



WORLD BANK GROUP

The Networked Carbon Markets Initiative Partners & Strategy Workshop

May 26, 2017 | Barcelona, Spain

Summary Note



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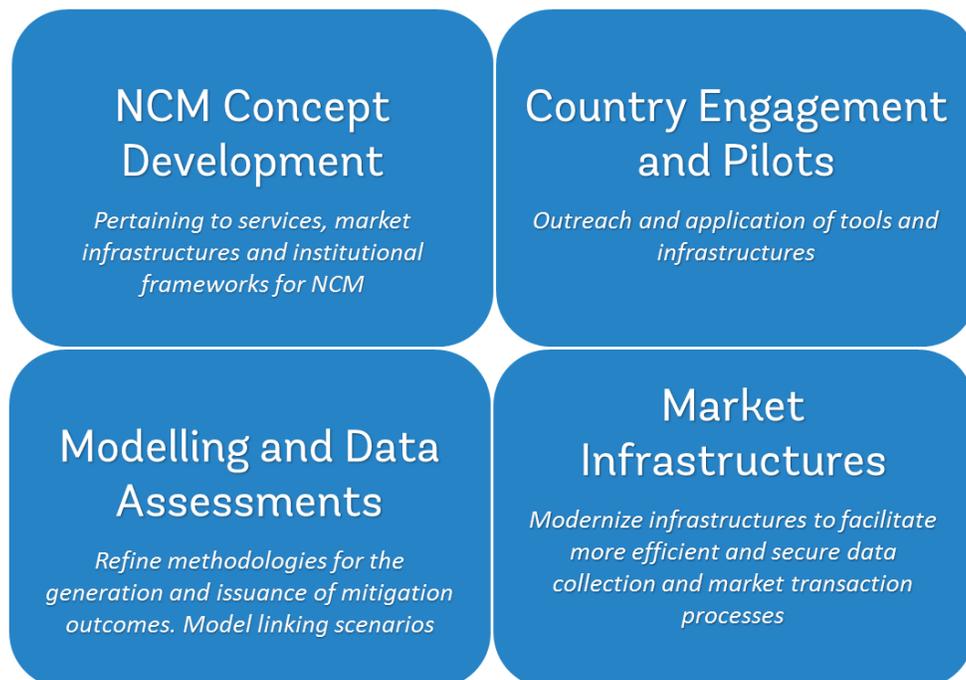
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1. Introduction

The [Networked Carbon Markets \(NCM\) initiative](#), as an innovation platform, aims to collaboratively develop the tools, services and institutional frameworks required to support the next generation of climate markets. The end-goal is to enable the creation and transfer of climate assets in a network of decentralized markets that is liquid, scalable and has environmental integrity.

The NCM initiative organized its annual Partners & Strategy Workshop on the 26th of May, 2017 in Barcelona following [the Innovate4Climate Finance and Markets Week](#). Based on the meeting’s discussion, this note summarizes (a) the Partners’ feedback on the NCM initiative’s main outputs in FY17 (July 2016 to June 2017) and recommendations for potential activities that can be undertaken within its main work-streams (Figure 1) and (b) suggestions on how the NCM initiative could contribute to the World Bank Group’s (WBG) overall Climate Markets Strategy.

FIGURE 1. THE NCM INITIATIVE’S INTERRELATED WORK-STREAMS



2. The NCM initiative's work plan for FY18 and beyond

2.1 Country engagement and pilots

The NCM initiative's Mitigation Action Assessment Protocol (MAAP)¹ aims to provide a user-friendly and secure platform for assessing, comparing and benchmarking the relative mitigation outcomes of a diverse set of climate actions. It is structured into four independent modules that cover various assessment areas, and each assessment area includes a set of key indicators that reflects what experts consider to be critical aspects of a robust climate action (Figure 2). The module's final score is based on the weight and scores that users assign to the relevant key indicators and assessment areas.

FIGURE 2. THE MAAP'S MODULES AND ASSESSMENT AREAS



By providing a flexible yet standardized framework to measure the relative robustness of climate actions, the MAAP aims to help decision makers track progress towards climate goals, inform financing and capacity building decisions and ultimately, enhance the fungibility of climate assets in networked carbon markets that may be linked at the subnational, national and regional levels.

