external criticism – and it was likely the provincial government would be able to implement it. Furthermore, the SGER itself was designed with compliance actors to ensure it did not threaten the competitiveness of domestic firms, with offsets being one of three design features (baselines and technology fund fee) that contained the compliance costs. However, the inclusion of offsets did enable support for the SGER from politically powerful interest groups that would benefit from the sale of offsets, and also from Albertan citizens who also favoured supporting the agriculture industry.

4.2.2 Enables ambition of the compliance scheme to be increased

The changes in the design of the ETS in Alberta – including levels of ambition - was due to changes in political parties in Alberta and the Federal Government, and their associated stance on climate action.

In 2018, the existing SGER was officially transitioned to the Carbon Competitiveness and Incentive Regulation (CCIR), a more ambitious scheme with regards to setting more stringent baselines under which compliance facilities would have to perform. The reason the CCIR was introduced was due to the election of the New Democratic Party (NDP) in 2015. Though the NDP election was historic, their election win was as a backlash against the incumbent Progressive Conservative Party, who were seen to have failed to insulate the province from the 2014 oil crash (Riedhulbe, 2015). In contrast, the NDP is a left-wing party that has a strong policy platform on undertaking climate action. The NDP introduced the Alberta Climate Leadership Plan in 2015, which included transforming the SGER into the CCIR by setting more stringent

targets based on industry standards. Facilities, however, were still allowed to use offsets, or pay into the technology fund. Offsets were welcome as an alternative price to paying the technology fund fee, as the NDP essentially doubled the fee price between 2015 and 2017 (see Table 11 above).

However, in April 2019, the United Conservative Party (UCP) defeated the NDP, based on the political promise to "scrap the job-killing carbon tax" (Lake, 2019). The UCP replaced the CCIR with the Technology Innovation and Emissions Reduction (TIER) system, starting on 1 January 2020. The UCP initially wanted to revoke carbon pricing in Alberta altogether, but realized that it would trigger the Federal Government to intervene under the Greenhouse Gas Pollution Pricing Act, passed in December 2018. This Act requires all provinces in Canada to have an economy-wide carbon price (Government of Canada, 2019). Though provinces have the choice to implement this carbon price through an ETS, carbon tax, or hybrid system, each province must ensure that the carbon price achieved is in line with the federal carbon price level for that year. Provinces that fail to implement this carbon price will be subject to a revenue-neutral carbon tax imposed by the Federal Government, which acts as a backstop mechanism.

In order to retain greater control of the carbon price in the province, the UCP introduced TIER, which integrates the design elements of the CCIR and SGER by rewarding facilities with the best-in-class performance but would have even lower requirements than the CCIR for the facilities that had lower performance (Government of Alberta, 2019). The TIER also increased the maximum limit of flexibility credits (EPCs and offsets) that each facility could use from 30% under the previous systems to 60%. Nevertheless, the TIER Fund fee would be in line with the mandated carbon price level set by the Federal Government (Government of Alberta, 2019). The TIER is therefore less ambitious in terms of having lower baselines for facilities that are underperforming in comparison to the best-in class baseline set by CCIR. But the TIER system is forced to be more ambitious in terms of setting a higher carbon price ceiling than the previous compliance mechanisms due to the Federal Government, which is set to be raised to CAD 50 (EUR 33) per tCO_2e in 2022.

Given these political circumstances, it cannot be argued that offsets were a key factor in enabling the compliance scheme to raise its ambition, as this was due to the level of climate ambition of the successive parties in the province, and policy alignment to the ambition level set by the Federal Government. The continuous use of offsets was due to its entrenchment in the original design of the SGER, and its success in providing revenue to politically powerful industries. Furthermore, it is clear that the provincial government wanted to create a 'counterweight' to the increase in the price levels of the TIER Fund by increasing the maximum limit of EPCs and offsets that could be surrendered. Therefore, the continued and more flexible use of offsets in Alberta could be perceived as a measure to water down the ambitious climate policies set by the Federal Government, thus as a hinderance to raising ambition. Offset sellers would welcome the higher carbon price and compliance limit as it provides the business case to undertake more ambitious climate change projects. Compliance buyers would also welcome the use of offsets as a cost containment measure against having to pay the higher TIER fund price for excess allowances.

4.2.3 Provides policymakers with flexible options to achieve emission reductions

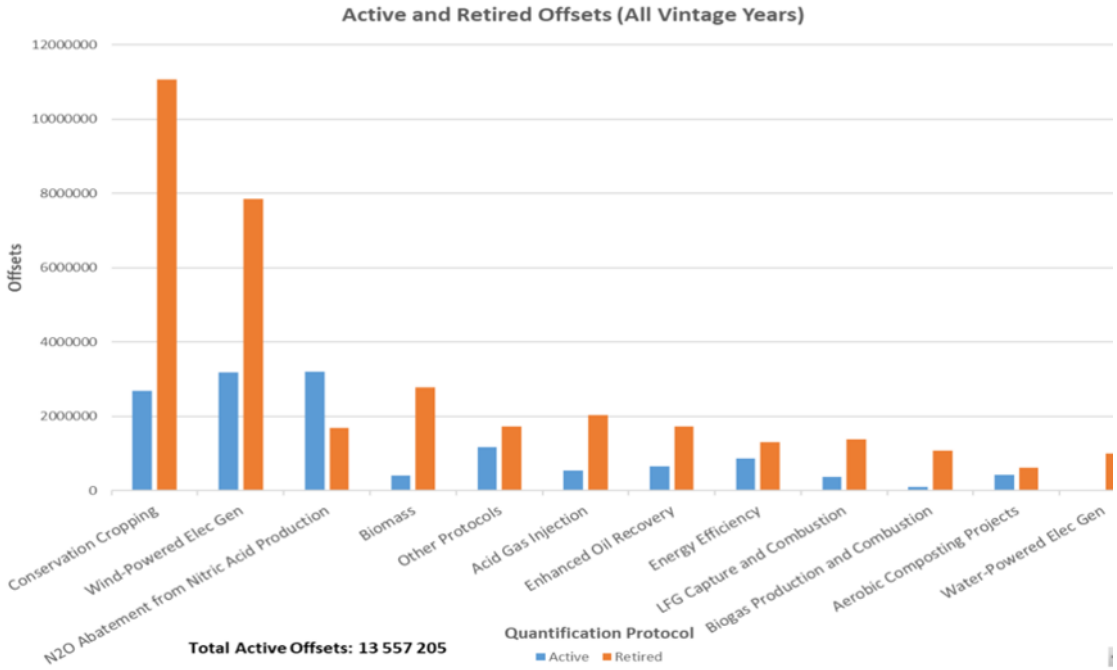
Climate change is a politically sensitive issue in Alberta, given the economy's dependence on the oil and gas industry. The Progressive Conservative Party under Premier Ralph Klein recognized that undertaking a first-mover approach to introducing a carbon pricing system would help Alberta in defending itself against external criticism – including the threat of the Federal Government imposing a carbon price on Alberta. However, the Albertan Government would also

face internal criticism of unilaterally imposing a carbon price on domestic industry that could severely hurt domestic competitiveness against foreign competitors who did not face the same carbon prices.

Given these circumstances, offsets provide an opportunity to policymakers to enable emissions reductions in non-compliance sectors, and for high cost projects in compliance sectors. The Government of Alberta would not be able to impose regulations or explicit emission reduction targets on non-compliance sectors – particularly agriculture – due to the politically powerful nature of this group, and the wider political support for the agricultural industry. Indeed, as Figure 6 below shows, the agriculture industry has benefited the most from offset sales, enabling finance for emission reductions in conservation cropping and biomass that would otherwise be difficult to achieve. Furthermore, offsets provided financing for undertaking higher cost abatement for the oil and gas sector (e.g. acid gas injection) and the chemical industry (through nitrogen dioxide abatement from nitric acid production).

By developing and approving offset methodologies for these sectors, the Albertan Government was able to create incentives for emission reductions in hard-to-abate sectors and technologies within compliance sectors that have high abatement costs. These projects have generated 47 $MtCO_2e$ emission reductions between 2007 and 2018 in sectors outside the Albertan ETS, thereby demonstrating how offsets can drive emission reductions in these sectors (Alberta Climate Change Office, 2018).

Figure 6: Comparison of types of offsets used for Alberta compliance market



Source: Government of Alberta, 2018.

4.2.4 Promotes investments in sustainable development

The approved protocols for the Alberta ETS covered not just emission reductions from heavy industry and renewables, but also nature-based solutions (NBS) with improved agricultural practices and reducing biological methane. The latter two types could be argued to have stronger sustainable development co-benefits. In addition, offsets provide income diversification

to the agricultural communities in Alberta. As a result, 240 projects were developed (Alberta Climate Change Office, 2018). However, as the offsets were only allowed to be sourced from projects located in Alberta, it can also be argued that this geographical restriction prevented investments in sustainable development opportunities in other Canadian provinces or in other countries, especially LDCs.

4.2.5 Avoids perverse incentives

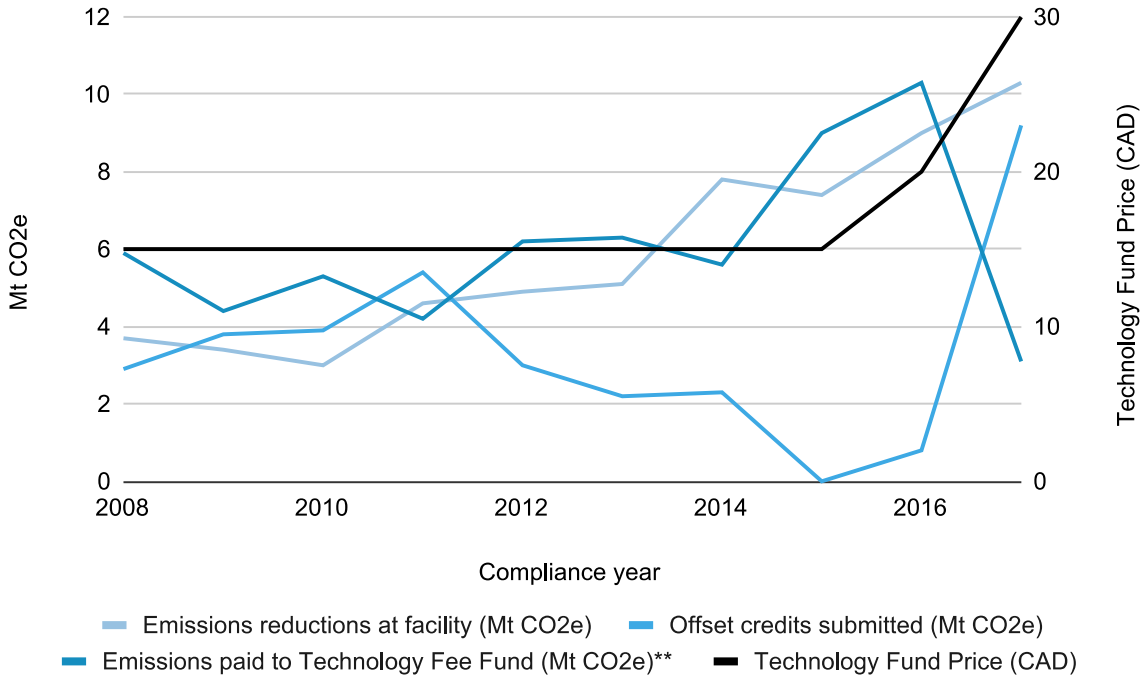
The SGER and CCIR did have a 30% limit on flexible compliance through surrendering EPCs and offset credits (Alberta Government, 2018). However, the TIER system actually increased the flexible limit to 60%, thereby giving firms the option to insulate themselves from paying the higher carbon price signal set by the Federal Government – thereby creating perverse incentives.

As a baseline-and-credit scheme, the SGER and CCIR can provide data to compare which flexible mechanism actors used to meet their compliance obligations. In looking at Figure 7 below, the period between 2009 and 2011 was the only time that total offsets that were surrendered for compliance exceeded total emissions reduced by compliance facilities. The reason may be that the economic recession prevented facilities from investing into their own emission reductions, thereby making it cheaper to rely on offsets. Therefore, for most years of the SGER, a greater number of emission reductions were achieved at the facility level, rather than relying on offsets. While this does not necessarily suggest that offsets avoided perverse incentives, it does suggest that facilities responded to the price signal by putting more efforts to reduce their own emissions rather than use offsets.

However, in most years, the mechanism that was most used to meet compliance obligations was the option to pay the technology fund fee. Only in 2017 was there a dramatic reduction in excess emissions being paid through the technology fund fee, with compliance largely being met by reducing emissions at the facility level, and then offsets. The main reason is because the fee price doubled between 2015 to 2017.[4] These changes in behaviour suggests that the most important determinant on whether the compliance actors reduced their own emissions was the carbon price signal of the compliance scheme, rather than the inclusion of offsets itself. In this case, the carbon price signal is set by the Government and could not be diluted by offsets.

[4]It should also be noted that in 2016, the number of offsets that were surrendered were low, as offset sellers decided to withhold their sale in 2016 in order to be able to sell offsets at a higher price in 2017.

Figure 8: Emission reductions and research funds raised from Alberta SGER



Source: Own illustration based on Alberta Climate Change Office, 2018.

* Includes additional credits issued under section 7 (1.2) of the SGER

**Calculated by dividing total payments to the fund by the Tier Fund Price.

Figures are subject to change as a result of auditing and are rounded for presentation purposes.

