Transformational change through Article 6

Discussion Paper – Designing carbon market incentive structures

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Summary

The discussion paper summarises the interim results of the research project "Transformation and Article 6" and seeks to explore the question how transformational change can be promoted through Article 6 cooperation, comprising both Article 6.2 cooperative approaches and cooperation under the Article 6.4 Mechanism (A6.4M). Building on the Transformational Change Methodology developed by the Initiative for Climate Action Transparency (ICAT), Article 6-specific transformational characteristics are derived. These comprise mitigation and sustainable development goal (SDG) outcomes at scale and sustained over time in line with the Paris Agreement's long-term targets and the 2030 Agenda, dynamic baselines, technological change and digitalisation, public-private partnership, and carbon pricing.

In order to promote transformational change through Article 6 activities, appropriate incentives need to be provided, either at the international or national level. While at the international level incentives can be set through intergovernmental processes or non-state actor engagement, at the national level they can be set through the buyer or host country. The authors focus on regulatory and monetary incentives in this paper.

One regulatory incentive is the generation of positive lists of activities. They can either be adopted by host countries or by buying entities to promote specific activities and technologies which are in line with their specific interests and needs. Another regulatory incentive which could be mandated by an intergovernmental process would be to only allow buyer countries to count international credits towards their nationally determined contribution (NDC), if their own NDC targets are aligned with a 1.5°C or 'well below 2°C' pathway. Moreover, mitigation activities that are not compatible with countries' Long-term Low Emission Development Strategy (LT-LEDS) or the Paris Agreement's long-term targets could simply be excluded from Article 6 cooperation. Closely related is the regulatory incentive to not allow generating carbon credits from activities that do not comply with the global GHG emissions budget to contain the temperature increase to well below 2°C or even 1.5°. This can be achieved e.g., through using dynamic baselines which become more stringent over time.

Regarding monetary incentives, the research team proposes the monetisation of ITMO price components such as a sustainable development premium or monetisation of positive effects on other planetary boundaries beyond climate (e.g., biodiversity). Such premium payments and potentially further incentives e.g., for introducing first-of-its kind technologies reward strong transformational impact.

The regulatory and monetary incentives have practical implications for core Article 6 elements such as ensuring environmental integrity, additionality testing and baseline setting. Additionality needs to be redefined in light of NDC targets and target additionality will play an important role in determining a transformational impact of an activity. In addition, new approaches to baseline setting with a normative aspiration are required in order to align crediting mechanisms with the Paris Agreement's long-term goals, considering the Common but Differentiated Responsibilities and Respective Capabilities principle.

The identified transformation characteristics are being applied to three different Article 6 case studies in Morocco's waste sector, Costa Rica's transport sector and Pakistan's energy sector. While some Article 6 activity design aspects promise transformational effects, Article 6 activities are generally still at early stages of their operationalisation and crucial aspects such as baseline setting often require further technical work. Still, the empirical analysis indicates that the Article 6 piloting landscape might become more diverse than under the Kyoto mechanisms, including through supporting transformational activities such as a modal shift towards biking. Regarding the setting of more stringent baselines, an adequate balance needs to be sought between predictability and stringency to not undermine investment incentives. Demand for stringency from buyer countries and entities will need to be met with the willingness to pay higher prices for internationally transferred mitigation outcomes.

Zusammenfassung

Das Diskussionspapier fasst die Zwischenergebnisse des Forschungsvorhabens „Transformation und Artikel 6“ zusammen und geht der Frage nach, wie transformatorischer Wandel durch Artikel 6-Kooperationen gefördert werden kann, die sowohl kooperative Ansätze nach Artikel 6.2 als auch Kooperationen im Kontext des Artikel 6.4 Mechanismus (A6.4M) umfassen. Aufbauend auf der Methodologie für transformatorischen Wandel der Initiative for Climate Action Transparency (ICAT) werden Artikel 6-spezifische Transformationsmerkmale abgeleitet. Diese umfassen Minderung und nachhaltige Entwicklungsziele (engl. Sustainable Development Goals, SDGs), die im Einklang mit den langfristigen Zielen des Übereinkommens von Paris (ÜvP) und der Agenda 2030 stehen sowie dynamische Baselines, technologischen Wandel und Digitalisierung, öffentlich-private Partnerschaften und Kohlenstoffbepreisung.

Um einen transformativen Wandel durch Artikel 6-Aktivitäten zu fördern, müssen geeignete Anreize auf internationaler oder nationaler Ebene geschaffen werden. Während auf internationaler Ebene Anreize durch zwischenstaatliche Prozesse oder das Engagement nichtstaatlicher Akteure gesetzt werden, kann dies auf nationaler Ebene durch den Abnehmer- oder Gastgeberstaat geschehen. Dieses Paper fokussiert sich auf regulatorische und monetäre Anreize.

Ein regulatorischer Anreiz ist zum Beispiel die Erstellung von Positivlisten, die entweder von den Gastgeberländern oder von den Abnehmerländern beschlossen werden, um bestimmte Aktivitäten und Technologien zu fördern, die ihren spezifischen Interessen und Bedürfnissen entsprechen. Ein weiterer regulatorischer Anreiz, der durch einen zwischenstaatlichen Prozess vorgeschrieben werden könnte, wäre, dass Käuferländer Emissionszertifikate nur dann auf ihre national festgelegten Beiträge (engl. Nationally Determined Contributions, NDCs) anrechnen lassen dürfen, wenn ihre eigenen NDC-Ziele auf 1,5°C oder „deutlich unter 2°C“ausgerichtet sind. Darüber hinaus könnten Minderungsaktivitäten, die nicht mit den langfristigen Emissionsminderungsstrategien (engl. Long-term Low Emission Development Strategy, LT-LEDS) der Länder oder den langfristigen Zielen des Pariser Abkommens vereinbar sind, einfach von der Artikel 6-Kooperation ausgeschlossen werden. Eng damit verbunden ist es die Generierung von Emissionszertifikaten dann nicht zuzulassen, wenn deren Aktivitäten nicht mit dem globalen Treibhausgasemissionsbudget zur Begrenzung des Temperaturanstiegs nach dem ÜvP vereinbar sind. Dies kann z.B. durch die Verwendung von dynamischen Baselines erreicht werden, die im Laufe der Zeit stringenter werden.

In Bezug auf monetäre Anreize schlägt das Forschungsteam die Monetarisierung in Form von Preiskomponenten der international übertragenen Minderungsergebnisse vor. Beispiele hierfür wären eine Prämie für nachhaltige Entwicklung oder positive Effekte auf andere planetare Grenzen jenseits des Klimas (z.B. Biodiversität). Solche Prämienzahlungen und potenziell weitere Anreize, z.B. für die Einführung von neuen Technologien, belohnen starke transformatorische Wirkungen.

Die regulatorischen und monetären Anreize haben praktische Auswirkungen auf die Kernelemente von Artikel 6 wie die Prüfung der Zusätzlichkeit und die Festlegung von Baselines. Die Zusätzlichkeit muss im Hinblick auf die NDC-Ziele neu definiert werden, und bei der Bestimmung der transformatorischen Wirkung wird die strategische Zusätzlichkeit eine wichtige Rolle spielen. Darüber hinaus sind neue Ansätze zur Baseline-Setzung erforderlich, um Anrechnungsmechanismen mit den langfristigen Zielen des ÜvP in Einklang zu bringen. Hierbei muss das Prinzip der „gemeinsamen, aber unterschiedlichen Verantwortlichkeiten und jeweiligen Fähigkeiten“ (engl. common but differentiated responsibilities and respective capabilities, CBDR-RC) berücksichtigt werden.

Die identifizierten Transformationsmerkmale werden auf drei verschiedene Artikel 6-Fallstudien angewendet. Diese fokussieren sich auf den Abfallsektor in Marokko, den Transportsektor in Costa Rica und den Energiesektor in Pakistan. Während einige Artikel 6-Designaspekte transformative Effekte versprechen, befinden sich Artikel 6-Aktivitäten im Allgemeinen noch in frühen Stadien. Die Operationalisierung dieser Aktivitäten und entscheidende Aspekte, wie die Festlegung von Baselines, sind noch unausgereift. Dennoch deutet die empirische Analyse darauf hin, dass die Artikel 6-Pilotlandschaft vielfältiger werden könnte als unter den Kyoto-Mechanismen. Was die Festlegung stringenterer Baselines angeht, muss ein angemessenes Gleichgewicht zwischen Vorhersehbarkeit und Strenge gefunden werden, um Investitionsanreize nicht zu untergraben. Die Nachfrage nach strengeren Vorgaben seitens der Abnehmerländer und -institutionen muss mit der Bereitschaft einhergehen, höhere Preise für internationale Emissionszertifikate zu zahlen.

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Abkürzungsverzeichnis

AESVT	Association des Enseignants des Sciences de La Vie et de la Terre
ARE	Alternative Renewable Energy
A6.4M	Article 6.4 Mechanism
BAT	Best Available Technology
BAU	Business As Usual
CBDR-RC	Common but Differentiated Responsibilities and Respective Capabilities
CDM	Clean Development Mechanism
COP	Conference of the Parties
CO_2e	Carbon Dioxide Equivalent
EU	European Union
GHG	Greenhouse Gas
GOP	Government of Pakistan
ICAT	Initiative for Climate Action Transparency
ITMO	Internationally Transferred Mitigation Outcome
JI	Joint Implementation
KliK	Foundation for Climate Protection and Carbon Offset
LT-LEDS	Long-term Low Emission Development Strategy
MADD	Mitigation Activity Design Document
MO	Mitigation Outcome
MRV	Monitoring, Reporting and Verification
NDC	Nationally Determined Contribution
NEPRA	National Electric Power Regulatory Authority
OWtE	Organic Waste to Energy
PA	Paris Agreement
PPA	Power Purchase Agreement
SB	Supervisory Body
SDG	Sustainable Development Goal
SNDD	National Sustainable Development Strategy

TCAF	Transformative Carbon Asset Facility
UNFCCC	United Nations Framework Convention on Climate Change
ÜvP	Übereinkommen von Paris

1 Background and objectives

The Paris Agreement (PA) builds on Parties' nationally determined contributions (NDCs), whose cumulative effect should achieve the long-term goal to reduce global warming to at least 'well below' 2°C, or even 1.5°C (UNFCCC 2016). Ensuring that the PA's bottom-up architecture delivers the ambitious long-term temperature target represents a key challenge. This is illustrated by the current emissions gap of 12 to 15 billion tonnes of carbon dioxide equivalent (CO_2e) between NDC targets and the 2°C-compatible emissions path (UN Environment Programme 2020). This emissions gap, which is even greater for the 1.5°C target, needs to be closed through increasing the ambition of national climate pledges and actions.