The focus of the NCM initiative's efforts in FY17 was to scale up the deployment of the MAAP and enhance the accessibility and usability of the tool. Main activities include:

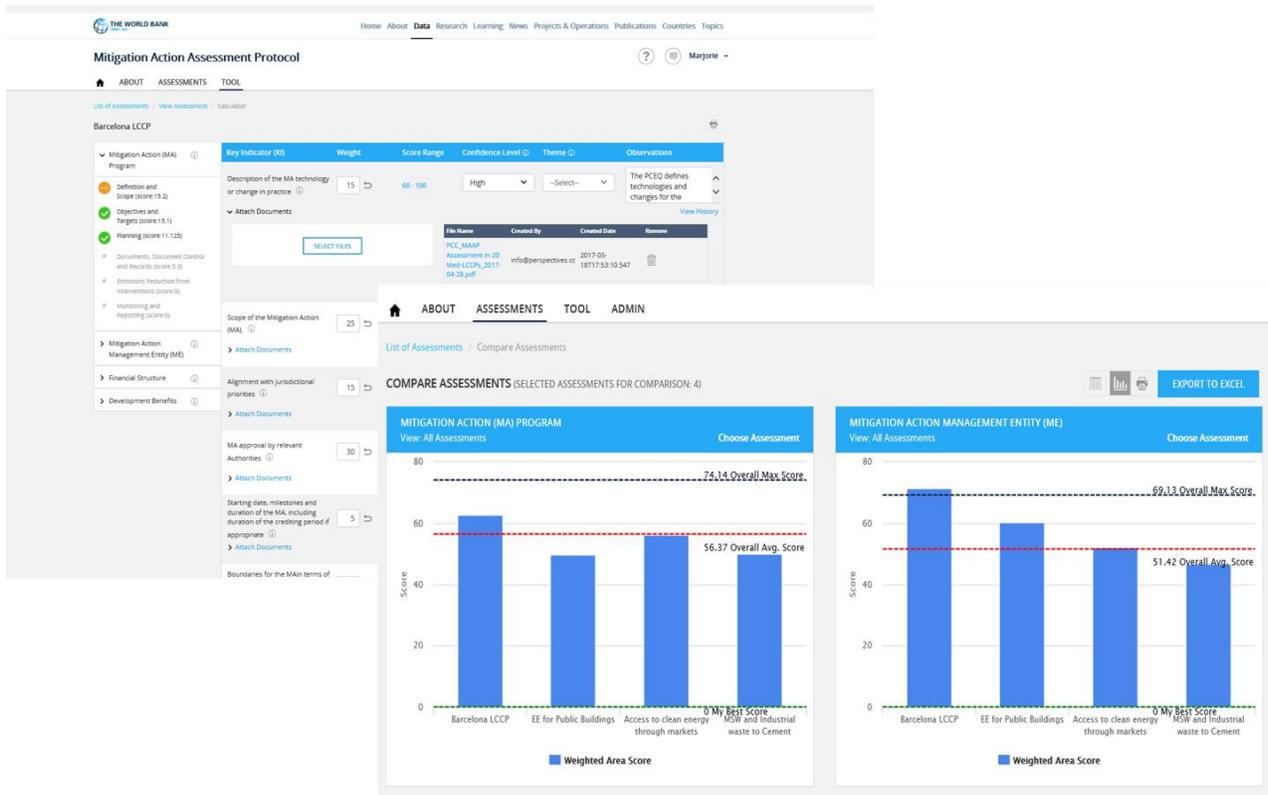
- **The launch of [the MAAP online interface](#).** The MAAP was originally developed as an excel-based tool in 2014. Following an extensive three-year consultation and pilot process, the NCM initiative decided that it was timely to roll out an online interface to build on the existing momentum and scale up the reach and impact of the tool. The online interface includes a number of additional functionalities. For example, it provides a user-friendly platform to manage results and store related documents; enhances access to datasets generated by

¹ A separate Partners & Strategy Roundtable was organized for the MAAP on May 25 in Barcelona. Please click [here](#) to view the Summary Note.

partners; includes visualization tools for comparison and benchmarking; and provides a live helpdesk, FAQ and a how-to video to guide the practical use of the tool.

- **Deployment of the MAAP in collaboration with Governments, the World Bank Global Practices and key expert groups².** To date, the MAAP has been applied to more than 180 climate actions in around 40 countries, including Nationally Appropriate Mitigation Actions (NAMAs), low carbon city program and white/green certificate programs.
- **MAAP-Design and MAAP-Implementation.** Two versions of the MAAP have been introduced, one tailored for actions at the early design stage and the other for actions that are more advanced at the implementation stage. The indicators and assessment areas remain the same but the two versions differ in terms of how the indicators are scored.

