CLIMATE CHANGE
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Final report

Suitability and Success Factors of Offsets post-2020

by:

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Abstract: Suitability and Success Factors of Offsets post-2020

Offsetting enables countries and companies to meet part of their climate change mitigation obligations by using mitigation outcomes generated elsewhere – in lieu of own emission reductions. This report explores the future role of offset approaches and how they could be successfully integrated into a post-2020 climate regime by focusing both the supply and demand side. For this purpose, the report develops a conceptual approach that derives a normative vision of what should be considered a successful offset use in a top-down manner to then link this vision to specific factors on the ground in sectors and jurisdictions where offsets will be generated and used. It explores how these factors influence the successful operationalisation of the offset approach and how they can inform its design. In addition, the report also explores six conceptual design aspects to providing recommendations on how to take these factors into account during the design of the offset approach. Based on these findings, the authors derive overarching policy recommendations on the integration of offsets into carbon pricing schemes.

Kurzbeschreibung: Eignung und Erfolgsfaktoren von Offsets post-2020

Offsetting ermöglicht es Ländern und Unternehmen, einen Teil ihrer Klimaschutzverpflichtungen zu erfüllen, indem sie anstelle von eigenen Emissionsreduktionen Minderungsergebnisse nutzen, die an anderer Stelle erzielt wurden. Dieser Bericht untersucht die zukünftige Rolle von Offset-Ansätzen und wie sie erfolgreich in ein post-2020-Klimaregime integriert werden könnten. Hierfür wird sowohl die Angebots- als auch die Nachfrageseite in den Fokus genommen. Zu diesem Zweck entwickelt der Bericht zunächst einen konzeptionellen Ansatz und eine normative Vision dessen, was als erfolgreiche Offset-Nutzung angesehen werden sollte. Anschließend verknüpfen die Autoren*innen diese Vision mit spezifischen Faktoren in den Sektoren und Jurisdiktionen, in denen Offsets erzeugt und genutzt werden. Es wird untersucht, wie diese Faktoren die erfolgreiche Operationalisierung des Offset-Ansatzes beeinflussen und wie sie dessen Gestaltung beeinflussen können. Darüber hinaus untersucht der Bericht sechs konzeptionelle Ausgestaltungsaspekte, um Empfehlungen abzuleiten, wie diese Faktoren bei der Ausgestaltung des Offset-Ansatzes berücksichtigt werden können. Basierend auf diesen Erkenntnissen leiten die Autoren*innen übergreifende Politikempfehlungen zur Integration von Offsets in Kohlenstoffpreissysteme ab.

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List of abbreviations

BAU	business as usual
BECCS	Bioenergy with Carbon Capture and Storage
CAT	Climate Action Tracker
CCU	Carbon Capture and Utilization
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
COP	Conference of the Parties
DAC	Direct Air Capture
EITE	Emissions-intensive and trade-exposed
ERPA	Emission reduction purchase agreement
ETS	Emissions Trading System
EU ETS	European Emissions Trading Scheme
FCPF	Forest Carbon Partnership Facility
FDI	Foreign direct investment
GCF	Green Climate Fund
GHG	Greenhouse Gas
GWP	global warming potentials
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
ITMO	Internationally Transferred Mitigation Outcomes
LT-LEDS	long-term low greenhouse gas emissions development strategies
MLP	Multi-level perspective
MO	Mitigation outcomes
MRV	Monitoring Reporting and Verification
MPG	Modalities, Procedures and Guidelines
NACAG	Nitric Acid Climate Action Group
NDC	Nationally Determined Contribution
NEFCO	Nordic Environment Finance Corporation
NETs	Negative emission technologies
OMGE	overall mitigation in global emissions
PA	Paris Agreement
P&M	Policies and Measures
PAF	Pilot Auction Facility
PMI	Partnership for Market Implementation
PMR	Partnership for Market Readiness
SDG	Sustainable Development Goal

UNEP	United Nations Environment Programme
TCAF	Transformative Carbon Asset Facility

Summary

Background

Offsetting enables countries and companies to meet part of their climate change mitigation obligations by using mitigation outcomes generated elsewhere – in lieu of own emission reductions. In the past, offsetting has been an integral part of national and international climate protection policy and is likely to remain an important mitigation instrument in the future, with market-based cooperation being integrated into Article 6 of the Paris Agreement. This report explores the future role of offset approaches and how they could be successfully integrated into a post-2020 climate regime. On the demand side, this report focuses on the use of offsets for compliance purposes while on the supply side the focus is put on carbon crediting.

The report pursues three interlinked purposes:

- First, it intends to put offset approaches into the broader context of the post-2020 world and show the instrument's potential to contribute to the overarching goals of the Paris Agreement, while also outlining the adverse effects offsets could have.
- Second, the report provides a structured overview on those factors that are relevant for the successful operationalisation of offset approaches.
- Third, the report explores how the design of offset approaches could be adapted to prevailing factors and further deep-dives into six selected design aspects.

With this, the report aims at assisting policymakers in assessing the suitability of a specific sector or jurisdiction for being included into an offset approach. Furthermore, it is to inform the design process of the offset approach and show how the instrument could be adapted to serve specific policy objectives. For this purpose, the report develops a conceptual approach that derives a normative vision of what should be considered a successful offset use in a top-down manner to then link this vision to the conditions on the ground in sectors and jurisdictions where offsets may be generated and used. 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. It builds on the findings of the case studies described in the parallel publication *Offset approaches in existing compliance mechanisms - Adding value and upholding environmental integrity?* by Carvalho, Meneses et al. (2021) and provides the basis for the sector-specific analyses whose results are compiled in the report *Potentials for Offset Approaches in Selected Sectors post-2020* by Carvalho, Sherman et al. (2021).

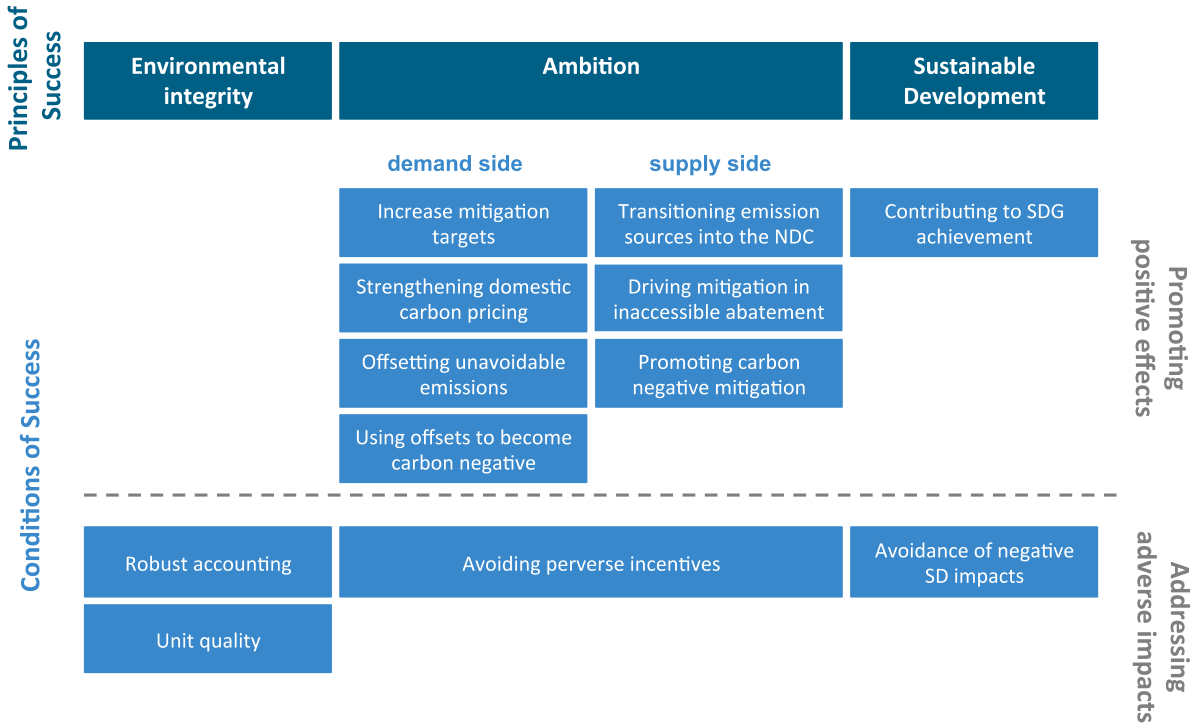
Putting offsets into the broader context of the post-2020 climate regime

The report first explores how the new framework conditions established with the Paris Agreement impact future offset approaches on the demand and the supply side. It starts off by identifying the Paris Agreement's mitigation objectives and its innovative architecture as an Overarching Framework that structures the functioning of offset approaches and determines their successful integration into a post-2020 climate policy. Building on the observation that future offset approaches must be fundamentally different from the zero-sum game known from the past, the authors derive three key **Principles of Success** for post-2020 offset approaches:

- environmental integrity,
- ambition, and
- sustainable development.

The report finds the achievement of these Principles of Success to be contingent on specific **Conditions of Success.** As can be seen from Figure 1 below, individual Conditions of Success can either promote positive effects or address adverse impacts related to each of the Principles of Success.

Figure 1: Overview on Conditions of Success and Principles of Success



Source: Own illustration, Wuppertal Institute

The analysis of the functioning of the Conditions of Success revealed the following:

- Priority should be given to those Conditions of Success that address negative effects as these can be considered a precondition for achieving positive impacts
- Coherence in maintaining each of the three Principles of Success should be ensured, meaning that positive and negative impacts should be addressed separately
- A single Principle of Success should not be achieved at the expense of another one
- Priority should be given to positive long-term effects instead of short-term gains

Identifying relevant factors for the successful operationalisation of offset approaches

The achievement of the Conditions of Success will in turn be influenced by **Success Factors** which relate to the circumstances in the jurisdiction or sector involved in the offset approach. The report identifies a total of 13 of such Success Factors. For each of these Success Factors the report discusses how it relates to the Conditions of Success. An overview is provided in Table 1 below.

Table 1: Relevance of Success Factors for the Conditions of Success

		Principles of Success											
		EI		Ambition								SD	
Success Factors	Conditions of Success	Robust accounting	Unit quality	Avoiding perverse incentives	Raising national mitigation targets	Strengthening carbon pricing	Offsetting unavoidable emissions	Using offsets to become carbon negative	Transitioning sources into the NDC	Driving mitigation in inaccessible abatement	Promoting carbon negative mitigation	Contribution to SDGs	Avoiding adverse SD impacts
NDC-related	NDC metrics and timeframes	■											
	Conditionality of NDC	■							■				
	NDC coverage	■	■	■					■				
	NDC ambition level		■		■								
Political	Opposition against carbon pricing					■			■				
	Coverage of climate policies		■	■									
	Ambition level of carbon pricing scheme			■		■	■			■			
Economic	Mitigation costs of technologies		■	■	■	■				■			
	Carbon price responsiveness					■							
	Carbon leakage risk					■							
Technical	Maturity and market penetration		■							■			
	Technical mitigation potential			■	■	■	■	■		■	■		
Env. & Social	Environmental and social impacts											■	■

Source: Own compilation (Wuppertal Institut). Note: The dark marker was placed for those Success Factors that are of particular importance for a specific Condition of Success. The abbreviation "EI" stands for environmental integrity, "SD" for sustainable development.

Adapting the design of offset approaches to prevailing factors

The report further explores how these Success Factors could inform the design of the offset approach. The analysis shows how **characteristics of Success Factors can be effectively**

integrated into the design of the offset approach. Table 2 summarizes key recommendations of how policymakers may take into account Success Factors when designing an offset approach in order to contribute to numerous Conditions of Success and thereby maintain the Principles of Success.

Table 2: Overview on how Success Factors can inform the design of an offset approach

Success Factors		Design considerations
NDC-related	NDC metrics and timeframes	**Introduce a domestic offset approach** in order to circumvent accounting issues **Limit eligibility** to host countries that have adopted NDCs that align with their own NDC Develop unilateral **accounting standards** for dealing with diversity of NDCs Make adherence to basic accounting principles a key **requirement** for the access of host countries to the scheme
	Conditionality of NDC	Use the unconditional target as a basis for **accounting**
	NDC coverage	**Restrict eligibility** to NDC-covered sources or **account** also for units not covered by an NDC to address perverse incentive
	NDC ambition level	Make independent **assessment of NDC ambition** an eligibility criterion for host Parties to avoid hot air transfers Introduce **quantitative limits** and rigorous **additionality tests** if NDC lacks ambition
Political	Opposition against carbon pricing	Introduce **quantitative limits on offset use** if the offset approach is used as a bargaining chip in the carbon pricing negotiations
	Coverage of climate policies	Require existing and planned policies to be taken into account during **additionality demonstration** and **baseline setting** Limit **crediting periods** to avoid perverse incentives for national climate policy making
	Ambition level of pricing scheme	**Limit use of offsets** to ambitious carbon pricing schemes
Economic	Mitigation costs of technologies	Establish sector-specific thresholds that translate into **quantitative limits** or **discounting rates** Establish a threshold defined in EUR/tCO_2e to **exclude low-cost mitigation activities** (low-hanging fruits)
	Carbon price responsiveness	**Reduce eligibility of offsets** on the demand side to sectors with limited carbon pricing responsiveness **Focus on sectors with strong carbon pricing responsiveness** on the supply side if private sector is to be incentivised
	Carbon leakage risk	**Reduce the eligibility** of offset use on the demand side to sectors with considerable carbon leakage risk.
Technical	Maturity and market penetration	Develop **universal eligibility criteria** for the supply side to exclude technologies that are mature and widely diffused Require potential host countries to create **national positive or negative list** as a basis for future cooperation Take the maturity and market penetration into account during **additionality demonstration crediting baseline** setting
	Technical mitigation potential	**Limit eligibility** on the demand side to sectors with limited technical mitigation potential

		Limit the eligibility on the supply side with sectors that have a considerable technical mitigation potential
Env. - Social	**Environmental and social impacts**	Define **eligibility criteria** (positive/negative lists) for high risk activities Adapt the **implementation requirements** to the specificities of activities and develop a **safeguard system to ensure SDG contributions**

The following design areas have been identified to be particularly suitable for being informed by the Success Factors:

- Establishing eligibility criteria that guide the selection of sectors or jurisdictions that will be part of the offset approach on the supply and demand side
- Defining limits on the offset use on the demand side
- Deriving implementation requirements for crediting activities on the supply side
- Developing robust accounting for all mitigation outcomes or limit the scope of the offset approach to domestic offsetting

Exploring selected design aspects of offset approaches

In addition to providing recommendations on how to take the Success Factors into account during the design of the offset approach, the report also explores selected conceptual design aspects. The following summarizes key findings and recommendations:

One aspect analysed is the approach to **establish a sectoral link between demand and supply side as a means to foster sectoral transformation**. For example, offset use could be restricted so that credits can only be used if they were generated in the sector to which the company using the credits also belongs. The analysis finds that the approach is only applicable to carbon taxation schemes, as the market interaction in an Emissions Trading System (ETS) would nullify the intended effect of the link. For carbon taxation schemes with a strong carbon price, introducing such a link could be a promising approach to foster sectoral transformation, both within the jurisdiction (domestic offsetting) as well as beyond (international offsetting). In order to actually foster sectoral transformation, the carbon tax would potentially have to be combined with other support measures.

The report further explores the idea of **whether offsets could be used as an alternative to free allocation in emissions trading systems** by allowing emissions-intensive and trade-exposed (EITE) businesses to surrender offsets to satisfy (part of) their compliance obligations. Compared to free allocation, offsets can be viewed more favourably in terms of ambition raising and their contribution to sustainable development: While free allocation does not lead to additional climate change mitigation, the use of offsets would allow to increase ambition through additional emission reductions and further drive sustainable development outside the scheme. At the same time, offsets could adversely affect the steering effect of the ETS: While in the case of free allocation EITE firms are still incentivized to reduce their own emissions so as to profit from selling any excess allowances, a mechanism that allows offsets to be used would not provide this option. Whether this effect outweighs the ambition raising potential of offsets would depend on multiple parameters, such as the price difference between allowances, offsets and own emission reductions as well as companies' mitigation strategies.

Another design approach this report analyses is the **integration of offsets into carbon taxation schemes.** The analysis shows that the climate impact of an offset component in carbon taxation schemes is highly dependent on the ambition level of the scheme and the intended use

of carbon tax revenues. While offsets could lead to an additional short-term mitigation impact if the carbon tax rate is low and tax revenues would not be used for climate change mitigation purposes, the opposite effect might also be possible. Given these considerations, the introduction of an offsetting option should only be considered in cases where needed due to political economy reasons and where carbon tax revenues cannot be earmarked towards supporting climate change mitigation.

The analysis of the **role public funds could play in supporting the commercialisation of offsets develops** a typology of funds and presents their key functions in supporting carbon finance. It reveals that carbon funds can provide upfront capital needed to supply the offsets to the market, particularly in piloting more transformative and innovative mitigation activities while they can also act as market enablers by purchasing offsets more innovative projects. Furthermore, market readiness funds can play an important role in capacity development by setting-up institutions, capabilities and infrastructure (e.g. Measurement, Reporting and Verification (MRV) systems) in host countries. Given these key functions, the analysis finds that public funds seem particularly well suited to complement offset approaches when the latter cannot be designed in a way that ensures that the price signal alone and by itself has the intended effects.

The report further explored the **role negative emissions could have as a source of supply for offsets**. The findings indicate that the integration of offsets from negative emissions into compliance schemes is associated with considerable ecological and implementation concerns. Furthermore, the interaction of carbon cycles speaks against the use of negative emissions from nature-based solutions for offsetting fossil fuel emissions. While technical solutions might perform better in this regard, these are still confronted with high costs limiting the potential benefits of their inclusion into a compliance scheme. However, there might be room to include negative emissions in future schemes with a high ambition level and where technically avoidable emissions have been fully mitigated. Hence, the inclusion of offsets into a carbon pricing scheme should be made on the condition that there is no technical mitigation potential left and by taking biophysical limits into account. While the integration of negative emissions into today's compliance schemes should be postponed, research on and use of environmentally and socially sound negative emissions should continue.

One last aspect explored by the authors is the **potential of an offset approach to support transformative change by promoting respective crediting activities in host countries.** Building on a brief review of transformative change literature, the report finds that the concept is in principle compatible with offset approaches, albeit with limitations. Offsets seem to be particularly well suited to bring already developed niche technologies to market, while both the early phase of transformative change and later phases do not provide entry points for offset approaches. The subsequent analysis of design options focuses on three key aspects: impacts beyond the scope of the activity, capacity development and policy integration. The analysis finds that achieving an impact beyond the scope of the activity and capacity development support is possible in principle and that it can be fostered through the design of the offset approach. However, achieving these additional impacts will presumably increase the costs of the mitigation activity and thereby reduce the cost-effectiveness of offsets. In terms of integrating the crediting activity into the domestic climate policy landscape the analysis reveals that this could be promoted by taking into account planned and existing policies and measures as well as Nationally Determined Contributions (NDCs) and long-term low emissions development strategies (LT-LEDS). In order to integrate the crediting activity into the actual mitigation pathway of the host country, the information included in these policy documents should be combined with additional parameters, such as economic indicators and information on

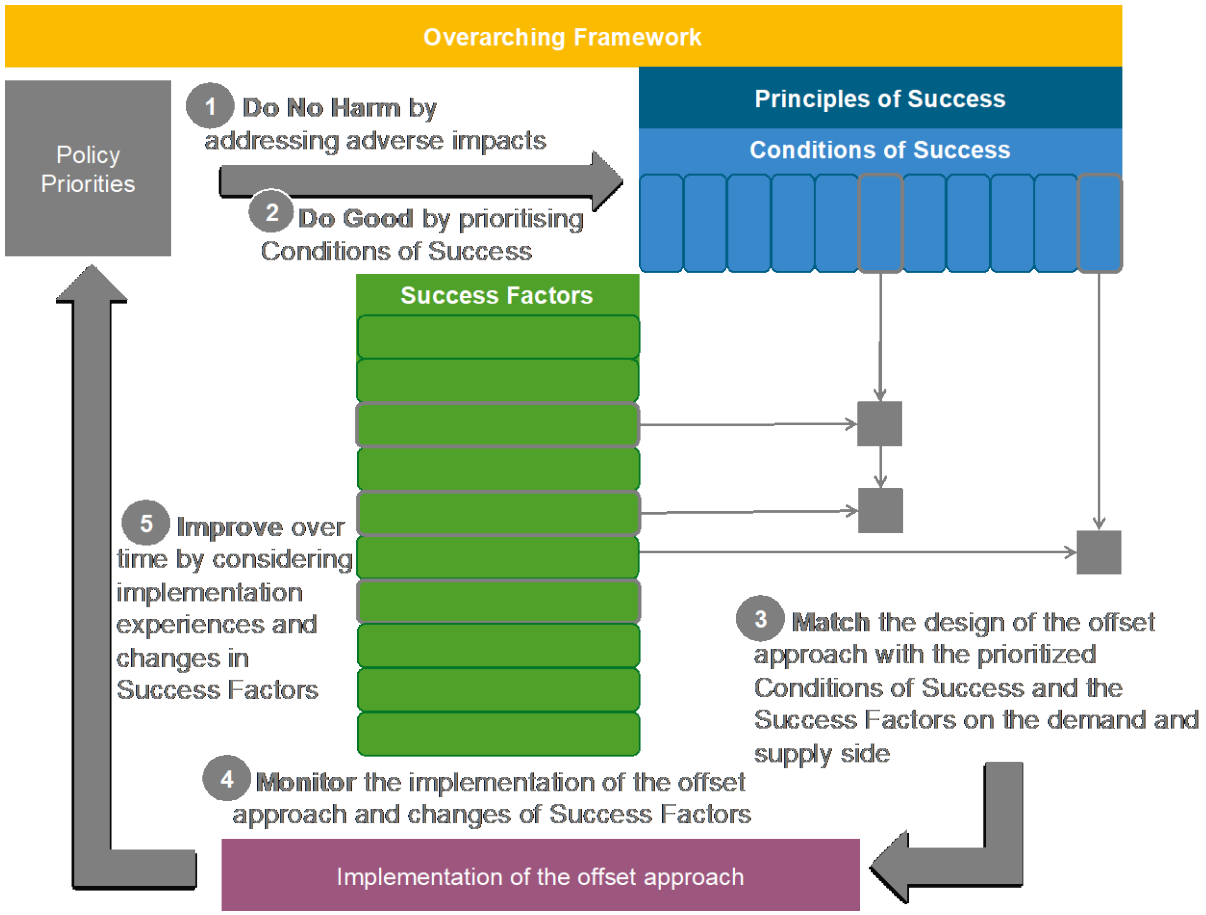
technology diffusion. Further research based on real-world data of a respective sector could provide important insights into how such a process could be designed in detail.

Overarching recommendations

Based on these findings, the following recommendations are made, see also the policy cycle illustrated in Figure 2 below:

- Do no harm. Governments considering the integration of offsets into their carbon pricing scheme or into their national mitigation strategy should first ensure that adverse impacts of offsets are addressed by focusing on the following Conditions of Success: robust accounting, unit quality, avoiding perverse incentives, avoidance of negative social and environmental impacts. The avoidance of adverse effects should guide the selection of sectors and jurisdictions on the demand and supply side.
- Do good. Addressing adverse impacts is necessary, yet not sufficient to legitimize the introduction of an offset approach in a post-2020 regime. Achieving positive impacts by raising the ambition level on the supply and demand side and through sustainable development contributions (at least for international offsetting) must be seen as necessary next steps which starts by prioritising the Conditions of Success to which the offset approach should contribute.
- Match the design of the offset approach with the prioritised Conditions of Success and prevailing Success Factors. After having decided on the policy objectives to which the offset approach is to contribute, policymakers will have to design the offset approach by taking into account the prioritised Conditions of Success and their respective Success Factors. This process will presumably be reciprocal, with prevailing Success Factors impacting the spectrum of positive Conditions of Success the offset approach can achieve.
- Monitor implementation and changes of Success Factors. Once introduced, policymakers should continuously monitor the performance of the offset approach and whether the intended Conditions of Success are achieved. Furthermore, the Success Factors should be subject to monitoring and regular assessments should be made in order to identify significant changes that may affect the performance of the offset approach.
- Improve over time by considering experiences from implementation and changes of Success Factors. The experiences gained with the implementation of the offset approach as well as any significant changes of the Success Factors should inform the design of the offset approach and feed into the prioritisation of Conditions of Success. An assessment of whether the Success Factors on the demand and supply side still allow for Conditions of Success to be met and Principles of Success to be maintained will also be required after the offset approach has been introduced. This continuous assessment process can be integrated into the design of the offset approach through specific design features, such as dynamic baselines, limited crediting periods and sunset clauses. With these elements, lock-in effects and other undesired impacts can be addressed while allowing for the offset approach to be integrated into a sound policy mix to fight climate change.

Figure 2: Exemplary illustration of an offset policy design process



Source: Own illustration (Wuppertal Institute). Please note: The prioritisation of Conditions of Success only relates to those Conditions of Success related to positive effects, while those relevant for the avoidance of adverse impacts should always considered as a priority

The findings of the report might be relevant for different kinds of policymakers. The prevailing perspective from which international offset approaches are being explored is that of a potential acquiring country interested in setting up an offset approach. However, the findings could also inform potential transferring countries, as the analysis consistently takes into account the demand and the supply side of the offset approach and tries to identify complementarities between the two. The report further connects domestic and international perspectives. It takes into account the current status of the United Nations Framework Convention on Climate Change (UNFCCC) negotiations under Article 6 of the Paris Agreement while the findings could also inform the design of domestic offsetting schemes.

Zusammenfassung

Hintergrund

Offsetting ermöglicht es Staaten und Unternehmen, einen Teil ihrer Klimaschutzverpflichtungen zu erfüllen, indem sie anstelle von eigenmmentareen Emissionsminderungen an anderer Stelle erzielte Minderungsergebnisse nutzen. In der Vergangenheit war Offsetting ein fester Bestandteil nationaler und internationaler Klimaschutzpolitik und es wird wahrscheinlich auch in Zukunft ein bedeutendes Minderungsinstrument bleiben, da marktbasierte Kooperation durch Artikel 6 in das Pariser Abkommens integriert wurden. Dieser Bericht untersucht die zukünftige Rolle von Offset-Ansätzen und wie sie erfolgreich in ein post-2020-Klimaregime integriert werden könnten. Auf Nachfrageseite konzentriert sich der Bericht auf die Nutzung von Offsets für Compliance-Zwecke, während auf Angebotsseite der Schwerpunkt auf CO_2-Crediting gelegt wird. Der Bericht verfolgt drei miteinander verknüpfte Ziele:

- Erstens sollen Offset-Ansätze in den breiteren Kontext der Welt nach 2020 eingebettet und deren Potenzial aufgezeigt werden, zu den übergeordneten Zielen des Pariser Abkommens beizutragen. Zugleich werden auch die negativen Auswirkungen, die von Offsets ausgehen können, berücksichtigt.
- Zweitens bietet der Bericht einen strukturierten Überblick über jene Faktoren, die für eine erfolgreiche Operationalisierung von Offset-Ansätzen relevant sind.
- Drittens untersucht der Bericht, wie die Ausgestaltung von Offset-Ansätzen an die vorherrschenden Faktoren angepasst werden könnte, um sie möglichst umweltinteger und ambitioniert zu halten, und vertieft sechs ausgewählte Design-Aspekte.

Damit zielt der Bericht darauf ab, politische Entscheidungsträger*innen bei der Beurteilung, ob sich ein bestimmter Sektor oder eine Jurisdiktion dazu eignen über Offset-Ansätze zu ambitionierten Klimazielen beizutragen. Darüber hinaus soll er den Ausgestaltungsprozess des Offset-Ansatzes unterstützen und aufzeigen, wie die Instrumente an die Umsetzung bestimmter Politikziele angepasst werden können. Zu diesem Zweck entwickelt der Bericht zunächst einen konzeptionellen Ansatz und eine normative Vision dessen, was als erfolgreiche Offset-Nutzung angesehen werden sollte. Diese Vision wird anschließend mit den Bedingungen vor Ort in den Sektoren und Jurisdiktionen verknüpft, in denen Offsets generiert und genutzt werden sollen. Dieser Bericht ist Teil des Forschungsvorhabens „Analyse der Vor- und Nachteile von Offset-Ansätzen in ausgewählten Sektoren - FKZ 3719 42 507 0“, dessen finalen Ergebnisse in drei separaten Berichten festgehalten wurden. Er auf den Fallstudien auf, die in der parallelen Veröffentlichung *Offset approaches in existing compliance mechanisms - Adding value and upholding environmental integrity* von Carvalho, Meneses, et al. (2021) dargestellt werden, und bietet die Grundlage für die sektorspezifischen Analysen, deren Ergebnisse in dem Bericht *Potentials for Offset Approaches in Selected Sectors post-2020 von* Carvalho, Sherman, et al. (2021) zusammengetragen sind.