One way to raise Parties' NDC ambition is the use of voluntary international cooperation under Article 6. Many Parties have communicated their interest to use voluntary cooperation under Article 6 to achieve their updated NDC targets (UNFCCC 2021). However, so far Parties have not yet been able to finalise Article 6 rules despite progress made at the 25th Conference of the Parties (COP25) (Sharma et al. 2020). Therefore, we are in the unique position that the NDC implementation period has kicked off at the beginning of 2021 but Article 6 rules are not yet finalised, undermining their ability to guide voluntary cooperation. This, however, does not stop ongoing piloting efforts which often strive for Article 6.2 bilateral cooperation due to its bottom-up nature compared to Article 6.4 which relies on international oversight (Greiner et al. 2020).

The research project "Transformation and Article 6" funded by the German Environment Agency (UBA) seeks to answer the question how transformational change can be promoted through Article 6 cooperation, comprising both Article 6.2 cooperative approaches and cooperation under the Article 6.4 Mechanism (A6.4M). Specific design options of market-based approaches under the PA can activate or strengthen their transformational impact. Carbon markets under the PA can accelerate transformational change by improving the ambition and integrity of NDCs and enhance the achievement of the Sustainable Development Goals (SDGs) for both buyer and seller countries. This requires that core principles of carbon markets are reinterpreted considering NDC targets, the Long-term Low Emission Development Strategies (LT-LEDS) and the PA's long-term objectives. By building on a definition of transformational change in the context of Article 6 and deriving transformation characteristics that can be applied to specific activities, the authors propose an incentive structure for ambition-enhancing Article 6 cooperation and discuss implications regarding its implementation.

The objective of this discussion paper is to provide a summary of the interim results of the research project. The paper will outline conceptual aspects and discussion as well as the results of an empirical analysis of three Article 6 case studies at early or conceptual stage in Morocco, Costa Rica and Pakistan. The paper aims to inform the international expert debate more generally, but also specifically serves as preparation for the participants of a consultative expert workshop conducted in May 2021 and to generate further inputs which can be considered in developing the final report of this research project.

Chapter 2 briefly outlines the proposed definition of transformational change and the derivation of transformation characteristics before chapter 3 introduces the proposed incentive structure for transformational change through Article 6 activities. In Chapter 4, the analysis of the three Article 6 case studies is summarised in the context of the countries' NDCs. In chapter 5, we outline the main conclusions of the paper and develop some recommendations to be considered.

2 Introducing the conceptual framework

Understanding transformational change builds on a diverse and fast-growing body of scientific and applied literature focused on conceptual and empirical studies of sustainability transition, planetary boundaries and social perspectives (TWI2050 2018; Sachs 2019; IPCC 2018; Raworth 2017; Rockström 2009; Hjalsted et al. 2020). In general, definitions of transformational change share a common focus on system change, different but complementary to incremental change and reform, which involves interrelated structural changes to economic, cultural, technological and institutional ways of doing things, engaging multiple actors at multiple levels (GIZ 2020; Geels 2002).

2.1 Defining transformational change

While multiple definitions of transformational change have been developed for specific purposes and contexts such as by the Green Climate Fund, the World Bank Climate Investment Funds, the German development corporation (GIZ) and in the context of the Initiative for Climate Action Transparency (ICAT), it has not yet been defined and applied in the context of Article 6 carbon markets and mechanisms. The objective of this research project is to help close the knowledge gap by exploring transformation characteristics conceptually and empirically relevant for Article 6 design of activities and incentive structures to enhance mitigation action ambition and transformational impact.

Taking a science-based and pragmatic approach to propose a definition of transformational change tailored to the Article 6 context and issues, a literature review and interviews with practitioners in carbon market funds and mechanisms served as the basis (Olsen et al. 2020). The ICAT Transformational Change Methodology (2020) was used as a starting point to adapt the existing definition, given its integrated focus on mitigation and sustainable development outcomes aligned with the dual Article 6 objective to deliver mitigation outcomes[1] (MOs) and promote sustainable development. Moreover, the close links between transparency of NDC implementation and Article 6 requirements for MRV of MOs to enable results-based payments in the context of NDC compliance and ambition raising support drawing on the ICAT methodology as the basis for a tailored definition for Article 6.

A literature review of 118 journal papers and reports in five categories (peer-reviewed, grey, corona, historical case studies, finance, market mechanisms) was conducted by a team of experts against a set of analytical questions. Information from the last category was used to prepare four interviews to understand how the concept of transformational change has been defined, applied and assessed in leading Article 6 finance institutions, namely the Foundation for Climate Protection and Carbon Offset (KliK), the Transformative Carbon Asset Facility (TCAF), the Dutch Entrepreneurial Development Bank and the European Bank for Reconstruction and Development. Insights from the literature analysis and interviews served to identify the characteristics of transformational change specifically relevant to Article 6 cooperative approaches.

On this basis, we propose the following definition of transformational change for Article 6 cooperative approaches:

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.

[1] Emission reductions and removals

The definition emphasises on the achievement of the 'alignment with the PA' objective in an integrated way with the 2030 Agenda for SDGs. It is consistent with the IPCC SR1.5 (2018) perspective on 1.5° pathways to net zero emissions by 2050 in the context of sustainable development assessments of synergies and trade-offs with the SDGs. However, the ICAT methodology and the taxonomy tailored to Article 6 purposes refer to the SDG framework, which does not build on an absolute, planetary boundary approach to sustainability assessment. The issue to avoid shifting the burden across the different dimensions of sustainability such as safeguarding biodiversity or jobs when transforming sectors and societies is therefore assessed more qualitatively through the mapping of interlinkages using the SDG framework.

2.2 Characteristics of transformational change

Building on the ICAT Transformational Change Methodology (2020) and insights from the in-depth analysis by the authors, transformational change as defined above is characterised by the following aspects. To indicate, how the ICAT definition is adapted to Article 6 purposes, new language and characteristics of transformation specific to Article 6 are highlighted in **bold**:

- 'system-wide impacts, driven by large-scale outcomes or a multitude of smaller-scale changes'
- 'sustained, long-term outcomes that reinforce zero-carbon practices while avoiding carbon lock-in and dependence on fossil fuels'
- **a dynamic and adaptive process that makes use of emerging windows of opportunity to further increase countries' climate and sustainability ambition (e.g., calls for green recovery packages in the context of the COVID-19 pandemic; low oil and gas prices as an opportunity to phase out fossil fuel subsidies)**
- **a long-term perspective in terms of rendering technical and economic systems more robust or resilient (e.g., through an improved approach to internalisation of risks) and sets clear milestones and incentives for decarbonisation/ low-carbon development and climate neutrality**
- **up-scaled direct investments in low-carbon technologies and green infrastructure (including R&D) by governments as enablers/drivers of transformation**
- **digitalisation can be a contributing factor to transformation, e.g., by allowing to reduce travel intensity and enabling real time, robust MRV of technology performance as well as digital payments, particularly important in the context of Article 6**

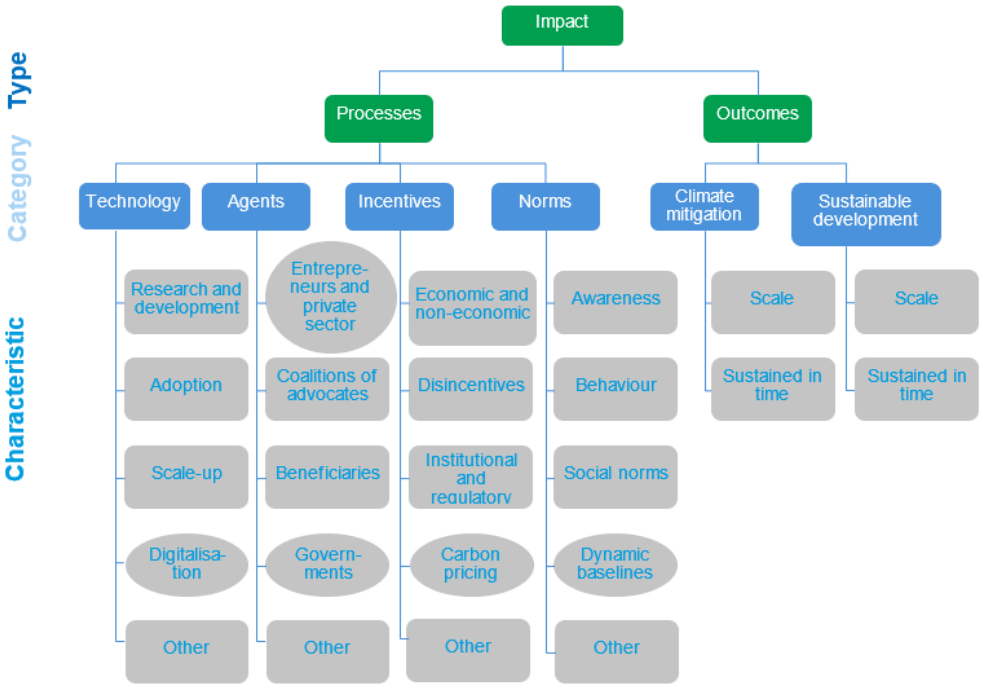
Furthermore, four main processes of system change are:

- 'technology change – processes, skills and practices from research and development, early adoption and widespread scale-up of clean technologies'
- 'agents of change – governments, entrepreneurs, the private sector and civil society, as well as cross-cutting coalitions and networks as agents of transformational change'
- 'incentives[2] for change' – long-term, adaptive policies implemented consistently over long periods, but that are adaptive to shocks and crises through their design and mechanism (e.g., dynamic baselines in crediting mechanisms; carbon pricing through hybrid instruments combining ETS and carbon tax). These policies utilise economic and noneconomic incentives and disincentives that accelerate technology and behavioural change)
- 'norms and behavioural change –processes that influence awareness and behaviour of people to drive a long-lasting change in societal norms and practices'

[2] In the ICAT Transformational Change Methodology 'incentives' is used to refer to drivers of change that are both voluntary and mandatory, such as rules and regulation. This is a broader notion of the term compared to common dictionary definitions, which define 'incentive' as something that motivates or encourages someone to do something.

The transformational characteristics identified through the literature review and interviews as particularly relevant to Article 6 are 'Digitalisation', 'Private sector and Governments', 'Carbon pricing' and 'Dynamic baselines'. For a comprehensive description of generic characteristics of transformational change, we refer to the ICAT Transformational Change Methodology (2020). Figure 1 below illustrates the taxonomy of transformational characteristics and the characteristics particularly relevant for the Article 6 context and purpose are specified in a circular dialogue box in the flow chart.

In subsequent chapters the definition and taxonomy of transformational characteristics for Article 6 are applied to propose an incentive structure at global and national levels and to case study analyses at activity level of transformational characteristics and impacts.



Source: UNEP DTU, Perspectives Climate Research and First Climate

Figure 1: Taxonomy of transformational change characteristics for Article 6 activities

2.3 Synergies between transformational change, sustainable development and planetary boundaries

Advancing the concept of transformational impact of Article 6 activities helps to mainstream and promote synergies between sustainable development and mitigation activities to leverage ambition for outcomes at scale and sustained over time. Yet, the bottom-up approach to assess how policies and actions are aligned with national SDG and NDC targets and with the global goals for climate and sustainable development does not ensure that absolute, planetary boundaries are not crossed.