Updated 27 August 2018

4.2.6 Key observations

The case study of Alberta emphasizes how politics affect the ambition and design of compliance schemes, including the role of offsets. There were three main ways offsets provided added value to the Albertan ETS. First, it increased the acceptance of the SGER, as both compliance actors and offset sellers played an instrumental role in ensuring it was included as a flexible mechanism for compliance. Second, sourcing offsets from Alberta was politically attractive to policymakers as well, as offsets could drive emission reductions in sectors that had high political support. Offsets also created a way to provide additional income to the agriculture industry, thereby providing sustainable development co-benefits that were also attractive to the wider public. While the primary motivation to introduce the SGER was to hedge against the imposition of a federal climate policy, offsets did play a role in increasing its acceptance within the province. Third, the political acceptability of increasing the carbon price ceiling in subsequent ETS was supported by the continued use of flexible mechanisms, such as offsets.

The Alberta example of the institution of the CCIR shows that sending strong carbon price signals can lead to increased efforts to reduce emissions at the facility level, and the increased use of offsets. Unfortunately, the replacement of the CCIR with TIER meant the new provincial government purposefully undermined the strong price signal of the Federal Government by allowing more flexibility in the use of offsets. The example of Alberta demonstrates the difficulty in setting and maintaining a strong carbon price signal when domestic politics allows for changes in government, who can then change the design of the compliance scheme to enable perverse incentives to occur.

Table 12: Summary of the principles of success achieved under the Alberta SGER and CCIR

Principles of success	Alberta SGER, CCIR, and TIER
Increases acceptability of compliance schemes	**Yes**. Generated large support from interest groups, both for compliance actors (particularly the oil industry) concerned about the costs of compliance; offset suppliers (mainly the agricultural sector), as the sale of offsets would provide them with additional streams of revenue; and Albertans, who were concerned both on the costs of the ETS and welcomed support for the agricultural industry.
Enables ambition of the compliance scheme to be increased	**No**. Offsets were not the key factor in the increased stringency of the scheme, however it is now an entrenched design feature of ETS as the carbon price ceiling set by the technology fund fee increases. Compliance buyers want offsets as an alternative to paying a higher technology fund fee price, and offset suppliers benefit from increases in the carbon price.
Provides policymaker flexibility	**Yes**. Offsets provide policymakers with the flexibility to drive emission reductions within and outside compliance sectors through choice of approved protocols. This flexibility is especially valued to gain political support in Alberta, but also to drive emission reductions in hard-to-abate sectors.
Promotes investments in sustainable development	**Unclear**. On the one hand, it allowed project types with strong sustainable development co-benefits. On the other hand, it required offsets to be originated in Alberta, preventing other regions (either within Canada or internationally) from receiving sustainable development investments.
Avoids perverse incentives	**Depends on whether a strong carbon price signal can be maintained while still limiting offset use**. The main mechanism that has determined whether compliance actors reduce their own emissions is the technology fund fee, where higher fund fee prices has led to greater abatement at the facility level. However, Albertan politics demonstrates the difficulties in maintaining a strong carbon price signal in the long term, as local governments can undermine the strong carbon price signal by increasing the use of flexible measures, such as offsets.

4.3 Australia's Emission Reduction Fund and Safeguard Mechanism

In 2015, the Australian ERF and Safeguard Mechanism replaced the Carbon Pricing Mechanism (CPM) that was established under the Clean Energy Act of 2011. The Australian ERF is a public fund that commits AUD 2.55 billion (approximately EUR 1.6 billion) to buy offsets – officially referred to as Australian Carbon Credit Units (ACCUs) – that are certified by the Australian Clean Energy Regulator under an approved methodology. The Safeguard Mechanism is a baseline-and-

offset ETS that covers facilities[5] that emit over 100,000 tCO_2e per year (The World Bank, n.d.). Compliance facilities under the Safeguard Mechanism need to surrender ACCUs if they exceed their baselines. Therefore, the ERF and the Safeguard Mechanism create demand for offsets through two separate mechanisms: a public fund and an ETS.

4.3.1 Increases acceptability of compliance scheme

The case study of Australia demonstrates the difficulties of keeping a stringent carbon pricing instrument in economies whose political discourse is dominated with ensuring domestic, carbon-intensive firms keep their international competitive advantage (Parr, 2019). In jurisdictions where stringent carbon pricing can be easily revoked, offsets may be the only instrument that is acceptable in incentivising emissions reductions in the absence of a stringent carbon price, as is explained below.

The CPM was introduced in 2012 by Prime Minister, Julia Gillard, who wanted to help Australia set an ambitious climate target backed by strong carbon price (Parr, 2019)[6]. A year after the CPM was introduced, opposition Leader Tony Abbott won the 2013 election precisely because he campaigned for the repeal of the CPM (Parr, 2019). Specifically, he argued that the CPM put a high cost burden on domestic firms, deterred international investments into lucrative fossil fuel extraction projects that would benefit the Australian economy, and thereby forego the royalty revenues that could be used to invest into important social programs. Furthermore, the members of Abbot's party discredited the CPM by saying it only achieved 0.1% of emission reductions in its first year of operation, while placing an AUD 7.6 billion cost on the economy (Parr, 2019). Within a few months of his election, Prime Minister Abbot introduced a bill to repeal the Clean Energy Act of 2011 under which the CPM was also established. Though the Senate rejected these bills, Prime Minister Abbot did eventually manage to have the CPM repealed in 2014 (Talberg et. al., 2015).

During the process of repealing the CPM, Prime Minister Abbott advocated for the introduction of the ERF as a replacement of the CPM (Parr, 2019). He argued the ERF was a superior compliance mechanism to the CPM as it did not hurt the international competitiveness of Australian firms by imposing a high carbon tax on domestic firms. Prime Minister Abbot also argued that the ERF would help Australia meet its compliance target under the Kyoto Protocol by using the public money to procure an estimated 421 million ACCUs over the period to 2020 (Talberg et. al., 2015; Parr, 2019). The ERF would even help compliance facilities reduce their emission reductions from facilities, as these facilities could sell ACCUs to the ERF if they undertook methodologies that were approved by the Clean Energy Regulator (Parr, 2019). Additionally, Prime Minster Abbot argued that the ERF was a more cost-effective way to source emission reductions in Australia, as it undertook reverse auctions to procure ACCUs.

Though the ERF put the onus of achieving emission reduction target on the Government, the Government had to ensure it did not send a policy signal that compliance facilities that were formerly under the CPM could therefore increase their emissions. The Safeguard Mechanism was consequently introduced to ensure facilities keep their emissions within an emissions intensity baseline. Facilities could buy ACCUs if they went above their baseline.

[5]Sectors covered include power generation, mining and resources, oil and gas extraction, gas supply, manufacturing (including metals, cement and lime), transport (air, sea, rail and road), heavy and civil engineering and waste (The World Bank, n.d.).

[6]The CPM required compliance facilities to buy permits from the Government at a fixed carbon price of AUD$23 per ton which eventually would be transitioned to a floating price ETS after three years (Castellas et al., 2016).

4.3.2 Enables ambition of the compliance scheme to be increased

Australia decreased its ambition between its 2020 target for the Kyoto Protocol and its 2030 target under the Paris Agreement (Climate Action Tracker, 2019):

- Kyoto target:
  - First commitment period: an economy wide commitment to limit emission to 8% above 1990 levels by 2012
  - Second commitment period: an economy wide commitment to limit emission to 0.5% below 1990 levels by 2020
- Paris NDC: 26% to 28% below 2005 levels by 2030 (equivalent to 4% to 7% above 1990 levels by 2030 if LULUCF is excluded)

The reduction in ambition is reflective of the Liberal Party's position on ensuring climate policies do not inhibit carbon-intensive industries in Australia. Australia submitted its NDC in the same year as it launched the ERF and Safeguard Mechanism. Therefore, the procurement of offsets via the ERF or Safeguard Mechanism has not led to an increase of ambition by the Australian Government. However, this reduction of ambition is more reflective of the position of the current elected Government. It is also unlikely that Australia will increase its ambition under the 2020 NDC submission. In the 2019 elections, the opposition parties in Australia all proposed more ambitious carbon targets to be submitted as part of an updated NDC, but they were defeated by the incumbent Liberal Party, who proposed maintaining the 2015 NDC target (Gabbatiss, 2019)[7].

The only signal the current Government has demonstrated in continuing to support emission reductions domestically is by injecting an additional AUD 2 billion (approximately EUR 1.2 billion) to procure future ACCU volumes under the Climate Solutions Fund (CSF) (Australian Government Clean Energy Regulator, 2019). The main reason is that the ERF has already allocated over 90% of its capital to acquiring 193 million ACCUs, which shows the expected 421 million ACCUS procured by 2020 to be an overestimation. (Talberg et. al., 2015; Australian Government Clean Energy Regulator, 2019). Furthermore, international climate negotiations are discussing putting restrictions on carrying over offsets achieved prior to 2020 to be used for targets set under Paris.[8] If Australia is not allowed to carry over offsets generated in the Kyoto era to meet its Paris targets, it suggests that Australia will need to put more efforts to obtaining post-2020 offsets through the CSF if it intends to meet its 2030 target. Australia has not made any indication for increasing the stringency for the Safeguard Mechanism, though it does plan to provide benchmarks for certain new facilities in 2021 (Kouchakji & RepuTex Energy, 2020).

4.3.3 Provides policymakers with flexible options to achieve emission reductions

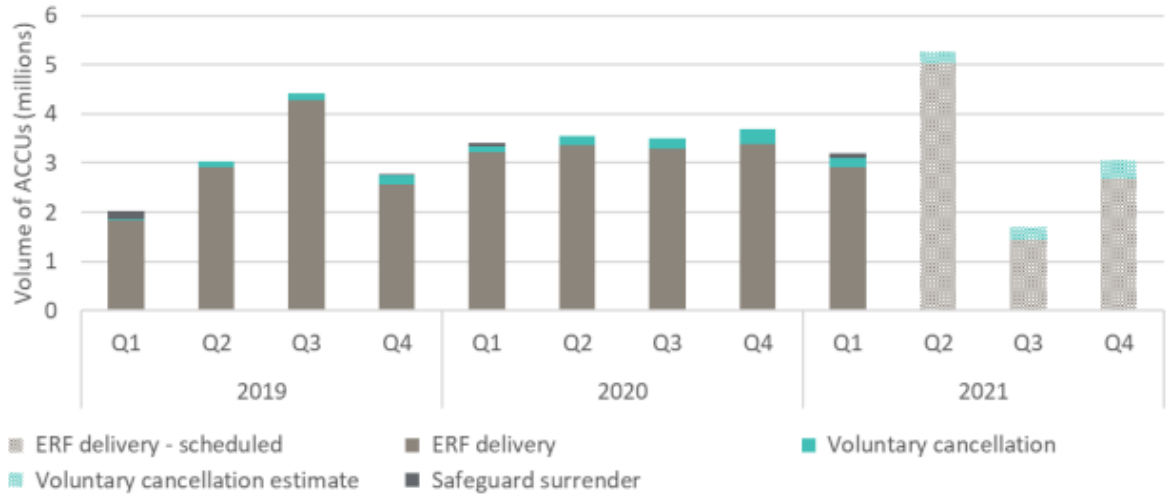
Given the difficulties in implementing a stringent carbon price in Australia, offsets have provided flexible options for Australian policymakers to achieve emission reductions through the ERF and the Safeguard Mechanism. As has been argued in Section 4.3.1 and 4.3.2, Government procurement of offsets via the ERF allowed the Government to pay for emission reductions domestically without having to burden compliance facilities to meet the NDC target. As can be

[7]The Australian Labor Party committed to reducing Australia's pollution by 45 percent on 2005 levels by 2030, and to reach net zero pollution by 2050. The Green Party Labor is committed to reducing Australia's pollution by 45 percent on 2005 levels by 2030, and to reach net zero pollution by 2050 (Gabbatiss, 2019).

[8] Australia's insistence on carrying over Kyoto era credits has been one of the contributing factors to a stalemate on the terms of Article 6 at COP25 in Madrid in 2019, as it signals a deviation from the best practice of using newer vintages for future compliance.

seen in Figure 9 below, the Government has contracted the largest volumes of ACCUs for delivery in 2019 and 2020 through the ERF (Australia Clean Energy Regulator, 2021). In contrast, compliance facilities subject to the Safeguard Mechanism surrendered a minimal number of ACCUs in the first quarter of each year. It is interesting to note the voluntary cancellations of ACCUs has been greater than private sector facilities under the ERF. Voluntary cancellation of ACCUs by organizations actually increased by 52% in Q1 2021 in comparison to Q1 2020. 62% of the ACCUs that were voluntarily cancelled were for the Climate Active Initiative, which is a government standard that certifies organizations that have set annual targets to reduce emissions, have a reduction plan to reduce internal emissions, and offset remaining emissions with approved carbon credits – that includes, but is not limited to, ACCUs.

Figure 9: Actual and estimate demand for ACCU



Source: Australian Government Clean Energy Regulator, 2021.

The Clean Energy Regulator has approved methodologies that support emission reductions in agriculture, forestry, building, electricity, fuel combustion, industry, transport, and waste in Australia. Like the Alberta case study, the choice of where offsets can be sourced provides Australian policymakers with the flexibility to drive emission reductions in domestic sectors that are difficult to implement stringent regulations or a carbon price, such as agriculture and forestry.