Einbettung von Offsets in den breiteren Kontext des post-2020-Klimaregimes

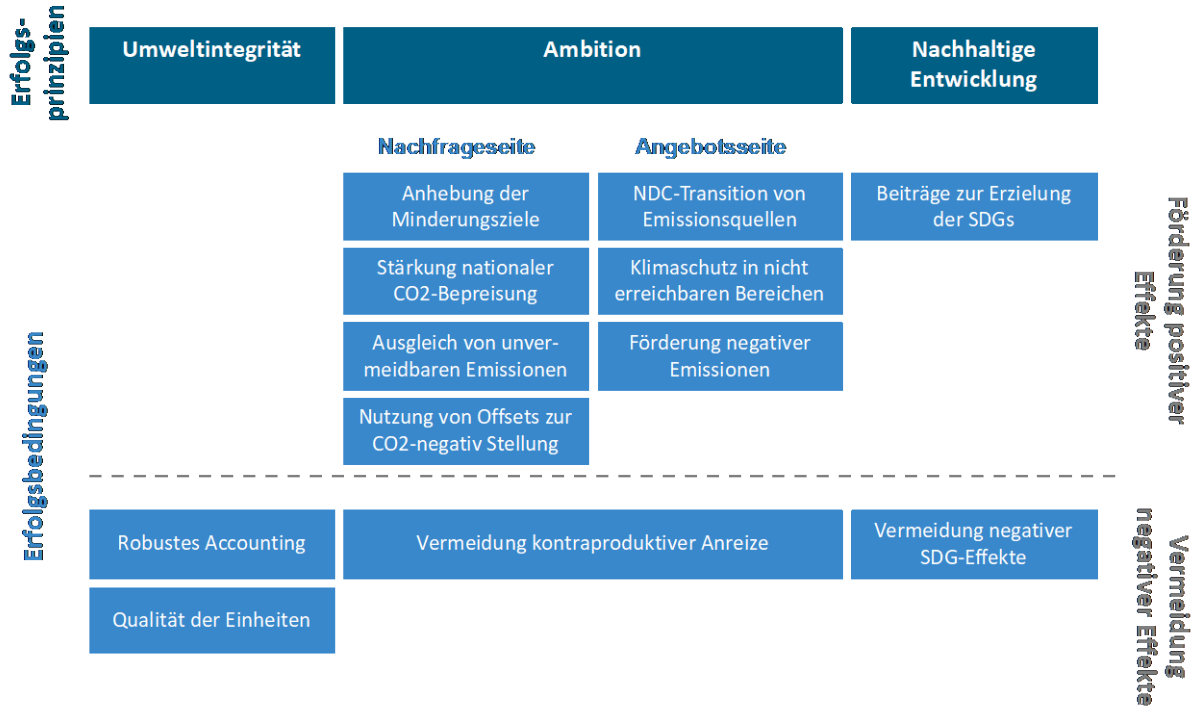
Der Bericht untersucht zunächst, wie sich die neuen Rahmenbedingungen, die mit dem Pariser Abkommen geschaffen wurden, auf zukünftige Offset-Ansätze auf Nachfrage- und Angebotsseite auswirken. Zunächst werden die Minderungsziele des Pariser Abkommens und seine innovative Architektur als übergreifender Bezugsrahmen identifiziert, der die Funktionsweise von Offset-Ansätzen strukturiert und ihre erfolgreiche Integration in eine post-2020-Klimapolitik bestimmt. Aufbauend auf der Beobachtung, dass zukünftige Offset-Ansätze sich grundlegend von dem aus der Vergangenheit bekannten Nullsummenspiel unterscheiden müssen, leiten die

Autoren*innen drei zentrale **Erfolgsprinzipien (Principles of Success)** für post-2020-Offset-Ansätze ab:

- Umweltintegrität,
- Ambition und
- nachhaltige Entwicklung.

Der Bericht kommt zu dem Schluss, dass das Erreichen dieser Erfolgsprinzipien von bestimmten **Erfolgsbedingungen (Conditions of Success)** abhängt. Wie in Abbildung 1 unten zu sehen ist, können einzelne Erfolgsbedingungen entweder positive Effekte fördern oder negative Auswirkungen in Bezug auf jedes der Erfolgsprinzipien adressieren.

Abbildung 1: Überblick über die Erfolgsprinzipien und -bedingungen



Quelle: Eigene Darstellung (Wuppertal Institut)

Die Analyse der Funktionsweise von Erfolgsbedingungen ergab Folgendes:

- Jenen Erfolgsbedingungen, die negative Auswirkungen adressieren, sollte Vorrang eingeräumt werden, da diese als Voraussetzung für das Erreichen positiver Auswirkungen angesehen werden können.
- Kohärenz bei der Aufrechterhaltung jedes der drei Erfolgsprinzipien sollte gewährleistet sein, d. h. positive und negative Auswirkungen sollten getrennt voneinander behandelt werden.
- Ein einzelnes Erfolgsprinzip sollte nicht auf Kosten eines anderen Erfolgsprinzips erreicht werden.
- Langfristige positive Wirkungen sollten Vorrang vor kurzfristigen Gewinnen haben.

Identifizierung relevanter Faktoren für die erfolgreiche Operationalisierung von Offset-Ansätzen

Das Erreichen der Erfolgsbedingungen wird wiederum von **Erfolgsfaktoren (Success Factors)** beeinflusst, die sich auf die Umstände in der Jurisdiktion oder dem Sektor beziehen, der in den Offset-Ansatz involviert ist. Der Bericht identifiziert insgesamt 13 solcher Erfolgsfaktoren. Für jeden dieser Erfolgsfaktoren wird im Bericht diskutiert, wie er mit den Erfolgsbedingungen zusammenhängt. Eine Übersicht ist in Tabelle 1 dargestellt.

Tabelle 1: Relevanz der Erfolgsfaktoren für Erfolgsbedingungen

		Erfolgsprinzipien												
		UI		Ambition									NE	
Erfolgsfaktoren	Erfolgsbedingungen	Robustes Accounting	Qualität der Einheiten	Vermeidung perverser Anreize	Anhebung der minderungsziele	Stärkung nationaler CO2-Bepreisung	Ausgleich unvermeidbarer Emissionen	Nutzung von Offsets zur C02-negativ Stellung	NDC-Transition von Emissionsquellen	Klimaschutz in nicht erreichbaren Bereichen	Förderung negativer Emissionen	Beiträge zu Erzielung der SDGs	Vermeidung negativer SDG-Effekte
NDC-bezogen	NDC-Metriken und -Zeiträume	■											
	NDC-Konditionaliät	■							■				
	NDC-Reichweite	■	■	■					■				
	Ambitionsniveau des NDC		■		■								
Politisch	Widerstand gegen CO2-Bepreisung					■			■				
	Abdeckung der Klimapolitiken		■	■									
	Ambitionsniveau des CO2-Bepreisungssystems			■		■	■			■			
Ökonomisch	Minderungskosten der Technologien		■	■	■	■				■			
	Reaktionsfähigkeit auf CO2-Bepreisung					■							
	Carbon Leakage-Risiko					■							
Technisch	Technologische Reife und Marktdurchdringung		■							■			
	Technisches Minderungspotential			■	■	■	■	■		■	■		
Ökol. & Sozial	Ökologische und Soziale Auswirkungen											■	■

Quelle: Eigene Darstellung (Wuppertal Institut). Hinweis: Die dunkle Markierung wurde für jene Erfolgsfaktoren gesetzt, die für eine bestimmte Erfolgsbedingung von besonderer Bedeutung sind. Die Abkürzung „UI" steht für Umweltintegrität, „NE" für Nachhaltige Entwicklung.

Der Bericht untersucht zudem, wie diese Erfolgsfaktoren das Design des Offset-Ansatzes beeinflussen könnten. Die Analyse zeigt, wie die Merkmale der Erfolgsfaktoren effektiv in die Ausgestaltung des Offset-Ansatzes integriert werden können. Tabelle 2 fasst die wichtigsten Empfehlungen zusammen und zeigt auf, wie politische Entscheidungsträger*innen die Erfolgsfaktoren bei der Ausgestaltung eines Offset-Ansatzes berücksichtigen sollten, um zu zahlreichen Erfolgsbedingungen beizutragen und somit die Erfolgsprinzipien aufrecht zu erhalten.

Tabelle 2: Ausgestaltungsoptionen des Offset-Ansatzes auf Grundlage der Erfolgsfaktoren

Erfolgsfaktoren		Ausgestaltungsoptionen
NDC-bezogen	**NDC-Metriken und -Zeiträume**	Einführung eines **inländischen Offset-Ansatzes**, um Anrechnungsprobleme zu umgehen **Beschränkung** auf Gastgeberländer, die NDCs verabschiedet haben, die mit dem eigenen NDC zusammenpassen Entwicklung eines unilateraler **Anrechnungsstandards** für den Umgang mit unterschiedlichen NDCs Einhaltung grundlegender **Anrechnungsprinzipien als Hauptvoraussetzung** für den Zugang von Gastgeberländern zum System
	NDC-Konditionaliät	Verrechnung (corresponding adjustments) der im Bereich des konditionalen NDC erzielten Minderungserfolge mit dem unkonditionalen NDC
	NDC-Reichweite	Beschränkung der Generierung von Offsets auf Quellen und Sektoren, die vom NDC des Gastgeberstaates erfasst sind oder NDC-Verrechnungen (corresponding adjustments) auch von Minderungsergebnissen, die außerhalb des NDC erreicht werden.
	Ambitionsniveau des NDC	Ambition des NDC kann der Nachfrageseite als Auswahlkriterium dienen, um die Übertragung von Mitnahme-Minderungserfolgen (hot air) zu verhindern. Ambitionsniveau eines NDC kann von einer unabhängigen Stelle anhand von Kriterien der Nachfrageseite geprüft werden Einführung von **Mengenbegrenzungen** und strengen **Zusätzlichkeitsprüfungen**, wenn das NDC nicht ambitioniert genug ist
Politisch	**Widerstand gegen CO2-Bepreisung**	Einführung von **Mengenbegrenzungen** für die Nutzung von Offsets, wenn der Offset-Ansatz als Verhandlungsmasse in den Verhandlungen über die Kohlenstoffpreisgestaltung verwendet wird
	Abdeckung der Klimapolitiken	Berücksichtigung bestehender und geplanter politischer Maßnahmen während des **Zusätzlichkeitsnachweises** und der Festlegung der **Baseline** Begrenzung der **Anrechnungszeiträume**, um kontraproduktive Anreize für nationale Klimapolitik zu vermeiden
	Ambitionsniveau des CO2-Bepreisungssysems	**Einschränkung** der Verwendung von Offsets auf Kohlenstoffpreissysteme mit hohem Ambitionsniveau
Öko-nomisch	**Minderungskosten der Technologien**	Festlegung sektorspezifischer Schwellenwerte, die sich in **quantitativen Grenzen** oder **Diskontierung** niederschlagen Festlegen von Schwellenwert in EUR/tCO_2e, um kostengünstige Minderungsmaßnahmen auszuschließen (low-hanging fruits)

	Reaktionsfähigkeit auf CO2-Bepreisung	**Beschränkung der Anrechenbarkeit** von Offsets auf Nachfrageseite auf Sektoren mit begrenzter Reaktionsfähigkeit auf Kohlenstoffpreise **Angebotsseitige Fokussierung auf Sektoren mit einer starken Reaktionsfähigkeit auf Kohlenstoffpreise**, wenn der Privatsektor einen Anreiz erhalten soll
	Carbon Leakage-Risiko	**Begrenzung der Anrechenbarkeit** von Offsets auf der Nachfrageseite auf Sektoren mit erheblichem Carbon Leakage-Risiko
Tech-nisch	**Technologische Reife und Marktdurchdringung**	Entwicklung **universeller Zulassungskriterien** für die Angebotsseite, um Technologien, die ausgereift und weit verbreitet sind, auszuschließen Anforderung an potenzielle Gastgeberländern zur Erstellung einer **nationalen Positiv- oder Negativliste** als Grundlage für die zukünftige Zusammenarbeit Berücksichtigung der Reife und Marktdurchdringung bei der Baseline-Festlegung und dem Nachweis der Zusätzlichkeit
	Technisches Minderungspotential	**Begrenzung der Anrechenbarkeit** auf der Nachfrageseite auf Sektoren mit begrenztem technischen Minderungspotenzial **Angebotsseitige Begrenzung** auf Sektoren, die ein erhebliches technisches Minderungspotenzial haben
Ökol. & Sozial	**Ökologische und Soziale Auswirkungen**	Festlegung von **Auswahlkriterien** für die Anrechenbarkeit (Positiv-/Negativlisten) für Aktivitäten mit hohem Risiko Anpassung der **Umsetzungsanforderungen** an die Besonderheiten der Aktivitäten und Entwicklung von Safeguards zur Sicherstellung von SDG-Beiträgen

Die folgenden Bereiche der Ausgestaltung wurden als besonders geeignet identifiziert, um von den Erfolgsfaktoren beeinflusst zu werden:

- Festlegung von Eignungskriterien (*eligibility criteria*), die zur Auswahl von Sektoren oder Jurisdiktionen herangezogen werden, die Teil des Offset-Ansatzes auf der Angebots- und Nachfrageseite werden sollen
- Festlegung von Obergrenzen für die Offset-Nutzung auf Nachfrageseite
- Ableitung von Umsetzungsanforderungen für Crediting-Aktivitäten auf Angebotsseite
- Entwicklung einer robusten Verrechnung (Accounting) für alle Minderungsergebnisse oder Begrenzung des Offset-Ansatzes auf inländisches Offsetting

Untersuchung ausgewählter Designaspekte von Offset-Ansätzen

Zusätzlich zu den Empfehlungen, wie die Erfolgsfaktoren bei der Ausgestaltung eines Offset-Ansatzes berücksichtigt werden können, untersucht der Bericht auch ausgewählte Designaspekte von Offset-Ansätzen. Im Folgenden werden die wichtigsten Ergebnisse und Empfehlungen zusammengefasst:

Ein analysierter Aspekt ist der Ansatz, eine **sektorale Verknüpfung zwischen Nachfrage- und Angebotsseite herzustellen, um eine sektorale Transformation zu fördern**. So könnte beispielsweise die Offset-Nutzung derart eingeschränkt werden, dass nur Credits genutzt werden können, die in demselben Sektor erzielt wurden, dem auch das Unternehmen zuzuordnen ist, welches die Credits nutzt. Die Analyse zeigt, dass der Ansatz nur auf CO_2-Steuersysteme anwendbar ist, da die Marktinteraktion in einem Emissionshandelssystem die beabsichtigte Wirkung der sektoralen Verknüpfung zunichtemachen würde. Für CO_2-Steuern mit einem hohen Kohlenstoffpreis könnte die Einführung einer solchen Verknüpfung ein

vielversprechender Ansatz sein, um den sektoralen Wandel zu fördern, und zwar sowohl innerhalb der Jurisdiktion (inländisches Offsetting) als auch darüber hinaus (internationales Offsetting). Um den sektoralen Wandel tatsächlich zu fördern, bedarf es voraussichtlich einer Ergänzung der Kohlenstoffsteuer durch weitere Fördermaßnahmen.

Der Bericht untersucht zudem die Idee der **Nutzung von Offsets als Alternative zur freien Zuteilung in Emissionshandelssystemen.** So könnte es emissionsintensiven und handelsexponierten Unternehmen gestattet werden, Offsets vorzulegen, um (einen Teil) ihrer Verpflichtungen zu erfüllen. Im Vergleich zur kostenlosen Zuteilung sind Offsets hinsichtlich ihres potentiellen Beitrags zu Ambitionssteigerung und nachhaltiger Entwicklung positiv zu bewerten: Während die kostenlose Zuteilung nicht zu Klimaschutz führt, würde die Verwendung von Offsets es ermöglichen, die Ambition durch zusätzliche Emissionsreduktionen zu erhöhen und die nachhaltige Entwicklung außerhalb des Systems weiter voranzutreiben. Zugleich könnten Offsets jedoch die Lenkungswirkung des ETS beeinträchtigen: Während im Falle einer kostenlosen Zuteilung für die betroffenen Unternehmen weiterhin ein Anreiz besteht, ihre eigenen Emissionen zu reduzieren um vom Verkauf überschüssiger Zertifikate zu profitieren, würde ein Offset-Mechanismus diese Möglichkeit nicht bieten. Ob dieser Effekt das Ambitionssteigerungspotenzial von Offsets überwiegt, hinge von mehreren Parametern ab, wie z.B. der Preisdifferenz zwischen Emissionsberechtigungen, Offsets und eigenen Emissionsreduktionen sowie den Minderungsstrategien der Unternehmen.

Ein weiterer untersuchter Ausgestaltungsansatz ist die **Integration von Offsets in CO_2-Steuersystemen**. Die Analyse zeigt, dass die Klimawirkung einer Offsetting-Komponente in CO_2-Steuersystemen stark vom Ambitionsniveau des Systems und der beabsichtigten Verwendung der Kohlenstoffsteuereinnahmen abhängt. Während Offsets zu einem zusätzlichen kurzfristigen Minderungseffekt führen könnten, wenn der Kohlenstoffsteuersatz niedrig ist und die Steuereinnahmen nicht für Klimaschutzzwecke verwendet würden, könnte auch der gegenteilige Effekt eintreten. In Anbetracht dieser Erwägungen sollte die Einführung einer Offsetting-Komponente nur dann in Betracht gezogen werden, wenn dies aus politökonomischen Gründen notwendig ist und die Einnahmen aus der Kohlenstoffsteuer nicht zur Unterstützung des Klimaschutzes eingesetzt werden können.

Der Bericht untersucht darüber hinaus auch die **Rolle öffentlicher Fonds bei der Unterstützung der Kommerzialisierung von Offsets.** Hierfür wird eine Typologie von Fonds entwickelt und deren Hauptfunktionen bei der Unterstützung der Kohlenstofffinanzierung vorgestellt. Die Untersuchungsergebnisse zeigen, dass Kohlenstofffonds Startkapital bereitstellen können, das benötigt wird, um das Angebot an Offsets zu generieren, insbesondere bei der Pilotierung von transformativen und innovativen Minderungsaktivitäten. Zugleich können diese Fonds den Markt ankurbeln, indem sie Offsets für innovativere Projekte ankaufen. Fonds können zudem eine wichtige Rolle beim Kapazitätsaufbau spielen, indem sie Institutionen, Fähigkeiten und Infrastruktur (z.B. Systeme zur Messung, Berichterstattung und Verifizierung) in den Gastländern aufbauen. Angesichts dieser Schlüsselfunktionen kommt die Analyse zu dem Ergebnis, dass öffentliche Fonds besonders gut geeignet scheinen, Offset-Ansätze zu ergänzen, wenn letztere nicht so ausgestaltet werden können, dass das Preissignal allein und von sich aus die beabsichtigte Wirkung entfaltet.

Der Bericht untersucht ferner die Rolle, die **negative Emissionen als Bezugsquelle für Offsets** haben könnten. Die Ergebnisse zeigen, dass die Integration von Offsets aus negativen Emissionen in Compliance-Systeme mit erheblichen ökologischen und umsetzungstechnischen Bedenken verbunden ist. Darüber hinaus spricht die Wechselwirkung der Kohlenstoffkreisläufe gegen die Verwendung von negativen Emissionen aus naturbasierten Lösungen zur Kompensation von Emissionen aus fossilen Brennstoffen. Während technische Lösungen in

dieser Hinsicht besser abschneiden könnten, sind diese immer noch mit hohen Kosten verbunden, die den potenziellen Nutzen ihrer Einbeziehung in ein Erfüllungssystem begrenzen. Es könnte jedoch Raum für die Einbeziehung negativer Emissionen in künftige Systeme mit einem hohen Anspruchsniveau geben, wenn technisch vermeidbare Emissionen vollständig gemindert wurden. Daher sollte die Einbeziehung von Offsets in ein Kohlenstoffpreissystem unter der Bedingung erfolgen, dass es kein technisches Minderungspotenzial mehr gibt und biophysikalische Grenzen berücksichtigt werden. Während die Integration negativer Emissionen in die heutigen Compliance-Systeme zurückgestellt werden sollte, sollte die Erforschung und Nutzung von umwelt- und sozialverträglichen negativen Emissionen fortgesetzt werden.

Ein letzter Aspekt, den dieser Bericht untersucht, ist das **Potenzial von Offset-Ansätzen, den transformativen Wandel durch Förderung von Crediting-Aktivitäten in den Gastgeberländern zu unterstützten**. Hierfür wurde zunächst im Rahmen einer Literaturrecherche die theoretische Eignung von Offset-Ansätze betrachtet. Die Ergebnisse deuten darauf hin, dass das Konzept des transformativen Wandels grundsätzlich mit Offset-Ansätzen kompatibel ist, wenn auch mit Einschränkungen. Offsets scheinen besonders gut geeignet zu sein, bereits entwickelte Nischentechnologien auf den Markt bringen, während sowohl die frühe Phase des transformativen Wandels als auch spätere Phasen keine Ansatzpunkte für Offset-Ansätze bieten. Die daran anschließende Untersuchung von Ausgestaltungsoptionen konzentriert sich auf drei Schlüsselaspekte: Die Wirkungen der Aktivität über deren Grenzen hinaus, Kapazitätsentwicklung und Politikintegration. Die Analyse kommt zu dem Ergebnis, dass die Erzielung einer Wirkung über die Grenzen der Aktivität hinaus und die Unterstützung der Kapazitätsentwicklung prinzipiell möglich sind und durch die Ausgestaltung des Offset-Ansatzes gefördert werden können. Die Erzielung dieser zusätzlichen Wirkungen wird jedoch voraussichtlich die Kosten der Minderungsaktivität erhöhen und damit die Kosteneffizienz von Offsets verringern. In Bezug auf die Integration der Minderungsaktivität in die nationale Klimapolitik zeigt die Analyse, dass dies durch die Berücksichtigung geplanter und bestehender Politiken und Maßnahmen sowie Nationally Determined Contributions (NDCs) und long-term low emissions development strategies (LT-LEDS) gefördert werden könnte. Um die Anrechnungsaktivität in den tatsächlichen Minderungspfad des Gastgeberlandes zu integrieren, sollten die in diesen Politikdokumenten enthaltenen Informationen mit zusätzlichen Parametern, wie z. B. wirtschaftlichen Indikatoren und Informationen zur Technologiediffusion, kombiniert werden.

Übergeordnete Empfehlungen

Basierend auf diesen Erkenntnissen können die folgenden Empfehlungen abgeleitet werden, siehe auch den in Abbildung 2 dargestellten Politikzyklus:

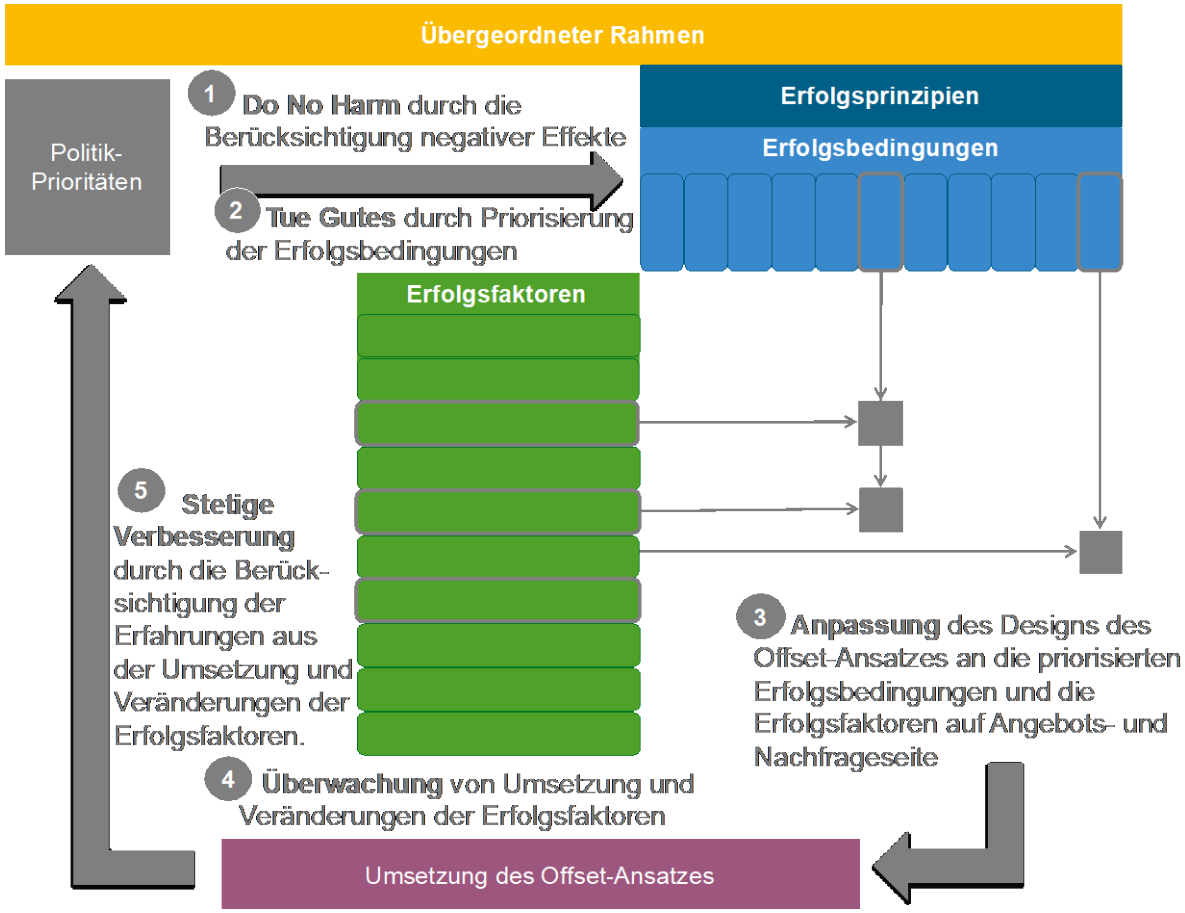
- Do no harm. Regierungen, die die Integration von Offsets in ihr Kohlenstoffbepreisungssystem oder in ihre nationale Minderungsstrategie erwägen, sollten zunächst sicherstellen, dass negative Auswirkungen von Offsets adressiert werden, indem sie sich auf die folgenden Erfolgsbedingungen konzentrieren: robuste Anrechnung, Qualität der Einheiten, Vermeidung von kontraproduktiven Anreizen und Vermeidung negativer sozialer und ökologischer Auswirkungen. Die Vermeidung negativer Auswirkungen sollte die Auswahl der Sektoren und Jurisdiktionen auf der Nachfrage- und Angebotsseite anleiten.

- Tue Gutes. Die Berücksichtigung negativer Auswirkungen ist notwendig, aber nicht ausreichend, um die Einführung eines Offset-Ansatzes in einem post-2020-Regime zu legitimieren. Die Erzielung positiver Auswirkungen durch die Anhebung des Ambitionsniveaus auf der Angebots- und Nachfrageseite und durch Beiträge zur nachhaltigen Entwicklung (zumindest für die internationale Kompensation) muss als

notwendiger nächster Schritt angesehen werden, der mit der Priorisierung der Erfolgsbedingungen beginnt, zu denen der Offset-Ansatz beitragen soll.

- Anpassung des Designs des Offset-Ansatzes an die priorisierten Erfolgsbedingungen und vorherrschenden Erfolgsfaktoren. Nach der Entscheidung über die politischen Ziele, zu denen der Offset-Ansatz beitragen soll, sollten die politischen Entscheidungsträger*innen den Offset-Ansatz unter Berücksichtigung der priorisierten Erfolgsbedingungen und ihrer jeweiligen Erfolgsfaktoren ausgestalten. Dies wird voraussichtlich ein wechselseitiger Prozess sein, wobei die vorherrschenden Erfolgsfaktoren das Spektrum der positiven Erfolgsbedingungen beeinflussen, die der Offset-Ansatz erreichen kann.
- Überwachung von Umsetzung und Veränderungen der Erfolgsfaktoren. Nach der Einführung sollten die politischen Entscheidungsträger*innen die Leistung des Offset-Ansatzes kontinuierlich überwachen und prüfen, ob die beabsichtigten Erfolgsbedingungen auch erreicht werden. Darüber hinaus sollten die Erfolgsfaktoren überwacht und einer regelmäßigen Neubewertung unterzogen werden, um wesentliche Änderungen zu erkennen, die die Leistung des Offset-Ansatzes beeinflussen könnten.
- Stetige Verbesserung durch Berücksichtigung von Erfahrungen aus der Umsetzung und Veränderungen der Erfolgsfaktoren. Die bei der Umsetzung des Offset-Ansatzes gewonnenen Erfahrungen sowie wesentliche Veränderungen der Erfolgsfaktoren sollten in die Ausgestaltung neuer und die Anpassung bestehender Offset-Ansatzes einfließen und bei der Priorisierung der Erfolgsbedingungen berücksichtigt werden. Auch nach Einführung des Offset-Ansatzes ist eine Bewertung erforderlich, ob die Erfolgsfaktoren auf der Nachfrage- und Angebotsseite noch die Erfüllung der Erfolgsbedingungen und die Aufrechterhaltung der Erfolgsprinzipien ermöglichen. Dieser kontinuierliche Bewertungsprozess kann in das Design des Offset-Ansatzes durch spezifische Ausgestaltungsmerkmale, wie dynamische Baselines, begrenzte Anrechnungszeiträume und Sunset-Klauseln, integriert werden. Mit diesen Elementen können Lock-in-Effekte und andere unerwünschte Auswirkungen adressiert werden, während der Offset-Ansatz in einen soliden Policy-Mix zur Bekämpfung des Klimawandels integriert wird.

Abbildung 2: Beispielhafter Prozess der Ausgestaltung einer Offset-Ansatzes



Quelle: Eigene Darstellung (Wuppertal Institut)

Die Ergebnisse des Berichts könnten für verschiedene Arten von politischen Entscheidungsträgern*innen von Bedeutung sein. Die vorherrschende Perspektive, aus der internationale Offset-Ansätze erforscht werden, ist die eines potenziellen Käuferstaates, der an der Einrichtung eines Offset-Ansatzes interessiert ist. Die Ergebnisse könnten jedoch auch für potenzielle Gastgeberländer hilfreich sein, da die Analyse konsequent die Nachfrage- und die Angebotsseite des Offset-Ansatzes berücksichtigt und versucht, Komplementaritäten zwischen beiden zu identifizieren. Der Bericht verbindet zudem nationale und internationale Perspektiven. Er berücksichtigt den aktuellen Stand der UNFCCC-Verhandlungen zu Artikel 6 des Pariser Abkommens, während die Ergebnisse auch zur Ausgestaltung nationaler Kompensationsprogramme genutzt werden könnten.

1 Introduction

With the Paris Agreement (PA) kicking-in in 2020 the world enters a new era of climate policy. By establishing ambitious long-term targets and committing all Parties to engage in climate change mitigation, this truly global agreement has fundamentally altered the context for developing international policy solutions in the fight against climate change.

One area to which the Paris Agreement has brought about a true sea change is international market-based cooperation and the role of offsets. An offset approach is a policy instrument that involves the transfer of emission reductions (or mitigation outcomes - MOs) from the supply side to the demand side in exchange of financial means. Such an offset approach must not necessarily involve two or more countries but offsets could also be sourced from within the same jurisdiction (domestic offsetting). Consequently, in the case of international offset approaches, the term demand side relates to the acquiring country, while under domestic offsetting, demand side is used to denote the sectors where offsets are used.

