Nigeria-SEA Virtual Pilot

Brief for policy makers

The Swedish Energy Agency has engaged Climate Focus to assess how Article 6 of the Paris Agreement could be operationalized using real host country cases and contexts. The Virtual Pilot presented in this policy brief combines Article 6 finance and sovereign green bonds to expand energy access in Nigeria, and proposes the design and implementation of a domestic crediting program to promote renewable energy mini-grids. The Virtual Pilot generates Internationally Transferred Mitigation Outcomes (ITMOs), and aims to enable the host country to transfer these ITMOs without jeopardizing achievement of its Nationally Determined Contribution (NDC).

The Virtual Pilot builds on the host country's mitigation priorities and domestic context but does not represent an official (political or contractual) commitment from Nigeria in implementing this Virtual Pilot, nor from the Swedish Energy Agency. This brief elaborates on the technical, financial and transaction aspects needing consideration in a hypothetical Article 6 Pilot transaction between Nigeria and potential investors.

1.1 Promoting electrification in Nigeria through Article 6

Nigeria has a high potential for the development of mini-grids, which has been recognized by policymakers. In its first NDC, Nigeria has defined the energy sector in general, and decentralized renewable energy for off-grid communities in particular, as a development and mitigation priority. In addition, in 2017 Nigeria developed a Sectoral Action Plan for the energy sector, which further specifies the policy measures envisioned to achieve the country's NDC target. The mini-grid regulation, also from 2017, is one example of Nigeria's commitment to electrification and the expansion of mini-grids in the country.

Despite this recognition, it is estimated that currently only 30 commercial mini-grids are operational in Nigeria.[1] Most of these mini-grids use an owner-operator business model, funded through a 70:30 mix of debt and equity supplemented with grant funding. [2]

To front the costs of mini-grid expansion in Nigeria, the Virtual Pilot makes use of the already established national regulatory and institutional framework for issuing sovereign green bonds. Like regular bonds, green bonds are financial instruments that deliver debt to projects, but in the case of green bonds, the proceeds are earmarked for projects with environmental benefits. Nigeria issued its first sovereign green bond of N10.69bn (USD 29.7m) in 2017.[3] Use of green bonds may trigger investments at a scale that would otherwise not occur given the high cost of commercial capital and the national limitations in the current financial sector.

The Virtual Pilot develops an innovative financing structure and foresees two different types of sovereign bonds that would be offered by the host country. These are green bonds with an embedded claim to mitigation outcomes (Type A) and regular green bonds (Type B). The Virtual Pilot applies 10-year bond issuance to align with NDC cycles, with the first issuance in 2021.

[1] Estimation by GIZ, as reported in Nigerian Economic Summit Group (2018) Mini-grid Investment Report. Scaling the Nigerian Market. Available at https://bit.ly/2wGE0kZ
[2] Nigerian Economic Summit Group (2018) Minigrid Investment Report. Scaling the Nigerian Market. Available at https://bit.ly/2wGE0kZ
[3] Nigeria is actively exploring and developing green bond opportunities to finance its climate ambitions. For example, in December 2018, the Securities and Exchange Commission (SEC) released Nigeria's Green Bond Issuance Rules to support the development of a non-sovereign bond market in the country.

