

CLIMATE CHANGE

06/2021

Urban components under Article 6 of the Paris Agreement

Final Report

CLIMATE CHANGE 06/2021

Project No. (KFZ) 117361

Report No. FB000445/ENG

Urban components under Article 6 of the Paris Agreement

Final Report

by

Sonja Butzengeiger, Dr. Axel Michaelowa, Kaja Weldner
Perspectives Climate Research gGmbH, Freiburg

Chang Deng-Beck, Dr. Eszter Mogyorósy, Jan-Albrecht Harrs
ICLEI, Bonn

Prof. Dr. Maike Sippel
Fakultät Technik, Wirtschaft und Gestaltung, Hochschule Konstanz, Konstanz

On behalf of the German Environment Agency

Imprint

Publisher

Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
buergerservice@uba.de
Internet: www.umweltbundesamt.de

[f/umweltbundesamt.de](https://www.facebook.com/umweltbundesamt.de)
[t/umweltbundesamt](https://twitter.com/umweltbundesamt)

Report performed by:

Perspectives Climate Research gGmbH
Hugstetter Str. 7
79106 Freiburg

Report completed in:

May 2020

Edited by:

Section V 2.6 Emissions Reduction Projects – CDM (DNA)/ JI (DFP)
Marcel Kruse
Fachgebietsleiter: Frank Wolke

Publicationen as pdf:

<http://www.umweltbundesamt.de/publikationen>

ISSN 1862-4359

Dessau-Roßlau, January 2021

The responsibility for the content of this publication lies with the author(s).

Kurzbeschreibung: Städtische Emissionsminderungsaktivitäten unter Artikel 6 des Pariser Übereinkommens

Städtische Gebiete verursachen über 70% der direkten und indirekten CO₂-Emissionen weltweit. Um das international vereinbarte Ziel zu erreichen, den globalen Temperaturanstieg auf 1,5 bis 2 °C zu begrenzen, sind erhebliche Anstrengungen zur Emissionsreduktion in Städten erforderlich. Die Mobilisierung signifikanter Treibhausgasminderungen in Städten ist jedoch aufgrund ihrer sehr heterogenen Strukturen und einer großen Anzahl kleiner, unterschiedlicher Emissionsquellen (z. B. Verkehr, Gebäude) eine große Herausforderung. Darüber hinaus sind die Organisationsstrukturen städtischer Emissionsquellen viel vielfältiger als die von z.B. großen industriellen Punktquellen. Eine weitere Herausforderung für verantwortliche Entscheidungsträger und Institutionen ist, dass sie nur eingeschränkten Zugang zu Investitionskapital haben, um großskalierte Maßnahmen zur Reduktion von Treibhausgasminderungen umzusetzen.

Kohlenstoffmarktmechanismen nach Artikel 6 des Pariser Abkommens können neue Chancen für die Mobilisierung von großangelegten Emissionsminderungs-Maßnahmen und Politiken darstellen. Das vorliegende Forschungsprojekt hat zunächst die Prävalenz und Erfahrungen städtischer Minderungsprojekte im Rahmen des Clean Development Mechanism (CDM), von Nationally Appropriate Mitigation Actions (NAMAs) sowie von Transformative Actions Programs (TAP) untersucht. Darauf aufbauend wurden verschiedene konzeptionelle Ansätze zur Umsetzung von Artikel 6 in Städten erarbeitet. Um die unterschiedlichen nationalen Strukturen und Rahmenbedingungen angemessen berücksichtigen zu können, wird ein „Menüansatz“ mit einheitlichen Prinzipien und Standards vorgeschlagen.

Darüber hinaus untersucht die Studie Ansätze zur Bestimmung der Zusätzlichkeit urbaner Minderungsaktivitäten und diskutiert verschiedene Finanzierungsoptionen.

Abstract: Urban components under Article 6 of the Paris Agreement

Urban areas cause over 70% of direct and indirect CO₂-emissions worldwide. To achieve the internationally agreed goal of limiting the global temperature increase to 1.5 to 2 ° C, considerable efforts to reduce emissions in cities are required. Mobilizing significant greenhouse gas reductions in cities is, however, a major challenge due to their very heterogeneous structures and a large number of small and varied emission sources (e.g. traffic, buildings). In addition, the organisational structures of urban emission sources are much more diverse than those of e.g. major industrial point sources. A general challenge for responsible decision-makers and institutions is that they have limited access to investment capital to implement large-scale measures to reduce greenhouse gas emissions.

Carbon market mechanisms under Article 6 of the Paris Agreement can offer new opportunities for the mobilisation of large-scale emission reduction measures and policies. This research project first examined the prevalence and experience of urban reduction projects within the framework of the Clean Development Mechanism (CDM), Nationally Appropriate Mitigation Actions (NAMAs) and Transformative Actions Programs (TAP). Building on this, various conceptual approaches to the implementation of Art. 6 in cities were developed. In order to take appropriate account of the different national structures and framework conditions, a “menu approach” with uniform principles and standards is proposed.

In addition, the study examines approaches to determine the additionality of urban mitigation activities and discusses various financing options.

Table of Content

List of figures	8
List of tables	9
List of abbreviations	10
Zusammenfassung.....	12
Summary	15
1 Introduction.....	18
2 Urban mitigation activities: experiences under recent and existing market mechanisms	19
2.1 Analysis of urban activities within the Kyoto mechanisms.....	22
2.1.1 Observations from the analysis of CDM methodologies	22
2.1.2 Analysis of CDM projects and Programmes of Activities.....	24
2.1.3 Challenges for urban projects in the CDM.....	27
2.1.4 Success factors for urban projects in the CDM.....	29
2.2 Analysis of projects with urban component outside of the Kyoto mechanisms	32
2.2.1 High-level screening of the urban NAMA and TAP projects	32
2.2.2 In-depth analysis of successful NAMAs and TAP projects	35
2.2.3 Challenges of urban activities in the context of Non-Kyoto mechanisms	37
2.2.4 Success factors of urban activities in the context of Non-Kyoto mechanisms	38
2.3 Conclusions chapter 2	39
2.3.1 Key challenges of urban mitigation activities	39
2.3.2 Potential solutions for urban mitigation activities under Article 6 PA	40
3 Approaches for urban mitigation activities under Article 6 of the Paris Agreement.....	42
3.1 Framework concept for urban Article 6 activities	45
3.1.1 Common principles and methodologies.....	45
3.2 Menu of approaches	52
3.2.1 Subsector approach	52
3.2.2 Policy type categorisation.....	54
3.2.3 Project facilitator approach	56
3.2.4 Top-down approach.....	60
3.2.5 City climate fund approach.....	62
3.3 Best-practice roadmap.....	65
3.4 Environmental and social safeguards	66
3.4.1 Environmental safeguards	66
3.4.2 Social safeguards.....	68

3.5	Evaluation of approaches.....	73
3.5.1	SWOT analysis.....	73
4	How additionality can be tested for urban Article 6 activities.....	76
4.1	Why the additionality principle is relevant for Article 6 activities.....	76
4.1.1	Emission sources not covered by NDCs	76
4.1.2	Unconditional parts of NDCs.....	76
4.1.3	Status quo of UNFCCC-negotiations on additionality rules for Article 6 mechanisms	77
4.2	A generic decision tree for additionality requirements under Article 6.....	77
4.2.1	Scenario 1: High-frequency BAU determination	78
4.2.2	Scenario 2: Low-frequency BAU determination	78
4.3	City specific mitigation activities and policy interventions.....	79
4.3.1	Financial incentives.....	80
4.3.2	Regulatory instruments	81
4.3.3	Infrastructure investment and public procurement.....	81
4.4	Conclusions for Article 6 additionality testing	82
5	Financial Solutions for Urban Mitigation Projects.....	83
5.1	Challenges of financing urban sustainable projects	83
5.2	Barriers for financing urban mitigation projects that could be alleviated by Article 6	83
5.2.1	Lack of capacity and awareness for financial instruments	83
5.2.2	Lack of fiscal capacity and creditworthiness.....	84
5.2.3	Lack of direct access to international funds at local level	84
5.2.4	Difficulty to engage private sector.....	84
5.2.5	Uncertainties caused by election, administrative changes and dependency on national governments.....	84
5.3	Identification of common financial methods applied for urban projects.....	85
5.3.1	Traditional instruments for municipal finance	85
5.3.2	Innovative financial instruments for municipal governments.....	85
6	Conclusions.....	97
7	References.....	100
A	Annexes:	105
A.1	Subsectors with Urban Relevance	105
A.2	Analysis: Table 1. Considered CDM Methodologies with Urban Component	106
A.3	Analysis: Table 2. Analysis of Projects and Programmes of Activities with an urban component.....	116
A.4	Analysis: Table 3. Summary of the analysis of NAMAs and TAP projects.....	121

List of figures

Figure 1: Study Scope of the Non-Kyoto Mechanism	21
Figure 2: CDM methodologies with urban component per subsector and category	23
Figure 3: Number of single projects and PoAs per subsector	25
Figure 4: Forecast and actually issued CER volume of Transmilenio BRT project in Bogotá, Colombia (1000 CERs)	28
Figure 5: Forecast and actually issued CER volume of Bandeirantes landfill project, São Paulo, Brazil (1000 CERs)	29
Figure 6: Forecast and actually issued CER volume of São João landfill project, São Paulo, Brazil (1000 CERs)	30
Figure 7: Forecast and actually issued CER volume of metro modal shift project in Delhi, India (1000 CERs).....	31
Figure 8: Delhi Metro revenues from CER sales (million €).....	32
Figure 9: Sectoral Distribution of urban TAP projects and urban NAMAs	33
Figure 10: Comparison between TAP projects and urban NAMAs	34
Figure 11: Climate Policy Framework in Philippine and Indonesia	35
Figure 12: The reporting completeness rate for selected deep-dive project	36
Figure 13: Proposed framework concept for urban mitigation activities under Article 6 of the Paris Agreement	42
Figure 14: Corresponding Adjustments for seller and buyer countries	44
Figure 15: Complexity of defining urban boundaries at the example of the waste sector (flow of urban waste streams and waste-related emissions).....	46
Figure 16: Collective emission trajectories for more than 10,000 Global Covenant of Mayors' cities and local governments under business-as-usual and target scenarios (avoided emissions if targets are set), with the NDC commitment line highlighted in a BAU scenario	49
Figure 17: General Approach to a Top-down Sectoral Baseline	53
Figure 18: Policy choices by regulator type with relevance for Article 6.....	55
Figure 19: Possible incentive structures under Article 6 (centralised approach) ...	56
Figure 20: Project facilitator approach: support flow for actions under Article 6 ..	58
Figure 21: GCoM cities and local governments across all regions, represent over 864 million people and more 10% of the global population, are demonstrating enormous potential for significantly lowering emissions compared to business-as-usual (BAU) scenarios.....	61
Figure 22: Direct exchange of ITMOs between cities.....	62
Figure 23: Tailgaiting-approach.....	64
Figure 24: City Climate Fund approach	65
Figure 25: Various potential baseline levels for (urban) Article 6 activities	67
Figure 26: Proposed additionality testing for Article 6 mechanisms - scenario of high-frequency national baseline checks	78

Figure 27: Proposed additionality testing for Article 6 mechanisms - scenario of low-frequency national baseline checks	79
Figure 28: Additionality of incentive-policies.....	80
Figure 29: Process Illustration for Revolving Fund.....	86
Figure 30: Land value capture	88
Figure 31: Blended finance.....	90

List of tables

Table 1: General assessment criteria	21
Table 2: Additional criteria for NAMAs and TAP activities.....	22
Table 3: Analysis of single projects with urban relevance	26
Table 4: Analysis of PoAs with urban relevance.....	26
Table 5: Example: Definition of urban targets in NDCs.....	47
Table 6: Important players and responsibilities under the project facilitator approach.....	57
Table 7: Selected indicators of the social dimensions of the SCPI according to CityKeys (2017) that shall ensure the quality of access to public services, diversity, social cohesion, education, housing, equity and community involvement	69
Table 8: Five Social Safeguarding Principles underpinning the Gold Standard for the Global Goals	70
Table 9: Revolving fund's applicability	87

List of abbreviations

ADB	Asian Development Bank
A6.4ER	Article 6.4 Emission Reduction (Credits)
BAU	Business-as-usual
BRT	Bus rapid transport
CCFLA	Cities Climate Finance Leadership Alliance
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO2eq	Carbon dioxide equivalent
COP	Conference of the Parties
DOE	Designated Operational Entity
EIB	European Investment Bank
EPA	United States Environmental Protection Agency
ETS	Emission Trading Scheme
ESCo	Energy Service Company
FMDV	Global Fund for Cities Development
GHG	Greenhouse Gas
GIB	Global Infrastructure Basel Foundation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMC	Gwalior Municipal Corporation
MRTC	Hong Kong Mass Transit Railway Company
INEA	Innovation and Networks Executive Agency of the European Commission
IFI	International financial institution
LCCAP	Local climate change action plan
LVC	Land-value capturing
MDB	Multilateral Development Bank
MRV	Monitoring, Reporting, Verification
NAMA	Nationally appropriate Mitigation Action
NDC	Nationally Determined Contribution
ODA	Official Development Assistance
PA	Paris Agreement
PB	Participatory budgeting
PoA	Programme of Activities
RBCF	Results-based Climate Finance
R20	Regions of Climate Action
RWF	Revolving Water Fund
SB	Supervisory Body
SCC	Smart Cities and Communities network

SCISS	EU Smart Cities and Communities network
SDGs	Sustainable Development Goals
SIF	Sustainable Infrastructure Foundation
SRPP	Socially responsible public procurement
TAP	Transformative Actions Program
TER	Technical expert review
TFEU	Treaty on the Functioning of the European Union
UNCDF	UN Capital Development Fund
UNFCCC	United Nations Framework Convention on Climate Change

Zusammenfassung

Im ersten Teil dieser Studie wird die Prävalenz städtischer Minderungsprojekte im Rahmen des Clean Development Mechanism (CDM), von Nationally Appropriate Mitigation Actions (NAMAs) sowie von Transformative Actions Programs (TAP) untersucht, wobei nach den Unterkategorien Abfall, private Gebäude, öffentliche Infrastruktur, lokale Energiebereitstellung, städtischer Transport sowie Wasser und Abwasser differenziert wurde.

Bei einzelnen CDM-Projekten dominieren im urbanen Umfeld hinsichtlich der Anzahl der durchgeführten Maßnahmen die Kategorien Abfall und Abwasser. Demgegenüber dominieren bei programmatischen CDM-Ansätzen (POAs) sowie städtischen NAMAs lokale Energiebereitstellung und Maßnahmen in privaten Gebäuden. Bei TAP-Projekten verzeichnen die Kategorien öffentliche Infrastruktur sowie Wasser/Abwasser die höchste Anzahl umgesetzter Projekte. Städtische Transportprogramme sind bei NAMAs und TAPs mit jeweils 18% durchaus signifikant vertreten, während sie im Kontext des CDM mit 3% nur eine sehr untergeordnete Rolle spielen. Die Unterschiede hinsichtlich der Dominanz von Projekttypen lässt sich durch die unterschiedlichen Wirk-, Anreiz- und Finanzierungsmechanismen von CDM, NAMAs und TAPs erklären.

Die qualitative Analyse zeigt, dass mit einer systematischen und umfassenden Reduzierung der Treibhausgasemissionen in kommunalen Gebieten verschiedene Herausforderungen verbunden sind. Die wichtigsten Herausforderungen sind:

- ▶ Stark unterschiedliche städtische Strukturen und Emissionsprofile auf internationaler und nationaler Ebene als Hindernis für die Definition standardisierter Ansätze.
- ▶ Teilweise ungünstige Eigentümerstrukturen (Bsp. Mietobjekte) und komplexe politische Verantwortungsstrukturen sowie Herausforderungen bei der Einbeziehung sämtlicher relevanten Akteure (insbesondere der Regierungsebenen), die für die Durchführung städtischer Minderungsmaßnahmen erforderlich sind.
- ▶ Finanzierung von Minderungsmaßnahmen, insbesondere: Bankfähigkeit von Projekten / Aktivitäten, finanzielle Anreize für die Umsetzung von Maßnahmen, sowie Beschränkungen beim Zugang zu (internationalen / nationalen / lokalen) Finanzmitteln.
- ▶ Datenverfügbarkeit zur genauen Bestimmung der Treibhausgasminderungs-Effekte einer bestimmten Maßnahme.
- ▶ Komplexität der Monitoring-Anforderungen an städtische Minderungsmaßnahmen als Grundvoraussetzung für ergebnisorientierte Finanzierungen (RBF).

Als mögliche Lösungsansätze für urbane Minderungsvorhaben unter Artikel 6 des Übereinkommens von Paris wird ein Rahmenkonzept als „one-fits-all“-Ansatz und alternativ ein sektoraler „bottom-up“ Ansatz skizziert.

Kapitel 3 des Berichts identifiziert und untersucht mögliche Ansätze für städtische Minderungsmaßnahmen unter Artikel 6 des Pariser Übereinkommens. Im Rahmen des Forschungsprojekts wurden von den Auftragnehmern verschiedene Vorschläge erarbeitet und in einem fokussierten Workshop im Oktober 2019 vorgestellt. Die Präsentationen und Expertengespräche zeigen, dass es keinen einheitlichen Ansatz gibt, der für alle städtischen

Umgebungen weltweit als gut geeignet angesehen werden kann. Stattdessen erfordern unterschiedliche nationale Strukturen und Gesetzgebungssysteme von Städten in ihrem lokalen und regionalen Umfeld - einschließlich sozialer und kultureller Bedingungen - individuelle Konzepte.

Gemeinsame Grundsätze und standardisierte Ansätze können jedoch nicht nur bei der Umsetzung von urbanen Artikel 6 Aktivitäten hilfreich sein, sondern auch dazu beitragen, dass sowohl die städtischen Behörden als auch Bundesregierungen gezielte Maßnahmen ergreifen, um systematisch urbane Emissionsminderungsmaßnahmen gemäß Artikel 6 umzusetzen.

Das Rahmenkonzept basiert auf gemeinsamen Prinzipien und standardisierten Methoden sowie eine Reihe von Ansätzen, die eine Stadt / ein Land je nach Struktur und Anforderungen wählen kann. Die Studie skizziert und evaluiert dabei die folgenden Ansätze:

- ▶ Subsektoraler Ansatz
- ▶ Ansatz der Politikinstrument-Kategorisierung
- ▶ Projekt-Moderator-Ansatz
- ▶ Top-Down-Ansatz
- ▶ Konzept städtischer Klimafonds

Die gemeinsamen Prinzipien umfassen die nachfolgend dargestellten Aspekte, die Stadtbehörden und / oder nationale Regierungen bei der Planung von urbanen Minderungsmaßnahmen unter Artikel 6 systematisch beachten kann:

1. Klare Definition der Stadtgrenzen und damit verbundenen Emissionsquellen.
2. Sicherstellung, dass die vorgesehenen urbanen Minderungsmaßnahmen mit dem national festgelegten Minderungsbeitrag (NDC) des Landes unter dem Pariser Abkommen im Einklang stehen.
3. Definition geeigneter und ökologisch integrierter Methoden zur Quantifizierung der Minderungseffekte.
4. Definition geeigneter Regeln für die Überwachung, Berichterstattung und Verifizierung (MRV).
5. Sicherstellung der sozialen Integrität von Maßnahmen.
6. Objektive Darstellung der Zusätzlichkeit der Minderungsmaßnahmen und Schaffung finanzieller Anreize.

In Kapitel 4 des Berichts wird die Notwendigkeit von Zusätzlichkeitstests für urbane Minderungsmaßnahmen zur Wahrung der Umweltintegrität entsprechender Artikel 6 Programme diskutiert. Zudem zeigen wir einige Optionen zur Herangehensweise der Zusätzlichkeitsbestimmung auf. Die Diskussion zeigt, dass Zusätzlichkeitstests für urbane Minderungsmaßnahmen nach Artikel 6 schnell sehr komplex werden können. Grundsätzlich sollten Zusätzlichkeitsanforderungen entsprechend des Ambitionsniveaus der NDC des Gastlandes sowie der sektoralen NDC-Abdeckung differenziert werden – siehe auch die ausführliche Diskussion in Kapitel 4. Aktivitäten, die direkt im keinen Bedingungen unterliegenden Teil der NDC aufgeführt sind, können nicht als zusätzliche Aktivitäten angesehen werden.

In Bezug auf politikspezifische Zusätzlichkeitstests kann eine Reihe allgemeiner Aspekte für jeden der wichtigsten politischen Instrumententypen berücksichtigt werden, d.h. finanzielle Anreize - Regulierung - Direktinvestitionen. Positive und negative finanzielle Anreize sollten als zusätzlich angesehen werden, wenn der Anreiz ein Niveau überschreitet, bei dem der Großteil der mobilisierten Emissionsminderungen (hinreichende) positive Minderungskosten aufweist.

Eine Regulierung sollte als zusätzlich angesehen werden, wenn die Amortisationszeit der vorgeschriebenen Technologie die übliche Schwelle für Entscheidungen von Industrieunternehmen und Haushalten überschreitet. Gleichermaßen sollte für öffentliche Beschaffungsprogramme gelten. Bei Infrastrukturinvestitionen sollte eine Kontrollgruppe ähnlicher Städte eingesetzt werden, um zu bewerten, ob die Investition „gängige Praxis“ ist.

Solche Zusätzlichkeitsansätze sind zwar auf internationaler Ebene (aktuell) nicht verbindlich vorgeschrieben, könnten jedoch von einem Club gleichgesinnter Käuferländer angewendet werden. Die Unterzeichner der San José-Prinzipien, die sich für Mindeststandards für Umweltintegrität und Ambitionssteigerung in den internationalen Verhandlungen zu Marktmechanismen einsetzen, könnten die Grundlage eines solchen Clubs sein.

Im letzten Kapitel werden mögliche neue Finanzierungsmechanismen für urbane Minderungsmaßnahmen identifiziert, und zwar:

- ▶ Revolvierende Fonds
- ▶ Abschöpfung von Bodenpreisseigerungen
- ▶ Verkauf von Bebauungsrechten
- ▶ Mischfinanzierung
- ▶ Kommunale (grüne) Anleihen
- ▶ Energieeffizienzverträge
- ▶ Revolvierende Nutzung der Einnahmen von CO₂-Bepreisungsmechanismen.

Summary

In the first part of this study, the prevalence of urban mitigation projects within the framework of the Clean Development Mechanism (CDM), Nationally Appropriate Mitigation Actions (NAMAs) and Transformative Actions Programs (TAP) is examined. Doing so, the subcategories waste, private buildings, public local energy supply, urban transport and water/wastewater were differentiated.

In the case of individual CDM projects, the categories waste and wastewater dominate in terms of the number of projects implemented. In the case of programmatic CDM approaches (POAs) and urban NAMAs, local energy supply and measures in private buildings dominate. For TAP projects, the categories public infrastructure and water/wastewater have the highest number of projects implemented. Urban transport programs are significantly represented in NAMAs and TAPs with 18% each, while in the context of CDM they only play a very minor role with 3% (both single CDM and PoAs). The differences in the dominance of project types can be explained by the different incentives and financing mechanisms of CDM, NAMAs and TAPs.

The qualitative analysis shows that there are various challenges associated with a systematic and comprehensive reduction of greenhouse gas (GHG) emissions in municipal areas. The main challenges are:

- ▶ Very different urban structures and emission profiles at international and national level as an obstacle to the definition of standardised approaches.
- ▶ Partially unfavourable ownership structures (e.g. rental properties) and complex political responsibility structures, as well as challenges in the involvement of all relevant actors (especially government levels), which are necessary for the implementation of urban mitigation measures.
- ▶ Financing mitigation measures, in particular: bankability of activities, financial incentives for the implementation of measures, and restrictions on access to international / national / local funds.
- ▶ Data availability for the exact determination of the GHG reduction effects of a certain measure.
- ▶ Complexity of the monitoring requirements for urban reduction measures as a basic requirement for result-based financing (RBF).

We outline a “one-fits-all” approach and alternatively a sectoral “bottom-up” approach as possible solutions for urban mitigation projects under Article 6 of the Paris Agreement.

Chapter 3 of the report identifies and examines possible approaches to urban mitigation measures under Article 6 of the Paris Agreement. As part of the research project, the contractors developed various suggestions and presented them in a focused workshop in October 2019. The presentations and expert discussions show that there is no one-size-fits-all approach that can be considered suitable for all urban environments worldwide. Instead, different national structures and legislative systems of cities in their local and regional environment - including social and cultural conditions - require individual concepts.

However, common principles and standardised approaches can not only be helpful in the implementation of urban Article 6 activities, but can also help both the city authorities and

federal governments to take targeted measures to systematically implement urban mitigation measures under Article 6.

Based on these considerations, we propose a framework concept with common principles and standardised methods as well as a series of approaches that a city / country can choose depending on the structure and requirements. The study outlines and evaluates the following approaches:

- ▶ Sub-sectoral approach
- ▶ Policy instrument type approach
- ▶ Project facilitator approach
- ▶ Top-down approach
- ▶ Concept of urban climate funds

The proposed common principles include the following aspects which any city agency and/or national government that plans to systematically implement urban mitigation measures under Article 6 should take into account:

1. Clearly define city boundaries and associated emission sources.
2. Ensure that the planned urban mitigation measures are in line with the NDC of the country under the Paris Agreement.
3. Define suitable and ecologically proper methods for quantifying the reduction effects.
4. Define appropriate rules for monitoring, reporting and verification (MRV).
5. Ensure the social integrity of measures.
6. Objectively assess the additionality of the reduction measures and create financial incentives.

Chapter 4 of the report discusses the need for additionality tests for urban mitigation measures to maintain the environmental integrity of corresponding Article 6 activities. We also outline some options for additionality determination. The discussion shows that additionality tests for urban mitigation measures under Article 6 can quickly become very complex. In principle, additionality requirements should be differentiated according to the ambition level of the NDC of the host country and the sectoral NDC coverage - see also the detailed discussion in Chapter 4. Activities listed directly in the unconditional part of the NDC cannot be considered additional activities.

With regard to policy-specific additionality tests, a number of general aspects should be taken into account for each of the most important types of political instrument, i.e. financial incentives - regulation - direct investment. Positive and negative financial incentives should be seen as additional if the incentive exceeds a level at which the majority of the mobilised emission reductions iseshow (sufficient) abatement costs. The regulation should be seen as additional if the payback period of the required technology exceeds the usual threshold for decisions by industrial companies and households. The same should apply to public procurement programs. A control group of similar cities should be used for infrastructure investments to assess whether the investment is "common practice".

Such additionality approaches are not currently mandatory at international level, but could be used by a club of like-minded buyer countries. The signatories to the San José principles who

advocate minimum standards for environmental integrity and increased ambition in the international negotiations on market mechanisms could be the basis of such a club.

The last chapter identifies possible new financing mechanisms for urban mitigation measures, namely:

- ▶ Revolving funds
- ▶ Land value capture
- ▶ Sale of development rights
- ▶ Blended finance
- ▶ Municipal (green) bonds
- ▶ Energy efficiency contracts
- ▶ Revolving use from revenue from CO₂ pricing mechanisms.

1 Introduction

Over 70% of global greenhouse gas (GHG) emissions are generated in cities; a share that is expected to rise further given the trend towards urbanisation and the increasing energy consumption in urban areas (IEA 2008). To reach the internationally agreed goal of limiting the global temperature increase to 1.5-2°C, substantial mitigation efforts in urban areas are required. Also the “largest opportunities for future urban GHG emissions reduction are in rapidly urbanizing areas where urban form and infrastructure are not locked-in”, but where overall capacities are constrained (IPCC 2014). Parties of the United Nation Framework Convention on Climate Change (UNFCCC) are currently developing the rules for ‘cooperative approaches’ under Article 6 of the Paris Agreement (PA) that aim to mobilise international support and finance for mitigation action. With a view of identifying how such approaches can foster mitigation action in cities, this report analyses experience with existing support mechanisms in urban areas.

The terms “city” and “urban” are used throughout this document to refer to geographically discernible subnational entities, such as communities, townships, cities, and neighbourhoods. In this document, they are also used to indicate all levels of subnational jurisdiction as well as local government as legal entities of public administration (Fong et al. 2014 p. 3).

Six sectors with particular relevance in urban contexts are considered in the analysis: local energy supply, private buildings (incl. data centres), public infrastructure, urban transport, water and wastewater, and waste¹. Large stationary energy supply is excluded from the scope of the analysis, as this belongs to the energy sector.

Chapter 2 analyses the role of selected existing support mechanisms – i. the Clean Development Mechanism (CDM), ii. Nationally Appropriate Mitigation Actions (NAMAs), and iii. Transformative Actions Programs (TAP) - for urban mitigation action.

Chapter 3 presents possible approaches under the new Article 6 of the PA that could support urban mitigation action in different settings. Those approaches were developed in an expert workshop in October 2019, are conceptually presented in this report and also evaluated from a generic point of view. City-specific case studies have not been part of this study but could deliver valuable additional insights regarding the applicability of the proposed concepts.

Finally, chapter 4 addresses additionality considerations for urban mitigation action under Article 6 of the PA and discusses various market-based funding options.

¹ These sectors cover the major emission sources in cities and therefore allow for a sensible analysis of challenges and success factors of urban climate projects. Nevertheless, it should be stressed that some of the analyzed projects cover actions in several sectors and that for some types of projects (e.g. the installation of PV on buildings) a clear distinction is difficult. The use of a sectoral approach vs. an approach that considers urban emissions as a whole ('one-fits-all approach') is discussed in section 2.3.2.

2 Urban mitigation activities: experiences under recent and existing market mechanisms

This chapter analyses the role of selected existing support mechanisms for urban mitigation action. The following types of support mechanisms are considered in the analysis:

- (i) The Clean Development Mechanism (CDM)
- (ii) Nationally Appropriate Mitigation Actions (NAMAs), and
- (iii) ICLEI's Transformative Actions Program (TAP)².

Both NAMAs and TAP are support mechanisms being more directly linked to national and international governmental support (in this document also referred to as Non-Kyoto mechanisms).

Under the CDM, GHG mitigation projects generate credits - so-called Certified Emission Reductions (CERs) -, which can be traded internationally. In order to issue credits, CDM projects must follow the registration and issuance process defined by the UNFCCC. This process includes an independent validation and verification process by so-called Designated Operational Entities (DOEs) and a formal approval by the CDM Executive Board. CERs are issued upon verification and certification of the emission reduction activities. The CDM comprises single projects as well as Programmes of Activities (PoAs), which target more programmatic approaches than the former category.

Although a relevant share of CDM projects has been implemented in urban territories, only a few projects have actively been supported or implemented by municipalities themselves (Sippel and Michaelowa 2011). Conceptual considerations how to cater better for the specific conditions of cities have been discussed at “CDM-peak times” (UNEP2011; UNEP 2014) and again recently in the context of development of an ‘urban tool’³ in the CDM (UNFCCC 2019e, UNFCCC 2019f).

While the Kyoto-mechanisms can be seen as a blueprint for market-based approaches – optimally combined with sufficient sources of demand, e.g. through emission trading schemes (ETS) on company level allowing for offsetting with CERs/Emission Reduction Units (ERUs) – there are also other financial mechanisms inside and outside the UNFCCC aiming to promote mitigation of GHG in urban areas.

Such “Non-Kyoto-mechanisms” often are referred to as traditional forms of public finance through government funds or grants, such as official bilateral or multilateral development assistance and domestic government spending. Since those mechanisms are government-driven, the level of finance generated will depend largely on the strength of political will and the national agenda. Under the UNFCCC, the concept of results-based climate finance (RBCF) is essential and has been reflected in NAMAs and discussions on Article 6 of the PA.

This study focuses specifically on two types of Non-Kyoto mechanisms: NAMAs and TAP. NAMAs are voluntary GHG mitigation activities in developing countries. There are NAMAs on the project, policy or strategic level, but all NAMAs focus on specific sectors and the enhanced implementation of mitigation action and sustainable development through a longer-term consideration of the supporting institutional and policy framework (UNIDO 2009). NAMAs can either receive international financial or technical support (“supported NAMAs”) or be

² See more info on the [website of the transformative actions program](#)

³ This covers the development of guidelines for the use of CDM in urban areas, including the application of multiple methodologies under one PoA. A guideline document was adopted by the CDM Executive Board in June 2020 focusing on the Development of PoA for buildings (UNFCCC 2020).

implemented domestically (“unilateral NAMAs”). The term NAMA was formally introduced in 2007 in the Bali action program. Today, the database of NAMA projects counts 181 submitted NAMAs that have received 164 million USD (UNEP DTU Partnership 2019a) in finance. The UNFCCC keeps an online registry of NAMAs.⁴

TAP stands for Transformative Actions Program. It is an initiative instigated and led by ICLEI that aims to catalyse and improve capital flows to cities, towns, and regions, and strengthen their capacity to access climate finance and attract investment. The TAP initiative also compiles a project pipeline. It serves as an incubator by collecting and screening applications based on their transformative⁵ potential. TAP projects showing high transformative impact potential can bear the TAP seal of approval and benefit from TAP Services to connect to project preparation facilities, funders, and solution providers. For its first call in 2015 a total of 124 projects from 41 countries were submitted- equally representing the Global South and Global North -, with an identified investment need of 9 billion USD. Until 2019, 23 projects successfully secured financial resources and started or completed project implementation. As of writing this report, 44 pre-screened projects remain in the pipeline further looking for finance.⁶

The 23 successful TAP projects used their own financial sources and/or received government grants or funds to leverage finance from the private sector.

1 Analysis of Kyoto-Mechanisms

In light of a large number of projects, our analysis started with a selection of methodologies in sectors and subsectors with particular urban relevance. For this, data from the CDM database (UNEP DTU, 2019) was used. Single CDM projects and PoAs applying a CDM methodology with urban relevance were extracted and analysed quantitatively, taking into account the number of projects with issuance as well as their performance. In a next step, a number of particularly insightful urban projects were analysed in depth. This resulted in an identification of success factors and challenges for urban activities. The longstanding practical experience of the consortium with the CDM, as well as experience from Joint Implementation (JI) projects, was also taken into consideration.

2 Non-Kyoto-Mechanisms

The NAMA and TAP projects were selected for an in-depth analysis for two reasons:

1. NAMA and TAP are both initiated by governments; NAMA at national level and the TAP at subnational level. NAMA and TAP projects can demonstrate how governments at different administrative levels design and implement the NDCs in urban areas.
2. NAMA and TAP both show a large project pipeline, with 124 TAP projects from 41 countries and 181 NAMAs from 46 countries (UNEP DTU Partnership 2019a), representing various urban sectors.

For this project, we first conducted a high-level screening of all 139 urban NAMAs from the NAMA pipeline and all 44 TAP projects in the pipeline. Through this screening, we aimed to identify typical project characteristics such as project sector, level of MRV process and financial status.