A common element of all offset approaches is that on the demand side, the mitigation outcomes transferred will be used in lieu of emission reductions. There is, however, a broad spectrum of how offsets could be used and the changes brought about by the Paris Agreement affect the different types of offset uses to varying degrees. On the one end of the spectrum you can find companies and other private sector organisations using offsets to voluntarily compensate the climate impact of their operations. On the other end of the spectrum there are national governments acquiring offsets from abroad to use them for achieving their nationally determined contribution (NDC) or net-zero targets. Closely linked to these latter use case there are private-sector compliance entities who use offsets to comply with their obligations under domestic carbon pricing instruments – such as emissions trading systems (ETS) or carbon taxation schemes. These compliance offset use cases will be the focus of this report while the voluntary carbon market is disregarded.

Looking at the supply side, there are different ways of how offsets could be generated and transferred. Under the Paris Agreement, internationally transferred mitigation outcomes (ITMOs) could in principle be transferred directly from one country to the another, without these transfers being linked to a specific mitigation activity on the ground (government to government transfers). Governments could also decide to link their policies, for instance by allowing compliance entities of one ETS to surrender allowances from another system (policy linking). Crediting of mitigation activities is another possibility: Eligible activities that meet the requirements of the crediting standard applied and show that their operation has resulted in emission reductions are issued credits, which can then be transferred to the demand side and used for offsetting. Such crediting will be the focus of this report on the supply side.

With this scope, the report explores the future role of offset approaches and how they could be successfully integrated into a post-2020 climate regime while acknowledging potential adverse effects offsets could have. For this purpose, the authors first develop a conceptual approach that derives a normative vision of what should be considered a successful offset use in a top-down manner to then link this vision to the conditions on the ground in sectors and jurisdictions where offsets will be generated and used. With this, the report pursues three interlinked purposes:

First, it intends to put offset approaches into the broader context of the post-2020 world and show the instrument's potential to contribute to the overarching goals of the Paris climate regime, while also outlining the adverse effects offsets could have.

Second, the report provides a structured overview on those factors that are relevant for the successful operationalisation of offset approaches. This overview on factors is to support policymakers when assessing the suitability of a specific sector or jurisdiction for being included on the demand and supply side of an offset approach.

Third, the report explores how the design of offset approaches could be adapted to prevailing factors and further deep-dives into six selected design aspects. With this, the report aims at assisting policymakers in the design of an offset approach and showing how the policy instrument could be adapted to serve specific policy objectives.

The findings of the report might be relevant for different kinds of policymakers. While the prevailing perspective from which international offset approaches are being explored is that of a potential acquiring country interested in setting up an offset approach, the findings could also inform potential transferring countries, as the analysis consistently takes into account both sides of the offset approach and tries to identify complementarities between demand and supply side. This is an acknowledgement of the new reality of the Paris Agreement: International offset approaches will not only have to be aligned with global mitigation objectives but must take into account the national targets and the interests of all countries involved. Under the Paris climate regime, the transferring country perspective will play a primordial role in the design of offset approaches.

The report further connects domestic and international perspectives. It takes into account the current status of the UNFCCC negotiations under Article 6 of the Paris Agreement and how they influence the design of unilateral or bilateral offset approaches. At the same time, many of the findings could also inform the ongoing negotiations on the Article 6 rulebook. By bringing together these different perspectives, the analysis is to contribute to the discussion about the future role of offset approaches in a post-2020 world and their potential to curb climate change.

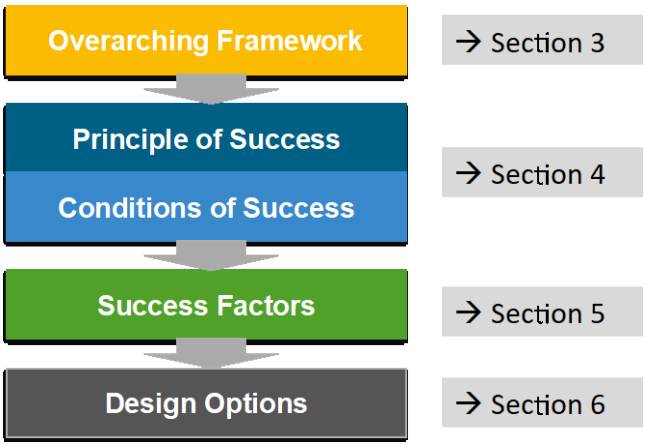
2 Conceptual approach and structure of the report

The report begins by exploring the Overarching Framework that determines the objectives the functioning of offset approaches post-2020. This **Overarching Framework** is based on the findings in natural science and their reflection at the highest level of international climate policy. While this framework cannot be easily altered, it is not static and might change over time through the progress of science and its interaction with global climate policy. One example for such a modification over time is the shift from the objective agreed at COP15 in Copenhagen "to hold the increase in global temperature below 2 degrees Celsius" (Decision 2/CP.15 (Copenhagen Accord) in UNFCCC 2010) towards the goal of [h]olding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C" (Article 2, PA UNFCCC 2016) agreed in Paris at the 21st Conference of the Parties (COP21).

The Overarching Framework is the reference point and structuring element for all subordinate climate policies and instruments intended to achieve these goals, including offset approaches. On the basis of the Overarching Framework identified, the report asks: Which are the effects post-2020 offset approaches should have? By exploring this question on the basis of the Overarching Framework, the report derives generic **Principles of Success** that are relevant for all offset approaches - irrespective of whether they are established at the international, national or subnational level. These generic Principles of Success will take shape in so called **Conditions of Success**. Conditions of Success are understood as a manifestation of the respective Principle of Success. As will be shown, each Principle of Success can be linked to various Conditions of Success.

The Conditions of Success in turn will be influenced by Success Factors on the supply and demand side of the offset approach. The concept of Success Factors relates to the circumstances in the jurisdiction or sector involved in the offset approach which influence the materialisation of the Conditions of Success. As will be shown, in most cases various Success Factors are relevant for achieving a single Condition of Success. The Success Factors identified can inform the **design** of the offset approach. However, also other considerations might be relevant when deciding on how the offset approach is to function. The report hence also explores key design options policy makers have at their disposal to make offset approaches successful policy instruments. The report builds upon an understanding that is illustrated in Figure 3 and which is further outlined in Table 3 below.

Figure 3: Key elements explored in the report



Source: Own illustration (Wuppertal Institute)

The report is structured as follows: Section 3 briefly outlines the Overarching Framework Conditions we consider relevant for offset approaches. Section 4 presents the Principles of Success for post-2020 offset approaches and their Conditions of Success. Section 5 explores the Success Factors relevant for the successful operationalisation of offset approaches and how they can inform the design of an offset approach. Section 6 analyses key design aspects relevant for the successful operationalisation of an offset approach. Section 7 provides policy recommendations and concludes.

Table 3: Concepts used for describing offset performance

Concept	Specification/Explanation	Example
Overarching Framework	The Overarching Framework is established by the Paris Agreement and its scientific basis.	1.5 °C goal of the Paris Agreement
Principles of Success	The Principles of Success are derived from the Overarching Framework.	Ambition raising as a key principle of the Paris Agreement.
Conditions of Success	One or more conditions enable each Principle of Success.	The offset approach allows the supply side to tap mitigation options that it could not target unilaterally.
Success Factors	The Condition of Success arises due to individual Success Factors, which can also be interrelated.	On the supply side the technology needed to tap the mitigation potential in the sector is characterized by low diffusion and high costs.
Design Options	When designing the offset approach, policy makers take into account the Success Factors identified and establish rules that promote the achievement of the Principles of Success.	The rules of the offset approach require offset activities to be implemented in sectors with high mitigation potential but where diffusion of respective mitigation technologies is low and costs are high.

3 Overarching Framework

The Overarching Framework is based on the findings in natural science and their reflection at the highest level of global climate policy, providing a point of orientation for all climate policies at international and national level, including offset approaches.

After its adoption at COP21 in 2015, the Paris Agreement entered into force in record time only twelve month later, on 4 November 2016. Its mitigation objectives and innovative bottom-up architecture structure all climate policies. The Paris Agreement establishes **clear and ambitious long-term objectives** that provide the basis for all climate-related activities, including the use of offsets and market-based mechanisms. Article 2 of the Paris Agreement sets the objective to limit global warming to "well below 2 °C" and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels (Art. 2, PA, UNFCCC 2016). This objective is further specified in Article 4.1, in which Parties have agreed to establish a balance between emissions and removals in the second half of the century (Art. 4.1, PA, UNFCCC 2016). The Intergovernmental Panel on Climate Change (IPCC) translated these long-term objectives into global emission pathways with no or limited temperature overshoot. The pathways envisage different mitigation strategies with varying amounts of carbon dioxide removal, ranging from pure afforestation to extensive deployment of bioenergy with carbon capture and storage (BECCs).[1] In these pathways, global anthropogenic carbon dioxide (CO_2) emissions decline by around 45 per cent from 2010 levels by 2030 reaching net zero by mid-century. The remaining global carbon budget to stay within the limits with a probability of 66 per cent is 420 $GtCO_2$, according to the IPCC (IPCC 2018). However, the budget might even be considerably smaller, given the fact that the estimates contain substantial uncertainties which are larger than the estimated budget itself. With current emissions, this budget could be consumed in 10 years or even earlier. There is hence an urgent need for steep and fast emission reductions at scale (UBA 2018). The need to ramp-up mitigation ambition is also underscored by the emissions gap report published by the United Nations Environment Programme (UNEP). The report finds that even if all unconditional NDCs are fully implemented, the world is on course for a temperature rise of 3.2 °C. In order to meet the 1.5 °C goal, global emissions must drop by 7.6 per cent per year between 2020 and 2030. The emissions gap between unconditional NDCs and the 1.5 °C is between 29 and 35 $GtCO_2e$ (United Nations Environment Programme 2019).

Another key aspect framing post-2020 offset approaches is the **bottom-up nature and the dynamic structure of the Paris Agreement**. At the core of Paris Agreement's architecture to induce a raise of climate ambition lie the Nationally Determined Contributions that all Parties are to undertake and communicate and which are to "represent a progression over **time**" (Art. 3, Paris Agreement). Parties are required to update their NDC every five years (Article 4.9) while they can also adjust their NDCs at any time "with a view to enhancing its level of ambition" (Art. 4.11). In any case, successive NDCs must represent a progression beyond current NDCs and reflect the highest possible level of ambition (Art. 4.3).

The updating of NDCs is to be informed by other processes of the Paris Agreement. One key element of the NDC cycle is the Transparency Framework (Art. 13), which requires Parties to submit relevant information to inter alia track their progress towards achieving their NDCs. The data submitted by Parties undergoes a technical expert review which is also to identify areas of improvement for Parties. Another key component of the NDC cycle is the Global Stocktake.

[1] Pathway 2, for instance, is characterized by a broad focus on sustainability including in energy intensity and shifts towards sustainable consumption patterns, low-carbon technology innovation and well-managed land systems with limited role for BECCs. This pathway requires greenhouse gas (GHG) emissions to be reduced by 49% by 2030 relative to 2010 levels.

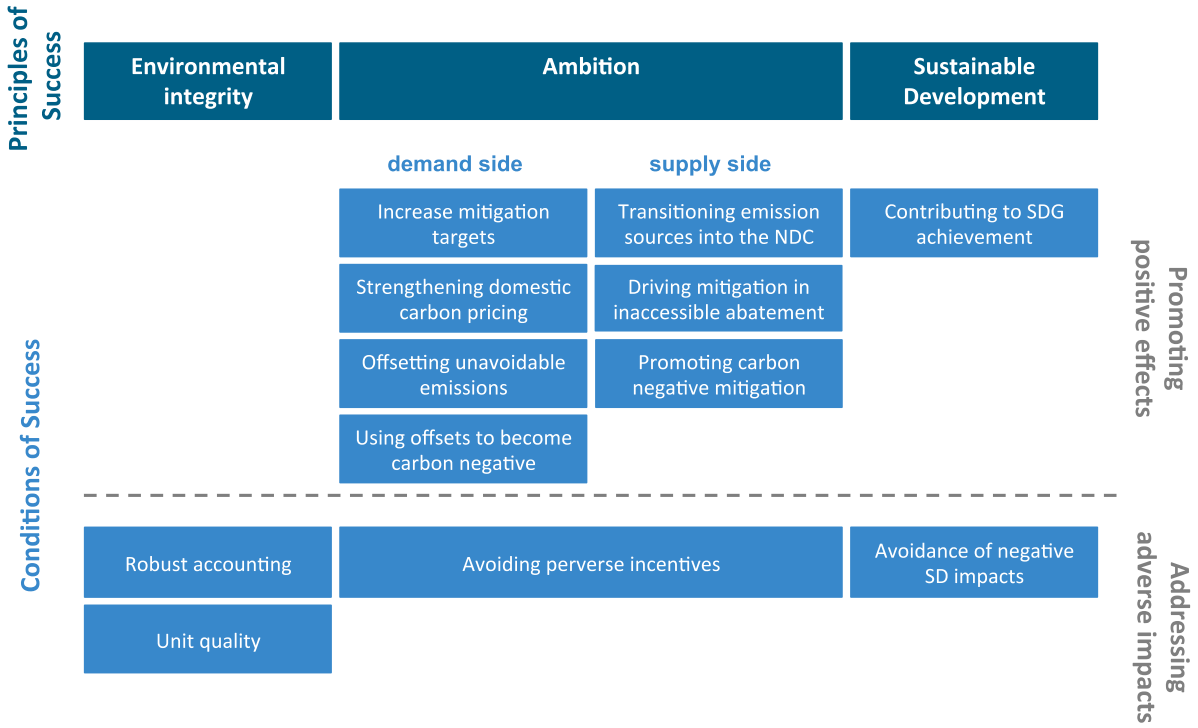
Building on a broad range of information sources, the Global Stocktake assesses the collective progress towards achieving the Paris Agreements long-term goals in regular periods of five years. While the focus of the Global Stocktake is on assessing the global progress towards meeting the goals of the Paris Agreement indicating an aggregate assessment, this process may also include disaggregated components (Holz and Ngwadla 2016). Through this structure, the Global Stocktake informs the update of Parties' NDCs. Another instrument that could inform the NDC updating processes is the mechanism to facilitate the implementation of and promote compliance with Paris Agreement established by Art. 15.1. The mechanism consists of an expert-based committee that is to be facilitative in nature and function in a non-punitive manner.

Together, these elements are to induce an enhancement of mitigation ambition both with regard to the level of Parties' NDCs as well as in terms of the action taken by Parties to reach their current NDCs. They could hence also inform the potential design and use of offset approaches as part of a broader climate change mitigation strategy. As will be shown, the bottom-up nature and the dynamic structure of the Paris Agreement have serious implications on how offset approaches could be used internationally and domestically.

4 Principles of Success and Conditions of Success for post-2020 offset approaches

The scientific findings and their translation into policy objectives at the global level speak a clear language: If offsetting is to play a role in the post-2020 climate regime, it must be fundamentally different from the approaches known from the past. The mere shifting of emission reductions from one country or sector to another is clearly insufficient to induce the change required for achieving the ambitious objectives of the Paris Agreement and staying within the boundaries of the climate system. To more specifically describe what could be considered a successful use of offset approaches, three **Principles of Success** apply. As can be seen from Figure 4, each Principle of Success is associated to specific **Conditions of Success**, which either promote positive effects or address adverse impacts in order to support its respective Principle of Success. The following section presents how these two concepts interrelate.

Figure 4: Principles of Success and their respective Conditions of Success



Source: Own illustration (Wuppertal Institute)

From pre-2020 Indicators of Success to post-2020 Principles of Success

The transition from the pre-2020 Kyoto world to the post-2020 Paris regime fundamentally changed the role of offset approaches and our understanding of what should be considered a successful use of offsets. In light of the ambitious targets set by the Paris Agreement, some of the benchmarks used to assess the performance of existing offset approaches must be reassessed. For the analysis of pre-2020 offset approaches in Carvalho, Meneses et al. (2021), the following Indicators of Success were used:

- Increases acceptability of compliance schemes
- Enables ambition of the compliance scheme

- Provides policymaker flexibility
- Promotes investments in sustainable development
- Avoids perverse incentives

These indicators vary substantially from the Principles of Success elaborated in this report: First, with regard to the climate impact of offset approaches, the pre-2020 indicators focused exclusively on the demand side while the instruments' contribution to the supply side remained limited to investments into sustainable development. Second, the pre-2020 Indicators of Success related to sustainable development impacts does not take into account the avoidance of adverse impacts. Third, the pre-2020 indicators are not hierarchically organized and the Conditions of Success elaborated by Carvalho, Meneses et al. (2021) to assess the success of offset use in pre-2020 compliance scheme differ from those used in this report. This leads to the fact that some of the Indicators of Success used by Carvalho, Meneses et al. (2021) are considered Conditions of Success in this report. We hence consider these to be contributing to the Principles of Success without by themselves constituting a successful operationalisation of offset approaches. This differentiation is relevant, as the following example illustrates: The pre-2020 Indicator of Success "increased acceptability of compliance scheme" does by itself not describe a successful use of offsets even if the offset approach has enabled the creation of a carbon pricing scheme, as the mere existence of a carbon pricing scheme does not ensure ambitious climate action. You could even think of a carbon pricing scheme that, given poor implementation and low ambition level, could undermine ambition as its existence could dilute the need to develop and implement other climate policy instruments. As can be seen, there are decisive differences between the conceptual approach elaborated in this report for post-2020 offset approaches and the understanding underpinning the analysis of pre-2020 policy instruments conducted by Carvalho, Meneses et al. (2021).

4.1 Environmental integrity

In order to go beyond a mere 'zero-sum game', all post-2020 offsets will have to build on conditions that ensure environmental integrity and do not undermine ambition. For international transfers, environmental integrity has been defined as follows: "environmental integrity would be ensured if the engagement in international transfers leads to aggregated global [greenhouse gas (GHG)] emissions that are no higher as compared to a situation where the transfers did not take place." (Schneider and La Hoz Theuer 2018). However, environmental integrity could also be defined by putting the compliance scheme where offsets are used at its centre: Following this approach, environmental integrity is considered to be ensured if the use of offsets does not undermine the environmental goal of the policy instrument. This narrow definition is closely related to the first one as a situation in which offsets undermine the environmental goal of the carbon pricing scheme will ultimately also lead to an undermining of environmental integrity at the global level. This definition, however, disregards the environmental impacts the generation and transfer of offsets can have on the supply side.

Therefore, we have developed an expanded version of the first definition that is also applicable to domestic offsetting: Environmental integrity would be ensured if the generation, transfer and use of offset credits leads to aggregated global GHG emissions that are no higher as compared to a situation without such credits.

According to our understanding, environmental integrity cannot be promoted but it can only be protected from being undermined.[2] Two Conditions of Success aimed at addressing adverse impacts are relevant for preserving environmental integrity as a Principle of Success of offset approaches.

4.1.1 Unit quality

On the supply side, the quality of units is one Condition of Success for ensuring environmental integrity of an offset approach. It is relevant for international and domestic offset approaches. In the context of crediting, additionality of units is a key precondition for ensuring unit quality. Following Gillenwater (2012), additionality is about causation: The concept describes the causal relationship between the mitigation activity generating the offsets and the overarching policy intervention that is supposed to have triggered it, which in our case is the offset approach. The assessment of additionality is challenged by its counter-factual nature, as activity proponents must describe what would happen in the absence of the overarching policy intervention. Another precondition of unit quality in the context of crediting is the correct estimation of the emission reduction achieved by the mitigation activity. Here, unit quality might be undermined by the following risks (Kreibich and Hermwille 2016):

- Inflated baselines
- Underestimation of activity emissions
- Non-permanence of mitigation outcomes
- Project leakage and rebound effects

These risks are not directly related to the circumstances under which offsets are implemented and they must therefore be addressed through the design of the offset approach, such as the rules for baseline setting, additionality demonstration and monitoring, reporting and verification (MRV). There are, however, more indirect effects: The environmental impact of non-additional activities or of activities for which emission reductions have not been estimated correctly depends on the relationship between the activity and the mitigation target of the host country. If the mitigation activity is implemented within the scope of an ambitious NDC and its export is robustly accounted for, the host country would have to make up for each unit exported. The impact would hence be limited. Non-additional activities or overestimated emission reductions may however threaten environmental integrity if the mitigation target is set at unambitious levels or if exports are not robustly accounted for (Kreibich and Obergassel 2019a). This shows that while some of the risks as such must be addressed through the design of the offset approach their salience might depend on the circumstances of implementation.

Project leakage refers to a situation when emissions outside the scope of the mitigation activity increase as a result of the activity. It is a concern as it could reduce unit quality and undermine environmental integrity (Kreibich and Hermwille 2016). This risk does not only apply to mitigation projects but can also occur with larger scale activities, such as programmes, sectoral crediting or even policy-based activities. It is particularly problematic for activities that do not directly address the drivers of emissions. Not all sectors are equally affected by leakage. The risk of project leakage was one of the reasons why the inclusion of forestry activities in several ETS around the world has been complicated or even blocked, as in the case of the EU ETS. Over the last couple of years, however, considerable progress has been made in the development and

[2] Please note that this understanding conflicts with the wording of the Paris Agreement which requires Parties "to promote environmental integrity" (Art. 4.13, PA UNFCCC 2016).

implementation of methodologies for reducing these risks, including through improved GHG accounting methodologies (van der Gaast et al. 2018). An alternative approach in dealing with project leakage risk is to expand the scope MRV activities beyond the scope of the mitigation activity.

4.1.2 Robust accounting

Robust accounting is another precondition for ensuring that transfers do not undermine environmental integrity. This risk is particularly salient for international transfers under the Paris Agreement, since the bottom-up nature of the new regime has led to a large diversity of national mitigation targets that challenge robust accounting of transfers. One of the risks that must be avoided through robust accounting is double counting. Double counting refers to a situation in which a single mitigation impact is counted more than once towards achieving mitigation targets and it can occur in three ways: double issuance, double claiming and double use (Hood et al. 2014; Kreibich and Hermwille 2016; Prag et al. 2013). However, double counting is not the only environmental integrity risk that must be addressed through robust accounting. Aggregate global emissions could also increase if Parties do not robustly account for temporal differences between generation and use of mitigation outcomes as well as for different metrics of Parties mitigation targets (Kreibich and Hermwille 2016; Schneider and La Hoz Theuer 2018).

Robust accounting must be ensured through the establishment of a clear accounting system and accounting rules at the international level as well as a uniform system to track transfers, while at the national level NDC targets must be clearly defined and progress towards NDC targets must be tracked (Schneider and La Hoz Theuer 2018). With the adoption of the Transparency Framework at COP25 in Katowice, Parties made a first step towards the operationalisation of an accounting system (Kreibich and Obergassel 2019a). Para 77d) of the Katowice Decision requires Parties to report to the UNFCCC how mitigation outcomes transferred have been accounted for through 'corresponding adjustments' as well as other information on the use of Article 6 (Decision 18/CMA.1, para 77d) UNFCCC 2018a). However, other components of the accounting system have not been agreed on yet and negotiations on how to operationalize Article 6 are ongoing.

While double counting and other risks could undermine the environmental integrity of international transfers as long as there is no agreement on an accounting system at the international level, robust accounting is not relevant in the context of domestic offsetting, irrespective of whether offsets were generated within or outside the scope of the country's NDC as long as the mitigation outcome is ultimately only counted towards one actor, the jurisdiction's climate target that has implemented the compliance scheme.

4.2 Ambition

Instead of providing countries with more flexibility to meet their mitigation targets, as was the case under the Kyoto Protocol's 'flexible mechanisms', post-2020 offsets must allow Parties under the Paris Agreement to increase their ambition and make a contribution to global emission reductions. Given the dynamic nature of the Paris Agreement, offsets can no longer be a tool for reaching a pre-defined and short-term mitigation target but must instead contribute to the dynamic improvement of the short-term mitigation targets in order to align them with the long-term objectives. This is already reflected by the Paris Agreement, with Article 6.1 stating that voluntary cooperation under Article 6 is to allow Parties to increase their ambition. Ambition raising is one of the main objectives Article 6 of the Paris Agreement is to contribute to. Against this backdrop and with the Article 6 rulebook still being subject to negotiations, a

strand of literature explores how the rules of Article 6 could be designed in order for the instrument to have an ambition raising impact (CCAP 2017; Fuessler, Kohli, Lehmann, et al. 2019; Fuessler, Kohli, Spalding-Fecher, et al. 2019; Howard 2018; Kreibich 2018; Warnecke et al. 2018). Based on this literature, numerous options of how offsets could contribute to ambition raising can be identified. It should be highlighted that options are not mutually exclusive. Rather, a combination of different options should be pursued in order to maximize the ambition raising effect on the supply and demand side. Furthermore, an offset approach must address any perverse incentives that could undermine an ambition raising effects.

Definition of ambition

Ambition under the Paris Agreement: Building on previous work (Kreibich 2018; Wang-Helmreich et al. 2019), ambition raising can be related to Parties' targets *and* actions. This definition is derived from the Paris Agreement, where some Articles make reference to the Parties' mitigation targets included in their NDCs while others link the concept more broadly to Parties' actions. It is important to see ambition raising from a dynamic perspective given that the Paris Agreement itself is based on the dynamic process of the NDC cycle.

Furthermore, ambition raising should be clearly delinked from the concept of overall mitigation in global emissions (OMGE). OMGE describes an environmental benefit that is not related to individual Parties and which results from the design of the Art. 6.4 mechanism. Ambition raising refers to measures taken by Parties, while overall mitigation refers to measures embedded in the functioning of the Art. 6.4 mechanism.

Ambition of carbon pricing policies: The definition of the ambition level of domestic carbon pricing policies depends on the type of the policy. The ambition of an emissions trading scheme could be increased through numerous ways, with the tightening of the cap being the most evident. Under carbon tax schemes, policy makers could increase the tax level of the scheme to increase ambition.

4.2.1 Ambition raising options on the demand side

There are different options of how offsets may allow the demand side to raise its ambition. Many of them build on the fact that the use of offsets will lead to short-term cost savings for the buyer government or the subnational private entities acquiring the offsets for compliance with their individual mitigation obligation. Under certain conditions, these gains from trade could allow the government of the acquiring country to overcome barriers that would otherwise prevent ambitious climate policy.

Enhancing national mitigation targets

The most evident example involves the use of international credits for the adoption of a more stringent national mitigation target. Acquiring countries could do this at the moment of communicating their NDC by defining a specific amount of units they intend to acquire (Kreibich 2018). But offsets might also have a more indirect effect on the ambition level of the acquiring country, as indicated by Fuessler et al. (2019): The future development of emissions is dependent on several variables such as effectiveness of policies and economic development, some of which are challenging to predict. To avoid a situation of failing to achieve their target, countries might be prone to adopt conservative mitigation targets. Offsets could allow the acquiring country to hedge this risk of underperformance, allowing them to adopt a more ambitious mitigation target. While not as straight forward, you could think of this approach also being applied at subnational level if sectoral targets have been agreed: The potential to use

offsets from other sectors could support the adoption of a more ambitious sectoral mitigation target.

Strengthening domestic carbon pricing

Carbon pricing is increasingly being recognized as a key climate policy instrument: By August 2021, a total of 64 carbon pricing initiatives are implemented or scheduled for implementation. These initiatives cover 45 national jurisdictions and 35 subnational jurisdictions (World Bank 2021a). An analysis from 2019 found that 97 of the 185 Parties that have submitted their NDC under the Paris Agreement are planning or considering the use of carbon pricing as a tool to meet their contributions (World Bank 2019). A quarter of the countries that have submitted new or updated NDC by February 2021 already have carbon prices in place. However, most systems do not have the prices needed to meet the targets of the Paris Agreement (World Bank 2021b). Offsets could assist governments in strengthening domestic compliance obligations, which has by some been considered the most direct form of increasing ambition through carbon markets (Howard 2018).

In jurisdictions where carbon pricing instruments are already operational, the government could allow covered entities to fulfil part of their obligation through the use of offsets, generated either from international or domestic sources. The reduced compliance costs could then underpin the government's plans to raise the ambition of its instrument. There are different possibilities to increase the ambition level of an ETS: The regulator could either lower the cap of the scheme by reducing the amount of available allowances. Alternatively, it could make the allocation of allowances more stringent by reducing the amount of allowances allocated for free. By contrast, increasing the scope of an ETS cannot be considered ambition raising per se, as the expansion could also reduce the ambition level within sectors already covered by the scheme. If, however, the expanded scope is properly taken into account when setting the cap, ambition could be raised. The most direct form of increasing the ambition level of the carbon tax in response to the introduction of the offset components is to increase the tax rate of the scheme. If the carbon tax includes design features intended to reduce compliance costs, the regulator could decide to revoke or limit these, such as full or partial exemption from tax obligations, reduced tax rates or rebates (for options to reduce compliance costs see: PMR 2017).

In jurisdictions that are in the process of introducing a carbon pricing scheme offsets could be used as a bargaining chip in the political negotiations. The offset component could hence be used as a means to overcome political pressure and to reduce costs in the short term: The government aims at introducing a compliance scheme in a sector with hard to abate emissions. The introduction of this scheme, however, triggers fierce political opposition from entities presumably targeted by it. In order to appease this opposition, the government could decide to introduce an offsetting component that would allow compliance actors to use credits generated outside the scope of the carbon pricing scheme to fulfil part of their obligation. With regard to the effect on the introduction of emission trading schemes, there is no evidence indicating that the inclusion of offsets was a key factor in enabling acceptance of the EU ETS (see: Carvalho, Meneses, et al. 2021). However, findings indicate that offset components have allowed for the introduction of carbon taxes in Colombia (see: Carvalho, Meneses, et al. 2021), Mexico and South Africa (Wang-Helmreich and Kreibich 2019).