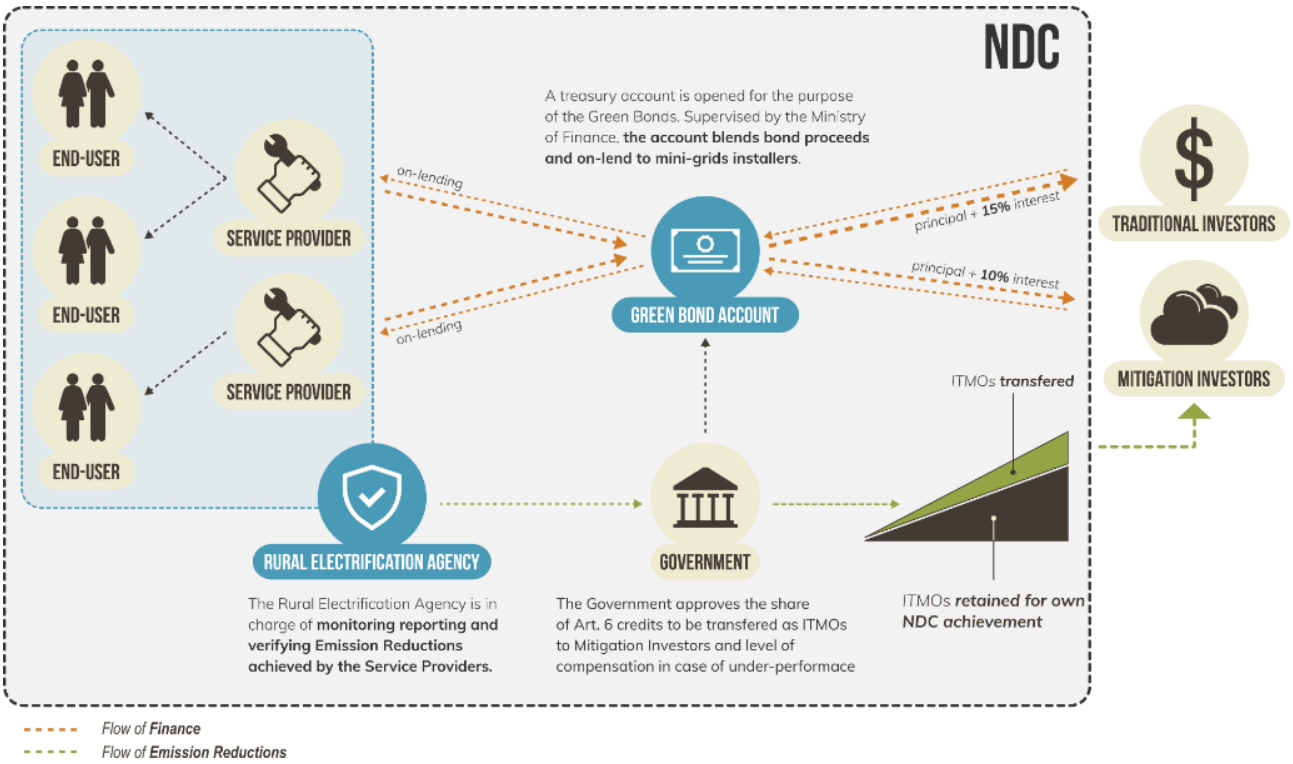

Figure 1. Overview of the Virtual Pilot

Alignment with the National Electrification Project

To further advance the operationalization of mini-grids, the Nigerian Rural Electrification Agency is currently implementing a 5-year National Electrification Project (NEP), co-financed by the World Bank with a USD 350 million loan.[4] The NEP targets private mini-grid developers of solar and solar-diesel hybrid technologies for electrification, and is set to serve at least 300,000 households. The NEP provides a minimum subsidy tender, targeting large multinational mini-grid developers to kick-start the market. In addition, the NEP provides performance-based grants on a rolling basis, targeting mini-grid developers with a defined site and a developed business plan. This Virtual Pilot is developed in parallel with the NEP, building on the capacities developed as part of this project.

The mini-grids supported by the NEP subsidy tender have to be installed on one of 250 eligible sites. These eligible sites are selected on the basis that the main electrical grid will not reach these sites anytime soon, and stand-alone solar does not provide cost-effective alternatives to meet the energy needs. Five standardized mini-grid configurations are eligible for subsidy support, and mini-grids financed through performance-based grants have to meet a number of eligibility criteria, such as using certified equipment. Under both financing streams, mini-grids may use conventional sources of energy provided that more than half of the installed capacities is supplied by renewable energy.