Nine planetary boundaries (climate change, biosphere integrity, land system change, freshwater use, biogeochemical flows, ocean acidification, atmospheric aerosol loading, stratospheric ozone depletion, and novel entities) are proposed by scientists to assess the stability of the Earth System (Rockström et al. 2009). Furthermore, a social foundation perspective has been developed to define a Safe and Just Operating Space for society to stay within absolute environmental and social limits for sustainability (Raworth 2012). To safeguard planetary boundaries and a safe and just operation space at any level of society, downscaling of global thresholds to the individual level based on ethical allocation principles (e.g. utilitarianism, egalitarianism, decent living standards), then up-scaling to the level of assessment (e.g. company, sector or country) can serve as a benchmark for absolute sustainability assessment. For climate change, the global carbon budget approach is used to determine how much CO_2e can be emitted globally to limit global warming to 1.5°C. However, for other aspects of environmental and social sustainability more research, conceptual and empirical studies are needed to operationalize an absolute approach to transformational impact assessment, also for the Article 6 context and issues.

3 Incentivising transformational change through Article 6 cooperation

The authors propose an incentive structure for transformational change through Article 6 activities which comprises of several potential incentives to be provided at the international or national level. Incentives that are to be implemented at the national level can either be introduced by the buyer country or by the host country itself. It is differentiated between regulatory and monetary incentives. However, the authors recognise that other types of incentives such as behavioural ones are also present but not further focused upon in the following.

3.1 Regulatory incentives

Four types of potential regulatory incentives have been identified that can incentivise transformational change, namely i) generating positive lists of activities to promote specific activities and technologies, ii) developing international rules that only allow buyer countries to acquire international credits if their own NDC targets align with a 1.5°C or well below 2°C emissions pathway, iii) establishing criteria to restrict or exclude Article 6 activities not compatible with countries' LT-LEDS or PA's long term targets, and iv) restricting generation of credits that do not comply with the global budget of well below 2°C.

The first type aims to generate **positive lists of activities either adopted by host countries and/or buying entities to promote specific activities and technologies**. Positive lists aim to reduce transaction costs by predefining what type of activities are expected to be authorised or could acquire ITMOs. These could include activities with high abatement costs and limited availability in the country or region, activities that foresee that a high share of generated MOs will remain in the host country, activities with high sustainable development benefits, or activities that apply safeguards against negative effects in the activity cycle.

A second regulatory incentive could be to develop **international rules that will only allow buyer countries to acquire international credits if their own NDC targets align with a 1.5°C or well below 2°C emissions pathway**. Furthermore, these rules could establish that Internationally Transferred Mitigation Outcomes (ITMOs) could only be used against stringent NDC pathways that are significantly lower than BAU. This measure could ensure that buyer countries do not use market-based mechanisms instead of actually reducing emissions but rather as an approach to increase mitigation ambition by reinvesting savings achieved through lower costs in further domestic mitigation actions, as well as supporting conditional mitigation in developing countries.

The third regulatory incentive can be used to establish rules or criteria at the international level to restrict or **exclude Article 6 activities that are not compatible with countries' LT-LEDS or the PA's long-term targets**. Regarding the LT-LEDS, to assess the compatibility with those instruments, most of the countries would need to have (i) (well) developed LT-LEDS, and (ii) the LT-LEDS would actually need to be transformational. This means clearly specify when and how the net-zero target is going to be reached. Until now, very few countries have adopted LT-LEDS, and they have taken very different forms. This lack of comparability can hinder the possibility of having transparent LT-LEDS in the long run. Therefore, the need for these two preconditions makes the incentive's alignment with LT-LEDS not the most practical approach to follow. Conversely, the alignment with the PA long-term target is considered a more far-reaching incentive. On the one hand, buyer countries might require certain technologies to be excluded from bilateral Article 6 cooperation because of their lack of alignment with the PA's decarbonisation pathway (e.g., combined-cycle gas turbine). On the other hand, buyers could require a compatibility assessment to be conducted between certain Article 6 activities and regional or national decarbonisation paths scientifically verified before the conclusion of an ITMO contract (e.g., establishment of performance criteria by ITMO procurement programmes).

Closely connected to the previous point, another regulatory incentive could be to **not allow the generation of credits that do not comply with the global budget of well below 2°C or even 1.5°C**. This will imply developing further rules at the international level on how to break down the global GHG emissions budget to national emissions budgets. A more recent and innovative debate aims to set baselines so that they are compatible with at least the well below 2°C emission pathway at the country level. This can be achieved, for example, through dynamic baselines that build on a business as usual (BAU) scenario which is gradually decreased over time according to a so-called 'ambition coefficient' and reaches over time an 'OUGHT-margin' (Hermwille 2020) or a 'normative reference' (Michaelowa et al. 2021). The 'OUGHT margin' can thereby be derived from sectoral NDC targets (only if sufficiently ambitious), an ambitious performance benchmark such as 'best available technology[3] (BAT), long-term deep decarbonisation scenarios or a net-zero long-term benchmark (Hermwille 2020). Michaelowa et al. (2021) propose that the 'normative reference' should be the net-zero scenario but differentiated according to countries' responsibilities and capabilities (Michaelowa et al. 2021). The first two iterations of the current Article 6.4 negotiation draft text (UNFCCC 2019a; UNFCCC 2019b) list multiple options to develop baseline methodologies including performance-based benchmarks and BAT. It is further specified that baseline approaches shall "be consistent with the implementation of the host Party's NDC and the long-term goals of the Paris Agreement" (UNFCCC 2019a, para. 41; UNFCCC 2019b, para. 40). This shows that the current draft negotiation text includes options that endorse such an approach. Adopting such an approach at the international level could allow international market mechanisms to be trusted as operating in line with the PA target (Michaelowa et al. 2021).

[3] BAT can be understood in different ways; in this case, it refers to the technology/practice that is technically possible but may not have been achieved in practice yet (Hermwille 2020).

3.2 Monetary incentives

Monetary incentives also form an important part of the incentive structure. These are i) monetisation of ITMO price components, and ii) encouraging specific forms of public-private partnerships.

The first type of monetary incentive is the monetisation of ITMO price components. Most of the Article 6 pilots use tailored pricing models that include components such as the opportunity costs (Greiner et al. 2020). Several other price components such as technology costs, transaction costs, sustainable development premium and market premium may be reflected in ITMO prices. Furthermore, carbon asset owners can price their ITMOs in a way that monetises the positive effects of the activity on other planetary boundaries. This ensures the activity's negative effects are examined closely and the respective safeguards are implemented, building on the existing measurement and reporting structure.

Hence, an important precondition for monetisation of transformational SDG impacts is the establishment of a well-functioning MRV system from the beginning. Some countries may require technical assistance for implementing such an MRV system, thereby indirectly contributing towards the monetisation of sustainable development benefits that arise from the activities. Such technical assistance should include provisions on safeguards against any negative impact on sustainable development in the host country. Any negative impacts would result in the buyer to stop buying ITMOs until the situation is remedied. Another option would be to have an ex-post provision in place such as an ex-post premium when MRV shows strong performance on transformation characteristics by the activity.

Moreover, another incentive could be the provision of higher prices for first-of its-kind technologies that have not yet penetrated domestic markets. Declining prices after the diffusion of the technology can accelerate technology development and achieve scale. Buyers can thus ensure that the activity is deployed at a faster rate while at the same time ensuring that the activity achieves a long-lasting impact. Through showing an increased risk tolerance, buyers can provide an important incentive for future-oriented novel technologies that require high upfront investments. However, this will require the blending of financing as carbon finance is results-based and will not be able to mobilise the necessary resources for associated research and development.

The second type of monetary incentive would be to encourage specific forms of public-private partnerships. The onus rests on the governments to set the right incentives to ensure greater participation from the private sector. An agreed minimum profitability over the cash flows by the government through long-term contractual agreements is an example of an incentive that will ensure and strengthen long-term investment security for the private sector to participate in high-risk projects. In such a scheme the government cannot only guarantee up to a certain percentage of the revenues but also set a maximum revenue ceiling that a project developer can retain. Any excess revenue can then be diverted back to the government (UNESCAP 2008). Moreover, the governments can encourage investments from the private sector by using an effective mixture of financial assistance. One example for this are concessional and other sources of public finance along with technical assistance such as building capacity and supporting risk-taking initiatives (Gardiner et al. 2015). The policy instrument of integrating Article 6 in renewable power auctions in Pakistan represents such an incentive.

3.3 Considerations for establishing transformational incentives

The following section discusses practical implications of potential carbon market incentives in more detail in order to identify open questions or to outline specific challenges which need to be addressed.

3.3.1 Redefining additionality in light of NDCs

Activities implemented through market-based mechanisms need to be additional. Additionality testing needs to prove that mitigation activities and the resulting MOs would not have occurred without the revenues generated from selling emission reduction units (Michaelowa and Butzengeiger 2017). Therefore, additionality is a key aspect of environmental integrity and limits the generation of carbon credits, thereby enabling a more efficient allocation of scarce climate finance (Michaelowa et al. 2019).

The current Article 6.2 draft negotiation text does not include an additionality definition (Michaelowa et al. 2020b). In the context of Article 6.4, Parties seem to agree that additionality rules will need to be different than in the CDM context. Activities will be deemed additional only if they are not mandated by existing national policies and laws (regulatory additionality). It is not clear yet whether Article 6 activities must exceed mitigation policies and measures that form part of the NDC of the host country (target additionality) (Michaelowa et al. 2020b). A distinction is probably required between those mitigation policies that contribute to the conditional and those contributing to the unconditional part of the NDC, which has not been addressed in United Nations Framework Convention on Climate Change (UNFCCC) negotiations so far (Michaelowa et al. 2020b).

Thus, there are still some open questions revolving around the link to the NDC in terms of whether the activity needs to go beyond the activities associated with the NDC and whether planned measures are also included in that as well as the link with existing LT-LEDS. In order to contribute to transformational change, it is necessary to safeguard the overselling of MOs by host countries. Therefore, activities should be additional at least to the unconditional NDC targets. A common understanding of conditionality has not yet been achieved in international negotiations. Therefore, it will, to a certain extent, not only depend on the distinction of conditional and unconditional NDC targets but also on the role the country foresees for Article 6 cooperation.

Ideally, additionality testing also takes into account the host country's LT-LEDS. Transformational change thus requires further adjustments to tools for additionality determination: Instead of reflecting on what BAU is, the question is what ought to be achieved in order to meet the PA's long-term objective. Instead of deliberating on how a proposed activity can go beyond BAU, the discussions under transformational change require identifying what 'ought to become BAU' (Michaelowa et al. 2019). Hence, evaluating the transformation potential of an activity implies assessing whether it is aligned with a transformational development pathway or not (Michaelowa et al. 2019; Hermwille and Obergassel 2018). As long as the LT-LEDS is ambitious and ideally in line with a well below 2°C emissions pathway, the determination of strategic additionality could contribute to transformational change. Against the background that many countries have not developed LT-LEDS yet and the diverse nature of targets submitted in LT-LEDS, this is not established as a necessary condition. However, if host countries have well developed LT-LEDS, the determination of activities' strategic additionality should be considered.