It should be highlighted, though, that the introduction of domestic compliance instruments or the increase of their ambition level does not automatically raise the national ambition. Without further action it would simply assist the country in achieving its national target. Therefore, the expected climate change mitigation impact accruing from the introduction or enhancement of national instruments must be translated to the international level by increasing the ambition

level of the country's NDC. Furthermore, there is a risk that the short-term political and economic gains may lead to increased costs in the longer-term, as they could delay the decarbonisation process and lead to lock-in effects (Kachi et al. 2019; Wang-Helmreich and Kreibich 2019). The offset component could hence be only operational for a limited period of time, before it is phased-out and the sector is fully decarbonised.

Offsetting unavoidable emissions

Under the Paris Agreement, „[a]ll Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies" (Art. 4.19 PA, UNFCCC 2016). Many Parties have already communicated such long-term low greenhouse gas emissions development strategies (LT-LEDS), many of which have adopted net-zero goal by 2050. However, it will not be possible to bring the emissions in all sectors to zero, some emissions will be unavoidable. Unavoidable emissions can be expected to occur in the agriculture and the industry sector (in particular in cement production), aviation and shipping (Denishchenkova et al. 2019). Offsets could allow Parties achieve their net-zero targets by either importing mitigation outcomes from removals achieved in other sectors within their jurisdiction (domestic offsetting) or in the form of mitigation outcomes (emission reduction or removals) from abroad (international offsetting).

Using offsets to become carbon negative

The Paris Agreement's goal of achieving "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century" (Art. 4.1, PA, UNFCCC 2016) has by many countries been interpreted as a call to reduce their emissions to net-zero by the mid of the century. Given the unequal distribution of capabilities, however, presumably not all countries will be able to become net-zero by 2050 while others will have to achieve net-zero well before 2050. This implies that countries with high (historic) responsibility and stronger capabilities will have to become net-negative earlier to offset the emissions of countries with limited capacities. Becoming carbon negative will become even more important after 2050: the IPCC scenarios compatible with the 1.5 °C target include a significant role for negative emissions after 2050. Offsetting could support countries in becoming carbon negative with credits either coming from GHG abatement activities or from removals. In the long run, use of removals could be considered a strategy that is better aligned with the goal of achieving a global balance between emissions and removals (see also the considerations on promoting carbon negative mitigation actions in section 4.2.2 below).

4.2.2 Ambition raising options on the supply side

Transitioning emission sources into the NDC

The literature on ambition raising has identified different options of how the supply side could increase its ambition level through the export of offsets. One such option envisages host Parties to target emission sources that were outside of an NDC to then progressively transition these under the NDC (see: CCAP 2017; Howard 2018). Another ambition raising option put forward was to transition emissions from the conditional to the unconditional part of the host countries' NDC through the use of markets (Kreibich 2018).

As can be seen, these options are based on the assumption that countries would not have to account for mitigation outcomes exported from sectors not covered by their NDC. The negotiations on Article 6, however, have progressed in dealing with this question and there seems to be agreement that accounting will be required for all ITMOs irrespective of whether they were generated from sectors and gases covered by an NDC or not (see Box below). This has serious implications for these ambition raising options: If countries are required to also account for ITMOs generated outside the scope of the NDC (or from the conditional part of the NDC)

these emission sources would de facto immediately become part of the (unconditional) NDC. This immediate inclusion of emission sources into the NDC is fundamentally different from the governed integration originally intended by the ambition raising options proposed.

Accounting for inside/outside scope and conditional / unconditional components

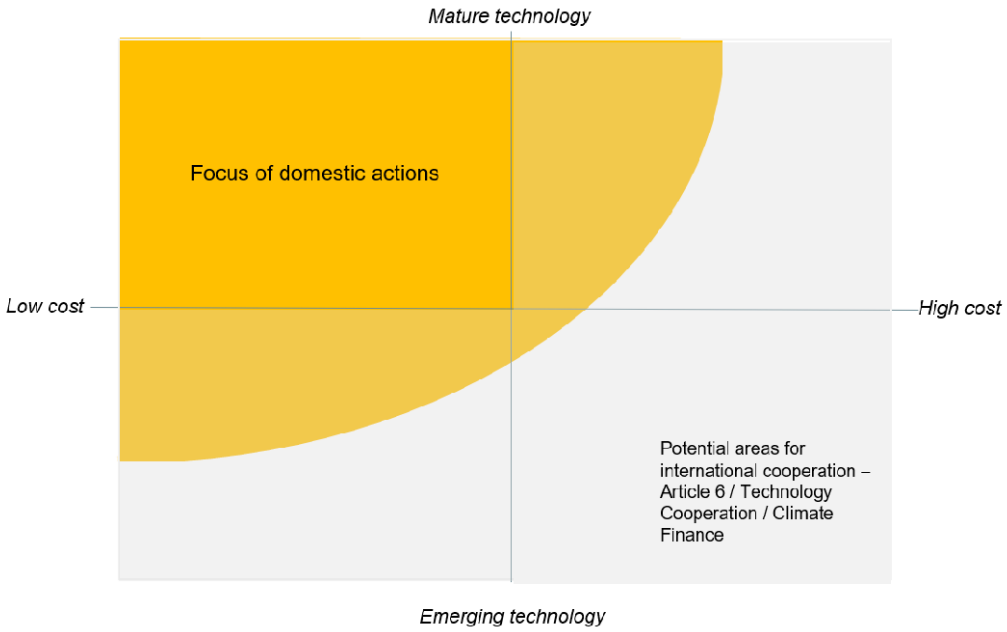
The question of whether mitigation outcomes are generated inside (within) or outside (beyond) the scope of a country's NDC has been considered key for many years. The relevance of this question derives from the fact that it was assumed that Parties exporting ITMOs would only be required to account for those emission reductions that were generated from sources and gases covered by their NDC by implementing corresponding adjustments. However, it became increasingly clear that answering this question can be extremely difficult in some cases. Furthermore, allowing Parties to export emission reductions not covered by their NDC may also lead to a perverse incentive not to expand the coverage of their NDC. In light of these challenges, proposals were made to require exporting countries to account for all mitigation outcomes exported (Japan 2017; Schneider et al. 2020). In the negotiations on Article 6, this approach seems to fall on fertile ground, as the last draft text from Madrid on Article 6.2 envisages that accounting will also be required for ITMOs generated from sectors and gases not covered by an NDC (UNFCCC 2019a Annex, para 15).

Another related question is whether accounting should be required for emission reductions generated from the conditional elements of an NDC. Many developing countries have communicated NDCs with conditional targets they intend to achieve with external assistance, including through carbon crediting. This, however, poses serious challenges: If exporting countries transfer mitigation outcomes that allow them to move to the conditional part of their NDC without accounting for these exports and if these ITMOs are then used by the acquiring country for offsetting, emissions would be higher when compared to a situation where this support be provided through climate finance. If host Parties are required to account for the ITMOs exported, crediting does not provide an actual support to these countries as they would have to make up for the ITMOs exported. As highlighted by Schneider et al. (2017), this is a dilemma that raises doubts about whether international crediting should be used to support countries in achieving their current conditional targets (Schneider et al. 2017).

Driving mitigation in inaccessible abatement options

In their report on Article 6, Warnecke et al. (2018) present the idea of Article 6 being used as a vehicle for driving mitigation in so called 'inaccessible abatement options'. This Condition of Success does not aim at assisting host countries in enhancing the coverage of their NDCs but builds on the fact that particular developing countries might not be able to unilaterally tap their domestic mitigation potential due to prevailing capacity limitations, technological or financial barriers.

Figure 5: Two-dimensional technology mapping



Source: Warnecke et al. (2018)

The authors of the report suggest that Article 6 could assist these countries in reaching and overachieving current mitigation efforts. Using a two-dimensional matrix that takes into account the maturity of a technology and its associated costs, Warnecke et al. (2018) aim at identifying the areas where international cooperation can provide particularly strong contributions and maintain that the focus should be put on high cost, emerging technology. The external support should be temporarily limited to the first phase of technological uptake while at the same time not jeopardise current and future mitigation.

Promoting carbon negative mitigation actions

Another Condition of Success that would contribute to ambition raising is to use offsets as a means to promote carbon negative mitigation actions. Carbon negative mitigation actions do not reduce or avoid emissions but they sequester carbon dioxide from the atmosphere acting as a sink. They can either be a natural sink, such as afforestation, or an artificial one, such as direct air capture. These activities could be promoted through regulation or carbon pricing in cases where the carbon negative mitigation technology is directly linked to the emission source, for instance by requiring fossil fuel power plants to use technologies that capture the carbon emitted. If there is no such direct link to the emission source, however, these carbon negative mitigation activities cannot be promoted through regulation or by putting a price on carbon. In such a situation these activities could be promoted by expanding the price signal of the compliance scheme beyond covered sectors. Please note that there is an ongoing discussion about negative emissions as respective activities might be associated with considerable benefits as well as adverse impacts (for a discussion see section 6.4 of this report).

4.2.3 Avoidance of perverse incentives that undermine ambition

Offset approaches cannot only contribute to ambition raising, but there is also a risk that offsets undermine ambition by setting perverse incentives. Even if the units transferred have quality and the transfer has been correctly accounted, offsets could have such an adverse impact, in particular in the long-term.

On the supply side, the possibility to export emission reductions could result in a disincentive to undertake domestic climate action, as climate policies could lower the potential to generate and export credits. Parties interested in exporting offsets under Article 6, for instance, could be incentivised to keep the ambition level of their NDCs low or to maintain a small scope of their NDCs if selling emission reductions beyond the NDC's scope must not be accounted for. Depending on how rules are set, activity proponents could further focus on actions that provide short-term gains while activities with a broader transformative effect are neglected, leading to lock-in effects (Schneider and La Hoz Theuer 2018). If, for instance, the offset approach allows for the generation and use of credits from high efficient coal projects, this could delay the transformation process of the power sector in the host country. Perverse incentives are also possible on the demand side. Here, the possibility to use offset credits might reduce the price signal of the carbon pricing instrument diverting investors from shifting long-term investments in the emission sources covered by the scheme to low-carbon alternatives, which could also lead to lock-in effects (Wang-Helmreich and Kreibich 2019).

While many of the underlying risks can be addressed through the design of the offset approach, the salience of these risks and the applicability of the provisions to address them will be influenced by specific factors on the demand and the supply side, which will be explored below.

4.3 Sustainable Development

Sustainable development could be considered a third Principle of Success, at least for international offset approaches, as respective contributions are explicitly mentioned as one of the objectives of voluntary cooperation under Article 6.

Contribution to SDG achievement

The contributions of an offset activity do not need to be limited to "climate action" as the Sustainable Development Goal (SDG) 13, but could also expand to the remaining 16 SDGs established by the United Nations. Whether an offset activity will actually contribute to one or several SDGs depends on its design and implementation, which in turn will be influenced by the design of the offset approach and the circumstances under which it is implemented in the host country (for details on how to assess SD impacts of carbon market activities and on how to strengthen the role of SD contributions under the Paris Agreement see: Day et al. 2020; Kachi et al. 2020).

Avoidance of adverse sustainable development impacts

While mitigation activities can provide for synergies with other environmental and social goals, they can also have detrimental effects if the focus is exclusively put on greenhouse gas reductions. One prominent example is the Barro Blanco hydropower project in Panama, a Clean Development Mechanism (CDM) project which is located in the immediate proximity of an indigenous region. During planning and implementation, the project has led to violent conflicts with the local population and showed multiple violations of human rights, affecting in particular the right to property and the right to housing (Obergassel et al. 2017).

The risk for such detrimental effects to occur is not the same for all activity types and sectors and will further depend on other circumstances of implementation. Together with the design of the offset approach these factors will influence the likelihood of adverse impacts (Olsen et al. 2018; Arens et al. 2015).

4.4 Interim observations

The three Principles of Success identified constitute the basis for assessing the performance of post-2020 offset approaches. The preceding analysis disclosed relevant differences among the Principles of Success and how they can be maintained. While Ambition and Sustainable Development cannot only be ensured by addressing adverse impacts but also be promoted by achieving positive effects, there appears to be no possibility for promoting positive effects of Environmental Integrity. Environmental Integrity as such can only be preserved.

Upholding these Principles of Success will depend on specific Conditions of Success. For some Principles of Success, more than one Condition of Success is required. In order to preserve Environment Integrity, for instance, robust accounting *and* unit quality must be ensured. Similarly, Ambition and Sustainable Development require respective adverse impacts to be addressed which can be seen as a precondition to achieve positive contributions. More generally, **avoidance of negative effects should be prioritized** before focusing on how positive impacts could be achieved.

Furthermore, positive and negative impacts should not be diluted but addressed separately. It is clear from the outset that negative impacts, for instance on sustainable development cannot be compensated by positive SD impacts. While **maintaining coherence within each of the three Principles of Success** will be key, it will also be important to take into consideration that all three Principles of Success are equally relevant for the overall success of offset approaches. This holistic approach also means that **a single Principle of Success cannot be achieved at the expense of another one** if the offset approach is to be considered successful. Consider, for instance, an activity that generates mitigation outcomes in the forestry sector by protecting natural forests that was previously used by forest dwellers for firewood supply. The mitigation activity might assist the host country (supply side) to increase its ambition by targeting emissions that it was unable to tap unilaterally. The reduced access to natural resources could however lead to adverse social impacts in the forest-dependent communities and thereby undermine sustainable development. In order to be successful, the activity would hence have to be complemented with a social component that ensures that forest dwellers are not adversely affected.

The operationalisation of offset approaches could also lead to conflicting Principles of Success or to a conflict between different options for achieving one Principle of Success. In such a situation, **priority should be given to positive long-term effects instead of short-term gains**.

5 Success factors and conceptual design considerations

As outlined before, offsets should only be seen as a means to an end, not as an end in itself. Environmental Integrity, Ambition and Sustainable Development have been identified as the Principles of Success of post-2020 offset approaches. In the following, the factors impacting the successful implementation of offset approaches will be explored. The relevance of individual factors varies depending on whether you look at the supply or demand side and if you consider international or domestic offsetting. The focus will be put on those factors that are relevant for the achievement of the Principles of Success identified above and relate to the supply or demand side sectors and jurisdictions.

Factors that are relevant for the operationalisation of an offset approach per se (be it on the demand or supply side) will not be part of this analysis. Likewise, we will not take into account factors that are related to the mitigation activity as such, as these are mainly dependent on the design of the offset approach. Table 4 provides an overview of the Success Factors identified. Each Success Factor is assigned to a specific category. This categorization is meant to provide a better overview on the Success Factors identified. Please note, however, that this categorization is indicative as there are overlaps and single Success Factors could be assigned to more than one category.

Following this broad categorization, the following section will explore how each Success Factor relates to Conditions of Success (highlighted in **bold**) and how it could inform the design of the offset approach (key options are in *italics*).

Table 4: Success Factors

Category	Success Factor
NDC-related	NDC metrics and timeframes
	Conditionality of NDC
	NDC coverage
	NDC ambition level
Political	Opposition against carbon pricing
	Coverage of climate policies
	Ambition level of carbon pricing scheme
Economic	Mitigation costs of technologies
	Carbon price responsiveness
	Carbon leakage risk
Technical	Maturity and penetration of the technology
	Technical mitigation potential
Environmental and Social	Environmental and social relevance of the sector

Source: Own compilation (Wuppertal Institute)

5.1 NDC-related factors

5.1.1 NDC metrics and timeframes

If offsets are transferred internationally and used by the demand side for achieving a national mitigation target, these transfers must be accounted for in order to ensure environmental integrity through **robust accounting**. Accounting will be easier to implement if Parties involved in the transfer use the same parameters when defining their NDCs. However, the NDCs communicated by Parties to the Paris Agreement display a large diversity. While around 70 per cent of the Parties to the UNFCCC have communicated GHG-based targets, some have put forward other contributions, such as renewable energy targets (CAIT 2020). Converting all NDCs into a uniform accounting format can be expected to be politically unfeasible as this would by many Parties been considered to go against the bottom-up nature on which the Paris Agreement is built (Hood and Soo 2017). And differences also exist among those Parties who have communicated CO_2e targets, as not all of them use the same global warming potentials (GWP). Different timeframes of Parties' NDCs are another point of concern: If the unit was generated in a time period that is different to the time period for which it is used, global aggregate emissions could be higher (Schneider and La Hoz Theuer 2018). Different metrics and timeframes could hence lead to an increase of global emissions und thereby undermine environmental integrity.

Policy makers considering the introduction of an offset approach have different options to deal with the diversity of NDCs in terms of metrics and timeframes. The most straight forward option in dealing with the accounting challenges posed by the diversity of NDCs is to *introduce a domestic offset approach*. By limiting the eligibility to credits generated within the same jurisdiction, these transfers would not have to be accounted for as long as the emission reductions are from sources covered by the NDC. If, by contrast, credits were generated from sources beyond the scope of the NDC, the question of whether accounting for these transfers is needed must be answered (see section 5.1.3 on NDC coverage below).

If offset credits are to be sourced internationally, policy makers could decide to *limit access to host countries that have adopted NDCs that align with their own NDC*. This could increase the compatibility of NDCs and facilitate accounting.

Another concern is the lack of commonly agreed accounting rules for Article 6 of the Paris Agreement. Being confronted with this situation, policy makers could postpone the decision on whether and how to integrate offsets. This, however, could lead to delays in the introduction of the compliance scheme, since the design of the offsetting approach should also be taken into consideration when designing other features of the ETS or carbon tax. An alternative consists in the establishment of own accounting rules and development of respective accounting methods. Since this will presumably lead to path dependencies, these *unilateral accounting standards* should be designed in a way that maximizes compatibility with future standards to be agreed on by the UNFCCC. One possibility to increase the likelihood of approaches to be compatible is to take the San José Principles as a starting point. The San José Principles (DCC 2019) were tabled at the end of COP25 by a group of Parties led by Costa Rica and endorsed by more than 30 Parties as a benchmark to ensure high ambition and integrity of international carbon markets. The document contains some principles relevant for accounting, including the avoidance of double counting and universal implementation of corresponding adjustments, the use of CO2-equivalence in reporting and accounting for emissions and removals as well as the full application of the principles of transparency, accuracy, consistency, comparability and completeness (DCC 2019). The *adherence to these same principles would then become a guiding criterion for the selection of potential host countries*.

5.1.2 Conditionality of NDC targets

Under the Paris Agreement, many developing countries have submitted NDCs that make their mitigation contributions conditional on receiving international support, such as finance, technology transfer and or capacity building. While this could in principle enhance equity among countries, the feasibility of NDCs is challenged by the fact that the conditions are often not well defined (Pauw et al. 2019). Lack of clarity also relates to the potential role carbon markets could play for achieving conditional elements. Notwithstanding this lack of clarity, many potential seller countries stipulated in their first round of NDCs that they intend to use market mechanisms to finance the conditional part of their NDC (Obergassel and Gornik 2015).

In principle, conditional elements could contribute to both, positive as well as negative impacts. On the one hand, conditional elements could allow the host country to **transition conditional elements into the unconditional part of its NDC**. On the other hand, conditional elements could also pose challenges for **robust accounting.**

However, both factors will only be relevant if the accounting system differentiates between conditional and unconditional elements. As outlined above (see Box in section 4.2.2) corresponding adjustments will presumably be required for all types of transfers. This will effectively make the ambition raising option irrelevant while also avoiding the risk of adverse effects. Given these considerations, the design of the offset approach should require host countries to *use the unconditional target as a basis for implementing corresponding adjustments*, irrespective of the relationship between the mitigation activity and possible conditional elements of the host country's NDC.

5.1.3 NDC coverage

Not all Parties to the UNFCCC have adopted economy-wide NDCs; some have limited the coverage to specific sectors or activities. A limited sectoral scope could impact the success and applicability of offsetting in different ways:

We will first look at international transfers. If emission reductions generated in a sector covered by an NDC are transferred and accounted for by the host country through corresponding adjustments, there would be an in-built incentive to only export emission reductions that are additional as it would have to make up for each emission reduction exported (assuming the country's NDC is ambitious). This positive effect on **unit quality** is missing if offsets can be generated from sectors outside the scope without accounting for these exports, raising the question about how to ensure **robust accounting**. In addition, there could be a **perverse incentive** for the host country not to increase the scope of its NDC. If, by contrast, the supply side accounts for the emission reductions generated outside the sectoral scope of its NDC it would effectively bring the emissions under the scope of the NDC, allowing to use the cooperation for **transitioning emission sources into the NDC**.

Similar considerations are relevant for domestic offsetting. If a country uses offsets from outside the scope of its NDC to offset emissions covered by its NDC without accounting for these transfers, ambition could be undermined: The country would claim to be achieving its target by using emission reductions generated in sectors that were not taken into account when developing the NDC. There would further be a **perverse incentive** to not increase the scope of the NDC as this would reduce the potential offset supply. It should be noted, however, that this is rather a theoretical problem, as countries allowing for the use of domestic offsets for meeting obligations with carbon pricing instruments, such as South Africa and Colombia, have adopted economy-wide NDCs.

Given these considerations for international and domestic offsetting approaches, there is a strong argument in favour of *restricting eligibility* to reductions from sources covered by an NDC and/or to *require to account for all units* exported irrespective of whether they were generated from covered sources.

5.1.4 Ambition level of the NDC

On the demand side, the ambition level of an NDC will be particularly relevant if offsets are to be used for **raising national mitigation targets**. An ambitious NDC can be considered a precondition for this ambition raising option.

In a system with robust accounting provisions, an ambitious NDC on the supply side provides an in-built incentive to ensure **unit quality** of emission reductions generated from sources that are covered by the NDC. An unambitious NDC, by contrast, could lead to the generation of hot air which is then transferred into to the demand side, undermining environmental integrity.

In order to address the risk of hot air generation and subsequent transfer to the demand side, an *independent assessment of NDC ambition* could be included in the design of the offset approach. It is important to note that the outcome of such an ambition level review could also provide the basis for deciding on whether additionality testing of the mitigation activity will subsequently be required or not (Michaelowa et al. 2019). Given the current divide in the climate change negotiations and the political dimension of the issue, agreement on a common approach for evaluating the ambition level of NDCs seems unlikely. Policy makers will hence have to develop their own approaches. As highlighted by Fuessler, Kohli, Spalding-Fecher, et al. (2019), there are numerous approaches that could be used for assessing the ambition level of NDCs, some of which are primarily concerned with the moral obligation to mitigate climate change while others primarily relate to the technical necessity. Many of these approaches are, however, challenging to operationalize. In the context of market-based cooperation under Article 6 and offsetting, an assessment of how the mitigation targets compare to business as usual (BAU) emissions seems the most promising approach. There are different methodologies to evaluate BAU emissions, such as projection of emissions on the basis of historical trends, development of forward-looking emissions projections on the basis of emission drivers or bottom-up analysis based on detailed national projections. Policy makers could also build on approaches used in NDC assessments conducted to date, such as the Climate Action Tracker (CAT), which takes into account country-level information when estimating BAU emissions (Fuessler, Kohli, Spalding-Fecher, et al. 2019).

The independent assessment of NDC ambition would become a key element of the offset approach. If the assessment identifies that the NDC lacks ambition, policy makers could decide not to allow offsets to be generated. In order to avoid countries with a weak NDC being fully excluded, the offset approach could be designed in a way that allows also these countries to generate offsets subject to *quantitative limits* and under the condition that the underlying mitigation activity has successfully undergone a rigorous *additionality test* (Michaelowa et al. 2019).

5.2 Political factors

5.2.1 Opposition against carbon pricing

Potentially adverse impacts of carbon pricing on competitiveness of companies and economies has been a key barrier to progress on carbon pricing (World Bank Group 2019). Examples of carbon pricing being pushed back by opposition include the repeal of Australia's carbon pricing mechanism and of the carbon tax in Alberta, Canada. On the demand side, strong opposition

from those targeted by the carbon pricing scheme might indicate that offsets could be required to address concerns about cost increases, competitiveness issues and leakage. In such a situation, offsets could help **strengthening the case for domestic carbon pricing**. On the supply side, strong opposition against carbon pricing could be an indication of the need to use offsets as an alternative to carbon pricing for incentivising emission reductions.

In a situation where opposition against carbon pricing is strong on the demand side, offsets could hence be used as a bargaining chip that paves the way for the introduction of a carbon pricing scheme. If political economy considerations where one of the key drivers leading to the introduction of offsets, *quantitative limits on offset use* are particularly relevant. These limits can be established using the estimated aggregate emission reductions as a reference point with offset use being limited to a certain share of these emission reductions. Alternatively, the regulator can limit the share of regulated entities' compliance obligations that can be met with offsets. A third possibility consists in introducing entity-specific supplementarity rules by setting different limits for different types of regulated entities (PMR and ICAP 2016).

It should be noted though, that an offset approach is only one possibility to control costs for regulated entities. The design of the offset scheme should therefore be aligned with other design features of the carbon pricing scheme, such as the overall cap and the allocation methods of an ETS or the tax rate of a carbon tax. In section 6.2 we explore whether and how offsets could be used as an alternative for free allocation in emission trading schemes.

5.2.2 Coverage of climate policies

Whether specific emission sources or sinks are targeted by domestic climate policies can be an important factor for the successful implementation of offset approaches on the supply side. If the offset approach on the supply side targets emissions or sinks that are already covered by a domestic policy, there is a risk of limited additionality of the mitigation activity – potentially adversely affecting unit quality and undermining environmental integrity. For the demand side, the question of climate policy coverage is redundant as we will assume that there is a climate policy in place for which offsets will be used, be it a national mitigation target or a compliance scheme (ETS or carbon tax).

Existing and planned policies play a relevant role for the design of the offset approach and its provisions for additionality demonstration and baseline setting. If these provisions require activity proponents to take into account existing and planned policies they may provide a **perverse incentive** for policy makers in the host country not to adopt such policies. If, by contrast, activity proponents are allowed to disregard these policies, there is a high risk of mitigation activities not being additional, adversely affecting **unit quality**. This poses a 'dilemma' (Schneider et al. 2017) that cannot be easily resolved.

One relevant aspect here is the question of materiality. Can we reasonably assume that the mitigation activities implemented on the demand side will generate emission reductions at a scale that prevents the host country government from adopting domestic climate policies? Experience from the CDM suggests otherwise: While the risk for perverse incentives was considered limited there is a considerable risk of unit quality being undermined (Spalding-Fecher 2013). While this could theoretically change in the future with sectoral or policy crediting under Article 6 (Fuessler, Wunderlich, Kreibich, et al. 2019; Kreibich and Obergassel 2018; Kreibich and Obergassel 2019b), policy makers developing the rules for an offset approach should start off by *requiring existing and planned policies to be taken into account during additionality demonstration* and *baseline setting*. In order to avoid a perverse incentive, the external support could be reduced over time by *limiting the crediting period* of activities.

5.2.3 Ambition level of the carbon pricing scheme

The level of ETS ambition can be determined by using three parameters (PMR and ICAP 2016):

- The *quantity and speed of emission reductions* achieved under the ETS cap,
- the *allowance price* reflecting the marginal costs of emitting a tonne of CO_2 in an ETS,
- and the *total costs* associated to achieving the total amount of emission reductions.

Similarly, the ambition level of a carbon tax could be determined by a combination of the tax rate level, compliance entities' abatement options and their costs and the total costs associated to achieving the total amount of emission reductions.

A high ambition level of the carbon pricing scheme could indicate that the sector is on its way towards decarbonisation and that remaining emissions could be difficult to reduce. In this situation, offsets could be a seen as a viable solution to further **strengthen domestic carbon pricing instruments**. By contrast, a compliance scheme with limited ambition should first and foremost be strengthened by domestically raising its ambition level.

Similarly, a high ambition level of the carbon pricing scheme can also be seen as a precondition for **offsetting unavoidable emissions**, as the existence of a strong carbon price (or other policies) provide the basis for the avoidable emissions to be mitigated in the first place.

But a high ambition level of the carbon pricing scheme is not only relevant for raising the ambition on the demand side. It is also needed for **driving mitigation in inaccessible abatement options** on the supply side. Assisting host countries in tapping their "high-hanging fruits" will presumably require significant amounts of funding. In order to ensure funding provided by carbon finance is sufficient, the price difference between the compliance costs and offset prices must not only be significant but also be at a high level.

If, by contrast, an offset approach is introduced with a carbon pricing scheme that has a low ambition level (loose cap of an ETS or low tax rate of a carbon tax), its effect will presumably be limited as the carbon price will lie below the costs for offset generation and the carbon price would effectively act as a price ceiling. While this would obviously also limit any adverse effects of offsetting such as perverse incentives and other undesired impacts on environmental integrity, it cannot be assumed that it is the policymakers' intention to have a (non-) functioning offsetting scheme. Furthermore, policymakers can also address these undesired effects in a high ambition scenario: By further increasing the ambition level of their compliance scheme, policymakers can avoid a situation in which the introduction of offsets would drive down compliance costs for regulated entities and limit the incentive to reduce own emissions. These considerations indicate that *introduction of an offset approach should be limited to ambitious carbon pricing schemes*.

5.3 Economic factors

5.3.1 Mitigation costs of technologies

In addition to providing benefits to unregulated sectors, offsets are typically seen as a cost containment measure (PMR and ICAP 2016). The magnitude of these costs on the demand side can therefore be considered a relevant factor and is also important for some of the Conditions of Success identified above.

On the demand side, high abatement costs of regulated entities could challenge the introduction of an ambitious carbon pricing scheme. Since offset credits reduce the compliance costs for regulated entities, the offset approach could be introduced as a means to appease these concerns, potentially allowing for **strengthening the domestic carbon pricing instrument**. Limiting offset use to entities with high abatement costs would also address the **risk of perverse incentive** that entities with own cost-efficient emission reductions rely on offsets. Particularly high mitigation costs of technologies on the demand side could also represent a barrier to **raising national mitigation targets** domestically and make the case for offsets to be used for this purpose.

On the supply side, low abatement costs have in the past often been used as one of the selection criteria as they can promote cost effectiveness and cost containment (PMR and ICAP 2016). However, low-cost mitigation potential could be seen as an indicator of emission reductions being non-additional, adversely affecting **unit quality**. Another aspect that is particularly problematic for international offsetting schemes is that crediting of low-cost mitigation activities will become ever more difficult, as countries will become increasingly hesitant to export their low-cost mitigation outcomes but instead use these so-called low-hanging fruits for achieving their own NDC. Focusing on activities with high mitigation costs could also reduce the risk of overselling (Spalding-Fecher et al. 2020) and contribute to **driving mitigation in inaccessible abatement** (Warnecke et al. 2018).