[4] Please find all details on the World Bank Nigeria Electrification Project in the Project Appraisal Document at https://bit.ly/2yrltdh

1.2 Generating internationally transferrable emission reductions

The Virtual Pilot is designed to enable the host country to generate internationally transferable emission reductions. Strong domestic MRV capacities are required to ensure the quality of these emission reductions. Moreover, the Virtual Pilot develops a specific baseline for mini-grid implementation so that only additional emission reductions will be credited, which may only be transferred internationally if the host country is on track to achieve a pre-established mini-grid implementation target.

Article 6 route

To engage in Article 6, host countries are likely to need an extensive build-up of domestic capacities. To avoid delay of Article 6 cooperation due to this requirement the Virtual Pilot suggests starting off using Art. 6.4. The international Art. 6.4 infrastructure can provide a certain level of environmental integrity when domestic capacities are still in development but has the disadvantage of potentially high transactional costs. Building national MRV capacity in the meantime can help cooperating countries make the transition to Art. 6.2. The Virtual Pilot suggests borrowing the approach used by the World Bank's Carbon Initiative for Development (Ci-Dev) Standardized Crediting Framework (SCF). A streamlined MRV framework for energy access gives an active role to domestic bodies regarding the methodological work underpinning the Virtual Pilot, thereby allowing for host country ownership and the increase of domestic capacities.

An additional consideration to start cooperation through Art. 6.4 is that its use may be more suitable for a transaction coupled with the use of bonds. Art. 6.4 may ensure that bond investors have access to unit types that are internationally recognized and endorsed, and which are tracked by an International Transaction Log. By using the Article 6.4 infrastructure, it will be easier to guarantee the quality of the units and to link and trace individual units connected to the bond.

Environmental integrity aspects

The Virtual Pilot is designed to safeguard the environmental integrity of mitigation outcomes in accordance with the emerging international guidance from the Paris Rulebook. The Virtual Pilot also aims to enable the host country to exceed its NDC target and to safeguard the country from over-selling its mitigation outcomes. Defining a conservative baseline and ensuring additionality of mitigation outcomes are central to achieving this.

The Virtual Pilot applies a mini-grid implementation benchmark to ensure the additionality of mitigation outcomes and to keep track of sectoral progress in achieving its NDC target. As the Nigerian NDC comprises of only an economy-wide emission reduction target, this Virtual Pilot applies an extrapolation of the economy-wide NDC target to the renewable energy sector.[5] The Sustainable Energy for All (SE4ALL) Action Agenda projects that by 2030 a total mini-grid capacity of 5.3 GW is to be realised. While the plan does not distinguish between unconditional and conditional targets, an assumption can be made that the 5.3 GW represents the total mini-grid market potential. From this, an unconditional target of 2.4 GW by 2030 can be projected, calculated by multiplying the 5.3 GW by the unconditional versus conditional targets ration specified in the NDC (20%/45%). The below table indicates the inferred unconditional and conditional benchmarks used to determine the additional effort that is to be financed under the Virtual Pilot.[6]

[5] With the overall NDC target as the only tangible point of reference for calculations, a precise extrapolation requires a clear understanding of the intended impact of these activities on the overall mitigation pledge. However, given the limited scope of this analysis and information publicly available, for the purposes of this study, this extrapolation is built on high-level information provided in the host country's NDC and other policy documents such as the Nigeria Sustainable Energy for All Action Agenda.

[6] The SE4ALL Action Plan covers the period 2014 to 2030. For simplicity, the above table reports for the year 2021 the cumulative of the forecasted 2014 – 2020 implementation. It should be noted that as of today, only 364 MW of mini-grid capacity has been realised in Nigeria, significantly below the projections featured in the Action Plan.

Table 1. Projects of mini-grid systems in MW as per the SE4ALL and inferred implementation benchmark

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
SE4ALL TARGET (MW)	348	405	608	911	1,367	2050	3,075	3,691	4,429	5,314	**5.3 GW**
UNCONDITIONAL (20%)	155	180	270	405	608	911	1,367	1,640	1,968	2,362	**2.4 GW**
CONDITIONAL (45%)	193	225	338	506	759	1,139	1,708	2,051	2,461	2,952	**2.9 GW**

As the negotiations on Article 6 in the Paris Rulebook is still ongoing, the Virtual Pilot considers two potential ways of securing additionality. First, additionality may be reinforced as mitigation results that go beyond what would be achieved through the unconditional mitigation pledges of the host country.[7] Alternatively, a more conservative approach would define additionality as emission reductions that are below business-as-usual (BAU) emissions. The latter approach would allow for the use of existing UNFCCC guidance developed under the CDM, in particular, AMS-I.L "Electrification of rural communities using renewable energy."