FIGURE 3. SCREENSHOTS OF THE MAAP ONLINE INTERFACE



The NCM initiative will move forward with the following next steps recommended by participants:

- **Explore opportunities to apply the MAAP to internal WBG operations** to guide investment decisions and contribute to WBG's broader efforts to test methodologies for creating and exchanging assets in the next generation of climate markets.
- **Coordinated engagement and outreach with complementary tools and initiatives.** The NCM initiative should continue to regularly engage with related assessment frameworks, such as the United Nations Development Program's (UNDP) Climate Action Impact Tool³, [the Initiative for](#)

² This includes the Institute for Global Environmental Strategies (IGES), Perspectives Climate Change, UNEP DTU Partnership, Gold Standard and Carbon Trust Mexico.

³ The Climate Action Impact Tool is currently being developed by UNDP to measure the impact of NDC climate actions towards the SDGs.

[Climate Action Transparency \(ICAT\)](#)⁴ and [Gold Standard](#)⁵. Where possible, outreach efforts should also be coordinated to ensure that targeted users can make an informed decision on which tool(s) would be most suitable for their assessment needs.

- **Support climate funds and capacity building programs**, such as [Green Climate Fund \(GCF\)](#)⁶, [the NDC Partnership](#)⁷ and the Capacity Building Initiative for Transparency (CBIT)⁸ to avoid overlap and incentivize the use of the MAAP.
- **Engage with UNFCCC** to receive feedback on the MAAP and explore opportunities to support new requirements under the Paris Agreement, particularly in relation to transparency, capacity building and potential market mechanisms.
- **Training workshops/webinars** to further guide users in the application of the MAAP and populate the online interface.

It was also suggested that the NCM initiative should **explore the possibility to add a module on adaptation**. As evidenced in the MAAP assessments in Jalisco Mexico, components of the MAAP (e.g. indicators within the “Management Entity” and the “Financial Structure” modules) are applicable to actions for climate change adaptation. By adding a module on adaptation, the MAAP may further support co-financing of assets with mitigation and adaptation benefits. However, further work in this area should be discussed and coordinated with relevant World Bank teams which specialize in climate change adaptation evaluations.

2.2 Modelling and data assessments

2.2.1 Modelling the application of the METRIC Guidelines

The NCM initiative and [Carbon Pricing Leadership Coalition \(CPLC\)](#) plan to publish a paper titled “*the METRIC Guidelines for Successful Linking under the Paris Agreement*” later this year. The paper is targeted at high-level stakeholders in the private and public sector, and aims to enable, explore and guide the range of approaches that could be applied to carbon market linkage under the Paris Agreement.

THE PAPER BUILDS ON THE WORLD BANK PREVIOUS ANALYTICAL WORK, SUCH AS THE “[STATE AND TRENDS OF CARBON PRICING 2016](#)” REPORT AND THE “[FASTER PRINCIPLES FOR SUCCESSFUL CARBON PRICING](#)”. IT HIGHLIGHTS KEY BARRIERS AND OPPORTUNITIES FOR LINKING, DRAWING FROM EXISTING EXPERIENCE TO LINK, REQUIREMENTS OF THE PARIS AGREEMENT AND INTERVIEWS WITH PRIVATE AND PUBLIC SECTOR MEMBERS OF CPLC. IN THIS CONTEXT, THE METRIC GUIDELINES WERE DEVELOPED TO SET OUT A SERIES OF CONSIDERATIONS THAT POLICYMAKERS, THE PRIVATE SECTOR AND OTHER STAKEHOLDERS MIGHT CONSIDER WHEN DEVELOPING NEW CARBON MARKET LINKS (

Figure 4).

⁴ In 2015, the Children’s Investment Fund Foundation (CIFF) and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) founded ICAT to help Governments build capacity to measure the effects of their policies and report progress publicly.

⁵ Gold Standard is a standard and certification body that standards for the best that can be achieved in climate and development projects.

⁶ GCF is a global fund created to support developing countries’ efforts to mitigate and adapt to climate change. It was set up by 194 countries who are parties to the UNFCCC in 2010, as part of the Convention’s financial mechanism.

⁷ NDC Partnership was launched at COP22 as a coalition of countries and international institutions to provide technical and financial support for the implementation of NDCs and related sustainable development commitments.

⁸ UNFCCC established CBIT as part of the Paris Agreement to strengthen the institutional and technical capacities of developing countries to meet the enhanced transparency requirements of the Paris Agreement.