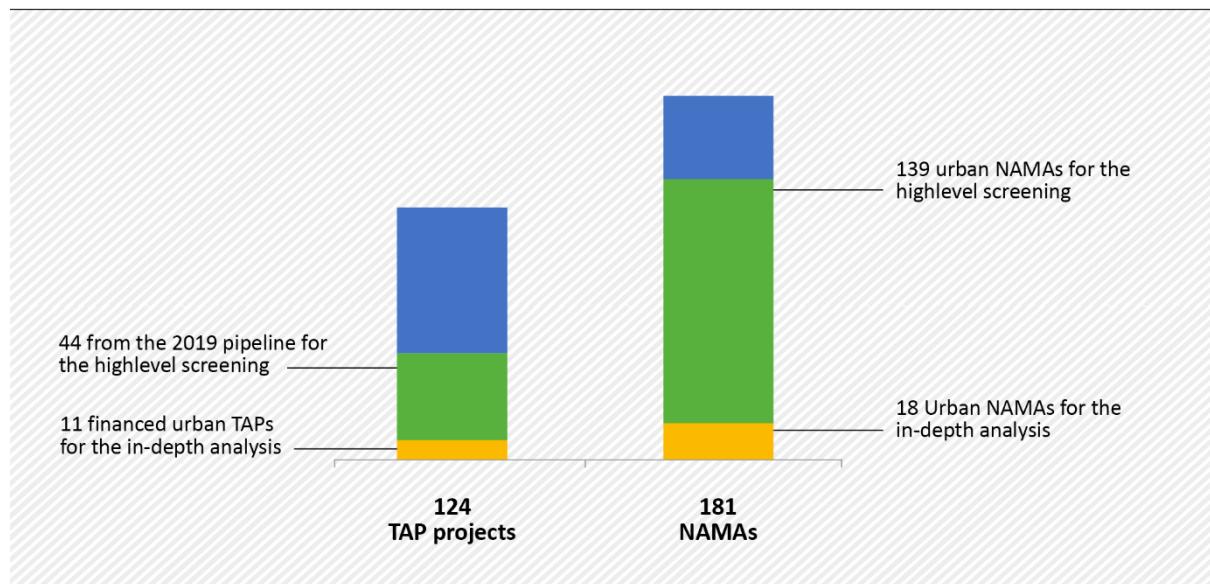
⁴ The UNFCCC NAMA registry can be accessed at the [UNFCCC website](#).

⁵ The definition of “transformative” action refers to an action that contributes to tackling climate change (low to no emission development; climate change mitigation, adaptation, and/or resilience; and access to secure, affordable, and sustainable energy). It supports systematic and sustainable change at the community level, with the potential for large-scale impact and scalability. TAP projects submitted have to fulfill the criteria of “transformative” and ensure that the three key components (ambitious, cross-cutting, inclusive) are embedded in the projects. There is a basic screening process of these criteria when projects are submitted.

⁶ Financed projects and soft measures such as studies, policy and awareness raising projects have been removed from the pipeline.

Then, an in-depth analysis was applied to 18 selected NAMAs and 11 financed urban TAP projects. The selected NAMAs and TAP projects: i) represent typical urban sectors, such as local energy generation, urban transport, private buildings, public infrastructure and waste, as well as water supply and wastewater, ii) secured or partially secured financial assistance, and iii) have been or are currently being implemented).

Figure 1: Study Scope of the Non-Kyoto Mechanism



Sources: own illustration, ICLEI World Secretariat

Based on the results of this analysis, we derived the challenges and success factors for urban projects utilizing Non-Kyoto market mechanisms.

3 Indicators used to identify challenges and success factors

For both Kyoto- and Non-Kyoto mechanisms, the following criteria have been applied:

Table 1: General assessment criteria

Analysis Criteria	Description
Brief description of the project	Brief overview of the project
Project finance mechanism (Bilateral collaboration, international trading mechanism, domestic project)	Identify the most successful finance mechanism for certain type of project
Subsector	Identify the project focused urban activities including: 1. Urban 2. Transport 3. Waste, 4. Wastewater & Water supply 5. Energy 6 Private building, 7. Data centre 8. Public infrastructure
Number of project components / activities in subsectors	Identify single projects from bundled projects
Host Country	Name of the project hosting country
Is the project hosted in LDCs and small islands?	Identify projects from LDCs
Is this project hosted in developing countries?	Identify projects from developing countries

Analysis Criteria	Description
For Article 6 mechs/NAMAs/JI: host country NDC (mitigation goal section)	Identify the NDC of the host country
For Article 6 mechs/NAMAs/JI: is the NDC level considered in the implementation of the project?	Identify the project's contribution to the host country NDC
Project implementer/organiser	Identify project implementer /organiser. Here we try to identify each actor's favourite project type and financial mechanism.
MRV approach	Illustrate the MRV approach applied by the selected project.
Expected annual ITMOs (other credits) generation	Identify the mitigation potential
Actual annual ITMOs (other credits) generation	Track actual delivery of the project impact
% Performance	Track performance of the impact
How is the environmental & social integrity enhanced? (Co-Benefits)	Identify non-mitigation impacts

Source: own illustration, ICLEI World Secretariat

For the Non-Kyoto Mechanisms, the following additional criteria were added in order to track the characteristics of NAMA and TAP activities:

Table 2: Additional criteria for NAMAs and TAP activities

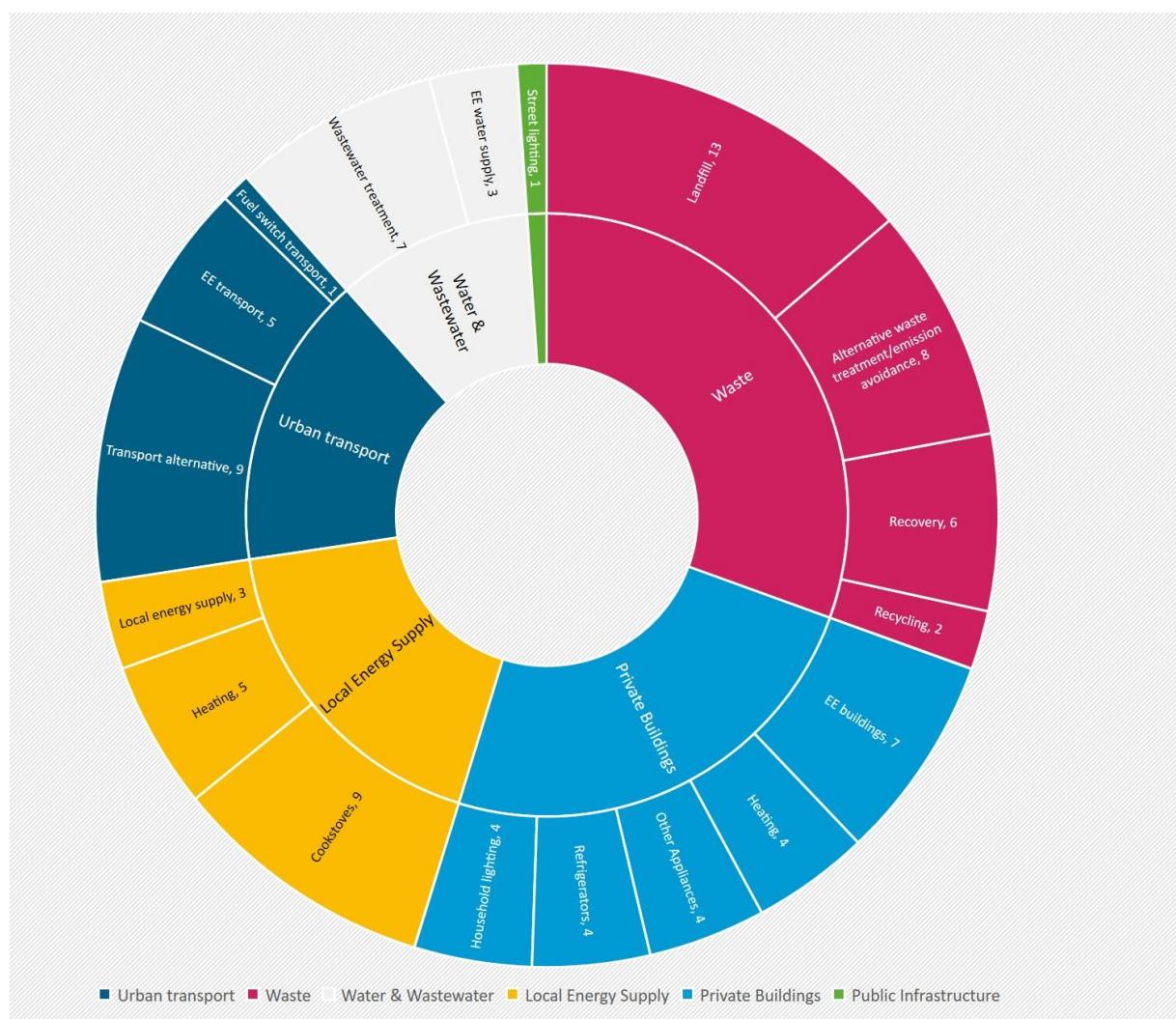
Total cost (million USD)
Requested financial support (million USD)
Received financial support (million USD)
Financial support from
Amount of finance from local governments (million USD)
Local government finance rate of the whole project
Status

Source: own illustration, ICLEI World Secretariat

2.1 Analysis of urban activities within the Kyoto mechanisms

2.1.1 Observations from the analysis of CDM methodologies

95 methodologies with urban relevance were identified. Figure 2 shows the methodologies per subsector, as well as the dominant categories for methodologies within each sector.

Figure 2: CDM methodologies with urban component per subsector and category

Source: own illustration, Perspectives Climate Group

The following observations have been made:

- ▶ There is only one CDM methodology in the public infrastructure subsector, namely in the area of street lighting.⁷
- ▶ Energy efficiency methodologies make up about 1/3 of the methodologies analysed; particularly, the methodologies of the categories in the building subsector refer to energy efficiency (EE). They can be distinguished into EE methodologies for appliances (categories: household lighting, refrigerators, appliances) and for buildings. Next to the buildings subsector, EE is dominant in the categories of heating (energy), EE transport, as well as EE water supply. In the latter category, all methodologies refer to energy efficiency for water pumps or water purification systems.
- ▶ The category ‘Alternative Transport’ broadly captures the replacement of vehicles or a modal shift in transportation, opposed to energy efficiency improvements in vehicles.

⁷ As we will discuss later, our analysis shows that this is also the case for NAMAs.

Nevertheless, there are also CDM methodologies for Rapid Transit Systems in urban contexts.

- ▶ There are rather few methodologies in the subsector of energy: cookstove methodologies and electricity generation by the user (e.g. referring to the installation of PV on household level).

2.1.2 Analysis of CDM projects and Programmes of Activities

Figure 3 shows the number of single CDM projects and PoAs per subsector. It shows that the major share of single projects is in the waste and wastewater subsectors whereas most PoAs are in the sectors of private buildings and local energy supply.

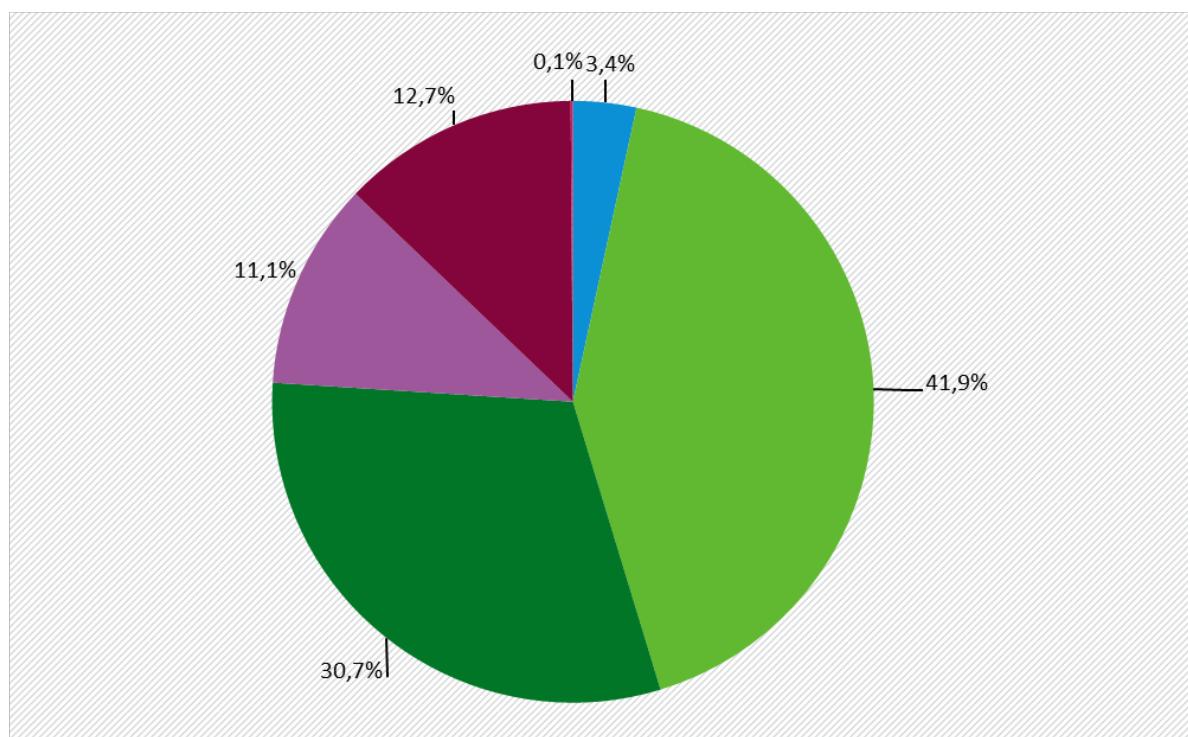
Table 3 provides a more detailed analysis of single CDM projects in urban sectors, showing that of 1728 projects, 358 projects have issued CERs with the project performance varying between 34,9% (private buildings) and 60% (urban transport). Of 301 PoAs, 49 have issued CERs, with the share of PoAs varying from nearly 6% in the waste sector and near to 30% for PoAs in local energy supply. This analysis leads to the following observations:

While the number of methodologies is quite evenly distributed (see Figure 2), when looking at the number of CDM projects and PoAs, some sectors become more dominant: in particular buildings and energy sector for PoAs, as well as waste and waste water for single projects (see Table 3).

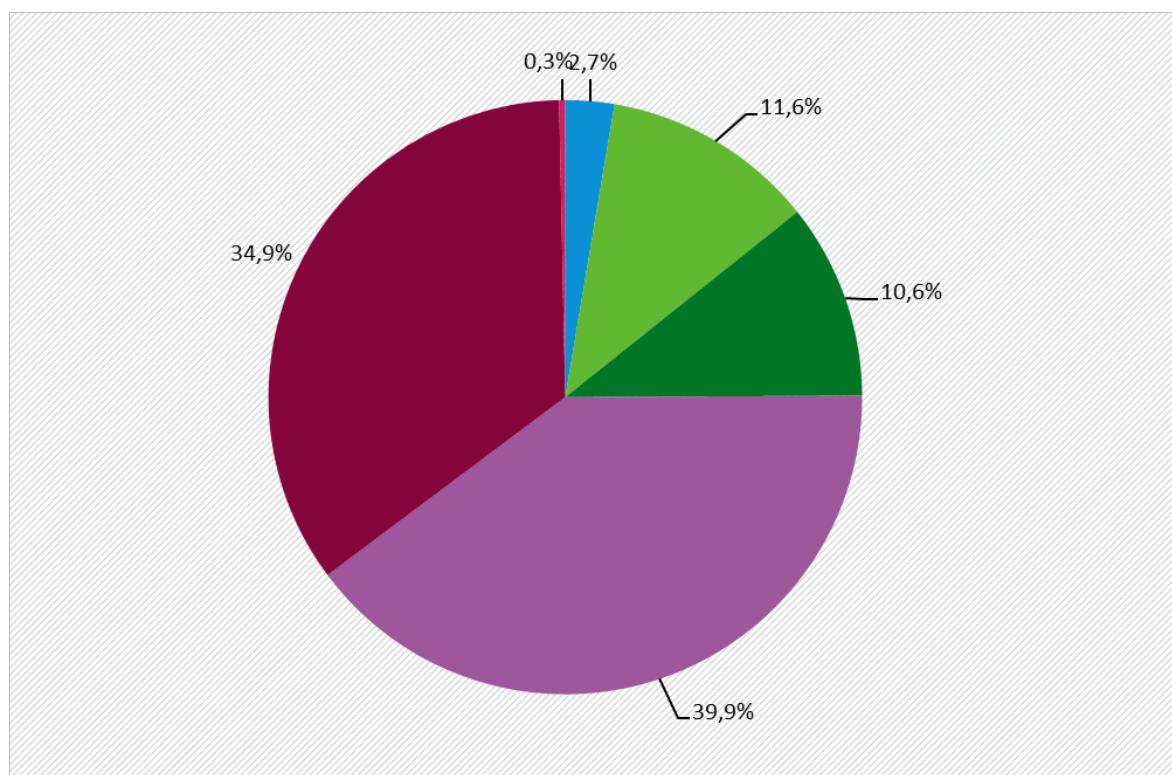
- ▶ While the transport sector has a large number of methodologies, there are comparatively few projects and PoAs in the transport sector. Except for one project using an energy efficiency methodology, all projects and PoAs fall into the category of 'alternative transport'.
- ▶ Energy related methodologies show a rather low share of projects with issuance and a rather low performance rate of those projects. However, the same methodologies seem to be very successful when applied to PoAs (see Table 3 and Table 4). The category 'heating' (district heating grid), particularly stands out with 49 PoAs registered and having issued CERs.

Figure 3: Number of single projects and PoAs per subsector

Single projects



PoA



■ Urban Transport ■ Waste ■ Water and Wastewater ■ Local Energy Supply ■ Private Buildings ■ Public Infrastructure

Source: own illustration, Perspectives Climate Group

Table 3: Analysis of single projects with urban relevance

Sector	Projects	Projects with Issuance	Share of Projects with Issuance	Performance of Projects ⁸
Urban Transport	57	12	21,1%	60,8%
Waste	704	177	25,1%	59,3%
Water and Wastewater	516	106	20,5%	69,2%
Energy	187	38	20,3%	34,9%
Private Buildings	262	25	9,5%	55,2%
Public Infrastructure	2	0	0,0%	0,0%
Total	1.728	358	0,0%	0,0%

Sources: own illustration based on UNEP DTU 2019, Perspectives Climate Group

Table 4: Analysis of PoAs with urban relevance

Sector	PoA	PoA with Issuance	Share of PoA with Issuance	Performance (kCER)
Urban Transport	8	1	12,5%	312
Waste	35	2	5,7%	2.287
Water and Wastewater	32	4	12,5%	1.029
Energy	120	35	29,2%	9.442
Private Buildings	105	7	6,7%	8.747
Public Infrastructure	1	0	0,0%	
Total	301	49		

Sources: own illustration based on UNEP DTU 2019, Perspectives Climate Group

Based on the quantitative analysis, a few projects have been analysed in detail in order to identify challenges and success factors. This detailed analysis focuses on relevant projects from the waste, public transport and buildings sectors. The selection of projects for in-depth analysis is based on the authors' experience with CDM in urban areas.

The detailed analysis shows that CDM projects in sectors managed by the municipality are particularly promising for municipalities. In many countries, waste management, power generation and distribution for private households, and public transport are organised by the

⁸ Performance of projects is measured as the sum of real CERs (in kCER) of all projects from methodologies in this sector divided by the sum of expected CERs (in kCER) from the same projects.

municipality. Frequently, public transport is also operated by a municipal company. Through land use regulation, municipalities have a strong influence on transport and partially on buildings.

Waste-related projects dominate in municipal CDM, mainly regarding landfill gas collection. Surprisingly, municipal power companies have not seriously ventured into the CDM. The only exceptions are Chinese city power companies that have invested mainly in hydropower. The main problem seems to be the relatively small size of municipal power plants and the lack of investment budgets for plant refurbishment.

While there are large-scale building energy efficiency projects in the CDM, they are usually implemented by energy service companies or owners of large commercial buildings and do not involve local authorities.

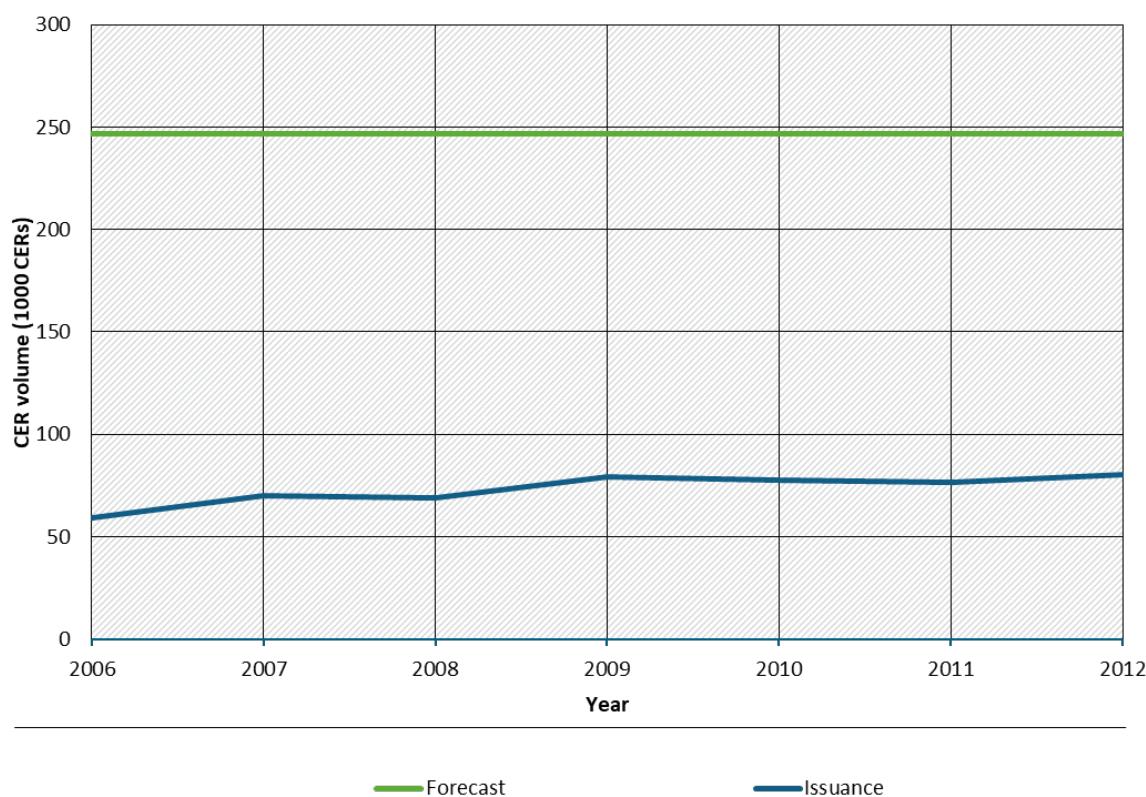
2.1.3 Challenges for urban projects in the CDM

Looking at the challenges for urban projects in the CDM by subsector, we come to the following conclusions:

Landfill gas projects have generally been suffering from a low level of performance. This is mainly due to wrong estimates regarding the share of organic waste, unprofessional engineering on the landfill site regarding management of leachate and a generic tendency of the model-based estimate of methane generation to overestimate methane generation. Generally, private CDM project developers have complained about the slow decision-making and high degree of arbitrary changes in landfill gas project design and royalties to be paid to municipalities, particularly when city governments changed due to local elections. For example, project developers in Indonesia had to wait for several years before they could actually start their projects.

Bus lane transport projects in cities are often managed by a separate company that is not explicitly labelled as a municipal company. Underperformance is often linked to construction delays and passenger overestimates (Grütter Consulting 2009). The first project with issuance, Transmilenio in Bogotá, achieved just 24% of the forecast in its first issuance. Performance improved subsequently, but did never reach the forecast. This nicely reflects the average performance rate (25%) of all bus rapid transport (BRT) CDM projects.

**Figure 4: Forecast and actually issued CER volume of Transmilenio BRT project in Bogotá, Colombia
(1000 CERs)**



Source: own illustration based on UNFCCC 2019, Perspectives Climate Group

The first municipality who developed a CDM project for **energy efficient buildings** was Cape Town, with the Kuyasa project in the township of Khayelitsha planning to retrofit 2300 houses with ceiling insulation, energy-efficient lamps and solar water heaters. The project which had already been registered in August 2005 was stalled for several years, as the upfront revenue from forward sale of CERs to the British government at 15 EUR (Michaelowa 2005) only covered 30% of project costs, and the rest of the costs remained uncovered. In 2007, just ten pilot houses had been retrofitted. Eventually, the financing gap was closed through a Department of Environmental Affairs and Tourism poverty alleviation grant. By late 2009 more than 1200 houses had been retrofitted and in 2010, all 2300 houses were completed. The project provided 76 jobs. While 9532 CERs were issued for the period 2005-2010 in July 2016, an earlier request for issuance of 10,527 CERs for the same period had been rejected by EB 85 in July 2015, due to changes in project design and monitoring inconsistencies. No issuance requests have been made since then, probably because of the mentioned MRV-challenges and sharply reduced CER-prices.

A bottleneck for municipalities to become active in the CDM was the reason that many city-level mitigation options, e.g. in transport or buildings energy efficiency, did not have approved baseline and monitoring methodologies before the CER price crash and thus could not materialise. Nevertheless, significant theoretical CDM potential remained in the waste management sector and with regard to programmatic renewable energy. Overall, municipalities were unable to mobilise this substantial potential due to two key reasons:

- ▶ Firstly, the competencies required to write a Project Design Document (PDD) and accompany a project through the project cycle were not available in municipal

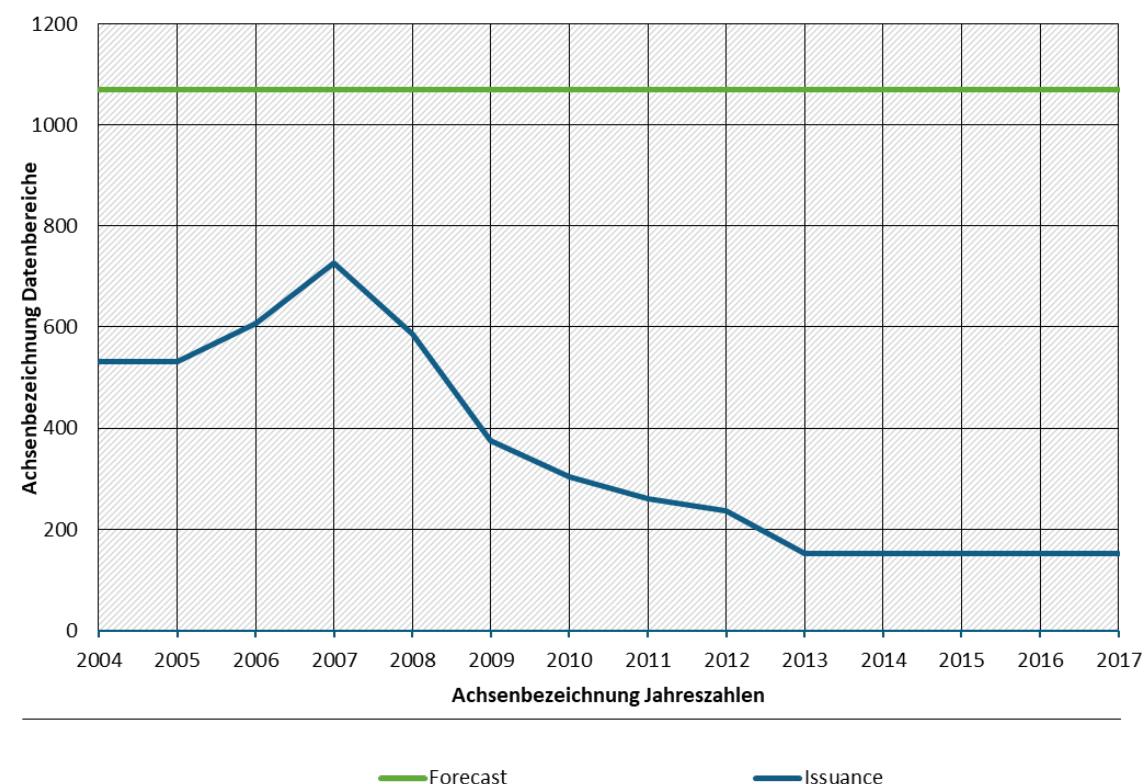
administrations. Even if they were available, such skilled staff would be very much in demand and allocated to more urgent tasks. Therefore, specialised CDM consultants always had a competitive advantage compared to a municipality and were more likely the project assignments. Even for landfill gas projects where a municipality should have a competitive edge due to its intimate knowledge of the situation on the ground, only a small share of projects had a municipality as project participant.

- ▶ Secondly, municipal officials serve only for short periods. Thus, the incentive from CER revenues did not really reach them, as the long CDM project cycle meant that CER generation would occur only years after the officials have left office. For the official, it is much more attractive to engage in a highly visible project which is “fashionable” with the voters. This is why Bogotá’s mayor Moreno preferred the “glitzy” metro to the more mundane, but effective Transmilenio bus system (Gilbert 2008, p. 460).

2.1.4 Success factors for urban projects in the CDM

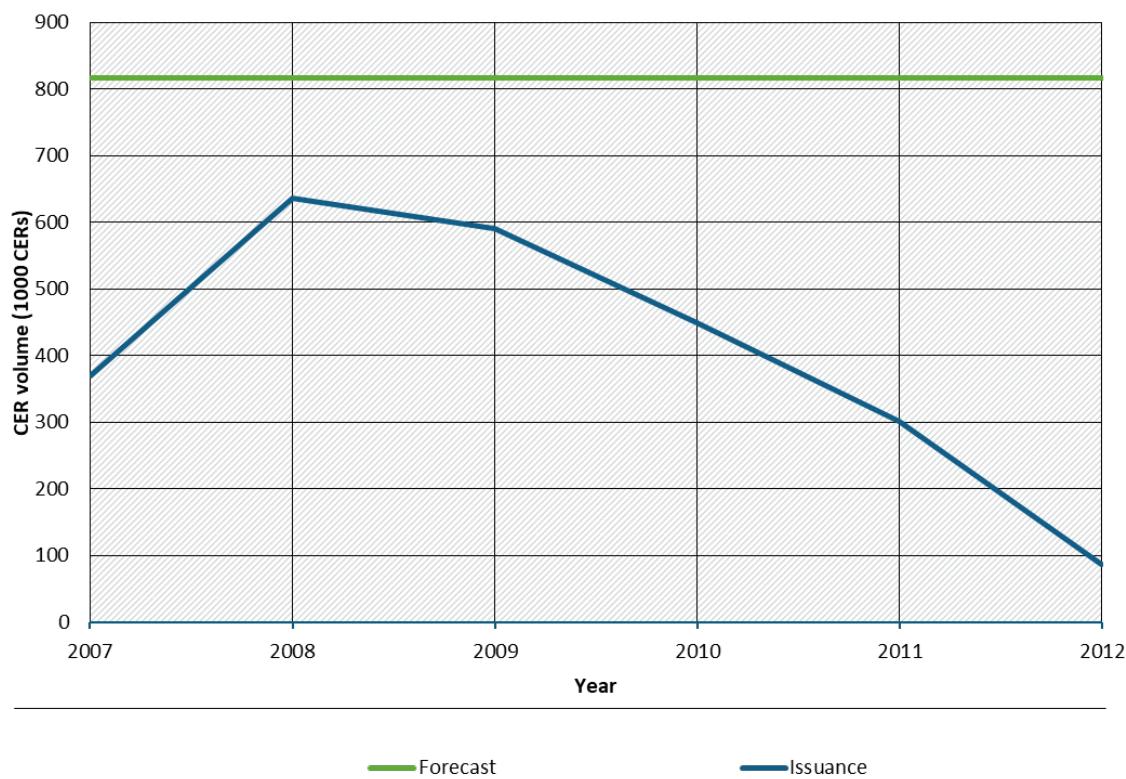
The two large **landfill projects** at Bandeirantes and Sao Joao in Sao Paulo were among the first CDM projects worldwide issuing large quantities of CERs. While their issuance success significantly deteriorated over time, they initially had a high success rate, which enabled the city to benefit from the high prices for issued CERs in 2007-2008.

Figure 5: Forecast and actually issued CER volume of Bandeirantes landfill project, Sao Paulo, Brazil (1000 CERs)



Source: own illustration, based on UNFCCC (2019a), Perspectives Climate Group

**Figure 6: Forecast and actually issued CER volume of Sao Joao landfill project, Sao Paulo, Brazil
(1000 CERs)**



Source: own illustration, based on UNFCCC (2019b), Perspectives Climate Group

The city of Sao Paulo has maximised CER revenues from the two landfill projects by auctioning 1.5 million CERs through the Sao Paulo stock exchange in 2007 and 2008. This procedure prevented losses through brokerage fees and achieved revenue of 26 million EUR at the time when CER prices reached their historical high (C40 Cities 2009). A further sale of 0.53 million CERs occurred in mid-2012 at a price of 3.3 EUR, thus generating another 1.6 million EUR (Cruz and Paulino 2013 p. 128). Since then, no further sales seem to have been made. 50% of these revenues are formally to be allocated to the Environment and Sustainable Development Fund (FEMA), which is administered by the Municipal Department for the Environment. Allocation of these funds to projects seemingly did not benefit the population around the landfills, but other interest groups in the city (Cruz and Paulino 2013). Sao Paulo landfill CDM projects can thus be characterised as “cashing in” during the CDM gold rush phase, but did not have a long-term effect.

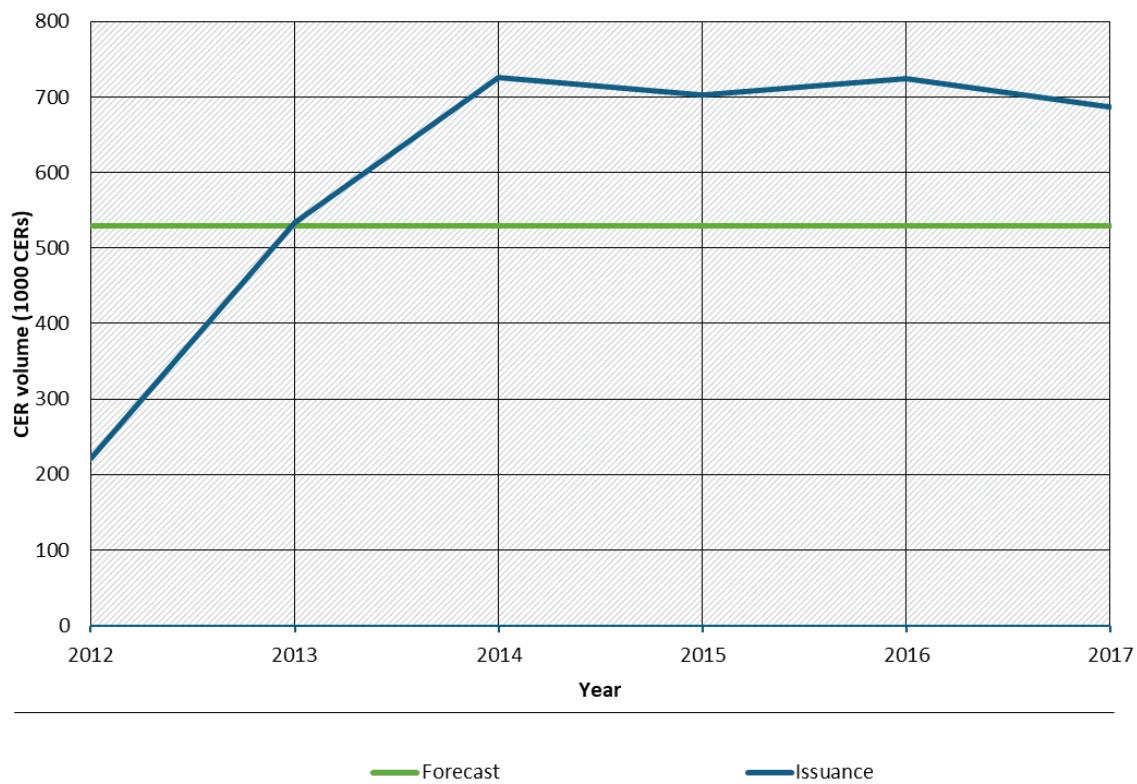
Delhi Metro, which is probably the most **successful transport infrastructure** in India and has been universally acclaimed for its efficiency, has made strong use of the CDM.⁹ Its first project was registered in 2007 and received around 50,000 CERs per year for the regenerative braking systems of the metro carriages. After 2009 it has consistently achieved issuance above the forecast level of 43,500 CERs. CERs have been sold to a Japanese company at € 4.5/CER (India Power Trading Info 2011).