In a scenario where all countries have ambitious NDCs with a sufficient level of stringency and NDCs cover all sector and emissions sources, there would be no need for additionality tests (Michaelowa and Butzengeiger 2017). Activity-level additionality testing could also be waived or relaxed if host countries would allow an independent assessment of the stringency of their NDCs (Michaelowa et al. 2019). However, such conditions do not exist. On the contrary, many countries' first NDC submissions contained 'hot air' (Michaelowa et al. 2019). Scheiner et al. (2017) found that the first set of NDCs contained a potential of 2.2 to 3.5. Gt CO_2e of hot air due to BAU overestimation. Against this background, it is important that the determination of target additionality does not remain the only additionality test if the NDC's stringency is not proven. Ideally, financial additionality through the application of an investment test should be proven in addition to target additionality. This does not result in a transformative effect but is an important precondition, so that the activity can potentially result in a transformation.

As outlined in chapter 2, an important transformation characteristic is MOs at scale which are sustained over time. Michaelowa et al. (2019) propose a differentiated approach to additionality determination depending on the respective activity type. Regarding policy approaches, an investment test should consider the pay-back period of technologies (regulations), the introduction of a minimum carbon price (carbon pricing policies) or the absence of overallocation (trading schemes).

The use of so-called negative and positive lists is one way for host countries, project developers and buyers to establish (non)additionality. The CDM generated first experiences with positive lists aimed at reducing transaction costs by specifying certain project types to be automatically additional (Cames et al. 2016). These lists specified criteria such as the status of the technology in a defined geography, regulatory environment, technology penetration rates, costs, for which no further additionality test was required (Cames et al. 2016). Voluntary carbon standards such as the Verified Carbon Standard and Gold Standard also applying positive lists for automatic additionality. Negative lists could be used to exclude activities that do not comply with a certain degree of transformational change required to achieve NDCs, LT-LEDS targets and the long-term PA target. Although certain technologies could be included in negative lists without much controversy, e.g., coal and nuclear power, the inclusion of state-of-the-art fossil fuel technology might be more controversial.

Positive lists under the PA should not only focus on additionality as defined in the CDM context but also consider transformational change criteria (the potential of the activity to drive transformation and increase in NDC ambition) when determining automatic additionality. In other words, through assessing the potential for upscaling an activity without further support of ITMO revenues after an initial crediting period, for example, through declining cost curves as a result of market penetration or future regulations in the host countries. Positive lists' scoring cards could provide a high score to an activity if i) there is a high probability that an activity would be able to significantly reduce its operating costs for being self-sufficient in the long run, and ii) potential for technology diffusion exist. If an activity can fulfil these requirements, it can significantly contribute to transformational change. In addition, positive lists could also include carbon credit vintages to determine eligibility and could be tailored to segments of the global carbon market.

Experiences with positive lists in international carbon markets have been decidedly mixed. Under the CDM grid-connected renewables like solar and wind have remained on the positive list (Michaelowa et al. 2019) despite a cost reduction of an order of magnitude over the last decade that has made these activities the cheapest power generation options in many locations. The CDM regulators did not revise the positive list while voluntary carbon market standards like Verra and the Gold Standard in 2020 have put such activities on a negative list due to their general lack of additionality (Michaelowa et al. 2020a). Positive lists therefore do not represent a panacea and in order to ensure environmental integrity they need to be updated frequently in fixed intervals (e.g., in order to account for cost reductions and increased market penetration) to avoid weakening environmental integrity.

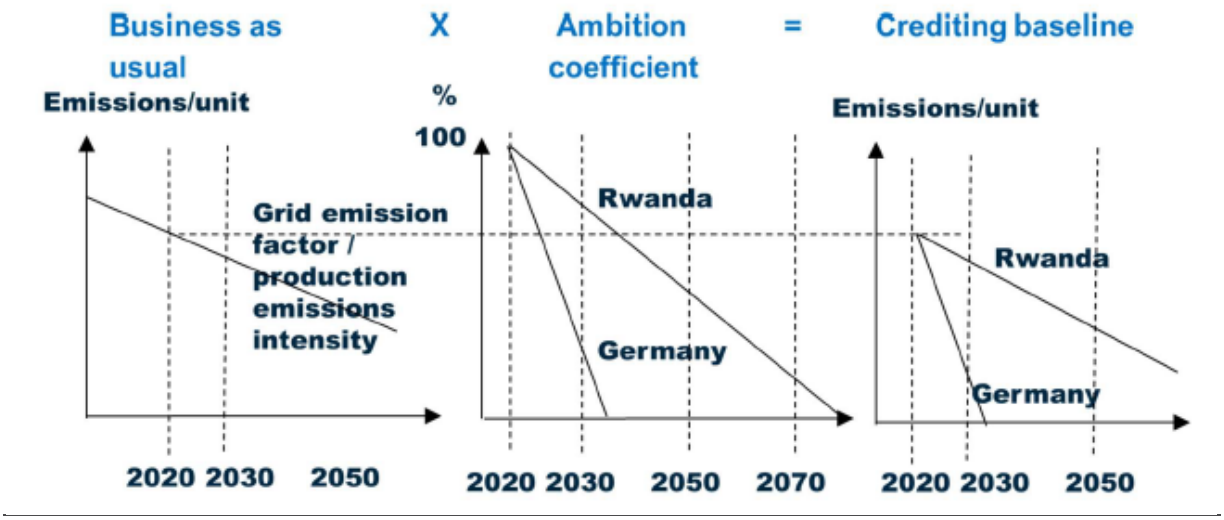
In practice, including transformational change as a criterion has proven to be difficult. Based on the experiences from the Nationally Appropriate Mitigation Action Facility and the Green Climate Fund, the transformational change concept needs to be tailored to each sector in order to avoid ambiguity (Hermwille and Obergassel 2018). Hence, further research for each sector would need to be carried out, as well as domestic or multilateral decision-making processes. Another highly relevant development are benchmarks emerging from Sustainable Finance, particularly in the EU, which also consider establishing a "negative" list/"brown" taxonomy (TEG 2020, p.51). While such benchmarks are still under discussion, this development represents an opportunity to establish reference points for Article 6 related positive or negative lists.

3.3.2 Dynamic approaches to baseline setting

Ensuring transformational impact from upscaled crediting approaches will require regular updating of key parameters forming part of the baseline calculation. Therefore, dynamic approaches to baseline setting should form part of Article 6 methodologies, especially for sectoral approaches and policy crediting. Quantified parameters should therefore be identified ex-ante and updated ex-post to ensure that transformation is triggered. While the Supervisory Body (SB) under the A6.4M should address the incorporation of a dynamic approach in its methodological/technical work, Parties cooperating under Article 6.2 could already consider a more dynamic approach and report on it in order to demonstrate their ambition, particularly for upscaled crediting. But a dynamic approach in itself does not guarantee a transformational contribution, the key is how baseline stringency is changing over time.

Whereas the current Article 6.2 draft negotiation text does not stipulate any stringent baseline approaches (Michaelowa et al. 2020b) and basically leaves it up to the cooperating Parties to choose an approach, the first two iterations of the Article 6.4 draft negotiation text propose among others stringent approaches such as the application of a best available technology (BAT) approach (UNFCCC 2019a; UNFCCC 2019b). In fact, BAT benchmark approaches derived from best available technologies/practices in a certain geography, is mentioned in both iterations in at least one of the three introduced baseline setting approaches. Even though this is not a new baseline setting approach as benchmarking derived from BAT has found some limited application under the Kyoto Mechanisms, its inclusion in the final Article 6.4 negotiation text would set a clear signal for a more widespread use of such baselines approaches in the future. A BAT-derived benchmark results typically in more stringent crediting thresholds than historical or BAU baseline emission factors calculated through project-specific baselines, thus increasing environmental integrity. BAT-derived baselines would no longer allow crediting for mature technologies with zero or low abatement costs, thus moving Art. 6 action towards 'middle-hanging' or 'high-hanging fruit'. But this also triggers criticism that a BAT baseline would then become too stringent, not incentivising any investments anymore. But if ITMO sales prices are high enough, a lower volume of credits generated by an activity would be compensated by the higher credit price and thus generate revenue that exceeds the mitigation cost. BAT-benchmarks could help to generate trust and thereby higher long-term certainty on the value of high integrity carbon credits which is key to generate appetite of investors. A BAT-approach would also ensure that host countries do not oversell their MOs. In general, the application of BAT can help the host country to more easily identify the interventions which will require Article 6 cooperation, are aligned with NDC achievement and thereby contribute to the long-term transformation of the respective sector (Forth 2021). Challenges that would need to be overcome to enable a wider application of such benchmarks is the limited data availability – at least publicly – and the potentially restricted understanding of industry-provided data by the regulator(s). It is important to note though that BAT-derived benchmarks are in general only suitable for sectors that feature homogenous products such as the metal and cement production industry or electricity generation (Füssler et al. 2019).

An alternative to BAT approaches that could be applied to any sector would be the alignment of baselines with the PA's long-term targets. Such an alignment is making baselines more stringent over time through the application of a dynamic transition parameter (Hermwille 2020), also referred to as 'ambition coefficient' (Michaelowa et al. 2021). This proposal of a dynamic baseline relates to a pre-determined pathway such as global, regional or national pathways towards net zero emissions (Michaelowa et al. 2021). The transition parameter would mean that the baseline emissions intensity moves downwards from the current value as calculated by a CDM methodology towards a normative reference. The normative reference can either refer to an 'ought margin' differentiated by technology (Hermwille 2020) or to a net-zero national emissions path to be in line with the PA target (Michaelowa et al. 2021). Whether the 'normative reference' will be BAT or net-zero, it is pivotal that the Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) principle is applied (Michaelowa et al. 2021). In the context of a net-zero emissions path as 'normative reference', richer countries will need to reach net-zero earlier than poor ones. The general idea is then that the BAU emissions intensity which is calculated based on the CDM baseline methodologies is multiplied by the ambition coefficient which declines over time (see Figure 2). One important consideration in this context would be that the ambition coefficient valid for the relevant crediting period should be fixed ex-ante, ideally updated every five years in line with the NDC cycle (Michaelowa et al. 2021).



Source: Michaelowa et al. 2021

Figure 2: Application of the ambition coefficient to BAU to derive a dynamic crediting baseline

For operationalising such a dynamic ambition coefficient in different country contexts, parameters should not necessarily be derived from national strategies such as NDCs or LT-LEDS but rather from general indicators relevant for Paris-aligned emissions pathways (Michaelowa et al. 2021):

- Gross National Income per capita
- Cumulated historical emissions
- Mitigation potential
- Geographic criteria

Building on these and potentially further criteria, country-specific pathways could be developed in order to derive a specific ambition coefficient. Taking an example of an energy efficiency project for grid-connected electricity in South Korea, the first step would be to calculate the grid emission factor in accordance with the relevant CDM tool. Subsequently, the year in which the ambition coefficient reaches zero is determined which is 2040, implying that an ambition coefficient of 75% would be multiplied by BAU in order to derive the crediting baseline.