FIGURE 4. OVERVIEW OF THE METRIC GUIDELINES

M arket Integrity	<ul style="list-style-type: none"> • Ensuring that capital is allocated efficiently and avoiding disturbing the continued efficient function of carbon and related markets
E nvironmental Integrity	<ul style="list-style-type: none"> • Giving all participants, as well as external stakeholders, confidence that the linking arrangements are supporting real and additional emission reductions
T ransparency	<ul style="list-style-type: none"> • Being transparent and providing all stakeholders with a clear understanding of its rationale in order to generate support, and allowing the free exchange of information between linked systems
R ecognize Ambition	<ul style="list-style-type: none"> • Recognizing early action and avoiding incentives to reduce effort
I nclusiveness	<ul style="list-style-type: none"> • Facilitating and encouraging more jurisdictions to join the system, promoting greater international cooperation, and considering domestic and international equity concerns
C ost Effectiveness	<ul style="list-style-type: none"> • Reducing the overall cost of mitigation, including administrative and transaction costs, and improving economic efficiency

The paper illustrates how the METRIC guidelines could work in practice through a case study on a hypothetical link between a proposed Emission Trading Scheme (ETS) in Mexico and the ETS in California⁹. The case study first provides background on the relationship between Mexico and California’s climate policies, including details of California’s ETS design and a potential design approach of the planned ETS in Mexico. It then evaluates how the METRIC guidelines can help policymakers identify potential obstacles as well as preliminary suggestions on solutions and first steps towards a potential link.

As a next step, the NCM initiative is exploring the possibility of using the METRIC guidelines to quantitatively evaluate the financial and mitigation implications of different linking options, using the potential link between Mexico, California, Quebec and Ontario’s ETs as a hypothetical case study. In terms of modelling techniques, it was suggested that the study could use ENERDATA’s [EVALUATE model](#)¹⁰, since the model was used for the NCM initiative’s internal study on hypothetically linking China, South Korea and Mexico’s ETs.

Participants agreed that the proposed quantitative assessments could help demonstrate the potential cost/efficiency benefits and distributional impacts of linking; and further evaluate whether networking carbon markets could serve as an alternative, “second-best” option for linking given the current bottom-up climate policy landscape. The NCM initiative will move forward with the following next steps as recommended by participants:

⁹ For simplification purposes, the case study focuses exclusively on California, even though it recognizes that such linking arrangement may affect other jurisdictions since California is part of an existing common regional carbon market with Québec, and a member of the Western Climate Initiative (WCI).

¹⁰ EVALAUTE was developed by Enerdata and financially supported by the World Bank for the Government of Brazil. It uses marginal abatement cost curves (MACCs) produced by POLES to quantitatively estimate the impact of G20 economies’ energy-related INDCs and mitigation policies on costs, emissions and trade flows at the country and sector level.

- **Consultations with stakeholders involved in the ETSs selected for the case study** to receive input on the proposed linking scenarios, and gauge the availability of key input data from official sources.
- **Consider and compare different modelling techniques.** For example, one option discussed was to use Enerdata’s POLES model to generate MACCs at the subnational level for California and Ontario. MACC data from POLES is already available at the national level for Mexico. This would provide the best level of comparability but may require additional effort and would have to be checked against official sources. On the other hand, participants suggested that the project team could ask countries/states/provinces for their MACCs underlying their 2030 analyses. This may not be available on a consistent basis but would align with existing analysis of the countries.
- **Identify additional uses of the MACCs for other macroeconomic assessments,** given the expected effort to generate new MACCs at the subnational level using POLES.
- **Produce a two-page glossary of terms** to clearly define the different modalities of linking and introduce key concepts explored by NCM.

2.2.2 Climate Transparency

The NCM initiative helped establish Climate Transparency under the leadership of Peter Eigen (Founder of Transparency International) and Alvaro Umaña (Former Minister of Environment and Energy of Costa Rica) in late 2014¹¹. Climate Transparency aims to provide a balanced representation of countries’ climate ambition and performance; and as such, it acts as a neutral, independent consortium that brings together the knowledge and analytical work of climate experts from a range of countries and fields, as listed in Figure 5 below.

FIGURE 5. CLIMATE TRANSPARENCY’S TECHNICAL AND FINANCIAL PARTNERS



An annual report has been produced since 2015. This year, the report titled [“Brown to Green – the G20 transition to a low carbon economy”](#) was launched on July 3 in Hamburg alongside the G20 summit. The paper aims to provide a comprehensive and comparable overview of G20 economies’ emissions, climate policy performance, finance and decarbonization trends. The report is accompanied by G20 [Country Profiles](#), which provides more detailed assessments at the country level.