In mid-2011, the expansion of the metro system was registered and received CERs for the shift of passengers from cars to the metro. This project has significantly over performed due to the metro being used by more passengers than expected. The project is also special as it continues to

⁹ An overview can be found on the website from Delhi Metro.

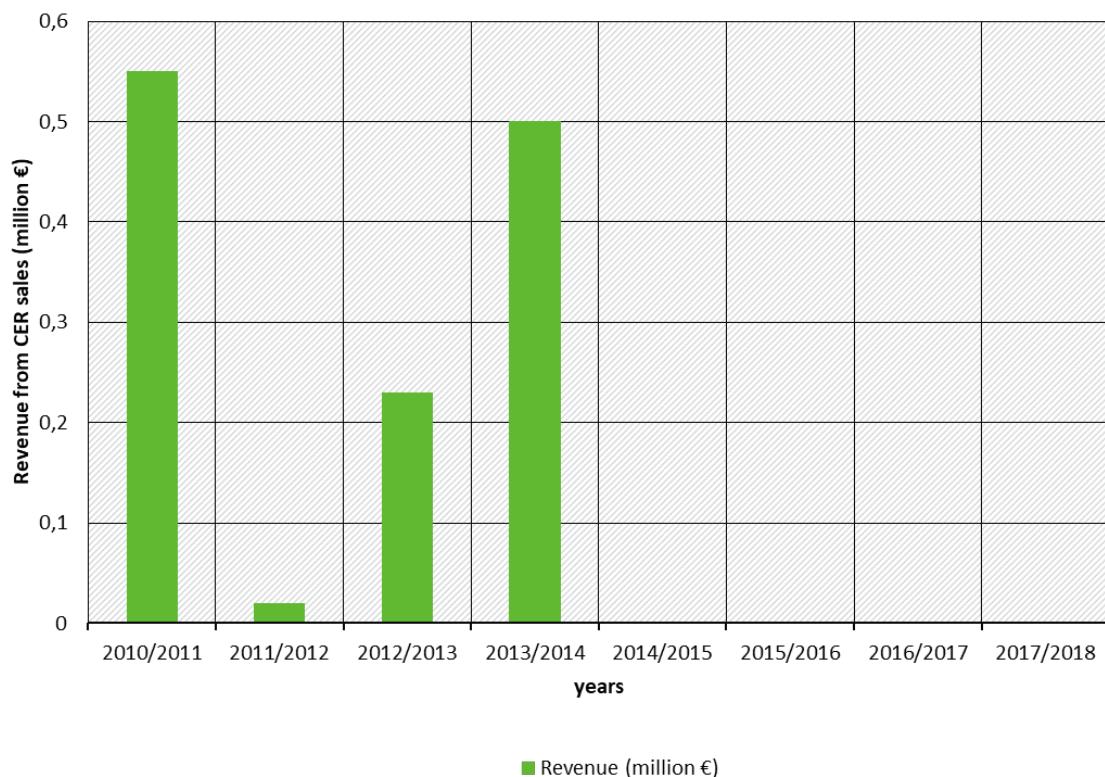
issue CERs until today despite the low CER prices, and tries to sell these on the free market (Delhi Metro Rail Corporation Ltd. 2019).

Figure 7: Forecast and actually issued CER volume of metro modal shift project in Delhi, India (1000 CERs)



Source: own illustration, based on UNFCCC (2019c), Perspectives Climate Group

Delhi Metro generated significant revenues from CER sales between 2011 and 2014, but not since.

Figure 8: Delhi Metro revenues from CER sales (million €)

Source: own illustration, based on Delhi Metro Rail Company: Annual reports (various years), Perspectives Climate Group

As Delhi Metro made such positive experiences with the CDM in the late 2000s, it even registered a third CDM activity bundling 31 solar PV plants on metro installations with a total capacity of 14.9 MW in early 2017, forecasting 18,000 CERs per year (Shah 2017; UNFCCC 2019d). This project is part of a CDM PoA for various renewable energy projects in India managed by the Swiss CDM consultancy South Pole. The first monitoring report (UNFCCC 2018) shows a slight underperformance, with 85% of the forecast emission reduction.

Overall, it can be said that Delhi Metro has used the CDM in a very smart way, covering any aspect of its operation that leads to greenhouse gas reduction by making use of different methodologies (split up in several projects). All its CDM activities have been performing well.

2.2 Analysis of projects with urban component outside of the Kyoto mechanisms

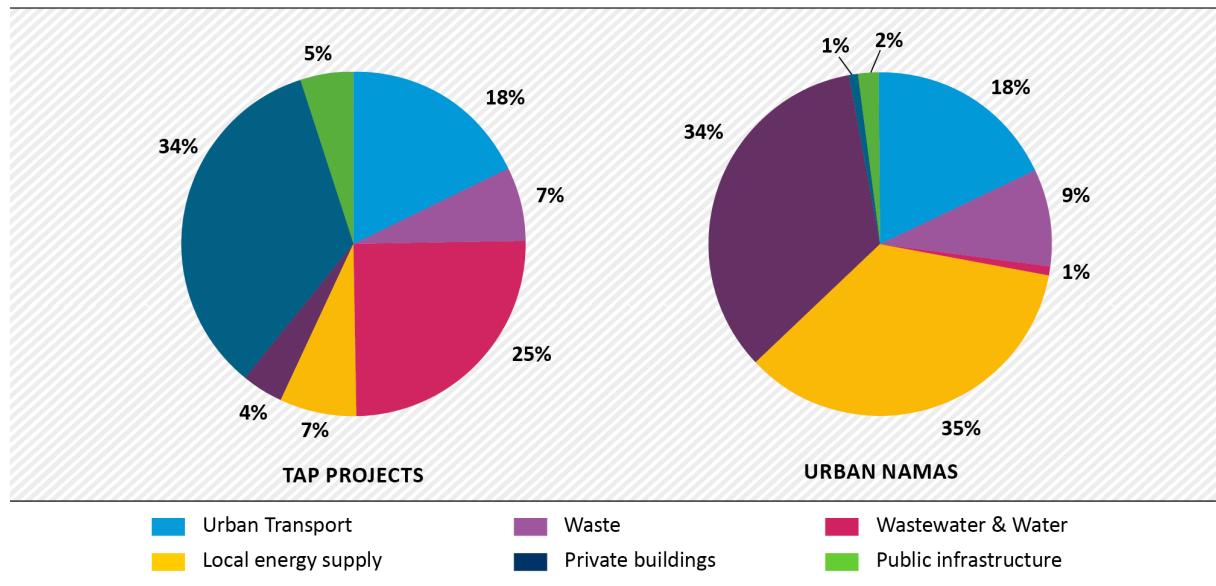
2.2.1 High-level screening of the urban NAMA and TAP projects

This section provides an overview of 139 urban NAMAs and 44 TAP projects in the pipeline. The data source of this research is based on published statistics from the UNEP DTU NAMA Pipeline Analysis and database (UNEP DTU, 2019a) and ICLEI's TAP (Transformative Actions Program) platform.

As illustrated in Figure 9, local governments that submitted TAP projects are favouring public infrastructures, wastewater and water supply projects, because they often fall into their administrative mandates. On the other hand, national governments that initiated NAMAs more often focusing on energy efficiency measures and private building energy supply sectors. This is because the national climate action plans are often driven by the energy ministry. The

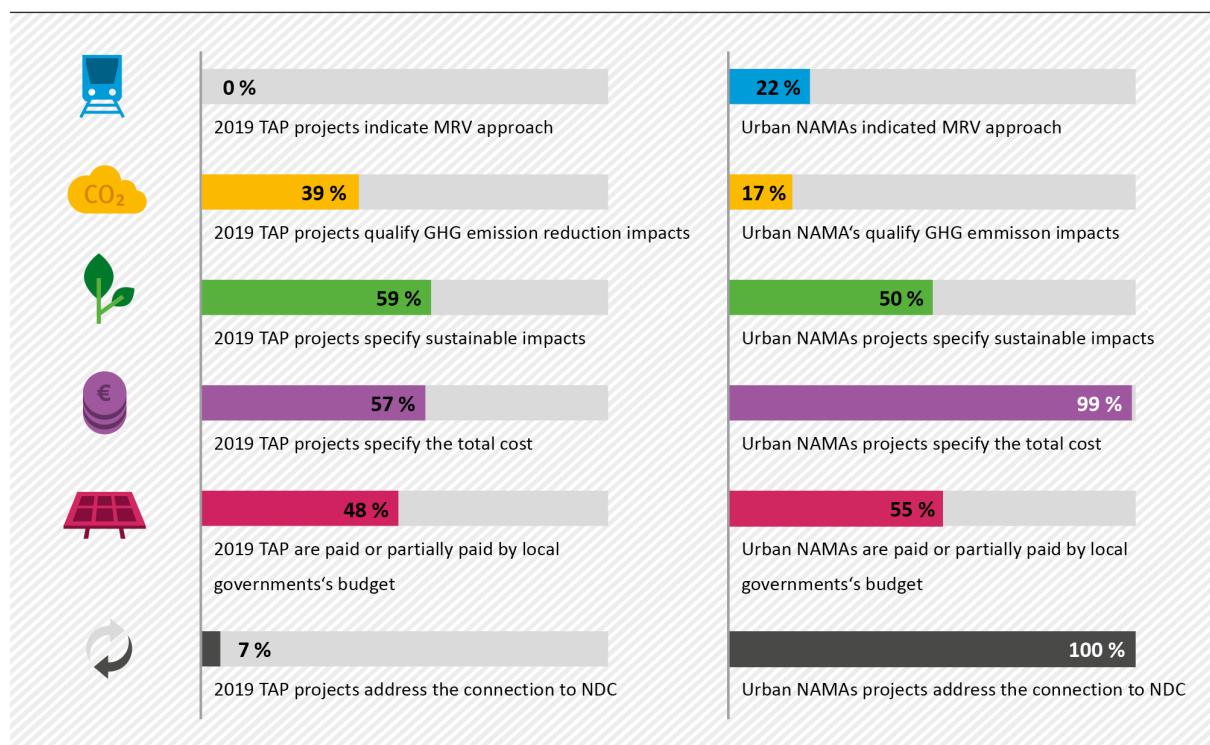
mismatching of sector focus is caused by **different mandates between various levels of governments**. It also indicates the disconnection between administrative levels for national climate policy and the NDC implementation.

Figure 9: Sectoral Distribution of urban TAP projects and urban NAMAs



Source: own illustration, ICLEI and Perspectives Climate Group

Figure 10 demonstrates the completeness rate of reports received by TAP and NAMA pipelines. The majority of analysed NAMAs and TAP projects do **not specify a Monitoring, Reporting and Verification (MRV) approach nor GHG emission reduction estimations**. The major reason for the lack of quantitative impact assessment is that the proposed projects and NAMAs are still at their conceptualizing phase. Only 4 out of 139 urban NAMAs and 11 infrastructure projects out of 124 TAP applications have been implemented so far. For the 116 urban NAMAs seeking support, only 31 indicated or attached a feasibility study or project plan. Among them, 8 NAMAs reported receiving external assistance for project preparation. On the other hand, many are still seeking support for project preparation.

Figure 10: Comparison between TAP projects and urban NAMAs

Source: UNEP DTU, 2019a and TAP pipeline (2018), own illustration, ICLEI and Perspectives Climate Group

At local level, the TAP projects often express a political ambition for an urban mitigation goal. The technical details, such as project boundary, number of activities included and technology choice, are not yet decided. This problem is especially severe at local level, where 43% of TAP projects do not have a total cost estimation, business plan or project feasibility study.

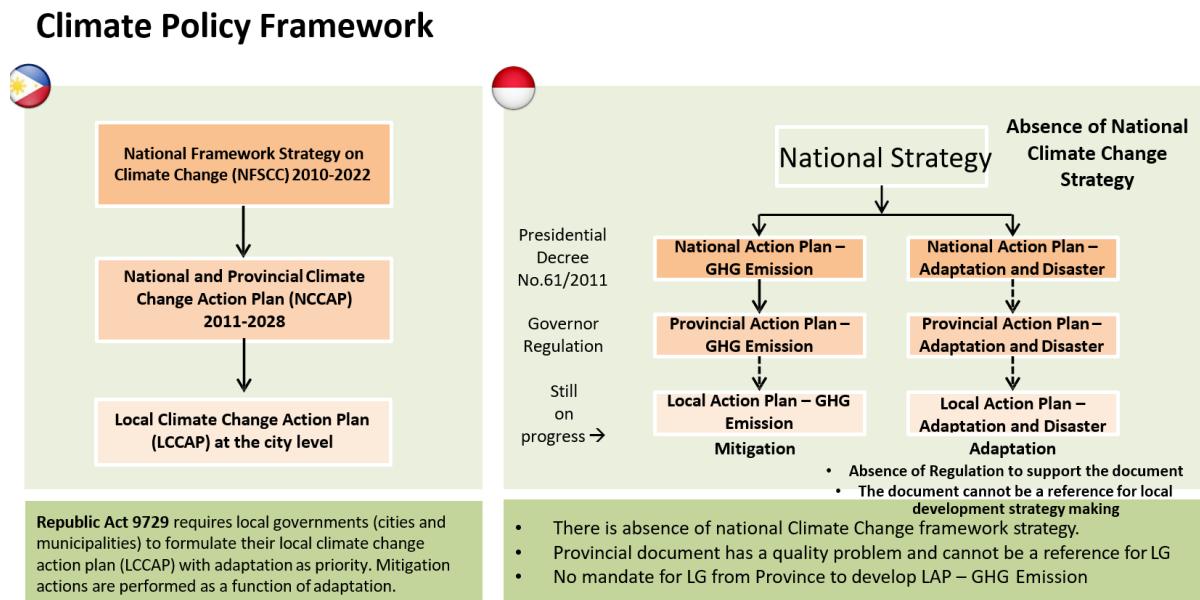
Although international financial institutions, project preparation facility providers value TAP as an important source for local sustainable projects, it is difficult for them to provide direct funding for project implementation, due to the mismatching of project size and under-developed project concepts. Some TAP partners, such GIZ/ FELICITY and GIZ/CoM SSA III provided technical assistance for (pre-)feasibility studies with the goal to improve the quality of the proposals and strengthen the capacity of the local governments.

In addition to the potential GHG emission reduction, governments at all levels **highly value the social and ecological co-benefits**. The most frequently quoted co-benefits are gender equality, job creation and reducing air pollutants.

At all administrative levels, most of the Non-Kyoto projects studied, received government grants or funds. The government's investment is mostly used for project preparation. There is still a large financial gap for implementation of proposed mitigation activities. This is expected because, as illustrated in Figure 9, the proposed projects often fall into the areas under direct administrative control of local governments, such as public infrastructure and wastewater & water supply, hence mainly financed with local government's own budget. The limited capacity of local government in accessing national and international funds and commercial finance mechanisms, restrains the number and size of these projects. On the other hand, it also reveals the lack of awareness about various commercial finance instruments. The lack of capacity for project preparation and to demonstrate project impacts and bankability, further disable governments from accessing commercial finance sources.

TAP projects from local governments are often disconnected or not directly linked to NDCs and therefore lack national support. Even though the projects still address NDC-relevant sectors, only 7% local governments address the connection to the NDC compared to 100% for NAMAs. Apparently, there is a lack of integrated MRV processes and systems, connecting local and national governments to account impacts of actions at each administrative level.

Figure 11: Climate Policy Framework in Philippine and Indonesia

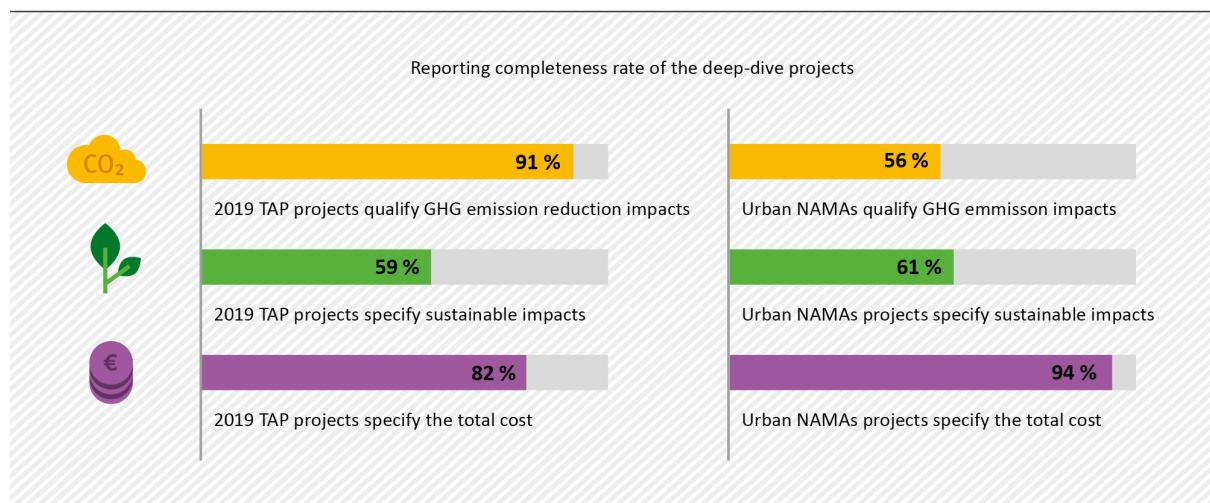


Source: ICLEI's Study on Multi-Level Governance in Climate Change Planning and Implementation

At domestic level, the national climate change strategy often does not allocate mandates to local governments to implement mitigation measures. In the Philippines for example, the National Climate Policy Framework (Republic Act 9729) requires local governments (cities and municipalities) to formulate their local climate change action plan (LCCAP) with adaptation as priority. Mitigation actions are performed only as a function of adaptation. In Indonesia, the national mandate does not reach to local government level. The lack of mandates signifies the lack of financial and technical support as well as guidance for project planning and monitoring.

2.2.2 In-depth analysis of successful NAMAs and TAP projects

In this section, we zoom into 18 selected NAMAs and 11 TAP projects. The selected NAMAs and TAP projects i) represent typical urban sectors, such as local energy generation, urban transport, private buildings, public infrastructure and waste, as well as water supply and wastewater, ii) secured or partially secured financial assistance, and iii) enjoy an advanced development status (implemented or being implementing). The in-depth analysis aims to identify success factors of urban projects.

Figure 12: The reporting completeness rate for selected deep-dive projects

Source: Analysis of project data from the UNFCCC NAMA registry and TAP pipeline 2018, own illustration, ICLEI World Secretariat

Comparing Figure 12 and Figure 10, it becomes obvious that the reporting rate for the selected projects for in-depth analysis is significantly higher than the average level. **The successful project preparation, especially in defining technical details and quantifying costs and benefits are the key to secure financial resources.**

At local level, less material is published revealing the project selection process by the governments for granting financial assistance. However, it is worth noticing that TAP project preparation facilities, such as the GIZ's FELICITY and the Cities Climate Finance Leadership Alliance (CCFLA) support local governments to connect with potential funders.

At national level, a large amount of the financial support provided by donor countries is given to policy development and capacity building in the form of NAMA concept design and NAMA scoping. At this stage, the majority (78%) of the analysed NAMAs have not defined a detailed MRV approach or indicators, because the initial financial assistance from the donors is not yet linked to achieved emission reductions. However, if those NAMAs are to be moved from conceptualisation to implementation stage, significantly more investment will be required, which would then likely lead to a RBF approach including respective MRV requirements.

It is difficult to clearly identify success factors for securing bilateral NAMA support, since the support is negotiated by national governments behind closed doors. However, it is worth noticing that several NAMA preparing facilities such as the NAMA Facility and the Japanese International Cooperation Agency (JICA)'s¹⁰ Official Development Assistance (ODA) project are supporting developing countries to access funds from the donor countries.

The private sector's involvement is critically important for the financed projects at local level. All TAP projects indicated private sector involvement, and 40% of the projects directly receive investment from the private sector, such as hosting project activities or donations of project equipment. **Preferred taxation policy or a regulatory framework is the typical governmental approach to attract engagement with the private sector.** However, at this stage the private sector's involvement is still at the project piloting stage as part of the company's Corporate Social Responsibility (CSR) profile. In order to incentivise the private

¹⁰ Japan International Cooperation Agency assists and supports developing countries as the executing agency of Japanese ODA. It has supported 3 NAMAs for concept design or pilot project implementation.

sector to make substantial contributions, an activity must generate revenues and have low risk. A major reason for **weak revenue generation** from local infrastructure projects may be that users, especially in developing countries, cannot afford to pay for the services¹¹.

One good example for attracting private finance in the preferred policy framework is San Francisco's Zero Waste TAP project¹². The program is funded solely from revenue generated through refuse rates charged to customers. Such a financial mechanism is only possible because of the regulatory framework. In 2009, San Francisco made recycling and composting a requirement for all businesses and residences. It passed the nation's first mandatory composting law. San Francisco also banned environmentally hazardous items like checkout bags and Styrofoam. To encourage behaviour change, San Francisco initially set trash collection rates much higher than recycling and composting rates. While rates are more comparable now, residential bin sizes provide a behavioural nudge. Standard residential services include a 64-gallon blue recycling bin, a 32-gallon green composting bin, and 16-gallon black trash bin. Businesses are also charged according to the volume of waste they produce. They receive discounts for using the green and blue bins and are penalised if recyclables or compostables end up in the trash.

2.2.3 Challenges of urban activities in the context of Non-Kyoto mechanisms

Based on our experience and qualitative assessment of urban Non-Kyoto activities, the following challenges have been identified:

Challenges related to the project boundaries:

- ▶ Setting the boundary of city activities e.g. for baseline setting frequently is a challenge. Often, cities are strongly influenced by the surrounding regions (e.g. waste from rural areas treated in the waste management facilities inside the city boundary; or waste from the city being transported and dumped outside the city boundaries; transport of products etc.).

Challenges related to the project type:

- ▶ Increasing energy efficiency in private buildings and public infrastructure is often a pre-dominant mitigation option in cities. The problem is often that GHG effects of individual activities (e.g. application of green ACs or LED lighting) are difficult to measure, due to other influencing factors (proper installation of technology, behaviour of building user, overall energy performance of the building, etc.).
- ▶ Due to the small size of most renewable energy and energy efficiency projects, classical project finance is inappropriate as the high transaction costs render the project unattractive for many funders.
- ▶ In the building sector, the split-incentive (or ownership-tenant dilemma) problem- i.e. opposing financial interests between the landlord (who installs e.g. energy-efficient boilers) and the tenants (who pay the heating bill) - prevents investors from taking future avoided costs into account as these costs have to be covered by somebody else.

¹¹ See summary of [Good Practice of Successful Project Preparation Facilities from 2018](#)

¹² See the Zero waste case study San Francisco on the [website from the United States Environmental Protection Agency \(EPA\)](#)

Challenges related to the project hosts:

- ▶ City governments often follow a different political agenda (short-term) and may have other priorities than the national authorities, who may rather have the long-term view for reducing GHG emissions under the NDC.
- ▶ The variety and high number of involved authorities within a city and - even more challenging – between different cities, is a big challenge for designing a financing approach (business models, financing mechanisms, incentive schemes, responsibilities, lack of money, etc.).
- ▶ A lack of capacities at city level can be a barrier for ensuring ownership of local authorities. Other barriers in this regard often include the poor communication and coordination between different hierarchy levels (e.g. ministry, to city-government and municipality).
- ▶ Statistical data is often unavailable or in poor quality for cities, but rather available at national or sub-regional (provincial) level. This can cause problems e.g. for setting the baseline or for creating a MRV approach.
- ▶ It is confirmed by all consulted experts that creditworthiness of cities, due to a limited ability to generate revenues and the associated economic, political and financial risks in developing and emerging countries is generally very low. Furthermore, public institutions at the national level are often reluctant to step in to provide guarantees for their cities.

2.2.4 Success factors of urban activities in the context of Non-Kyoto mechanisms

From our analysis of NAMAs and TAP-projects, we have identified the following success factors:

- ▶ Simple design of the mitigation activity and involvement an appropriately low number of players with clearly defined responsibilities increases the chances for implementation and good performance. In some urban sub-sectors, such as street lighting or public buildings, this is easier to achieve than in others.
- ▶ Cities may be highly attractive due to potential co-benefits of mitigation action – such as reduced air pollution due to optimized urban transport, and increased mobility of people.
- ▶ Synergies of methodologies applied for monitoring and reporting between various mitigation actions should be identified, aligned and ideally simplified (but, at the same time ensuring environmental integrity).
- ▶ Bundling-up small projects enables the creation of scaled-up lending from financial institutions. Political support and/or government de-risking instruments such as guarantees or tax-reduction measures help to mobilise such lending more easily.

2.3 Conclusions chapter 2

2.3.1 Key challenges of urban mitigation activities

The analysis of urban mitigation activities under the CDM, NAMAs and TAP initiatives as well as the discussion in the previous chapters shows that there are various challenges related to a systematic and comprehensive reduction of GHG emissions in municipal areas.

The key challenges are related to:

- ▶ Strongly varying urban structures, settings and emission profiles on the international and national level as a barrier to defining standardised approaches applicable to municipal areas in general.
- ▶ Ownership structures / political responsibility and involvement of all relevant players (especially governmental levels) required for implementation of a mitigation activity.
- ▶ Funding of mitigation activities:
 - a) bankability of projects/activities;
 - b) financial incentives for implementation; and
 - c) access to (international/national/local) funding.
- ▶ Data availability for accurately determining GHG mitigation benefits of a given activity.
- ▶ Ability to accurately monitor the GHG mitigation benefits of a given activity (MRV) and, hence, generate outcomes for RBF.

The first aspect – **strongly varying urban structures**, both in the national and international context – prevents the definition of generally valid, standardised approaches that can be applied to all municipalities worldwide. Both geographical impacts (e.g. demand for heating/cooling; availability of water) and economic impacts (share of population living in poverty – eventually even in slums; average income and financial ability of private households to invest e.g. in energy efficient appliances) are key factors in this context. Including mitigation actions from various cities may lead to different requirements of those cities (e.g. some have the opportunity to implement a bus rapid transport (BRT) system, while others do not due to narrow streets and other demand patterns). If an Article 6 crediting approach would be established across various cities, the comparison of mitigation actions and finding a common understanding between the various city stakeholders (majors, municipalities, etc.) can become a challenge.

Ownership structures and **political responsibilities** are key with regard to elaborating urban GHG mitigation plans and the ability to implement them. The waste sector is an example of a potentially difficult setting. The Indian government, for example, has correctly identified the urban waste sector as a hot-spot of GHG emissions. Despite having a clearly defined objective to tackle those emissions, the practical implementation is more than challenging because of the high number of different actors, which mainly are not under control of the government (such as the informal waste collection sector), combined with a lack of funding. These barriers have continuously prevented local urban bodies to introduce proper waste separation and management systems that could help to significantly reduce GHG emissions in the waste sector.

As the positive CDM-experience has shown, the situation is completely different with clear ownership structures and direct financial incentives: a high number of landfill gas projects has not only been planned, but also implemented.

Funding often is a key barrier preventing the implementation of urban mitigation activities. However, one needs to differentiate again between the different ownership and project types. In CDM-times, there was a clear **financial incentive** for private entities to invest in mitigation activities – such as energy efficiency in buildings, energy generation or landfills. Contrary to this, the implementation of NAMAs and TAP projects suffers from a lack of funding and/or **bankability** of projects. In most cases, international support for NAMA development was limited to the conceptualisation of NAMAs, but did not cover implementation costs sufficiently. As a consequence, many NAMA concepts have been put on hold.

With a view to urban mitigation activities under Article 6 of the PA, international funding will be linked to a proper quantification and accounting. At this level, **limited data availability** and challenges related to proper financial modelling and MRV of achieved mitigation outcomes will become key challenges. Taking the example of the Indian waste sector again, availability of reliable data e.g. on waste fractions and quantities at the household level, make it extremely difficult to accurately define baseline emissions and, hence, estimate mitigation outcomes.

2.3.2 Potential solutions for urban mitigation activities under Article 6 PA

In this section, we discuss potential solutions for urban activities under Article 6 of the PA. Those solutions will be analysed in more depth in chapter 3.

2.3.2.1 Option 1: “One-fits-all” top-down approach

Article 6 might become more attractive for municipalities than the CDM if it allows to cover a city's entire mitigation action plan under an upscaled crediting approach, particularly under Article 6.2. This would mean that the combined measures of a local government to reduce greenhouse gas emissions would be bundled into one Article 6 activity. This would probably include a variety of different technological solutions and sectors and also support programs and regulatory activities. The critical question would be whether the financial modelling and MRV required for such a broad approach could be managed by the municipal administration, mainly in terms of human capacities and competences.

The stronger role of central governments in Article 6 activities may also overcome barriers on the municipal level, for example if under Article 6.2 the central government defines the baseline and monitoring methodology to follow, with the municipality “just” having to provide the data to be fed into the methodology. Such an approach, however, might amplify challenges related to data availability, MRV and accounting.

If various sectors (energy, transport, waste, buildings) are covered in a city-approach, the coordination and steering of involved stakeholders and responsible authorities can be challenging. Further agreements between city governments, municipalities and the national authorities (NDA, Ministries) will be required. In addition, additioality assessment can become complex and eventually challenging, if different activities with different financial / economic characteristics are bundled.

2.3.2.2 Option 2: “Sectoral” bottom-up approaches

Another option would be to define “sub-sectoral” approaches covering the main categories of urban GHG mitigation: urban transport, public infrastructure, private buildings, waste, waste water, IT/data centres, etc. Under this approach, common guidelines - equivalent to

“methodologies” in the CDM context – could be developed and agreed on. Depending on the outcomes of UNFCCC negotiations, the definition of such guidelines could be done at UNFCCC-level, or bilaterally between countries that aim to be involved.

In any case, and referring to the discussion above, it might be sensible to differentiate guidelines by ownership structure, e.g.

- 1) Activities with a high level of control by city governments/municipalities
 - E.g. public buildings, public transport, public landfills, other public infrastructure (such as street lighting), (waste water), and water supply.
- 2) Activities with a low level of control by city governments/municipalities
 - Waste management (depending on national circumstances), (waste water)
- 3) Activities under control of companies
 - Financial resources required
 - Reliability of results-based finance important
 - Bankability of projects
- 4) Activities under control of individuals / households
 - E.g. energy efficient appliances, buildings insulation/heating, etc.
 - Consider limited access to finance; may require political instruments such as financial incentives (e.g. tax reductions, subsidies for new heaters)
 - Consider ownership issues (e.g. in rented flats/buildings)

In addition, data availability and MRV feasibility of the respective mitigation activities need to be considered thoroughly. Furthermore, potential further options and eventually combined approaches will be developed and assessed.

3 Approaches for urban mitigation activities under Article 6 of the Paris Agreement

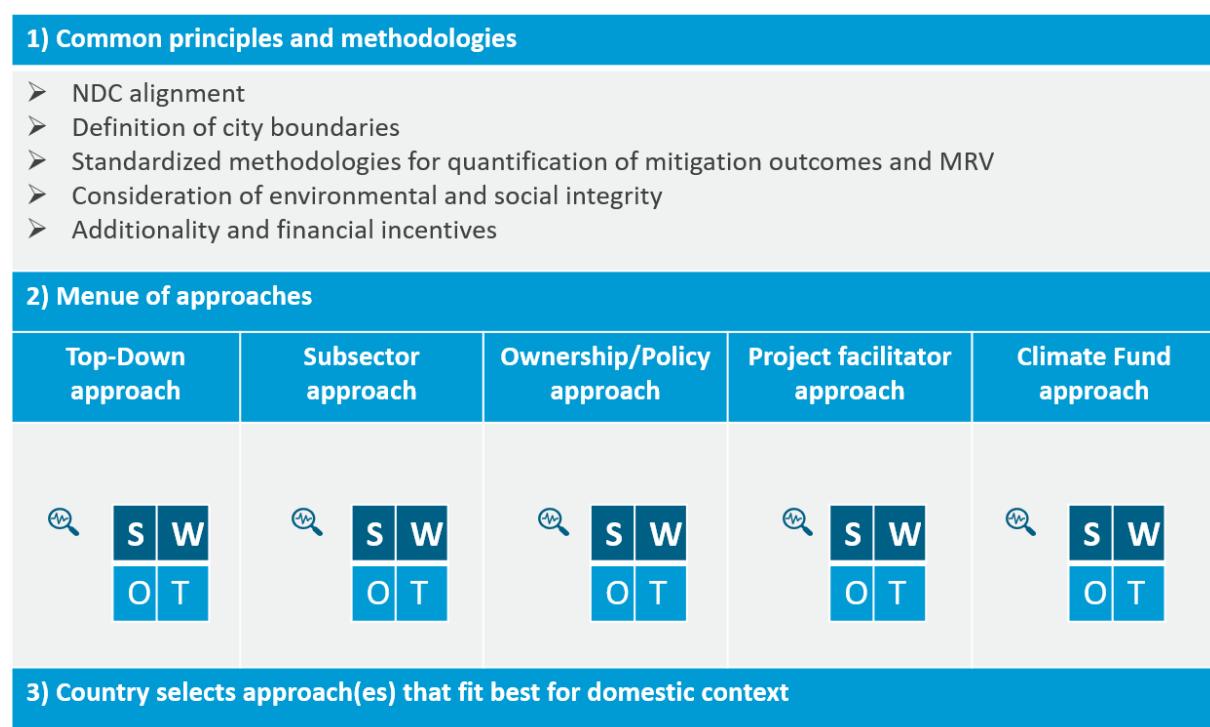
This chapter looks at potential approaches for urban components under Article 6 of the P A. As part of the research project, each of the consortium's partners prepared at least one proposal on how an urban market mechanism, or component hereof, could be designed. Doing so, the findings of chapter 2 have been taken into consideration – in particular the identified challenges and barriers.

These proposals have been presented in a dedicated workshop held in October 2019. The presentations and expert discussions showed that there is no single approach that can be considered well-suited for all urban settings world-wide. Instead, national structures, legislative systems, structures and needs of a given city in its local and regional environment - including social and cultural systems and circumstances – require individual concepts.

Nevertheless, common principles and standardised approaches can not only be helpful for implementing urban Article 6 activities – they can become a facilitator encouraging both city authorities and federal governments to take dedicated action to systematically engage in urban mitigation activities under Article 6.

Based on these considerations, the authors suggest a **framework concept with common principles and standardised methodologies and a menu of approaches** that a city/country may choose depending on its structures and requirements. Figure 13 summarizes the proposed framework concept, which is described in detail in sections 3.1 to 3.5. All approaches will be evaluated with a SWOT-analysis.

