A blueprint for carbon credit generation through E-Mobility solutions in rural Western Kenya

Key messages

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Introduction

In the context of the Partnering for Green Growth and the Global Goals 2030 (P4G) programme "*Accelerating E-Mobility Solutions for Social Change in rural Western Kenya*", Perspectives Climate Group provides a comprehensive overview of the opportunities and barriers that carbon credit generation presents for the business of e-mobility start-ups. The report focuses on the start-up partners that formed part of an incubation programme for electric mobility (e-mobility) solutions in rural Western Kenya along the shores of Lake Victoria launched by Siemens Stiftung (Foundation) together with its non-for-profit enterprise WE! Hub Victoria Ltd (WeTu).

The viability of scaling up mitigation action can be boosted by additional finance leveraged by carbon markets through the sale of carbon credits. One carbon credit represents one metric tonne of carbon dioxide equivalent (tCO_2e) issued by a crediting standard for a greenhouse gas (GHG) mitigation outcome (emission reduction or removal) that meets relevant criteria. Standards aim to ensure environmental integrity by ensuring that carbon credits represent real, additional, verified and permanent emission reductions, quantified against a valid baseline. Additionality refers to the demonstration that the emission reductions would not happen in the baseline scenario, for example by showing that the emission reductions go beyond national targets and policies and identifying more financially attractive but higher-emitting alternatives to the credited activity. One option to demonstrate the additionality of the credited activity is to show that the activity's market penetration rate is below a pre-determined threshold (typically 5% under current standards). It is worth noting that additionality is a moving target: over time, costs may fall, national targets and policies are enhanced and market penetration increases, and activities that are currently additional to national efforts are incorporated into enhanced national efforts. Carbon market cooperation can help to pave way for the gradual enhancement of national efforts by leveraging support for the piloting and scale up of additional activities.

Under Article 6 of the Paris Agreement (PA), countries engaging in international market-based cooperation are required to ensure environmental integrity and robust accounting (including avoiding double-counting of internationally transferred mitigation outcomes (ITMOs)), and promote sustainable development. Existing or new standards could be applied for ensuring environmental integrity. Double-counting can be avoided by countries through robust national inventories, accounting and reporting under the PA, including the application of corresponding adjustments (CA) to their emission balance to reflect international transfers of mitigation outcomes.

Carbon market segments

The current carbon market landscape is characterised by fragmentation and uncertainty, due to the existence of multiple crediting standards, demand sources and uses for carbon credits, and the lack of detailed rules to operationalise international carbon market cooperation under the PA. The post-2020 market for carbon credits comprises three key market segments: the voluntary carbon market (VCM), which has served as a marketplace for carbon credits already for decades, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which starts in 2021, and international carbon market cooperation under the PA, which is expected to be operational in 2023 at the earliest, subject

to adoption of PA's carbon market rules at the 26th UN climate conference (COP26) in Glasgow in November 2021.

The three market segments differ from each other in terms of scope, requirements, prices, demand drivers and market participants, and crediting standards have differences in scope and requirements. However, there are also important similarities across the market segments and crediting standards. In fact, the same crediting standard can serve multiple market segments, and a mitigation activity can supply carbon credits to multiple market segments and be eligible for registration under multiple standards. Furthermore, the methodologies developed under one standard may be eligible under other standards. For example, many methodologies developed under the Kyoto Protocol's Clean Development Mechanism (CDM) are eligible also under the two main VCM standards, namely the Gold Standard (GS) and Verified Carbon Standard (VCS). These three standards serve both the VCM and the CORSIA's pilot phase, and serve as a basis also for standards under PA's market cooperation.