Regarding governance, the Article 6.4 SB could potentially be responsible for administering the ambition coefficients and providing guidance on their development. An important consideration in this context would be how such a dynamic approach could be implemented in a bottom-up system under Article 6.2. An agreement among buyer country clubs on joint ambition coefficients could potentially represent an important behavioural incentive for other countries which fear "naming and shaming" under the Article's stringent reporting requirements. Obviously, such a buyer club needs to be willing to pay significantly higher credit prices than before. In general, the mobilisation of sufficient buy-in until a critical mass of countries is reached requires extensive consideration.

In summary, stringent baseline setting approaches are required to unlock the transformational impact of Article 6 activities. The main considerations of stringent baseline setting are:

- Incentives: BAT-derived benchmarks or baselines aligned with a net-zero pathway will result in a lower volume of generated carbon credits due to their stringency. Therefore, higher carbon prices will be needed for a potentially smaller number of verified MOs. Otherwise, the mechanism may be too unattractive for project developers and carbon buyers and thus languish.
- Predictability: Project developers require a reasonable degree of certainty about expected carbon revenues for taking investment decisions. Whereas the duration of the crediting period was already an arbitrary choice prescribed by CDM rules (UNFCCC 2002), the introduction of dynamic baselines could entail a second arbitrary element into the mechanism, thereby rendering it less transparent and robust. A balance between predictability and stringency could be restored by combining ex-ante fixed declines in baseline parameters and updates to all baseline parameters at the point of crediting period renewal to avoid uncertainty for project owners and investors. Frequent and unpredictable revisions to baselines will undermine the project owner's readiness to invest.
- Efficiency: To yield the same number of creditable emission reductions and monetary carbon revenues, proportionally longer crediting periods are required in the context of stringent baseline setting. However, activities for transformational impact should use crediting periods that are relatively short compared to the technical lifetime of the technology, thus generating long-term benefits for the host Party and the climate. An exemption to this is costly technologies that have long payback periods. In this case, crediting periods should be linked to the payback period necessary to mobilise the technology. Especially for activities with short crediting periods, a higher price per tCO_2e will be required to create equivalent investment incentives under a crediting scheme with “stringent” baselines which should go hand in hand with an increase of ambition and willingness to pay on the ‘buyer’ side.
- Resources and capacity: The development of BAT benchmarks is a highly complex, resource-intensive and contentious process even for seemingly “homogeneous” products such as cement as revealed by experience with the CDM and JI (Schneider et al. 2012). Given the many potential technologies and highly varying host country circumstances, this will require significant resources at the level of the Article 6.4 SB and potentially the Regional Collaboration Centres, as many host countries will not have the institutional capacity, technical know-how nor the resources to ensure robust standardised baseline setting. It would be much easier to apply simple solutions like the ‘ambition coefficient’.

The listed aspects should be considered in ongoing Article 6 negotiations but also in further technical work by the Article 6.4 SB.

4 Experience from Article 6 pilot activities

This chapter provides an overview of the case study analysis demonstrating how the characteristics of transformation are applied across the three countries. The following sections analyse the “Organic waste to energy” activity currently being implemented in Morocco, the “Development and promotion of urban cycling in the municipalities of Curridabat and Montes de Oca in San José” in Costa Rica and the conceptual case study on “Integrating Article 6 in competitive power auctions” in Pakistan. For each country, the analysis is undertaken at the NDC and sectoral level, followed by an activity level analysis. The first sub-section in each of the three case studies describes how the NDC and SDG national and sectoral goals and ambitions can be described in terms of transformational outcome characteristics. The second sub-section looks at the practical implementation of the Article 6 activities to assess the process characteristics for how activities contribute towards transformation of the sector.

4.1 Morocco

The activity under assessment is the Organic Waste to Energy activity in Morocco, which has been pre-selected by the KliK Foundation as an Article 6 piloting project for the MADD phase. The project has been chosen due to its novelty in the focus country and the important role the waste sector plays in Morocco's NDC in terms of the identified mitigation potential. The transformational potential of the waste sector in Morocco makes the case study an ideal testing ground for combining Article 6 and transformational change characteristics.

4.1.1 NDC and sector level

In 2017, the country adopted the National Sustainable Development Strategy (SNDD) with the goal of achieving a green and inclusive economy by 2030 (SNDD 2017). In its NDC, Morocco committed to an unconditional target of reducing greenhouse gas (GHG) emissions by 17% compared to BAU by 2030 (SEDD 2016), backed up by a list of over 60 specific actions differentiated into unconditional and conditional components (SEDD 2016). This made Morocco's NDC one of the most ambitious and detailed NDCs (Climate Action Tracker 2019). Currently, the country is updating its NDC and developing a national climate plan that will integrate all national climate policies, which intends to build resilience to climate risk and accelerate the country's transition to a low carbon economy (Centre de Compétences Changement Climatique (4C) du Maroc 2019).

The waste sector in Morocco accounts for 8% of Morocco's net GHG emissions (MEMEE 2016). Of this, 41.2% emissions are caused by uncontrolled waste disposal, 21.9% by controlled landfills and the rest by wastewater treatment (MEMEE 2019). A very ambitious GHG emission target has been set for the solid waste sector in the NDC. Several sectoral policies like the National Household Waste Programme 2008 are aimed at improving solid waste management systems, e.g., by rehabilitating uncontrolled landfills and establish recycling centres (Ministry of Interior 2008; MEMEE 2016). The high mitigation potential of the waste sector was identified in its NDC with nearly 13% of the country's expected mitigation efforts between 2021 and 2030 coming from the waste sector (SEDD 2016). The National Strategy for the Reduction and Recycling of Waste (2019) specifies recycling targets for each waste segment and endorses a move towards the concept of circular economy. Morocco has made considerable advances in energy recovery rates from waste management as well as established new disposal sites and rehabilitating old ones (MEMEE, 2016). Civil society is an active participant in the sector with its most influential association being the Association des Enseignants des Sciences de La Vie et de la Terre (AESVT) that engages with parliamentarians as well as organises local trainings in waste sorting (AESVT 2019). While entrepreneurs have been driving progress in management of solid waste, strong political support and coordination between responsible ministries is still lacking. This was shown by the fact that the engagement of the Ministry of Interior in the NDC update process was rather limited, leading essentially to a 'recycling' of the approach undertaken in the first NDC. Furthermore, the waste sector has been facing issues due to lack of funding, planning and technical capacity at the local level (Climate Chance 2020). The mixed success of carbon crediting approaches under the CDM due to low volumes of emission reductions achieved by Moroccan landfills caused by the semi-arid conditions and failure of the eco-tax on plastics (Zero Mika Law) are examples that show that carbon pricing is not a panacea to solve all problems of the waste sector (UNEP DTU Partnership 2020; MEMEE 2016). Educational programmes about recycling and training programmes to promote proper waste segregation may improve reactivity of waste sector actors to incentives (AESVT 2019; SEDD 2016).

4.1.2 Activity level: Waste-to-energy activity in Morocco

This ex-ante assessment analyses the initial project design of the Organic Waste to Energy (OWtE) activity in Morocco, supported by the KliK Foundation. The activity aims to generate energy from organic waste in food processing between 2021 and 2030. Organic waste is converted into biogas instead of being transferred to landfills, and the biogas is then used to produce combined heat and power. The avoided methane emissions via this Article 6 activity can be certified and sold as ITMOs. It is a highly innovative, first of its kind project in Morocco that will introduce large anaerobic biodigesters. The start date of the project implementation is contingent upon Morocco and Switzerland signing a bilateral agreement along the lines of the agreements undertaken with Peru and Ghana. Individual projects will be implemented at the city/municipality level starting with larger cities. These can be scaled up and replicated in other cities and provinces in Morocco and other countries. Apart from reducing Morocco's GHG emissions, the programme will also generate several co-benefits such as reduced landfill leachate and groundwater contamination, job creation, improved resource efficiency, raising awareness about waste treatment and know how transfer among others. KliK Foundation is slated to be a compliance buyer. The activity is pre-selected by KliK Foundation for the MADD phase, which started in late Q1 2021 (KliK 2021).

Table 1: Assessment of Moroccan activity's contributions towards transformational change

Transformation characteristics	Issues to consider in designing Article 6 activities
GHG MOs at scale, sustained over time, aligned with the PA temperature goal of well below 2°C	**Stringency of additionality testing** ► The activity envisages two types of additionality testing: (1) additionality against the unconditional part of the NDC, and (2) financial additionality. **Mitigation potential** ► The avoidance of uncontrolled release of methane results in approx. 15,000 tCO_2e per year per project which will be sold as ITMOs. This would amount to approx. 1.5 to 2 million tCO_2e reductions until 2030, if 15 projects are introduced that generate ERs for 7 years (KliK, 2021). **Likelihood that activity leads to an expansion of the unconditional part of the NDC in its next revision** ► Depends on an increased engagement of the line ministry MOI and MEME in the sector which was not visible in the 2020 NDC update. **Policy instrument is highly likely to contribute to existing conditional NDC elements given the cap on eligibility limited through market penetration.** ► The activity represents only about 3% of the sectoral mitigation target in cumulative terms until 2030. Thus, the activity can play a small but important part of achieving the sectoral emission reduction targets of Morocco's conditional NDC. **Likelihood that activity leads to upscaling of mitigation** ► High likelihood that the activity is expanded to be implemented in other cities and provinces in Morocco and other countries if technically robust. **Share of MOs kept by the host country** ► Details still need to be elaborated; will need to be approved by all relevant stakeholders **Degree of innovation of underlying policy instruments**

Transformation characteristics	Issues to consider in designing Article 6 activities
	► Highly innovative with great mitigation potential; such an activity has not yet been implemented in Morocco at this scale.
SDG outcomes at scale, sustained over time, aligned with the 2030 Agenda global goals and Planetary Boundaries (PB) framework	**Level of detail of accounting of SDG benefits** ► Programme contributes mainly towards SDG 12, but also SDGs 3, 6, 7 and 8. Detailed analysis of the social benefits will be conducted in the MADD phase. **Level of safeguards against adverse effects in development and on planetary boundaries** ► "Do no harm" criteria will play a key role in assessing potential Article 6 programmes (KliK, 2021). Standard terms of references for calls of proposals must specify that the availability of safeguards to prevent negative impact on SDGs is considered in the pre-selection process. However, no comprehensive set of safeguards is foreseen nor available at the current stage. **Existence of ex-ante assessment of potential SD contributions and risks** ► When submitting a proposal, the applicants will need to explain what SDG goals are affected and in what way (KliK, 2021). **Level of detail of SDG benefit monitoring** ► The depth at which SDG benefit monitoring will be conducted is still undetermined. A direct alignment of SDG reporting with MRV could also be explored for this activity, depending on whether the activity's MRV can be based to an extent on existing carbon standards. **Existence of third-party verification of SDG benefits** ► Third-party verification is currently not planned nor envisaged but could become more relevant once the concept development is further advanced.
Technology change and *digitalisation*	**Broader technology development - R&D, adoption and scale-up:** **Likelihood of catalytic implementation of mitigation technology** ► If successful, the programme could lead to the desired catalytic effect as the OWtE is aimed at to be a step-by-step scale-up of projects, eventually covering most larger municipalities in Morocco. **Degree of understanding of abatement costs of the technology *and the ability to lower them*** ► Feasibility studies authorised for two potential project locations were conducted to better understand the abatement costs of processing organic waste in anaerobic biodigesters. Indicative calculations from the studies suggest that a price between EUR 20-30/t CO_2e over a 7-year period could make such projects financially feasible. **Level of risk for lock-in fossil infrastructure?** ► The project proposal was regarded as having no risk for lock-in into fossil fuel infrastructure because it generates renewable energy while avoiding the uncontrolled release of methane. **Digitalisation:** **Degree of support for acceleration of implementation of mitigation technology** ► Minor role in OWtE programme.