Figure 13: Proposed framework concept for urban mitigation activities under Article 6 of the Paris Agreement



Source: own illustration, Perspectives Climate Group

Article 6 of the Paris Agreement

Article 6 of the PA enables Parties to voluntarily cooperate in the implementation of their NDCs in order to 'allow for higher ambition (...) and to promote sustainable development and environmental integrity' (Article 6.1). For this, the article sets out two market-based avenues. Firstly, **cooperative approaches under Article 6.2** allow countries to exchange internationally transferred mitigation outcomes (ITMOs) under an international accounting framework. International oversight is limited to a report-and-review process to ensure compliance with accounting rules. Secondly, **Article 6.4 has established a baseline and credit mechanism** under supervision of an international body, under which GHG reduction activities generate credits, so-called A6.4ER. A6.4ER are issued following a process similar to the Clean Development Mechanism (CDM). While over 80 countries consider the use of international market mechanisms in their NDCs (Graichen et al. 2016) and some countries have piloted approaches (Greiner et al. 2019), the development of guidelines and rules for the approaches still needs to be finalised at COP26 (CMA 3). Under Article 6.8, the PA also introduces a framework for non-market approaches. It remains to be decided whether international carbon credits can be retired under Article 6.8 as a form of results-based climate finance.

Article 6 requires that environmental integrity is ensured, particularly in terms of additionality of the generated units and contribution to NDC ambition, transparency and avoidance of double counting. However, there are several challenges towards the operationalisation of these principles in the rules for the two approaches:

- ▶ Some countries' NDC targets are less stringent than a business as usual (BAU) scenario. Experience with the fairly similar Joint Implementation (JI) has shown that in such a situation countries have an incentive to transfer these "hot air" units (Michaelowa et al. 2019a), thus threatening the environmental integrity of the market (for a detailed discussion refer to chapter 4.1).
- ▶ Currently, most NDCs only cover certain sectors, such as energy, transport, and waste management, and the PA requires Parties to expand the coverage of the NDCs over time. The design of carbon markets can provide (dis-)incentives for countries to expand the coverage of their NDCs.
- ▶ There is an inherent risk of double counting emissions, e.g. through crediting an emission reduction more than once or counting the same mitigation outcome towards more than one mitigation pledge. This risk needs to be prevented through robust accounting. The diversity of countries' NDCs with regard to metrics, nature of targets, and coverage makes the definition of rules for accounting fairly complex.

In addition, both Article 6 mechanisms will allow for the generation of credits through policy instruments or on a sectoral level. This requires new exigencies for additionality testing and environmental integrity (Michaelowa and Butzengeiger 2017).

These risks for environmental integrity need to be addressed in the international rules to ensure the credibility of the market, as well as a real contribution to the goal and ambition of the Paris Agreement. However, the interpretation of the principles and the concrete design of the approaches are highly contested in the negotiations. **Corresponding Adjustments (CA)** are the cornerstone of the international accounting rules that are to be defined through the guidance for Article 6.2: All international transfers of mitigation outcomes need to be accounted for through 'corresponding adjustments' to exchanging parties' NDCs to ensure that double counting is

avoided. In principle, this means that countries need to adjust their emission balances to reflect ITMO sales and acquisitions, which is illustrated in Figure 14. A selling country needs to add the amount of ITMOs sold to its emission level in the National Inventory Report (NIR) (or another balance if other metrics were to be used), whereas the acquiring country can subtract the amount of acquired ITMOs from its NIR (or other emission balance) in order to meet its NDC target.

Up to now, there is no agreement on whether mitigation outcomes achieved in sectors or covering gases outside of a countries' NDC can be transferred outside of the country and whether such a transfer triggers a CA. It is also unclear whether activities from the unconditional components of the NDC will be eligible. In addition, there is no agreement on the metrics of units, as some NDC targets are expressed in metrics other than CO₂-eq. How these questions are resolved will have implications for the additionality of the credits, as well as the robustness of the accounting framework (Michaelowa et al. 2019b; Greiner et al. 2019a; Schneider et al. 2017a).¹³

Figure 14: Corresponding Adjustments for seller and buyer countries



Source: Müller et al. (2019)

Credits under Article 6.2 will likely be issued by Parties, while under Article 6.4, Parties will approve the transfer of the credit. The tracking of mitigation outcomes on the international or national level is contested, as well as the length of crediting periods and the possibility for renewal. Furthermore, Parties are still discussing whether non-state entities can also engage in exchanging mitigation outcomes; and some Parties oppose the definition of ITMOs as tradable units.

With regard to baselines, COP decisions on Article 6.2 will likely provide guidelines (e.g. on stringency, conservativeness, below BAU projection), leaving the responsibility for baseline setting to the participating Parties. For Article 6.4, baseline setting and additionality tests will be determined by the Supervisory Body on the international level.

The emerging governance rules of the mechanisms will influence the accessibility of the markets to participants from the private sector and cities. Article 6.2 will be governed by a process in which governments report on their participation in cooperative approaches and this information is reviewed on the international level. The design of approaches and ways of private sector or city participation are therefore determined by participants in specific cooperative approaches. In contrast, the governance structure of Article 6.4 is contested. Some countries are

¹³ For an in-depth discussion of propositions refer to Müller et al. (2019)

in favour of a CDM-like structure, in which the Supervisory Body (SB) develops methodologies, accredits Designated Operational Entities (DOEs) and maintains and manages registries. Other countries, under the initiative of the EU are in favour of increased responsibilities for host countries in the governance of Article 6.4 with regard to the approval of activities, selection of applicable methodologies as well as accreditation of DOE that validate projects and verify emission reductions. Such an approach would likely make the process more complex and more dependent on countries' capacities. The resulting increased transaction costs might impose additional barriers for the participation of actors from the private sector and cities. The market created under Article 6.2 will likely be rather fragmented, due to different levels of stringency and credibility and different credit import rules.

A central precondition for successful Article 6 mechanisms is a sufficient level of demand. Demand may come from governments to fulfil their NDCs. Demand from the private sector will only develop if the private sector is allowed to make use of Article 6 credits to comply with domestic policies. Until 2012, the EU emissions trading scheme (EU-ETS) was an important source of demand for CERs from CDM projects, and the abrupt downfall of the CDM after 2012¹⁴ shows how important such incentives are for the private sector.

3.1 Framework concept for urban Article 6 activities

3.1.1 Common principles and methodologies

Any city authority and/or national government planning to systematically implement urban mitigation activities under Article 6 needs to conduct the following steps:

1. Define city boundaries.
2. Ensure that urban mitigation action under Article 6 is aligned with the country's Nationally Determined Contribution (NDC).
3. Agree on / determine appropriate and environmentally sound methodologies for quantification of mitigation outcomes.
4. Agree on / determine appropriate rules for monitoring, reporting and verification (MRV).
5. Define and ensure aspects of social integrity.
6. Additionality and financial incentives.

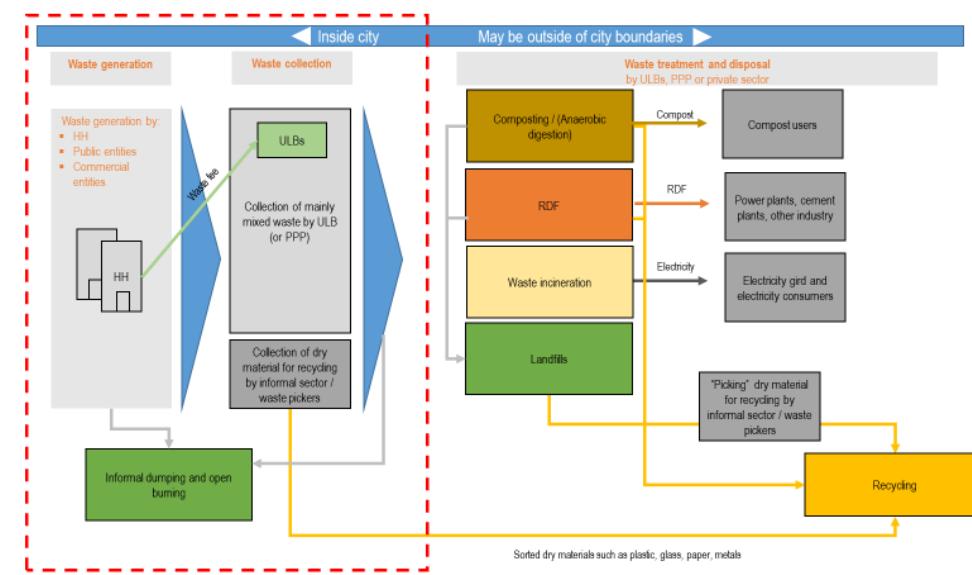
3.1.1.1 Definition of city boundaries

As the analysis in chapter 2 showed, urban mitigation can encompass activities in many different sectors and subsectors. Some of these activities – such as energy efficiency measures in buildings are of stationary nature, whereas others have mobile elements that can even cross formal city territories. Examples of the latter are the transport sector – e.g. people commuting to cities for daily work – and the waste sector that is often characterised by a complex flow of waste streams inside and outside the city territory.

Figure 15 exemplarily shows the waste streams and actors involved in waste handling for the case of an Indian city. Several of the facilities involved to process the waste produced by urban households and industry, are located outside the city's territories.

¹⁴ The EU introduced stringent qualitative and quantitative restrictions on the use of CERs from 1 January 2013 onwards, which reduced the use of CERs substantially.

Figure 15: Complexity of defining urban boundaries at the example of the waste sector (flow of urban waste streams and waste-related emissions)



Source: Michaelowa et. al (2019)

There are two main options to define city boundaries for the purpose of urban mitigation under Article 6 of the PA:

- ▶ a strict territorial definition of city boundaries, and
- ▶ a cause-related definition of city boundaries.

Under option 1, only activities taking place within the territories of the city/urban area would be eligible. This approach has the advantage that it is likely easier to control activities for a city government (of course depending on the national circumstances), but comes with challenges regarding cross-border mitigation activities e.g. in the case of personal transport and transport of consumer goods, as well as sectoral waste activities.

Option 2 would allow an inclusion of mitigation activities targeting transport to/from the city, and also waste handling outside city boundaries. However, it may go beyond the traditional responsibility and level of influence of a city-administration and therefore require new forms of inter-urban collaboration.¹⁵

Both approaches may make sense depending on domestic context, and the NDC-approach chosen by a given country (see next section). It is therefore almost impossible to provide a generally valid evaluation – it rather needs to be evaluated in a given country context.

3.1.1.2 Alignment of urban Article 6 activities with the NDC

Under the Paris Agreement, all countries have an obligation to develop and communicate increasingly more ambitious NDCs for mitigation. While there is no legal obligation to actually achieve the mitigation contributions defined by the NDCs, countries are obliged to 'pursue domestic mitigation measures', with the aim of achieving their NDC objectives (Article 4.2 PA).

Any party of the PA therefore needs to plan ahead how it aims to reach its NDC-target. The national mitigation 'target' needs to be broken down to sectors. With regard to urban emissions,

¹⁵ E.g. collaboration between cities, or cities and administrative bodies responsible for city surroundings, or cities and the state or federal government.

the dilemma is that many countries traditionally did not define cities as a stand-alone “sector”, but rather allocate urban emissions to the standard sectors energy , waste, households, transport, etc.

Although many city governments world-wide have become active with regard to emission reduction activities (see discussion at the end of this chapter), the traditional sector definition does not provide any incentive to urban authorities to actively develop comprehensive climate policy targets and plans for their territories.

A solution would be to **define cities as a stand-alone sector**, to explicitly define urban mitigation ‘targets’ and to make city authorities responsible¹⁶ for reaching those targets. China is one of the few countries already following such an approach within the framework of “low carbon piloting cities”.¹⁷

Such an approach requires clear definitions and a clear decision how to deal with activities going beyond city boundaries, such as transport or urban waste management. If there is political will, it should be possible to derive such definitions. The example below visualises how such an approach may look like.

Example: A country’s NDC defines an unconditional, economy-wide target of -15% compared to business as usual (BAU) until 2030. The NDC defines the sectors and sectoral targets as specified in Table 5.

Table 5: Example: Definition of urban targets in NDCs

Sector	BAU forecast 2030 (Mt CO2-e)	Sectoral NDC target (%)	Sectoral NDC target (Mt CO2-e)
Industry	200,00	-0,15	170,00
Energy production	250,00	-0,15	212,50
Agriculture	150,00	-0,10	135,00
Forestry	100,00	-0,20	80,00
Transport (outside cities)	175,00	-0,10	157,50
Households (outside cities)	50,00	-0,10	45,00
"Cities", including: • Urban transportation • Urban buildings (public & private), including electricity consumption • Urban waste management (also outside city boundaries if originating from city) • Urban water & wastewater • Local energy supply (public local power/heat stations, household cooking, solar roofs etc.).	175,00	-0,20	140,00

¹⁶ and to empower them legally and financially

¹⁷ The piloting program was designed by National Development and Reform Committee and implemented at city level.

Sector	BAU forecast 2030 (Mt CO2-e)	Sectoral NDC target (%)	Sectoral NDC target (Mt CO2-e)
Total	1.100,00	-0,15	940,00

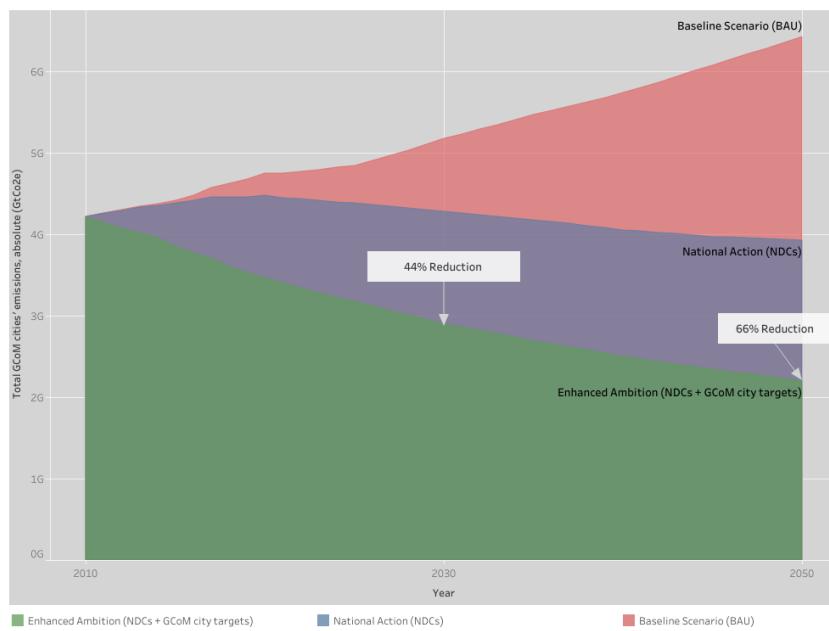
Sources: own illustration, Perspectives Climate Group and ICLEI World Secretariat

In the context of Article 6, countries will need to decide a) when ITMOs or A6.4ERs can be sold and b) who will make such decisions. Countries using market mechanisms conservatively may only want to sell Article 6 credits, if it is clear that the NDC will be/has been reached, and may want to make centralised decisions – i.e. the federal government may want to take this decision. Less conservative countries may want to allow Article 6 sales already if the given sector has reached its target, and may want to pass the decision-making rights (and responsibilities for reaching the target) to the sector or even each city authority.

All those decisions will impact on the level of direct incentivisation for city authorities.

It needs to be pointed out that many cities plan and implement climate action and policies. In the flagship initiative *Global Covenant of Mayors for Climate and Energy* alone, 10,239 cities across 6 continents and 138 countries have set emission reduction targets which account for 2.3 billion tons CO₂-eq of annual emissions reduction in 2030 (GCoM, 2019a). Based on their commitments, cities and regions have reported more than 10,000 climate actions (NCI, PBL, DIE, Blavatnik School of Governance and University of Oxford, 2019) and promote collaboration of local, regional and national governments, as well as organisations across various platforms (e.g. the Partnership for Collaborative Climate Action). The engagement of cities and other non-state actors in climate action has gained importance in the past years, and national governments have formally recognised the efforts of cities in the cover decision to the Paris Agreement, as well as the importance of providing incentives for emission reduction activities by cities (Decision CP/2015/10/Add. 1, para 133-36). Given the increasing engagement of cities in climate mitigation and adaptation, their recognition and relevance in the international process, as well as their access and mandate to govern, plan and implement local action, it is decisive for the success of the Paris Agreement to define the contributions of cities to NDCs and enable the urban emission reductions systematically across countries.

Figure 16: Collective emission trajectories for more than 10,000 Global Covenant of Mayors' cities and local governments under business-as-usual and target scenarios (avoided emissions if targets are set), with the NDC commitment line highlighted in a BAU scenario



Source: GCOM (2019b)

3.1.1.3 Environmentally sound methodologies for quantification of mitigation outcomes

How environmentally sound methodologies in the context of an urban Article 6 activity will be designed, depends on the outcomes of the negotiations on the international rulebook for Article 6. This was one of the key topics of COP 25. Text box 1 summarises the decision texts on Article 6 baseline setting that were agreed on in the working groups. However, the COP 25 plenary finally could not make a decision on Article 6 rules, but deferred the negotiations to COP 26, making reference to three different versions of text. This means that negotiations will continue based on all three versions of text and thus various issues may be reopened in the run-up and during COP 26. Even if COP 26 takes a decision on the rules, it is clear that substantial work remains to be undertaken in the context of the Article 6 work programme over several years in order to operationalise the rules.

Text box 1: Proposals for Article 6 baseline setting negotiated at COP 25

At COP 25, there was an intense discussion around which approaches to baseline setting would be allowed for Article 6.4 activities in order to safeguard environmental integrity. There was consensus that baseline methodologies are to be approved by the Supervisory Body. In the iteration of text issued on December 14, two options on baseline and additionality determination were proposed. In both of them, the concepts of best available technology and performance benchmarks were proposed, while only one option specified that baselines were to be below business as usual. Projected or historical emissions were only to be eligible if countries could justify that the use of other approaches would make activities not economically and technologically viable. One option clearly referred to standardised baselines. However, only one of the two options provided language specifying the approach to additionality testing. For both options, wording was proposed that additionality testing could be waived for LDCs and SIDS. In the

final iteration of December 15, all questions relating to baselines and additionality were relegated to the work programme.

The text also foresaw that host countries could specify which baseline approach would have to be used by activities on their territory. However, any methodology elaborating the approach would still have to be approved by the Supervisory Body.

There was consensus that no international rules would be applied for baseline setting under Article 6.2. However, there was also consensus that countries will have to report how baselines ensure environmental integrity, show conservativeness and are below business as usual.

After the COP, a number of industrialised countries announced that they would continue piloting Article 6 activities under Article 6.2 and would not wait for an international agreement. The most important development in this context was the emergence of a club of countries declaring it would follow the “San José Principles for High Ambition and Integrity in International Carbon Markets”¹⁸ (DCC 2020). With regard to baselines, the principles state that baseline methodologies should “support domestic NDC achievement and contribute to the achievement of the Paris Agreement’s long-term temperature goal”. Interpreted strictly, this would no longer allow historical or business-as-usual baseline approaches. However, it remains unclear how the signatories of the principles want to operationalise them.

Against this background, it will be important that Article 6 pilot activities, including in urban contexts, apply credible baseline methodologies and ideally use the additionality test of the CDM to show that they are not business as usual. Standardisation will not be a panacea, but should be tested for highly aggregated interventions.

3.1.1.4 Appropriate MRV rules

For Article 6.2, the only handle to ensure a high level of integrity are the reporting rules that apply to countries, whereas for Article 6.4, the Supervisory Body will approve monitoring methodologies for mitigation activities. As discussed in section 3.1.1.3 above, there was a version of the rulebook text that made reference to good MRV practice in the reporting requirements, whereas the last version of the Presidency texts relegated all MRV methodology issues to the work programme, meaning that principles and rules for developing MRV approaches would only be developed at a later point in time.

In the context of Article 6 piloting, the San José Principles state that reporting for emissions and removals, shall “fully apply the principles of transparency, accuracy, consistency, comparability and completeness”, and that “centrally and publicly accessible infrastructure and systems” are to be used to “collect, track, and share the information necessary for robust and transparent accounting” (DCC 2020). As the devil lies in the detail, the signatories of the principles now need to show how they want to operationalise the principles.

¹⁸ The “San José Principles for High Amition and Integrity in Internatioal Carbon Markets” were put forward during COP25, as negotiations on market mechanisms were stalled, by a coalition of Costa Rica, Switzerland, Belize, Colombia, Paraguay, Peru, Marshall Isalnds, Vanuatu, Luxemburg and the Cook Islands. They have been signed to date by 32 countries (Germany, Sweden, Denmark, Austria, Grenada, Estonia, New Zealand, Spain, Ireland, Latvia, the Netherlands, Norway, Slovenia, Belgium, Fiji, Portugal, France, the United Kingdom, Italy, Finland, Trinidad and Tobago and Tuvalu). The eleven principles represent a set of outcomes for the Article 6 rulebook, that the signatories work towards for Article 6 activities to meet minimum requirements of ambition and environmental integrity. The full list of principles is available at [the website of the Costa Rican Climate Change Directorate](#) (DCC 2020).

3.1.1.5 Consideration of social integrity

Determining the social integrity of Article 6 activities in an urban context can be based on Socially Responsible Public Procurement in Europe.¹⁹

An established approach and strategy to ensure social safeguards within products and services is public (and private) procurement. Socially responsible public procurement (SRPP) aims to address the impact of the goods, services and works purchased by the public sector on society. It recognises that public authorities are not just interested in purchasing at the lowest price, but also in ensuring that the procurement achieves social benefits and prevents or mitigates adverse social impacts during the performance of the contract. As a public buyer, one can consider social objectives throughout the procurement process, provided these are linked to the subject-matter of the contract.²⁰ In the European Union, SRPP must be carried out in compliance with the 2014 Procurement Directives and the principles enshrined in the EU Treaty²¹ and Charter of Fundamental Rights, as well as international agreements such as the WTO Government Procurement Agreement.

SRPP can be a powerful tool, both for advancing sustainable development and for achieving international, national, regional or local social objectives. It views public procurement as a strategic instrument to spend public money efficiently and sustainably. It considers a broad spectrum of social issues at the appropriate stages of the procurement procedure, including:

- ▶ Compliance with labour law;
- ▶ Social inclusion;
- ▶ Employment opportunities for long-term unemployed and disadvantaged people, as well as people with disabilities;
- ▶ Equal opportunities, including gender and ethnic equality;
- ▶ Accessibility and design for all;
- ▶ Ethical trade issues, including human rights and decent work; and
- ▶ Youth.

Combining social with green²², circular²³ and innovation²⁴ considerations can bring a strategic approach to sustainability in public procurement²⁵.

¹⁹ The following paragraph builds on the work done by the European Commission DG GROW on social procurement. Further information is available at the [website of the European Commission](#)

²⁰ This fundamental requirement for SRPP is explained in Section 3.4.2, with specific examples throughout the Guide.

²¹ Treaty on the Functioning of the European Union (TFEU)

²² For guidance on green public procurement, see the 2016 [Buying Green! Handbook](#)

²³ For guidance on circular procurement, see [Public Procurement for a Circular Economy](#)

²⁴ For guidance on innovation procurement, see the [Commission notice Guidance on Innovation Procurement](#)

²⁵ The Communication from the Commission to the Institutions [Making Public Procurement work in and for Europe](#) highlights “the possibilities of public procurement as a strategic tool to support sustainable, social policy objectives and innovation.”

Carbon Market Consultation

Next to these principles and obligations, public actors within the carbon market should think about how suppliers could meet social needs for the planned product, service or work. Questions to consider include:

- ▶ Is the market mature enough to deliver the social requirements? Are existing suppliers capable of meeting the social needs, or are there new suppliers with social innovations entering the market?
- ▶ Will the market be technically capable of meeting social requirements? For example, can suppliers react to demands for information on supply chain working conditions, or to community benefit clauses relating to employment creation? How will such commitments be verified and enforced?
- ▶ How many suppliers can provide what is required? Does market capacity mean there will be competition for the tender, or will the social demands potentially restrict bids?
- ▶ Can social requirements bring suppliers from different subsectors, such as the social economy, together in a socially innovative way? How would this work and what can the design of the tender do to promote this?
- ▶ Do suppliers operate differently or provide other goods or services in different geographical areas, and how would this affect the social aspects of the offer?

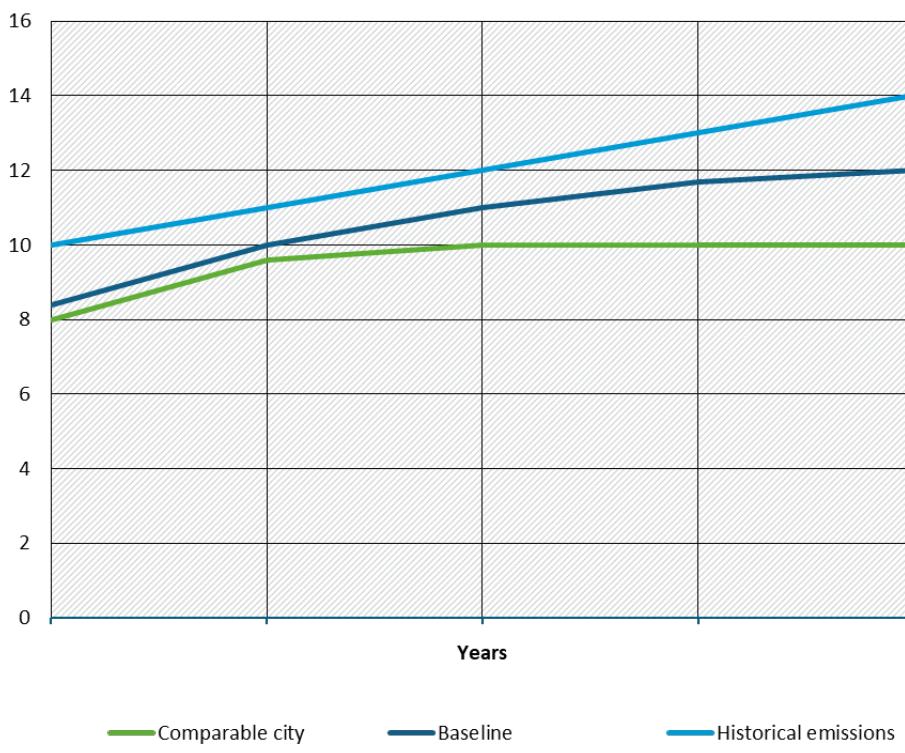
A list of social safeguards that are the basis to ensure the social integrity of carbon credits can be found in section 3.4.2 of this report.

3.2 Menu of approaches

3.2.1 Subsector approach

This approach starts with the principle that GHG emissions from each sector in a city are influenced by various policy instruments that address technology choice, as well as by the intensity of technology use of its inhabitants. The crediting of emission reduction takes place against a baseline that reflects both types of policy instruments. This is assured through a standardised baseline and monitoring approach covering the entire sector within the geographical boundary of the city. The sector-specific parameters of this baseline can be influenced by the technology used and the behavioural change in the city.

As a general approach, the baseline would take into account both, the historical trends of the past 10 years within the city boundary and the values for the parameter in a “counterpart” city that is comparable in population density and per capita income (see Figure 17, where the baseline is the average of the parameter values in the city and its counterpart). The monitoring would be ensured by the cities through significant samples either measured or surveyed.

Figure 17: General Approach to a Top-down Sectoral Baseline

Source: own illustration, Perspectives Climate Group

In the transport sector, a parameter that reflects tCO₂-eq per person-km (pkm; for persons) or tonne-km (tkm; for freight) would reflect both technology and behavioural change. This could be combined with a parameter measuring pkm or tkm per inhabitant and year, which can be influenced only by behavioural change. Historical values for this parameter in the city and its counterpart derived from traffic surveys would define the baseline. Under the Article 6 intervention, technology choice and intensity of use can be influenced through policy instruments such as public transport system subsidies or linking public housing with public transport infrastructures, limitation of parking lots, parking fees or road usage tolls. Their combined effect would reduce the value of the parameter. As the baseline covers the geographical boundaries of the city, commuting to and from the city and transit traffic would not be taken into account.

In the buildings sector, a baseline that captures policy instruments such as efficiency standards, subsidies for efficiency in housing or procurement for energy efficient compliances covers both tCO₂-eq/m², which can be influenced by housing efficiency standards or subsidies for energy efficiency (as well as energy consumption behaviour) and the amount of living area per person per year (m²/person) which can be influenced through behavioural change. The overall baseline needs to include housing, commercial and public buildings.

For the waste sector, the baseline needs to include the parameters tCO₂ emissions from waste or wastewater per inhabitant and year to cover technology choice and behaviour, such as improved waste collection and recycling. Behaviour can be influenced through policies such as waste volume taxes in combination with free recycling points, or waste collection and management standards for urban entities.

3.2.2 Policy type categorisation

The starting point for this approach is the consideration of regulator types and their influence- and control-options. For instance, **national or state/provincial governments** may impact urban GHG emissions either directly through regulation (e.g. country-wide building codes or energy efficiency standards for lighting, cars; etc.), or indirectly through financial incentives for city administrations to take action reducing GHG emissions within their territories.

City administrations typically have a high level of control over public infrastructure – i.e. public buildings, public transport, street lighting, wastewater, etc. Furthermore, public expenditure on works, goods and services represents a major market share. For instance, public procurement in the EU corresponds to around 14% of the GDP, accounting for roughly 1,8 trillion EUR annually (DG Environment 2016). On the contrary, city administrations may have a low level of control over waste management (see discussion under **Fehler! Verweisquelle konnte nicht gefunden werden.**./Figure 15), energy efficiency of private buildings, private energy consumption, etc. as they may not possess the mandate or ownership.

The **private sector** (industry, companies) and **households** require either financial incentives or regulative requirements in order to take action lowering their GHG emissions. With regards to private sector action, return on investment and bankability of investments in GHG reduction activities are important aspects. In the household sector, a typical challenge is the ownership-tenant dilemma in rented houses and flats. And the **informal sector** that exists in many less developed regions is hardly approachable by regulation, but may be reachable by financial incentives if those are designed in a proper, systematic manner.

In terms of **policy options**, regulators principally have the choice between:

1. incentive-based policies,
2. regulation, and
3. infrastructure investments and public procurement.

Incentive-based policies can be direct or indirect financial incentives for mitigation actions. The challenge is that developing countries often do not have the financial resources for large-scale policy incentives for urban mitigation actions as they often need to direct available financial resources into other development priorities. Article 6 of the PA can become a new source of finance, but the NDC-alignment discussed in section 3.1.1.2 needs to be considered properly.

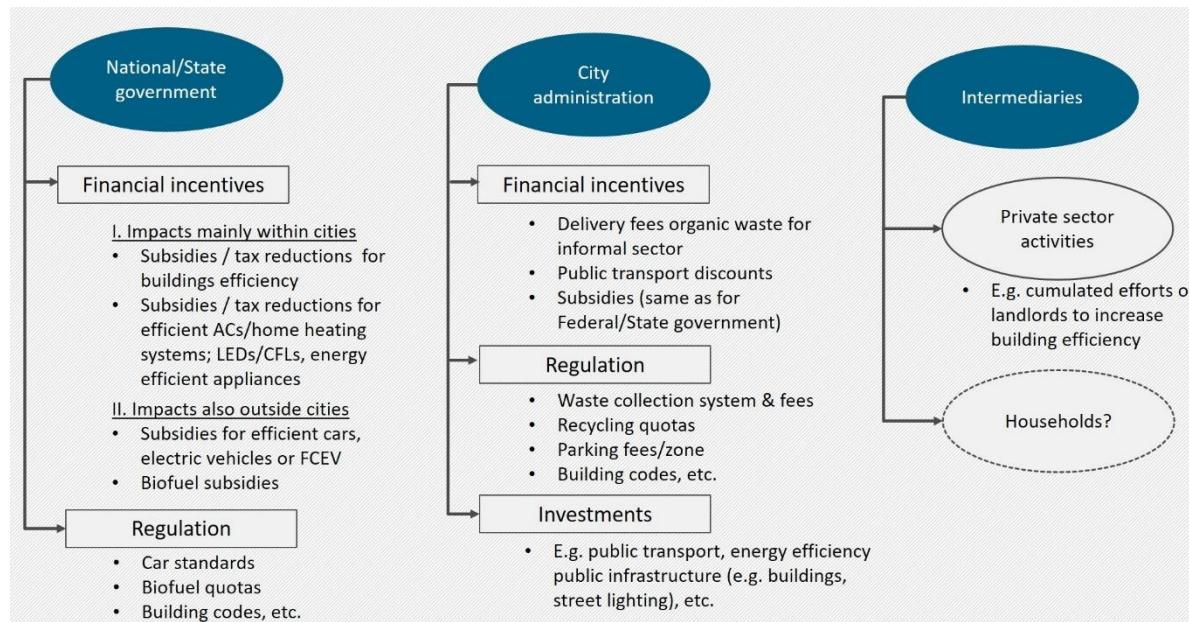
Regulation means a legal obligation to, for example, meet certain standards such as emissions standards, energy efficiency standards, etc. Costs for meeting the standards typically need to be covered by targeted entities. Hence, public budgets are not as much affected as in case of financial incentives, but policy makers often worry that they overburden companies and/or households, and that the international competitiveness of their economies is negatively affected.

Infrastructure investments, such as investments in local public transport and energy efficient street lighting can be very effective and straightforward means to reduce urban emissions. Sustainable and social public procurement is an important tool to achieve respective policy goals. Again, developing countries often lack the required financial resources. Hence, Article 6 of the PA could become an interesting new funding source.

Figure 18 summarizes the main policy options, differentiated by regulator type, with relevance for urban mitigation under Article 6 of the PA. As the private sector (except for larger industry) and households are characterised by low to very low individual emission levels, it might make sense to introduce “intermediaries” that bundle micro-level action and thus bring them to a scale

workable under Article 6 mechanisms. An example would be cumulated efforts of house owners or landlords to increase energy efficiency measures in buildings that are not subject to, or go beyond, efficiency standards or financial incentives.