Given the bottom-up nature of the Paris Agreement and the resulting heterogeneity of countries’ mitigation contributions, it was agreed that Climate Transparency could ensure the effectiveness of networked carbon markets by enhancing the transparency of the process and accountability of domestic institutions and structures. However, participants also suggested that Climate Transparency’s analysis

¹¹ Click [here](#) to view the co-chairs’ video statements on the World Bank’s collaboration with Climate Transparency.

could have broader, additional benefits, such as informing the Global Stocktake and reporting/accounting requirements for NDC.

The NCM initiative will coordinate with Climate Transparency to address the following next steps suggested by participants:

- **Identify additional partners**, particularly from Multilateral Development Banks (e.g. Asian Development Bank) and G20 countries where Climate Transparency does not have a partner in (Japan and South Korea).
- **Explore links with MAAP**. The MAAP primarily assesses the mitigation value of actions at the project/program level (see section 2.1 for further information), whereas Climate Transparency measures mitigation value at the national ambition/policy level. Nonetheless, a deep dive into potential synergies/overlap in the indicators and methodology used could help us better understand how mitigation assessments could be linked at different scales.
- **Strengthen cooperation with the World Bank** While Climate Transparency has already referenced a number of World Bank's technical work such as the [RISE index](#)¹², it can strengthen its technical partnership with the World bank by leveraging other resources such as the [Carbon Pricing Dashboard](#)¹³, [NDC Platform](#)¹⁴ and [Climate Change Knowledge Portal](#)¹⁵. At the same time, it could also consider coordinating its outreach efforts with the World Bank Communications Team ahead of next year's G20 summit in Buenos Aires for the launch of the annual Brown to Green report.

2.3 Market infrastructure

The post-Kyoto generation of climate markets is growing to be a network of decentralized markets, linked at regional, national, and sub-national levels. As the global network scales up, markets may have to accommodate a more diverse set of regulations, asset classes, linking arrangements, and types of transactions (peer-to-peer, results-based, machine-to-machine etc). The NCM initiative is exploring how the potential application of disruptive technologies, such as Blockchain, Big Data and the Internet of Things, which are gaining popularity in other industries, could address these issues and form the underlying infrastructure for climate markets.

In relation to this, the University of Edinburgh is developing a project to build a distributed ledger technology (Blockchain) infrastructure¹⁶ to enable global scale networking of carbon markets, and has published two papers to outline the conceptual model: (a) [“A Conceptual Model for Networking of Carbon Markets on DLT Architecture”](#) (April 2017); and (b) [“Networked Carbon Markets: Permissionless Innovation with Distributed Ledgers?”](#) (July 2017).

The University of Edinburgh found that while Blockchain does not offer significant functionality that could not be otherwise achieved, it does provide potential for innovative solutions to data sharing and

¹² RISE index is a set of indicators to help compare national policy and regulatory frameworks for sustainable energy.

¹³ The Carbon Pricing Dashboard is an interactive platform with up-to-date information on jurisdiction's carbon pricing policies.

¹⁴ NDC Platform provides a comprehensive overview of countries' NDC.

¹⁵ Climate Change Knowledge Portal provides climate risk and adaptation country profiles.

¹⁶ Blockchain is a protocol for building a replicated and shared electronic ledger system, collectively maintained by the participants in that system/network, rather than by one central party. In a Blockchain system, each network participants constitutes a “node” or, more precisely, the nodes comprise the individual participants' computers, each of which contains a complete set of transaction records (i.e. the ledger). Taken together, the nodes constitute and maintain the distributed ledger.

transaction management application that could accommodate the new requirements of the Paris Agreement (Figure 6).

FIGURE 6. BLOCKCHAIN ELEMENTS AND POTENTIAL RELATION TO THE PARIS AGREEMENT

Blockchain elements	Potential relation to the Paris Agreement
Blockchain (ledger) accumulative, immutable	<ul style="list-style-type: none"> • Security of transaction (e.g., fraud prevention) • Robust accounting, double-counting control • Auditable
Distributed database, “permissioning”	<ul style="list-style-type: none"> • Transparency (based on permissioning) • Confidentiality
Private/public key encryption	<ul style="list-style-type: none"> • Security against IT attack (e.g., fraud, theft) • Transparency but with appropriate protection of confidentiality
Decentralized infrastructure	<ul style="list-style-type: none"> • Cost efficiency • Other peer-to-peer efficiency (e.g., transaction time)
Regulation by code (contract terms)	<ul style="list-style-type: none"> • Environmental integrity • Supplimentarity¹⁷ • National rules flexibility (sovereignty)

Source: Macinante

Key elements of the underlying technology framework as outlined in the papers were presented and discussed, including (a) how such networked carbon markets might come into being; (b) possible alternative mechanisms for transaction; (c) institutional elements and requirements of digital infrastructure; (d) “smart contracts”¹⁸ as the key transactional component; (e) types and roles of participants; and (f) other legal and regulatory concerns.