Transformation characteristics	Issues to consider in designing Article 6 activities
	Degree of facilitation of MRV ► Linking of registries and the automatization of reporting processes can significantly lower MRV costs and increase transparency. If feasible, the OWtE will make use of such advances.
Normative change – (*dynamic) baselines*	**Degree of consistency of baseline approach with PB concept and long-term target of the Paris Agreement, e.g., through crediting thresholds and derivation of a baseline emissions path below BAU** ► Cannot be determined yet, as these issues will be decided on later in the process. **Degree of conservativeness** ► BAU scenario is deemed to be the most realistic baseline at this stage. Further considerations will be taken into account during the MADD phase. ► Project baselines need to consider the situation in the respective cities and what would happen with the organic waste if it were not treated in an anaerobic biodigester. **Length of crediting periods (relative to technology lifetime?)** ► The OWtE programme intends to set up a structure and a pricing model where the individual projects should be able to operate without carbon revenues after a term of seven years.
Agents of change - *government and private sector*	**Are actors involved that have the power to drive transformation?** ► Yes, the actors involved have the power to facilitate and foster an effective institutional design for the activity. But a stronger engagement of relevant ministries is needed. Additionally, OWtE plants will be developed by private sector companies who will drive technology transfer for this technology.
Incentives for change - *carbon pricing*	**Does the activity enhance the likelihood that carbon pricing policies are mentioned in the NDC?** ► It is unlikely that the activity has led to a more prominent role of carbon pricing in the updated NDC and will likely not do so for future Moroccan NDC submissions. But if the activity is a success, this picture could change.

This Article 6 activity is still in its early stage of development and preliminary assessment indicates the NDC conditionality is favourable for enabling the activity to participate in Article 6. Initial discussions regarding a bilateral agreement between Morocco and Switzerland to establish a framework for cooperative approaches under Article 6 are underway. This activity is unique to Morocco with great mitigation and upscaling potential. There are several SD benefits associated with the activity. These include SDGs 3, 6, 7, 8, 12. However, details still need to be discussed by agencies involved in the MADD phase with regards to appropriate assignment of roles and responsibilities to government and non-government agencies, better understanding of abatement costs, degree of consistency and conservativeness of baseline approaches, SDG benefit monitoring among others.

4.2 Costa Rica

The pilot activity assessed is called 'Development and promotion of urban cycling in the municipalities of Curridabat and Montes de Oca in San José'. The activity's novelty, large sustainable development benefits and alignment with the country's National Decarbonisation Plan, with potential replication of the activity in other municipalities and countries highlight its transformational nature.

4.2.1 NDC and sector level

Costa Rica presented its National Decarbonisation Plan in 2018 (Government of Costa Rica 2019). The plan sets the objective to achieve full decarbonisation by 2050 and net-zero emissions, placing the country in the position of a pioneer for developing new approaches to reduce emissions and transform society. The decarbonisation plan was developed through the collaboration of several ministries, leading this decarbonisation objective to be well integrated with other development plans that seek economic development in an environmentally friendly way at all levels (MIDEPLAN Costa Rica 2018). Moreover, to avoid any trade-offs with sustainable development, the country explored linkages between the Decarbonisation Plan and the 2030 Agenda for sustainable development. Instruments such as carbon taxes and a domestic carbon market are currently under discussion (MINAE Costa Rica 2019). The sector in focus for Costa Rica is the transport sector. The Decarbonisation plan elaborates the goals to be achieved by the transport sector, such as developing a mobility system based on safe, efficient and renewable public transport, transforming the light-duty vehicles fleet to have zero emissions and promoting a cargo transport that adopts sources of energy with zero or the lowest possible emissions. The reason for such a specific focus of the decarbonisation plan on the transport sector is because it contributes the most to the GHG emissions of Costa Rica (~44%) (Government of Costa Rica 2019). This is so because of an increased rate of urbanisation and lack of public transport options. While the sector itself is not expected to reach net-zero emission by 2050, high mitigation potential in this sector will enable Costa Rica to reach net-zero emissions at the national level. Emission reductions in this sector are expected to be achieved through fuel switch, use of electric vehicles and efficiency improvements. Digitalisation has been identified as having a key role in transforming the sector as a knowledge-based economy strategy to foster accumulation, processing and analysis of data has been implemented (Government of Costa Rica 2019) along with the development of a digitised transparency system "SINEMECC" to track transformational processes. The country has a long history of incentives to protect the environment from degradation and that is highly likely to spill over to the transport sector. Green tax reforms (Sengupta and Villegas 2019), eco-taxes on cars and fossil fuels, restrictions of the use of private vehicles in city centres (San Jose) and the creation of a favourable institutional and regulatory framework for the use of sustainable transport (MINAE Costa Rica 2019) will be important drivers for decarbonisation of the transport sector. While awareness has increased to promote the use of sustainable modes of transport, the focus needs to be directed towards investing in infrastructure such as roads, expanding public transport reach etc. to facilitate the ongoing efforts to transform the sector.

4.2.2 Activity level: Modal shift to non-motorised transport in Costa Rica

The activity assessed for Costa Rica is the development and promotion of urban cycling in the municipalities of Curridabat and Montes de Oca in San José, the capital. The assessment is based on unpublished project activity descriptions, notes from three semi-structured interviews conducted between January and February 2021 with a representative from the Ministry of Environment and Energy of Costa Rica, a national consultant working for ICAT and two representatives from the municipality of Curridabat. The goal is to make space for bikes and build a network of bicycle paths. The focus is to build infrastructure and stimulate the use of bikes for short-distance commuting. Currently, the high-speed and accidents created by car drivers is a challenge for the safe use of bikes. This project wants to decrease speed and make the streets better for other users than cars. Streets can be converted to green corridors. Urban greening to develop parks and green areas around bicycle and walking paths can also help address other urban problems such as congestion, poor air quality, inequality and well-being through improved health and reduced costs from active mobility and adaptation to enhance resilience to heat and flooding. Problems can be converted to opportunities. E-bikes could also play a role in reducing GHG emissions because they allow for longer travels. The objective is to promote urban cycling as a means of transport through a four-phased approach: 1) training and data collection from consolidated urban cycling communities, 2) data analysis, 3) design of infrastructure interventions and regulatory incentives for urban cycling and 4) implementation and operation of these interventions. Moreover, the intervention is integrated into a more comprehensive sustainable transport intervention also improving public transport.

The activity is implemented by the two municipalities 2019-22 and it is embedded in Costa Rica's National Decarbonisation Plan 2018-2050 to achieve the national goal of net-zero emissions by 2050. A pilot case study on MRV/transparency aspects is undertaken with support from ICAT based on the ICAT Transformational Change Methodology (2020). The objective of the pilot assessment is to identify transformational characteristics and design elements for learning and upscaling of similar activities, assuming the activity could be designed and developed as an Article 6 programme going forward for replication in other municipalities and cities. The activity is considered transformational and novel in global carbon markets mainly due to its many sustainable development benefits, its political alignment with long-term decarbonisation and a significant replication and upscaling potential country wide.

Table 2: Assessment of Cost Rican activity's contributions towards transformational change

Transformation characteristics	Issues to consider in designing Article 6 activities
GHG MOs at scale, sustained over time, aligned with the PA temperature goal of well below 2°C	**Stringency of additionality testing** ► Pilot activity's aim is not to assess additionality as Government of Costa Rica does not currently intend to sell emission reduction units. However, it can be explored for up-scaled similar projects in the future. **Mitigation potential** ► Minimal as it is a local activity. But the activity has the potential to be upscaled. **Likelihood that activity leads to an expansion of the unconditional part of the NDC in its next revision** ► Costa Rica does not have a conditional NDC component. There are several political reasons for this: First, that Costa Rica's ability to achieve its net-zero goal depends on foreign technologies being available and supported nationally. Second, the practical

Transformation characteristics	Issues to consider in designing Article 6 activities
	implementation of tracking and distinguishing between conditional vs unconditional parts of an NDC is not (yet) possible. **Likelihood that activity leads to upscaling of mitigation** ► The aim of the activity is to pilot local activities in two municipalities which may be replicated in other municipalities to achieve national targets on transport as outlined in the Decarbonisation Plan. The focus of the pilot activity is also about sustainable development and active mobility as goals in their own right. **Share of MOs kept by the host country** ► Not yet determined if Costa Rica is ready to sell emission reduction units internationally in 2021. The infrastructure and design for a compensation/offset mechanism is under development. **Degree of innovation of underlying policy instruments** ► Very innovative; there is a new vision for transformational change in the transport sector – shifting to low-carbon modes of transport.
SDG outcomes at scale, sustained over time, aligned with the 2030 Agenda global goals and Planetary Boundaries (PB) framework	**Level of detail of accounting and monitoring of SDG benefits** ► Existence of qualitative assessment of SDGs, which over time will be integrated into the SINAMECC system including provisions for quality assurance through technical review. **Level of safeguards against adverse effects in development and on planetary boundaries** ► No safeguards discussed yet. **Existence of ex-ante assessment of potential SD contributions and risks** ► SD impacts are assessed ex-ante and eventually ex-post **Existence of third-party verification of SDG benefits** ► Technical review as part of quality assurance for reporting under the domestic transparency system
Technology change and *digitalisation*	**Broader technology development - R&D, adoption and scale-up:** **Likelihood of catalytic implementation of mitigation technology** ► E-mobility has upscaling potential ► Will have a catalytic effect on how people think about transportation. ► Implementation will also depend on broader policy development such as policies on road safety and public transport infrastructure. **Degree of understanding of abatement costs of the technology *and the ability to lower them*** ► Abatement costs are not assessed but may be relatively high due to the local and small scale of MOs **Level of risk for lock-in fossil infrastructure?** ► No risk for lock-in fossil infrastructure. **Digitalisation:** **Degree of support for acceleration of implementation of mitigation technology**

Transformation characteristics	Issues to consider in designing Article 6 activities
	► Project will create infrastructure and increase awareness which will translate in greater participation of private sector and the civil society **Degree of facilitation of MRV** ► Mitigation impact will be tracked through MRV of GHG and SDG impacts using the SINAMECC. **Degree of facilitation of digital payments /financing mechanism** ► Digital payment methods are not used in Costa Rica to disincentivise use of cars. Cars are used freely as parking is free
Normative change – (*dynamic) baselines*	**Degree of consistency of baseline approach with PB concept and long-term target of the Paris Agreement, e.g., through crediting thresholds and derivation of a baseline emissions path below BAU** ► TBD **Degree of conservativeness** ► Baseline scenario is assumed to be the continuation of the use of existing modes of transport in the absence of the project according to the CDM small-scale methodology (see UNFCCC 2018). **Length of crediting periods (relative to technology lifetime?)** ► TBD
Agents of change - *government and private sector*	**Are actors involved that have the power to drive transformation?** ► Local governments /municipalities with the civil society playing an important change agent role. The municipal governments are responsible for promoting policies and formulating mobility strategies to promote non-motorised transport. Furthermore, private sector is also expected to play an important role to drive new business opportunities. **Does the activity create institutional capacity and improve effectiveness?** ► Central government is required to step in for this aspect as infrastructure and services of public transport are managed by the central government. They would be the main force to promote intermodal transport. **Does the activity include a gradual phase-out of Article 6 funding through 'catalytic' finance?** ► TBD
Incentives for change - *carbon pricing*	**Does the activity enhance the likelihood that carbon pricing policies are mentioned in the NDC?** ► Carbon pricing is not so applicable because emissions are difficult to measure due to the local scale issue.

