KONRAD ADENAUER STIFTUNG

Carbon Pricing in Sub-Saharan Africa

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ACRONYMS

AFOLU	Agriculture, Forestry and Other Land Use
BAU	business as usual, meaning the baseline case representing the level of GHG emissions that would result if future development trends follow those of the past and no changes in policies to reduce emissions takes place
CAFI	Central African Forest Initiative
CCBs	Climate Community and Biodiversity Standards
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CO_2e	carbon dioxide equivalent (tCO_2e = tonnes of carbon dioxide equivalent)
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DRC	Democratic Republic of the Congo
EAA	East African Alliance on Carbon Markets and Climate Finance
ECOWAS	West African Economic Area
ERPA	emission reduction purchase agreement
ETS	emissions trading scheme
FCPF	Forest Carbon Partnership Facility
GCF	Green Climate Fund
GHG	greenhouse gas
HFLD	high forest, low deforestation
IMF	International Monetary Fund
ktoe	kilotonnes of oil equivalent
ITMO	internationally transferred mitigation outcome
LULUCF	land use, land use change and forestry
NDC	Nationally Determined Contribution
Paris Agreement	United Nations Framework Convention on Climate Change, Decision 1/CP.21 (Adoption of the Paris Agreement) and Annex (Paris Agreement)
RBCF	results-based climate finance
REDD+	reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks
SDM	Sustainable Development Mechanism
UNFCCC	United Framework Convention on Climate Change
VCS	Verified Carbon Standard, formerly Voluntary Carbon Standard (also known as VERRA)
WAA	West African Alliance on Carbon Markets and Climate Finance

EXECUTIVE SUMMARY

Increasing global interest in national carbon pricing measures, and financial and political imperatives to introduce them, is driving active discussion in Africa on regional and country-appropriate approaches. A paucity of scholarship that is informed by a nuanced appreciation of the region's specific carbon pricing context and dynamics means that the rapidly evolving African conversation is, generally speaking, unsupported by relevant analysis. In recognition of this deficiency, this study, commissioned by the Konrad Adenauer Stiftung (KAS) and conducted by a South African and Kenyan team of carbon legal and technical specialists, is a timeous and important contribution to the African carbon pricing debate.

Among the issues addressed by this study is whether the sub-Saharan African discussion on forms of carbon pricing needs to be more expansive than is usually found in the existing literature, to take account of local needs and challenges. A particular finding is that current research trends are primarily (but not exclusively) centred on developed countries and, while existing analysis is a useful point of departure for sub-Saharan African deliberations, such research may be insufficiently nuanced for a proper understanding of carbon pricing mechanisms that are appropriate for (developing and least developed) African economies and contexts.

Carbon pricing has several benefits, including its ability to offer positive gains to an economy through the generation of revenues that can be used to pursue economic and development objectives. Processes to identify carbon value in developed countries have often placed reliance on industrial-scale greenhouse gas (GHG) emissions, carbon taxation and emissions trading schemes (ETSs) as the major sources of value. Due to long-accrued knowledge of their means of implementation and relative effectiveness, carbon taxation and ETSs have come to be regarded as the default or traditional carbon pricing mechanisms, appropriate to most situations. Taxation and ETSs, termed the "traditional carbon pricing mechanisms" in this study, impose a cost on carbon, for example, by pricing GHG emissions. A notable consequence of this traditional position is the view (regularly expressed in some of the existing literature) that these mechanisms are relevant for, and directly transplantable into, developing and least-developed economies, including those in sub-Saharan Africa. This study postulates that, while this view certainly has merit, it is unwise to accept its general applicability. This is especially true for economies without the industrial-scale GHG emissions for which the traditional carbon pricing mechanisms are the accepted means of imposing a cost on carbon. This does not imply that the traditional carbon pricing mechanisms are inappropriate to the sub-Saharan African context. Rather, the proposition is that carbon pricing mechanisms in developing and least-developed economies may need to identify