The CDM is likely to seize operating by 2023, and new crediting activities cannot be registered or credited under CDM. The draft negotiation text on the rules for carbon markets under the PA include a process for transitioning existing CDM credits, activities and methodologies to the new Article 6.4 Mechanism (A6.4M) under the PA by 2023, as well as rules and procedures for the A6.4M, which could be operational in 2023. The PA's carbon market rules will also include guidance to governments on avoiding double-counting of internationally transferred mitigation outcomes, which will need to be applied to internationally transferred carbon credits used for compliance under the PA and CORSIA, and likely also to carbon credits associated with certain voluntary uses (voluntary compensation of emissions) under the VCM.

It is important to note that carbon credits are issued only for emission reductions that occur during the activity's crediting period, which may be shorter than the activity's lifetime. Gold Standard reviews the activity's eligibility to generate carbon credits every five years. Under VCS, the crediting period is either seven years, which can be renewed twice, or ten years without a renewal option (except for activities in agriculture, forestry and land use which may have longer crediting periods). Under the PA, including A6.4M, host countries have the power, and may also have an interest, to limit the crediting period in order to control the volume of emission reductions that are transferred outside the country.

Currently, the VCM is the only mature market segment, with strong growth expected. The pilot phase of CORSIA (2021-2023) focuses on pre-2021 vintages, and is thus not a source of demand for new crediting activities. CORSIA demand will shift to post-2020 vintages of carbon credits with CAs from 2024 onwards. Demand for carbon credits for compliance use under the PA is expected to take off after 2023, although some bilateral piloting already exist, providing a limited but interesting source of governmental demand for innovative activities such as e-mobility.

Carbon credit pricing

There is no uniform market price for carbon credits. Instead, the price of a carbon credit reflects its attributes, such as the activity type, host country, activity start date, carbon credit vintage (the year in

which the mitigation outcome is generated), transaction volume and co-benefits, as well as the crediting standard applied and eligibility for use for different purposes. Higher prices are generally paid for carbon credits associated with high environmental integrity, proven sustainable development co-benefits and/or “charismatic” activity types that are perceived attractive due to e.g., their community benefits, innovation or compatibility with a net zero emission future.

In the future, higher prices are also very likely to be paid for carbon credits associated with a CA by the host country, which are considered best practice for voluntary compensation use and carbon neutrality claims, are likely to enjoy a higher price and demand than carbon credits that are not associated with a CA. However, countries are unlikely to have institutional readiness to implement CAs until after 2023 (see Figure 1). Meanwhile, however, pioneering host countries may issue Letters of Intent (LoI) for specific activities, indicating their intention to implement CAs for that activity, once possible. Although LoIs do not represent a firm host country commitment to making CAs, carbon credits with LoIs are likely to fetch a price premium and have a broader demand base.