4.3 Pakistan

The following conceptual case study assesses how Article 6 can be integrated into competitive auctions for renewable energy in Pakistan. It has been selected as the activity is an innovative policy instrument that will accelerate technology deployment through an effective price discovery mechanism.

4.3.1 NDC and sector level

The Government of Pakistan (GOP) has been proactive in mainstreaming the SDGs in all its policies, plans and strategies, being the first country to adopt the 2030 agenda for SD back in 2016 (GOP 2019). In 2018, the National SDG Framework was approved by the National Economic Council which prioritises the global goals into several categories. Pakistan has committed to reducing up to 20% of its 2030 projected GHG emissions, conditional on international support (GOP 2016). Furthermore, the Ministry of Climate Change is actively considering the use of market mechanisms in the context of Article 6 of the PA to achieve this target. The country has always focused its polices and plans towards the energy sector which is responsible for nearly 46% of total emissions, making it the largest contributor in Pakistan's emissions profile (GOP 2016). Additionally, the country is suffering from an ongoing energy crisis due to a lack of sustainable energy sources and an imbalance between supply and demand in the energy sector (GOP 2016; Aleluia et al. 2019). It is crucial to tackle these problems in the energy sector as reliable energy supply is critical to sustaining economic growth. As a result, the National SDG Framework prioritises the goal of 'Affordable and Clean Energy'. In its first NDC submission, GOP has identified large scale and distributed grid-connected solar and wind power as high priority mitigation options. The institutional and regulatory framework in the country at present are favourable such as the country is trying to engage the private sector in the public sector dominated power sector. Pakistan's policy framework at the national level is fully supportive of instruments such as carbon taxes (NCCP 2012) and emissions trading (Aleluia et al. 2019) as part of its mitigation strategy. The country can draw on its successful experiences with CDM revenues for wind power and generate further awareness about the benefits of wind power. However, despite the pledge to increase the share of renewable energy to 60% (IISD 2020), there are coal-fired plants with a capacity of 2640 MW still under construction (Lo 2020). The importance of its ties with China has put pressure on the country to expand coal power and take coal power plant loans. Additionally, efforts must be directed towards managing the unrealistic power tariffs, high inefficiencies, low payment recovery and effective management of subsidies mechanism as these issues pose a great barrier for future energy sector investment.

4.3.2 Activity level: Integrating Article 6 in competitive power auctions in Pakistan

This conceptual case study delves into how competitive power auctions for renewable energy projects, specifically wind power projects can be supported through Article 6. The activity under consideration is an innovative policy instrument that will result in the proliferation of wind power technologies, whose potential remains largely untapped, into the country's energy mix thereby making it transformative in nature. Renewable energy auctioning is expected to be implemented at the sectoral level with the duration of the policy being connected to the contract duration of the power purchase agreement. Such a policy is crucial to Pakistan for achieving the recently announced ambition increase of increasing the share of renewables to 60% by 2030 according to the country's Prime Minister (IISD 2020), significantly higher than the 30% increase by 2030 announced by the Alternative and Renewable Energy Policy which was adopted in 2020 (GOP 2020). The ability of this policy instrument to accelerate technology deployment stems from the fact that power auctions set a fixed offtake price over a certain period which promotes investments in new and expensive low-carbon technologies. This fixed CO_2 price supports the off-taker in providing continuous and reliable incentives for emission reductions to investors. The upscaling of renewable energies will not only help reduce Pakistan's GHG emissions but also contribute towards achieving SDG 7 and results in other sustainable development benefits such as job creation and improved health of its citizens. Furthermore, this policy is likely to set a precedent for how investments can be mobilised towards capital-intensive technologies beyond renewable energies. Actors such as the Alternative Energy Development Board, responsible for drafting the Alternative and Renewable Energy (ARE) Policy, National Electric Power Regulatory Authority, the independent regulator in the power sector, and Ministry of Climate Change would play a key role in the effective implementation of the Article policy instrument. These agencies will need to work in close cooperation with each other in order to drive transformational change.

Table 3: Assessment of Pakistani activity's contributions towards transformational change

Transformation characteristics	Issues to consider in designing Article 6 activities
GHG MOs at scale, sustained over time, aligned with the PA temperature goal of well below 2°C	**Stringency of additionality testing** ► Additionality testing in the case of direct financial support should start from the calculation of an implicit carbon price and to then apply a threshold of at least 5 EUR/tCO_2 (Michaelowa et al. 2019) ► Can be promoted by international carbon market mechanisms until a penetration threshold of 5% is reached. Once the threshold has been surpassed the generated emission reduction could be sold in a national voluntary carbon market, MOs could then be accounted towards domestic NDC achievement. **Mitigation potential** ► Potentially large mitigation potential depending on how broadly the instrument will be applied (which technologies, scale) **Likelihood that activity leads to an expansion of the unconditional part of the NDC in its next revision** ► Policy instrument is likely to contribute to existing conditional NDC elements but statements on the expansion of unconditional NDC targets purely speculative at the current stage; a precondition would be the clear distinction between the conditional and unconditional targets in the updated NDC

Transformation characteristics	Issues to consider in designing Article 6 activities
	Likelihood that activity leads to upscaling of mitigation ► Likelihood of upscaled mitigation is high as policy instrument can easily be applied for other technologies and sectors **Share of MOs kept by the host country** ► To be determined bilaterally between buyer and seller country **Degree of innovation of underlying policy instruments** ► Highly innovative; can be applied for capital-intensive technologies (e.g., hydrogen)
SDG outcomes at scale, sustained over time, aligned with the 2030 Agenda global goals and Planetary Boundaries (PB) framework	**Level of detail of accounting of SDG benefits** ► Existing task forces and SDG support units at the national and provincial levels to monitor and support the activity's contribution to affordable and clean energy (SDG 7), GHG reduction (SDG 13), job creation (SDG 8) and improved health (SDG 3) ► Existing SDG data collection and institutional challenges (e.g., data at district level) need to be addressed (Ministry of Planning, Development and Reforms, 2017) **Level of safeguards against adverse effects on sustainable development and on planetary boundaries** ► No safeguards established yet, but can be integrated with pre-bid qualifications
Technology change and *digitalisation*	**Likelihood of catalytic implementation of mitigation technology** ► High likelihood of catalytic implementation of policy instrument across multiple sectors **Degree of understanding of abatement costs of the technology *and the ability to lower them*** ► Policy will contribute to reduced abatement costs of the technology GOP can partially recover the capital needed in foreign currency for PPAs through carbon revenues **Level of risk for lock-in fossil infrastructure** ► No risk for a lock-in in fossil infrastructure as incentives are set in such a manner that decarbonisation of the sector is clearly accelerated **Degree of support for acceleration of implementation of mitigation technology** ► Digitalisation would need to be enhanced decisively in order to accelerate the implementation of mitigation technology ► Digitalisation would also help in grid automation, thereby stabilising the existing grid infrastructure (NEPRA, 2021)
Normative change – (*dynamic) baselines*	**Degree of consistency of baseline approach with PB concept and long-term target of the Paris Agreement, e.g., through crediting thresholds and derivation of a baseline emissions path below BAU** ► Boundaries need to be set for the baseline scenario and drivers of emissions identified in the absence of the policy (Kreibich and Obergassel, 2018) ► Policy instrument can build on extensive experience with establishing grid emission factors in the CDM. Some adjustments will need to be made to CDM baseline scenarios including the application of OMGE or ambitious crediting thresholds

Transformation characteristics	Issues to consider in designing Article 6 activities
	Length of crediting periods (relative to technology lifetime?) ► Need to shorten crediting periods compared to technology lifetime to generate transformative impacts
Agents of change - *government and private sector*	**Are actors involved that have the power to drive transformation?** ► AEDB thanks to its new proactive role and NEPRA are powerful actors which have the capacity to drive the transformation of the energy sector ► Ministry of Climate Change will play an important role in the policy instrument's coordination with other policies, including the implementation of a potential ETS **Does the activity create institutional capacity and improve effectiveness?** ► Institutional capacity to implement effective policies for the promotion of renewable energies already exists (Interview Pak2, 2021; NEPRA, 2021); few institutions in the power sector infrastructure like NTDC still need to enhance institutional capacity. ► Activity will improve effectiveness as the instrument would ensure that GOP allocates subsidies more efficiently (Malik et al., 2018)
Incentives for change - *carbon pricing*	**Does the activity enhance the likelihood that carbon pricing policies are mentioned in the NDC?** ► Yes; Policy activity requires an existing carbon price; it would most likely go hand in hand with the establishment of an ETS **Does the activity contribute to the reduction of fossil fuel subsidies (negative carbon pricing)?** ► Activity could result in the reduction of fossil fuel subsidies but increasing electricity costs would need to be prevented (NEPRA, 2021)

The assessment of this Article 6 activity is at a conceptual stage. However, this explorative assessment indicates the transformative and mitigation potential that renewable power auctions have. The activity has great upscaling potential as it can be applied to various new technologies within and beyond the power sector. The activity will contribute to SDG goals at national and regional levels, more specifically SDG 7. However, scrutiny is required when it comes to setting baselines (below BAU) and crediting periods in order to generate transformative impact. Positive and negative lists could be a viable approach to provide ex-ante certainty at which technology at precise scales will be eligible for Article 6 cooperation and ITMO transfers. Furthermore, all public and private agents involved need to work in close collaboration with each other to ensure smooth and effective implementation of the policy instrument.