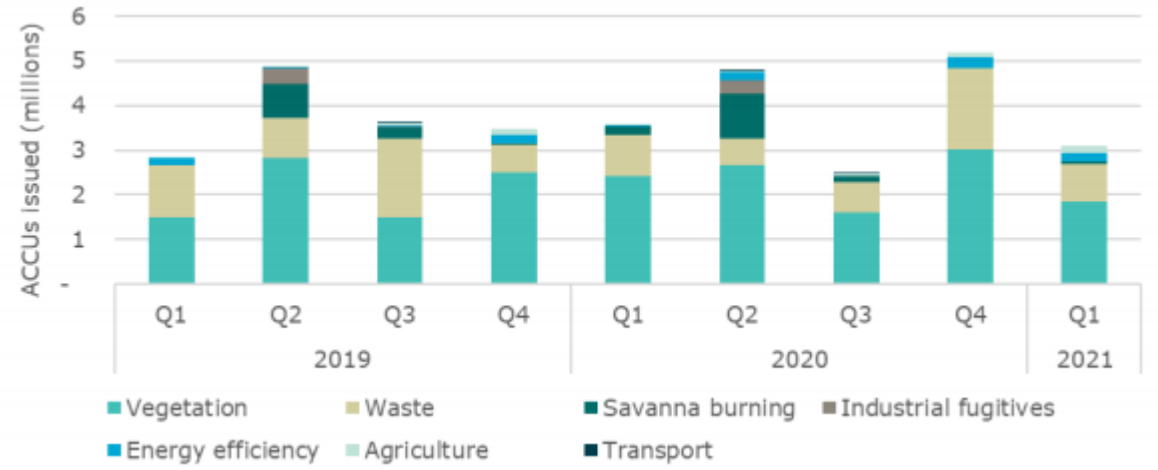
4.3.4 Promotes investments in sustainable development

The Clean Energy Regulator provides a wide range of project types that are eligible to be sources for offsets. As can be seen in Figure 10 below, the majority of ACCUs issued come from land use-related methodologies such as vegetation, and savanna burning to improve management of bush fires caused by natural causes. Vegetation projects account for 59% of ACCUs that are issued, and waste accounts for 27% of ACCUs that are issued (Australian Clean Energy Regulator, 2021). In Australia, ACCUs from improved fire management due to savannah burning relies on techniques developed by the Aboriginal people (Korrf, 2020) The revenues from ACCU sales provides additional incomes to these communities. Furthermore, these controlled methods inhibit excessive economic damages caused by bushfires ignited through increasing temperatures (Australian Clean Energy Regulator, 2018).

Three limitations to further promoting investments into sustainable development projects are whether the Government will expand the number of approved methodologies to include ones that have greater sustainable development benefits; and whether it is willing to pay a higher

price to realize these sustainable projects under the fund. The third limitation is restricting offsets to be sourced domestically. While politically palatable, the choice to not source credits from developing countries is a missed opportunity for supporting investments in a greater scope of sustainable development projects.

Figure 10: Types of offsets that were issued by the Australian Clean Energy Regulator



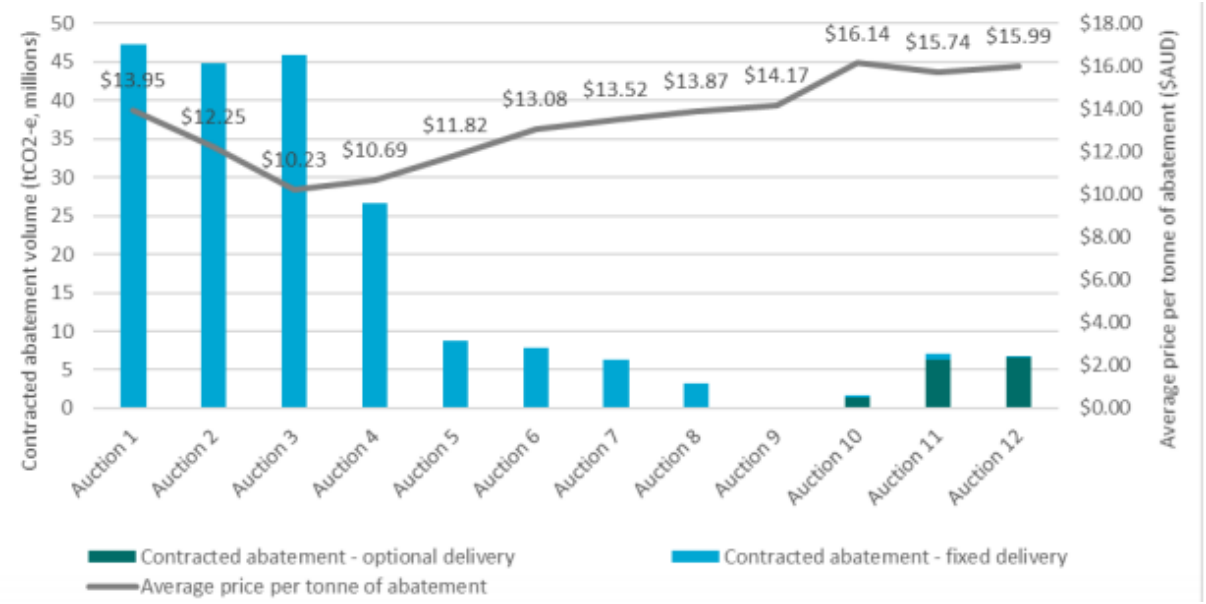
Source: Australian Clean Energy Regulator, 2021.

4.3.5 Avoids perverse incentives

As can be seen in Figure 9 above, the Australian Government is the largest buyer of offsets. As is suggested in the previous subsections, by relying solely on offsets as the mechanism to drive emission reductions in Australia through the ERF, the Australian Government avoids having to impose more stringent targets or carbon prices on facilities covered under the Safeguard Mechanism. It could thus be argued that the ERF creates a perverse incentive to avoid driving further emission reductions amongst the most carbon-intensive facilities in Australia. However, given the divisive nature of climate politics in Australia, procuring offsets through the ERF appears to be the most politically viable mechanism to reduce emissions in the country.

One way the Australian ERF has 'diluted' the carbon price signal is through the Government's choice to set a 'secret bid price' that is too low to support more ambitious emission reduction projects. The secret bid price essentially eliminates any submitted bids that are above that price during the reverse auction process (Australian Government Clean Energy Regulator, 2019). The supply of potential projects that qualify under the approved methodologies, and can produce offsets cost-effectively at the auctioned prices, is decreasing (Australia MAG, 2019). As can be seen in Figure 11 below, though the latest auction had one of the highest bid prices, the volume of ACCUs that are contracted are much lower. The Australian Clean Energy Regulator is also revising its secret bid price to contract larger volumes (Australian Government Clean Energy Regulator, 2019) which could therefore boost the carbon price signal. The Australian Clean Energy Regulator has called for an expression of interest to support the development of an exchange traded market for emissions offsets, creating an Australian carbon exchange that can support the market trade and delivery of ACCUs for compliance – and increasingly – voluntary corporate demand (Australian Government Clean Energy Regulator, 2021).

Figure 11: ERF auction results



Source: Australian Government Clean Energy Regulator, 2021.

4.3.6 Key observations

The divisiveness of climate politics in Australia demonstrates the difficulties of maintaining a stringent carbon price in the long run (see Table 13 below). By being in operation for over 5 years, the ERF and Safeguard Mechanism is Australia's longest running carbon price and will continue to operate under the current Government. The implication is that Australia is unlikely to increase its ambition with an enhanced NDC target. In fact, the procurement of offsets through a public fund creates the perverse incentive of not forcing Australia's emission-intensive facilities to reduce their own emissions.

The ERF demonstrates that shifting the burden of emission reductions to a public fund may be the only politically acceptable way to create incentives to reduce emissions when the dominant political discourse in a country is to protect carbon-intensive industries as a way to support and boost the economy against foreign competition. The Safeguard Mechanism only acts as an inhibitor to stop emissions from compliance facilities eroding emission reduction achieved via the fund. A benefit of the ERF is that it provides policymakers with the flexibility to reduce emissions in sectors that it would like to support, including ones that have sustainable development benefits. However, the ability of public funds to drive further emission reductions is based on the size of the fund, the price they are willing to pay under the fund, and their willingness to expand approved methodologies when low-cost abatement options are realized.

Table 13: Summary of the principles of success achieved by the Australia Emission Reduction Fund and Safeguard Mechanism

Principles of success	Australia Emission Reduction Fund and Safeguard Mechanism
Increases acceptability of compliance schemes	**Yes**. The Australian ERF and Safeguard Mechanism demonstrates shifting the compliance burden from emission-intensive facilities to a public fund that procures offsets can be the most politically

Principles of success	Australia Emission Reduction Fund and Safeguard Mechanism
	acceptable way of introducing a carbon price when the climate politics are divisive.
Enables ambition of the compliance scheme to be increased	**No**. Offsets were introduced to meet existing mitigation targets for Australia, which has not aspired to more ambitious targets. The Australian Government has agreed to set up the Climate Solutions Fund when the ERF capital is close to being fully committed as a way to continue to procure offsets to meet the 2030 target. Therefore, while offsets did not necessarily allow for raised ambition, they do provide the Government with a mechanism for meeting targets set by the Government.
Provides policymaker flexibility	**Yes**. A public fund that procures offsets gives policymakers the flexibility to shift the burden of compliance to the Government when imposing a carbon price on domestic facilities is politically untenable. Furthermore, the choice of methodologies allows the policymaker to drive emission reductions to sectors they favour.
Promotes investments in sustainable development	**Yes**. A large percentage of ACCUs comes from nature-based solutions (NBS), with certain projects benefiting Aboriginal communities and reducing economic damage from uncontrolled bushfires. However, offsets must originate in Australia, which prevents other developing countries from benefiting from sustainable development investments.
Avoids perverse incentives	**No**. By shifting the burden of achieving targets by procuring offsets through a public fund, there is little incentive for compliance facilities to reduce their own emissions. The lack of stringent baselines also means the Safeguard Mechanism only inhibits compliance facilities from increasing its emissions.

4.4 Colombia's carbon tax

The National Carbon Tax Law was implemented in Colombia on 1 January 2017 as part of a structural tax reform (The World Bank, n.d.). The tax is applied on emissions released from the combustion of liquid and gaseous fossil fuels that are used as propellant, in stationary combustion engines, or as heating fuels. It is paid by producers and importers of liquid fossil fuels who then sell the fuels to end customers, and industrial users of natural gas (Sousa, et al., 2018). It is currently set at a level of approximately USD 5.93 (EUR 5)/tCO_2e and is set to increase annually to inflation plus one percentage point until it reaches approximately USD 10 (EUR 9)/tCO_2e (Alarcon-Diaz, et al., 2018; Organisation of Economic Cooperation and Development, 2019).

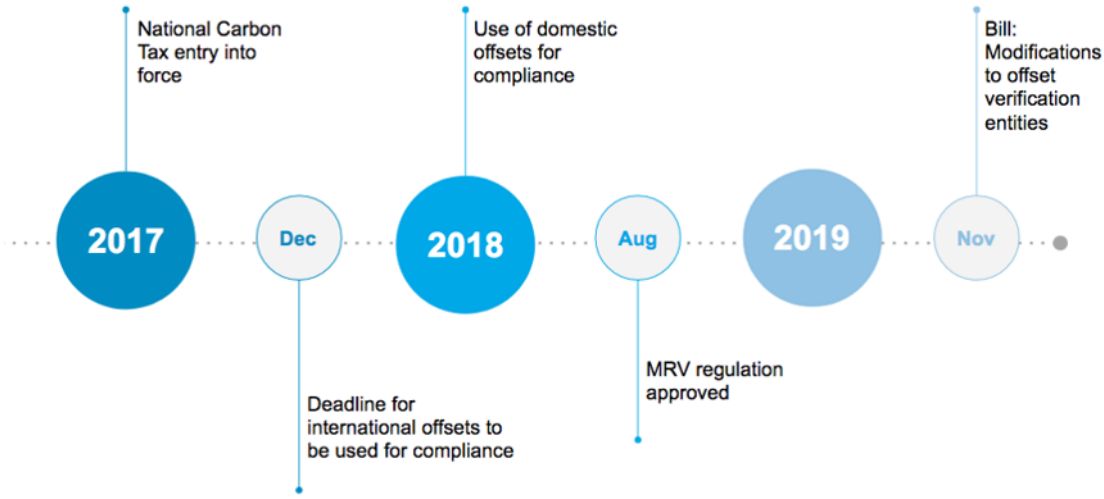
The Colombian carbon tax allows offsets to be surrendered in lieu of paying the tax obligation. It also allows compliance entities to be certified as 'carbon neutral', thereby allowing them to offset 100% of the volume of emissions that would have otherwise been paid through the tax

(Alarcon-Diaz, et al., 2018). Oil and gas companies, the aviation and land transport sectors are among the main buyers of carbon credits in Colombia[9].

However, using offsets for compliance has been difficult due to the Government changing the institutional governance of offsets (as can be seen in Figure 12 below). In the first year of the scheme, carbon neutral entities were allowed to buy offsets certified from international standards from foreign projects. By January 2018, only offsets from domestic projects would be accepted, though these could be certified under international and domestic carbon standards. The government also adopted Regulation 1447 which establishes a registry, MRV provisions, and accounting requirements. These provisions were established to better track the estimation and accounting of carbon credits, particularly for REDD+ projects.