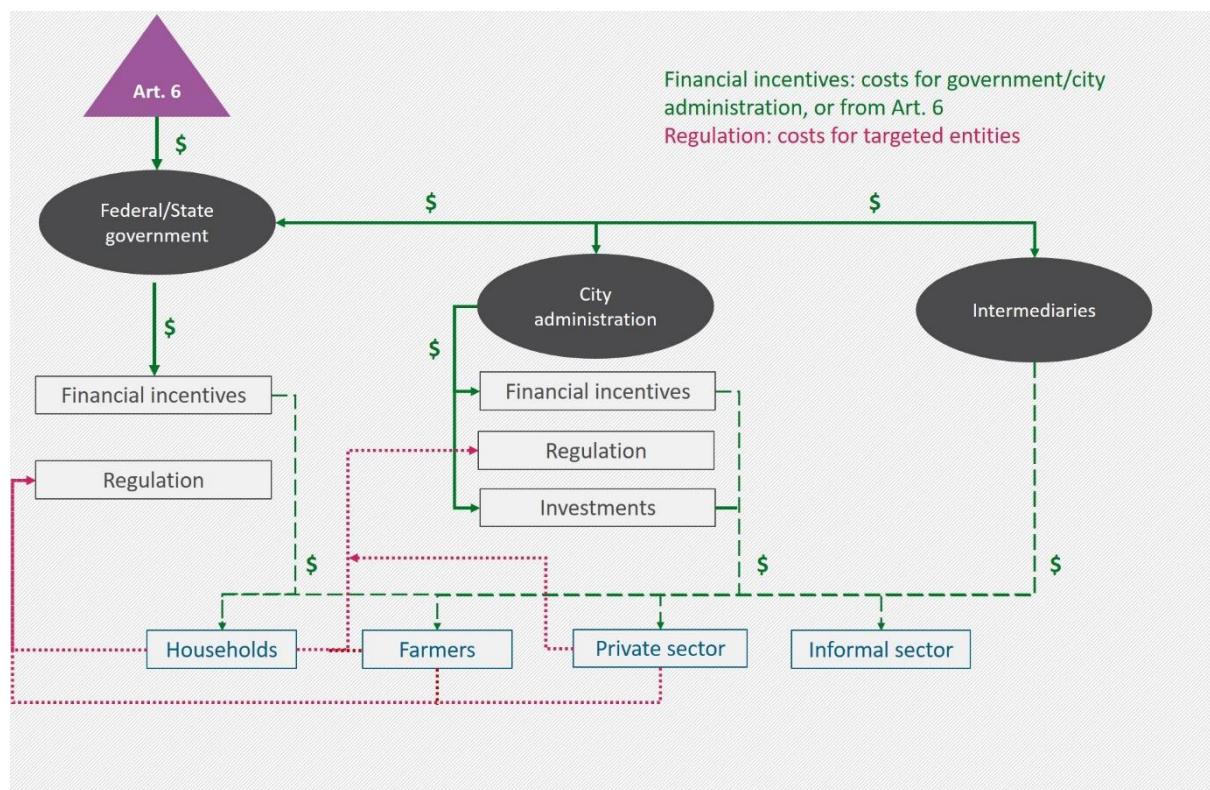
Figure 18: Policy choices by regulator type with relevance for Article 6



Source: own illustration, Perspectives Climate Group

Looking at those policy instruments that require financial resources – i.e. financial incentives schemes and direct infrastructure investments – Article 6 of the PA can create an interesting new source of (co-)funding, both on the national level and on the city level.

International partners may either buy ITMOs under Article 6.2, or A6.4ERs as a form of RBF; or they may provide funding for urban mitigation activities under Article 6.8. Those funds can either be bundled at the national level as shown in Figure 19, or they can directly go to city administrations. A bundling at the national level would require a well-coordinated approach by the national government, which would then re-allocate the financial resources to cities according to their mitigation contribution or according to planned/implemented policies. Or the national government may initiate “Urban Article 6 tenders” for which city administrations can apply and submit their proposals how to reduce GHG emissions within their territories. In this case, the national government would have a channeling function between cities and international ITMO-/A6.4ER- buyers or Article 6.8 donors.

Figure 19: Possible incentive structures under Article 6 (centralised approach)

Source: own illustration, Perspectives Climate Group

A more direct approach would be to allow city administrations - or even the above-mentioned intermediaries - to directly participate in Article 6. This means that international funding under Article 6.2 and Article 6.4 would directly go to cities that have overachieved their domestic NDC contributions (see discussion in section 3.1.1.2 above); or for planned policies or investments under Article 6.8. The direct approach has the advantage that city governments may have stronger incentives to take action, and that the risk of corruption may be lower as less hierarchy levels are involved compared to a situation where the national government receives funds and many people are involved in the reallocation process. Obviously, this very much depends on the situation and structures in a given country.

Allowing intermediaries to participate directly in Article 6 of the PA can be a new form of private sector engagement. One needs to define proper rules to avoid double counting with policies implemented by national, state or city governments; and it is equally important to ensure reliability and continuity of such private sector incentives. The CDM showed in its initial 12 years of operation how effectively proper incentives can mobilise private sector engagement – but it also showed how quickly a disruption of demand can lead to a stalling of such engagement.

3.2.3 Project facilitator approach

The starting point for this approach is that Article 6 is not yet commonly used by local governments due to the following challenges:

- ▶ Strongly varying urban structures, settings and emission profiles on the international and national level as a barrier to defining standardised approaches.
- ▶ Ownership structures / political responsibility and involvement of all relevant players (especially governmental levels) required for implementation of a mitigation activity.

- ▶ Challenges related to the funding of mitigation activities, such as bankability of projects/activities, lacking financial incentives for implementation, and funding access.
- ▶ Data availability for accurately determining GHG mitigation benefits of a given activity.
- ▶ Ability to accurately monitor the GHG mitigation benefits of a given activity (MRV) and, hence, generate outcomes for RBF.

To overcome the identified barriers, the authors propose an approach that highlights the autonomy of national governments in deciding the trading scope, MRV, baseline and boundary setting, and project methodologies. Having analyzed the technical, financial and political challenges that cities face to a larger degree than other market participants, this approach allocates certain activities to a facilitator organisation supporting the national and local level of government with the planning, preparation, financing, monitoring and verification of projects. The facilitator will reduce the technical burden for local governments, minimise the transaction costs during the credit generation and trading processes, thereby mediating technical, financial, and political risks.

The players involved in this proposed approach and their responsibilities are illustrated in the Table 6 below.

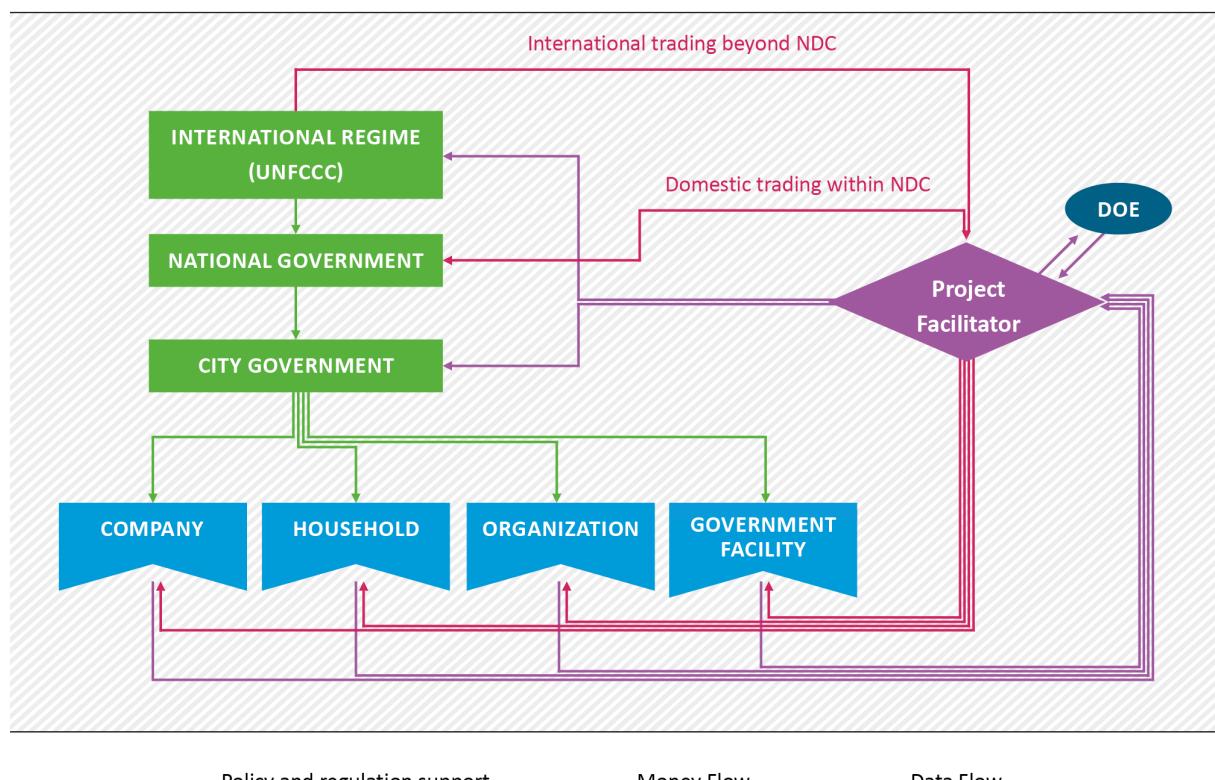
Table 6: Important players and responsibilities under the project facilitator approach

Player	Responsibilities
National governments	<p>Define NDC and disaggregate the NDC into implementable action plans for each region and each ministry.</p> <p>Check for stringency of cities' mitigation targets and contributions to the NDC sector 'cities' or the contribution to each sector by cities (in this case mitigation targets of cities for each sector must be aligned with the NDC).</p> <p>Design and put in force vertically integrated MRV methodologies and institutional processes as well as baseline and boundary settings with consultation with local governments.</p> <p>Design a pool of project methodologies with requirement of environmental and social integrity.</p>
Local government	<p>Receive mandate from national government to implement NDC.</p> <p>Establish policy framework to facilitate individual implementer.</p> <p>Conduct mitigation activities within its boundary as project implementer.</p>
Project implementers	<p>Responsible for implementing the mitigation activities and sending the mitigation data.</p> <p>The project implementer(s) could be local government, private companies or individual households.</p>
Project facilitator	<p>Project preparation, i.e. helping cities with selecting and using an applicable project methodology.</p> <p>Impact evaluation.</p> <p>Bundling-up validation and verification.</p>

Player	Responsibilities
	<p>Compiling and reporting mitigation data to the national government.</p> <p>Channelling funds to project implementer(s) by facilitating carbon credit trading.</p> <p>Advising and build capacities for project implementers.</p>
Evaluator	<p>A third-party organisation, recognised by the national government will evaluate the project implementation results.</p> <p>The results will be submitted to national governments as the basis for distributing result-based assistance</p>

Source: own illustration, ICLEI World Secretariat

Figure 20: Project facilitator approach: support flow for actions under Article 6



Source: own illustration, ICLEI

3.2.3.1 Market participants and procedures

As depicted in Figure 20 above, the national government participates in international carbon markets and gives cities the opportunity to benefit from it through generating credits and finance. As a prerequisite, it would be required that the NDCs can be disaggregated, so that either a national 'city' sector is created or the contribution of cities towards each sector in the NDC is clear and transparent (also see discussion in section 3.1.1.2).

To channel the credits to the cities and collect project data, the national government designates a qualified organisation to act as 'project facilitator' coordinating the mitigation impact evidence as a basis of internationally credit trading. Most importantly, the project facilitator collects

project information from each implementer of urban mitigation activities (city government facilities, individuals, and companies) and sends them to the national government in the scope and quality needed for international carbon markets, after having supported the verification and validation of additionality of credits with an accredited DOE. The national government then claims the (additional) mitigation impacts in the form of carbon credits to the Article 6 supervisory entity, which should be installed to oversee at least Article 6.4, and in return collects the corresponding volume of funds. These funds are then distributed to the urban project implementers via the project facilitator. A fixed percentage of the funds could be taken for capacity building, fund management and advisory services by the project facilitator.

3.2.3.2 Essential requirements

The national government establishes technical methodologies for MRV (which should be aligned with the IPCC guidelines or any upcoming UNFCCC guidelines defined for Article 6) and institutional processes, carried out by national agencies mandated to collect all national GHG data in a geographically disaggregated way. These procedures should prospectively be vertically integrated and aligned to the local level so that one coherent approach to measurement guarantees that no double counting happens domestically.

The MRV results must be published internationally to maintain transparency and avoid double counting. International guidance on transparency and methodologies should be followed and harmonisation be sought for.

The project facilitator, even though being appointed by the national government, could have the requirement of obtaining **accreditation by the Article 6 supervisory body** to ensure independence of the national government²⁶. This would decrease the risk of regulatory capture and corruption, thus benefiting the environmental integrity of the issued carbon credits.

Regarding **capacity building**, the project facilitator would have a pivotal role: increase the accessibility of expertise and knowledge at local government level for project development (e.g. on methodologies) and support the improvement, creation and approval of methodologies for cities. A sound understanding of methodologies for project developers and city governments is important to achieve an accurate pre-assessment of possible credits volumes at an early planning stage. Additionally, the project facilitator could use its expertise and practice with validation of emission reductions and MRV to support the national institutions responsible for creating a national GHG inventory and MRV system, paving the way for a fully vertically integrated and aligned MRV system.

The project facilitator can **bundle up similar projects**, equivalent to PoAs in the CDM-context, in order to reduce transaction costs for project preparation, registration, validation and verification. Every implementer of a mitigation activity will enjoy cash-in-flow from credit trading. Achieving creditworthiness and overcoming financial and banking challenges is crucial for cities. Hence the project facilitator acts as an advisory hub supporting the application for commercial finance, including the feasibility assessment, identification of revenue options for the project and possible additional funders. Also, the project facilitator could help with the buyer-seller relationship by identifying possible buyers of credits and helping with the contractual procedures.

It could be advisable that the project facilitator be a multilateral development bank (MDB) or be backed by a MDB. This would allow for **upfront payment** before a mitigation outcome is issued and increase the participation of the private sector, as banks decrease the risk of commercial

²⁶ One could also introduce the rule that not the national government appoints the project facilitator, but the UNFCCC. The question is, however, if this is politically acceptable.

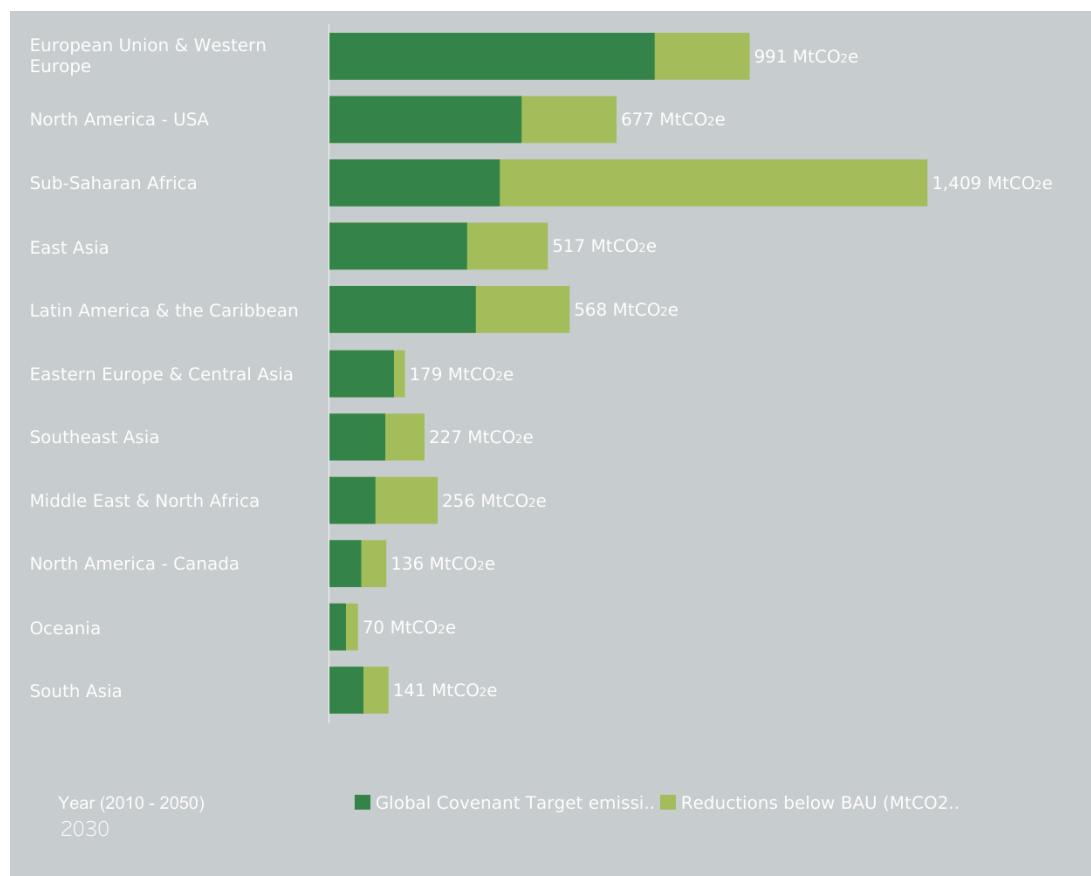
failure. This will kick-off project implementation and reduce financial burdens of project implementers. As the project facilitator could take over many project development tasks and potentially bear the financial risk when providing up-front payment to project developers, these services require a service fee which will in turn reduce the financial attractiveness of using the market mechanism, when the credit price is low.

As an advisory service, the project facilitator could help align mitigation activities to **national climate strategies and NDCs**, thereby increasing the likelihood of national co-finance. Similarly, it can guide cities in the multi-level governance process of managing mitigation activities. Political instability and ownership are a risk for mitigation activities on all levels of government, but limited financial resources and curbed political mandates of urban actors amplify this volatility, as cities depend on national or state actions, funding or approval for many policies or projects. Furthermore, the support of the project facilitator for mitigation projects could increase political support over the span of electoral cycles and political parties, decreasing the domestic political volatility of the city administration. Finally, the co-benefits of mitigation activities are another crucial motivator for project development. Having gained local experience and expertise with the methodologies being used in a country or region, the project facilitator could use this to support the realisation of various co-benefits.

3.2.4 Top-down approach

This approach pursues the idea of direct exchange of ITMOs between cities with emission targets under Article 6, coordinated by umbrella organisations. This assumes that national governments are willing to authorise city administrations and their umbrella organisations to engage in ITMO transactions without interference by the central government. The umbrella organisations are associations or networks of cities with the aim of promoting knowledge exchange between cities and strengthening their capacities for climate protection. As the approach relies on emission targets determined by cities, this approach offers a solution to accommodate the variety of city structures and the diversity of emission reduction approaches in cities. It can also build on existing networks and resources to strengthen cities' capacities for monitoring and accounting of emissions.

Many cities have defined own emission reductions or climate neutrality targets (GCoM 2019a, ARUP and C40 Cities 2014) across all regions (see Figure 21). At the same time, city umbrella organisations provide platforms for cities to report on their progress (e.g. the carbonn climate registry) and develop methods to uniformly measure GHG emissions and set mitigation targets (WRI et al. 2014). Cooperative approaches under Article 6.2 will allow for a diverse set of approaches. A cooperative approach in which cities trade ITMOs is thus conceivable under Article 6.2.

Figure 21: GCoM cities cumulative emission reduction targets, by region

Source: GCoM (2019b)

The precondition for a city to participate in such a mechanism is that it has set a city-wide emission reduction target, which constitutes the crediting baseline. In addition, the city needs to have an emissions inventory in place and be able to monitor emissions within the city (and emissions related to activities within the city). Finally, the emission targets of participating cities need to be at least as stringent as the NDC of the country to avoid that the cities sell “low hanging fruit” that have to be made up by emission reductions elsewhere. This is necessary to ensure that trading of mitigation outcomes from cities leads to an overall decrease in emissions. The assessment should be undertaken by the national entity responsible for authorisations for Article 6, as it should have the best overview of the national situation with regard to emissions mitigation.

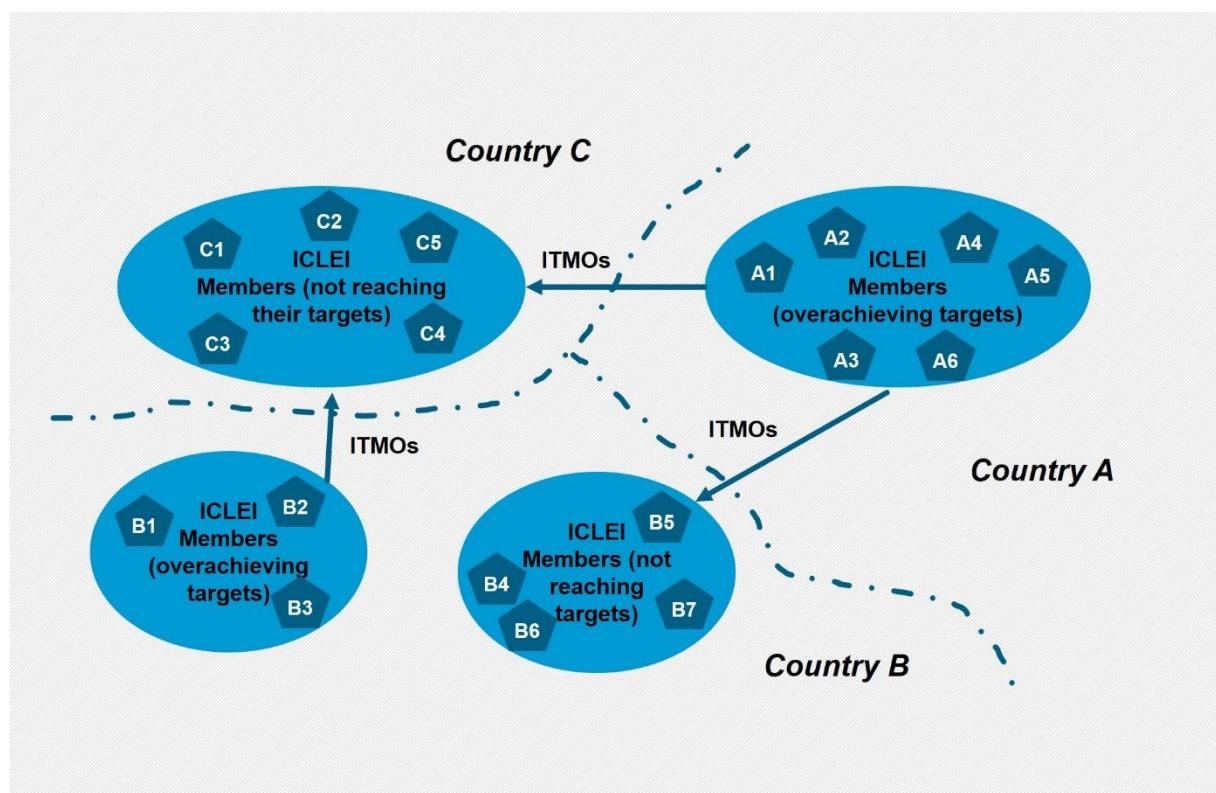
Ideally this exchange is based on a standardised approach to calculating the emission reductions from cities, based on city inventories or the definition of activity boundaries. A standardised approach would facilitate accounting for the exchange of mitigation and ensure the transparency of the mechanism. The role of umbrella organisations is to set guidelines for the boundaries that apply, or which activities are eligible and define the monitoring approaches. These guidelines can build on already existing approaches for harmonizing city inventories and reporting towards targets, e.g. the community-level GHG protocol (WRI et al. 2014). It also needs to set guidelines for the crediting period of the approach, which needs to take into account countries’ NDC, as well as the cities’ target years. The city umbrella organisation thus acts as intermediary for cities willing to participate in the approach and facilitates the exchange. It then needs to be decided whether a city is a buyer or seller of international credits. If this is determined ex-ante and by the city, the approach requires cities to undertake projections of their emissions of their

progress towards their target. A more conservative approach would be that cities determine whether they want to be buyers or sellers at the end of the target period.

Figure 22 illustrates the idea of direct trading between cities facilitated by a city umbrella organisation. Cities that overachieve their targets (represented by the items A1-A and B1-B3) could sell ITMOs to cities not reaching their targets (represented here by items C1-C5 and B4-B7) under the conditions described above.

For the selling cities, the national government has two important roles in this approach: (1) It checks whether city emission targets are more stringent than the (unconditional part of) the NDC. This requires an approach for the allocation of a part of the NDC to cities (cf. section 3.1.1.2). (2) It approves the issuance and transfer of ITMOs. This is necessary to ensure the environmental integrity of the approach, e.g. to avoid double counting of emissions. For the buying cities, the national government needs to authorise the transaction and ensure the ITMOs are surrendered to it.

Figure 22: Direct exchange of ITMOs between cities



Source: own illustration, Perspectives Climate Group

Selling cities benefit from a direct financial incentive from selling emission reductions. Buying cities have the incentive to use the mechanism to reach their emission reduction target cost-efficiently or compensate for unavoidable emissions, if they have set a climate neutrality target. This incentive is even stronger when city targets are legally binding. For city associations such an approach could be a continuation of currently ongoing efforts to support cities in establishing inventories, attracting finance for mitigation projects and building capacities.

3.2.5 City climate fund approach

This approach addresses the following key challenges:

1. Difficulty to reliably measure mitigation impacts of urban projects – due to:

- limited data availability and/or poor quality of data
 - lack of capacity to accurately monitor GHG mitigation impacts
2. Lack of capacity to develop projects on the urban level.
 3. Not all project types on the local level (in terms of GHG mitigation on an urban level) are included
 - Transport projects are so far underrepresented.
 - Projects of cultural and behavioural change are hardly included.
 - Projects and initiatives with a high but indirect effect on GHG emissions (such as plant-rich diet, educating girls for improved family planning) are not included (Project Drawdown n.d.).

Background of this approach:

The dynamics for ambitious GHG mitigation activities may be better than ever. Protests have raised climate awareness to a new record, with more than 6 million people demonstrating for climate action around 20th September 2019. The 2018 IPCC report gives scientific evidence, why we might consider sticking to 1.5° as extremely important (avoiding tipping points) and shows that emission pathways which stay below 1.5° reach carbon neutrality globally around 2040 (IPCC 2018 Chapter 2 Figure 2.5). This corresponds to the carbon crunch presented by Figueres et al. 2017 with Mission 2020 (Figueres et al. 2017).

Also, these days a growing number of pioneers of change have set science-based targets and define when to go carbon neutral or even carbon positive: E.g. Bosch announced it will be carbon neutral by 2020 – by improved energy efficiency, green electricity and carbon-offsetting. The first national German football league club TSG Hoffenheim declared to be carbon neutral. The city of Copenhagen has set the goal to become the first carbon-neutral city by 2025. Other cities - like Tübingen in Germany for 2030 - follow.

“Climate Emergency” has been declared in more than 500 cities worldwide in 2019 – and it is still open for discussion, what follows these mostly symbolic declarations. On a national scale, on 17th December, *Germanzero* has published an ambitious but realistic climate action plan for Germany, sticking to Germany’s remaining carbon budget towards 1.5°. Besides a plan to go carbon-neutral in Germany until 2035, the plan incorporates off-setting of any emissions emitted in Germany from about 2023, when the carbon budget is finished (*Germanzero* 2019).

Taking the above, the momentum for climate action may be higher than ever. Solutions for real climate action that are 1.5° conform lead towards global net zero carbon emissions in one or two decades. For industrialised countries they necessarily include off-setting.

Proposed approaches:

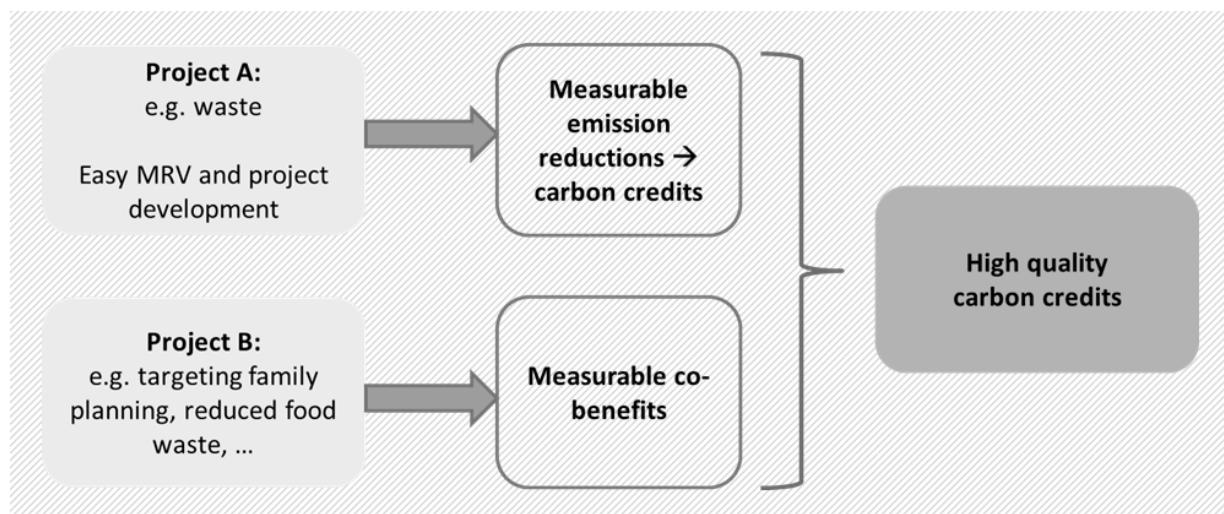
Note that ensuring additionality is addressed in Chapter 3 and not comprehensively covered by the approaches presented here.

A) Tailgaiting-approach

„Easy“ offsetting project A is piggybacking high-impact project B, whose emission reductions are not readily measurable. Project A would be a project type that has been successfully implemented in the past and is rather easily developed, planned and monitored. Project B would have a high quality in terms of emission reductions and co-benefits towards the Sustainable

Development Goals, but would be difficult / impossible to produce defined and measurable emission reductions. Carbon credits would only be issued for the measurable emission reductions of Project A, which can then be sold either on the voluntary market or in form of ITMOs/A6.4ERs depending on the specific case. This would lead to a premium segment of carbon credits, and Project B could include urban mitigation potentials, that have not been tapped upon until now due to MRV-issues.

Figure 23: Tailgating-approach

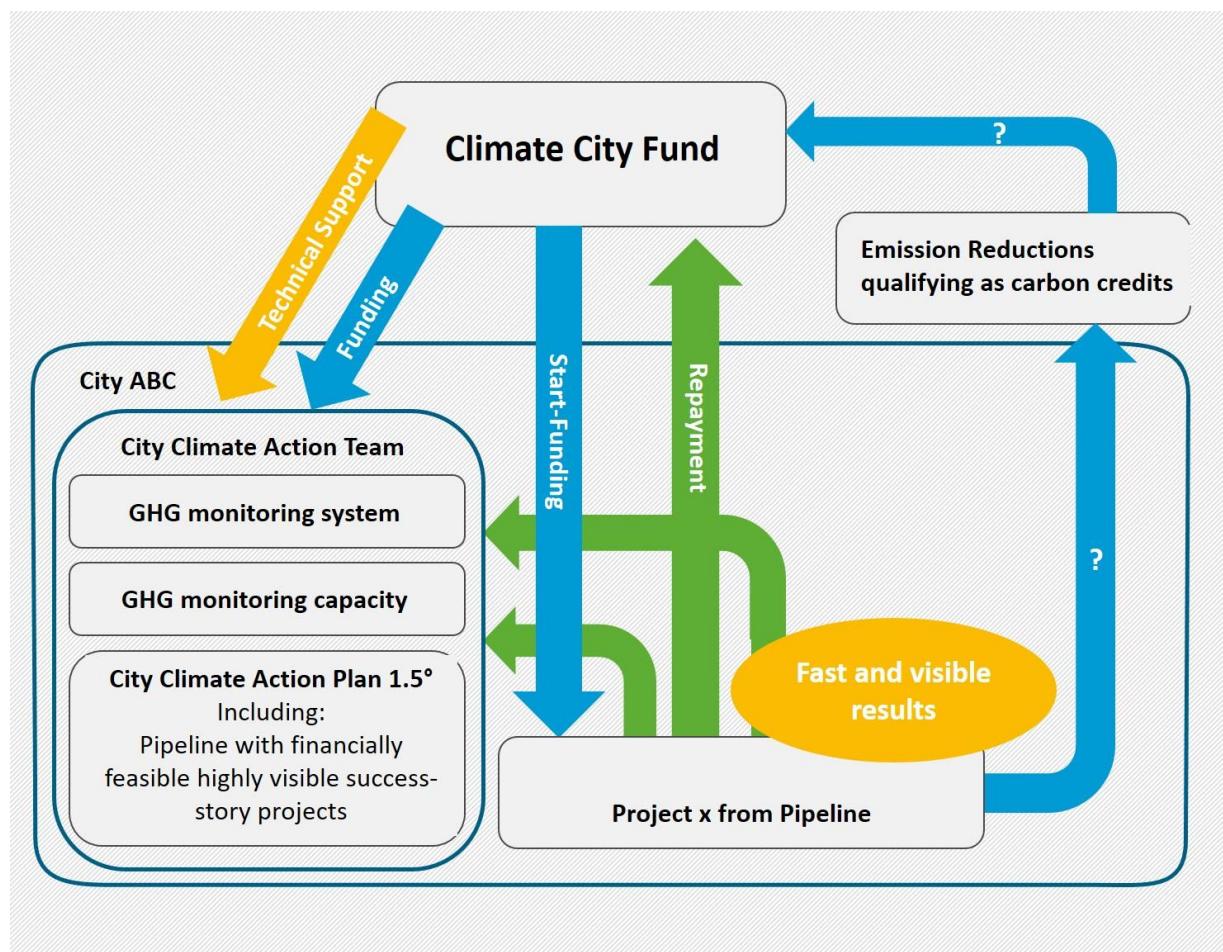


Source: own illustration, Maike Sippel and Perspectives Climate Group

B) Revolving fund for initiating strategic urban climate action

The capacities of cities to strategically plan and implement emission reductions are critical. The lack of cities' capacity for MRV and strategic climate action planning may be addressed by the following approach: Cities are supported in building capacity for climate action – with a clear focus on low-hanging fruits and other initial actions with short financial pay-back periods. Cities would get financial and technical support for establishing a city-wide GHG emission monitoring system, for building up monitoring capacity in the city climate department and for the development of an overall climate action plan leading to carbon neutrality in accordance with 1.5° target.

This climate action plan lays a special focus on preparing a pipeline of initial action projects that are proven success-stories elsewhere and generate funds (e.g. by energy savings). Cities are then supported in developing and starting implementation of initial action projects. Once initial action projects are started, they generate funds. Part of these funds are used to pay back the investments that were put into establishing a climate action plan, monitoring capacity and project development. Eventually, additional funding might also be sourced by labelling the emission reductions as carbon credits.

Figure 24: City Climate Fund approach

Source: own illustration, Maike Sippel and Perspectives Climate Group

3.3 Best-practice roadmap

The discussion of different possible approaches in section 3.2 shows that any country aiming to comprehensively implement urban mitigation action under Article 6 of the PA could engage in the following steps:

1. **Define urban mitigation contributions** that are expected from cities to meet the country's NDC (see section 3.1.1.2 above).
 1. Define what subsectors are covered. E.g. private housing, public infrastructure, waste, wastewater, etc.
 2. Define how the subsectors transport and energy are dealt with: are they included in city targets or allocated to energy/transport sector?
2. Implement a **working group “urban GHG mitigation”** open to all city governments in the country
 1. Training on policy options “regulation – financial incentives – investments”
 2. Explain how they can potentially benefit from Article 6
 3. Discuss cities’ priorities and strategies for urban mitigation action
3. Request city governments to **develop their own mitigation concepts for their territories**, as they know the circumstances of their cities and specific needs best.

1. City administrations should estimate the expected GHG mitigations and costs of a proposed policy/measure
2. Cities can “opt in” to use Article 6 (i.e. sell ITMOs/ A6.4ERs to generate funding for their policies) after prior approval by the federal government in terms of NDC alignment
4. Federal governments should support urban action in defining an **urban Article 6 framework**, i.e. preparing rules/methodologies how cities can participate as well as to ensure the environmental and social integrity of the actions.
 1. Guidelines / enabling framework for “regulation – financial incentives – investments” on city level
 2. Such guidelines would optimally follow international guidelines developed by the UNFCCC

Some countries may choose governmental agencies to execute those tasks; while others may choose private sector “project facilitators”, which could be MDBs when appropriate.