Overall, participants agreed that the proposed Blockchain architecture has significant potential to support networked carbon markets in the future by enabling greater transparency and transactional security. The NCM initiative will move forward with the following next steps recommended by participants:

- **Maximize knowledge sharing and map out collaboration opportunities.** There is a significant number of Blockchain-related initiatives that are emerging in the climate space and other sectors. The NCM initiative should ensure regular communication with these initiatives, especially those with direct bearing on connecting climate markets, in order to receive feedback on the conceptual work, explore synergies and avoid overlap.
- **Explore opportunities for country pilots.** The NCM initiative should continue to conduct and consolidate analytical work to explore the feasibility of applying Blockchain to upgrade registry

¹⁷ ‘Supplimentarity’ is the requirement that reductions achieved externally, for example, via trading, should be supplemental to mitigation achieved domestically. This applied to IET under the Kyoto Protocol and applies under the EUETS.

¹⁸ Smart contract is a term of art used commonly in relation to Blockchain applications. It refers to the transactional terms and conditions embedded in computer code which allow automatic execution of the relevant transaction once precise conformity with those terms and conditions has been established.

systems. If the results of these studies are positive, the WBG could take further steps to pilot these technologies.

3. The WBG's strategy for operationalizing climate markets

The CMI Practice is currently coordinating efforts to develop a WBG-wide Climate Markets Strategy to support the development of internationally connected markets for climate assets¹⁹. The Strategy is informed by an internal Working Group of WBG stakeholders from key Global Practices (GPs) and regions, as well as an external Advisory Panel of stakeholders from the private sector and key industries to provide feedback and guidance on the strategy.

Three preconditions have been identified to achieve this goal: a) initial liquidity comprised of **demand** (i.e. countries/companies must have the need and means to procure and transfer mitigation or adaptation outcomes) and **supply** (i.e. climate assets need to be available to be transferred); b) clear methodologies for asset generation and rules/procedures to govern asset issuance and transfer so that market players may transact; and c) countries must have the **infrastructure** for generating, issuing and transferring climate outcomes. Against this backdrop, WBG aims to provide four key types of services to achieve these goals a) **investment services** to mobilize public and private capital and create initial market liquidity; b) **knowledge services** to develop relevant concepts and methodologies; c) **advisory services** to build countries' readiness to participate in climate markets; and d) **advocacy services** to build consensus around key issues around climate markets. It is envisioned that these services will be provided by leveraging synergies between existing and forthcoming partnerships and programs.

It was suggested that the NCM initiative could contribute to the Strategy by, for example:

- Develop and test the methodologies on asset creation and exchange through lessons learned from the MAAP
- Promote the exploration of alternative, innovative approaches for climate markets by partnering with WBG programs such as CPLC and the Partnership for Market Readiness (PMR) to engage with decision makers, private sector and other key stakeholders
- Compare and harmonize countries' NDCs and longer-term mitigation goals through Climate Transparency
- Collaboratively design and test market infrastructures required to support a bottom-up, decentralized approach under Paris through its conceptual analyses on disruptive technologies and regulatory frameworks

In this context, the NCM initiative will undertake the following activities to support the Climate Markets Strategy:

- **Scale up engagement with countries and other key stakeholders** to receive feedback on the usefulness of the proposed conceptual frameworks, methodologies and infrastructures
- **Conduct general outreach** to receive feedback on basic concepts around networking carbon markets, explain technical terms around markets and Articles of the Paris Agreement, and explain the approach and objectives of the Strategy.

¹⁹ Climate assets include among others, carbon credits in the form of CO₂e units, other forms of mitigation outcomes which may come in the form of renewable energy capacity installed or other metrics, as well as outcomes linked to adaptation.