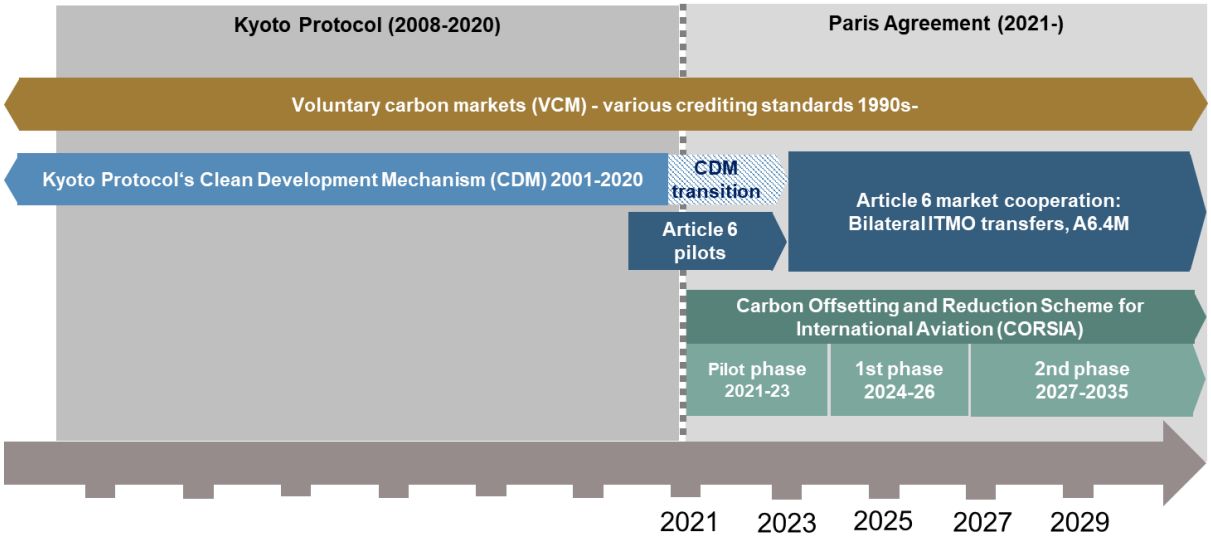

Figure 1. Overview of carbon market segments (Source: Authors)

In 2019, average unit prices for carbon credits in the VCM ranged from 1.40 USD for renewable energy generation activities to 4.30 USD for forestry and land use activities. The average unit price for carbon credits issued under VCS and GS was 1.62 USD and 5.27 USD respectively. Based on the authors’ expert judgement, the average unit price for carbon credits without CAs is expected to remain within the current range, at around 1.50-5.00 EUR until 2025, and fall over time as the supply for carbon credits with CAs increases. The average unit price for carbon credits with CAs is expected to be higher, around 5-10 EUR by 2025, and 10-20 EUR by 2030. ITMOs eligible for compliance under the PA are estimated to fetch an average unit price of 10-20 EUR by 2025 and 20-30 EUR by 2030. CORSIA prices are estimated to be somewhere between VCM credits with CAs and PA-compliance credits.

However, as in the current VCM market, the price range is expected to be broad, with prices of up to 50 EUR paid for carbon credits associated with particularly desirable attributes, and potentially even higher prices for carbon credits from high-cost carbon removal technologies. This upper bound is close to the PA-compatible carbon price of 50-100 USD/t.

Conclusions

Overall, a carbon crediting project or programme aimed at scaling up the e-mobility solutions promoted by Siemens Stiftung and the start-up partners (such new and retrofitted buses, e-motorcycles, e-bikes) seems to have good potential to be additional and be successfully registered under the VCM (VCS or GS) and potentially also under the PA's A6.4M. Registration under the CDM is unlikely to be possible for post-2020 activities but relevant CDM methodologies are eligible also under VCM crediting standards, such as the VCS and GS, and are thus considered in this report. The project or programme could serve all the three market segments.

Applying trusted standards and environmental and social safeguards to carbon crediting maximises the potential demand for, and price of, carbon credits. To increase the likelihood of the activities' carbon credits being eligible under all key market segments, we recommend applying best practice methodological approaches. This means applying CDM (and/or VCS) methodologies to the activity, even though we do not foresee CDM registration as a viable option. CDM methodologies are eligible under VCS and GS, and many bilateral ITMO transfers as well as the A6.4M are likely to build on CDM methodologies. A key change in the application of CDM methodologies in the PA context compared with the pre-2021 CDM era is taking into account the host country's national efforts and targets under the PA in baseline setting and additionality demonstration.

We recommend to consider structuring the potential crediting activity aiming to scale up e-mobility solutions as a Programme of Activities (PoA). The PoA structure has been developed for activities that aim to gradually replicate a large number of activities that are typically small in scale and spread across space and time, and may be implemented by multiple actors. The PoA structure constitutes of an "umbrella" PoA to coordinate the overall programme, which is registered upfront, as well as component project activities (CPAs) for groups of similar activities, which can be included to the PoA over time as the programme expands, potentially even to multiple countries. The PoA can be registered without the need to define the scale-up in detail ex ante and the CPA inclusion process is lighter than registering groups of activities as a stand-alone project. The PoA structure may promote effective implementation and reduce transaction costs per carbon credit through coordination, flexibility, streamlining and economies of scale. However, the PoA's extra layer of coordinate may also increase transaction costs and complexity compared with a stand-alone project. To reap the benefits of the PoA structure, the scope of the programme needs to strike a balance between sufficiently wide coverage to enable meaningful scale while avoiding unnecessary complexity. In the feasibility study, factors affecting the viability of carbon crediting and the appropriateness of the PoA structure (e.g., scale, price, crediting period) will be explored in more detail.