However, certifying projects under these domestic institutions has also been challenging due to a lack of domestic capacity; clarity on which institutions are responsible for different functions within the offset governance process; and infrastructural linkages that allows buyers to surrender offsets for compliance. These challenges have limited the surrender of offsets to be used in lieu of paying the carbon tax. According to Szabo (2019), in the first year of the scheme, nearly 2.8 million credits were retired, but by September 2019 the amount of credits decreased substantially as a result of regulatory adjustments that led to market uncertainties.

Figure 12: Timeline of regulatory changes for Colombia's carbon tax



Source: South Pole and Wuppertal Institute

4.4.1 Increases acceptability of compliance scheme

The carbon tax was proposed in 2016 during a particularly pivotal time in Colombian history, which affected its design. Due to the confluence of political, economic, and social factors, there was support for the introduction of the carbon tax by specific groups and even the wider public. Since 2010, Colombia has been developing policies to address climate change, particularly with regards to adaptation, REDD+ and low-carbon development (Alarcon-Diaz, et al., 2018). In 2015, it submitted an NDC with a 20% reduction target by 2030 compared with the business- as-usual scenario, or 30% with international support (Government of Colombia, 2015). The NDC also

[9] For further information refer to the CDM, VERRA, Cercarbono and ProClima registered project.

mentioned Colombia would consider using market or economic instruments to meet its target. Aside from climate, other important developments were Colombia starting the ascension process to join the Organisation of Economic Cooperation and Development (OECD) in 2013 (OECD, 2020). And in 2016, the Colombian Government signed the Peace Treaty with Revolutionary Armed Forces of Colombia (FARC-EP) (BBC, 2016).

The decision to introduce a carbon tax followed the recommendations of the OECD to include the carbon tax as part of a broader structural tax reform that would also help Colombia diversify its tax base away from royalties obtained from oil production, given the drop in global oil prices in 2014 (Monge, 2018). Diversifying the tax base against these kinds of commodity price shocks was a key element to gaining ascension into the OECD. Other taxes were considered, such as plastic bags, general sales, and coal mining. While the latter two were considered politically contentious, the carbon tax was less contentious, particularly as it was imposed on upstream and midstream retailers of liquid and gaseous fuels, and not directly on consumers (Monge, 2018).

The carbon tax was also an attractive instrument to support climate mitigation and adaptation in Colombia. A key challenge to the Government was the difficulty to monitor and implement climate change policies in a post-conflict era (Alarcon-Diaz, et al., 2018). Applying the carbon tax to retailers of liquid and gaseous fuels would be easier to administer and establish Measuring, Reporting, and Verification (MRV) systems to collect emissions data. The revenue collected from the tax was intended to finance projects to avoid deforestation and conservation projects, as well as to strengthen the National System of Protected Areas (Monge, 2018).

The private sector did raise competitiveness concerns about the Carbon Tax Law that led to specific exemptions and the introduction of offsets (Alarcon-Diaz, et al., 2018; Monge, 2018; Mogollón, 2020). The coal and other solid fuels were explicitly excluded from the carbon tax in order to protect the domestic mining industry (Michaelowa et al, 2018). Other exemptions included natural gas used in refineries or in the petrochemical industry. Corporations advocated for the inclusion of offsets as an alternative to paying the tax, which was accepted by the Government. The offsetting mechanism was also welcome by carbon project developers, who were already active in Colombia due to developing CDM projects in Colombia. After the collapse of the CDM market, the carbon tax would thus create a new compliance demand for credits from domestic projects, particularly in forestry, that could support poverty alleviation in post-conflict areas.

Even without offsets, there was broader public support for the carbon tax given the use of revenues, and that it was less objectionable tax to the public than other options, such as a sales tax. Nevertheless, offsets did increase the acceptance of its introduction from specific industry groups by creating cost containment measures against the increasing rate of the carbon tax; and getting broader support from project developers and the wider public in channelling additional carbon finance to support key priorities in Colombia.

4.4.2 Enables ambition of the compliance scheme to be increased

Since the passing of the carbon tax, Colombia has signalled that it will increase its climate targets. In December 2017, Colombia passed an Executive Order called the “National Policy for Climate Change” that includes a long-term goal to be carbon neutral by 2050 (UNDP, 2020). In December 2019, it passed the Executive Order of the “Colombian Low-Carbon Development Strategy” which includes having working groups to assess mitigation and adaptation options by each sector, including sector-specific abatement curves (UNDP, 2020). Colombia has also joined

the Climate Ambition Alliance in 2019, that was part of a group of nations signalling their willingness to enhance their NDC targets in their 2020 submission (Presense Presidencia, 2020).

Despite signals of a more ambitious climate target, the Colombian Government has not increased the ambition of the carbon tax itself. First, the original tax rate has not increased in real terms from USD 5/tCO_2e since its introduction 3 years ago, even though it was scheduled to increase each year (The World Bank, n.d.). Second, the Government has not increased the scope of the compliance scheme to include emissions of other solid fuels (such as coal) in recent modifications to the tax law, despite lobbying from some business groups, such as the Colombian Association of Natural Gas (Naturgas) (OECD, 2019; Romero Melo & Celis, 2019).

Exempting coal from the carbon tax essentially rewards consumption of more carbon-intensive fuels, particularly for sectors in which coal and natural gas compete (Alarcon-Diaz, et al., 2018; Michaelowa et al, 2018). Though legislative proposals have been distributed to include coal in the tax, its exemption demonstrates the Government's continued support for domestic coal mining (The Carbon Trust et al, 2018). Colombia is one of the top five global exporters of coal (International Energy Agency, 2019). Therefore, the exemption of coal from the carbon tax could actually lead to *an increase* in emissions, threatening Colombia's ability to meet more ambitious NDC targets.

In short, the Government has not managed to increase the carbon tax rate or expand its scope. Offsets have not played a decisive role in supporting the increase of the carbon tax rate, and in fact, could have played a debilitating role due to delays in offset delivery for compliance. While it should be noted the failure to increase the carbon tax is still not clear, the difficulties in delivering offsets would not have assured buyers they could rely on offsets as a way to reduce their compliance costs with a higher tax rate. With such institutional setbacks, it is unlikely that offsets will play a strong role in enhancing ambition if it there continues to be risks in delivering offsets for compliance in the existing period. However, the reasons for why the Government have not increased the carbon tax rate remain unclear.

4.4.3 Provides policymakers with flexible options to achieve emission reductions

For Colombian policymakers, offsets provide a useful mechanism to drive emission reductions in sectors that have been difficult to implement climate policy due to reasons of poverty and conflict. Colombia has accepted a range of methodologies, but most offsets in Colombia come from forestry projects: reforestation, rehabilitating forests systems degraded due to livestock use, REDD+ projects that improve ecological corridors, ecological restoration of natural forests, mangroves and several projects implementing efficient firewood stoves (Alarcon-Diaz, et al., 2018; AsoCarbono, 2020).

Channelling financing into forestry projects via the offset mechanisms is also important to help Colombia meet its REDD+ strategy target of zero deforestation in the Amazon up to 2020 (Alarcon-Diaz, et al., 2018). Since setting the target in 2015, the converse effect has happened with deforestation rates actually increasing since the signing of the peace treaty. After the signing of the treaty, people were able to convert forests into agriculture and cattle ranching, expand road infrastructure, and undertake illegal mining as they were now able to use territories that were formerly under the control of the FARC-EP. Given the difficulties to halt deforestation rates due to lack of incentives to protect forests, allowing offsets to be generated from REDD+ activities that is eligible for the carbon tax provides an alternative stream of revenue that can counter the economic drivers of deforestation. Forestry offsets also align with the Colombian Government's priorities to channel improving adaptation to climate change.

Another attractive feature of incorporating the offset mechanism into the carbon tax design is that it reduces the reliance of emission reduction projects receiving financing through the earmarking of carbon tax revenues. Governments can change how they allocate tax revenues due to changing fiscal – or political - priorities in successive years. Such a change happened in Colombia after the first year of the tax, where 100% of the carbon tax revenues that was earmarked for environmental projects via the Sustainable Colombia Fund was reduced to 30% under the Peace Fund. It has been recently reported that 366,000 million pesos (approximately EUR 85.3 million) that was supposed to support environmental projects via the Peace Fund has not been allocated to the Ministry of the Environment and Colombia Heritage for implementing such projects (Semana Sostenible, 2020). Therefore, while it might not be possible to rely on carbon tax revenues to deliver financing for emission reduction projects in the long run, offsets provide a direct carbon financing mechanism to achieve this objective.

4.4.4 Promotes investments in sustainable development

The Colombian carbon tax was designed to contribute to sustainable development in the country by encouraging the development of domestic projects, primarily to address deforestation. Nevertheless, there is no explicit requirement for offsets to meet multiple UN SDGs. Instead, the only requirements are to follow the rules of the offset standards. According to the authors' market analysis based on the CDM pipeline and the rf local standards, most of the CERs that have been issued so far comply with SDG 13 'Climate Action' and SDG 15 'Life on Land'. CERs from the energy sector also comply with SDG 7 'Affordable and Clean Energy'.

As most offsets surrendered for the carbon tax are from forestry credits, a helpful analysis would be to determine whether forestry offsets have supported sustainable development, particularly to address the poverty factors that drive deforestation. However, since the offset regulation changed with regards to accredited verification entities and setting baselines, it is unknown if all forestry projects registered under the carbon tax contribute to sustainable development benefits. While the analysis of forestry credits shows a promotion of 'climate action' and 'life on land', some forestry projects have raised concerns with regards to community engagement. Furthermore achieving even 'climate action'. is not the case for all forestry projects as some have additionality concerns. In fact, a Carbon Market Watch and Latin American Centre for Investigative Journalism (2021) report has calculated that two large-scale REDD+ projects are likely to have overestimated the amount of emission reductions by 21 million tCO_2e. They are basing this overestimation on the number of carbon credits issued under the project's baseline, which is less conservative than the government reference value that was set under jurisdictional REDD+ program of Vision Amazonia. The report points to poor governance processes with regards to the carbon standards and verifiers who certified these projects. The report also points to poor government enforcement of its own regulation with regards to ensuring appropriate MRV systems and accounting frameworks under Regulation 1447, which was specifically developed to prevent such overestimations from occurring.

There are also other factors that limit whether offsets used for Colombia's carbon tax can support sustainable development. Future investments into new and more ambitious projects that could support sustainable development are limited due to the persistently low carbon tax rate. Project developers in Colombia note that the supply of offset projects that could be developed cost-effectively under the carbon tax rate is effectively exhausted. This means there are not enough high-quality existing credits that could be cost-effectively delivered at a USD $5/tCO_2e$ price level to satisfy the demand in the country. Another important factor that could limit the sourcing of offsets from projects with high SDGs is social armed conflict in specific areas. For example, one of the regions in Colombia with the highest mitigation and conservation

potentials (El Chocó) is currently in the middle of an armed conflict, which disincentivizes the development of mitigation projects.

4.4.5 Avoids perverse incentives

The Colombian carbon tax is the only case study that allows compliance entities to meet 100% of their obligation through offsets. Providing full compliance flexibility suggests that the scheme does not avoid perverse incentives, as compliance actors could solely rely on offsets rather than reducing their own emissions. However according to Alarcon-Diaz, et al. (2018), offsets only accounted for 5% of the expected tax collection in 2017, the year in which most offsets were surrendered for compliance.

This statistic suggests there are other reasons why there was such a low uptake of offsets, despite buyers being allowed to be certified as being carbon neutral. First, it is the persistently low carbon tax rate that has compliance buyers pay the carbon tax rather than buy offsets. Second, the risk of offsets being delivered in time from compliance means that buyer's risk being in non-compliance if they solely rely on using offsets to meet their tax obligations as a carbon neutral buyer. The current delays have deterred many small and medium compliance actors from relying on offsets to meet compliance. Instead, only firms with a large emissions profile are willing to pursue offsets as a way of reducing their tax liability.

It is also difficult to determine if offset have driven additional emission reductions since the launch of the carbon tax due to delays in implementing National Register of Greenhouse Gas Emission Reductions (RENARE, in its Spanish acronym). RENARE will require mitigation activities that are a result of the compensation scheme of the carbon tax to be registered, thereby allowing emissions reductions associated with the offsetting scheme to be tracked. Though launched in 2019, RENARE is still under a pilot phase and not publicly available. Therefore, it is currently difficult to provide an accurate reflection of the emission reductions achieved by offsets (based on total volume of emissions that could be reduced through project investments) versus the amount of emissions released under the carbon tax.

It should be noted that the recent Carbon Market Watch and Latin American Centre for Investigative Journalism (2021) report tells a different story by pointing to the lax enforcement of regulation 1447 leading to an easy supply of carbon credits for buyers. One of the provisions of regulation 1447 was that if a project had already issued credits prior the passage of this regulation in 2018, then only a certain percentage of carbon credits from these projects could be surrendered for the domestic carbon tax. It estimates that out of the 21 million 'hot air' credits that have been issued, about 12.4 million are in breach of this national regulation. This increased supply of carbon credits would mean compliance buyers have a cheaper option than paying the carbon tax. The Report estimates that 4.9 million 'hot air' credits from the two investigated projects have been used for domestic compliance, mostly by fossil fuel distributer that is covered under the carbon tax policy. The report argues that if the environmental integrity of the compliance scheme is not upheld with high quality certification of carbon projects, then the supply of cheap credits will create perverse incentives for compliance buyers to avoid paying the carbon tax.