Given these considerations, it is advisable to take the mitigation costs on the supply side and on the demand side into account when designing the offset approach. On the demand side, linking *the offset approach to the estimated marginal abatement costs of compliance entities* could be explored. So, for instance, offsetting could only be allowed if mitigation costs lie above a certain threshold, which could be defined for entire sectors or differentiated by entity types. A more nuanced approach would be to combine the mitigation costs with other design parameters, such as quantitative limits on offset use or discounting approaches. Consequently, for sectors or activity types that are confronted with high abatement costs, softer quantitative limits or discounting rates would apply than for those with lower abatement costs.

On the supply side, the design of the offset approach should steer the price signal of the compliance scheme into high cost mitigation options. This could be done by *establishing a threshold defined in EUR/tCO_2e*, which is used to exclude mitigation activities that lie below that threshold. This approach proposed by Spalding-Fecher et al. (2020) as a strategy to deal with the overselling risk could build on the assessment made by the host country in the context of deciding which mitigation activities will be used for NDC attainment.

Of course, a key challenge is to correctly estimate the abatement costs. Whether costs are considered to be low or high depends on numerous aspects, such as the time horizon, the role of non-climate benefits, etc. Despite these challenges it should be noted that there are strong synergies between the elaboration and implementation of an NDC and activities that assist countries in getting ready for being a host country for Article 6 activities under the Paris Agreement. Against this background, increasing technical readiness by inter alia estimating mitigation costs seems a no loose option that can contribute to the successful implementation of offset approaches. However, it should be noted that many countries lack the capacities required making additional external support necessary. More generally, mitigation costs can only be one of numerous factors relevant for the inclusion of a specific sector into an offset approach.

5.3.2 Carbon price responsiveness

The responsiveness to carbon prices varies considerably across different sectors and economic actors. This relates to the demand side as well as to the supply side of an offset approach, with the former being impacted by the costs imposed by the carbon tax or ETS and the latter responding to a negative price in form of carbon revenues from the sale of credits.

On the demand side, a low responsiveness of (future) compliance entities towards a strong carbon price could be an indication that offsets are needed. If, for instance, compliance entities are rather paying the carbon tax (or high allowance prices and fines in the case of an ETS) instead of reducing their emissions, offsets could be an alternative compliance option that has a direct mitigation impact while potentially reducing entities compliance costs. Depending on how the foregone carbon tax or ETS revenues would have been used, this could **strengthen the domestic carbon pricing instrument**.

On the supply side, the relevance of carbon price responsiveness depends on the design of the offset approach. Mitigation activities can either be driven by governments, such as the national REDD+ programme in Indonesia, or by private actors, as under the CDM. A government-run offset programme must not necessarily build on a market-based structure to achieve mitigation outcomes but can also rely on regulation or other policies. If, however, the offset programme is to directly incentivise private sector mitigation activities, high carbon price responsiveness will be key.

Carbon price responsiveness could hence be a relevant factor for designing the offset approach, by *reducing the eligibility of offsets* on the demand side to sectors with limited carbon pricing responsiveness while focusing on sectors with strong carbon pricing responsiveness on the supply side if private sector entities are to be incentivised.

5.3.3 Carbon leakage risk

Carbon leakage is a contentious issue that describes a situation in which emissions intensive activities are relocated in space due to the cost effects of the compliance scheme. Carbon leakage does not only lead to emissions being emitted elsewhere but also to a loss of jobs and economic activity in the jurisdiction that has introduced the climate policy. The extent by which individual sectors are affected by carbon leakage is, however, disputed (PMR 2015). If a sector or production process is found to be at high leakage risk, the introduction of offsets could be used as a means to mitigate this risk by reducing compliance costs. This could in turn allow for **strengthening the carbon pricing instrument**. A high carbon leakage risk could also indicate that offsets are needed for **raising national mitigation targets**. When designing the offset approach, policymakers could decide to *reduce the eligibility* of offset use on the demand side to sectors or economic activities with considerable carbon leakage risk.

5.4 Technical factors

5.4.1 Maturity and market penetration of the technology

Maturity and sectoral penetration of technologies are key factors influencing the ambition raising impact of the offset approach and particularly relevant for **driving mitigation in inaccessible abatement** options. Technologies that are mature and widely diffused will presumably not need support from offset approaches and the host country might be willing to use these for achievement of its NDC. Exclusion of these technologies would allow additional external funding to be used for promoting innovative and sparsely diffused technologies

(Warnecke et al. 2018). Maturity and penetration of the technology is also a relevant parameter for **unit quality**.

There are different design options of how an offset approach can take into account the maturity and penetration of a technology. One possibility would be to develop *universal eligibility criteria in the form of negative or positive lists* that exclude technologies and practices that are mature and widely diffused. Such a list could be applied globally and be derived from publicly available sources, such as IPCC reports, IEA analysis, and other sources. In order to take account of the technological progress and increased diffusion, the list would have to be regularly updated. While such an updating process could take account of the global dynamics it will not be possible to consider regional and country-specific differences of technological penetration, which differ significantly. This divergence in terms of market penetration of technologies has also been taken into account by the CDM. The methodological tool to demonstrate the additionality of microscale project activities, for instance, requires host countries to recommend specific renewable energy technologies to the CDM Executive Board for approval of being deemed additional in the country and for a limited period of time of three years (UNFCCC 2018b). The approach would hence have to be complemented by a positive or negative list that takes into account country-specific circumstances. While such a list could in principle also be developed by the offset approach on the basis of international expertise and tools, in-country knowledge would be necessary for such an approach to be useful. Hence, instead of developing such a list in a top-down manner during the design of the offset approach, the provisions of the offset approach could *require potential host countries to create a national positive or negative list* as a basis for future cooperation (Spalding-Fecher et al. 2020). Both lists would have to be regularly updated in order to take account of the technological diffusion at the global and national level.

In order to ensure unit quality, the maturity and penetration of the technology to be applied by a mitigation activity should be taken into account during *additionality determination* as well as when developing the *crediting baseline* of the mitigation activities.

5.4.2 Technical mitigation potential

The technical mitigation potential of a sector is a relevant factor indicating its suitability to be used on the supply or demand side of an offset approach.

On the demand side, limited technical mitigation potential could indicate that the sector could generate significant demand for offsets and be used for ambition raising. A high mitigation potential, by contrast, could indicate that offsets would provide a **perverse incentive** not to increase ambition by reducing residual emissions. If the sector is an emissions source and remaining emissions cannot be avoided, the inclusion of this sector into the offset approach could allow for **offsetting unavoidable emissions**. If the sector does not contain any residual emissions its integration into the offset approach could even allow for **using offsets to become carbon negative**. More generally, a limited technical mitigation potential is relevant for **raising national mitigation targets** and **strengthening carbon pricing instruments** as it indicates that additional mitigation potential from the supply side is needed.

On the supply side, a certain level of technical mitigation potential is required as it would otherwise not be suitable for offset generation. Therefore, technical mitigation potential is particularly relevant for **driving mitigation in inaccessible abatement** and for **promoting carbon negative mitigation**. The mitigation potential must be sufficiently high in order to make up for the costs associated with establishing the technical, institutional and legal preconditions for offset generation in the sector. It should be noted, though, that the mere existence of a high

mitigation potential does not automatically indicate that this sector should supply offsets; this potential could also be exploited through other policy instruments.

The technical mitigation potential should be included as one key parameter when defining the sectoral scope of an offset approach. On the demand side, *eligibility should be limited to sectors with limited technical mitigation potential* while on the supply side the *focus should be put on sectors that have considerable technical mitigation potential*. Estimating the technical mitigation potential of a sector is complex and can be particularly challenging in countries where data quality and availability is low. Therefore, synergies with existing processes should be exploited, such as processes underpinning NDC development and UNFCCC reporting (National Communications, Biennial Reports / Update Reports). Depending on the final structure of the Global Stocktake, the information collated in this process could also be used as a source of information.

5.5 Social and environmental factors

5.5.1 Environmental and social impacts

Mitigation activities can have environmental and social impacts that go beyond climate and might be both positive and negative. Some sectors and their emission sources or sinks are more closely related to the natural environment while others might be particularly relevant for social wellbeing of the local population. In some cases, both aspects are linked: A conservation activity in the forestry sector, for instance, has the potential to **contribute to the Sustainable Development Goals** by enhancing local biodiversity (SDG 15). At the same time, the activity could also lead to **adverse SD impacts** by, for example, reducing access to natural resources that play a key role in the livelihood of the local population. There are different design options to enhance synergies and to address adverse environmental effects.

The first design option that policymakers have is to *define eligibility criteria (positive/negative lists*) for the offset approach based on the expected environmental and social impacts of activities. Here, policymakers will have to balance activities' potential to contribute to positive non-climate impacts with the risk of activities leading to adverse impacts.

In order to balance potential risks with synergies, policymakers could *adapt the implementation requirements to the circumstances* in the specific sector. In doing so they can build on existing experiences made and tools developed by certification standards, in particular from the voluntary carbon market, as well as climate finance. There are several tools that can be integrated into the design of an offset approach in order to reduce the risk of negative social and environmental impacts while achieving positive effects. Such a *safeguard system* could for instance include do no-harm criteria to which any activity funded by the mechanism must adhere, ex-ante social and environmental impact assessment with third party approval as well as MRV provisions for social and environmental impacts and strong stakeholder participation possibilities before and during activity implementation (Arens et al. 2015; Kreibich and Obergassel 2019a; Kachi et al. 2020; Day et al. 2020).

5.6 Interim observations

This section aimed at identifying the key factors that are relevant for the successful application of an offset approach. For each Success Factor, the section discussed how it relates to the Conditions of Success and their respective Principles of Success and how it could inform the design of the offset approach. The findings of the analysis indicate that there is a large number of Success Factors that are relevant for the different Conditions of Success with some of them being

relevant for the demand side, some for the supply side and some for both sides of the offset approach:

- Among those Success Factors that are relevant for both sides of the offset approach, some lead to a successful outcome if they are aligned between demand and supply side, such as NDC metrics and timeframes. Another example is mitigation costs, which should be high on the demand side for making the case for offset use while also being high on the supply side in order to drive mitigation in inaccessible abatement.
- For other Success Factors a reciprocity between demand and supply side has been identified, requiring the factor to be positive on the one side and negative on the other. One example is the technical mitigation potential, which should be low for offsetting unavoidable emissions on the demand side while being high (yet untapped) on the supply side.
- The analysis further revealed overlaps and interactions between some of the Success Factors. For instance, opposition against carbon pricing will presumably be stronger if expected mitigation costs are higher or when there is a strong carbon leakage risk.

Table 5 provides an overview on the relevance of individual Success Factors for the Conditions of Success. It is important to point out that only those Success Factors that are actually relevant for the specific Condition of Success are marked in black.

Table 5: Relevance of Success Factors for the Conditions of Success

		Principles of Success											
		EI		Ambition								SD	
Success Factors	Conditions of Success	Robust accounting	Unit quality	Avoiding perverse incentives	Raising national mitigation targets	Strengthening carbon pricing	Offsetting unavoidable emissions	Using offsets to become carbon negative	Transitioning sources into the NDC	Driving mitigation in inaccessible abatement	Promoting carbon negative mitigation	Contribution to SDGs	Avoiding adverse SD impacts
NDC-related	NDC metrics and timeframes	■											
	Conditionality of NDC	■							■				
	NDC coverage	■	■	■					■				
	NDC ambition level		■		■								
Political	Opposition against carbon pricing					■			■				
	Coverage of climate policies		■	■									
	Ambition level of carbon pricing scheme			■		■	■			■			
Economic	Mitigation costs of technologies		■	■	■	■				■			
	Carbon price responsiveness					■							
	Carbon leakage risk					■							
Technical	Maturity and market penetration		■							■			
	Technical mitigation potential			■	■	■	■	■		■	■		
Env. & Social	Environmental and social impacts											■	■

Source: Own compilation (Wuppertal Institute). Note: The dark marker was placed for those Success Factors that are of particular importance for a specific Condition of Success. The abbreviation "EI" stands for environmental integrity, "SD" for sustainable development.

The analysis further showed that the Success Factors can serve as an indicator for meeting the Conditions of Success, while they do by themselves not ensure that the Conditions of Success are met and that the respective Principle of Success is maintained. The Success Factors identified

further display limited potential of being 'improved' or 'adapted' to the functioning of an offsetting approach. More generally, such modifications of the Success Factors were considered to be beyond the control of those involved in the design of the offsetting approach.[3] Therefore, instead of exploring possibilities to improve the Success Factors we looked into possibilities to take these factors into account during the design of the offset approach. In this respect, the following observations were made:

- By effectively integrating the features of individual Success Factors into the design of the offset approach, offsets can provide support in meeting multiple Conditions of Success and in maintaining the Principles of Success.
- The most direct and powerful way of taking the Success Factors into account during the design an offset approach is by **establishing eligibility criteria** that guide the selection of sectors or jurisdictions that will be part of the offset approach on the supply and demand side. This allows policymakers to implement the offset approach in those sectors and jurisdictions that align best with their policy goals.
- On the demand side, some of the Success Factors can further be taken as a basis for **defining limits on the offset use** which can be operationalized by establishing quotas, thresholds or discounting rates.
- On the supply side, the Success Factors identified can inform the **implementation requirements for crediting activities**, such as the provisions for additionality demonstration, baseline setting and monitoring, reporting and verification.
- In light of the lack of commonly agreed accounting standards due to the ongoing Article 6 negotiations, offset approaches could develop their own accounting standards which all participating jurisdictions must adhere to and which inter alia **require robust accounting for all mitigation outcomes** irrespective of where they have been generated. An alternative for dealing with the uncertain prospects of an international accounting standard under the UNFCCC, the scope of the offset approach could be limited to domestic offsetting.

By combining these design options, the use of offsets on the demand side could be restricted to ambitious carbon pricing schemes in sectors that are characterized by high mitigation costs and limited (or even non-existent) mitigation potential. These sectors will presumably also feature a higher (perceived) carbon leakage risk and stronger opposition against carbon pricing, allowing offsets to make valuable contributions in advancing climate action.

On the supply side, a combination of the design options could steer the price signal of the compliance instrument into sectors that have a considerable mitigation potential that is not yet exploited due to low penetration and high costs of the respective mitigation technologies. By focusing on sectors with considerable relevance for social wellbeing and/or environmental benefits, the contributions of offsets could be expanded from ambition raising impacts to

[3] The technical mitigation potential of a sector, for instance, is defined by the products and services it generated or by the natural conditions (winds, solar) as well as by the existence of respective abatement technologies. Adapting the functioning of the sector to the design of an offset approach does neither seem prudent nor possible. Even those factors that can in principle more easily be modified by governments, such as the coverage of climate policies, will presumably not be adapted to suit the requirements of an offset approach as other factors will be more relevant.

additional contributions to sustainable development. Table 6 provides an overview on how Success Factors can inform the design of an offset approach.

Table 6: Overview on how Success Factors can inform the design of an offset approach

Success Factors		Design considerations
NDC-related	NDC metrics and timeframes	**Introduce a domestic offset approach** in order to circumvent accounting issues **Limit eligibility** to host countries that have adopted NDCs that align with their own NDC Develop unilateral **accounting standards** for dealing with diversity of NDCs Make adherence to basic accounting principles a key **requirement** for the access of host countries to the scheme
	Conditionality of NDC	Use the unconditional target as a basis for **accounting**
	NDC coverage	**Restrict eligibility** to NDC-covered sources or **account** also for units not covered by an NDC to address perverse incentive
	NDC ambition level	Make independent **assessment of NDC ambition** an eligibility criterion for host Parties to avoid hot air transfers Introduce **quantitative limits** and rigorous **additionality tests** if NDC lacks ambition
Political	Opposition against carbon pricing	Introduce **quantitative limits on offset use** if the offset approach is used as a bargaining chip in the carbon pricing negotiations
	Coverage of climate policies	Require existing and planned policies to be taken into account during **additionality demonstration** and **baseline setting** Limit **crediting periods** to avoid perverse incentives for national climate policy making
	Ambition level of pricing scheme	**Limit use of offsets** to ambitious carbon pricing schemes
Economic	Mitigation costs of technologies	Establish sector-specific thresholds that translate into **quantitative limits** or **discounting rates** Establish a threshold defined in EUR/tCO_2e to **exclude low-cost mitigation activities** (low-hanging fruits)
	Carbon price responsiveness	**Reduce eligibility of offsets** on the demand side to sectors with limited carbon pricing responsiveness **Focus on sectors with strong carbon pricing responsiveness** on the supply side if private sector are to be incentivised
	Carbon leakage risk	**Reduce the eligibility** of offset use on the demand side to sectors with considerable carbon leakage risk.
Technical	Maturity and market penetration of the technology	Develop **universal eligibility criteria** for the supply side to exclude technologies that are mature and widely diffused Require potential host countries to create **national positive or negative list** as a basis for future cooperation Take the maturity and market penetration into account during **additionality demonstration crediting baseline** setting
	Technical mitigation potential	**Limit eligibility** on the demand side to sectors with limited technical mitigation potential **Limit the eligibility** on the supply side with sectors that have a considerable technical mitigation potential
Env. - Social	Environmental and social impacts	Define **eligibility criteria** (positive/negative lists) for high risk activities Adapt the **implementation requirements** to the specificities of activities and develop a **safeguard system to ensure SDG contributions**

Source: Own compilation (Wuppertal Institute)

6 Exploring selected conceptual design aspects

The preceding section has identified factors that are relevant for the successful operationalisation of offset approaches and illustrated how they can inform the design of offset approaches. In the following, the report will deep-dive into selected conceptual design issues in order to show how offsets can support specific policy objectives.

In order to preserve environmental integrity, offsets must represent real, measurable, and additional emission reductions to counterbalance the emissions emitted by a compliance facility when these offsets are surrendered. It is therefore essential that the governance of offset certification is rigorous in terms of being certified under standards that have strong environmental integrity criteria as part of their accepted methodologies, and the emission reductions are verified by credible third party auditors. Furthermore, accounting issues of offsets can undermine environmental integrity.

If, for instance, the underlying mitigation activity is not additional, the positive climate impacts outside the carbon tax system described above will not materialise, while the lower price for offsets can drive down the effective tax rate of ambitious systems if compliance actors are allowed to offsets a large percentage of their tax liability. In the past, doubts have been raised about the additionality of activities credited under the Clean Development Mechanism (CDM) and Joint Implementation (JI) (Cames et al. 2016; Kollmuss et al. 2015).

Taking the preceding elaboration on Principles of Success, Conditions of Success and Success Factors of post-2020 offset approaches as a background, this chapter explores a diverse range of aspects: Some of the following sections explore innovate approaches, such as whether establishing a sectoral link between demand and supply side could foster sectoral transformation (section 6.1) or whether offsets could be used as an alternative to free allocation in emissions trading systems (section 6.2). The chapter also explores the potential impacts of approaches that are already being implemented, such as the integration of offsets into carbon taxation schemes (section 6.3) and the role of funds for supporting the commercialisation of offsets (section 6.4). Other sections explore issues that are gaining increased relevance due to the changed framework conditions introduced with the Paris Agreements, such as the role of negative emissions for supplying offsets (section 6.4) and the potential to foster transformative change by promoting respective crediting activities in host countries (section 6.6). For each of these aspects, the authors provide a brief background, explore potential effects and arrive at conclusions and recommendations.

6.1 Promoting sectoral transformation through a sectoral link between demand and supply side

6.1.1 Background

One key concern about offset use is that it undermines the incentive established with the carbon pricing instrument to reduce the compliance actor's own emissions by introducing the option to buy less expensive offsets. In order to avoid a situation in which a massive inflow of offsets will reduce the price signal set by the ETS or carbon tax, policy makers usually introduce quantitative limits on offsets. The introduction of quantitative limits is also being proposed in the context of international transfers under Article 6 (for a discussion see: La Hoz Theuer et al. 2019). The regulator of a carbon pricing scheme may set quantitative limits on the basis of political considerations and according to its specific policy objectives. Quantitative limits can be set at the overall system level (Phase Three of the European Emissions Trading Scheme (EU ETS)), at the level of the individual regulated entities (Korean Emissions Trading System) and

may be further differentiated by the different types of regulated entities (use of outside Saitama credits in Saitama's ETS) (see: ICAP 2020). This can challenge the political process of their introduction. The same holds for qualitative limits, such as the decision by the EU to limit the eligibility of newly generated international offsets to CERs generated in developing countries and the exclusion of industrial gas credits for the third phase of the EU ETS.

In light of the challenges of introducing quantitative and qualitative limits to offsets, this section explores a complementary approach: linking the offset credit to the obligation of the credit user. There are different possibilities to establish a link between the credit user and the credit, such as taking into account the regulated entities' processes, technologies or products. In the following we will use the sector as a basis for such a link. With such a sectoral link, regulated entities would only be allowed to use offsets that were generated in the same sector. e.g. a steel producer could only surrender offsets generated in the steel industry, while a power station covered by the carbon pricing scheme could only use credits from the power sector. Credits would hence have different prices and 'values' depending on where they have been generated and who can use them for compliance.

The approach builds on the assumption that the regulated entity will only acquire credits from the respective activity if the credit price lies below the entities' compliance costs. With this assumption the approach is suitable for carbon taxes, where a regulated entity has three options to be compliant: Reduce its own emissions, pay the carbon tax or surrender offset credits. Assuming a rational actor, the regulated entity will only buy and surrender the sector-specific offset credit if this is more cost-effective that the alternative of reducing its emissions or paying the carbon tax. A sectoral link could possibly also be applied to other policy instruments with an offset component that are limited to one sector. One example of such a policy instrument is the Upstream Emission Ordinance in Germany which is based on the Council Directive (EU) 2015/652 (2015). The Upstream Ordinance allows companies that are marketing liquid fuels and are subject to emission reductions quotas to meet part of their obligation through offsetting upstream emission reductions.

In emission trading schemes covering different sectors, however, the situation is somewhat different, as regulated entities can trade allowances among each other. This could lead to a situation in which a regulated entity decides to purchase offsets at a price that lies above its compliance costs in order to 'free-up' allowances which it can then sell to another entity with higher abatement costs. This would run counter the rationale of establishing sector-specific credits as they would no longer have different prices and values. Therefore, applicability would be limited to carbon taxation schemes, where such trading is not possible. With these limitations in mind, we will now explore the possible effect of such a sectoral link.

6.1.2 Possible effects of a sectoral link between an offset credit and its user

Climate impact

Establishing a sectoral link for offset use could *foster sectoral transformation*: Since regulated entities would be required to find credits generated in the same sector, new collaborations and opportunities could emerge. If such a link is established as part of an international offsetting scheme, regulated entities in a sector of one country could establish a cooperation to buy credits from unregulated entities in the same sector of another country. The acquisition of credits could be combined with the sale of abatement technologies to uncapped entities of the same sector and nurture new forms of interaction in key sectors. If the link is introduced as part of a domestic offsetting programme, it could create a financial incentive to promote additional low-carbon abatement options within the sector. The offsetting option could allow to tap additional

mitigation opportunities at sources that are currently exempt from the compliance scheme or foster development of alternative low-carbon or even zero-carbon technologies within the sector, thereby promoting transformative change (see section 6.6).

Linking the credit to the credit user could also *limit the distorting effect of offsets* and address a situation in which a sector targeted by a carbon pricing scheme relies on low-cost offsets generated in other sectors to meet its obligations. In systems without any quantitative limits for offset use, the abatement costs in the offsetting sectors together with the transaction costs would translate into a credit price which establishes a de-facto price ceiling for the carbon pricing scheme, limiting the regulated entities' incentive to reduce own emissions. By linking the credit to the credit user, this price ceiling would become closer to the actual abatement costs relevant for the regulated entity, limiting the distorting effect of offsets.

Economic effects

One concern related to the use of this approach as part of an international offsetting scheme is a *competitiveness issue in sectors* with a strong carbon leakage risk. If regulated entities acquire credits from their unregulated counterparts in other jurisdictions, they are directly supporting their competitors, who in turn would benefit from the carbon revenues. In theory, this does not pose a problem if the mitigation activity is additional and the revenues from the sales of credits do not exceed the incremental costs associated with the project. Practical experience from the CDM, however, shows that additionality is questionable for some project types and that many projects are associated with strong additional benefits (Cames et al., 2016). Crediting could hence lead to distortions in the respective sectors. While evidence for CDM-induced carbon leakage in energy intensive sectors of the EU-ETS was not found (Erickson et al. 2011), concerns about competitiveness distortions were raised by European steel companies regulated under the EU-ETS who acquired CERs from projects implemented in the steel sector of developing countries. This competitiveness issue could be seen as an argument not to introduce a link between the credit and the regulated entity in sectors with a strong leakage risk when offsets are allowed to be sourced internationally. It should be noted though that the competitiveness issue would also prevail without a sector-specific eligibility restrictions on offsets. If demand from different regulated sectors in one country meets supply from different offsetting sectors in the host countries, the effect can be expected to be even stronger, since the acquiring entities would not take potential competitiveness concerns into account when making their investment decision. In the context of domestic offsetting, such concerns can be disregarded. It should be noted though that, as with any restriction that limits offset use, the sectoral link would lead to *higher compliance costs* for regulated entities.

A more fundamental concern with the approach is that it *reduces the economic efficiency of offsetting*. Through international offsetting, the price signal of the compliance scheme is expanded beyond its borders, allowing mitigation to happen at the lowest possible costs. By restricting the eligibility of credits, the offsetting scheme cannot exploit the differences in marginal abatement costs across sectors. This will not only increase the compliance costs for regulated entities but also prevent the offsetting component to exploit its full potential. Furthermore, the restricted usability of credits will limit the size of the market where offsets are traded and increase its complexity. This will further reduce economic efficiency.

Feasibility

In principle, the approach is *compatible with both domestic and international offsetting*. If applied in the context of domestic offsetting, policy makers will have to address double counting risks, as these are particularly relevant if offsets are sourced within the same sector of the same

jurisdictions. Establishing an international offset scheme, in turn, is currently hampered by the uncertain future of international carbon markets: Regulation for Article 6 remains in limbo and the fact that all Parties to the Paris Agreement are to contribute to climate change mitigation could potentially reduce Parties' willingness to sell offsets (Spalding-Fecher et al. 2020).

A second aspect relates to the *rationales* of setting the scope for carbon pricing instruments and defining the eligibility of offsetting activity types. When defining the scope of an ETS or carbon tax, policy makers have in the past often focused on large emitters whose emissions can be easily tracked by MRV (e.g. power supply). Offset activities, by contrast, are particularly valuable for incentivizing mitigation activities that cannot be fostered through carbon pricing, such as afforestation activities or energy efficiency in households. Linking the credit user to the origin of the credit prevents policymakers from applying these different rationales and *complementarities between demand and supply side would get lost*. This is particularly true if the link is applied to international offsets. If applied to domestic offsetting, by contrast, some complementarities could be maintained, for instance by incentivizing small-scale low-carbon technologies in the same sector that are not covered by the carbon price.

6.1.3 Conclusions

This section has explored the functioning and potential effects of a sectoral link between the credit and the credit user. One key observation is that the approach is only applicable to carbon taxation schemes or sector specific pricing policies, as the market interaction in an ETS would nullify the intended effect of the link. For carbon taxation schemes with a strong carbon price, introducing such a link could be a potential way to foster sectoral transformation, both within the jurisdiction (domestic offsetting) as well as beyond (international offsetting). As with any provision restricting the use of offsets, such a link will increase compliance costs for regulated entities. However, concerns about such a link further exacerbating international competitiveness concerns seem unfounded. A more fundamental concern with the approach is that it reduces the economic efficiency of offsetting. To support expensive technologies, a combination with other policy instruments such as funds would be required (see section 6.4 on the role of public funds).

6.2 Using offsets as an alternative to free allocation in emission trading systems

6.2.1 Background

For policymakers considering either implementing or increasing the stringency of a cap-and-trade system, concerns about rendering domestic emissions-intensive and trade-exposed (EITE) sectors economically uncompetitive are often paramount. These concerns are predicated on the belief that the imposition of carbon costs on industrial emitters provides a comparative advantage to firms that do not face the same carbon price, thereby incentivizing domestic production to relocate to jurisdictions without a carbon price (carbon leakage).

To minimize this leakage risk, policy-makers can make use of a number of tools. In reviewing the designs of the 21 emission trading schemes (ETSs) that are operating worldwide, the free allocation of allowances to EITE facilities is the most common measure used by 20 systems to mitigate these fears of diminished competitiveness (ICAP 2020). Systems that allocate allowances for free to firms belonging to EITE sectors include the EU ETS and California's cap and trade program. While increasing the palatability of cap-and-trade in many jurisdictions around the world, the free allocation of allowances is associated with a number of drawbacks, including reduced auction revenue and the hindrance of price discovery in the market

(Narassimhan et al. 2018). Furthermore, the allocation of free allowances is subject to political lobbying in terms the number of firms claiming risk exposure to carbon leakage, and therefore justifying a higher proportion of free allowances. Therefore, the distribution of allowances can be perceived as being unfair.

Consequently, this section examines an alternative cost-containment policy to free allocation: allowing EITE facilities to surrender offsets to meet, either in part or in full, their compliance obligations. After outlining the basic functioning of this alternative policy option this section compares the approach with free allocation along the following dimensions: magnitude of cost-containment for targeted firms, environmental integrity, ambition raising, and contribution to sustainable development. It should be noted that emissions trading systems do not only use free allocation for addressing the carbon leakage risk. This allocation method is also applied to limit the impact of the system's carbon price on individual companies and sectors, allowing them to gradually adapt their operations to the circumstances under ETS. This section will not consider this second purpose of free allocation but instead focus on how sectors susceptible to carbon leakage could be protected.