We further recommend the project partners to start engaging with the Kenyan government on potential carbon market cooperation. In the post-2020 era, host country governments have a key role in authorising activities and international transfers of carbon credits, and implementing CAs which are likely to be associated with a higher price and broader demand base. Such engagement will be essential for the development of a realistic approach to the monetisation of carbon credits. Ideally, Kenya would be willing to transfer internationally mitigation outcomes from activities that are clearly additional and have high abatement costs and would thus be unlikely to be implemented by domestic resources alone, at least at the scale and pace achieved with the support of carbon credit revenues. This said, Kenya may wish to retain a share of the resulting mitigation outcomes for use towards its NDC and/or contribute some domestic resources to the mitigation activity, either from the start of the activity or after an initial period of scaling. This is a matter of negotiation between the activity developer and the Kenyan government, and potentially also the carbon credit buyer.

We highlight the following challenges in realising the carbon crediting potential of e-mobility solutions in rural Kenya which the Siemens Stiftung and the start-up partners need to take into account:

- The current uncertainty regarding the development of existing and emerging carbon market segments undermines the realisation of the carbon crediting potential. A key source of uncertainty is the lack of PA's rules for carbon market cooperation, including for the A6.4M, CDM transition and avoidance of double-counting. The latter is relevant also for the VCM and CORSIA. The rules are expected to be adopted at the end of 2021. The VCM's development will depend on how private sector actors implement their voluntary climate targets as well as how governments implement their NDCs.
- Another key challenge is to keep transaction costs of the programme and individual activities manageable so that they do not become a barrier to upscaling.
- Data availability, and the cost and effort associated with monitoring, reporting and verification (MRV) are also key challenges for the assessment of the crediting potential.

Based on our assessment of the emission reduction potential as well as of the opportunities and barriers to realise and monetise this carbon crediting potential, we conclude that e-mobility is a promising future activity type in Kenya in the context of the PA.

As next steps, key attributes, such as additionality and sustainable development co-benefits, that influence the carbon crediting potential of e-mobility solutions in rural Kenya, will be explored in more detail in the feasibility study.

A viable business model is crucial for realising the carbon crediting potential and, vice versa, realising the carbon crediting potential is crucial for the viability of a business model (of an additional activity, by definition). Therefore, carbon crediting projects or programmes need to be developed in close collaboration with, and carbon crediting considerations – including the amount and timing of emission reduc-

tions and carbon credit payments – need to be incorporated into a detailed business model and implementation plan, which should specify the scale and pace of implementation and an upscaling strategy for the activity and how carbon crediting enhances the business model.

This report's estimates of the emission reduction potential are based on preliminary data and assumptions. More accurate data are needed to validate and/or enhance the accuracy of the emission reduction estimates, for example, on the vehicles introduced per year, the fuel economy of both the baseline technologies and project technologies, the emission factors of the fossil fuels used in the country and the estimated travelled distance per type of vehicle, especially for e-bikes. In addition, there is a need for data on how technology providers plan to recharge their batteries (grid vs. renewables) and the current penetration rate for each type of vehicle.

In conclusion, the proposed e-vehicle technologies seem to have a good potential to be additional and be successfully registered under the VCS or the GS and potentially also under A6.4M. It is highly likely that there will be demand for "high-hanging fruit" such as e-mobility activities in rural areas. However, the level and pace of increase of demand and prices for carbon credits is uncertain.

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