4.4.6 Key observations

The Colombian case study highlights that offsets can augment emission reductions efforts within a jurisdiction only if the compliance scheme sends a strong price signal, are certified to robust baselines that ensures the environmental integrity of certification, and the institutions that regulate and transfer offsets for delivery to buyers are well functioning (please see Table 14). As data from RENARE is not available, it is difficult to assess the volume and quality of offsets

achieved after the carbon tax was launched. However, the pipeline of projects that could be cost-effectively developed under the current carbon tax rate has been exhausted. This also negatively impacts the tax's ability to drive additional emission reductions outside of the compliance sectors as well as to promote sustainable development.

The domestic institutions that govern the certification and delivery of offsets to the end buyers would also need to be well functioning in order to drive emission reductions that are truly additional, and do not undermine sustainable development. While it is unclear as to why the government has not increased the carbon tax rate according to its tax schedule, the delays in delivering offsets would not encourage the increase in the tax rate as buyers would not have sufficient carbon credits to be 100% neutral. Therefore, though compliance actors could choose to offset 100% of their compliance obligation, it appears that only big emitters are willing to buy offsets to capitalize on the cost savings once the offsets are delivered. However, if lax enforcement of existing regulations and carbon certification leads to increased supply of carbon credits that breach environmental integrity, it could mean that domestic buyers will be able to surrender more of these offsets when RENARE is fully operational. Therefore, it is important to use the registry system to intervene by preventing domestic buyers to use these credits, by the government enforcing the quantitative restrictions set under regulation 1447.

The case study of Colombia also demonstrates the urgency of channelling financing to protect the Amazon forests. The carbon tax was meant to provide policymakers with the option of channelling financing through the offset and carbon tax revenues to achieve this goal. However, the potential for the carbon tax to achieve these broader climate and societal goals is limited due to the lack of ambition of the carbon tax, current governance limitations of certifying new forestry projects, and problems with fiscal distribution.

Table 14: Summary of the principles of success of the Colombian carbon tax

Principles of success	Colombian carbon tax
Increases acceptability of compliance schemes	**Yes**. While the carbon tax was most likely going to be passed, offsets reduced political resistance by allowing compliance buyers to reduce 100% of their emissions and supporting emission reductions in politically sensitive areas.
Enables ambition of the compliance scheme to be increased	**No**. The ambition of the carbon tax has not increased. While it is unclear for why the carbon tax rate has not increased, the delays in delivering offsets would not encourage an increase in the tax rate as buyers could not rely on offsets reduce their increased tax liability.
Provides policymaker flexibility	**Yes**. Policymakers could choose the types of offset projects that it would like to encourage emission reductions, particularly in the case of forest conservation and climate adaptation, that could especially benefit forestry communities recovering from the conflict.
Promotes investments in sustainable development	**No**. Concerns about the certification of carbon projects that ensure sustainable development are called into question. The supply potential of projects that can be developed cost-effectively under the

Principles of success	Colombian carbon tax
	carbon tax rate is exhausted, including for projects with high sustainable development benefits.
Avoids perverse incentives	**No.** The design of the compliance scheme does not limit offset use for compliance actors.

Source: South Pole and Wuppertal Institute

4.5 Japan's Joint Crediting Mechanism

The Joint Crediting Mechanism (JCM) was created by the Government of Japan as a bilateral crediting mechanism to facilitate diffusion of low-carbon technologies for climate mitigation actions in partner countries. Similar to the CDM, the JCM provides a framework for the development of projects in developing countries, allowing companies from Japan and partner countries to invest in them and generate emissions reductions credits. The JCM was designed to complement the CDM due to procedural inefficiencies and regulatory bottlenecks in issuing CERs, as observed by Japan after the active involvement of the Japanese private sector during the first commitment period of the Kyoto Protocol (Asian Development Bank, 2019). The JCM was initiated in 2011, shortly after Japan decided not to participate in the Kyoto Protocol's second commitment period (Ministry of Foreign Affairs of Japan, 2010). In the same year, the Japanese government advocated for a more bilateral cooperative approach that would allow Japan to work with host countries to fund projects that would reduce emissions, thereby providing greater flexibility and efficiency in meeting targets (Asian Development Bank, 2019).[10]

After its launch in 2013 with 6 partner countries the JCM has included 11 more partner countries by the end of 2019 (Asian Development Bank, 2019). The Government of Japan buys and retires JCM credits as part of their climate policy. But the credits are not only allocated to the Japanese Government but to three other stakeholders: partner country government, Japanese project participant, and the partner country's project participant. The Japanese Government offtakes at least 50% of credits from each project (Global Environment Centre Foundation, 2019). As for the partner countries, only Indonesia and Mongolia have stated the proportion of credits they will claim (at least 10% for Indonesia and 20% for Mongolia).

Hence the JCM is not a compliance scheme in terms of requiring domestic actors to reduce its emissions. Instead it promotes investment into emission reduction projects in developing countries and it provides credits that may be used by private sector buyers for the voluntary market in Japan, and by the Japanese Government for compliance to its NDC target.

4.5.1 Increases acceptability of compliance scheme

While Japan did not set a compliance target for the second Kyoto Period, it signalled its international commitment to support the Cancun Agreement via initiating the development of the JCM in 2011. It was not introduced as a compliance mechanism but aligned with Japan's commitment to promote technology transfer and emission reductions in developing countries.

[10] In fact, in 2011, the Japanese Government advocated for the framework for various approaches, such as the Funding Valuation Adjustment (FVA), which was launched at COP21 in Durban (Asian Development Bank, 2019), to provide greater flexibility and efficiency in achieving emission reductions through a bilateral approach. The rationale behind the FVA led to the launch of the JCM in 2013. In 2014, the text submission of the Japanese Government supporting the FVA provides the foundations behind Article 6.2, which was adopted under the Paris Agreement a year later (Asian Development Bank, 2019). The text says the purpose of the FVA is to "to facilitate the development and implementation of, and coordinating interaction among, existing and emerging market-based approaches that result in international transfers of mitigation outcomes, in a transparent manner that provides assurance of environmental integrity" (Ministry of Foreign Affairs of Japan, 2014).

It is unlikely that the JCM played a pivotal role in increasing the acceptability of Japan to adopt its 2015 NDC target. The Japanese Government made it clear that it did not include the JCM in setting its NDC target (Government of Japan, 2015). Instead, this bottom-up calculation was based on considering sector specific improvements that could be achieved domestically in Japan, with a projection that Japan could potentially reduce its 2013 emissions by 20 to 40% by 2030 with improvements in abatement costs. As Japan settled on an NDC target of 26% reduction on 2013 levels by 2030, it is clear that Japan expected to achieve its NDC target through domestic reductions. However, Japan's 2015 NDC also makes clear that even though JCM credits were not calculated when setting the NDC, any credits purchased by the Government via the JCM will be counted as a reduction for Japan.

The JCM is also not eligible for private sector actors to meet domestic compliance obligations, and therefore could not have played a role in their acceptance. Japan implemented a carbon tax on all fossil fuels in 2012 (World Bank, n.d.). The carbon tax does not allow any offsets to be surrendered by producers of fossil fuels, who are liable to pay for the tax. Instead, the carbon tax is relatively low (as EUR 2.67 per tCO_2e) and there are exemptions to certain industries due to competitiveness concerns. The subnational ETS launched in Tokyo and Saitama in 2010 and 2011 respectively, do allow for offsets generated from projects within their respective jurisdictions. However, there was no push for the private sector to include JCM credits as part of the ETS, most likely due to the nascent nature of the JCM at the time these ETSs were being proposed.

The private sector in Japan can surrender the JCM credits for voluntary commitments. For example, JCM credits can be used by Japanese power companies to offset their CO_2 emissions intensity (emissions per unit of user-end electricity) for their voluntary commitment of the Federation of Electric Power Companies (FEPC) of Japan. The FEPC allows power companies to use both CERs and JCM credits in order to achieve their targets, in addition to using domestic offsets (Federation of Electric Power Companies of Japan, 2013). There are no confirmed plans to transition these voluntary commitments into compliance obligations.

4.5.2 Enables ambition of the compliance scheme to be increased

In March 2020, Japan had submitted its updated NDC which showed that it had not increased its ambition from its 2015 target. However, the then Prime Minister of Japan, Shinzo Abe, resigned in August 2020 due to health concerns. He was thus succeeded by Prime Minister Yoshihide Suga in September 2020. Since then, the newly elected Prime Minister has declared more ambitious climate targets for Japan: first in October 2020 with a net zero target by 2050, two weeks after UN Secretary General called for all UN member states to reach carbon neutrality by 2050 (UN News, 2020); and then in April 2021, at the Leaders Summit on Climate - that was hosted by US President Biden - where he declared that Japan would increase its target from 26% to 46% in 2030 for 2013 levels in order to keep it on track to meet its long-term goal of net zero by 2050 (Ministry of Foreign Affairs, 2021).

Therefore, Japan appears to have increased its ambition through announcement of targets through the Executive branch of the Government. In his speech at the Leader's Summit, Prime Minister Suga was clear that Japan would engage in domestic decarbonization – particularly of its power sector – and for companies and sub-national regions. Japan would also work in partnership with the US to "promote world-wide decarbonization and continue cooperation in each area of climate ambition and the implementation of the Paris Agreement; clean energy technologies and innovation; and accelerating transition of developing countries including Indo-

Pacific countries to a decarbonized society" (Suga, 2021). It is unclear from this statement, or from the speech in general, if world-wide efforts would include bilateral crediting under the JCM.

So far, Japan has not developed actual policy documents that reflect this higher ambition. Its 2020 NDC submission has yet to be updated to reflect the more ambitious NDC target. Based on only assessing the JCM mentioned in the 2020 submission, it did not play a pivotal role in increasing the 2020 NDC target from its NDC target from 2015 levels. The only mention of the role of the JCM contributing to the achievement of its NDC is what was already written in the 2015 NDC submission (Government of Japan, 2020). It is surprising that the JCM has not played a pivotal role in enhancing Japan's NDC target, even by submitting a conditional target. In government presentations on developments of the JCM, the 50 to 100 million tCO_2 of reductions that the Government estimated could be delivered by 2030 would contribute to a 'higher ambition' target that is above the existing NDC target (Uga, 2018).

One potential reason that the Government may not have included a more ambitious conditional target based on the JCM is due to the lack of resolution on how corresponding adjustments will occur under Article 6.2 of the Paris Agreement. The JCM has already achieved emission reductions in partner countries with 31 projects (Asian Development Bank, 2019). The Japanese Government has made it clear that it will only undertake corresponding adjustments that is consistent with the bilateral rules set under Article 6.2 (Asian Development Bank, 2019).

In reading the 2020 NDC submission, it is clear that the main motivating factor that inhibits Japan from adopting a higher domestic target is due to the evolution of its energy mix (Government of Japan, 2020). After the 2011 nuclear disaster in Fukushima, Japan embarked on a phase out of existing nuclear generation assets. This has required relying more on existing coal power plants, and building twenty-two new coal plants in the next five years, which would dramatically increase Japan's future emissions unless countervailing measures are achieved (Tabuchi, 2020). The 2020 NDC does indicate that it will revise its NDC target if other disruptive innovations, such as artificial photosynthesis, carbon capture utilisation and storage, and hydrogen technologies, help it achieve its long-term goal of a decarbonized society. The NDC states that the Japanese Government will set its future NDC target according to emission reductions achieved domestically, which will therefore be subject to its evolving energy mix.

It is clear that the increased ambition in targets is due to the change in ambition of a newly elected Prime Minister who is responding to calls for greater climate leadership. While JCM was not the reason for this increased ambition, it is unclear whether the new Prime Minister will use the JCM as a bilateral mechanism to promote worldwide decarbonisation to support meeting more ambitious targets. It is clear from the 2020 NDC that any purchased credits from the JCM will be used towards Japan's NDC achievement.

4.5.3 Provides policymakers with flexible options to achieve emission reductions

The JCM is designed to directly support low-carbon technology transfer and capacity building in developing countries, particularly for energy and industry projects (Asian Development Bank, 2019). The Japanese Government provides targeted support for an international consortium consisting of a Japanese entity and an entity in a partner country to develop projects for the JCM. First, it offers financial support for project implementation and MRV. The Ministry for the Environment of Japan supports up to 50% of investment costs through an upfront commitment to pay after project validation (Government of Japan, 2019a). The Ministry also covers MRV costs, at least for the first validation and verification. According to an interview with the Japanese Government that was conducted for this report, this financial support is the main driver for private sector participation in the JCM (Government of Japan, 2019b).

Another beneficial aspect of the bilateral approach is that the government can have greater latitude in fostering partnerships with countries and achieving mutual benefits through the sharing of emission reductions achieved under the JCM. Partner countries include Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Lao People's Democratic Republic, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand and the Philippines (Government of Japan, 2019). Another reason for the development of the JCM was to support mitigation projects in small island developing countries and LDCs, regions which did not have extensive offset project development under the CDM.

Lastly, the JCM provides the Japanese Government with an opportunity to demonstrate its support for international climate cooperation, particularly after it refused to ratify the second commitment period of the Kyoto Protocol in 2010.