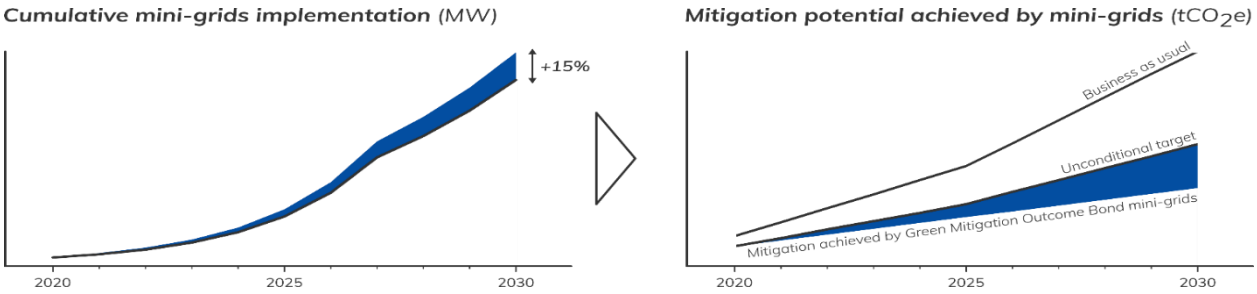

Figure 2: Extrapolation of the NDC target for the energy sector. The study assumes an additional effort to roll-out mini-grids of 15% beyond the county's unconditional effort.

1.3 Green bonds and Article 6

The Virtual Pilot is designed to tap into new financing sources to incentivize mini-grid implementation by using green bonds. Green bond proceeds are channelled to mini-grid investments that require a level of concessional finance to become bankable in the current market context. Moreover, a share of payments could be earmarked for upfront funding necessary to cover technical assistance activities.

The Virtual Pilot envisions the issuance of two types of sovereign bonds. The first is a Special Purpose Green Bond (Type A) that offers investors a claim of a certain volume of mitigation outcomes generated by the financed mini-grids. The possibility for bondholders to claim mitigation outcomes generated through the proceeds of a Special Purpose Green Bond is an innovation in environmental finance. In case there is insufficient demand for this security, the remainder of the intended funding would be raised through a regular green bond (Type B), which nature is similar to the sovereign green bond that has been issued by Nigeria to date. Special purpose Type A bonds and regular Type B bonds have different coupon rates (see Box 1).

The spread between the two coupon rates is difficult to estimate upfront as pricing is a function of demand of the product upon issuance. Regardless, leading factors impacting the pricing are the host country's credit rating and credit outlook.

[7] For this logic to hold, the host country's emission reduction target needs to be below the business-as-usual scenario. See in this respect Randall Spalding-Fecher et al. Environmental integrity and additionality in the new context of the Paris Agreement crediting mechanisms. Carbon Limits, 2017; and World Bank, Establishing Scaled-Up Crediting Program baselines under the Paris Agreement: Issues and Options. PMR, Technical Note 15 2017.

Box 1. Green bond types and pay-out models

For the Virtual Pilot, the following pricing conditions have been assumed for the two pay-out models:

- *Special purpose bond (Type A):* coupon rate of 10%, paid annually, with two claims on mitigation outcomes. In the event that all investors would opt for this bond, the government would owe USD 46 million in coupon payments each year (given the bond principal of USD 460 million and a 10-year maturity).
- *Regular green bond (Type B):* coupon rate of 15%, paid annually without any claim on generated mitigation outcomes. In the event that all investors would opt for a regular pay-out model, the government would owe USD 69 million in coupon payments each year.