3.4 Environmental and social safeguards

Market-based mechanisms can be effective mitigation instruments. However, their integrity and efficacy of global climate action have to carefully be assessed. This section provides an overview of environmental and social safeguards that may be applied in the context of urban Article 6 activities.

3.4.1 Environmental safeguards

NDC ambition and environmental integrity of Article 6

A key challenge under the Paris Agreement framework is that each Party can define its own level of ambition in its NDC, and also the type of NDC commitments. As a result, the first round of (I)NDCs submitted showed very different types of mitigation pledges – ranging from economy-wide, absolute multi-year emission budgets to unsystematic lists of sub-sectoral activities whose expected GHG-outcomes are not quantified (Graichen et al. 2016). The resulting lack of clarity and comparability of NDCs makes it difficult to assess which NDCs really go beyond a business-as-usual (BAU) scenario and which ones don’t.

A high share of NDCs submitted so far is not sufficiently ambitious. In its September 2019 report, Climate Action Tracker estimates that “under current policies, the world will exceed 1.5°C of warming around 2035, 2°C around 2053, and 3.2°C by the end of the century. [...]. If governments fully achieve the emissions reductions they have committed to, warming is likely to rise to 2.9°C” (CAT 2019, p. 1).

With regard to the environmental integrity of Article 6 activities, the problem is as follows: if BAU emission projections of NDCs are overestimated²⁷, and the NDC target is less ambitious than the ‘real’ BAU, global emissions would increase through crediting of non-additional Article 6 activities. This risk is real, as shown during the first commitment period of the Kyoto Protocol. Here, in the case of JI, the economic downturn and corresponding reduction of emissions experienced by the states of the former Soviet Union led to huge amounts of ‘hot air’ compared to the former BAU projection. Kollmuss et al. (2015) conclude that the environmental integrity of 80% of emission reduction units issued under JI is questionable, and that JI may consequently

²⁷ I.e., a higher than realistic level of emissions is assumed (intentionally or not)

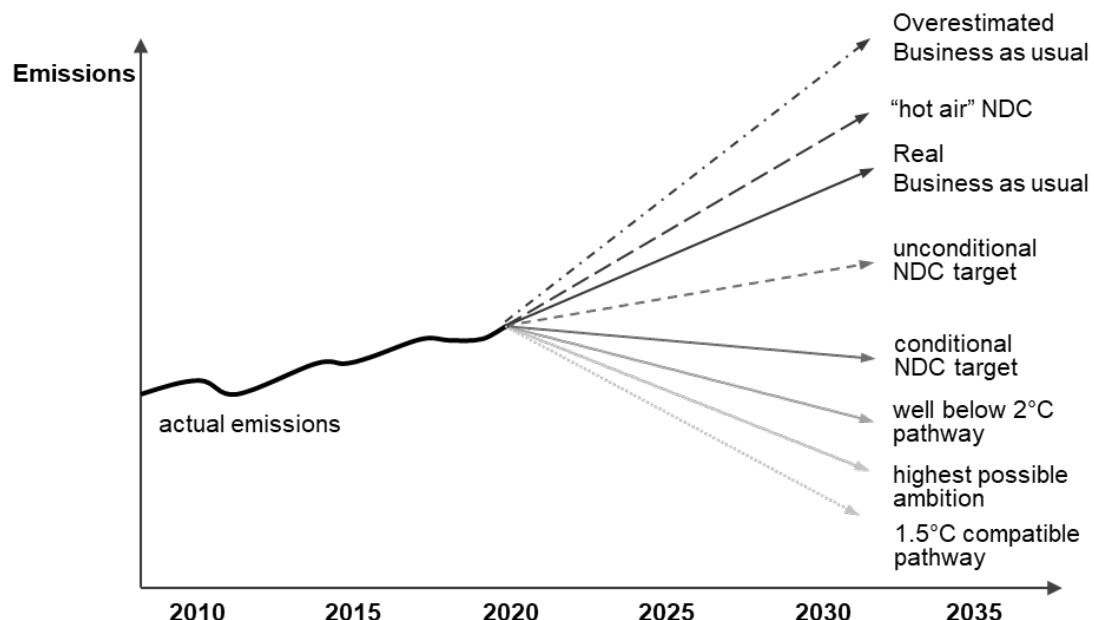
have enabled global greenhouse gas emissions to be about 600 million tCO₂eq higher than they would have otherwise been.

As indicated above, the ‘hot air’ issue has resurfaced also under the Paris Agreement. Schneider et al. (2017) found that the current round of NDCs contains a considerable potential of 2.2–3.5 Gt CO₂eq of ‘hot air’, mainly by BAU overestimation and targets that are less stringent than the real BAU. However, ambitious NDCs also exist, so the critical question is to differentiate between ‘hot air’ generating NDCs and ambitious ones.

To make things even more complex, one needs to consider that numerous NDCs from developing countries contain an unconditional commitment and a conditional one. The unconditional target can be reached by own means, but for reaching the conditional targets, international support is required – and often, NDCs are not 100% clear which policies and measures are conditional and which one not. This makes any additionality determination for Article 6 activities even more challenging (Michaelowa et. al., 2019a).

Figure 25 visualises the high number of possible baselines for Article 6 activities under consideration of various ambition levels of NDCs and NDC target types.

Figure 25: Various potential baseline levels for (urban) Article 6 activities



Source: Michaelowa et. al. (2019a), p. 1216

How to ensure environmental integrity of urban Article 6 activities?

As long as there is no uniform approach to ensure that NDCs are sufficiently ambitious to reach the globally accepted target of limiting global temperature increase to well below 2°C, and as long as there is no globally accepted methodology to evaluate the ambition level of a given country’s NDC, an activity-specific additionality test for Article 6 action seems inevitable.

Additionality has become a key concept in the context of the CDM in order to ensure that inappropriate use is avoided or at least minimised. The CDM’s additionality test – consisting of an investment analysis, a barrier test and a common practice test – was specifically designed for project-related activities implemented by the private sector. For Article 6 activities that go beyond projects – as proposed by many actors due to the need to upscale mitigation to achieve ambitious NDC targets – additionality tests will have to look different than in the CDM context.

Key questions will therefore be how to evaluate the additionality of policy instruments, and whether it is possible to agree on common Article 6 additionality concepts at UNFCCC-level. As long as adequate, commonly agreed rules for additionality testing – or, in other words, environmental safeguards for Article 6 activities – do not exist, buyers of ITMOs or A6.4ERs have the power – and ethical obligation – to ensure that they only buy real emission reductions. They can do so by setting strict procurement standards. Germany, other EU member states and UNFCCC-Parties with a strong interest in ensuring the environmental integrity of the Paris Agreement have the opportunity to define appropriate standards and to lead the international debate through becoming first movers.

For a more detailed discussion see section 4.

3.4.2 Social safeguards

As part of the analysis, two approaches were identified to provide guidance on how to measure social sustainability impacts of urban development projects and how to assess their applicability for determining social safeguards in the context of Article 6.

Europe can be seen as a front-runner in measuring urban sustainability (Turcu 2013), with a host of metrics having been developed and implemented over the years. Therefore, a consolidated approach that European cities apply when implementing urban infrastructures was researched to offer valuable insights for determining social safeguards in the context of Article 6. The set of indicators used by cities and collected by the European project *CityKeys* was finally chosen on the grounds that they (a) built on existing frameworks and initiatives, (b) sought to use open data formats and standards and (c) involved cities from beginning to end (Eurocities 2015).

The second guiding case selected and documented in this chapter is the *Gold Standard*, as it was developed for and within the carbon market itself and has a global perspective and applicability. Particularly and in its current version, the *Gold Standard* seeks to support the Sustainable Development Goals and the Paris Climate Agreement. For this purpose, *Gold Standard for the Global Goals* has been formulated to ensure that projects apply safeguarding measures.

The above-mentioned social impact indicators of smart city projects have been defined by different stakeholders and actors among the Smart City community in Europe and across the globe. These indicators aim to specify the social dimension for the overall sustainability assessment process of smart solutions that are implemented on a local level. During the last years, the technical validation of smart measures has concentrated particularly on energy and climate aspects within the environmental assessment, however, also seeking to measure the social impact of smart projects on citizens' quality of life.

In Europe, social impact indicators used for smart city project evaluation have been mainly defined under the efforts of the European Innovation Partnership on Smart Cities and Communities. The EU funded project *CityKeys*, defined a basis of key performance indicators that EU cities should use to assess the sustainability impact of the different smart solutions implemented in their territories (Eurocities 2015). These KPIs included social, environmental, and technology related components, framed into four dimensions: Planet, People, Prosperity and Governance. Most of the social KPIs are embedded into the dimensions of People, Prosperity and Governance (see Table 7).

Table 7: Selected indicators of social dimensions

People
Access to public services which includes:
Access to public transport
Quality of public transport
Improved access to vehicle sharing solutions
Increase in online government services
Diversity and social cohesion which includes:
People reached %
Increased consciousness of citizenship
Increased participation of vulnerable groups
Prosperity
Education:
Increased access to educational resources
Housing:
Diversity of housing
Equity:
Fuel poverty
Cost of Housing
Governance
Community Involvement:
Local community involvement in planning phase
Local community involvement in implementation phase

Source: City Keys (2017)

Current application of social impact indicators

In Europe, the social impact indicators used for the evaluation of smart city projects, are mainly used by cities that are part of the Smart Cities and Communities (SCC) network; which have to report on these mandatory to the EU Smart Cities Information System (SCIS) and the Innovation and Networks Executive Agency (INEA) of the European Commission. Cities rely on these indicators to assess homogenously the impact of their measures in the local context. Another application of these KPIs is focused on the development of benchmarking processes with other cities. So far this set of indicators has not been used within the context of carbon market mechanisms, but due to their close link to urban development in general, and energy and climate in particular, they are appropriate to be considered and applied.

Social safeguarding principles of the Gold Standard

Conceived by the WWF in 2003 and incrementally refined by the organisation, partners and supporters since, the Gold Standard has emerged as a globally recognised approach to ensure broader positive sustainable development impacts of CDM projects (Drupp, 2011). Following the adoption of the Sustainable Development Goals and the Paris Agreement, the Gold Standard for the Global Goals was launched in 2017 and a first version of requirements was published (Gold standard, 2017). The Gold Standard for the Global Goals incorporates various measures to ensure that projects apply safeguarding measures. Projects must (a) make positive contributions to at least three of the Sustainable Development Goals, (b) demonstrate that no harm is caused (see Table 8 below for the main indicators), (c) are informed by a stakeholder consultations process and (d) are monitored throughout the project cycle (Verles et al. 2018).

Further, project developers wishing to obtain Gold Standard certification must carry out an upfront assessment that draws upon the safeguarding principles and feeds into project design / monitoring arrangements as well as into verification and performance review processes (Arens & Mersmann, 2018).

Table 8: Five Social Safeguarding Principles underpinning the Gold Standard for the Global Goals

Principle 1 - Human Rights:	Principle 2 – Gender Equality & Women’s Rights:	Principle 3 – Community Health, Safety and Working Conditions:	Principle 4 – Cultural Heritage, Indigenous Peoples, Displacement and Resettlement:
Poverty alleviation / equitable distribution of developmental opportunities & benefits. Respect obligations & international treaties and support protection and fulfilment of these. Uphold accountability, rule of law, participation & inclusion, equality & non-discrimination.	Promote gender equality & the empowerment of women. No discrimination against women or gender-based discrimination / inequalities. Recognise & seeks to contribute to SDG 5 – Achieve gender equality and empower all women and girls	Avoid adverse impacts on the health and safety of affected communities. Provide workers with safe and healthy working conditions and prevent accidents, injuries & disease.	Protect / preserve cultural heritage & equitable sharing of benefits from use of cultural heritage. Avoid alteration, damage or removal of artefacts and objects of cultural value. No forced evictions or use of violence. Respect IPs’ human rights (self-determination, resources & territories, traditional livelihoods & cultures, etc.). Partner w. IPs & local farmers (full consent & effective participation / on rights, lands, resources, territories & livelihoods).
4.1 Sites of Cultural & Historical Heritage:	4.2 Forced Eviction and Displacement	4.3 Land Tenure and Other Rights:	4.4 Indigenous Peoples:
No alteration, damage or removal of any sites, objects or structures of significant cultural heritage. Inform affected communities of rights, scope, nature & potential consequences. Sharing of benefits: commercialisation of knowledge, innovation, or practice, customs & traditions. Opinions and advice of expert stakeholder(s) sought & included in project design.	No involuntary relocation of people No physical / economic displacement & mitigate impacts on persons / communities when displacement cannot be avoided. Opinions and advice of expert stakeholder(s) sought & included in project design.	Respect & safeguard: legal rights; customary rights & special cultural, ecological, economic, religious or spiritual significance. Follow relevant laws & regulations. Legal disputes resolved prior to implementation & all such changes must be based on free, prior and informed consent.	Identify communities directly or indirectly affected within project area. Recognise & respect IP’s rights to own, use, develop and control the lands, resources and territories. Respect / protect & conserve cultural, intellectual, religious & spiritual property of IPs. Ensure equitable sharing of benefits with IP (natural resources, territories,

		Uncontested land title must be held for entire Project Boundary to complete Project Design Certification. Opinions and advice of expert stakeholder(s) sought & included in project design.	traditional knowledge & practices). Opinions and advice of expert stakeholder(s) sought & included in project design.
Principle 5 – No Corruption:			
No contributing to or reinforcement of corruption of any kind.			

Source: Gold Standard (2019)

As aforementioned, developers must conduct an upfront assessment to ensure that the project adheres to safeguarding principles, with Principles 1 (Human Rights), 2 (Gender Equality & Women's Rights), 3 (Community Health, Safety and Working Conditions) and 5 (Corruption) being mandatory requirements for which documentation must be submitted, detailing how the project meets these specifically. For Principle 4 (Cultural Heritage, Indigenous Peoples, Displacement and Resettlement) developers must answer assessment questions with "Yes", "Potentially" or "No". Moreover, the project developers must clearly demonstrate that stakeholders have been consulted and recommendations have been incorporated into the project design for Principles 4.1 – 4.4.

The upfront assessment must consider implementation aspects as well as upstream or downstream issues, so that project developers can re-design project components with negative impacts / risk prior to implementation. When certain negative impacts cannot be avoided, the developer can submit a Deviation Request to the Gold Standard Secretariat for review. A review panel then judges whether an exception is justifiable on a case-by-case basis. Should Safeguarding Principles & Requirements not be met, non-conformity procedures can be initiated by the Gold Standard Secretariat.

Comparing different approaches to social safeguarding

Whilst both approaches to safeguarding social integrity touch upon similar principles, the Smart City Project Indicators (SCPI) are tailored more closely to the urban context than the broader requirements stipulated by the Gold Standard. Both approaches emphasise the importance of local communities and vulnerable groups, but the SCC includes more specific sectorial indicators that can arguably be measured more readily than the Gold Standard Principles.

The Gold Standard certification is well established within the existing carbon markets and reflects projects in the Global South. Thus, it would be a suitable approach to be applied for the assessment of urban Article 6 activities. The qualitative certification is associated with some additional cost²⁸.

²⁸ In addition to paying annual registry fees (\$1000) project developers must also pay a preliminary review fee (\$500 - \$3,500), a design review fee (\$1000 - \$4,500), a performance review fee (\$650 - \$4,500) as well as fees for certification issuance, microscale validation and verification fund fees and other (optional) services.

Both approaches – the SCPI and the Gold Standard Principles, were found to be suitable to be applied in the context of urban Article 6 activities. A combination of both (and perhaps with other complementary frameworks), could also represent a way forward. Additional indicators related to cultural heritage, gender-equality and women's empowerment, health and rights / equity, for instance, could provide a more nuanced understanding of social integrity in an urban setting. Lastly, the importance of tools (stakeholder consultations, social impact assessments, redress mechanisms, action plans, monitoring and verification, etc.) to maintain social safeguards should not be underestimated.

3.5 Evaluation of approaches

This section provides an initial evaluation of the approaches discussed in the previous sections. It should be noted that the evaluation can only be done at a very general level because of the theoretic nature of the proposed concepts. In addition, evaluations may differ strongly in different country circumstances.

3.5.1 SWOT analysis

3.5.1.1 Strengths and opportunities

All proposed approaches are designed to remove certain barriers to mitigation activities in urban areas.

- ▶ Enhancing the connection between NDC and city government action

The Policy Type approach, Top-down approach and Project Facilitator approach all require alignment of NDC to local governments' mitigation action. According to these approaches, project implementers or local governments can only use market mechanisms as financial resources, when they have met the emission reduction requirement of the NDC. The approaches also help to create more awareness about the importance of cities in the context of climate protection.

All proposed approaches suggest an integrated action planning and reporting process between different levels of governments. This process supports a fair distribution of national targets to local targets, as well as a centralised data reporting system to track mitigation impacts, which is able to verify these local targets and thus establish local NDC contribution.

- ▶ Facilitating project implementers direct access to financial resources through market mechanism

All proposed approaches allow for project implementers to directly participate in Article 6 revenues. Hence, Article 6 can establish a direct incentive for more ambitious emission reduction action on city level – which can be a powerful tool with strong benefits for global GHG reduction. The Policy Type approach and Project Facilitator approach suggest a form of third-party organisation hosting the application of complex modalities and procedures required by the market mechanisms' framework. In the Project Facilitator approach, the facilitator organisation may also provide up-front investment to small urban mitigation projects.

- ▶ Provide guidance on boundary and baseline to ensure environment integrity

The proposed approaches offer two options to determine boundaries: territorial definition of the city boundary and a cause-related definition of the city boundary. Users can choose the methodology to determine the boundary depending on the accounting needs.

- ▶ Flexibility in local implementation

All the proposed approaches provide flexible principles which can be adapted to each country's political structure.

3.5.1.2 Weaknesses and threats

The attractiveness of a market mechanism is heavily dependent on the carbon price. Without stable international demand on emission reduction credit, all of the approaches are less effective. Policy makers should also bear in mind the long-term planning perspectives of both city governments and private investors, and they should avoid abrupt market disruptions as experienced in the CDM from 2012.

In case prices for urban Article 6 reduction certificates are too low, the Project Facilitator may add extra transaction cost, which in the case of a low carbon price would constitute a critical challenge.

In the proposed approaches, the modality and procedures for market mechanisms are determined by the national government. This may entail the incomparability of accounting rules across countries, therefore leading to double counting. However, the approaches also recommend integrating international guidance in the national processes.

The national government-led market mechanisms may lead to corruption and a lack of efficiency. Transparency and international oversight are crucial for the implementation of national government-determined market mechanisms.

4 How additionality can be tested for urban Article 6 activities

4.1 Why the additionality principle is relevant for Article 6 activities

Under the current international climate policy regime, market mechanisms are to play a key role in helping countries to achieve their NDCs and to support an increase in mitigation ambition over time. The principle of additionality in this context is crucial, as it requires that emission credits are only granted for mitigation activities that are not undertaken in a BAU situation.

Additionality determination has been highly contested in the context of the Kyoto Mechanisms, especially under the CDM where selling countries did not have any emission targets. Under the Paris Agreement, all countries have defined NDCs. At first glance, this seems to solve the additionality problem under Article 6, as any sale of a non-additional emission reduction credit means that a country would have to “make up” for this sale through emission reductions equivalent to the non-additional credits sold in order to reach its NDC (Michaelowa and Butzengeiger 2017).

However, this is not the case as shown by the JI example in 2012, when Ukraine and Russia created several hundred million emission reduction units in a few weeks, with many observers arguing that these two countries just “laundered” surpluses in their emissions budget, colloquially called “hot air” (Kollmuss et al. 2015). Hence, a necessary condition would be that a country’s mitigation commitment goes beyond business-as-usual. Generation of “hot air” due to an inflated baseline leads to non-additional emission credits. Additionality testing would thus only become superfluous if all countries had ambitious NDCs that would cover all sectors and emission sources with (comparable) levels of ambition (Michaelowa et al. 2019a). Currently, both conditions clearly are not fulfilled.

Under the PA, countries are free to choose baselines according to their political priorities. Projecting future emissions is a process that is highly dependent on variables such as economic and population growth, change in economic structure and energy prices. Any situation where the mitigation target is less stringent than a credible BAU path, generates “hot air”. In this case, no mitigation actions beyond existing policies (if at all) would be required to meet the target. Looking at the baselines in current NDCs, many baselines look to be overly high, creating several billion t CO₂eq of “hot air” (Schneider et al. 2017).

4.1.1 Emission sources not covered by NDCs

Various countries, especially poorer developing countries, have NDCs whose mitigation contribution excludes certain sectors. Approximately 6.1 billion t CO₂eq of projected emissions in 2030 are not covered by targets under current NDCs (Schneider et al. 2017). The situation gets more complex when in the future through the revision of NDCs non-covered sectors are brought into the NDC. As double counting must be avoided, this would lead to a situation where the seller country needs to decide whether to continue selling the credits or to use the mitigation to reach the NDC target. This situation would lead to a loss of revenue and therefore it has been argued, that it disincentivises expansion of NDC coverage.

4.1.2 Unconditional parts of NDCs

Any activity that is listed by a country in the unconditional part of the NDC will by definition be undertaken by the country anyway and thus not be additional. This is already reflected in the rules of various Article 6 pilot activities such as the Swiss KLiK Foundation (KLiK 2020).

4.1.3 Status quo of UNFCCC-negotiations on additionality rules for Article 6 mechanisms

The cooperative approaches under Article 6.2 and the Article 6.4 mechanism address the principle of additionality in a different manner. While it is included only implicitly as an objective under Article 6.2, it is formally defined as a criterion for Article 6.4.

- ▶ Given that the level of international oversight for **Article 6.2** is likely to be rather limited, additionality requirements can only be brought into the reporting requirements and the international review process. Thus, negotiators should strive to achieve full transparency of the type of additionality determination undertaken, and task international reviewers under the technical expert review (TER) to identify non-additional transactions. This would allow interested buyer-countries to avoid acquisition of non-additional credits. However, the approach cannot prevent transactions related to clearly non-additional activities between governments that do not care about international criticism.
- ▶ For **Article 6.4**, the additionality principle is enshrined in the PA text and therefore its operationalisation is one of the central issues. In recent negotiations, Parties disagreed on whether to take into account mitigation policies beyond the NDC of the host country. While some Parties made proposals including more stringent provisions than stated in the consolidated text by the COP presidency, other Parties seek to define all activities outside of the NDC or included as conditional target as automatically additional. As no agreement could be reached at COP25, additionality rules will remain open until – at least – COP26.

4.2 A generic decision tree for additionality requirements under Article 6

While the ultimate objective of any additionality discussion is to ensure the environmental integrity of Article 6, one first needs to have a common understanding of the additionality concept. Under the Kyoto Mechanisms, additionality has been defined as an activity being different from BAU (“additional to any that would occur in the absence of the certified project activity”).

While this definition appears suitable for projects and programmes, where BAU can be defined in terms of economically rational behaviour of project/programme proponents, it is challenging for policy instruments. How can BAU be defined for a policy instrument or for an entire sector/country? This is the problem which led to the exclusion of crediting for policy instruments by the CDM Executive Board (Michaelowa et al. 2019a).

Defining **BAU on the country level** could make use of economic/energy modelling, which has been routinely done in the past. The problem is that BAU forecasts have often proven remarkably off the mark, especially if they are to cover long time periods. This is due to unforeseen changes in technology that influence prices of different fuels and types of energy, shift the shares of economic sectors in the total economy, as well as unexpected economic crises²⁹.

²⁹ The former is illustrated nicely through the unexpected reduction in costs of solar photovoltaics, which have made that technology competitive much earlier than thought only a few years ago. The latter is illustrated by the financial and economic crisis of 2008, which led to much lower levels of industrial production for a number of years than forecast before 2008. This wreaked havoc in the

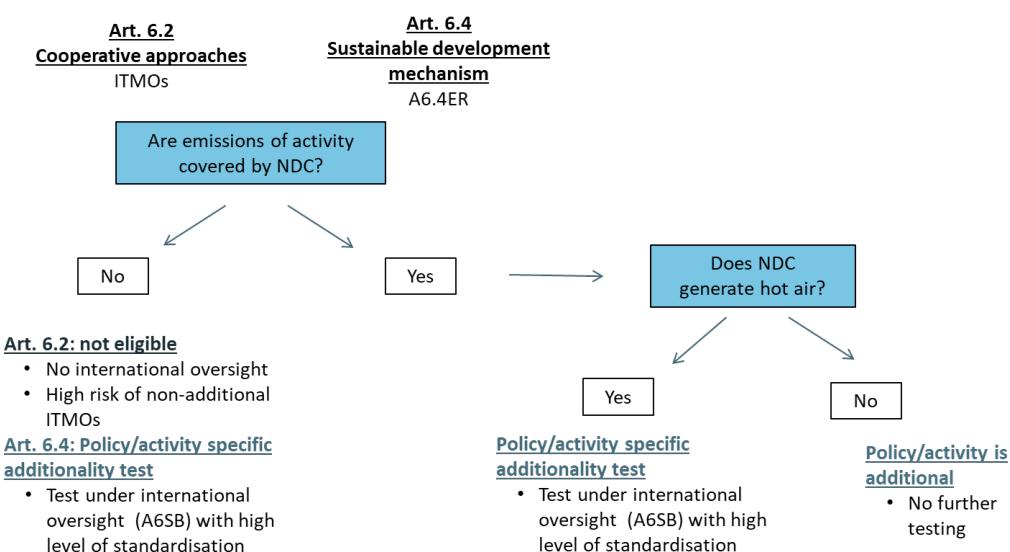
A possible solution to the BAU forecasting problem on the country level is the use of a “**dynamic**” **baseline** approach, where the baseline calculation is defined ex-ante, but the parameters that enter the calculation are only quantified ex-post. If this approach cannot be agreed on the international level, an alternative would be an increased **frequency of revision of country-level baselines** – e.g. at least every two years.

Obviously, the challenge remains how to introduce a country-level BAU assessment process under the current PA rule negotiation process, given the difficulty to even get agreement at all. If countries are not willing to agree on dynamic baselines or highly frequent baseline updates with standardised procedures, the only other option to ensure environmental integrity is to implement policy specific additionality tests.

4.2.1 Scenario 1: High-frequency BAU determination

In a scenario of high-frequency verification of baseline stringency of ambitious NDC and in where funding for Article 6.2/6.4 purchases is not earmarked as climate finance, an activity-specific additionality testing may not be required. On the contrary, if the sector/activity is not covered by the NDC, then an activity should not be eligible under Article 6.2, and an activity-specific additionality test should be conducted under Article 6.4. For cases where the sector/activity is covered by the NDC, but the NDC is not ambitious, an activity-specific additionality test should be conducted.

Figure 26: Proposed additionality testing for Article 6 mechanisms - scenario of high-frequency national baseline checks



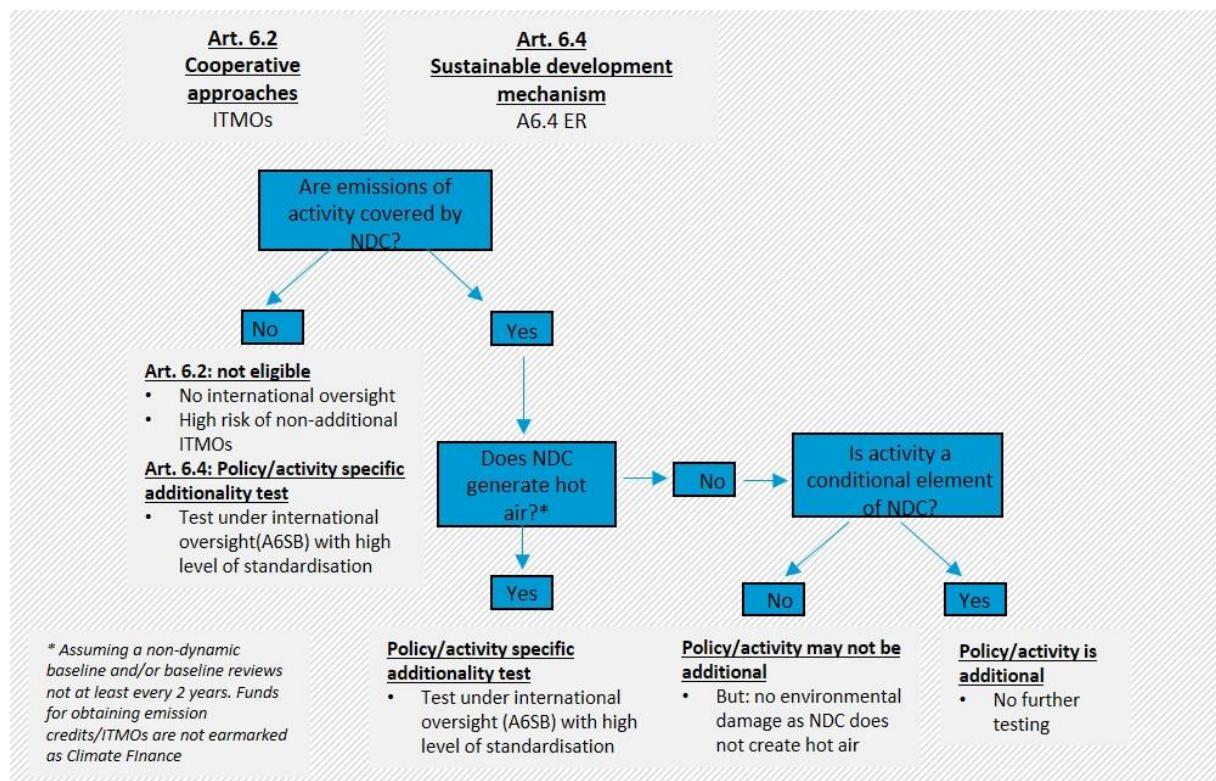
Source: Michaelowa et al. (2019a)

4.2.2 Scenario 2: Low-frequency BAU determination

If a dynamic adjustment of the national baseline and its external review is not possible due to sovereignty concerns, the procedure should be adjusted so that the question “does the activity take place in the conditional part of the NDC” is explicitly considered:

EU emissions trading scheme because the allocation of allowances had been made on the basis of the pre-2008 forecasts, and thus the system became heavily overallocated.

Figure 27: Proposed additionality testing for Article 6 mechanisms - scenario of low-frequency national baseline checks



Source: own illustration adjusted from Michaelowa et al. (2019a), Perspectives Climate Group

As can be seen from the figures above, a “**policy-/activity-specific additionality test**” is suggested for some cases - depending on the stringency of the NDC, and the (un-)conditional inclusion of the sector/activity in the NDC. The subsequent question is what such a policy-/activity-specific additionality test can look like.

Principally, a policy instrument can be seen as additional when its costs exceed its benefits. But the benefits of policies such as improved health due to lowered air, water and soil pollution are often difficult to measure, especially if they cannot be easily monetised. Similarly, there are cases where a given policy is introduced because relevant strategic side-effects are expected, such as improved standard of living / mobility of population (e.g. public transport policies). A policy instrument could also face barriers that require an outside intervention.

The subsequent section will explore in more detail the policy types relevant for urban Article 6 activities and suggest simplified approaches for determining additionality.

4.3 City specific mitigation activities and policy interventions

As discussed above, in terms of urban policy options, regulators principally have the choice between:

- ▶ incentive-based policies,
- ▶ regulation, and
- ▶ direct infrastructure investments and public procurement.

Additionality of any policy would first depend on the answer to two questions:

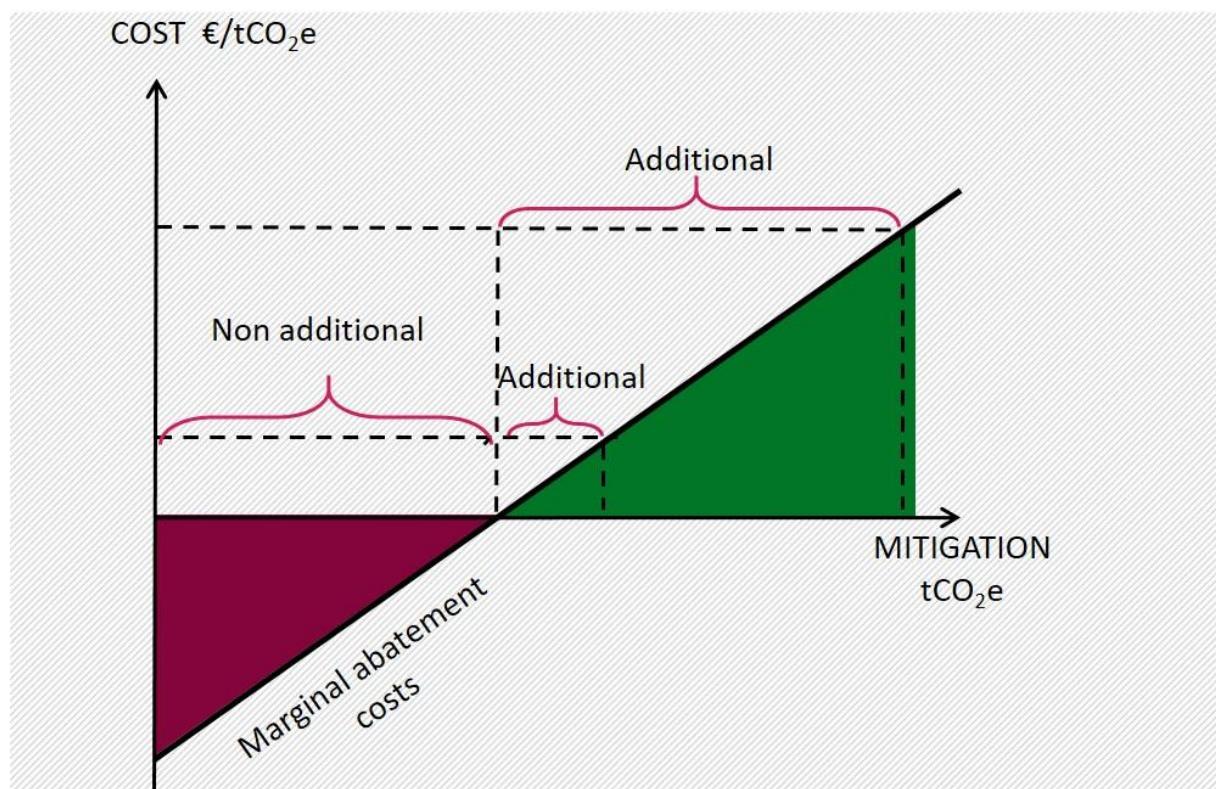
1. Would the city government also introduce the policy in absence of Article 6 of the PA, e.g. under the unconditional part of the NDC? If yes, policy additionality would not be given.
2. Do the policies generate significant co-benefits that justify the public expenses from a political point of view? This is very difficult to assess – both in general terms and also for specific cases, as there is virtually unlimited potential for political co-benefits, and it is hardly possible to approach them in a standardised manner. Thus, we propose not to assess co-benefits.

4.3.1 Financial incentives

Positive financial incentives can be e.g. tax reductions or subsidies on ticket prices for public transport, energy efficient appliances (e.g. refrigerators, energy efficient air conditioning), domestic use of solar energy, etc. All such schemes will lead to either reduced income for the city government/state (in case of reduced taxes), or increased cost (in case of subsidies/direct financial support schemes). If we now look at negative incentives, they could take the form of carbon taxes, fees or emissions trading generating a carbon price.