6.2.2 Exploring the effects of offset use as an alternative to free allocation

Emissions trading schemes usually combine auctioning of allowances with free allocation, with the latter being also used for addressing the risk of carbon leakage. For determining whether a sector or product is susceptible to carbon leakage and if it should be eligible for free allocation, policy makers are generally using (and combining) two main indicators: carbon intensity and trade exposure (PMR and ICAP 2016). Policy makers could build on this approach when determining whether a specific sector should be eligibility for the use of offsets.

After having determined whether a specific sector or product is at risk of carbon leakage, policy makers could define the quantitative limits on offset use. These limits could be defined using specific parameters. Here again, the regulator could use methods applied in the context of free allocation (PMR and ICAP 2016):

- Grandparenting
- Sectoral benchmarking
- Output-based approaches

For a predefined share of their emissions, companies or installations would then be given the possibility to acquire and surrender offsets instead of having to buy allowances in auctions or from other participants. There would be no free allocation of allowances. Since the offsetting approach would establish entity-specific thresholds for the use of offsets, some companies would be allowed to surrender offsets while others would have to cover all their emissions with allowances.

Magnitude of cost containment

Since the intention of introducing this approach is to protect companies from carbon leakage by reducing their compliance costs, one important aspect determining its success is the magnitude of cost containment, which in turn is determined by several factors:

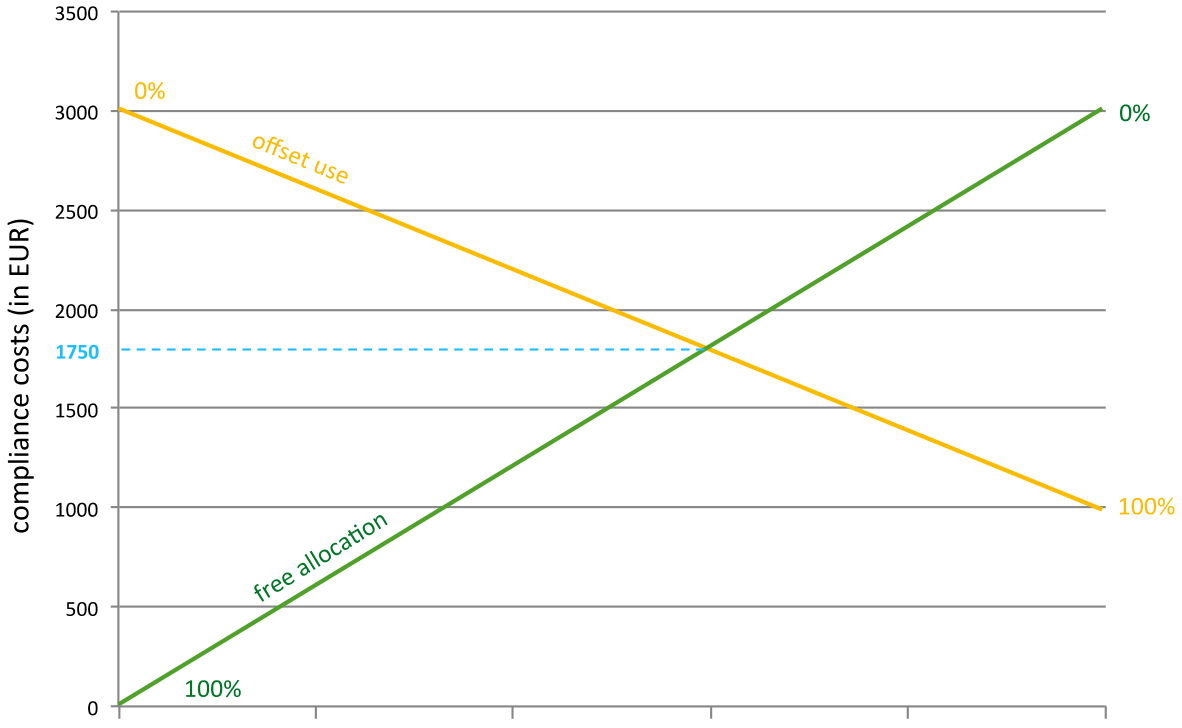
One relevant factor is the *price difference between allowances and offsets*. Allowing EITE firms regulated by an ETS to surrender offsets in lieu of allowances would curb their compliance costs only if eligible offsets are cheaper than the emission allowances they could purchase either at auction or on the secondary market. It should be noted that even with the option to use a

restricted number of offsets, EITE firms may not be willing to realise the cost savings of buying offsets due to transaction costs involved with trading and procuring offsets; and preference to pay the allowance price if it is low (Hintermann et al. 2015; Naegele 2018). Firms tend to engage with offset transactions when the allowance price signal is high enough to induce efforts to undertake cost savings, both within their operations and from other cost containment measures, such as offsets (see section 5.5 in Carvalho, Meneses, et al. 2021).

Another important design aspect are *quantitative restrictions.* For example, a system allowing EITE firms to meet 100% of their compliance obligations with offsets would mitigate costs to a greater extent than a system that allowed EITE businesses to surrender only half of their obligations with offsets, provided that the offsets are cheaper than the allowances.

The comparison between free allowances and this new approach will further be impacted by the *design of the free allocation* approach. Figure 6 illustrates how the design could impact the compliance costs of both approaches. For this illustration we assumed an allowance price of 30 EUR while the price for offset credits lies at 10EUR. The company has emissions of 100tCO_2e. If both approaches are fully applied, free allocation would obviously be more economically attractive from a compliance entity's perspective: Its costs would be zero, while they would be 1000 EUR if rules would allow for 100 per cent offsetting. Hence, even if offsetting would reduce costs, offsets would still have to be paid, while allowances are distributed to firms at no cost. However, both parameters, the share of allowances allocated for free and the quantitative limit on offset use could be adapted in a way that would result in compliance costs for the entity being the same for both approaches, lying at 1750 EUR in our example.

Figure 6: Impact of offset use and free allocation on compliance costs



Source: Own illustration (Wuppertal Institute)

The flip side of the coin of cost containment is how the approaches impact the ETS steering effect. Here, the introduction of free allocation provisions limits companies' incentive to reduce their own emissions, since they would not be confronted with costs as long as the allowances

obtained allow them to cover their emissions. However, even in the case of free allocation, EITE firms are still incentivized to reduce their own emissions so as to profit from selling any excess allowances to other firms on the secondary market. A mechanism that allows EITE firms to surrender offsets in lieu of allowances on the other hand would not provide this option and thereby weaken companies' incentive to reduce their own emissions. However, the magnitude by which it is weakened will again depend on specific factors such as the price difference between offsets, allowances and own emissions, and quantitative restrictions on offset use.

Consequently, none of the two approaches is per se superior in terms of cost-containment but both can be designed in a way that results in the same compliance costs for the compliance entity, similarly weakening the steering effect of the system.

Environmental integrity and ambition raising

When considering the use of offsets as an alternative to free allocation environmental integrity impacts and ambition raising effects should be taken into account. Under certain circumstances offsets could impact the cap of the ETS: Offsets that are surrendered *in addition* to the total allowances distributed under the cap represent an 'increase' to the total cap. To avoid this effect, the inflow of offsets must be taken into consideration at the moment of setting the cap. If the cap level takes these offsets into account and environmental integrity of offsets is ensured through a high unit quality and robust accounting (see section 4.1), offsets could result in an improved climate change mitigation impact when compared to free allocation: While free allocation does not lead to climate change mitigation, the use of offsets would result in emission reductions achieved outside the scheme and the emissions within the system would remain the same as with free allocation. A scheme that uses offsets as an alternative to free allocation could hence be considered to be more ambitious.

This ambition raising effect could also assist policymakers in driving emission reductions within their jurisdiction but outside of the compliance scheme. Offsets could finance emission reductions in non-ETS sectors, thereby contributing to the jurisdiction achieving its overall reduction goal. Offsets do not undermine the environmental integrity of the jurisdiction's environmental goal as long as total emission reductions from ETS and non-ETS sector is in-line with the emission reduction target, and the same reduction is not in both sectors when being reported in national inventory tables. This requires a robust accounting framework to avoid double counting between sectors within the country. If these offsets are transacted between jurisdictions, then corresponding adjustments would need to be made to ensure no double counting - otherwise global emission reductions would be overestimated.

For its part, the free allocation of allowances is not associated with environmental integrity challenges because the free allowances do not represent emission reductions.

Contribution to sustainable development

Permitting offsets to be used for compliance can drive finance to mitigation activities that contribute to a multitude of Sustainable Development Goals (SDGs) (Anderson et al. 2017). Among these are SDGs 5 (gender equality), 7 (affordable and clean energy), and 13 (climate action). In addition, assuming their eligibility to be surrendered for compliance in a developed jurisdiction, international offsets can funnel finance to poor and developing countries (Bernard et al. 2017), as well as marginalized communities in developed jurisdictions. Depending on the list of approved methodologies and rules regarding the allowed locations of projects, offsets can also promote technology transfer between countries and drive foreign direct investment (FDI) in innovative technologies (Nett and Wolters 2017).

By contrast, the free allocation of allowances is not associated with any particular sustainable development contributions beyond those benefits for EITE firms benefitting from reduced compliance costs. Therefore, when seeking to also advance sustainable development, allowing offsets to be surrendered for compliance by EITE firms can be viewed as a more advantageous measure to realize additional sustainable development co-benefits as a result of climate action. This advantage can be particularly important for achieving both goals set under the Paris Agreement, and the SDGs.

6.2.3 Conclusion

This section of the report examines an alternative cost-containment measure: allowing EITE businesses to surrender offsets to satisfy (part of) their compliance obligations. Compared to free allocation, offsets can be viewed more favourably on the ambition raising and contribution to sustainable development dimensions: While free allocation does not lead to climate change mitigation, the use of offsets with environmental integrity would allow to increase ambition by through additional emission reductions and further drive sustainable development outside the scheme.

At the same time, offsets could adversely affect the steering effect of the ETS: While in the case of free allocation EITE firms are still incentivized to reduce their own emissions so as to profit from selling any excess allowances, a mechanism that allows offsets to be used in lieu of allowances would not provide this option. Whether this effect outweighs the ambition raising potential of offsets being used as an alternative to free allocation will depend on multiple parameters, such as the price difference between allowances, offsets and own emission reductions as well as companies' mitigation strategies. This aspect should be explored further when considering the use of offsets as an alternative to free allocation.

6.3 Using offsets for crediting the carbon tax liability

6.3.1 Background

With the recent proliferation of carbon pricing, innovative hybrids have emerged. One such hybrid is the combination of a carbon tax with an offsetting component as introduced by Mexico, Colombia and South Africa. Since many countries are currently considering the introduction of a carbon tax, the implications of crediting the tax liability with an offsetting option has high policy relevance. This section will first outline the functioning of this crediting approach to then discuss potential impacts.

The operationalisation of offset components varies: In Colombia, taxpayers may surrender offsets for up to 100% of their carbon tax obligation and be certified 'carbon neutral' and consequently be exempt from the tax. In South Africa's carbon tax, regulated entities are allowed to use carbon offsets of either five or ten per cent of their total GHG emissions to reduce their tax liability. In both systems, each credit used will reduce the tax liability by one tonne of CO_2e. In Mexico, by contrast, credits surrendered by tax payers will not reduce the overall volume of taxed emissions but instead, the monetary value of credits will be used to reduce the tax payer's liability in monetary terms. This approach does not seem to provide tax payers with an actual alternative that lowers their compliance costs. Given its peculiar design, it is questionable whether the Mexican offset scheme should be considered 'offsetting' but rather an in-kind payment of the tax with the Ministry of Finance taking care of the commercialisation of the units. While this is an interesting approach that might have similar effects as funds for the commercialization of offsets (see section 6.4), it does not contribute to the aim of lowering

compliance costs which is usually one of the main objectives of introducing an offset component (Wang-Helmreich & Kreibich, 2019).

To explore the possible effects of offset components in carbon taxation schemes, we will therefore build on an approach that allows tax payers to reduce their carbon tax liability by surrendering offsets. Offsets could be generated domestically (domestic offsetting) or abroad (international offsetting).

6.3.2 Potential impacts of offset use in carbon tax systems

The effects of offset use in carbon tax systems will depend on the following variables:

- The ambition level of the carbon tax as well as the relationship between the tax rate, percentage of tax liability that can be credited with offsets, regulated entities' abatement costs, and prices of eligible offsets
- The use of carbon tax revenues
- The quality of offset credits that are eligible for compliance
- The political economy in which the carbon tax is being reduced, which can affect policymaker's choice of the above variables

These variables will influence the climate impact as well as the economic and political effects (and ambition raising potential) of the offsetting component.

Climate Impact

As indicated above, the climate impact of an offset component depends on different variables, which the following section will explore in more detail.

One relevant aspect is the *ambition level* of the taxation scheme. We will start by comparing two carbon tax schemes with different ambition levels, while entities' abatement costs and offset prices remain fixed. We will assume that offset prices lie below the carbon tax rate and/or regulated entities' abatement costs, as otherwise, the offset option would not represent a reasonable compliance option for economically rational actors. In what could be described as a high ambition scenario, the carbon tax lies above regulated entities' abatement costs. In such a situation, the offset approach could have a distorting effect on the carbon tax: As the offsetting option allows regulated entities to comply with their tax obligation at a lower cost, it limits firms' incentive to reduce their own emissions, driving the effective tax rate downwards. It should be noted that policymakers could mitigate this effect by only allowing a small percentage of the tax liability to be reduced using offsets (such as in South Africa). In a low ambition scenario the carbon tax rate lies below the abatement costs of regulated entities. In such a scenario the carbon tax as such will not have a direct mitigation impact and regulated entities can be expected to simply pay the tax. If such a system introduces an offsetting option, its use could directly increase mitigation action outside the carbon tax system, as compared to a situation in which the regulated entity simply pays the equivalent amount of the carbon tax. Therefore, the introduction of an offsetting option could lead to a certain mitigation impact which is otherwise lacking in a low ambition scenario.

The positive or negative climate impact of both scenarios further depends on the intended *use of carbon tax revenues*. If the government was planning to use the carbon tax revenue for climate

mitigation purposes, the offsetting option reduces the size of the carbon tax revenue the government would have used for climate change mitigation. It is difficult to quantify the mitigation impact that would have been achieved from this foregone carbon tax revenue. It would be important to be able to measure this impact as a way to assess whether it would be greater or less than the emissions reduced from the surrendered offsets. If the climate mitigation impact of the foregone carbon tax revenues is higher than the surrendered offsets, then it would have been better to not have the offset component in order to achieve greater emission reductions. It should be noted though that the climate impact from the use of carbon tax revenues is negligible if revenues are used for other fiscal purposes, as is currently the case for most carbon tax revenue (Marten and van Dender 2019). When carbon taxes are used for other fiscal purposes, the offset component can have a more positive climate impact by encouraging additional emission reductions.

Another key aspect is *unit quality*. Here, an important difference to an ETS can be observed, where low quality units would always undermine the environmental integrity and result in an overall decrease of climate change mitigation. Under a carbon tax, by contrast, low quality credits used for compliance would not directly undermine environmental integrity as the result of crediting non-additional activities is rather comparable to government revenues (from auctioning of allowances or tax revenues) being invested in activities that would have been implemented even without this public investment. Providing them with financial support from public means would be an inefficient use of public resources. Therefore, quality should be ensured for all offset credits, irrespective of the type of compliance scheme in which they are used.

In sum, the use of offsets could have a positive climate impact under the following conditions:

- Units do have quality.
- The climate impact of offsets is higher than the climate impact of the intended carbon tax revenue use.
- The carbon tax rate is below regulated entities' abatement costs.

Regarding the latter aspect, it should be highlighted that a carbon tax rate that lies below covered entities' abatement costs will not provide the price signal needed for achieving the desired climate change mitigation impact. However, carbon taxes are often introduced at low rates and gradually increased in order to soften the impacts of suddenly putting a price on carbon and allowing entities to adjust to the new costs and adopt abatement technologies and practices (PMR 2017).

In turn, if the opposite in any of these conditions applies, allowing for 100% of offset use would result in a negative climate impact, an effect that could be contained by limiting the amount of offsets eligible to be used by tax payers. As can be seen, the climate impact of an offsetting option is highly dependent on the overall design of the carbon tax and on how carbon tax revenues would be used. A full comparison between the climate impact of offsets the use of tax revenues for climate change mitigation is beyond the scope of this report and will in turn depend on a multitude of factors.

Table 7: Exemplary illustration of the climate impact of a carbon tax component

Scenario	Tax rate	Abate-ment costs	Offset price	Integrity of offsets	Intended revenue use: climate change mitigation	Climate impact
High ambition	50 EUR	25 EUR	10 EUR	Yes	Not relevant	Positive only if the mitigation impact of offsets is higher than the mitigation impact of complianc e entities' abatement activities
Low ambition	20 EUR	25 EUR	10 EUR	Yes	Yes	Positive only if the mitigation impact of offsets is higher than the mitigation impact of revenue use

Source: Own compilation (Wuppertal Institute)

Economic effects

The economic effects of an offsetting option can be assessed by comparing what positive economic impacts could have been achieved from the foregone carbon tax revenue, versus carbon financing of high quality offsets.

The introduction of an offsetting option provides regulated entities with an additional possibility to meet their carbon tax obligations, possibly leading to *reduced compliance costs*. From the regulators' perspective, however, the use of the offsetting option will either lead to a reduction of compliance entities' abatement activities or to a *decrease of carbon tax revenues*. This again depends on the relation between tax rate, abatement costs and costs for offset use.

The *decrease of carbon tax revenues* is particularly relevant since carbon taxes are often introduced with the additional objective to increase public revenues, as was the case in Mexico (Presidencia de la República 2013). If international offsets are used, the foregone revenue is essentially lost from the economy and the government only benefits from using offsets against its NDC, which could entail cost reduction. Where domestic offsets are used, the foregone revenues will have an effect comparable to earmarking, however, with important differences: In contrast to earmarking, where the amount of money diverted to a given objective is equivalent to the revenue foregone from the general budget, the actual amount of money invested in

mitigation activities through offsetting depends on a range of factors, such as the costs of emission reductions in offsetting sectors, the market price for offsets and the abatement strategy of covered entities. The interaction of these factors could lead to undesired effects: If the generation of carbon offsets is very cheap and there is a high demand for offsets, offset prices could move close to the carbon tax rate. In such a situation, offset providers may make substantial profits while the government foregoes a large amount of revenues for little investment (PMR, 2017). In order to avoid such effects, regulators would need to adapt the design of the offset approach to key characteristics of the carbon tax and existing policy priorities, such as restricting eligibility to offsets with higher abatement prices, or have mitigation activities that support positive economic effects (poverty reduction, greater employment, greater education).

Political effects and ambition raising

The expected economic impacts of an offsetting option could significantly *affect the political economy* of the process of introducing the carbon tax: While the potential reduction of carbon tax revenues could raise the opposition from line ministries (in particular the ministry of finance), the (expected) reduction of compliance costs for regulated entities could increase private sector support for the introduction of the compliance scheme – as was the case in Mexico and South Africa (Wang-Helmreich and Kreibich 2019). If a domestic offsetting scheme is envisaged, representatives from sectors where offsets will be generated could become relevant allies in the endeavour of putting a price on carbon.

With regard to the *introduction of mitigation policy instruments* in the future, domestic offsetting could highlight existing climate change mitigation potential and how it can be addressed in an economically efficient way. While this could assist the technical process of designing mitigation policy instruments at a later point in time it could also foster opposition against such a step, as it is associated with a loss of revenues from the sale of credits in offsetting sectors as well as increased compliance costs for regulated entities.

By introducing the offset approach, policy makers would further *forego some budgetary control*, allowing the offset market and its search function to decide which mitigation activities should be implemented (see climate impact above). Some control can be retained by introducing quantitative and qualitative limits and specific provisions that align the functioning of the offsetting scheme with existing policy priorities.

6.3.3 Conclusions

As shown in this brief analysis, the climate impact of an offset component in carbon taxation schemes is highly dependent on the ambition level of the scheme and the intended use of carbon tax revenues. If the carbon tax rate is below the mitigation costs of regulated entities and tax revenues would not be used for climate change mitigation purposes, the use of offsets could lead to an additional short-term mitigation impact. In ambitious taxation schemes where revenues would be used for mitigation purposes, by contrast, the offsetting option could undermine the price signal of the instrument and the climate change mitigation impact would depend on the effects of offset activities. Under certain conditions, an offset component could hence increase the short-term mitigation impacts of a climate policy instrument that has otherwise limited impact.

In addition to these short-term climate impacts there are political effects that could impact ambition and which should be taken into account: While an offsetting component could make it easier to introduce a carbon tax in the first place, it could influence the introduction of a compliance scheme in the offsetting sectors at a later point in time, both positively and

negatively: While the need to discontinue the operation of the offsetting scheme could challenge the introduction of the compliance scheme, domestic offsetting could also highlight existing climate change mitigation potential and show how it could be addressed in an economically efficient way.

Given these considerations, the introduction of an offsetting option should only be considered in cases where such a flexibility tool is needed to appease political opposition against the introduction of a carbon tax and where carbon tax revenues cannot be earmarked towards supporting climate change mitigation. If introduced, the use of offsets should be limited in order to avoid some of the undesired effects described above. For instance, the percentage of the tax liability that can be reduced through offsets could be limited. As carbon taxes are often introduced with a lower tax rate level, the possibility to use offsets could be limited to this initial phase and then phased out. If offsets are generated domestically, this would still allow policy makers to make use of the search function of the market and the offset system could directly channel funding to additional and high quality mitigation activities that could otherwise be difficult to identify. When balancing the arguments for and against the introduction of an offsetting option, regulators should also take into account the costs associated to establishing the institutional, technical and regulatory infrastructure necessary for the operation of the offsetting approach.

6.4 The role of public funds for the commercialization of offsets

6.4.1 Background

An offset approach provides an economic incentive and an infrastructure for the development and implementation of mitigation activities in specific sectors of an economy. The strength of the economic incentive depends on several factors on the demand side, such as the ambition level of the carbon pricing scheme, the mitigation costs of compliance entities and the quantitative limits on offset use. The direction of the price signal, in turn, can be influenced through the design of the offsetting approach on the supply side. By establishing eligibility criteria, specific requirements and implementation rules policymakers can influence the steering effect of the price signal according to their policy priorities. In doing so they limit the pure search function of the market which would, in principle, exclusively focus on the identification of the most cost-effective mitigation activities.

However, there are limits to the use of design options for incentivising the development of specific mitigation activities that policymakers would prioritise, due to constraints in offset supply and demand, and institutional capacity to uphold environmental integrity of market transactions (as further elaborated below). Policymakers willing to support the development of certain mitigation activities that align with national priorities could be interested in channelling public finance into dedicated carbon funds as a way to overcome key challenges so that these activities could eventually be financed via the offset approach. As compliance schemes can have multiple project types that are eligible for compliance, policymakers may want to use public funds as a way to ensure these mitigation activities can compete in attracting financing from the sale of offsets by becoming more cost competitive. We see three basic areas where public funds can play an important role as a tool for supporting specific mitigation activities as proponents of domestic policy priorities:

- First, on the supply side, there could be a lack of investments into developing specific types of activities, such as more transformative mitigation activities. Due to their focus on impacts beyond the activity scope, their alignment with the broader policy framework and the integration of capacity development elements (see section 6.6 on transformative offsetting

activities), these activities presumably face higher implementation barriers and costs. They could also be prone to a higher risk in proving they can deliver the required emission reductions. A lack of supply of credits coming from innovative mitigation activities can also occur due to the lack of ready methodologies, determining the size of project and certification costs, and a lack of on-the-ground capacity to undertake emission reduction activities. Therefore, the failure to scale innovative mitigation activities can occur due to the lack of upfront investments into piloting these mitigation activities that can provide the necessary learning to lower their investment risks. Funds can play an important role as a means for overcoming these barriers on the supply side.

- Second, support could also be needed on the demand side as there might be a lack of buyers willing to purchase those types of offsets that align with specific policy goals and which might be riskier and more expensive. The lack of initial buyers undermines the business model for using carbon finance to generate revenues for these more innovative mitigation activities. Buyers could be even more unwilling to purchase these offsets when the offset market has sufficient supply of low price and less risky credits. Without buyers who are willing to acquire credits from these mitigation activities, it is unlikely that project developers are willing to invest into developing more innovative mitigation activities. Public funds to de-risk and bring down the costs of mitigation activities through being committed buyers of carbon credits for the first set of pilot projects.

- Lastly, commercialisation of credits in specific countries may not occur due to lack of host country capacity to develop the appropriate processes and infrastructure to register and transact carbon credits. Lack of carbon market readiness in a country can prevent investments into developing the supply of credits in the country, and can prevent potential purchases from these countries. This dilemma is acutely seen in piloting of Article 6 activities, particularly with countries not having institutions and infrastructures set up to undertake international carbon transactions to uphold environmental integrity principles (Greiner et al. 2019).

Different types of carbon funds can play an important role in overcoming these challenges. Carbon funds are investment vehicles to support carbon mitigation activities through different financing models: equity investments, loans, upfront payments and purchasing contracts. Returns to such investments could be in the form of carbon credits or capital gains. Carbon funds could act as a platform not only for financing new mitigation activities, but also to assist in financial resource management, facilitate the engagement of carbon trading activities, collect and disseminate information, as well as promoting capacity building and knowledge sharing in governments and sectors through international cooperation. Governments or international institutions can use public investments to set up carbon funds. These funds can also be co-financed by private sector investments, as a way to de-risk private sector capital.

The World Bank has been a pioneer in carbon finance ever since the creation of the Prototype Carbon Fund in 1999. Many public and private carbon funds have been set up since. Carbon funds can play an important role in supporting the commercialisation of offset projects in three different ways, as elaborated below.

6.4.2 A typology of carbon funds and their impacts

Carbon funds that finance activity development to enable supply

Carbon funds can anticipate potential demand for offsets from either compliance and voluntary markets, but realise there is insufficient capital to finance the upfront costs in supplying offsets

to these markets – particularly for mitigation activities it would like to encourage. Carbon funds can provide this upfront financing to cover carbon project development costs and build a project pipeline to enable the supply of offsets to the market. (World Bank, 2012). In exchange for financing the upfront risk of carbon projects, carbon fund managers agree an emission reduction purchase agreement (ERPA) with the project owner to purchase the anticipated volume of offsets issued from the project at an agreed price. The benefit to the project owner in undertaking this primary contract - rather than selling the certified offsets directly to the secondary market - is that it provides a secure source of revenue for undertaking the mitigation activity. Carbon funds can further support commercialisation of offsets in the following ways:

- piloting new types of mitigation technologies, processes and activities
- promoting development of new methodologies that passes the quality criteria of crediting standards
- build private sector capacity in undertaking mitigation activities in the host country that is monitored, reported and verified through the offset certification process

The success from piloting new activities can help these carbon funds in scaling investments by replicating successful projects. Carbon funds can determine the purchase price for the credits from their project pipeline. This could be done by setting up a fixed price for future emission reductions, establishing an auction or purchasing credits at the price of the market.

Offsets supplied through public carbon funds play a critical role in enabling the development of riskier carbon projects. These public funds however, should not compete with the private sector in developing the same low risk projects. Instead, public funds could help commercialise offset projects that the private sector does not have the risk appetite to develop, as a way to undertake learning that can discover whether these projects could eventually become commercially viable using carbon revenues.

Carbon funds that create offset demand through purchase agreements

Carbon funds can also provide finance to purchase credits to represent the successful achievement of emission reductions - thereby representing results-based payments. These types of carbon funds are especially useful in supporting the development of offset markets through creating:

- early stage demand for offsets to support market development, that can eventually create interest from private sector actors in the buying and trading of offsets (such as the Austrian JI/CDM Programme or the Nordic Environment Finance Corporation (NEFCO) Carbon Fund to enable demand for CDM/JI registered projects)
- create carbon market demand for offsets that are considered riskier and/or niche (e.g. the development of carbon funds to support carbon capture and utilization - CCU)
- create carbon market demand for offsets in specific countries to finance emission reductions there, and support increase in climate ambition
- boost offset market prices when market prices suddenly reduce in order to ensure ongoing financial payments for critical mitigation projects (e.g. Pilot Auction Facility (PAF) from the World Bank supports projects to reduce methane and nitrous oxide emissions that have been impacted by low market prices)

As it is in these funds' interests to minimise the risk of the delivery of carbon offsets, these funds can also invest into supporting additional due diligence through monitoring, reporting and verification activities, as well as the auditing of the projects. This due diligence includes ensuring carbon projects pass the additionality test.

Market readiness funds

Carbon funds engaging in market readiness activities are mainly financed through multilateral development funds. These funds not only facilitate commercialisation of offsets, but also support countries in the identification of knowledge and capacity gaps for either the design and implementation of market mechanisms. Carbon funds readiness efforts are built upon the work of other initiatives such as the Partnership for Market Readiness (PMR) and its successor the Partnership for Market Implementation (PMI), to support countries to meet their NDC targets, long-term decarbonization strategies and enabling participations of countries in Article 6 market mechanisms. The Transformative Carbon Asset Facility (TCAF) and the Forest Carbon Partnership Facility (FCPF) have also a readiness component to support countries.

With the entry into force of the Paris Agreement, the review of NDCs and the increasing trend for carbon pricing instruments, governments have to satisfy specific capacity building needs to leverage international market transactions under Article 6 (such as updating their NDCs to signal which mitigation activities it would be willing to undertake international transactions); or even the establishment of market-based domestic policies. A crucial element to meet is the design and implementation of robust MRV systems to ensure the environmental integrity of these emission reductions. A domestic MRV system is instrumental in setting the baseline for determining additionality of emission reductions, to develop a national registry to enable domestic and international transactions, as well as to define the institutional framework to authorise project development and the corresponding transactions.

6.4.3 Conclusions

Carbon funds can play an important role in supporting the emergence and operation of an artificial market that is policy-based and where intangible goods are exchanged. Carbon funds using public money can overcome key challenges with regards to ensuring offset mechanisms uphold environmental integrity while adding value. This added value is particularly directed at mitigation activities that align to national priorities, but would otherwise not be able to attract offset financing if other mitigation activities are less risky and less expensive in comparison. Carbon funds can provide upfront capital financing needed to supply the offsets to the market, particularly in piloting more transformative emissions reduction activities. Funds can also act as market enablers by purchasing offsets from innovative projects. Policymakers could therefore be interested in using public investments into carbon funds as a way to de-risk more innovative mitigation activities in priority sectors through piloting projects. The resulting lessons can contribute to assessing its potential to be scaled by private sector investments in the future. Lastly, market readiness funds do play an important role in capacity building in setting up institutions, capabilities and systems (e.g. MRV systems) that are necessary for enabling project development in host countries. Additionally, as commercialisation of innovative mitigation activities requires obtaining the expected delivery of offsets, it is in the carbon funds best interest to undertake due diligence by supporting offset governance in the host country to ensure these projects can be implemented.