By offering the claim on mitigation outcomes, the proposed bond reduced the costs of finance by the host country by USD 230 million over the 10-year duration of the bond. Given the mitigation potential of the underlying portfolio of 3.35 million tonnes of CO_2e, the proposed transaction values each mitigation outcome at a price of USD 64 per tonne. If only the green bond proceeds share is assumed (i.e. 45%), this price increases to USD 142 per tonne.

The availability of mitigation outcomes linked to the Type A bond is conditional on the performance of the host country's pre-established mini-grid implementation benchmark. If the host country is on track to (over-)achieve its implementation level, mitigation outcomes become available for Type A bondholders. In return, investors accept a below-market rate coupon rate for the bond. The conditional feature of the Type A bond allows the host country government to retain flexibility concerning its NDC compliance strategy. The conditionality implies that the host country is not required to internationally transfer the mitigation outcomes generated through the Virtual Pilot if it is not on track to achieve its mini-grid implementation benchmark.

Recognizing the possibility that the host country may fail to deliver internationally transferrable mitigation outcomes; the transaction terms should be structured in a way that adequately compensates the partner country in the event of non- or under- delivery. As such, if the mini-grid implementation benchmark is not met, investors would be compensated through a market-based coupon rate.

Type A bondholders would exercise their claim to mitigation outcomes twice throughout the duration of the bond (in 2025 and 2030), whereby three scenarios may occur. In case Nigeria meets its mini-grid implementation target, investors receive a pro-rata share of the mitigation outcomes underlying their bond investment (see Figure 3 below). In case Nigeria does not meet its mini-grid implementation target, Type A bondholders do not receive mitigation outcomes. Their lower coupon rate is compensated through a bullet payment, and the Type A bondholders will receive the same coupon rate as Type B bondholders. Finally, it may be the case that Nigeria partially meets its mini-grid implementation target. In this scenario, Nigeria will retain the share of the mitigation outcomes it needs to meet its mini-grid benchmark. Any remaining volume will be transferred to Type A bondholders, who will be partially compensated for the loss.