The critical question is to what extent the activities mobilised by financial incentives (positive or negative) would have happened otherwise. If one assumes a “classical” marginal abatement cost curve with a negative cost and a positive cost section, generally, the higher the subsidy/carbon price, the higher the likelihood that the activities mobilised will be additional, as the share of activities with positive mitigation costs will be higher (see Figure 28 below). Thus, there is no “black and white” additionality of incentive policies. Overall, an incentive policy would be additional if the share of mitigation at positive costs exceeds that of negative cost mitigation.

Figure 28: Additionality of incentive-policies



Note: The policy with the high incentive P2 mobilises a significantly higher share of additional reductions compared to non-additional ones. The low incentive P1 policy has a lower share of additional than of non-additional reductions.

Source: own illustration, Perspectives Climate Group

A pragmatic approach for additionality of incentive policies would be to define a threshold value that the incentive has to exceed in order to make the policy qualify as additional. Given the different shapes of marginal abatement cost curves according to each city, the definition of that threshold value will be challenging. Therefore, typical threshold values should be agreed for each policy / sector (Michaelowa et al. 2019a).

4.3.2 Regulatory instruments

Regulation, like mandating the use of a technology for a certain efficiency standard / energy type, is normally chosen to overcome barriers to otherwise profitable activities that are facing incentive problems like the famous tenant – owner dilemma preventing efficiency improvements in buildings, or lack of information about technology performance and failure risk. Regulatory instruments either generate income for the (city) government, or are cost-neutral if one neglects transaction cost for introducing and “operating” the policy instruments. Costs typically occur for the private sector (households and/or industry) that has to follow the regulation.

The general assessment of technical regulation should be done on the basis of the costs for the targeted entities that accrue because the mandated technology is more costly than the business as usual technology.

If there are no costs to the targeted entities and a city benefits from the removal of incentive-related barriers, e.g. due to lowered pressure on the transport system due to lower need for fuel transport, such regulatory mitigation policy instruments should not be deemed additional, unless real barriers are demonstrated e.g. lacking access to finance in foreign currency.

With regard to the assessment of the regulatory costs, a pragmatic approach would assess the payback period for the investment into the mandated technology. Academic literature and industry practice agree that 4 to 5 years, corresponding to an internal rate of return of around 20% per year, would be a typical threshold applied by companies. Consequently, regulation mandating technologies with longer payback periods would be additional (see Michaelowa et al. 2019a). Given that industry and households in developing countries usually face barriers to take up loans, and thus have a high implicit discount rate, the payback period threshold could be differentiated.

4.3.3 Infrastructure investment and public procurement

Infrastructure investment and public procurement for energy efficient equipment typically generate extra costs, so from an investment additionality point of view, this can be assessed positively. However, as in the case of financial incentives, the following questions need to be addressed:

1. Would the national or city government do the investment also in absence of Article 6 of the Paris Agreement?
2. Do the infrastructure investment / additional public procurement rules generate significant co-benefits that justify the public expenses from a political point of view?

As discussed above, both aspects are very difficult to assess in a standardised, objective manner. For procurement, the payback period of the procured equipment should be assessed similarly to the approach outlined in the preceding section. The best approach for infrastructure investment would probably be to look at a control group of cities of similar characteristics and to assess whether such investment can be deemed “common practice” or not.

4.4 Conclusions for Article 6 additionality testing

The discussion shows that additionality testing for urban Article 6 mechanisms will become very complex. Figure 26 and Figure 27 provide generic guidelines under consideration of the ambition level of a given country's NDC, and the NDC coverage of the sector/activity. With regard to policy specific additionality testing, a number of general aspects can be taken into consideration for each of the key policy instrument types, i.e. financial incentives – regulation – direct investment. Any activity directly listed in the unconditional part of the NDC cannot be deemed as additional.

However, when digging into more detail, one quickly enters into questions of political attractiveness / co-benefits, which are difficult to assess in a standardized, objective manner.

Positive and negative financial incentives should be deemed additional if the incentive exceeds a level at which the majority of the mobilised emission reductions is having positive mitigation costs.

Regulation should be deemed additional if the payback period of the mandated technology exceeds the common practice threshold for decisions of industrial companies and households; the same should apply for public procurement programmes. For infrastructure investment, a control group of similar cities should be applied to assess whether the investment is “common practice”

Such additionality approaches, while unlikely to be made mandatory on the international level, could be applied by a club of like-minded buyer countries. The signatories of the San José Principles could be the foundation of such a club.

5 Financial Solutions for Urban Mitigation Projects

5.1 Challenges of financing urban sustainable projects

With the Paris Agreement and the United Nations' Sustainable Development Goals (SDGs), for the first time there is one Agenda for a Sustainable Future bringing all nations into a common cause to undertake ambitious global climate efforts. To achieve these goals approx. 90 trillion USD of investment are needed until 2030 (New Climate Economy 2016). The International Finance Corporation estimates that there is about 29.4 trillion USD "climate-smart investment potential" in urban sectors in emerging markets (IFC 2018).

Domestic and international climate finance have been increasing, especially for mitigation activities, which accounted for 93% of climate finance in the 2017/2018, averaging 537 billion USD per year and representing a 101 billion USD annual increase from the 2015/2016 period (CPI, 2019). Still, despite this favourable environment and progress, more ambition is needed to meet the goals and to close the gap between how much money is and could be invested, and how much money is making it to local / city projects.

Today more than 1 trillion USD is missing each year for sustainable urban infrastructure investments; and the needs, for the coming decades, are projected to amount to several trillion (CCFLA, 2017). IIED researchers say that less than 10% of climate finance committed from international climate funds by 2016 was prioritised for local-level activities. They estimate that out of the total 17.4 billion USD, less than 10% (1.5 billion USD) was approved for locally focused climate change projects between 2003 and 2016. While, out of 17.4 billion USD total investments in climate finance only 1.5 billion USD was approved for local climate change projects between 2003 and 2016 (Institute for Environment and Development 2017).

5.2 Barriers for financing urban mitigation projects that could be alleviated by Article 6

Although in recent years, significant strides have been made at UNFCCC-level with regards to commitments of public international climate finance, accessibility of those funds remains limited. There is a critical barrier to the realisation of the many much-needed actions due to a range of difficulties and challenges for cities in identifying and securing sources of financing for projects, as well as being finance-ready.

5.2.1 Lack of capacity and awareness for financial instruments

There is demand from the funding institutions for good quality local and regional projects, but local governments need support for their urban project development at all stages – already from early project concept stage to final implementation and financing. Many local / city governments struggle in the very first stages of project preparation, scoping and project definition, as it is difficult to get finance for this phase. As already pointed out, local governments either do not have the necessary expertise or are already engaged in other activities. Furthermore, as experience shows, local governments often lack information on the various financing opportunities and project preparation facilities available. The financial architecture is complex and not easy to navigate, nor is it simple to define the right financial tool. Besides the insufficient knowledge and understanding of the innovative financial mechanisms, many local governments are either not eligible or confident enough to use them. As in the past with CDM, technical assistance could also be provided in the context of Article 6.

5.2.2 Lack of fiscal capacity and creditworthiness

In emerging economies, most of the local governments lack the fiscal capacity and the creditworthiness needed to apply for and access funds. Pre-financing or co-financing is not affordable. As described below, local governments in developing countries are highly dependent on the national level and therefore are limited in raising money on their own. This issue becomes particularly consequential when entering into market mechanisms, as the uncertainty around the eventually issued credits and their price adds to the overall financial uncertainty decreasing the chances to create a viable business model and find investors. Revenues from Article 6 could be used as collateral for cities to harness loans from financial institutions.

5.2.3 Lack of direct access to international funds at local level

Even if international financial institutions (IFIs), multilateral development banks and climate funds play an increasing role for urban finance, the vast majority of international finance cannot be directly accessed by local governments. The regulations of the IFIs are also “city-unfriendly” – i.e. not taking into consideration the local needs and capacities, favouring only large-scale projects, and defining complex and lengthy submission requirements. Thereby, small urban projects are less likely to be considered, and local governments are also hesitant to take the burden of the long application process. Given that Article 6 is an international mechanism, generating experiences with such a finance stream could improve the accessibility of cities to access other international finance mechanisms.. Likewise, success stories of cities accessing Article 6 could also increase the accessibility of funds provided by IFIs .

5.2.4 Difficulty to engage private sector

To engage the private sector in urban projects remains challenging. In the past years most of the climate related investments took place in the energy sector, renewable energy and energy efficiency, led by the private sector. However, despite this leading role in the global climate finance landscape only 30% of private funds are provided to public sector recipients (CCFLA, 2018). Investors are often unfamiliar with such projects and additionally, they favour short-term return on investment while urban mitigation projects usually require long-term investments. Looking at attracting the private sector for Article 6 project investments, clear and transparent regulatory frameworks are crucial. Besides that, fostering demand-side factors for credits through dedicated policies increases credit prices and hence revenue certainty. Also, investment uncertainties can be reduced further, if national carbon authorizing bodies work as transparent as possible (Füssler et. al, 2019). A fitting Article 6 institutional infrastructure could help to bring in private sector actors like in the heyday of the CDM.

5.2.5 Uncertainties caused by election, administrative changes and dependency on national governments

Election cycles are challenging all over the world. Changing political leaders often leads to the lack of continuity of long-term political support for developing and implementing urban projects. Experience shows that in many cases not only the highest level, but all levels of the administration change, which makes it even more difficult to ensure commitment and continuity. This uncertainty also discourages potential funders and in particular, creates challenges with private sector engagement.

In many countries, in particular in developing countries and emerging economies, besides the lack of financial and technical capacities, an additional challenge is the dependency on the national government which disempowers local governments, for example with respect to transfer and management of funds which is subject to national level approval. Especially in the

field of energy policies the mandates lie with the national government or sometimes the distribution is unclear, leading to a challenging political situation of the local government with regard to multi-level coordination of mitigation projects.

When planning an investment and applying for finance, this coordination can become an issue as the involvement of several actors complicates processes. Article 6 being a mechanism coordinated on the national level, the interaction between that level and city government could be improved.

5.3 Identification of common financial methods applied for urban projects

5.3.1 Traditional instruments for municipal finance

While traditional forms of municipal finance, including own-source revenues such as fees and taxes, loans, grants and subsidies retain their importance, the role of new financial instruments and the private sector becomes vital due to the high level of investment required for ensuring local sustainable development.

In the past years, revenues at the municipal level have not kept pace with the increased expenditure requirements. Given that local governments are largely responsible for investments in services and infrastructure, the strengthening of existing revenue sources of local budgets (e.g. own-source revenue, transfers, etc.) and the implementation of non-traditional financial instruments are crucial aspects of regional urban development (UNH 2009).

No single source of funding is sufficient to cover the anticipated costs of urban development in the short and medium term. Cities should instead use a mix of public and private funding from international, national, local, and community sources (e.g. loans, grants, bonds, microfinance, tax revenue, community lending, crowdsourcing etc.). Article 6 can play an important role as an additional source of finance which may leverage other ones.

Before deciding on the most suitable mechanism(s), local government needs to have a clear understanding on the technical requirements of a project and quantify the related financial needs. Once there is a solid financial assessment defining the costs, the next step is to check if there are own funds (liquidity and/or asset) to support the investments. In most of the cases, and particularly for large scale projects, relying purely on own sources is not enough and external support is needed.

5.3.2 Innovative financial instruments for municipal governments

We discuss seven innovative finance mechanisms that have been tested and reviewed by ICLEI's member cities (Solutions Gateway 2019). We specifically focus on mechanisms that help to overcome the barrier of low local government capacity in financing and difficulty to engage private sector players when making the selection. These mechanisms may also be relevant in the context of financing low carbon action in German cities.

It is worth mentioning that all the traditional and innovative financial instruments can be used together with market mechanisms under Article 6 for financing mitigation projects. Since there is a synergy in demonstrating social and environmental impacts, the combination of financial instruments will potentially reduce transaction cost for application of market mechanism. In return, with market mechanism as an income source, the urban mitigation projects will be more financially attractive to private sector engagement.

5.3.2.1 Revolving Funds³⁰

Figure 29: Process Illustration for Revolving Fund



Source: Orskov Foundation (n.d.)

A revolving fund is a fund set up for specified purposes with the concept that repayments to the fund may be used again for these purposes (International Urban Cooperation n.d.). This also implies that a revolving fund is suitable only for projects with revenue generation potential. Ideally, the revolving fund only needs a starting budget (illustrated as arrow 1). Once it is implemented it can be self-sustaining. The projects that received the fund (illustrated as arrow 2) are required to repay it (illustrated as arrow 3) overtime. Sometimes the community raises more funds from the projects than the original starting budget, which enables the community to start its own revolving funds for other purpose (illustrated as arrow 4).

However, it is important to note that for the local government it is difficult to recover the project operating cost especially in the early years of operation. The repayment period is typically 5 to 8 years or even longer. This limits the size of projects a revolving fund can support. Additionally, it adds the uncertainty to the fund allocation, because during the first repayment period the financial sources mobilised, and the return of the investment, can restrict the new project applications. The successful application of a revolving fund highly depends on the municipal government's capacity with regard to administrative and management practices, financial mechanisms including auditing systems, forecasting, monitoring and evaluation procedures, etc.

Revolving funds have been used in the past particularly to finance energy efficiency investments. They have not been universally successful; their success depends strongly on the quality of project selection and the financial stability of project developers.

Text box 2: Revolving Water Fund, Gwalior, India

The Revolving Water Fund (RWF) has been created as a pilot demonstration project in Gwalior. The Revolving fund was initiated with the support of the Asian Development Bank (ADB) and UN Habitat through Water For Asian Cities program. It is managed by the Gwalior Municipal Corporation (GMC). As illustrated by the flow chart below, the revolving fund is allocated to the Community Water and Sanitation Committee (CWASC) for the design, implementation and operation of water connection to 1500 households. The repayment of the fund is collected by CWASC as service fee from the households over 32 months. The recovered fund will be used for other municipal projects.

³⁰ The Revolving Fund model is already introduced in section 3.2.5 as part of the "City Climate Fund approach". We illustrate it again here to keep the finance instrument section complete. We would also emphasize that this financial model's applicability is not limited to one specific approach.

Source: UN Habitat et al. (2006)

Applicability to urban mitigation projects: This instrument helps to overcome barriers of accessing funds as well as engaging the private sector. It is a good complimentary financial mechanism to Article 6 for its wide applicability to Article 6 urban project sectors, as illustrated in the table below:

Table 9: Revolving fund applicability

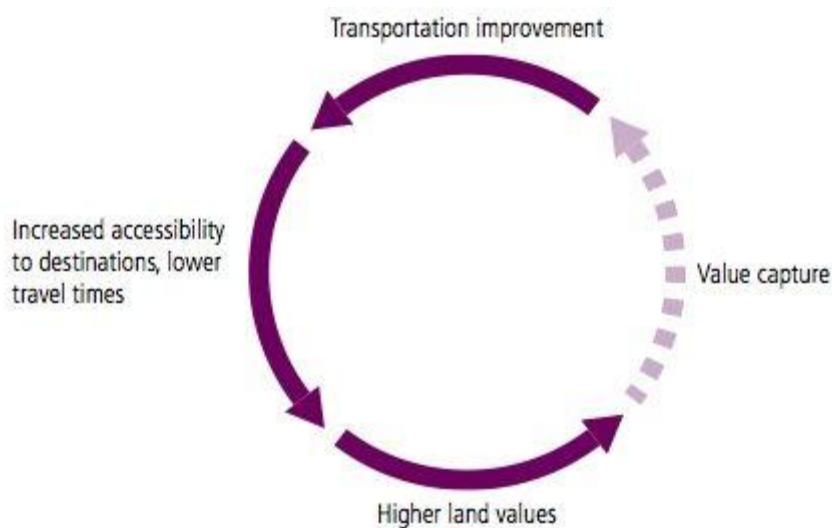
Subsector	Applicability	Lead actor	Possible revenue source
Urban transport	Yes	Local government or private company	Charge of public transportation
Municipal waste treatment	Yes	Local government or private company	Charge of waste collection and treatment fee
Wastewater& Water supply	Yes	Local government or private company	Charge of wastewater treatment fee or water supply fee
Local energy generation	Yes	Local government, private company or individual households	Feed-in tarif for energy generated

Source: own illustration, ICLEI World Secretariat

A revolving fund can be used to enable very different mitigation measures, such as no-interest loans for energy efficient installations or co-funding of low-emission public transport systems. The additionality of each activity would need to be assessed, e.g. as proposed in section 4.2 above.

5.3.2.2 Land value capture

Public regulation, planning or investment can increase the value of land (Prosper: Land Value Capture n.d.). For example, improving road infrastructure will increase the value of land in suburbs. “Up-zoning”, i.e. changing an area for more intense development and commercial use, will increase the demand for such areas, thereby also increasing its value. Land value capturing (LVC) allows the public sector to financially participate in such a value increase (Kamiya 2016). The LVC works, because whenever people perceive value, they are willing to pay for it. People will often pay higher value for a house, which in a good location for accessing places where the residents want to go. In other words, the money is a reflection of the value created by the improved accessibility and the accessibility makes the land more productive. This uplift in value due to improved accessibility will vary depending on the local circumstances.

Figure 30: Land value capture

Source: Prosper (2020)

Existing LVC methods tend to focus on either specific developments or a general taxation or levy. The first is through the selling or leasing of development rights. This can be done through a variety of different models including direct or joint property development, land or air rights sales, and land lease agreements. The other channel is through taxation-based schemes that target users, nearby landowners and other (often future) beneficiaries. For example, in Switzerland, increases of land value generated by re-zoning agricultural land to construction land are taxed. Most of the methods, however, include elements of both approaches and it is therefore often difficult to categorise them into one or the other.

Today's LVC approaches take a much more balanced view of how value should be shared and captured. So it is not only unlocking new sources of funding, but also creating a much stronger link between assets, funding and users (KMPG 2017). Therefore, it makes sense that, for example, the extra profit generated by transit should be shared between the agency providing the transit, and the people who own the land.

When there is proper collaboration between the private sector developer and the public sector, the LVC mechanism can:

- ▶ Support economic growth to be achieved in an environmentally sustainable way.
- ▶ Build a more competitive city region and a higher quality of life for its residents and businesses.
- ▶ Build sustainable, healthier communities.

In addition to the benefits in terms of public finance, many authors point out that LVC can also help to improve the economic efficiency of municipal investments, contribute to social equity, and serve as a tool for urban growth management and land price control, as well as reduce uncertainty for private developers about the timing of project approval and infrastructure provision (Inter-American Development Bank 2017).

Applicability to urban mitigation projects and link to Article 6: This instrument can be used to ensure that new buildings built on the land from which LVC is undertaken apply low carbon technologies. For example, the level of LVC could be reduced for low or zero carbon buildings, or

if renewable energy development is undertaken on the sites. Article 6 revenues would allow to keep the LVC reduction smaller than otherwise required.

Text box 3: Hamburg's Hafen City, Germany

In 1996, Hamburg set out a plan to expand the city using adjacent brownfield sites in order to dramatically increase the housing supply in conjunction with a new container terminal. While around 70 % of the land to be developed was already under the ownership of the city-state, the agency responsible for the project, Hafen City Hamburg GmbH, was tasked with bringing the remainder of the privately-owned land into public hands. The infrastructure for the project was financed by borrowing against the land assets and included building roads, bridges, public spaces and flood defenses. The total public expenditure of 2.4bn EUR was subsequently complemented by private investment totaling 8.4bn EUR. Sales of land that have captured the uplift in land value due to the infrastructure investment have permitted the agency to finance its operations and also to pay back the loans needed for investment.

Source: Centre for Progressive Capitalism (2017)

5.3.2.3 Sale of development rights

The sale of development rights is an important source of infrastructure funding in some parts of the world.

Applying this instrument means that cities separate land ownership from the right to further develop that land, and sell the right to further development within a given area. The sale of development rights can be structured in a variety of ways ranging from simple density standards to complex auctions. The best approach in a given environment will depend on the capacity and resources of the issuing municipality. The requirements for employing the sale of development rights include:

- ▶ The combination of culture, law and administrative strength must be such that development rights are excludable.
- ▶ There must be sufficient market demand for additional development in the location where the rights will be assigned.
- ▶ The law must include provisions that allow cities to create and sell additional development rights.
- ▶ The city must have an up-to-date comprehensive plan for growth and infrastructure management.
- ▶ The city must have an adequate administrative infrastructure (UN-Habitat 2016). The sale of development rights can be used to manage and limit growth as well as to encourage it. However, the sale of development rights through open auctions may prevent low and moderate income households from acquiring those rights and thereby limits their ability to invest in their land.

Text box 4: Hong Kong Mass Rapid Transit Railway Company (MTRC), China Hongkong

The MTRC is a government-led public leasehold system. It allows the MTRC exclusive rights on long-term 50-70-year government-controlled land leases and associated development rights above and adjacent to the stations. The MTRC divides the large government leased parcels into smaller parcels that are offered to private sector developers within a competitive bidding process. The prices reflect the increased value due to the transit station. The MTRC is one of a few instances in the world where a transit agency makes a profit. The profit largely comes from the success of real estate development that is realised as a result of the accessibility that comes with the provision of transit.

Source: International Urban Cooperation (2019)

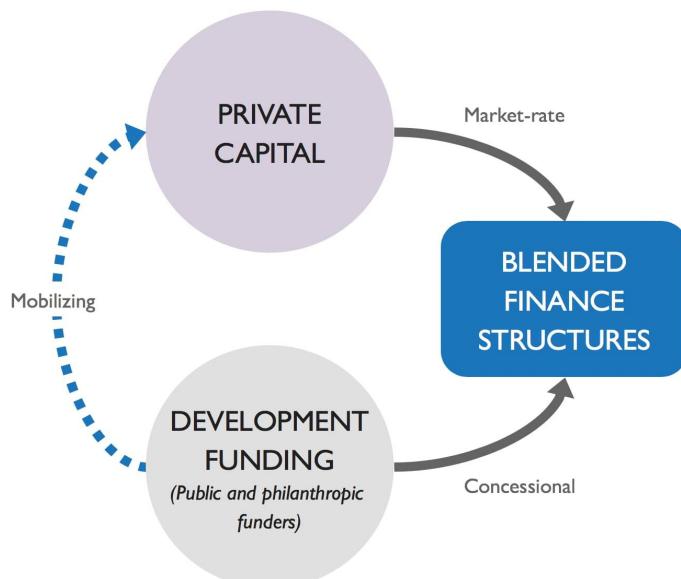
Applicability to urban mitigation projects and link to Article 6:

This model could work in the same way as the LVC, as the price for the development right could be reduced for low-carbon/renewable energy developments. Similarly, Article 6 revenues may allow to reduce the price of the development right, thus making low-carbon building more attractive.

5.3.2.4 Blended finance

The term blended finance implies the mixing of both public and private funds through a common investment scheme or deal, with each party using their expertise in a complementary way (Convergence Blended Global Finance n.d.). The concept and model was developed within the Redesigning Development Finance Initiative from the [World Economic Forum](#), who defined it as "the strategic use of development finance and philanthropic funds to mobilise private capital flows to [emerging](#) and [frontier markets](#) (World Economic Forum 2019)." Blended finance is a structuring approach that allows organisations with different objectives to invest alongside each other while achieving their own objectives (whether financial return, social impact, or a blend of both).

Figure 31: Blended finance



Source: Convergence (2019)

The main investment barriers for private investors addressed by blended finance are (i) high perceived and real risk and (ii) poor returns for the risk relative to comparable investments (Convergence Blended Global Finance n.d.).

Supporting mechanisms have been traditionally used by development funders in a blended finance package to attract and support private sector investors by managing risks and reducing transaction costs. These mechanisms can generally be classified as providing:

- ▶ technical assistance or grant funds to supplement the capacity of investees and lower transaction costs;
- ▶ risk underwriting, to fully or partially protect the investor against risk through appropriate risk mitigation; and
- ▶ market incentives, guaranteed payments contingent on performance of future pricing and/or payment in exchange for upfront investment in new or distressed markets.

Advantages:

- ▶ Blended finance is a critical tool that can mitigate early-entrant costs or project risks, helping to re-balance risk-reward profiles for pioneering investments and enabling them to happen (International Finance Corporation 2020).
- ▶ Blended finance improves terms for borrowers by lengthening the time horizons for capital providers, avoiding the risks associated with short-term capital flows faced by recipients of capital in emerging and frontier markets (OECD, 2015).

Disadvantages:

- ▶ Blended finance is mostly available for higher-income countries with a strong enabling environment: stable and well-regulated financial markets.
- ▶ More easily attracted to large projects, where it is typically brought in on the back of large public sector investments (or guarantees) (OECD, 2018).

Applicability to urban mitigation projects and link to Article 6: Blended finance is an instrument to engage private sectors' engagement in urban mitigation actions. It allows development funders to support private capital in transactions by:

- ▶ Participating in transactions that are deemed too risky or that offer marginal returns to some investors
- ▶ Assuming operational, regulatory and political risks
- ▶ Providing liquidity and exits for investors, particularly for institutional grade investments
- ▶ Hedging or guaranteeing prices and returns to reduce volatility and ensure commercial viability
- ▶ Reducing market entry and transaction costs, and sharing local knowledge, access and reputation

► Engaging on regulatory and investment reform

For its benefits, this instrument effectively reduces the investment risks for involving private sectors in market mechanism sectors such as local energy generation, energy efficiency improvement in buildings as well as public infrastructure projects. Revenues from Article 6 should be explicitly brought in as blending component from the outset.

5.3.2.5 Municipal (green) bonds

A green bond is a bond specifically earmarked to be used for climate and environmental projects. (Green) bonds are often verified by a third party, which certifies that the bond will fund projects that include benefits to the environment. They can be issued by development financial institutions (e.g. World Bank, European Investment Bank), commercial banks, state/municipalities, or corporations. Based on this, local governments have two options to benefit from the green bonds:

1. Issuing own (green) bonds

The issuer of a municipal bond receives a cash purchase price at the time of issuance in exchange for a promise to repay the purchasing investors, or their transferees, (the bond holder) over time. Repayment periods can be as short as a few months (although this is very rare) or last up to 20, 30, or 40 years, or even longer. The issuer typically uses proceeds from a bond sale to pay for capital projects or for other purposes it cannot or does not desire to pay for immediately with funds on hand.

2. Align investment plans with other issuers

A pooled funding model offers a solution to municipalities whose funding requirements may not be big enough to justify standalone bond issuance, or who lack the bond expertise or in-house resources.

Advantages:

- Green bonds can enhance an issuer's reputation - showcasing their commitment towards green growth and sustainable development. Governments may want to make a political statement and demonstrate their commitment to certain environmental (e.g. combating climate change) and/or sustainability objectives (e.g. stimulating green growth or shifting to a green economy).
- Green bonds provide issuers with improved access to a specific set of global investors who may have mandates to invest in green/sustainable ventures. Attracting new investors is often an important benefit of issuing a green bond and many green bonds issued to date report being oversubscribed.
- The issuance of green bonds can create new market demand - domestic bond issuances help strengthen and, in some cases, create domestic capital markets (Global Green Bond Partnership 2019).

Disadvantages:

- The necessary preparatory work (institutional set up, verification) takes time and costs money.

- ▶ Often, it is determined by national regulations whether a local government can issue bonds or not.
- ▶ To make municipal bonds successful on the market, it needs a highly detailed, structured, skilful and diligent management process.

- (Green) bonds typically fund large-scale, capital-intensive (green) infrastructure projects such as energy efficiency projects, transit, or renewable power, among others, that can be repaid from steady, modest, long-term cash flows (Greenbonds Financing Sustainable Future n.d.):

Text box 5: Cape Town green bond, South Africa

On 12 July 2017, the City of Cape Town launched its inaugural green bond of 1 billion ZAR.

Within two hours, 29 investors made offers totaling 4.3 billion ZAR in response the 1 billion ZAR that was being sold. This response from the market was overwhelmingly positive and demonstrates the great appetite among investors to invest in sustainable projects.

The market's enthusiasm is also a resounding vote of confidence by investors in the city's governance, strong financial standing, and ability to deliver on sustainable projects.

The projects to be funded by the green bond are a mix of adaptation and mitigation initiatives, all of which are aligned with the City's Climate Change Strategy. Some of the projects include:

- Procurement of electric buses
- Energy efficiency in buildings
- Water management initiatives (which includes water meter installations and replacements, water pressure management, and upgrade of reservoirs)
- Sewage effluent treatment
- Rehabilitation and protection of coastal structures

Source: City of Cape Town (2020)

Applicability to urban mitigation projects and link to Article 6: Municipal green bonds could be issued for activities designed under Article 6. A well designed Article 6 project would allow to reduce the coupon of the green bond as the revenue from the sale of ITMOs would improve the financial health of the project. Furthermore, as mentioned above, the information and verification needed to ensure environmental integrity of the mitigation project under Article 6 could to a large degree or completely satisfy the verification needs of the environmental benefits of the green bond reducing the preparatory work and associated costs.

5.3.2.6 Energy Performance Contracts

An Energy Performance Contract (EPC) is a contract where an array of services is agreed, and the provider of the services is able to guarantee that a minimum of energy savings and/or sustainability value will be achieved. An Energy Service Company (ESCo) implements a customised energy service package, consisting of planning, building, operation & maintenance, optimisation, fuel purchase, (co-) financing and user behaviour (European Energy Service Initiative 2010).

This model can be suitable for municipalities that lack the financial and technical capacities as it offers a “no risk, no investment” approach, where the municipality does not have to raise upfront costs, unless it is the preferred option. EPC contracts can guarantee that a certain percentage of savings will be achieved, with the risk taken by the ESCo; if the guaranteed performance is not achieved, the ESCo would pay back the local government. Costs for maintenance are saved during the contractual period, and there is the guarantee that the ESCo – participating in the share of the saving will keep the system at its best performance. This model can bring expertise and give clarity on the viability of the project, building market capacity. Smaller municipalities could connect with neighbouring municipalities with similar needs, to engage a single ESCo that aggregates these similar projects to lower transaction costs and facilitates financing.

Provided that the contractual length is long enough to reach payback for the ESCo (i.e. 7 years) and includes maintenance services, the local government is committed to the ESCo for this period of time. The model might not be applied in locations where an enabling environment is lacking, such as in the case of emerging countries. Municipalities might need to provide bank or state guarantees.

Applicability to urban mitigation projects and link to Article 6: EPC can increase the scope of energy efficiency, and the revenue from Article 6 will make the EPC more attractive.

5.3.2.7 Investing revenues from carbon pricing

Carbon pricing can generate revenues that can be earmarked for low carbon projects (Econofact 2019).

Text box 6: Boulder, Colorado, USA 12 July 2017

In November 2006, voters in Boulder, Colorado passed what is said to be the first municipal carbon tax. It is a tax on electricity consumption (utility bills) with deductions for using electricity from renewable sources. As of 2015, the Boulder carbon tax is estimated to reduce CO₂ emissions by over 100,000 tons per year, and allows the city to collect 1.8 million USD in revenue that is injected back into the city. Those funds are invested back into the community by providing bike lanes, energy efficient solutions, rebates for business and homeowners to further invest in green energy, and community-based programs to further bring awareness to the movement.

Source: Bhatt & Ryan (n.d.)

Applicability to urban mitigation projects and link to Article 6: Linking revenue recycling to Article 6 revenues will increase the scope of activities that can be brought into Article 6 by a given municipality.

6 Conclusions

The research shows that the existing variety of city structures, national/ legislative environments - including social and cultural conditions - require individual concepts for urban Article 6 approaches. There is no one-size-fits-all approach that can be considered suitable for all urban environments worldwide. However, common principles and standardised approaches can help both, the city authorities and national governments, to take targeted measures to systematically implement urban mitigation measures under Article 6.

Based on these considerations, this report proposes a **framework concept with common principles and standardised methods** as well as a series of approaches that a city / country can choose depending on the structure and requirements.

- ▶ The **sub-sectoral approach** would cover GHG reductions resulting both from policies encouraging efficiency improvements and behavioural change, and aims to monitor them with high-level parameters capturing all changes within the city boundary (e.g. transport sector: tCO₂-eq per person-km or tonne-km for freight). However, it requires availability of accurate and up-to-date statistical data and therefore only appears feasible for countries with sophisticated data infrastructure.
- ▶ The **policy type categorisation** is useful for all countries aiming to set-up clear incentives for urban Article 6 activities at all levels (city administration, private sector, industry, federal government), and supports countries in defining clear structures and responsibilities. It is therefore recommended to all countries interested in developing urban Article 6 activities to go through a mapping process as discussed in chapter 3.2.2. A precondition is that countries have a reliable institutional system with low risk of corruption/funds getting lost when transferred from federal to city level and vice versa.
- ▶ The **project facilitator approach** is similar to the policy type approach, but involves third parties (the facilitator) as an additional element to relieve governmental/city agencies with limited capacities from doing Article 6-specific administrative tasks.
- ▶ The **top-down approach** allows cities to directly engage in ITMO trading and therefore provides direct incentives for city administrations. It requires, however, a direct link to the national inventory/reporting system, and therefore enhanced monitoring and reporting procedures as well as excellent coordination with the involved national governments.
- ▶ **City climate funds** can be additional tools to promote activities with a high co-benefit for sustainable urban development that would not get sufficient financial support through regular carbon markets.

Within the **common framework**, any city agency and/or federal government that plans to systematically implement urban mitigation measures under Article 6 should:

1. clearly define city boundaries and associated emission sources;

2. ensure that the planned urban mitigation measures are in line with the NDC of the country;
3. define suitable and ecologically proper methods for quantifying the reduction effects;
4. define appropriate and vertically integrated rules for monitoring, reporting and verification (MRV);
5. ensure the social integrity of measures; and
6. objectively assess the additionality of the reduction measures and create financial incentives.

The discussion of options for additionality determination showed that additionality tests for urban mitigation measures under Article 6 can quickly become very complex. In principle, additionality requirements should be differentiated according to the ambition level of the NDC of the host country and the sectoral NDC coverage - see also the detailed discussion in Chapter 4.

- ▶ Activities listed directly in the unconditional part of the NDC cannot be considered additional activities.
- ▶ With regard to policy-specific additionality tests, a number of general aspects should be taken into account for each of the most important types of political instrument, i.e. financial incentives - regulation - direct investment.
 - Positive and negative financial incentives should be seen as additional if the incentive exceeds a level at which the majority of the emission reductions mobilised show (sufficient) abatement costs.
 - The regulation should be seen as additional if the payback period of the required technology exceeds the usual threshold for decisions by industrial companies and households.
 - The same should apply to public procurement programs.
 - A control group of similar cities should be used for infrastructure investments to assess whether the investment is "common practice".

Such additionality approaches are not currently mandatory at international level, but could be used by a club of like-minded buyer countries. The signatories to the San José principles could be the basis of such a club.

Regarding possible new financing mechanisms for urban mitigation measures, several have been identified:

- ▶ Revolving funds
- ▶ Land value capture
- ▶ Sale of development rights
- ▶ Blended finance

- ▶ Municipal (green) bonds
- ▶ Energy efficiency contracts
- ▶ Revolving use from revenue from CO₂ pricing mechanisms.