4.4 Comparative analysis of the case studies

The assessment of all Article 6 activities has been conducted prior to their implementation and final design stage and is thus necessarily ex-ante and explorative. The aim of the assessment was to generate some preliminary findings about how Article 6 design can be incentivised to become more transformational. The findings are presented in Table 4. The activity's relationship to the NDC needs to be clear in order to specify, for example, the level of MOs that the host country can export without overselling its MOs and endangering NDC achievement. This is not the case for all Article 6 case studies. Therefore, it is important that the suggested incentive structure is based on clear guidance that supports countries in deciding to which extent an activity is eligible for positive lists. The Article 6 activity designs consider the need to redefine additionality in the context of NDCs. The activities do not duplicate existing national policies but build on them and expand them further. The Moroccan activity is also considering the application of an investment test in addition to target additionality. The conceptual activity design in Pakistan foresees the use of a carbon price threshold for additionality testing. Costa Rica is currently developing positive lists which include transformational change as an explicit criterion.

The Article 6 activities in Morocco and Pakistan could both potentially generate MOs at scale: In Morocco, the activity could be further upscaled by expanding investments in anaerobic biodigesters in other Moroccan cities. In Pakistan, the policy's application or redesign (e.g., into carbon contracts for difference) can also be expanded to other sectors such as the industry sector. The Costa Rica case study is a novel micro-scale activity with multiple SDG benefits; MOs at scale would be reached only if the activity would be taken up in several cities. The three Article 6 activity designs do not provide perverse incentives in terms of promoting MOs overselling or preventing and expansion of the NDCs' scopes. However, it is difficult to assess at this stage whether the activity might contribute to its potential integration into the NDC's unconditional targets as not all countries have already submitted updated NDCs. MO overselling risk are considered through stringent baseline setting (Pakistan) or the sharing of MOs (Morocco).

While all Article 6 activities build on the national priorities expressed within the SDG agenda, safeguards against negative impacts on SDGs do not play a pronounced role yet. The intention to develop such safeguards has been raised by the Pakistan Ministry of Climate Change. Thus, the analysis reveals that further emphasis could be put on the development of safeguards at the activity-level.

The Costa Rica Article 6 case study shows that low-tech solutions such as promoting biking and walking could play a larger role in the PA than in the CDM. Low-tech solutions entail many process-related transformational aspects such as a high number of locally relevant adaptation and sustainable development benefits. However, this is not only a design question but also depends on buyers' willingness to pay as such low-tech solutions are often more expensive. Still, smart MRV solutions due to enhanced digitalisation play an important role in this. For example, enhanced digitalisation enables the tracking of more dispersed activities through the use of apps (e.g. biking activity in Costa Rica). The Morocco case study makes use of short crediting periods compared to technical lifetime of the anaerobic biodigesters, thus generating transformational impacts through long-term benefits for the host Party. However, the Article 6 case study designs reveals that baseline setting for transformational change requires more guidance and such approaches need to be strongly incentivised.

Table 4: Comparative results of the Article 6 activity analysis

	Morocco	Costa Rica	Pakistan
Activity builds on existing national policies to develop national and sectoral pathways to align with the PA goal	The activity builds on the National Strategy for the Reduction and Recycling of Waste and extends recycling activities also to organic waste.	The activity is embedded in Costa Rica's National Decarbonisation Plan but can be considered a new measure.	The concept foresees the integration of Article 6 in an existing policy instrument, thus further extending it.
Activity contributes to the conditional part of the NDC	Activity contributes to the conditional NDC target in the solid waste sector.	Costa Rica's NDC comprises only unconditional targets but mentions that it will still rely on financial support, capacity building and technology transfer (MINAE 2020, p. 5).	It is likely that some NDC targets in the energy sector will be defined in the updated NDC, potentially also of conditional nature.
Additionality testing approaches	Activity design considers target additionality and financial additionality (investment test).	Additionality testing stringency is dependent on scale of activity. Transformational change as additionality criterion for large-scale projects.	Concept foresees application of an implicit carbon price (5 EUR/t CO_2) for investment test.
Does not set perverse incentives	Activity lies within the NDC's scope, thus not providing a perverse incentive against extending the country's NDC scope.	Activity forming part of the national decarbonisation plan.	Activity will most likely fall under NDC scope.
Likelihood of inclusion in the unconditional part in next NDC revision	Shows potential but depends on engagement of line ministries.	-	First, a clear distinction between conditional and unconditional NDC targets would need to be made.
Upscaling potential	Activity has large upscaling potential if implemented in further Moroccan cities.	Micro-scale activity could be decisively upscaled and even elevated to the national level in the form of a policy that promotes biking.	The conceptual activity is particularly well-suited to upscaling due to its applicability as a policy instrument to various technologies.
Activity to address country's priorities within SDG agenda	Waste-to-energy forms part of prioritised SDGs in Morocco.	The biking activity contributes to SDG goals at the national and local levels; effect to be measured through established indicators.	SDG 7 clearly represents a priority for Pakistan.

Establishment of safeguards against negative impacts on SDGs	Not yet addressed	Not yet addressed	Government considers the introduction of safeguards an important precondition for carbon market engagement.
Use of digitalisation for increased transformational impact	Not specifically considered	Apps will be used for the biking activity.	Emphasis on digitalisation as electricity grid malfunction solution.
Smart MRV solutions discussed	Smart MRV solutions are considered in the sense of linking registries and automisation of reporting processes.	Mitigation will be tracked through MRV of GHG impacts using SINAMECC.	-
Consistency and conservativeness of baseline approaches	Currently under consideration	Currently under consideration	-
Use of short crediting periods	Project design foresees short crediting periods.	-	Crediting periods to be in line with payback period.
Agent involved have the ability and power to drive transformation	Powerful agents are involved but further engagement required especially from the line ministries.	Powerful agents are involved at the local level.	Powerful agents are pushing for engagement in new carbon markets and piloting activities.

5 Conclusions and recommendations

Transformational change is essential to achieving the goals of the PA but has varying meanings in different expert communities. The Article 6-specific transformation characteristics put forward by the authors do not show any broad application to date. This can also be explained by the fact that there is little empirical substance due to the early stage of Article 6 rule-making and implementation. The three case studies focused upon in this report reveal that the **Article 6 landscape is still at an early stage but likely to be more diverse** than activities under the Kyoto Mechanisms, and definitely offers potential to harness transformational change. While core sectors like waste and energy dominate the current Article 6 piloting landscape (Greiner et al. 2020), more innovative activities such as clean transport including cycling and walking, emerging technologies like hydrogen as well as nature-based solutions may emerge more prominently.

Based on the observations, the practical implementation of Article 6 baseline approaches and methodologies requires further guidance and incentives. Furthermore, an incentive structure that rewards SDG benefits, and safeguards may be required to be put in place to mitigate negative impacts. Finally, the case study analysis reveals that Article 6 cooperation requires a better integration of MRV systems at different levels for NDC accounting and reporting, as well as for SDG benefits.

Core carbon market principles such as additionality and stringency in baseline setting need to be reconsidered in the Article 6 context. Article 6 activities will need to be additional not only to BAU but also to existing policies and potentially to planned policies and measures laid out in countries' NDCs and LT-LEDS, unless these are defined as being conditional on international support. We argue that in order to be transformational, **activities need to be additional to at least the unconditional NDC** targets to safeguard against overselling by the host country. This will also depend on how the host country defines conditionality of its targets and what role it foresees for Article 6 cooperation. Besides, it is recommended **that target additionality should not remain the only additionality test in case of an absent NDC stringency test** and an investment test at activity level should be conducted in addition. Such a dual approach to additionality testing represents a safeguard against 'hot air' and enables the host countries to prevent the sale of 'low-hanging fruit'. We propose that an important incentive would be the development of conservatively established positive lists by host countries or buying entities for automatic additionality. This provides guidance to activity proponents on what kind of activities they are considering granting authorisation to or acquiring ITMOs from. These positive lists should have a clearly defined validity period that is regularly reviewed. The transformational change concept could itself become an additionality criterion for establishing positive lists.

It is widely recognised among negotiators that stringency in baseline setting is an important principle in the PA context to ensure environmental integrity and contributions to host country NDC achievement. We recognise the **need for making baselines more dynamic** which can either be achieved by quantifying baseline parameters ex-post in a pre-defined calculation or by changing in value over time upon pre-defined changes in parameters. Especially the latter one is aligned with the proposed definition of transformational change, asking the question of what *should be* rather than what is. The determination of the 'normative reference' can be based on BAT-derived benchmarks, long-term deep decarbonisation or net-zero goals. The operationalization would be most simple through 'ambition coefficients' that decline over time and be plugged upon existing baseline methodologies, while specification of benchmarks would entail significant transaction costs. Most importantly, we argue to consider differentiation, based on the **application of the CBDR-RC principle in such a dynamic baseline approach** which would imply that most countries would increasingly be limited to generating units from emission removals (nature-based solutions or negative emission technologies) after 2030 whereas low-income countries with limited historical responsibility and per capita emissions could sell emission reductions until the second half of the century.

Yet, several practical concerns regarding stringent baseline setting remain. The shift from static to more dynamic baselines bears the risk of unpredictability for project developers. Therefore, a recommendation is that a **good balance needs to be sought between predictability and stringency** through, for example, the combination of ex-ante fixed declines in baseline parameters – like an ambition coefficient pre-defined for several decades – and updates to all baseline parameters at the point of crediting period renewal. The shortening of crediting periods can also contribute to the transformative impact of Article 6 activities. However, such a shortening should be based on technology characteristics and cost structures (e.g., payback period); the truly transformational technologies actually need long crediting periods!

The stringent application of core carbon market principles will have an impact on the carbon credit volume. Investment incentives have to be set in a manner that they account for the reduced carbon revenues and **demands from buyer countries and entities thus need to be paired with the necessary willingness to pay**. This implies that the buyer can set favourable conditions for the activities' contribution to transformational change.

In order to promote transformational change, Article 6 activities should also be assessed systematically for their contribution to SDG outcomes. This might render the Article 6 landscape more diverse and include new types of mitigation actions, driven predominantly by rewarding locally relevant sustainable development benefits rather than only Mos, as shown by the biking case study in Costa Rica. However, to avoid a situation where high-outcome, transformative mitigation actions are disregarded due to little or no contribution to SDGs a **more pronounced focus will also be required for safeguards against potential adverse effects on sustainable development and planetary boundaries** of Article 6 activity design. This holds especially true for emerging technologies such as negative emissions technologies which may entail risks and uncertainties and require a detailed consideration of their interplay with other planetary boundaries beyond the climate sphere. One recommendation in this regard is the conduct of further research on the operationalisation of the PB concept in the context of Article 6 activities in terms of downscaling the boundaries to the sectoral level.

Regarding the proposed incentive structure for transformational change through Article 6, some of the proposed incentives include recommendations on how the draft Article 6 rules could evolve further. In case these recommendations are not taken up during the future Article 6 negotiations, these could still be considered in subsequent methodological or technical work of the Supervisory Body by Article 6.4. Under Article 6.2, behavioural incentives will play an important role for example through voluntary principles established by a buyer club or by a coalition of countries (e.g., San José Principles).

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