4.5.4 Promotes investments in sustainable development

By designing the JCM methodologies for each country, projects are expected to meet country-specific sustainable development needs and regulations. Although the general JCM rules and guidelines do not have any specific provisions on meeting sustainable development benefits, each country can set its own policies and assessment for sustainable development benefits and avoidance of environmental and social damage. Indonesia and Mongolia have created country-specific tools for the assessment of each project's contribution to sustainable development[11].

In comparison to the CDM's Sustainable Development Co-Benefits Tool, which focuses on assessing environmental, social, and economic co-benefits, the JCM 'Sustainable Development Contribution Tool' also identifies prevention of negative impacts from projects. In addition, the JCM tool is part of the project registration and credits issuance process. Without passing the country review, the project cannot be approved. By enforcing this rule, private companies will assess sustainable development and SDG aspects of their projects, bringing greater awareness to sustainable development and the SDGs.

The JCM Model Project also provides funding for projects that are less attractive under other carbon market schemes, including F-gas destruction and small-scale energy efficiency projects. Most of the JCM projects are in small and large-scale renewable power generation, which has a high impact on sustainable development by improving energy security, improving livelihoods, providing new employment opportunities, and improving infrastructures (Asian Development Bank, 2019).

4.5.5 Avoids perverse incentives

The Japanese Government is undertaking measures to avoid the potential for perverse incentives caused by the JCM. These risks involve overestimating emission reductions or deterring efforts for the Japanese state to reduce its own emissions.

There is a risk that the JCM could be overestimating emission reductions achieved by its projects, given that these projects are not certified by an independent, external standard. However, JCM's conservative approach to estimating emission reductions avoids the perverse incentive of overestimating emission reductions from its projects (Asian Development Bank, 2019). Japanese and partner countries governments play a highly active role in the design of each MRV methodology and monitoring of projects, making sure they estimate emission

[11]This tool uses 22 parameters to measure policy alignment, environmental impact assessment, pollution control, safety and health, natural environment and biodiversity, economy, social environment and community participation, and technology. Mongolia also incorporates potential contribution to SDGs into its assessment tool.

reductions in a conservative manner so that the offsets accounted towards the NDC are real. The Government also incorporates 'additionality' aspects of projects and activity data directly into the worksheets of MRV methodologies, so project developers are not required to create additional documents. These reductions are also validated and verified by independent third-party entities that are accredited by the CDM EB or ISO 14065 certification bodies (Asian Development Bank, 2019). The conservative approach for emissions reductions estimated under the JCM currently leads to a relatively small reduction potential: the average amount of emissions reductions achieved by JCM projects as of July 2019 is 1,011 tCO_2e per year per project (Tsukui, 2019). Lastly, the Japanese Government helps host countries develop their registry systems and to prepare to undertake corresponding adjustments that is in-line with the finalized Article 6 rules.

The second perverse incentive is on the demand-side, where the prospect of using credits derived from the JCM could deter private entities from reducing their own emissions, as well as the Japanese Government from reducing domestic emissions to meet its NDC target.

In-line with its mode of industrial development, Japan has developed long-term policies and plans to green and decarbonize its industry (Climate Change Laws of the World, n.d.). Furthermore, Japan has been discussing imposing a federal ETS since 2008, but this still at the stage of ongoing discussions (World Bank, n.d.). The JCM is not eligible for any of the domestic compliance schemes in operation. The interview with the Japanese government confirms that there are no plans to allow JCM credits to be used as offsets for the proposed national ETS, or existing carbon pricing schemes. Thus for private entities in Japan, the JCM does not constitute a perverse incentive.

As Japan has set its NDC for 2015 and 2020 without incorporating JCM credits, Japan expects to meet its NDC target by domestic reductions. The Japanese Government is hedging the risk of not being complaint to its own NDC target by assessing how future emissions will evolve as its energy mix becomes more carbon-intensive. This will require scaling efforts through domestic action, such as its passage of green industrial policy to support mitigation and adaptation plans in different sectors (Climate Change Laws of the World, n.d.). Thus it can be argued the prospects of JCM credits did not deter domestic climate ambition.

However, the Japanese Government is exercising its right to use credits it procured under the JCM. The Japanese Government would be interested in using this option to meet its NDC target, given that it may not be able to meet its target domestically as new coal power stations come online. While this could suggest a perverse incentive to deter Japan to reduce its own emissions, the potential contribution from the current supply of JCM credits is small in comparison to Japan's overall emissions reductions target. This could change if the Japanese Government pursue projects that can achieve larger emission reductions in the future (Asian Development Bank, 2019).

Therefore, as of now the JCM is unlikely to induce perverse incentives, as the low volume of credits that the JCM has yielded means the Japanese Government will need to scale its domestic action if it wants to meet its NDC target.

4.5.6 Key observations

The Japanese Government's intention of launching the JCM was not to help Japan meet its domestic compliance targets, but to support emission reductions in developing countries through supporting technology transfer and capacity-building. By requiring the project consortium to include domestic entities, the Japanese Government incentivizes its private sector to participate in the JCM through it financial and technical support. The Japanese Government

also works with partner countries to reduce emissions in these countries, and to build capacity that can help host countries undertake corresponding adjustments that comply with Article 6.2 rules (once these are finalized). Therefore, the JCM provides policymakers with the flexibility to support emission reductions according to geography and technology, promotes sustainable development through many of its community-based renewable energy projects, and ensures the environmental integrity of future Article 6.2 transactions are upheld (Asian Development Bank, 2019).

However, it is unlikely the JCM will drive Japan to increase its own NDC target in the future. While the Japanese Government has made it clear that it will use transferred credits from the JCM towards it NDC target, the current volumes of JCM credits are too little to induce any perverse incentives.

Table 15: Summary of the principles of success of Japan's JCM

Principles of success	Japan's JCM
Increases acceptability of compliance schemes	**Not applicable**. JCM credits are not eligible for domestic compliance schemes, though the Japanese Government exercises the option to use transferred credits towards its NDC target. The 2015 NDC target was calculated on emission reduction potentials that could be achieved by domestic action.
Enables ambition of the compliance scheme to be increased	**No.** Japan has not increased its NDC target from 2015 levels in its 2020 NDC submission, despite a pipeline of projects that could achieve emission reductions. However since then, the new Prime Minister has announced a net zero by 2030, and interim 2030 target for Japan that is more ambitious than the NDC target. These targets point to both domestic and support for worldwide decarbonization, which could point to role of JCM (though this is still unclear). Nevertheless, the JCM did not play a decisive role in increasing ambition.
Provides policymaker flexibility	**Yes.** Provides flexibility to meet Japan's NDC using internationally sourced offsets and partner countries' NDC using international capacity building, finance, and technology support.
Promotes investments in sustainable development	**Yes.** Most of the projects include technology transfer for renewable power generation in poor communities, which have high impact in sustainable development. Also, the use of the Sustainable Development Contribution Tool provides more robust assessment of sustainable development impact of projects, including identifying risks to sustainable development.
Avoids perverse incentives	**Currently yes but unclear in the future.** JCM credits do not pose perverse incentives to Japanese private sector entities, as JCM credits are not eligible for domestic compliance schemes. The Japanese government also expects to meet its NDC target through domestic action rather than use of JCM credits, though it reserves the right to use JCM

Principles of success	Japan's JCM
	credits for its NDC target. Currently the volumes of JCM credits are too small to suggest perverse incentives, but this could change in the future if Japan scales sourcing of JCM credits, and efforts via green industrial policy do not reduce domestic emissions to meet the NDC target.

Source: South Pole and Wuppertal Institute

5 Identifying conditions and associated factors to explain success (or otherwise) of offsets within existing compliance schemes

None of the case studies demonstrate that offsets achieved all five indicators of success associated with adding value and upholding the environmental integrity of the compliance scheme. However, synthesising the findings of the case studies help identify the conditions when offsets achieve each principle of success. Table 16 below provides a summary of these conditions.

Different factors explain whether favourable conditions emerge to justify whether policymakers should incorporate an offset mechanism into compliance schemes. Unfortunately, it is difficult to determine whether compliance schemes are ambitious enough to economically justify the use of offsets. This would first require a scientific assessment that determines whether the climate policies that policymakers have set are in-line with science-based targets. It would then require an economic assessment of whether the costs of abatement to meet these targets would be significant enough to pose other negative economic risks such as carbon leakage, thereby justifying the use of cost containment measures such as offsets. However, the case studies do reveal that more subjective factors can lead to a political justification on incorporating offsets into the compliance scheme, particularly influenced by the domestic political economy perception that the proposed compliance scheme is ambitious and could lead to detrimental effects to the domestic economy (as shown in Table 16 below)

These factors can be grouped into the categories, as defined in Table 2 in Section 1.2. Not all of these categories may be pertinent to the emergence of each condition. However, categorising factors is useful in providing recommendations to policymakers on:

1. assessing whether offsets will add value and uphold the environmental integrity of their compliance scheme, based on determining whether key factors exist that enable or hinder the favourable conditions to emerge;
2. identifying key policy design considerations and capacity building activities to ensure that offsets achieve each indicator of success for compliance schemes.

The following subsections will highlight which factors are important in enabling (or hindering) the conditions for each indicator of success.

Table 16: Conditions that determine the success of offset use in compliance schemes

Indicator of success	Conditions
Increased acceptability of the compliance scheme	When policymakers are sensitive to the political economy effects of introducing compliance schemes and are therefore willing to incorporate cost containment measures, such as offsets, as a way to reassure compliance actors that the compliance scheme will not undermine domestic competitiveness. When policymakers want to increase the attractiveness of the compliance scheme by the choice of offset supply sectors.

Indicator of success	Conditions
Enabled ambition of the compliance scheme to be increased	When policymakers and compliance actors see offsets as a reliable and necessary cost containment option under the more ambitious scheme. When offset suppliers are also supportive of the increased ambition.
Provided policymakers with flexible options to achieve emission reductions	When policymakers were interested in achieving emission reductions in sectors and technologies that are within or outside the scope of the compliance scheme, that could also align with meeting broader political or societal goals.
Promoted investment in sustainable development	When offsets with high sustainable development benefits are cost competitive to other compliance measures. When certifying standards require the measurement of SDGs as part of the certification process.
Avoided perverse incentives to actors to rely solely on offsets to meet compliance requirements, rather than reducing their own emissions	When compliance schemes can maintain a strong price signal for actors to reduce their own emissions. When offsets were certified to principles that ensure environmental integrity, and are tracked under robust infrastructure, so that a large supply of 'cheap' offsets are not available to be bought.

Source: South Pole and Wuppertal Institute based on

5.1 Increases acceptability of the compliance scheme

While reservations and resistance towards the implementation of the compliance schemes could be noticed in four case studies where a carbon price was imposed, within three of them the incorporation of offsets did not play a pivotal role to the actual passage of the compliance scheme. In the case of the EU ETS and the Colombian carbon tax, the political momentum to introduce a carbon price was already under way. The Albertan Government introduced the SGER in order to stave off criticism of not supporting or undertaking action on climate.

In the case of Japan, the political intention of introducing the Japanese JCM was as a crediting mechanism to enable emission reductions in developing countries through the transfer of Japanese technologies and expertise. Japan did not have a domestic compliance target when the JCM was launched in 2013, therefore the JCM did not serve as a cost containment measure for a compliance scheme when it was introduced.

The only instance when offsets play an important role in enabling the passage of a compliance scheme is when policymakers are aware that the political economy of the jurisdiction is resistant to the introduction of a stringent compliance scheme, and therefore use offsets as the primary mechanism to meet compliance. This occured in Australia, as the ERF and Safeguard Mechanism was introduced to replace the CPM with a public fund that procured offsets to meet the compliance target. This design was more preferable for the compliance parties than previous compliance scheme, which was replaced as it imposed high carbon prices on carbon-intensive sectors of the economy.

It should be noted that while other factors and circumstances may play a more significant role in influencing whether or not a compliance scheme is passed, offsets can still play a role in increasing the acceptance of the compliance scheme. For example, the incorporation of offsets did increase the overall acceptability of the compliance schemes in the EU ETS, Alberta or Colombia, due to perceptions that cost-containment measures were justified. At the design stage of the compliance schemes, policymakers were sensitive to the economic and political ramifications of introducing compliance schemes – particularly as it was perceived that the compliance scheme could threaten the competitiveness of domestic firms. At the time of its introduction, the EU ETS and Alberta were the first ETS being introduced to reduce greenhouse gases. Therefore, the domestic perception in both – particularly amongst domestic firms – was that in the absence of foreign competitors instituting similar carbon pricing, their schemes were ambitious and would undermine domestic competitiveness. In the case of the EU ETS, how high future carbon prices could reach was unknown but anticipated to be high enough to undermine domestic competitiveness. In the case of Colombia, the anticipated increase in the carbon tax schedule raised competitiveness concerns about the private sector. Therefore, while in hindsight it can be argued that that these compliance schemes were not ambitious from an economic point-of-view, the perception amongst key stakeholders that the compliance scheme was ambitious did require policymakers to consider the incorporation of cost containment measures.