There are several aspects to be considered to find the most suitable financing mechanisms, or combination of mechanisms, pending of the mandates, technical and financial capacities, and projects of interests. ICLEI's "Climate Finance Decision Making Tree" presents a simplified approach guiding local governments, through answering "yes" and "no" questions, to identify the most appropriate finance tool. This decision-making guidance can be equally helpful for German cities and cities from developing countries, as apart from external developing finance, which is typically not accessible for German cities, the access to finance tools can be similar. All of these finance tools can be combined with Article 6 funding and setting up Article 6 projects will likely raise the possibility of accessing other finance streams, as securities and capacities of the local government increase.

7 References

Literature:

- ARUP and C40 Cities (2014): Working Together. Global Aggregation of City Climate Commitments.
- Bhatt, N. and Ryan, M. (n.d.): Carbon Energy Tax Boulder, CO, available online:
<https://www.smartgrowthamerica.org/app/legacy/documents/Boulder-Carbon-Tax.pdf> (accessed May 06, 2020)
- C. Arens and F. Mersmann (2018): Positive Results, no Negative Consequences - No-harm options for Article 6. IKO Policy Paper 03/2018. Wuppertal Institute for Climate, Environment and Energy.
- C40 Cities (2009): Sao Paulo, Brazil. Sao Joao and Bandeirantes Landfills, available online:
https://www.c40.org/case_studies/sao-joao-and-bandeirantes-landfills (accessed September 20, 2019)
- CAT (2019): Warming projections – global update, Climate Action Tracker, September 2019, available online:
https://climateactiontracker.org/documents/644/CAT_2019-09-19_BriefingUNSG_WarmingProjectionsGlobalUpdate_Sept2019.pdf (accessed October 29, 2019).
- Climate Disclosure Project (2017): 2017 – Cities Emission Reduction Targets. Available online:
<https://data.cdp.net/Emissions/2017-Cities-Emissions-Reduction-Targets/jgih-rq9t> (accessed January 7, 2020).
- Centre for Progressive Capitalism (2017): financing local infrastructure suing land value capture potential levels of investment for the Edinburgh City Region, available online <https://www.befs.org.uk/wp-content/uploads/2017/05/Edinburgh-City-Region-Land-Value-Capture-analysis-v2.1.pdf> (accessed May 06, 2020)
- City of Capetown (2017): Green pays: City's R1 billion bond a resounding success in the market. Available online: <http://www.capetown.gov.za/media-and-news/Green%20pays%20City> (accessed May 06, 2020)
- Convergence Blending Global Finance (n.d.): Blended Finance. Available online:
<https://www.convergence.finance/blended-finance> (accessed April 26, 2020)
- Cruz, Silvia and Paulino, Sônia (2013): Local Use of Resources From Clean Development Mechanism Projects in Landfill Sites in the City of Sao Paulo.
- Delhi Metro sells 82,000 CERs at € 4.5/CER, Times of India says (April 13, 2011), India Power Trading.info, available online: <http://indiapowertrading.info/delhi-metro-sells-82000-cers-at-e-4-5cer-times-of-india-says/> (accessed September 20, 2019).
- DG Environment (2016): Buying Green! A handbook on green public procurement. 3rd Edition. European Commission.
- Direccion de Cambio Climatico (DCC) Costa Rica (2020) : 32 leading countries set benchmark for carbon markets with San Jose Principles, Press Release, December 14, 2019 (updated January 6, 2020), Available online: <https://cambioclimatico.go.cr/press-release-leading-countries-set-benchmark-for-carbon-markets-with-san-jose-principles/> (accessed August 24, 2020)
- Drupp (2011): Does the Gold Standard label hold its promise in delivering higher Sustainable Development benefits? A multi-criteria comparison of CDM projects. Energy Policy, 39 (3) (2011), pp. 1213-1227
- Econofact (2019): Carbon Taxes: What Can We Learn From International Experience?
- Eurocities (2015): CityKeys project. Available online <http://www.citykeys-project.eu/> (accessed May 06, 2020)
- European Energy Service Initiative (2010): Standard EPC documents
- Figueres, Christiana, Hans Joachim Schellnhuber, Gail Whiteman, Johan Rockström, Anthony Hobley & Stefan Rahmstorf (2017): Three years to safeguard our climate. 28 June 2017, Nature Vol. 546, p593-595

Fong, Wee Kean; Sotos, Mary; Doust, Michael; Schultz, Seth; Marques, Ana, Deng-Beck, Chang (2014): Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. An Accounting and Reporting Standard for Cities. World Resources Institute, C40 Cities Climate Leadership Group and ICLEI, Local Governments for Sustainability.

Füssler, Jürg; Wunderlich, Alexander; Kreibich, Nicolas; Obergasse, Wolfgang (2019): Incentives for Private Sector Participation in the Article 6.4 Mechanism, on behalf of Umweltbundesamt, Berlin.

GCoM (2019a): Climate Emergency: Unlocking the Urban Opportunity together. 2019 Annual Report, <https://www.globalcovenantofmayors.org/wp-content/uploads/2019/12/2019-GCoM-Aggregation-Report.pdf> (accessed 09.01.2020).

GCoM (2019b): GCoM Cities: Impact on the climate emergency, <https://www.globalcovenantofmayors.org/impact2019/> (accessed 09.01.2020)

Germanzero (2019): Der 1,5°C Klimaplan für Deutschland, https://assets.website-files.com/5e663c02af4002dcab78dc/5e80ecf3d75a9b7b49f937a2_Der_1-5-Grad-Klimaplan_fuer_Deutschland.pdf (accessed 7 May 2020)

Global Green Bond Partnership (2019): <https://www.globalgreenbondpartnership.org/about-us> accessed April 26, 2020)

Greenbonds Financing Sustainable Future (n.d.): Defining Green Bonds, available online <http://www.gogreenbonds.org/defining-green-bonds/> (accessed April 26, 2020) Gold Standard (2017): Gold standard for the global goals - Browse standard documents, available online <https://www.goldstandard.org/project-developers/standard-documents> (accessed January 08, 2020)

Gold Standard (2019): Gold Standard For The Global Goals Principles and Requirements, available online: <https://docs.google.com/viewerng/viewer?url=https://globalgoals.goldstandard.org/wp-content/uploads/2018/03/100-GS4GG-Principles-Requirements-v1.2.pdf&hl=en> (accessed January 08, 2020)

Graichen, J.; Cames, M.; Schneider, L. (2016): Categorization of INDCs in the light of Art. 6 of the Paris Agreement, Discussion Paper; Umweltbundesamt, Berlin

Greiner, Sandra; Chagas, Thiago; Krämer, Nicole; Michaelowa, Axel; Brescia, Dario; Hoch, Stephan (2019): Moving towards next generation carbon markets. Observations from Article 6 pilots. Climate Focus and Perspectives Climate Group. Commissioned by Federal Ministry for Environment, Nature Conservation and Nuclear Safety, Berlin.

Greiner, S.; Michaelowa, A.; Krämer, N.; Espelage, A.; (2019a): Article 6 Corresponding Adjustments. Key Accounting challenges for Article 6 transfers of mitigation outcomes; German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin.

Grütter Consulting (2009): Monitoring Report DM project 0672: BRT Bogotá Colombia: TransMilenio Phase II-IV Monitoring Period 1.1.2008-31.12.2008, <https://cdm.unfccc.int/filestorage/F/J/H/FJHZMG35I72D9WUY6L4QXPATB1VSEK/Monitoring%20Report%203.pdf?t=Wmd8chk0c3hvfDApKgxb68VAKdoKzzpRjERF> (accessed September 20, 2019)

International Finance Corporation IFC (2020): Blended Finance, available online: https://www.ifc.org/wps/wcm/connect/CORP_EXT_Content/IFC_External_Corporate_Site/Solutions/Products+and+Services/Blended-Finance (accessed April 26, 2020)

International Urban Cooperation IUC (2019): Overview of financial sources at national level, available online: <https://tap-potential.org/wp-content/uploads/2019/10/overview-of-financial-sources-at-national-level.pdf> (accessed, May 06, 2020)

International Urban Cooperation IUC (n.d.): Innovative finance mechanisms,; available online: https://iuc.eu/fileadmin/templates/iuc/lib/iuc_resource/tools/push_resource_file_resource.php?uid=RgyepkQq (accessed April 26, 2020).

Institute for Environment and Development (2017): Climate Finance Not Reaching The Local Level, available online <https://www.iied.org/climate-finance-not-reaching-local-level> (accessed on January, 08, 2020)

Inter-American Development Bank (2017): The Potential of Land Value Capture for financing urban projects: <https://publications.iadb.org/en/potential-land-value-capture-financing-urban-projects-methodological-considerations-and-case> (accessed April 26, 2020).

IPCC (2018): Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Kamiya, Marco (2016): New solutions to close the gap on municipal finance.

KLiK (2010): Evaluation of Mitigation Activity Idea Notes, available online <https://www.international.klik.ch/index.html?id=289> (accessed May 06, 2020)

Kollmuss, A., Schneider, L. & Zhezherin, V. (2015). Has joint implementation reduced GHG emissions? Lessons learned for the design of carbon market mechanisms (SEI Working Paper No. 2015-07). Stockholm: Stockholm Environment Institute.

KPMG (2017): Funding wisely: Unlocking urban transit with Land Value Capture, available online: <https://home.kpmg/xx/en/home/insights/2017/05/funding-wisely-unlocking-urban-transit-with-land-value-capture.html> (accessed April 26, 2020).

Michaelowa, A., & Butzengeiger, S. (2017). Ensuring additionality under Article 6 of the Paris Agreement. Discussion Paper. Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety: Berlin.

Michaelowa, A.; Feige, Sven; Butzengeiger, S.; Mangotra, K.; Kaushik, A.; Ahuja, R.; Manuja, S.; Rangarajan, R.; Umamaheswaran, U. (2019): Market Based Instrument (MBI) for GHG reduction in the Municipal Solid Waste (MSW) sector in India. Prepared for: Ministry of Environment, Forests and Climate Change, Government of India.

Michaelowa, A.; Hermwille, L.; Obergassel, W.; Butzengeiger, S. (2019a): Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, in: Climate Policy, 19, p. 1211–1224

Michaelowa, A.; Müller, B.; Espelage, A. (2019b): Negotiating cooperation under Article 6 of the Paris Agreement, ecbi.

Michaelowa, A. (2005): CDM. Current status and possibilities for reform, HWWI Research Paper 3, Hamburg. NewClimate Institute, Data-Driven Lab, PBL, German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Blavatnik School of Government, University of Oxford. Global climate action from cities, regions and businesses: Impact of individual actors and cooperative initiatives on global and national emissions. 2019 edition.

OECD (2015): Blended Finance Vol. 1: A Primer for Development Finance and Philanthropic Funders

OECD – GIZ Conference (2018): Closing the gap for water in line with SDG ambitions: the role of blended finance

Orskov Foundation (n.d.): Revolving fund, available online: <https://www.orskوفoundation.org/revolvingfund> (accessed April 26, 2020).

Project Drawdown (n.d.): Table of Solutions, available online: <https://www.drawdown.org/solutions>, (accessed May 06, 2020)

Prosper: Land Value Capture (n.d.): <https://www.prosper.org.au/land-value-capture/> (accessed April 26, 2020).

Schneider, L. & La Hoz Theuer, S. (2019): Solutions. Environmental integrity of international carbon market mechanisms under the Paris Agreement. Climate Policy, 19, 386–400.

Schneider, L., Füssler, J., La Hoz Theuer, S., Kohli, A., Graichen, J., Healy, S., & Broekhoff, D. (2017): Environmental integrity under Article 6 of the Paris Agreement. Umweltbundesamt, Berlin

Schneider, L.; Füssler, J.; Kohli, A.; Graichen, J.; Healy, S.; Cames, M.; Broekhof, D.; Lazarus, M.; La Hoz Theuer, S.; Cook, V. (2017a): Robust Accounting of International Transfers under Article 6 of the Paris Agreement; on behalf of Umweltbundesamt, Berlin.

Seto K.C., S. Dhakal, A. Bigio, H. Blanco, G.C. Delgado, D. Dewar, L. Huang, A. Inaba, A. Kansal, S. Lwasa, J.E. McMahon, D.B. Müller, J. Murakami, H. Nagendra, and A. Ramaswami, 2014: Human Settlements, Infrastructure and Spatial Planning. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Shah, N. (2017): Delhi Metro. UNFCCC registers DMRC's Solar Power initiative as CDM project (March 28, 2017), available online: <https://www.metrorailnews.in/delhi-metro-unfccc-registers-dmrcts-solar-power-initiative-cdm-project/> (accessed September 20, 2019).

Sippel, M. and Michaelowa, A. (2011): Do global greenhouse gas emissions markets promote low-carbon development in developing countries? Lessons learnt from the Clean Development Mechanism. *Not published*.

Solutions Gateway (2019): The financial instruments and case studies are from ICLEI's Financing decision-making map of Solutions Gateway, available online: <http://www.solutions-gateway.org/show?page=financetool> (accessed April 26, 2020).

Turcu C. (2013): Rethinking sustainability indicators: local perspectives of urban sustainability, Journal of Environmental Planning and Management, 56:5, 695-719, DOI: 10.1080/09640568.2012.698984.

UN-Habitat (2016): Land-based Finance for Local Governments.

UN Habitat (2011): Cities and Climate Change. Global Report on Human Settlements. Earthscan, London.

UN-Habitat, United Nations Human Settlements Programme, Government of Madhya Pradesh, India (2006): Guidelines on revolving funds for community managed water supply schemes and construction of individual household toilets in urban slums in Madhya Pradesh, India, available online <https://www.ircwash.org/resources/guidelines-revolving-funds-community-managed-water-supply-schemes-and-construction> (accessed May 06, 2020)

UNEP (2012): Cities and Carbon Finance. Feasibility Study on an Urban CDM. Available online: https://www.thegreenwerk.net/download/UNEP_UrbanCDMreport.pdf (accessed 20.09.2019).

UNEP (2014): Climate Finance for Cities and Buildings – A Handbook for Local Governments. UNEP Division of Technology, Industry and Economics (DTIE), Paris.

UNFCCC (2019e): Concept Note. Further development of the CDM in urban sectors. CDM-EB90-AA-A15.

UNFCCC (2019f): Meeting report. CDM Executive Board 105th meeting. CDM-EB105. Available online: https://cdm.unfccc.int/filestorage/9/H/I/9HIJ2BPN3QWOT5AG817X406LYZSRCU/eb105_meeting_report_v01.1?t=eXR8cWZrbDFrfDAENOhiW7fJjZ7gUtzswFYU (accessed August 24, 2020).

UNFCCC (2020): Guideline. Development of a PoA applicable to buildings. CDM-EB106-A04. Available online: https://cdm.unfccc.int/filestorage/3/C/A/3CAYSRK2WTXLOZEQ9P7MDF4GJV5I80/EB106_repan04.pdf?t=Q058cWZrbGFzfDD2GpQ7YVlewI6LY8FFlypn (accessed August 24, 2020)

Verles, M., Braden, S., Taibi, F-Z., & Olsen, K. H. (2018). Safeguarding Principles and Do-No-Harm Approaches for Climate Actions: Best practice, tools and guidance for safeguarding principles and do-no-harm assessments of climate actions and relevant considerations for negotiations under Article 6 of the Paris Agreement. UNEP DTU Partnership.

World Economic Forum (2019): Blended Finance Vol. 1: A Primer for Development Finance and Philanthropic Funders, available online:

http://www3.weforum.org/docs/WEF_Blended_Finance_A_Primer_Development_Finance_Philanthropic_Funders.pdf, (accessed April 26, 2020).

World Resources Institute; C40 Cities; ICLEI (2014): Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. An Accounting and Reporting Standard for Cities.

Data Sources:

Delhi Metro Rail Corporation Ltd. (2019): Notice calling quotations. Selling CERs, GS-VER, GS-CER.

<http://www.delhimetrorail.com/otherdocuments/922/Quotation-for-Sale-of-CERs-and-GS-VERs-18-July-2019-Final-19072019.pdf> (accessed September 20, 2019).

Delhi Metro Rail Corporation Ltd. (various years): Annual Reports.

http://www.delhimetrorail.com/annual_report.aspx (accessed September 20, 2019).

ICLEI TAP pipeline (2019): <https://tap-potential.org/tap-projects/> (accessed September 20, 2019).

UNEP DTU Partnership (2019) : CDM/JI Analysis and Database, <http://www.cdmpipeline.org/> (accessed September 20, 2019).

UNEP DTU Partnership (2019a) : NAMA Pipeline Analysis and Database, <http://namapipeline.org/> (accessed September 20, 2019).

UNFCCC (2018): Monitoring report for ‘Renewable Energy PoA in India.

https://cdm.unfccc.int/filestorage/Y/C/0/YC0VBZNG2XASUJT94H80MIF1R6W7LQ/DMRC%20Monitoring%20Report_v1.1.pdf?t=NGl8cHk0dXV1fDDi9_0RtzVNp5Gw6N8OMNWJ (accessed September 20, 2019)

UNFCCC (2019): Project 0672: BRT Bogotá, Colombia: TransMilenio Phase II to IV.

<https://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view?cp=1> (accessed September 20, 2019).

UNFCCC (2019a): Project 0164: Bandeirantes Landfill Gas to Energy Project.

<https://cdm.unfccc.int/Projects/DB/DNV-CUK1134130255.56/view?cp=1> (accessed September 20, 2019).

UNFCCC (2019b): Project 0373 : São João Landfill Gas to Energy Project.

<https://cdm.unfccc.int/Projects/DB/DNV-CUK1145141778.29/view> (accessed September 20, 2019).

UNFCCC(2019c): Project 4463 : Metro Delhi, India.

<https://cdm.unfccc.int/Projects/DB/SQS1297089762.41/view> (accessed September 20, 2019).

UNFCCC (2019d): CPA 6161-P1-0002-CP1 : DMRC Solar PV Project.

https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/A9WKHVXZJ7FT1OEDC8RM1YU2BNG56Q/view, (accessed September 20, 2019).

A Annexes:

A.1 Subsectors with Urban Relevance

Sector	Urban subsector
Urban transport	Transport alternative (introduction of new transportation system, such as BRT, alternative vehicles, etc.) EE transport Fuel switch transport
Waste	Landfill Alternative waste treatment/emission avoidance Recycling Gas recovery Waste management
Wastewater & Water supply	EE water supply Alternative waste treatment/emission avoidance Wastewater treatment
Local energy supply	Cookstoves Local energy supply Heating
Private Buildings	EE buildings (private, commercial) Household lighting Refrigerators Other Appliances (also includes appliances in general) Energy Generation Buildings
Data centers	EE buildings measuring
Public Infrastructure	Street lighting EE buildings on public buildings, or public facilities such as municipal office, schools, waste treatment plants, harbours etc
	Urban planning

A.2 Analysis: Table 1. Considered CDM Methodologies with Urban Component

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AM94	Distribution of biomass based stove and/or heater for household or institutional use	0	0	local energy production	cookstoves
ASB16	Institutional Cook stoves in Uganda	0	0	local energy production	cookstoves
ASB18	Baseline woody biomass consumption for cookstoves in Burundi	0	0	local energy production	cookstoves
ASB25	Cookstoves in Senegal	0	0	local energy production	cookstoves
ASB32	Cookstoves in Namibia	0	0	local energy production	cookstoves
ASB33	Cookstoves in Togo	0	0	local energy production	cookstoves
ASB35	Cookstoves in Kenya	0	0	local energy production	cookstoves
ASB36	Cookstoves in Malawi	0	0	local energy production	cookstoves
ASB37	Cookstoves in Mali	0	0	local energy production	cookstoves
AMS-I.K.	Solar cookers for households	0	0	local energy production	cookstoves
AMS-I.E.	Switch from Non-Renewable Biomass for Thermal Applications by the User	30	29	local energy production	heating
AMS-II.G.	Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass	46	76	local energy production	heating

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AM58	Introduction of a new primary district heating system	18	0	local energy production	heating
AM117	Introduction of a new district cooling system	0	1	local energy production	heating
AM44	Energy efficiency improvement projects: boiler rehabilitation or replacement in industrial and district heating sectors	2	0	local energy production	heating
AMS-II.B.	Supply side energy efficiency improvements - generation	32	0	local energy production	local energy supply
AMS-II.K.	Installation of co-generation or tri-generation systems supplying energy to commercial buildings	2	3	local energy production	local energy supply
AMS-I.A.	Electricity generation by the user	57	11	local energy production	local energy supply
AM105	Improved energy efficiency in data centers through dynamic power management	0	0	data centers	EE data centers
AM91	Energy efficiency technologies and fuel switching in new buildings	0	0	private buildings	EE buildings
AMS-II.E.	Energy efficiency and fuel switching measures for buildings	60	7	private buildings	EE buildings

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AMS-III.AE.	Energy efficiency and renewable energy measures in new residential buildings	0	1	private buildings	EE buildings
AMS-II.C.	Demand-side energy efficiency programmes for specific technologies	38	29	private buildings	EE buildings
AM91	Energy efficiency technologies and fuel switching in new buildings	0	0	private buildings	EE buildings
AMS-II.Q.	Energy efficiency and/or energy supply projects in commercial buildings	1	1	private buildings	EE buildings
AMS-I.I.	Biogas/biomass use for thermal application for households/small users	0	9	private buildings	heating
AMS-II.R.	Energy efficiency space heating measures for residential buildings	0	0	private buildings	heating
AM72	Fossil Fuel Displacement by Geothermal Resources for Space Heating	2	0	Private Buildings	heating
AMS-I.J.	Solar water heating systems (SWH)	0	8	private buildings	heating
AM46	Distribution of efficient light bulbs to households	4	0	private buildings	household lighting
AM113	Distribution of compact fluorescent lamps (CFL) and	0	0	private buildings	household lighting

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
	light-emitting diode (LED) lamps to households				
AMS-II.J.	Demand-side activities for efficient lighting technologies (deemed savings)	52	27	private buildings	household lighting
AMS-III.AR.	Substituting fossil fuel based lighting with LED lighting systems	4	20	private buildings	household lighting
AMS-II.O.	Dissemination of energy efficient household appliances	0	0	private buildings	other appliances
AMS-II.N.	Demand-side energy efficiency activities for installation of energy efficient lighting and/or controls in buildings (also multi-family)	0	1	private buildings	other appliances
AMS-II.M.	Demand-side energy efficiency activities for installation of low-flow hot water savings devices	0	1	private buildings	other appliances
AM120	Energy-efficient refrigerators and air-conditioners	0	0	private buildings	refrigerators
AM60	Power saving through replacement by efficient chillers	0	1	private buildings	refrigerators
AMS-III.X.	Energy efficiency and HFC-134a recovery in residential refrigerators	1	0	private buildings	refrigerators

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AMS-III.AB.	Avoidance of HFC emissions in Standalone Commercial Refrigeration Cabinets	0	0	private buildings	refrigerators
AMS-II.L.	Demand-side activities for efficient outdoor and street lighting technologies	2	1	public infrastructure	street lighting
AM90	Modal shift in transportation of cargo from road transportation to water or rail transportation	2	1	urban transport	transport alternative
AM110	Modal shift in transportation of liquid fuels	0	0	urban transport	transport alternative
ACM16	Mass Rapid Transit Projects	18	1	urban transport	transport alternative
AM31	Baseline Methodology for Bus Rapid Transit Project	15	0	urban transport	transport alternative
AMS-III.C.	Emission reductions by electric and hybrid vehicles	18	2	urban transport	transport alternative
AMS-III.S.	Introduction of low-emission vehicles to commercial vehicle fleets	0	2	urban transport	transport alternative
AMS-III.U.	Cable Cars for Mass Rapid Transit System (MRTS)	1	1	urban transport	transport alternative
AMS-III.AY.	Introduction of LNG buses to existing and new bus routes	0	1	urban transport	transport alternative

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AMS-III.BM.	Lightweight two and three wheeled personal transportation	0	0	urban transport	transport alternative
AMS-III.AA.	Transportation Energy Efficiency Activities using Retrofit Technologies	0	0	urban transport	EE transport
AMS-III.AP.	Transport energy efficiency activities using post - fit Idling Stop device	0	0	urban transport	EE transport
AMS-III.AT.	Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets	1	0	urban transport	EE transport
AMS-III.BC.	Emission Reductions through Improved Efficiency of Vehicle Fleets	0	0	urban transport	EE transport
AMS-III.BN.	Efficient operation of public transportation	0	0	urban transport	EE transport
AMS-III.AQ.	Introduction of Bio-CNG in transportation applications	2	0	urban transport	fuel switch transport
ACM22	Alternative waste treatment processes	14	1	waste	alternative waste treatment/emission avoidance
AMS-III.AF.	Avoidance of methane emissions through excavating and composting of partially decayed municipal solid waste (MSW)	0	0	waste	alternative waste treatment/emission avoidance

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AM112	Less carbon intensive power generation through continuous reductive distillation of waste	0	0	waste	alternative waste treatment/emission avoidance
AMS-III.E.	Avoidance of methane production from biomass decay through controlled combustion	114	1	waste	alternative waste treatment/emission avoidance
AMS-III.L.	Avoidance of methane production from biomass decay through controlled pyrolysis	1	0	waste	alternative waste treatment/emission avoidance
AMS-III.AO.	Methane recovery through controlled anaerobic digestion	10	5	waste	alternative waste treatment/emission avoidance
AMS-III.BJ.	Destruction of hazardous waste using plasma technology including energy recovery	0	0	waste	alternative waste treatment/emission avoidance
AM25	Avoided emissions from organic waste through alternative waste treatment processes	143	5	waste	alternative waste treatment/emissions avoidance
ASB10	Landfill gas capture and flaring in Sao Tome and Principe	0	0	waste	landfill

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
ASB11	Landfill gas capture and flaring in the Dominican Republic	0	0	waste	landfill
ASB12	Landfill gas capture and flaring in Antigua and Barbuda	0	0	waste	landfill
ASB13	Landfill gas capture and flaring in Belize	0	0	waste	landfill
ASB14	Landfill gas capture and flaring in Grenada	0	0	waste	landfill
ASB22	Landfill gas capture and destruction in Cameroon	0	0	waste	landfill
ASB23	Landfill gas capture and destruction or use in Sudan	0	0	waste	landfill
ASB30	Landfill gas capture and destruction in Rwanda	0	0	waste	landfill
ACM1	Landfill gas project activities	380	13	waste	landfill
AM83	Avoidance of landfill gas emissions by in-situ aeration of landfills	1	0	waste	landfill
AM93	Avoidance of landfill gas emissions by passive aeration of landfills	0	0	waste	landfill
AMS-III.G.	Landfill methane recovery	76	3	waste	landfill

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AMS-III.AX.	Methane oxidation layer (MOL) for solid waste disposal sites	0	1	waste	landfill
AM75	Collection, processing and supply of biogas to end-users for production of heat	0	0	waste	recovery
AMS-III.AO	Methane recovery through controlled anaerobic digestion	12	5	waste	recovery
ACM24	Natural gas substitution by biogenic methane produced from the anaerobic digestion of organic waste	0	1	waste	recovery
AM53	Biogenic methane injection to a natural gas distribution grid	1	0	waste	recovery
AM69	Biogenic methane as a feedstock and fuel for town gas production	2	0	waste	recovery
AMS-III.O.	Hydrogen production using methane extracted from biogas	1	0	waste	recovery
AMS-III.AJ.	Recovery and recycling of materials from solid wastes	0	0	waste	recycling
AMS-III.BA.	Recovery and recycling of materials from E-waste	1	0	waste	recycling

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AM39	Methane emissions reduction from organic waste water and bioorganic solid waste using co-composting	31	0	wastewater	wastewater treatment
AMS-III.H.	Methane recovery in wastewater treatment	405	17	wastewater	wastewater treatment
AMS-III.I.	Avoidance of methane production in wastewater treatment through replacement of anaerobic lagoons by aerobic systems	13	0	wastewater	wastewater treatment
ASB26	Methane recovery from municipal wastewater treatment in Uganda	0	0	wastewater	wastewater treatment
ACM14	Mitigation of greenhouse gas emissions from treatment of industrial wastewater	53	1	wastewater	wastewater treatment
AM80	Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants	5	0	wastewater	wastewater treatment
AMS-III.Y.	Methane avoidance through separation of solids from wastewater or manure treatment systems	7	0	wastewater	wastewater treatment
AM20	Water pumping efficiency improvement	0	0	water supply	EE water supply

Approved Methodology	Description	Number of projects	Number of PoAs	Subsector	Category
AM86	Installation of zero energy water purifier for safe drinking water application	1	0	water supply	EE water supply
AMS-III.AV.	Low greenhouse gas emitting water purification systems	1	14	water supply	EE water supply
Total:					
95		1680	301		

A.3 Analysis: Table 2. Analysis of Projects and Programmes of Activities with an urban component

Category	No. Methodology	No. of Projects	Projects with issuance	Average expected CERs (kCER)	Average real CERs (kCER)	Performance	No. of PoAs	No. of PoAs with issuance	Average real CERs (kCER)	Methodologies included
Urban transport: Transport alternative	9	54	11	8.509	5.170	61%	8	1	312	ACM 16, AM31, AM90, AM110, AMS-III.C., AMS-III.S., AMS-III.U., AMS-III.AY., AMS-III.BM.
Urban transport:	5	1	1	1	2	182%	0	0	0	AMS-III.AA., AMS-III.AP.,

Category	No. Methodology	No. of Projects	Projects with issuance	Average expected CERs (kCER)	Average real CERs (kCER)	Performance	No. of PoAs	No. of PoAs with Issuance	Average real CERs (kCER)	Methodologies included
EE transport										AMS-III.AT., AMS-III.BC., AMS-III.BN.
Urban transport: Fuel switch transport	1	2	0	0	0		0	0	0	AMS-III.AQ.
Waste: Alternative waste treatment/ emission avoidance	8	229	34	27.158	15.743	58%	12	0	0	ACM22+AM S- III.AF.+AM1 12+AMS- III.E.+AMS- III.L.+AMS- III.AO.+AMS - III.BJ.+AM2 5
Waste: Recycling	2	1	0	0	0		0	0	0	AMS- III.AJ.+AM S-III.BA.
Waste: Landfill	13	457	141	165.661	98.518	59%	17	2	2.287	ASB10+ASB 11+ASB12+ ASB13+ASB 14+ASB22+ ASB23+ASB 30+ACM1+ AM83+AM9 3+AMS-

Category	No. Methodology	No. of Projects	Projects with issuance	Average expected CERs (kCER)	Average real CERs (kCER)	Performance	No. of PoAs	No. of PoAs with Issuance	Average real CERs (kCER)	Methodologies included
										III.G.+AMS-III.AX.
Waste: Recovery	6	17	2	69	27	39%	6	0	0	AMS-III.AO+ACM24+AM53+AM69+AMS-III.O.+AM75
Water & Wastewater: EE water supply	3	2	0	0	0		14	3	955	AM20+AM86+AMS-III.AV.
Water & Wastewater: Wastewater treatment	7	514	106	14.283	9.889	69%	18	1	75	ASB26+AM39+ACM14+AM80+AM5-III.Y.+AMS-III.H.+AMS-III.I.
Energy: Cookstoves	9	0	0	0	0		0	0	0	AM94+ASB16+ASB18+ASB25+ASB32+ASB33+ASB35+ASB36+ASB37+AMS-I.K.

Category	No. Methodology	No. of Projects	Projects with issuance	Average expected CERs (kCER)	Average real CERs (kCER)	Performance	No. of PoAs	No. of PoAs with Issuance	Average real CERs (kCER)	Methodologies included
Energy: Heating	5	96	21	4.795	4.014	84%	106	33	7.775	AMS-I.E.+AMS-II.G.+Am58+AM117+AM44
Energy: Local energy supply	3	91	17	2.068	970	47%	14	2	1.667	AMS-II.B.+AMS-II.K.+AMS-I.A.
Buildings: EE buildings	7	99	11	798	371	46%	38	2	552	AM91+AM S-II.E.+AMS-III.AE.+AM S-II.C.+AM91+AMS-II.Q.+AM105
Buildings: Household lighting	4	60	7	1.389	655	47%	47	3	2.841	AM46+AM 113+AMS-II.J.+AMS-III.AR.
Buildings: Refrigerators	4	1	0	0	0		1	0	0	AM120+A M60+AMS-III.X.+AMS-III.AB.

Category	No. Methodology	No. of Projects	Projects with issuance	Average expected CERs (kCER)	Average real CERs (kCER)	Performance	No. of PoAs	No. of PoAs with Issuance	Average real CERs (kCER)	Methodologies included
Buildings: Other Appliances	4	52	6	751	578	77%	2	1	2.692	AMS-II.O.+AMS-II.J.+AMS-II.N.+AMS-II.M.
Buildings: Heating	4	2	1	16	28	175%	17	1	2.662	AMS-I.I.+AMS-II.R.+AM72+AMS-I.J.
Public infrastructure: Street lighting	1	2	0	0	0		1	0	0	AMS-II.L.
Public infrastructure: EE buildings										
Sum	95	1680	358	225.498	135.965	60%	301	49	21.817	

A.4 Analysis: Table 3. Summary of the analysis of NAMAs and TAP projects

Selected deep-dive NAMA summary		
Urban Transport	5	28%
Waste	5	28%
Wastewater & Water supply	1	6%
Local energy supply	2	11%
Private buildings	3	17%
Data Center	0	0%
Public infrastructure	2	11%
Total	18	
Number of deep-dive NAMAs indicates MRV approach	4	22%
Number of deep-dive NAMAs qualify GHG emission reduction impacts	10	56%
Number of deep-dive NAMAs specify sustainable impacts	11	61%
Number of deep-dive NAMAs specify the total cost	17	94%
Number of deep-dive NAMAs paid or partially paid by local government's budget	6	33%
Number of deep-dive NAMAs address NDC	18	100%
Urban Transport	1	6%
Waste	2	11%
Wastewater & Water supply	0	0%
Local energy supply	6	33%
Private buildings	0	0%
Data Center	0	0%
Public infrastructure	2	11%

Selected deep-dive NAMA summary		
Total	11	
Number of deep-dive TAP indicates MRV approach	0	0%
Number of deep-dive TAP qualify GHG emission reduction impacts	10	91%
Number of deep-dive TAP specify the total cost	9	82%
Number of deep-dive TAP paid or partially paid by local government's budget	7	64%
Number of deep-dive TAP address NDC	0	0%
Urban Transport	8	18%
Waste	3	7%
Wastewater & Water supply	11	25%
Local energy supply	3	7%
Private buildings	2	5%
Data Center	0	0%
Public infrastructure	15	34%
Others	2	
Total	44	
Number of 2019 TAP projects indicates MRV approach	0	
Number of 2019 TAP projects qualify GHG emission reduction impacts	17	39%
Number of 2019 TAP projects specify sustainable impacts	26	59%
Number of 2019 TAP projects specify the total cost	25	57%
Number of 2019 TAP projects are paid or partially paid by local government's budget	21	48%
Addressing the connection to NDC	3	7%
Summary for all 139 urban NAMAs in the pipeline		
Urban Transport	25	18%
Waste	12	9%
Wastewater & Water supply	2	1%
Local energy supply	49	35%
Private buildings	47	34%

Selected deep-dive NAMA summary		
Data Center	0	0%
Public infrastructure	1	1%
Other	3	2%
Total	139	
Number of 2019 NAMAs MRV approach	31	22%
Number of 2019 NAMAs qualify GHG emission reduction impacts	23	17%
Number of 2019 NAMAs specify sustainable impacts	70	50%
Number of 2019 NAMAs specify the total cost	137	99%
Number of 2019 NAMAs are paid or partially paid by domestic government's budget	76	55%

Source: own illustration, ICLEI World Secretariat