Carbon finance can play a crucial role in facilitating the implementation of projects and to secure a sustained source of income for project owners or countries, however, carbon funds should ensure the supply of offsets satisfy additionality requirements and meets an existing demand of

high-quality credits. Most importantly, as mentioned previously, this market-responsiveness should lead to an increased climate ambition from both host and donor countries, where mitigation goals undertaken by host and donor countries should increase in proportion to the carbon financing provided.

6.5 The role of negative emissions for supplying offsets used in carbon pricing schemes

6.5.1 Background

One of the decisions policy makers must take when introducing an offsetting component relates to the eligibility of offsets and whether activities that sequester greenhouse gas from the atmosphere and generate 'negative emissions' should be included. Approaches to generate negative emissions include nature-based solutions, such as afforestation and reforestation practices as well as new negative emissions technologies (NETs), such as Direct Air Capture (DAC) or Bioenergy with Carbon Capture and Storage (BECCS).

Discussions about using negative emissions in the context of offsetting have gained traction with the ambitious mitigation targets introduced with the Paris Agreement, which sets the goal of reaching global peaking of emissions as soon as possible and to achieve a balance between emissions by sources and removals by sinks in the second half of the century. These ambitious targets might limit the potential for offsetting emissions through emission reductions abroad. In this context, removals have been put forward as an alternative that is compatible with the idea of getting towards net-zero.

Using carbon sequestration for offsetting builds on the idea that the net GHG balance remains the same, irrespective of whether emissions are reduced or the equivalent amount of carbon is sequestered from the atmosphere. We will in the following examine the validity of this assumption by exploring the following question: Does it make a difference whether emissions are being offset through emission reductions or through the sequestration of GHGs? While exploring this question, we will not look into aspects that are only relevant for specific negative emissions activities, such as issues of quantification (additionality, baseline definition and leakage, etc.). Instead, we will more generally explore the impact of using negative emissions for offsetting.

6.5.2 Possible effects of using negative emissions for offsetting

Until very recently, the discussion about using negative emissions for offsetting centred around the question of forestry crediting. Largely delinked from this debate, there is an ongoing discussion about the use of NETs. In both debates, arguments have been raised that are relevant for the question explored here.

Climate impact

Non-permanence can be considered the Achilles' heel of negative emissions. It describes a situation in which the greenhouse gases removed by a mitigation activity are reemitted into the atmosphere due to human-induced or natural disturbances at a later point in time, reversing the envisaged mitigation impact. The risk of reversals makes negative emissions fundamentally different from emission reductions and there is broad agreement that this risk must be addressed in order to make credits from negative emissions activities fully fungible with credits from other activity types. While the need to address non-permanence risks increases the costs of negative emissions there are several approaches that can be built upon. In the forestry sector, in particular private certification standards have developed numerous approaches for addressing

the risk of non-permanence of removals, including specific risk assessments, expanded monitoring periods, compensation for non-permanence and establishment of different liabilities (Chagas et al. 2019; Schneider et al. 2018). Similar approaches could be developed for future negative emissions technologies that include geological storage of carbon.

Another argument raised against the inclusion of negative emissions into offsetting schemes is that *reliance on negative emissions could lead to carbon lock-in effects and delay transformative change* processes in those sectors where offsets are being used. According to this view, negative emissions should be seen as a tool that complements emission reductions instead of substituting them (McLaren et al. 2019). From a historical point of view, there is no clear evidence substantiating this argument. Negative emissions are more expensive than buying other types of offsets, or paying the carbon price, which tends to be low. Contrary to the estimates produced for the Stern report (Stern 2007; for an update of the original estimates see: Grieg-Gran 2008), experience on the ground has shown that REDD+ activities might be more expensive than many had originally thought (Rakatama et al. 2017). Similarly, costs for NETs are estimated to be more than an order of magnitude more expensive than current mitigation technologies (Honegger and Reiner 2018). This is also reflected by the small share of afforestation and reforestation projects in compliance markets and the fact that there are no offset projects based on negative emissions technologies such as DAC.

However, it seems questionable whether taking a historic perspective is instructive here. First, the small share of offsets from forestry activities in the compliance markets is not only related to prices. The EU ETS, which has for a long time been the largest source of demand for credits from the world largest compliance crediting scheme, did not allow for the use of afforestation and reforestation credits from the CDM. Reasons for the exclusion of forestry credits from the EU ETS include the difficulty for a regulator to manage the temporary CDM credits as well as the monitoring system being regarded as less robust (Deheza and Bellassen 2015). This suggests that if forestry credits were eligible under the EU ETS, the share of forestry offset credits could have been substantially higher. Second, evidence from the voluntary carbon market shows that forestry projects can actually compete with other activity types: in 2018, forestry and land use was the most important project category with a share of around 55 per cent and an average price of 3.1 USD lying slightly above the average price across all project categories of 2.8 USD (Forest Trends' Ecosystem Marketplace 2019). Third, negative emission technologies are still at an early stage of development and they might experience unexpected cost decreases in the future. If at the same time compliance schemes are aligned with the Paris Agreement, the gap between the carbon price and the costs of negative emissions might be reduced significantly. This could make offsets from negative emissions a relevant compliance tool in the future. These observations show that despite there being no evidence from a historical perspective, there could be a massive influx of negative emissions credits in the future. This makes it even more important to limit the use of offsets to hard-to-abate emissions in order to avoid any delay of transformative change in the demand sectors. It should be noted, however, that this effect could also be relevant for other types of offsets, irrespective of where and how they have been generated.

Another point that must be taken into consideration in particular in the context of offsetting fossil fuel emissions relates to the *temporal differences of carbon cycles*: While fossil carbon sinks are part of the long-term carbon cycle and essentially permanent, so-called biotic carbon is part of the active short-term carbon cycle. Burning fossil fuels moves carbon from this long-term carbon cycle into the short-term carbon cycle and cannot be removed, at least not with natural carbon sinks. This effectively is the reason, why the primate lies on emission reductions and offsetting should only be used as a temporal solution and restricted to unavoidable emissions.

However, both technical as well as nature-based solutions have to deal with the *biophysical limits of negative emissions*. According to this view, today's use of negative emissions will consume part of the resources (land, energy, storage capacity) needed to deliver future negative emissions (McLaren et al. 2019; Smith et al. 2016). In the context of offsetting, this means that the use of offsets from negative emissions will reduce the mitigation potential which will no longer be available in the future. In dealing with this argument, it is important to underscore that it is not about generally postponing research on and use of negative emissions. It rather suggests that negative emission activities should not replace emission reduction activities but complement these.

Economic considerations

Integrating negative emissions into offsetting schemes is by many seen as a *means to channel financial resources* into the development and implementation of respective mitigation activities. This argument was made in the early debate about REDD+ financing (see: Arens et al. 2010) and it is underpinning current calls to link Article 6 and REDD+ (Graham 2017). Carbon markets are also being considered a means for a cost-effective global deployment of negative emissions technologies such as DAC and BECCS: Honneger and Reiner (2018), for instance, find that Article 6.4 could become the "cornerstone" of such an international policy if combined with a transparent sustainable development assessment.

It seems questionable, however, whether the finance provided by carbon markets can meet the financial needs for developing and implementing negative emissions. In terms of scale, the cash flow from compliance markets will presumably not match the amount of investment needed. Another aspect is the reliability of the finance provided. Volumes and prices of carbon markets were highly volatile in the past, raising concerns about future demand from carbon markets being sufficiently stable to provide the type of support needed. Such a non-steady financial situation is particularly problematic for negative emissions, where permanence must be ensured for a long period of time. Some of these concerns could be addressed by combining carbon market revenue streams with other financial support means (blended finance) or by developing fund-based marketing solutions (see section 6.4) that limit the impacts of carbon market dynamics.

Social and Environmental Impacts

The *social and environmental impacts* of negative emissions are highly dependent on the specific activity types. In terms of adverse impacts, both, nature-based solutions and NETs are associated with (different types of) environmental and social risks which must be taken into account. Nature-based solutions might for instance lead to biodiversity loss if monoculture afforestation activities are being implemented or negatively impact food security through switching fertilizers in crop production (Gehrig-Fasel et al. 2021). Concerns about adverse impacts from NETs have particularly been raised with regard to BECCs, where the land requirements could lead to a loss of primary forests and result in a loss of terrestrial species (Williamson 2016). In terms of positive social and environmental effects, negative emissions from nature-based solutions are associated with considerable benefits, such as enhancing food security, halting biodiversity loss and strengthening climate change adaptation capacities. NETs, by contrast, do not seem to offer any such contributions (Honegger and Reiner 2018).

6.5.3 Conclusions

The integration of offsets from negative emissions into compliance schemes is associated with considerable ecological and implementation concerns. Risks, such as non-permanence and adverse environmental and social impacts must be carefully observed and addressed when

exploring the inclusion of negative emissions. Furthermore, the interaction of different carbon cycles speaks against the use of natural carbon sinks for offsetting fossil fuel emissions. While technical solutions might perform better in this regard they are currently still confronted with extremely high costs. The level and reliability of funding that offsets can provide do not seem to align with the requirements of these technologies. It should be noted, though, that the situation might change in the future: If compliance schemes have raised their ambition level and technically avoidable emissions were fully mitigated, there might be room to include negative emissions for offsetting any unavoidable residual emissions. Hence, the inclusion of offsets into a carbon pricing scheme should be made on the condition that there is no technical mitigation potential left and biophysical limits are taken into account. At the same time, the decision on whether and how to support negative emissions should be taken separately from considerations on offset use.

6.6 Designing an offset approach that supports transformative mitigation activities

Transformative change is a reoccurring topic in today's climate debate. This raises a range of questions related to the potential role of offsets used for compliance purposes could play in supporting this change process: Is the concept of transformative change compatible with the basic characteristics and functioning of offset approaches in compliance schemes? And if it is compatible in principle, which phase of the transformative process could be considered an entry point for the supportive role offsets could play? These questions will be explored in the following. Finally, we will ask: how should an offset approach be designed in order to identify mitigation activities that support transformative change?

6.6.1 Background

Definition of transformative change

While extensive research on transformative change has been conducted, there is no commonly agreed definition of what it constitutes and how it can be identified and assessed. Building on previous research (Jacob et al. 2015; Kehrer et al. 2020; Mersmann et al. 2014; WBGU 2011), transformative change can in general terms be defined as a long-term and co-evolutionary change process that converts the institutional, cultural, technological, economic and ecologic dimensions of system and establishes a new balance within this system. Transformative change is co-evolutionary within and between these sub-systems. By questioning the existing system, paradigm, socio-technical regime and mindsets, transformative change can be differentiated from incremental change and reforms. It should be noted, though, that incremental change and reforms might contribute to reaching tipping points for transformative change. Furthermore, whether a change can be considered transformative also depends on the system level that is looked at. For instance, a shift to 100% renewable electricity might be considered 'transformative' for the power sector, while the same change might be called 'incremental' for the transformation of the energy sector (Kehrer et al. 2020). Some scholars also differentiate transformative change from transition, as the latter term rather implies an incremental change and does not call into question the structures of development and overall regimes (Kehrer et al. 2020).

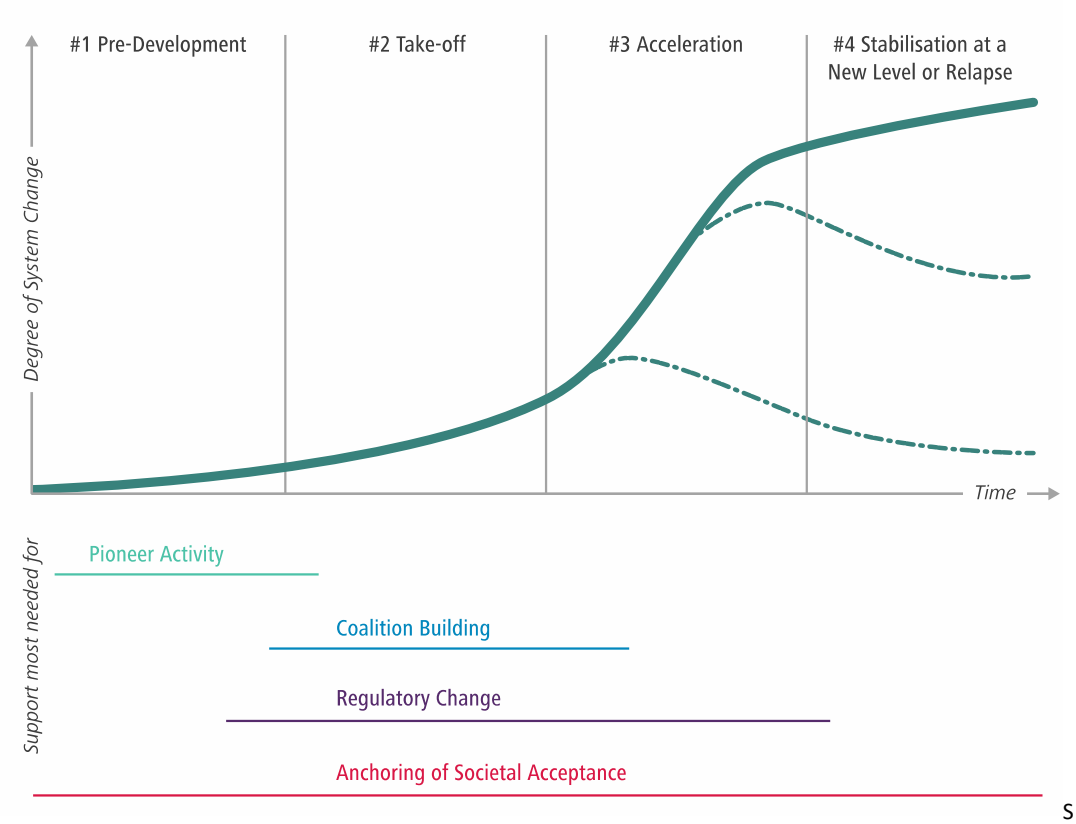
This broad and non-normative definition can be translated into the realm of climate change with transformative change being understood as:

A fundamental, sustained change of a system that ends established high-carbon practices and contributes to a zero-carbon society, in line with the Paris Agreement goal to limit global warming to 1.5–2°C and the United Nations Sustainable Development Goals (Holm-Olsen et al. 2021).

Transformative change as a dynamic process

The dynamic process of transformative change is usually described as an S-curve. This presentation from transition theory and innovation research depicts four phases of a non-linear process: A pre-development phase in which innovations are developed in a niche while the overall structure of the system remains unchanged. A take-off phase, during which the regime experiences first changes, which then accumulate and become visible during the acceleration phase. The process culminates with the stabilization phase, where a new regime is established (Wesely et al. 2013). As highlighted by Mersmann et al. (2014), each phase of the process requires a different type of support (see Figure 7).

Figure 7: Stages of the transformation process

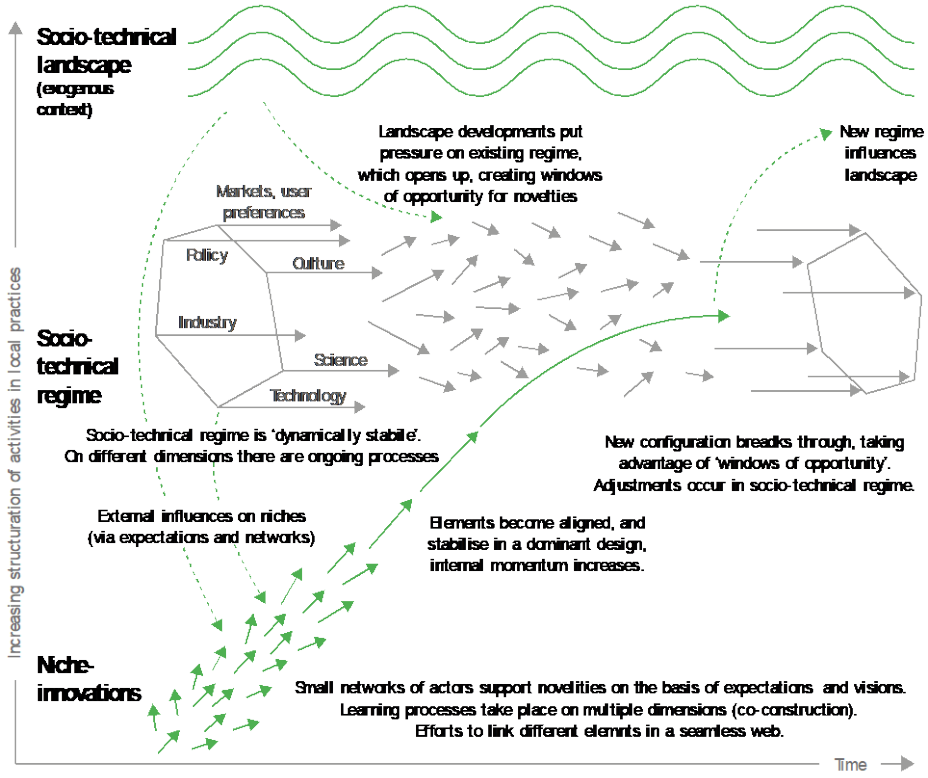


Source: Mersmann et al. (2014)

The success of this process depends on the interplay of multiple factors, which transition research has conceptualised in its multi-level perspective (MLP). The MLP establishes three levels – landscape, regime and niches – that interact with each other (see Figure 8): The landscape represents the exogenous context that cannot directly be influenced by individual groups of actors but shapes the structure of socio-technical regimes. The regime level is the set of rules embedded in institutions and infrastructure. The lowest degree of structuration is the

level of niches where innovation takes place that deviate from the dominant regime logic (Hermwille et al. 2015).

Figure 8: Multilevel perspective on transformation



Source: Kehrer et al. (2020), original from Geels and Schot (2010)

These conceptual considerations allow to draw some first observations about transformative change and how it might be relevant for the design of offset approaches:

- Transformative change is characterized by co-evolution and can therefore not be strictly planned and governed.
- Transformative change processes are characterized by a co-existence of concurring old and new institutions, technologies and cultural patterns.
- Whether a certain idea developed in the niche can be successfully integrated into the regime and influence the landscape depends on multiple factors and actors.
- Despite these restrictions, it is possible to support the transformative change process by taking into account the specific types of support needed in the different development phases.

6.6.2 The role of offsets in the transformative change process

The basic considerations above suggest that the concept as such is compatible with the general functioning of offset approaches. There are, however, certain limitations. First, offset approaches must result in an immediate mitigation impact. Therefore, contributing to transformative change can only be considered an additional objective. Second, the market-based character of offset approaches limits the spectrum of possibilities to support transformative change. An offset approach cannot be designed in a way that puts into question the market-based rationale on

which it is based. Hence, it could be considered that the potential of offset approaches is limited to supporting transitions rather than transformations (see above).

Another open question relates to the potential role offsets could play in the transformative change process. Which stages of the process can best be supported by offsets?

Given the market-based nature of offsets, offset approaches seem less suitable to provide finance for the development of entirely new technologies (Stage 1), as this will presumably too costly and not directly lead to a measurable mitigation impact. Here, direct public support for research and development of technological and social innovation seems to be a more promising approach. At the same time, offsets cannot support with the scaling of technologies that are already mature and diffused, as this would raise concerns about additionality (stage 3 and 4). Therefore, offset approaches seem particularly well-suited to support stage 2 of the transformative change process (see Figure 7): Offsets by their nature are meant to be at the niche stage as they are not transformative in and of itself, but instead could play a role in bringing niche technologies to the market. These activities are close to commercialisation but not close enough to be commercially viable and able to compete with incumbent technologies.

6.6.3 Designing an offset approach that supports transformative activities

The previous section identified the stage of the transformative process in which offsets could play a role. This raises the question about the type of mitigation activity to be supported and how it could be identified through the design of the offset approach. The following section explores different design options to support transformative change through offsets. For this purpose, we will briefly look at how transformative change has been integrated into the practice of different financial support instruments in the carbon and climate finance realm. As can be seen from the brief analysis of the Green Climate Fund (GCF), the NAMA Facility and the Transformative Carbon Asset Facility (TCAF), different priorities are being set when integrating the concept of transformative change into the operation of these funds (see Box below and Table 8).

The operationalisation of transformative change in carbon and climate finance

The **Green Climate Fund (GCF)** is one of the financial mechanisms of the UNFCCC and supports developing countries in their mitigation and adaptation activities. It was established in 2013 and given the mandate to promote a "paradigm shift". The potential of GCF projects to contribute to such a paradigm shift is assessed using the criteria included in Table 8 below. The funding proposal template further requires activity proponents to indicate the mitigation impact potential, sustainable development potential, how the project addresses the needs of the recipient, how country ownership is ensured as well as the project proposal's efficiency and effectiveness (GCF, 2019).

The **NAMA Facility** is a multi-donor fund aimed at accelerating carbon neutral development by providing financial support to developing countries and emerging economies through transformative projects that have sector-wide impacts (NAMA Facility 2020). Potential for transformative change is one of three criteria used to assess the ambition of proposed projects, which has been broken down into a list of criteria included in Table 8 below.

The **Transformative Carbon Asset Facility (TCAF)** is a World Bank initiative aimed at supporting developing countries in the establishment of national carbon pricing policies and sectoral mitigation measures by providing results-based finance for proven emission reductions. The experiences made at national level with these support activities are to feed into the international

process of shaping the global carbon market post-2020 (TCAF Website, 2020). TCAF defines four criteria for assessing the transformative quality of its programmes, see Table 8.

Table 8: Transformative change criteria used by GCF, NAMA Facility and TCAF

GCF	NAMA Facility	TCAF
Potential for up-scaling and replication	Government commitment / endorsement	Size: TCAF programmes are expected to achieve a large (immediate) mitigation impact.
Potential for knowledge sharing and learning	Embeddedness in national strategies including co-benefits as drivers for implementation and the linkage to the Nationally Determined Contributions (NDCs)	Sustainability: Emission reductions have to be sustainable over time and along the three dimensions of technology, policy and financing.
Contribution to an enabling environment	Catalytic effect and scope (significant change)	Technology sustainability: The activity promotes the right technology at the right point in time in line with the decarbonisation process of the sector.
Contribution to the regulatory framework and policies	Replicability / Scalability at national and/or regional level	Policy sustainability: The activity is directly or indirectly linked to domestic policies.
Overall contribution to climate-resilient development pathways consistent with relevant national climate change adaptation strategies and plans	Sustainability (irreversible change)	Financial sustainability: The activity can be implemented further without public funding.
		Leverage: TCAF activities are to enable host countries to increase domestic mitigation ambition over time.
		Carbon pricing: TCAF activities are expected to support the development and implementation of carbon pricing policies

Source: compilation by the authors based on GCF (2019), NAMA Facility (2020) and TCAF (2018).

While the NAMA Facility and the GCF highlight the potential for up-scaling and replication, the TCAF defines a large (immediate) mitigation impact and the support of carbon pricing policies as key selection criteria. The Green Climate Fund further requires activities to also be aligned with

the national adaptation strategies. Despite these differences, the three instruments display important commonalities that can be considered to be at the core of transformative change:

- Impact beyond the scope of the activity. While immediate mitigation impacts are still a necessary condition of the instruments analysed, all three of them put an emphasis on impacts beyond the scope of the activity itself. Supported activities are to achieve a catalytic effect and trigger developments that accelerate development towards a carbon-neutral pathway (NAMA Facility), contribute to an enabling environmental and an improvement of the regulatory framework in the host country (GCF), and assist host countries in increasing their mitigation ambition over time (TCAF). TCAF activities are further to be implemented without public funding. Interestingly, a focus is put on policy innovation and not exclusively on technological innovation.
- Policy integration: Another relevant commonality among the three instruments is that they require activities to be integrated into the existing domestic climate policy framework. The GCF for instance requires projects to be aligned with existing policies, including NDCs, and the national climate strategy. Activities supported by the NAMA Facility must also be embedded in national strategies and linked to the NDCs while TCAF activities must be directly or indirectly linked to domestic policies.
- Capacity development and government commitment: A third common element of all three instruments is their focus on strengthening domestic capacities and commitment by national governments. While the GCF underlines the potential for knowledge sharing and learning and the NAMA Facility requires activities to be endorsed by national governments, TCAF limits the capacity development contributions to the development and implementation of carbon pricing policies.

These three areas are being used by climate and carbon finance instruments to support transformative activities. In the following, we will explore possibilities to integrate these effects into the design of an offset approach.

6.6.3.1 Achieving impacts beyond the activity scope

The scope of a mitigation activity is defined in temporal (time), geographic (space) and sectoral (type of economic activity affected) terms. In principle, the impact of transformative activities can supersede all three dimensions, an effect that can be supported through the design of the offsetting approach.

Temporal scope

Policy makers willing to achieve a positive impact beyond the lifetime of the mitigation activity have different design options at their disposal. One possibility consists in limiting the crediting period of the mitigation activity. If the mitigation activity continues its operation without receiving credits in return, the mitigation impact will accrue to the host country. Obviously, limited crediting periods will reduce the returns for activity proponents and hence limit the incentive to develop and implement the activity. In order to uphold the incentive to reduce emissions, the crediting baseline could be adapted accordingly, for instance by allowing the generation of larger amount of credits during the limited years of operation. As this might jeopardize the ambition and additionality of the scheme, another possibility could be to allow for the shortened crediting periods to be prolonged on the basis of additionality assessments.

To ensure the continuation of the mitigation activity after the end of the crediting period the provisions for monitoring, reporting and verification (MRV) would have to be adapted. In order to provide activity proponents with a continued incentive to MRV the activity after the end of the

crediting period, the issuance process could be adapted so that a share of the credits is issued in a separate account and only transferred to the activity proponents once the expanded monitoring period has been successfully completed.[4]

If the crediting activity is sector- or policy-based, it will often build on an active involvement of the host government (Fuessler, Wunderlich, Kreibich, et al. 2019; Kreibich and Obergassel 2019b). The implementation of such a broader activity could be made conditional on political commitments from the host government regarding the continuation of the activity after the end of the crediting period. Such an approach is already being implemented by the Nitric Acid Climate Action Group (NACAG) in the provision of climate finance support: NACAG provides financial support to individual plant operators on the condition that the country in which the plant is located is committing to continue the emission abatement after 2023 (NACAG 2020).

Geographic and sectoral scope

In order to ensure that crediting activities have a positive impact beyond their geographic or sectoral scope, offset approaches could include these intended effects into the provisions for the design of mitigation activity. During the design of their mitigation activity, proponents could for instance be required to show that the problem their activity is addressing is also virulent for other countries or sectors and that the activity will support the replication by fostering intended spill-over effects.

Respective requirements could also be included into the implementation and MRV provisions of the activity. Proponents could for instance be required to implement knowledge-sharing activities (workshops) into their mitigation activities in order to foster the emulation of activities in other regions.

6.6.3.2 Promoting policy integration

Another characteristic of transformative mitigation activities is their integration into the domestic climate policy context. While domestic climate policy will by nature differ widely among countries, some common elements can be derived from the Paris Agreement and its Article 4. This article requires Parties to develop and communicate NDCs and to implement respective domestic mitigation policies and measures (P&M) intended to achieve these NDCs, while further calling all Parties to communicate long-term low greenhouse gas emissions development strategies (LT-LEDS). The following section explores how these three elements named in Article 4 PA could inform the offset design approach in order to align its use with the domestic climate policy of the host country.

Table 9: Key elements to be used for promoting policy integration

	Time horizon	Element	Paris Agreement provision
A	Present	Existing and planned policies and measures (P&M)	"Parties **shall** pursue domestic mitigation measures, with the aim of achieving

[4] A similar approach was agreed on under the CDM for dealing with the risk of reversal of carbon capture and storage activities (see: Chagas et al. 2019).

	Time horizon	Element	Paris Agreement provision
			the objectives of [their NDCs].” (Art. 4.2 PA, emphasis added)
B	Mid-term perspective	Nationally determined contributions (NDC)	“Each Party **shall** prepare, communicate and maintain successive nationally determined contributions that it intends to achieve.” (Article 4.2 PA, emphasis added)
C	Long-term perspective	long-term low greenhouse gas emission development strategies (LT-LEDS)	“All Parties **should** strive to formulate and communicate long-term low greenhouse gas emission development strategies” (Art. 4.19, emphasis added)

Source: Own compilation (Wuppertal Institute)

Eligibility criteria

The integration of offset approaches into the domestic climate policy predisposes transparency on the latter. In a first step, the offset approach could therefore require potential host countries to have adopted NDCs and LT-LEDS. Both elements could then be used as a starting point for the application of further requirements. Linking the participation in offset approaches to LT-LEDS is currently being discussed in the context of Article 6 under the UNFCCC. Establishing such a link has been proposed by several Parties at COP23 (Warnecke et al. 2018) and was also taken up by Parties in later sessions, as one of the latest drafts from the Article 6.4 negotiations in Madrid shows: It requires host countries to specify how baseline approaches and other methodological requirements it intends to apply are aligned with the its NDC and LT-LEDS (UNFCCC 2019b Annex, para 27).

In their paper on the ambition raising impact of Article 6 PA, Warnecke et al. (2018) suggest to go one step further by restricting the eligibility to Article 6 to Parties that have explicitly identified the role of ITMOs in the implementation of their LT-LEDS. This approach is explored further by Fuessler et al. (2019) and Denishchenkova et al. (2019) in their analysis of Article 6.4 design options. Fuessler et al. (2019) find that potential host countries could be required to answer a list of questions to show how the engagement under the Article 6.4 mechanism assists the achievement of their LT-LEDS (see also: CCAP 2017). However, agreeing on a format and criteria for robustly evaluating the answers provided will presumably be challenging under Article 6.4, since there is not even a pre-defined format for LT-LEDS (Denishchenkova et al. 2019).