Annex 1: Participant List

1. **Alan David Lee**, Energy Specialist, World Bank, USA
2. **Andrei Marcu**, Senior Fellow, ICTSD, Switzerland
3. **Axel Michaelowa**, Managing Director, Perspectives Climate Group, Switzerland
4. **Bianca Ingrid Sylvester**, General Manager, the Carbon Markets Institute, Australia
5. **Casey Cronin**, Associate Director, Advisory & Research, ClimateWorks Foundation
6. **Chandra Shekhar Sinha**, Lead Climate Change Specialist, World Bank, USA
7. **Cyril Cassisa**, Project Manager, Enerdata, France
8. **Eduardo Ferreira**, Senior Financial Specialist, World Bank, USA
9. **Gerd Leipold**, Program Manager, Climate Transparency
10. **John Ward**, Managing Director, Vivid Economics, USA
11. **Juan Mata**, Consultant, World Bank, USA
12. **Justin Macinante**, PhD Candidate, School of Law, University of Edinburgh
13. **Marcos Castro**, Senior Environmental Specialist, World Bank, USA
14. **Miguel Rescalvo**, Consultant, World Bank, USA
15. **Neeraj Prasad**, Manager, Strategy and Operations, World Bank, USA
16. **Rachel Chi Kiu Mok**, Consultant, World Bank, USA
17. **Venkata Ramana Putti**, Manager, Carbon Markets and Innovation, World Bank, USA
18. **Vikram Widge**, Manager, Climate Finance, IFC, USA
19. **VK Duggal**, Senior Climate Change Specialist, Asian Development Bank

Annex 2: Agenda

8:30	Coffee and registration
Introductory session	
9:00 – 9:15	<ul style="list-style-type: none"> • “Objectives of the workshop and introduction to the agenda”. Venkata Ramana Putti, Program Manager, Carbon Markets & Innovation (CMI) Practice, WBG (5 min) • “Overview of the NCM initiative’s activities in FY17”. Chandra Shekhar Sinha, Lead Climate Change Specialist, WBG (10 min)
Session 1 – WBG’s strategy for operationalizing climate markets under Paris	
9:15 – 10:15	<p>WBG’s CMI Practice is currently developing a WBG-wide strategy for operationalizing international climate markets under Article 6 of the Paris Agreement by bringing together the expertise and knowledge of various teams within the Climate Change Unit, Global Practices and IFC. This session will introduce the strategy, and explore how the NCM initiative’s activities and concepts may contribute to the strategy in FY18 and beyond.</p> <ul style="list-style-type: none"> • “Introducing WBG’s climate markets strategy”. Eduardo Ferreira, Senior Financial Specialist, WBG (15 min) • Roundtable discussion and Q&A (45 min)
Session 2 – The NCM initiative’s work plan for FY18 and beyond (<i>Moderator: Chandra Shekhar Sinha</i>)	
Session 2a – Modelling and Data Assessments	
10:15 – 10:55	<p>This session will discuss the rationale, objectives and approach of a proposed modeling study to estimate the financial and mitigation implications of linking California, Quebec, Ontario and Mexico’s emission trading schemes (ETS).</p> <ul style="list-style-type: none"> • “Modeling the implications of linking carbon markets based on the METRIC guidelines”. Linking scenarios: John Ward, Managing Director, Vivid Economics (15 min). Possible modelling methodologies: Cyril Cassisa, Project Manager, Enerdata (5 min) • Roundtable discussion and Q&A (20 min)
10:55 – 11:30	<p>This session will provide an update on the Climate Transparency activities to assess G20 economies’ climate policies and ambition at the national level, and explore synergies with the NCM initiative.</p> <ul style="list-style-type: none"> • “Climate Transparency’s composite mitigation index and G20 climate assessments”. Gerd Leipold, Program Manager, Climate Transparency (15 min) • Roundtable discussion and Q&A (20 min)
11:30	Break
Session 2b – Country Engagement and Pilots	
11:40 – 12:30	<p>This session will discuss how the NCM initiative could scale up engagement with countries by (a) supporting the development of “finance and market ready” mitigation actions through the Mitigation Action Assessment Protocol (MAAP); and (b) supporting countries’ technical/institutional capacity to link market-ready mitigation actions through analytical work.</p> <ul style="list-style-type: none"> • “Scaling up the application of the MAAP online interface” Miguel Rescalvo, Consultant, WBG (20 min) • Roundtable discussion and Q&A (30 min)
Session 2c – Market Infrastructures	

12:30 – 12:55	<p>This session will explore how potential application of disruptive technologies such as Blockchain could upgrade the existing carbon market infrastructures and address the new demands of decentralized networked markets under the Paris Agreement.</p> <ul style="list-style-type: none"> • “A conceptual model for networking of carbon markets on distributed ledger technology architecture”. <i>Justin Macinante, Consultant, WBG</i> (15 min) • Roundtable discussion and Q&A. (10 min).
Wrap-up	
12:55 – 13:00	<ul style="list-style-type: none"> • Summary and next steps. <i>Neeraj Prasad, Manager, Strategy and Operations, WBG</i> (5 min)
13:00	Lunch and Q&A discussion