Consequently, policymakers did consult with future compliance actors when designing the scheme as a way to identify cost containment measures that would be acceptable by these actors. Aside from offsets, other cost containment measures that compliance actors advocated policymakers to include during the design phase of the compliance scheme was the setting of baselines (in the case of Alberta and also Australia), provision of free allowances (in the EU ETS), sectoral exemptions (in the case of Colombia for coal), or phasing in compliance price (e.g. Colombia tax schedule). Offsets was just another type of cost containment option that industry groups lobbied for, particularly in anticipation that compliance prices would be prohibitively high (as in the case of the EU ETS).

What makes offsets different to other cost containment measures is that they can provide carbon financing to sectors and geographies outside of the compliance scheme, and even to more expensive low-carbon technologies within the compliance scheme. Compliance schemes that sourced offsets domestically helped increased the attractiveness of introducing the compliance scheme. Offsets were attractive to domestic groups whose sectors were eligible to supply offsets. In fact, lobbying from these groups played a key role in ensuring these sectors were eligible in Alberta, Australia, and Colombia. However, using offsets as a way to provide carbon financing to these domestic sectors also increased support for introducing the compliance scheme to the wider public.

It is therefore debatable whether offsets were successful for this indicator – as while it technically did increase acceptability in the majority of the case studies, it did not necessarily play a pivotal role in the passage of the majority of the compliance schemes. It should be noted that the lack of stringency and ambition in the analyzed compliance schemes appears to be mainly caused by the overall design of the scheme, e.g. price signal set low in Alberta and Columbia, lack of adapting to overload of allowances within the EU-ETS, rather than the incorporation of offsets. These case studies point to the importance of recognising the political economy context that govern how compliance schemes are designed and introduced, as the justification for the use of offsets can occur on politically subjective grounds, rather than objective economic grounds.

Table 17: When do offsets increase the acceptability of introducing a compliance scheme?

Condition	Factor category	Supply of offsets	Demand of offsets
When policymakers are sensitive to the political economy effects of introducing compliance schemes and are therefore willing to incorporate offsets as a way to increase the acceptance of the compliance scheme by incorporating cost containment options and want to increase the attractiveness of the compliance scheme by the choice of offset supply sectors.	Political economy	Political importance, and lobbying power, of actors in the sectors in which offsets are sourced. The inclusion of offsets can therefore appeal to specific groups, and wider to citizens.	Private sector perception and preference on the use offsets as a cost containment measure, particularly on the grounds of maintaining domestic competitiveness. Sectors under compliance are seen by citizens as important to the domestic economy in terms of economic growth and employment.
	Policy design	The sectors that are proposed for the sourcing of offsets are attractive to politically powerful groups and would therefore support policymakers to include offsets into meeting compliance.	How compliance costs will be set for sectors that will be under the compliance scheme to determine if cost containment measures are necessary. Compliance actors advocate for using offsets as a cost containment option.
	Economic case	Offset projects being considered for compliance eligibility can cost-effectively deliver offsets under proposed compliance price.	Sectors with high abatement costs, who therefore will find it difficult to comply to compliance schemes without losing competitiveness. This justifies using cost containment measures to avoid negative effects to domestic sectors.

Source: South Pole and Wuppertal Institute

5.2 Raising ambition of the compliance scheme

Within the five case studies, only Alberta and EU ETS set more ambitious targets in legislation, while Japan announced this in executive speeches. In the case of Alberta, the Federal Government forced the Albertan government to raise its ambition by increasing the technology fund fee price to be in-line with the federal carbon price. While the provincial government is challenging the Federal government on its power to impose this carbon price on provinces, the newly elected provincial government has instituted an interim measure that allows Albertan actors to increase the use of flexible mechanisms to meet compliance, including the use offsets. Therefore, it cannot be argued that offsets were a key factor in enabling the compliance scheme to raise its ambition. The provincial government of Alberta used these flexible measures to water down the stringent price signal set by a more ambitious federal climate policy. Conversely, the EU ETS increasingly restricted the use of offsets in future periods despite increasing its ambition, as it did not need to rely on offsets as a cost containment measure with the growing surplus of EUAs. In fact, EU policymakers reformed the EU ETS to boost the EUA price signal. In the case of Japan, the newly elected Prime Minister announced more ambitious targets as a response to key international events, when countries like Japan were asked to demonstrate climate leadership. Though his speech in April 2021 on supporting worldwide decarbonisation under the Paris Agreement could be undertaken through the JCM, it is unlikely the JCM played a pivotal role in convincing the Prime Minister to announce more ambitious targets.

Another important reason that offsets could have played a limited role in supporting the raising of compliance ambition is when it does not prove to be a reliable cost containment measure against high compliance costs. Both the EU ETS (with the use of CERs/ERUs) and Colombia's carbon tax (with domestic offsets) are good examples of how delays in the issuance of offsets can deter compliance buyer's interest in using these offsets. Japan is waiting for Article 6 rules on corresponding adjustments to be clarified before transferring credits under the JCM. Surprisingly, Japan did not use the pipeline of credits it has already developed under the JCM to introduce a more ambitious conditional target in its 2020 NDC submission. These developments demonstrate the importance of effective governance and well established infrastructures as a way to minimize credit risk delivery.

There should be careful conclusions drawn of whether offsets were 'successful' in raising ambition. There could be broader political economy reasons that stop governments from increasing their ambition – including the unwillingness or inability – of governments to increase compliance ambition in the first place. In the case of Australia and Japan, it was domestic political economy factors that explained this lack of ambition. Australian voters had re-elected the incumbent government who campaigned on a platform to keep its NDC target, while Japan said it would only change its NDC target subject to improvements to its domestic energy mix. The Colombian Government has not increased its carbon tax rate in real terms since its introduction, though the reasons remain unclear. The main reason for the increase in Alberta's carbon price was the federal backstop – otherwise it is unlikely that the Government of Alberta would have raised the price as the newly elected Albertan Government tried to eliminate the carbon price altogether. Instead the Government introduced the TIER system that introduced less stringent baselines and increased the use of flexible mechanisms as a counter to the increased technology fund fee price.

In summary, most of these case studies show that offsets were not successful in raising ambition due to policymakers themselves being unwilling to increase climate ambition in the first place. Only the EU increased its ambition, and even undertook EU ETS reforms to implement a stronger

price signal given the surplus of EU allowances. It was thus clear a more ambitious EU ETS did not need offsets as a cost containment measure. The findings suggest offsets can only contribute to raising compliance ambition when policymakers are willing to raise ambition with higher targets or a stronger carbon price signal, under which offsets are seen as a reliable and necessary cost containment measure. Offsets can also be used to undermine strong carbon price signals – as in the case of Alberta. They contribute less when other, more reliable measures are in place to contain costs with increased ambition.

Table 18: When do offsets help raise the ambition of the compliance scheme?

Condition	Factor Categories	Supply of offsets	Demand of offsets
When offsets are seen as a reliable and necessary cost containment measure under the more ambitious scheme	Political economy	Seen as an attractive sector to continue to support as part of increased ambition.	Government and voter's willingness to increase the ambition of the compliance scheme, and willingness to use offsets as a cost containment option to avoid negative effects on domestic economy.
	Economic case	Potential supply of offsets can provide cost-savings to the compliance price.	Higher compliance costs are likely to threaten the competitiveness of compliance sectors, justifying the use of cost containment measures.
	Policy design	Which sectors and types of projects are included in the future compliance scheme, which can contribute to the economic attractiveness of developing offset projects.	Higher ambition raises compliance price signal, that justifies incorporating cost containment measures such as offsets. Design of compliance price signal also ensures offsets – or other shocks - cannot undermine price signal that helps compliance scheme achieve its target.
	Private sector capacity	Political importance, and lobbying power, of actors in the sectors in which offsets are sourced to support increased ambition.	Private sector perception that offsets can be a reliable and effective cost containment measures. If offsets are not reliable, only firms that can afford to take delivery risk may be more interested in the continued use of offsets and will support using offsets as part of raising ambition.
	Public governance	Process and infrastructure for certifying, issuing, and trading offsets amongst public sector actors (particularly between standards, verifiers and registries) is well established and identified amongst public institutions, to reduce risks of offset supply and delivery.	The importance of the public sector in being able to set a credible and stringent compliance price; and the perception that offsets are reliable as a cost containment measure to high compliance prices but will not create perverse incentives that will inhibit emission reductions.

Source: South Pole and Wuppertal Institute

5.3 Provides policymakers with flexible options to achieve emission reductions

In all the case studies, offsets provided policymakers with the flexible design option to incentivize emission reductions in sectors and technologies that were hard-to-abate. At the design stage, incorporating offsets into the compliance mechanism was attractive to policymakers in providing carbon finance to sectors and technologies that were particularly difficult to impose stringent climate policies. Interestingly, this was especially the case for driving emission reductions in the agriculture and land-use sectors in Alberta, Australia, and Colombia. More recently, certain European governments, such as Belgium, France, Spain, Netherlands and the UK are developing domestic voluntary offset standards as a way to provide carbon finance to drive emission reductions in these sectors (Cevallos et. al, 2019). Voluntary carbon finance can help these countries to meet compliance targets to mitigate emissions for sectors outside of the EU ETS.

Offsets also allowed the EU and Japan to honour their international commitment to supporting emission reductions in emerging and developing countries by the choice of where international credits could be sourced. In the case of the Albertan, Australian, and Japanese Government, offsets also provided policymakers the latitude to develop methodologies that suited domestic or international sectors. Conversely, offsets provided the EU with power to restrict offsets from projects that did not fit its sustainable development criteria. EU policymakers also tried to leverage its power in determining the future use of CERs in the EU ETS as a bargaining chip in international climate negotiations.

While offsets were successful in providing policymakers with flexible options, it should be noted that offsets from these preferred source sectors need to be cost-effective against the carbon price signal (please see next sub-section on achieving sustainable development co-benefits). These findings demonstrate the importance of sending a strong carbon price signal in order to drive emission reductions in the preferred sectors of policymakers through the offset mechanism.

Table 19: When do offsets provide policymakers with flexible options for achieving emission reductions within and outside of the jurisdiction?

Condition	Factor Categories	Supply of offsets	Demand of offsets
When policymakers are interested in driving emission reductions in specific sectors/technologies/geographies that are inside or outside of the scheme.	Political economy	Difficulties in imposing stringent climate policies, or setting a strong carbon price signal, in sectors considered for offsets.	Policymakers can bargain on offset eligibility rules to try and influence other stakeholders towards policymakers' goals.
	Economic case	Emission reductions in eligible sectors will be difficult to achieve without external finance.	Compliance scheme will impose high compliance costs, and therefore justifies incorporating cost containment options, such as offsets.
	Private sector capacity	Lack of knowledge and capacity to reduce emissions in the sector justifies use of offset mechanism to develop capabilities in measuring, reporting and certifying emission reduction potential in the sector. However other private sector actors can help with the offset development and certification process.	Not applicable.
	Public governance	Government capacity to develop and approve offset methodologies that are suitable to context in which offsets are sourced.	Not applicable.

Source: South Pole and Wuppertal Institute based on

5.4 Promoting investments in sustainable development

The findings from the case studies demonstrate that the extent to which offsets promote investments into sustainable development is based on the cost competitiveness of offsets with high sustainable development benefits compared to other offsets that are also eligible for the compliance scheme, and the compliance cost itself.

The case studies show mixed results with regards to being successful for this indicator. In the case of the use of CERs/ERUs in the EU ETS, projects with high sustainable development benefits were not used for compliance as they provided lower volumes, and had higher prices and risks, than more cost competitive industrial gas and large-scale renewable projects. This particularly pertained to CERs from LDCs. However, in Alberta, Australia, and Colombia, offsets with the higher sustainable co-benefits benefited the most from carbon finance as they have the lowest abatement costs in comparison to other eligible methodologies. Nonetheless, the latter two countries appear to have developed the supply potential of projects that can be cost-effectively developed under the current carbon price. Offsets will only promote further investments into sustainable development projects in these countries if the carbon price is raised – demonstrating the importance of policymakers setting a strong compliance price signal to achieve these co-benefits.

Another condition that determines whether offsets realize sustainable development is if the offset standards have robust baselines that ensure the additionality of carbon credits, and require the measurement of SDGs as part of the certification process and can even restrict the issuance of credits if projects do not achieve a certain number of SDGs. While the policy design and governance processes surrounding the certifications of CERs has been criticized for its lack of clear definitions on sustainable development criteria, much can be learnt from the voluntary market standards such as the Gold Standard and VCS. Both certification standards include quantification tools for measuring the SDG impacts. The governance of certifying offsets are important in ensuring that projects do not undermine sustainable development, are inclusive with regards to engaging community stakeholders, and in the measurement of actual SDG impacts.

Table 20: When do offsets promote investments into sustainable development?

Factor	Factor Categories	Supply of offsets	Demand of offsets
When offsets with high sustainable development benefits are cost competitive to other compliance options.	Economic case	How cost competitive offset projects with high sustainable development benefits are in comparison to offset projects with lower sustainable development benefits, or the compliance price.	How the compliance price compares to the offset price of projects with high sustainable development benefits.
	Policy design	The types of offset projects that are eligible have strong sustainable co-benefits.	Strong carbon price signal is maintained, and other cost containment measures are more expensive than buying offsets.
	Private sector capacity	Project developers' willingness and ability to develop projects with high sustainable development benefits.	Civil society can play a critical role in influencing policy design to allow only offsets with high sustainable development benefits to be eligible for compliance.
	Public governance	Ability for standards to develop approved protocols that have high quality assessments of additionality and sustainable development benefits.	Not applicable.
Certifying standards require the measurement of SDGs as part of the certification process	Policy design	Standards have clear and concrete identification of sustainable development criteria (e.g. SDGs) that projects cannot violate and need to meet.	Compliance scheme only accepts offsets certified by standards that have strong SDG requirements.
	Private sector capacity	Whether private sector capacity for verifying and certifying offsets (particularly independent verifiers) includes tools to measure the extent to which an SDG/SDGs are achieved by offsets.	Civil society can play a strong role in monitoring and ensuring accountability of standards, and specific projects, on whether it promotes or undermines sustainable development.