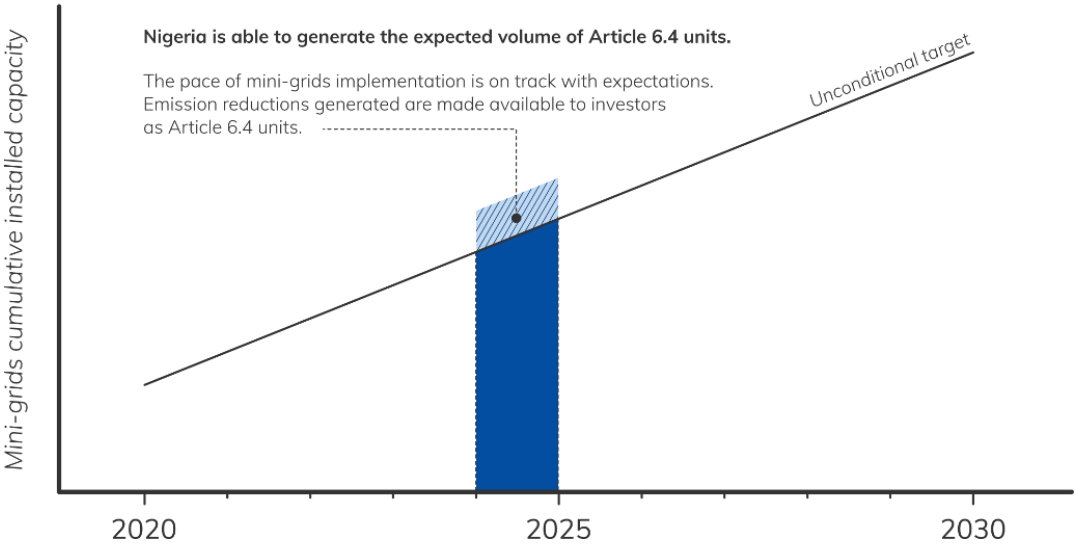

Figure 3. Availability of mitigation outcomes to Type A bondholders

The Virtual Pilot Green Bond would be issued in accordance with Nigeria's Green Bond Guidelines from 2017. Moreover, to ensure alignment between the Virtual Pilot and the NEP, minimum co-finance requirements are included to enable commercial finance to be crowded-in. The NEP estimates a total CAPEX of USD 330 million, where 55% is to be brought in by qualified mini-grid developers (through a mix of debt and equity investments).[8] As such, it may be expected that Special Purpose Green Bond proceeds could be used to help cover up to 45% of the CAPEX, with the remaining finance needs being leveraged by mini-grid developers through commercial loans (35%) and equity contributions (20%).

The Virtual Pilot foresees that the green bond proceeds are credited to a Green Bond Proceeds Account. Any funds generated would be directly on-lent in the form of concessional loans to project developers. Sub-accounts managed by the Nigerian Debt Management Office are opened for each mini-grid investment to support the transparency and traceability of funds.

1.4 The legal framework

The Virtual Pilot is placed within the existing climate change governance infrastructure in Nigeria, expanding and enhancing capacities of the different actors. It builds upon the capacities developed by the NEP and suggests the application of the Standardized Crediting Framework to allow Nigeria to manage its mini-grid implementation and the authorization of the transfer of emission reductions. Building on existing implementation structures or programmes may strengthen secure buy-in and readiness for implementation.

The structure of the Virtual Pilot requires a number of legal arrangements to be set up, including domestic eligibility criteria for mini-grid developers. These eligibility criteria are suggested to be designed in alignment with the NEP and the Nigeria Green Bond Framework rules on use of proceeds. However, the Virtual Pilot departs from the NEP criteria by limiting eligibility to mini-grids that are 100% solar.

The bond agreement may include a number of legal provisions to manage the uncertainty connected to the availability of mitigation outcomes generated through the Virtual Pilot. These terms and conditions may include:

[8] See World Bank Nigeria Electrification Project, Project Appraisal Document at https://bit.ly/2yrltdh

- conditions for delivery: transparency and reporting provisions to inform bondholders on the host country's progress in achieving its mini-grid implementation benchmark, and thereby on the availability of ITMOs;
- convertible bond structure: in case the host-country does not (over-)achieve its benchmark, the Type A bonds may be (partially) converted into regular Type B bonds, providing a safeguard for bondholders that may be set out in the bond agreement;
- timing and volume of delivery: parties could establish a maximum volume being transferred for each pre-defined delivery date. Building in milestones in these conditional transfers helps build confidence for buyers while protecting the host country from the non-achievement risk.

Legal ownership of mitigation outcomes

With different players involved at different levels in the generation, authorization and transfer of emission reductions, a transparent domestic legal arrangement is required to sort out contracting and the chain of transfer of legal title over emission reductions, and avoid conflicting claims over mitigation outcomes.

The Virtual Pilot appoints a central legal entity as programme manager, tasked to select mini-grid developers, manage the inclusion of component project activities, and liaising with stakeholders on technical matters. Primary ownership over the emission reductions generated through the Virtual Pilot lies with the mini-grid project developers, but access to concessional finance is conditional upon transferring these rights to the programme manager. Streamlining the process of negotiating with mini-grid developers as well as having one entity to market and transfer emission reductions to interested buyers may reduce the overall transaction costs of the programme, and simplifies potential scale-up of the intervention. As a next step, the programme manager could assign the rights to the emission reductions to the host country to ensure the host country has the appropriate title to effect pay-outs in the form of Art. 6.4 units to the Type A bondholders.

In case there is a buyer that does not wish to subscribe to the green bond but is interested in buying mitigation outcomes, a bilateral Mitigation Outcome Purchase Agreement (MOPA) may be entered into between the host country and the buyer. Like the green bond terms and conditions, the MOPA can deal with various scenarios where the host underdelivers on a target (whether that is NDC or sectoral) and when ITMO transfers are triggered, as well as defining when adjustments are to be made

1.5 Lessons learned

Most host countries will require extensive domestic capacities before being able to engage in Article 6. Only after fully understanding the level of effort and types of mitigation interventions needed to achieve their pledges is that host countries will feel comfortable in engaging with Article 6 and authorizing the international transfer of mitigation outcomes.