Annex 3: List of featured reports

1. **Andrei Marcu (May 2017) “Views on Mitigation Value and its Application”**. Explore the role of Mitigation Value in supporting networked carbon markets in the context of Article 6.2 of the Paris Agreement. <https://www.ictsd.org/themes/climate-and-energy/research/views-on-mitigation-value-and-its-application>
2. **Climate Transparency (July 2017) “Brown to Green: The G20 transition to a low carbon economy”**. Compare main climate trends across G20 countries in terms of emissions, climate policy performance, finance and decarbonization, http://www.climate-transparency.org/wp-content/uploads/2017/07/Brown-to-Green-Report-2017_web.pdf
3. **Climate Transparency (September 2016) “Brown to Green: Assessing the G20 Transition to a low carbon economy”**. Bring together knowledge and data from Climate Transparency’s partners to conduct a composite assessment of G20 countries’ climate actions, including aspects related to NDCs, countries’ mitigation potential and policies, and climate finance. <http://www.climate-transparency.org/wp-content/uploads/2016/08/Brown-to-Green-Assessing-the-G20-transition-to-a-low-carbon-economy.pdf>
4. **Climate Transparency (December 2015) “G20 climate action – a turning point”**. A comparison of G20 countries’ climate mitigation action in terms of a range of criteria: historical development of emissions; the capacities and capabilities of countries; indicators of decarbonization, such as the development of renewable energy and carbon/energy intensity; national and international climate policy performance; and policy ambition, as expressed in countries INDCs and in the context of the global 2°C target <http://www.climate-transparency.org/g20-climate-performance/g20report2015>
5. **Justin Macinante (July 2017) “Networked carbon markets: Permissionless innovation with distributed ledgers”**. Outline the most important questions identified in relation to the connecting of carbon markets through the application of distributed ledger technologies, and outlines the author’s current thoughts on those questions from a legal and regulatory angle. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2948580
6. **Justin Macinante (April 2017) “A conceptual model for networking of carbon markets on distributed ledger technology architecture”**. Set out a conceptual model for the networking of

ETS, built on the architecture of distributed ledger technology.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2948580

7. **World Bank, Justin Macinante (July 2016) “Networked Carbon Markets: Key Elements of the Process”**. Consolidate and summarize the NCM initiative’s conceptual frameworks on what services, market infrastructures and institutional structures may be required to support networking. <https://openknowledge.worldbank.org/handle/10986/25750>
8. **World Bank, Climate Strategies (July 2016) “Carbon Market Clubs and the new Paris Regime”**. Explore how carbon market linkages could be operationalized within different types of climate clubs. <https://openknowledge.worldbank.org/handle/10986/25768>
9. **World Bank, Grantham Research Institute and INFRAS Consulting Group (April 2016) “Prototyping for instruments reducing risks and linking carbon markets”**. Building on the design options explored (see point 1), present ICAR prototypes for three different forms of restricted linking. <http://pubdocs.worldbank.org/en/342101466013221524/Final-report-ICAR-Prototype-June-2016.pdf>
10. **World Bank, Reed Smith (April 2016) “Regulatory Framework to Support Carbon Market Linkage”**. Explore what regulatory frameworks may be required to link bilaterally or multilaterally, based on lessons learned from existing linking and trading arrangements. Link: <http://pubdocs.worldbank.org/en/680061461687518813/The-Regulatory-Framework-to-support-the-NCM-Linking-Model.pdf>
11. **World Bank, DNV GL (April 2016) “Mitigation Action Assessment Protocol”**. Provide a summary of the rationale, objectives, development process and methodology of the MAAP. <https://openknowledge.worldbank.org/handle/10986/25371>
12. **World Bank, Grantham Research Institute and INFRAS (July 2015) “Design Options for an International Carbon Asset Reserve”**. Explore different design options for an ICAR, as an instrument to address carbon market-related risk by increased connectivity and pooling of risk mitigation efforts. <https://openknowledge.worldbank.org/handle/10986/22484>
13. **World Bank, Harvard and IETA (November 2015) “Evaluating Mitigation Effort: Tools and institutions for assessing nationally determined contributions”**. Identify tools and institutional frameworks which may be required to measure and monitor the relative contribution of countries’ NDCs. <http://pubdocs.worldbank.org/en/736371454449389076/pdf/Evaluating-Mitigation-Effort-Nov-2015.pdf>
14. **World Bank, Justin Macinante (October 2015) “Key Elements of the Mitigation Value Assessment Process”**. Summarize the conceptual thinking behind networking, based on consultations with Governments, private sector and climate expert groups. <https://openknowledge.worldbank.org/bitstream/handle/10986/23812/Networked0carb0e0assessent0process.pdf?sequence=1&isAllowed=y>