Source: South Pole and Wuppertal Institute

5.5 Avoids perverse incentives

There are mixed results as to whether offsets were successful in avoiding perverse incentives that undermine the steering effect of the compliance scheme to reduce emissions. The first test is whether the use of offsets deterred actors from reducing their own emissions.

The most clear-cut case where this indicator failed was in Australia, as offsets reduced incentives for actors to reduce their own emissions in Australia. The Australian ERF was designed specifically to shift the effort of emission reductions from large emitting facilities to the public procurement of offsets to meet compliance targets. The purpose of the Safeguard Mechanism was to ensure that compliance facilities did not excessively increase their emissions beyond their baselines, so that Australia could still meet its NDC. Though opposition parties did try to propose more ambitious climate targets, the 2019 election of the incumbent party demonstrates the difficulties of instituting more stringent climate targets. In this case, offsets will unfortunately continue to provide perverse incentives against this political reality.

Similarly, the Japanese Government could shift the burden of meeting its NDC target to the JCM rather than reducing emissions domestically. However, the conservative approach to estimating emission reductions provides a low yield of offsets from the current JCM pipeline. This low volume suggests the Japanese Government would need to scale the volume of credits from the JCM to meet its NDC target. It is unclear if the Japanese Government will increase its reliance on JCM credits to meet its NDC target in the future, or whether it will focus on reducing emissions domestically, as its NDC target suggests. It is unclear whether Japan will be able to undertake domestic emission reductions, as it has yet to impose a stringent domestic compliance regime at the federal level. Japan has been discussing imposing a federal ETS since 2008, however it has yet to occur (World Bank, n.d.). Therefore, it appears that Japan will need to rely on other domestic measures (e.g. industrial policies to decarbonize domestic industry), or import credits from the JCM, to meet its NDC targets. The Japanese case study also demonstrates how the difficulties in imposing stringent climate policy domestically means governments could rely on offsets as a way to meet domestic targets. Sourcing offsets internationally could also be economically justified in the case of Japan, given the high costs of abatement for decarbonising efficient industrial facilities Japan. It will be important to see the role of international offsets under the newly announced targets of Japan.

While Australia and Japan are case studies on how offsets do not incentivize emitting actors to reduce their emissions, it is more difficult to ascertain for the other case studies, as it is difficult to understand the internal decision-making of compliance actors on whether to reduce their own emissions or buy offsets. One a potential way to detect the existence of perverse incentives is if compliance actors used the maximum number of offsets they were allowed to use. Another way is to see if offsets where the most used of the flexible mechanisms.

Interestingly, the case studies of the EU ETS and Colombia demonstrate that compliance actors did not maximize their use of offsets, though the EU ETS case shows sectoral variation. Empirical evidence shows that just under half of compliance actors in the EU ETS did not use their maximum offset limit in Phase II, and even 22% did not use any of their offset quota (Naegele, 2018). This meant many compliance users did not realize the considerable cost savings that they could have achieved by paying the CER price rather than the EUA price, even when there was a high supply of CERs available. The main reason was firms who did not buy CERs tended to not engage in the trading of allowances, potentially due to high transaction costs involved with

trading that could undermine any cost savings, the size of the firm, or corporate attitudes towards risk (Hintermann et al. 2016; Sato et al. 2016; Naegele, 2018).

In the case of Colombia, the problems in delivering offsets reduced the reliability of using offsets as a cost containment measure against the carbon tax. Furthermore, as the carbon tax rate did not increase in real terms, actors ensured compliance by just paying the carbon tax. The size of cost savings from buying offsets would only be attractive to firms with large compliance obligations under the carbon tax. However, as the infrastructure is now working, it could lead to a large delivery of carbon credits with no environmental integrity to be used by buyers. A key lesson from Colombia is the importance of governance with regards to robust certification and enforcement of restrictions to ensure that buyers only use carbon credits with high environmental integrity for domestic compliance.

In Alberta, offsets were the least used of the flexible mechanisms in most years. The only time offsets were used the most was during the economic recession between 2009 and 2011, which suggests firms did not have the resources to reduce their own emissions. In most years, compliance actors chose to pay the technology fund fee when they went over their baseline, suggesting a low 'penalty' price for not meeting the facilities' compliance target. It was only when the technology fund fee price increased that evidence shows that actors increased their efforts in reducing their own emissions, and then through surrendering offsets. Unfortunately the provincial government has increased the quota of flexible mechanisms that can be used to meet compliance as a response to the increased technology fund fee price – and therefore could create perverse incentives that reduces actor's efforts to reduce their own emissions.

The case studies of the EU ETS, Colombia and Alberta suggest that compliance actors are only motivated to buy offsets when the compliance price signal is high, thereby creating a motivation to realize cost savings. If the compliance price signal is low, actors do not rely on offsets to meet their compliance obligations but instead pay the compliance price. Therefore, one important condition to ensure offsets does not create perverse incentives is to ensure the compliance scheme maintains a strong compliance price. The second way offsets can create a perverse incentive is when the supply of offsets undermines the price signal of an ETS. While CERs are often blamed for undermining the EU ETS price signal, empirical evidence suggests that other factors were more significant in undermining the EUA price (Koch et al, 2014).

The findings of these case studies suggest that compliance schemes can avoid potential perverse incentives of offsets hindering its steering effect if the scheme itself sets and maintains a strong compliance price signal. Conversely, offsets do create perverse incentives if the intention of the government is to use offsets as the primary way to meet its compliance targets, rather than impose stringent compliance schemes on actors to reduce their emissions. In either scenario, the political economy matters in determining whether policymakers are willing and able to pass a stringent compliance scheme to mitigate domestic emissions.

Nevertheless, policymakers can design the compliance scheme to avoid perverse incentives. Policymakers can set quantitative and qualitative restrictions on the use of offsets by actors, which can also limit negative impacts on the carbon price signal and support emission reductions in projects with high environmental integrity and sustainable co-benefits. Furthermore policymakers can design in-built adjustment mechanisms for the ETS if a large supply of offsets reduces the carbon price signal, that can be triggered if the carbon price goes below a certain carbon price floor or the volume of carbon credits in the markets exceeds a certain level. Ensuring that strong governance measures are in place to impose and oversee these restrictions are developed is also essential in ensuring perverse incentives are avoided.

Table 21: When does the incorporation of offsets into compliance schemes manage to avoid perverse incentives?

Condition	Factor Categories	Supply of offsets	Demand of offsets
When the compliance scheme can introduce and maintain a strong price signal for actors to reduce their own emissions.	Political economy	Not applicable.	Ability and willingness of policymakers to pass an ambitious compliance schemes that is designed to keep a strong price signal, and ensures offsets are only used as a cost containment measure.
	Policy design	Restrict eligible offsets to those with higher abatement costs.	Compliance scheme maintain strong price signal through creating prize stabilizer mechanisms to any supply or demand shocks. Offset buyers have restrictions on the use of offsets, and offset use is phased out.
	Economic case	Costs of eligible offsets are close to compliance price.	Whether the compliance price is strong enough to induce actors to reduce their own emissions. Transaction costs associating with buying offsets is high.
	Private sector capacity	Not applicable.	Willingness of the private sector to realize cost savings in buying and sourcing offsets, rather than pay the compliance price.
	Public governance	Not applicable.	Public governance processes that can react to internal or external factors that could undermine the stringency of the compliance price, including incorporating price stabilisation or offset restriction rules. Governments are willing to use registry system can track the proper use of carbon credits by buyers.

Source: South Pole and Wuppertal Institute

6 Conclusion

The objective of this report was to identify the conditions that determine when offsets can add value to compliance schemes without undermining their environmental integrity. To achieve this objective, five indicators of success have been defined to evaluate whether offsets added value and upheld the environmental integrity of compliance schemes. This evaluation framework has been applied to five case studies to assess the impacts of offsets to the respective compliance schemes, thereby providing data to identify common conditions that can explain whether or not offsets contributed to the success of a compliance scheme.

These case studies were chosen due to their variety of characteristics, in terms of political economy, design and evolution of the compliance scheme, and impact of offsets. In comparing the results of the case studies, common conditions were identified when offsets did (or did not) meet the indicator of success for the compliance scheme. The synthesis also identifies the variety of factors that explain why these conditions emerge. While these conditions and factors are common to these case studies, it would be interesting to test whether they provide similar explanatory salience to other compliance schemes that incorporate offsets. These common conditions could also be useful in helping policymakers that are considering using offsets to determine if they have amenable conditions for offsets to add-value and uphold environmental integrity of their compliance scheme.

The analysis of five case studies demonstrates that no offset mechanism has managed to meet all indicators of success. In examining the conditions that determine whether offsets achieve met each indicator, two common conditions emerge as being the most important.

The first condition is that the **compliance scheme needs to be ambitious in order to economically and politically justify the use of offsets** as a cost containment option. Unfortunately, it is difficult to undertake an objective assessment of whether offsets are justified as a cost containment measure from an economic point of view as this depends on each industry's individual financial and technical abatement capacity. While this kind of economic assessment is outside the scope of this report, Climate Action Tracker points out that only Morocco has set climate policies that are compatible with the Paris Agreement's 1.5 degree Celsius target (Climate Action Tracker, 2021). This lack of countries that have Paris-compatible targets points to the difficulties for policymakers to propose, pass and implement ambitious climate policies due to the politics of climate change. The findings of this report demonstrate two important aspects of how offsets can support ambitious targets from a political and economic perspective.

From a political perspective, offsets can play a role in overcoming the political resistance towards compliance schemes that are perceived to be too ambitious within the domestic political economy context. Offsets can help in introducing and raising ambition of the compliance scheme by acting as a cost-containment measure to perceived high economic costs to the domestic economy and can widen support for the compliance scheme by providing carbon financing options to drive emission reductions outside the scheme. This aspect of offsets makes it more attractive to policymakers than other cost containment measures, as it incentivizes emission reductions in sectors that are otherwise difficult to impose climate policy. By giving policymakers the flexibility to choose which sectors, technologies and geographies offsets can be sourced, policymakers can widen the scope of the compliance scheme and achieve broader societal goals, such as realizing sustainable development co-benefits.

However, the findings also demonstrate that offsets do not realize these outcomes if the compliance signal is low – thereby demonstrating the importance of designing the compliance

scheme to be ambitious from an economic point-of-view. If policymakers are not willing to set an ambitious compliance price signal, then compliance actors are more likely to pay the compliance price rather than buy offsets. When the compliance price is low, compliance actors are less incentivized to reduce their own emissions. When the compliance price is high – and expected to be high in the long-term - compliance actors are more willing to exercise efforts to reduce their compliance costs by mitigating their own emissions and buy offsets as another cost containment measure. To ensure that the compliance price signal is not diluted by 'cheap' offsets, policymakers would need to place quantitative and qualitative restrictions on the use of offsets – including restricting eligibility to offsets that are valuable in terms of augmenting impacts to sustainable development.

The second condition is that the **governance and infrastructure that regulates offsets needs to be well established** to ensure offsets deliver value to the compliance scheme. The governance of offsets is important in ensuring that offsets uphold to the principles of environmental integrity by credibly representing emission reductions that are real, verifiable, and additional. The standards that certify offsets also need to incorporate assessment tools that measure the sustainable co-benefits of projects, including strict criteria that rejects the certification of projects that undermine sustainable development. Lastly, the institutions, processes and infrastructure that certify offsets needs to have sufficient capacity and be well established in order to minimize unnecessary delays in delivering offsets to the final buyer. Problems in delivering offsets due to a lack of institutional capacity in certifying offsets, or immature registry infrastructures, reduces offsets reliability as a cost containment option. Policymakers should consider the maturity of offset governance systems and infrastructure when deciding whether to incorporate offsets into a compliance scheme. Policymakers could consider using international standards and associated registry systems if domestic institutions are not mature.

Both conditions have to be met in order to achieve all five indicators of success. If offsets are only used as a cost containment measure to a high compliance price without proper governance, it is unclear whether the delivered offsets uphold to the principle of environmental integrity or could realize sustainable development co-benefits. Furthermore, the lack of reliable delivery of offsets deters buyer's willingness to purchase offsets as a cost containment option. If offset governance is only achieved without a strong compliance price, offsets are not needed as a cost containment measure and will not be able to deliver on their other functions, enable sustainable co benefits and mitigation outcomes outside of the scope of the compliance mechanism as there will be no interest in purchasing them.

While policymakers can undertake efforts to improve the institutional governance and infrastructure of offsets, what is more difficult is policymaker's willingness to introduce stringent compliance regimes. The political economy in which compliance schemes are introduced – and implemented – matters in determining the ambition and design of the compliance scheme, and the probability of its longevity. Offsets are just one type of design feature that policymakers can incorporate into a compliance scheme. What makes offsets an attractive feature in comparison to others is that it has the potential to achieve other societal goals that are in-line with the preferences of policymakers, and wider society.

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