To further reduce the risk of over-selling ITMOs, international transfers can be made conditional on the host country being on track to (over-)achieve a pre-agreed sectoral effort or GHG emissions trajectory. This pre-agreed sectoral effort needs to be consistent with the wider NDC pledge and conservatively established. Those emission reductions produced beyond the NDC pledge (i.e. crediting baseline) could be transferred internationally. This conditionality helps to define those emission reductions that can be safely converted into ITMOs and ensures the host country is not contractually forced to sell GHG reductions it will eventually need to meet its own international commitment. It also reinforces the additionality of ITMOs sold since these are produced over and above sectoral mitigation actions the host country planned to achieved unilaterally.

For this to work, however, the host country and buyers need clarity that the NDC pledge and its apportioning into sectoral efforts are consistent and ambitious enough. Translating NDC targets into

sectoral or sub-sectoral targets can be challenging. Often, sector and sub-sector specific targets are not clearly expressed in the NDC, leaving the overall unconditional pledge as the only tangible point of reference for calculations. Using the overall NDC target to extrapolate the implementation rate of mitigation activities (in this case, for mini-grid systems) requires a clear understanding of the intended impact of these activities in the overall mitigation pledge of the country. As such, a preliminary step in any transaction between a buying and a selling country would entail the strengthening of the host country NDC, allowing more insights on the sectoral allocation of mitigation efforts.

Nigeria has developed a comprehensive set of policy interventions to achieve its NDC, but further clarity on the expected annual GHG trajectory for key sectors and the specification of their mitigation potential can be useful in the context of Article 6 cooperation. For this Virtual Pilot, a high-level extrapolation exercise of the NDC target into sub-sector specific benchmarks served to define the amount of ITMOs available over the years. Given the limited scope of this exercise and available information, this extrapolation was built on a number of more general assumptions regarding the conditionality and total potential for the mini-grid implementation in Nigeria.

Importantly, the environmental integrity of this approach lies in the premise that the NDC target is below BAU. If this is not the case, a conservative BAU scenario must be developed and used as the basis for the generation of ITMOs. A conservative and forward-looking sectoral crediting baseline (set below BAU) will also help secure that mitigation outcomes represent a real and additional effort. Moreover, ongoing MRV capacity building needs to be expanded. Application of the SCF concept is, in this context, suggested as a tool for promoting in-country capacity while increasing domestic ownership of sectoral crediting interventions. Host countries will also need substantial capacity to meet their international reporting obligations and participation responsibilities under Article 6 and to effect corresponding adjustments properly.

Transactions need to be designed as so to mitigate the risk of both over- and under-delivery of ITMOs. The former would negatively impact the host country NDC achievement, whereas the latter would frustrate partner country and/or buyer's expectations. A balance, therefore, needs to be achieved so that the transaction becomes interesting for the selling country, but can still attract carbon market finance. Realizing this balance requires strengthening capacities of the host country on various levels, enabling the host country to keep track of its mitigation results and NDC achievement properly. To cover necessary technical infrastructure for MRVing GHG emissions and tracking ITMOs, buyers may consider earmarking a share of upfront funding as part of their long-term bilateral cooperation strategy.

For ambitious countries, there will always be some risk that the NDC (or the relevant programme implementation benchmarks) are not achieved. In this Virtual Pilot, the bond terms and conditions and the Mitigation Outcome Purchase Agreement (MOPA) entered into by the contracting parties should cater to all relevant scenarios. On the one hand, only allowing ITMOs beyond a specific sectoral benchmark minimizes the risk for the host country. On the other, by introducing an investor's compensation mechanism that is triggered in the event of under-delivery, the partner country/investors can be partially compensated for committing funding to an activity that in the end does not deliver the planned volume of ITMOs.