While these limitations might be valid for crediting under Article 6.4 where a broad agreement among Parties under the UNFCCC is needed, designing a bilateral offset approach provides policymakers with more leeway. Here, the acquiring country could unilaterally require host countries to have adopted a LT-LEDS and develop a generic list of questions to show how the crediting activity will support its implementation. Access to the crediting programme would then be subject to the outcome of an assessment against uniform assessment criteria.

Additionality

In order to integrate the crediting activity into the climate policy landscape, the provisions of the offset approach should require activity proponents to take existing and planned policies into account during additionality demonstration (see also section 5.2.2). Hence, additionality of proposed activities should be based on the country's P&M and its NDC. However, in order to prevent the environmental integrity from being undermined, regulatory additionality will not sufficient but would have to be considered in the broader context of the NDC's ambition level, mitigation costs, technological progress, etc.

Crediting baselines

Crediting baselines provide the basis for calculating the emission reductions that can be credited as a result of the mitigation activity. Due to their potentially dynamic nature, crediting baselines seem to be the most promising design option for integrating crediting activities into the broader policy landscape. In theory, all three elements – P&M, NDC and LT-LEDS – could be used as a basis for baseline setting.

The first option is to derive crediting baselines from existing and planned P&M of the host country. However, given the dynamic nature and ambition of the Paris Agreement, exclusively relying on existing and planned P&M of the host country will be clearly insufficient for setting robust crediting baselines.

Therefore, more forward-looking elements should be taken into account. The most obvious option for integrating the crediting activity into the future domestic climate policy is to use a crediting baseline derived from the host country's NDC. The advantage of this approach is that it will not per se exclude any potential host countries as all Parties to the Paris Agreement must develop and submit such an NDC, which is the host countries' official statement of what will happen without (and if conditional elements are included, with) external support. Disadvantages of developing crediting baselines on the basis of NDCs are that these could be unambitious, not provide information on sectoral emission pathways, and lack clarity regarding unconditional and conditional elements (Broekhoff et al. 2017). Furthermore, deriving baselines from NDC goals might further be challenged by the fact that many countries mention specific NDC actions that are illustrative and not directly linked to mitigation pledges (Spalding-Fecher et al. 2020).

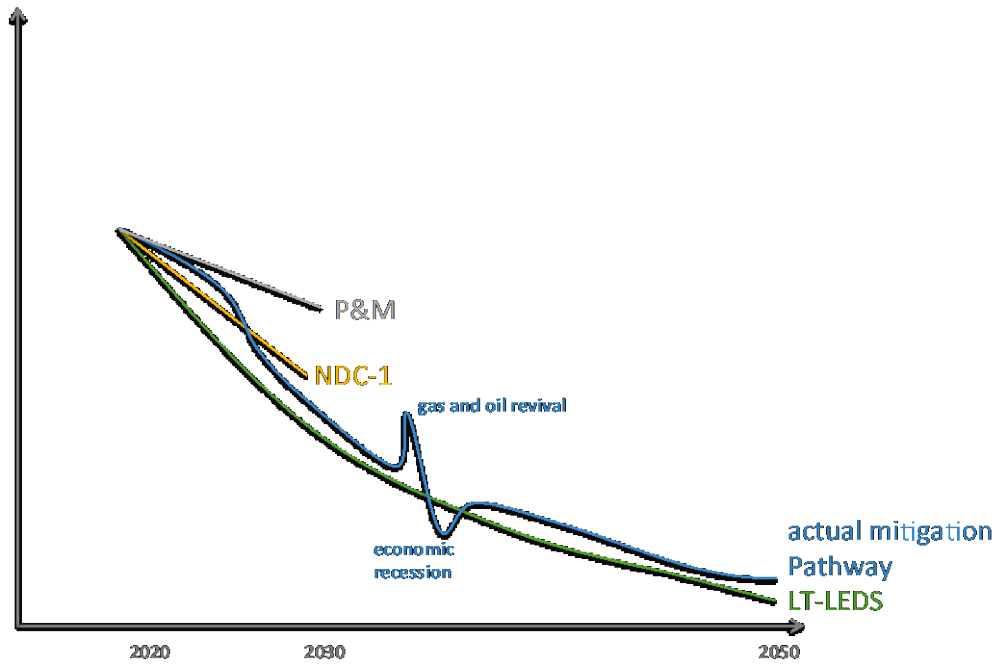
A third option consists in developing crediting baselines on the basis of the host country's LT-LEDS. While this approach might be conceptually appealing, challenges could even be higher than for deriving baselines from NDCs. Due to the forward-looking nature, LT-LEDS will presumably be even more delinked from the actual situation in a specific sector of the host country, making it even more difficult to use them as a basis for baseline setting.

Combining elements to promote policy integration

The preceding section has explored possibilities to integrate domestic climate policy instruments into key design parameters of an offset approach. The findings indicate that all three elements can inform the design of an offset scheme allowing to better align its use with the climate policy of the host country. However, exclusively relying on one of these elements for designing a specific component of the offset approach does not seem advisable given the numerous challenges associated to the elements:

- Existing and planned P&M might not be aligned with the NDC
- NDCs will not necessarily include the information required to derive sector-specific emission pathways
- NDCs and LT-LEDS might lack ambition and not be aligned with the goals of the Paris Agreement
- P&M, NDCs and possibly also LT-LEDS will be moving targets, meaning they will progress dynamically over time
- All three elements will usually not be perfectly aligned and integrated into the broader Paris world, which is why requiring the activity proponent to take into account one of the elements will not lead to the automatic integration into the host country's climate policy.

Figure 9: Illustrative relationship between P&M, NDC, LT-LEDS and mitigation pathway



Source: Own illustration (Wuppertal Institute)

Figure 9 illustrates how the actual mitigation pathway of a country could deviate from the pathways envisaged by its policies and measures, the NDC and the LT-LEDS. In the figurative example, emissions fall continuously, but experience a peak with a gas and oil revival as well as a downturn due to a economic recession. As can be seen, each element on its own as well as their combination cannot be considered to provide a solid basis to predict future developments. Therefore, the three elements should be carefully combined with other parameters to inform the design of the offset approach.

P&M, the NDC and the LT-LEDS could also inform additionality demonstration and baseline setting. Given the limitations outlined above, both processes should however also take into account other parameters, such as the ambition level of the Paris Agreement, global technological progress as well as major economic developments. These other factors will impact the additionality of mitigation activities and should also be taken as a basis for setting crediting baseline, despite often not being directly attributable to the domestic climate policy. The following Box illustrates how the domestic and the international climate policy could be combined with other parameters when developing crediting baselines for offset approaches.

Baseline setting: Linking offsets to the long-term mitigation pathway of the host country

As has been elaborated in section 6.6.3.2, integrating the crediting activity into the host country's climate policy will be key. However, domestic policies might not be fully aligned with each other and will in most cases not be ambitious enough to meet the Paris objectives. Furthermore, policies do only provide a snapshot of how the government intends to achieve a certain policy objective under specific circumstances. Even if the policy objective remains unchanged, the circumstances will change over time. These changes must be taken into account when developing crediting baselines, which are used to quantify the mitigation impact of an activity.

An approach of how to deal with the discrepancy between the current (insufficient) status of climate policy and the action needed to address climate change in the context of setting crediting baselines is the *Situation-Ambition Approach* by Hermwille (2020). The approach combines three elements: An *IS-margin* that represents where a specific sector stands at the moment, an *OUGHT-margin* as a normative element that defines how this specific sector should develop in the future, and a transition factor that defines how the crediting baseline will transition from the IS towards the OUGHT margin. Hermwille (2020) suggests to determine the IS-margin by building on existing methodologies, BAU scenarios as well as econometric models, while the OUGHT-margin could be derived from host country's NDC, provided it is ambitious enough to be compatible with the well below 2°C target and can be broken-down into sectors. Other possibilities to determine the OUGHT margin are deep decarbonisation scenarios derived from LT-LEDS or absolute mitigation targets, such as a full decarbonisation of the sector by a specific point in time. The transition factor as well as the transition period over which the shift in the relative weights of IS-margin and OUGHT-margin occurs need to be aligned on the basis of which the OUGHT-margin is determined. If the OUGHT-margin is based on an NDC, for instance, the transition period should be the NDC period. By combining the three elements, this approach goes beyond the practice under the CDM that focused on improving the representation of the current status of climate policy by introducing a normative factor and aligning the process of setting crediting baselines with the Paris Agreement (Hermwille 2020; Hermwille et al. 2020).

6.6.3.3 Capacity development

When the discussion about the future role of market-based cooperation touches upon the issue of capacity development, the focus is usually put on the *support host countries need in order to participate* in such activities (e.g. Kreibich 2020; Spalding-Fecher et al. 2020). Capacity

development could, however, also be seen from the opposite direction: the *participation in market activities establishes capacities* that can assist countries in other domestic climate policy processes. This potential of market-based cooperation in establishing domestic capacities has only received limited attention, despite the fact that a common view among stakeholder is that "capacity-building for low-carbon development within developing countries may be one of the most important sustainable development impacts of the CDM" (Spalding-Fecher et al. 2012). For post-2020 offset approaches, different options for achieving a capacity development impact can be discerned.

Indirect effects (pull factors)

The most basic form by which offset approaches can contribute to capacity development is through setting an incentive for potential host countries to transfer emission reductions in exchange of financial means. The possibility to export emission reductions will presumably be subject to certain conditions. If the transfers are to be accounted for under Article 6.2 of the agreement, specific provisions from the Transparency Framework and its Modalities, Procedures and Guidelines (MPG) adopted at COP24 in Katowice will apply (Kreibich and Obergassel 2019a):

- When submitting their Transparency Reports, Parties engaged in cooperative approaches under Article 6.2 must inter alia:
  - Report on the annual level of anthropogenic emissions by sources and removals by sinks covered by the NDC on an annual basis reported biennially;
  - Provide an emissions balance reflecting the level of anthropogenic emissions by sources and removals by sinks covered by their NDC adjusted on the basis of corresponding adjustments
  - Provide information on how each cooperative approach applies robust accounting to ensure inter alia the avoidance of double counting
- Para 61 of the MPGs further introduces national ITMO registries, requiring Parties to provide information on the institutional arrangements in place to track progress made towards NDC achievement, including on those used for tracking ITMOs.

An offset approach established under Article 6.2 will hence incentivise potential host countries to comply with these and other provisions of the Transparency Framework. The agreement between Peru and Switzerland, the first bilateral agreement on Article 6 cooperation, reflects these requirements by inter alia requiring Parties to submit annual emission balances, information on Mitigation Outcomes first transferred as well as information on the implementation on the implementation of corresponding adjustments (for further details see Art. 9 to 13 in: Peru and Switzerland 2020).

In addition, offset approaches could establish further eligibility criteria that require potential host countries to establish respective capacities. Provisions that are relevant in this regard could be the requirement to show how the crediting activity is integrated into the broader domestic climate policy (see above).

Another indirect capacity development impact of offset approaches is associated to the risk of overselling. In order to avoid a situation that makes it more difficult or costly to achieve their own NDC, it is in the host countries' own interest to obtain certainty about how the crediting activity will impact its domestic climate policy. Getting such information will require significant

capacities to be developed, in particular for countries that have not developed their NDC on a solid sector-specific data (Spalding-Fecher et al. 2020).

Linking access to the offset approach with capacity development

A possible capacity building effect of offset approaches has been discussed in the context of programmes that are established as part of a carbon club. Fuessler et al. (2019) suggest that these carbon clubs could also be used for providing additional capacity building support for increased transparency, development of LT-LEDS and identifying the specific roles of different sectors and technologies in market-based cooperation. By providing this support, the clubs could even be more likely to attract potential host countries (Fuessler, Kohli, Spalding-Fecher, et al. 2019).

Capacity building effects at the activity level

In order to foster capacity building in the host country, the provisions of the offset approach could require activity proponents to implement workshops and trainings as part of their mitigation activities. Capacity building effects could also be included in the institutional setup of the mitigation activity for instance by requiring a certain share of local organisations to be involved in the activity.

6.6.3.4 Conclusions

This section explored whether and how offset approaches used in compliance schemes could support transformative change in host countries. By looking into existing research in the field of transformative change, the section found that **the concept is compatible with the functioning of offset approaches in principle, albeit with limitations**: First, the crediting activities' focus on short-term mitigation impacts is only partially compatible with the co-evolutionary and process-oriented concept of transformative change. Second, the market-based character of offsets limits the spectrum of possibilities to support transformative change.

Due to these limitations, **the most promising role in the transformative process is that of an incubator** that brings niche technologies to the market. By contrast, offsets are less suitable to provide finance for the development of entirely new technologies and for scaling technologies that are already mature and diffused, as this would raise concerns about additionality.

The subsequent analysis explored different design options of how offsets could support transformative change and made the following observations:

The analysis **identified numerous design parameters that can be used for achieving an impact beyond the scope of the activity and supporting capacity development in the host country**. However, achieving these additional impacts will potentially lead to higher implementation costs of mitigation activities without directly providing activity proponents with respective returns in the short-term. A possibility in dealing with this challenge which should be explored further could be blended finance, where only a part of mitigation activity would be financed through (and attributed to) carbon markets with the remainder obtaining means from climate finance (Fuessler, Kansy and Spalding-Fecher 2019).

Another key finding is that **policies and measures, NDCs and LT-LEDS provide good starting points for integrating the crediting activity into the domestic climate policy landscape.** All three elements could inform specific processes, such as additionality demonstration and baseline setting, but will have to be combined with additional parameters (such as economic indicators, information on technology diffusion) in order to integrate the crediting activity into the actual mitigation pathway of the host country.

Table 10: Achieving transformative impacts by adapting the design of the offset approach

	Impact beyond the activity scope	Policy integration	Capacity development
Crediting baselines	Temporal: Limited crediting period	Take the host country's P&M, NDC and LT-LEDS into account when developing the baseline and combine them with other parameters.	-
MRV provisions	Temporal: Expand applicability of MRV activities	-	-
Issuance	Temporal: Adapt issuance process to incentivise long-term impacts.	-	-
Eligibility criteria	Geographic/sectoral: Require host countries to make political commitments	Require potential host countries to have adopted NDCs and LT-LEDS (and identify role of ITMOs)	Require host countries to establish respective capacities
Additionality demonstration	-	Require activity proponents to take existing and planned P&M into account during additionality demonstration	-
Additional implementation requirements	Geographic/sectoral: Require proponents to implement knowledge sharing activities	-	Provide capacity building support at the programme level

Source: Own compilation (Wuppertal Institute)

7 Conclusions and recommendations

This report explored how the new framework conditions established with the Paris Agreement impact future offset approaches on the demand and the supply side. It started off by identifying the Paris Agreement's mitigation objectives and its innovative architecture as an **Overarching Framework** that structures the functioning of offset approaches and determines their successful integration into a post-2020 climate policy. In light of the ambitious targets established with the Paris Agreement, future offset approaches must be fundamentally different from the zero-sum game known from the past. Post 2020 offset approaches must adhere to three key **Principles of Success**:

- environmental integrity,
- ambition and
- sustainable development.

The achievement of these Principles of Success is contingent on specific **Conditions of** Success, which in turn will be influenced by Success Factors that inform the design of the offset approach. The report explored these elements and further analysed selected design options relevant for post-2020 offset approaches.

7.1 Conditions of Success

The analysis of the functioning of the Conditions of Success revealed the following:

- Priority should be given to those Conditions of Success that address negative effects as these can be considered a precondition for achieving positive impacts
- Coherence in maintaining each of the three Principles of Success should be ensured, meaning that positive and negative impacts should be addressed separately
- A single Principle of Success should not be achieved at the expense of another one
- Priority should be given to positive long-term effects instead of short-term gains

7.2 Success Factors

The achievement of these Conditions of Success will in turn be influenced by **Success Factors** which relate to the circumstances in the jurisdiction or sector involved in the offset approach. The report identified a total of 13 of such Success Factors. For each of these Success Factors the report discussed how it relates to the Conditions of Success and how it could inform the design of the offset approach. The analysis showed that by **effectively integrating characteristics of Success Factors into the design of the offset approach**, offsets could assist governments in achieving multiple Conditions of Success and to maintain the Principles of Success. The following design areas were identified to be particularly suitable for being informed by the Success Factors:

- Establishing eligibility criteria that guide the selection of sectors or jurisdictions that will be part of the offset approach on the supply and demand side
- Defining limits on the offset use on the demand side
- Deriving implementation requirements for crediting activities on the supply side

- Developing robust accounting for all mitigation outcomes or limit the scope of the offset approach to domestic offsetting

Table 11 summarizes key recommendations of how policymakers should take into account Success Factors when designing an offset approach in order to contribute to numerous Conditions of Success and thereby maintain the Principles of Success.

Table 11: Overview on how Success Factors can inform the design of an offset approach

Success Factors		Design considerations
NDC-related	NDC metrics and timeframes	Introduce a domestic offset approach in order to circumvent accounting issues Limit eligibility to host countries that have adopted NDCs that align with their own NDC Develop unilateral accounting standards for dealing with diversity of NDCs Make adherence to basic accounting principles a key requirement for the access of host countries to the scheme
	Conditionality of NDC	Use the unconditional target as a basis for accounting
	NDC coverage	Restrict eligibility to NDC-covered sources or account also for units not covered by an NDC to address perverse incentive
	NDC ambition level	Make independent assessment of NDC ambition an eligibility criterion for host Parties to avoid hot air transfers Introduce quantitative limits and rigorous additionality tests if NDC lacks ambition
Political	Opposition against carbon pricing	Introduce quantitative limits on offset use if the offset approach is used as a bargaining chip in the carbon pricing negotiations
	Coverage of climate policies	Require existing and planned policies to be taken into account during additionality demonstration and baseline setting Limit crediting periods to avoid perverse incentives for national climate policy making
	Ambition level of pricing scheme	Limit use of offsets to ambitious carbon pricing schemes
Economic	Mitigation costs of technologies	Establish sector-specific thresholds that translate into quantitative limits or discounting rates Establish a threshold defined in EUR/tCO2e to exclude low-cost mitigation activities (low-hanging fruits)
	Carbon price responsiveness	Reduce eligibility of offsets on the demand side to sectors with limited carbon pricing responsiveness Focus on sectors with strong carbon pricing responsiveness on the supply side if private sector is to be incentivised
	Carbon leakage risk	Reduce the eligibility of offset use on the demand side to sectors with considerable carbon leakage risk.
Technical	Maturity and market penetration of the technology	Develop universal eligibility criteria for the supply side to exclude technologies that are mature and widely diffused Require potential host countries to create national positive or negative list as a basis for future cooperation Take the maturity and market penetration into account during additionality demonstration crediting baseline setting
	Technical mitigation potential	Limit eligibility on the demand side to sectors with limited technical mitigation potential Limit the eligibility on the supply side with sectors that have a considerable technical mitigation potential

Env. - Social	**Environmental and social impacts**	Define eligibility criteria (positive/negative lists) for high risk Adapt the implementation requirements to the risk structure of activity type and develop a safeguard system to ensure SDG contributions

Source: Own compilation (Wuppertal Institute)

7.3 Selected design aspects

In addition to providing recommendations on how to take the Success Factors into account during the design of the offset approach, the report also explored selected conceptual design aspects. The following summarizes key findings and recommendations:

One aspect analysed was the approach to **establish a sectoral link between demand and supply side as a means to foster sectoral transformation** as an alternative to the introduction of quantitative and qualitative limits on offset use. The analysis found that the approach is only applicable to carbon taxation schemes, as the market interaction in an ETS would nullify the intended effect of the link. For carbon taxation schemes with a strong carbon price, introducing such a link could be a promising approach to foster sectoral transformation, both within the jurisdiction (domestic offsetting) as well as beyond (international offsetting). In order to actually foster sectoral transformation, the carbon tax would potentially have to be combined with other support measures. While the applicability of the approach is limited to carbon taxation schemes, it could still be of interest given the rising numbers of jurisdictions introducing a carbon tax that allows for offset use.

The report further explored the idea of **whether offsets could be used as an alternative to free allocation in emissions trading systems**. by allowing emissions-intensive and trade-exposed (EITE) businesses to surrender offsets to satisfy (part of) their compliance obligations. Compared to free allocation, offsets can be viewed more favourably in terms of ambition raising and their contribution to sustainable development: While free allocation does not lead to climate change mitigation, the use of offsets would allow to increase ambition through additional emission reductions and further drive sustainable development outside the scheme. At the same time, offsets could adversely affect the steering effect of the ETS: While in the case of free allocation EITE firms are still incentivized to reduce their own emissions so as to profit from selling any excess allowances, a mechanism that allows offsets to be used would not provide this option. Whether this effect outweighs the ambition raising potential of offsets would depend on multiple parameters, such as the price difference between allowances, offsets and own emission reductions as well as companies' mitigation strategies. These findings point to the need to conduct additional research on the topic.

Another design approach analysed was the **integration of offsets into carbon taxation schemes.** This approach is being increasingly applied by emerging carbon taxes but has nonetheless received little attention in the literature. The analysis conducted shows that the climate impact of an offset component in carbon taxation schemes is highly dependent on the ambition level of the scheme and the intended use of carbon tax revenues. While offsets could lead to an additional short-term mitigation impact if the carbon tax rate is low and tax revenues would not be used for climate change mitigation purposes, the opposite effect might also be possible. Given these and other considerations, the introduction of an offsetting option should only be considered in cases where needed due to political economy reasons and where carbon tax revenues cannot be earmarked towards supporting climate change mitigation. One possibility in dealing with the different effects offsets could have on a carbon tax and which should be explored further is to limit the use of offsets to the initial phase of a carbon tax.

The analysis of the **role public funds could play in supporting the commercialisation of offsets** developed a typology of funds and presented their key functions in supporting carbon

finance. It revealed that carbon funds can provide upfront capital needed to supply the offsets to the market, particularly in piloting more transformative and innovative mitigation activities while they can also act as market enablers by purchasing offsets more innovative projects. Furthermore, market readiness funds can play an important role in capacity development by setting-up institutions, capabilities and infrastructure (e.g. MRV systems) in host countries. Given these key functions, the analysis finds that public funds seem particularly well suited to complement offset approaches when the latter cannot be designed in a way that ensures that the price signal alone and by itself has the intended effects.

The report further explored **the role negative emissions could have as a source of supply for offsets**. The findings indicate that the integration of offsets from negative emissions into compliance schemes is associated with considerable ecological and implementation concerns. Furthermore, the interaction of carbon cycles speaks against the use of negative emissions from nature-based solutions for offsetting fossil fuel emissions. Technical solutions might perform better in this regard. They are, however, confronted with high costs. While this speaks against their inclusion today, there might be room to include negative emissions in future schemes with a high ambition level and where technically avoidable emissions have been fully mitigated. Hence, the inclusion of offsets into a carbon pricing scheme should be made on the condition that there is no technical mitigation potential left and by taking biophysical limits into account. In the meantime, research on and use of environmentally and socially sound negative emissions should continue.

One last aspect explored by the authors is the **potential of an offset approach to support transformative change by promoting respective crediting activities in host countries**. Building on a brief review of transformative change literature, the report finds that the concept is in principle compatible with offset approaches, albeit with limitations. Offsets seem to be particularly well suited to support the take-off stage of the transformative change process, by bringing niche technologies to the market. Based on a brief analysis of how the concept is operationalized by climate and carbon finance instruments, the authors then explored design options by focusing on three key aspects: impacts beyond the scope of the activity, capacity development and policy integration. The analysis finds that achieving an impact beyond the scope of the activity and capacity development support is possible in principle and that it can be fostered through the design of the offset approach. However, achieving these additional impacts will presumably increase the costs of the mitigation activity and thereby reduce the cost-effectiveness of offsets. Potential solutions in dealing with this trade-off are blended finance and the involvement of carbon funds. In terms of integrating the crediting activity into the domestic climate policy landscape the analysis revealed that this could be promoted by taking into account planned and existing policies and measures as well as NDCs and LT-LEDS. In order to integrate the crediting activity into the actual mitigation pathway of the host country, the information included in these policy documents should be combined with additional parameters, such as economic indicators and information on technology diffusion. Further research based on real-world data of a respective sector could provide important insights into how such a process could be designed in detail.

7.4 Overarching recommendations

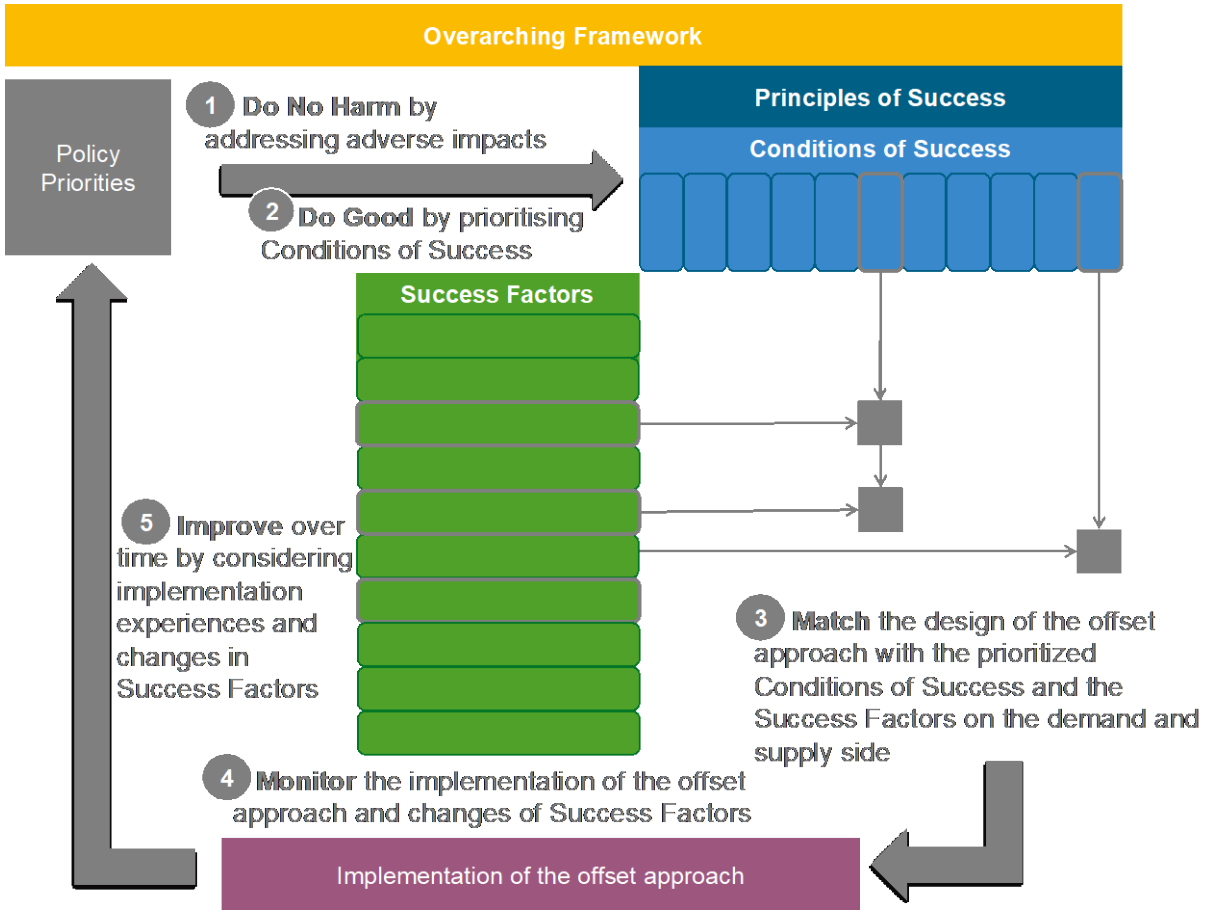
Based on these findings, the following recommendations are made, see also the policy cycle illustrated in Figure 10 below:

- **Do no harm.** Governments considering the integration of offsets into their carbon pricing scheme or into their national mitigation strategy should first ensure that adverse impacts of

offsets are addressed by focusing on the following Conditions of Success: robust accounting, unit quality, avoiding perverse incentives, avoidance of negative social and environmental impacts. The avoidance of adverse effects should guide the selection of sectors and jurisdictions on the demand and supply side.

- **Do good.** Addressing adverse impacts is necessary, yet not sufficient to legitimize the introduction of an offset approach in a post-2020 regime. Achieving positive impacts by raising the ambition level on the supply and demand side and through sustainable development contributions (at least for international offsetting) must be seen as necessary next steps which starts by prioritising the Conditions of Success to which the offset approach should contribute.
- **Match the offset design of the offset approach with the prioritised Conditions of Success and prevailing Success Factors.** After having decided on the policy objectives to which the offset approach is to contribute, policymakers will have to design the offset approach by taking into account the prioritised Conditions of Success and their respective Success Factors. This process will presumably be reciprocal, with prevailing Success Factors impacting the spectrum of positive Conditions of Success the offset approach can achieve.
- **Monitor implementation and changes of Success Factors.** Once introduced, policymakers should continuously monitor the performance of the offset approach and whether the intended Conditions of Success are achieved. Furthermore, the Success Factors should be subject to monitoring and regular assessments should be made in order to identify significant changes that may affect the performance of the offset approach.
- **Improve over time by considering experiences from implementation and changes of Success Factors.** The experiences gained with the implementation of the offset approach as well as any significant changes of the Success Factors should inform the design of the offset approach and feed into the prioritisation of Conditions of Success. An assessment of whether the Success Factors on the demand and supply side still allow for Conditions of Success to be met and Principles of Success to be maintained will also be required after the offset approach has been introduced. This continuous assessment process can be integrated into the design of the offset approach through specific design features, such as dynamic baselines, limited crediting periods and sunset clauses. With these elements, lock-in effects and other undesired impacts can be addressed while allowing for the offset approach to be integrated into a sound policy mix to fight climate change.

Figure 10: Exemplary illustration of an offset policy design process



Source: Own illustration (Wuppertal Institute) Please note: The prioritisation of Conditions of Success only relates to those Conditions of Success related to positive effects, while those relevant for the avoidance of adverse impacts should always considered as a priority.

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