sources of potential carbon value other than industrial emissions and to impose a cost on such sources, while recognising that defaulting to the traditional carbon pricing mechanisms may be impractical and impossible, in the light of the country context. For example, where forestry sequestration represents a source of potential carbon value, neither carbon taxation nor an ETS would be the most appropriate instrument to impose a cost thereon. This does not mean, however, that costing the potential carbon value of forestry sequestration is impossible or impractical. On the contrary, carbon sink potentials are regularly quantified in terms of tonnes of carbon dioxide equivalent (tCO_2e), making it quite feasible to impose a cost on a forestry sequestration potential indexed to a notional carbon price per tCO_2e. Article 3.3 of the Kyoto Protocol to the UNFCCC (United Framework Convention on Climate Change) formally recognised the mitigation potential of forestry sequestration by including "forestry activities" in the list of carbon sinks that remove GHG emissions from the atmosphere, and by permitting the use of such removals to achieve developed country party mitigation commitments. In addition, while the traditional carbon pricing mechanisms may well be appropriate in some sub-Saharan African jurisdictions, this study questions whether these countries would be able to bear the resultant economic costs of their introduction, or have the necessary institutions and capacity for efficient implementation and enforcement.

In any event, sub-Saharan African implementation of any form of carbon pricing will require considerable support, particularly in designing systems that avoid any regressive impacts on vulnerable groups. Most importantly, the design would need to consider in-country GHG emission profiles and acknowledge that, if a country has a low fossil-fuel base, a carbon tax or ETS may be less useful than other forms of carbon pricing, such as sequestration, results-based climate finance (RBCF) and the potential reform of fossil fuel subsidies.

Moves to implement a carbon tax or ETS in sub-Saharan Africa also appear to be still embryonic, although interest has been growing in recent years. The initial nationally determined contributions (NDCs) for most of the countries included in the study did not express an intention to adopt the traditional carbon pricing mechanisms, but did indicate interest in participating in the international carbon market and, in many instances, to focus carbon-related efforts on REDD+ activities (reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks). At present, the priority of many sub-Saharan African countries remains on how such countries can benefit from forms of carbon pricing outside the traditional carbon pricing mechanisms, for example, any successor to the Clean Development Mechanism (CDM) and other project-based mitigation activities, such as those supported by RBCF. This highlights the potential for RBCF and the role of

non-traditional carbon pricing and demonstrates that, while there may not have been a widespread appetite for the traditional carbon pricing mechanisms when the NDCs were being devised, there was certainly a recognition of the value of carbon pricing, especially linked to sequestration activities such as REDD+.

In more recent years, following the submission of the NDCs, the position has evolved to some degree, although it remains in its early stages. There is now a small but growing interest in the region, particularly in West Africa, in the possibility of introducing carbon taxation or ETS. For example, two new groups, the West African Alliance on Carbon Markets and Climate Finance (WAA) and the East African Alliance on Carbon Markets and Climate Finance (EAA), have both expressed an interest in regional carbon pricing initiatives, possibly including the traditional carbon pricing mechanisms. Similarly, discussions at the Africa Climate Week in March 2019, and statements by the Vulnerable 20 showed an appetite for carbon pricing and fossil-fuel-subsidy reform. South Africa has recently also taken the continental lead by imposing a domestic carbon price in the form of a complex legal taxation regime; and, Burkina Faso, *Côte d'Ivoire*, Rwanda, Senegal and Nigeria are considering, or are currently progressing, carbon pricing initiatives. These are varied and wide-ranging. They encompass both the traditional carbon pricing mechanisms and other more innovative and context-appropriate approaches, for example, RBCF and forestry-derived carbon value.

In this context, Part 1 of this study provides an overview of various forms of carbon pricing, including the theoretical benefits and the risks of implementation. Part 2 considers the extent of national interest in carbon pricing and measures taken across sub-Saharan Africa to date, to give expression to this interest, including the degree of uptake of carbon sequestration activities and other non-traditional forms of carbon pricing, such as vehicle taxes. The content of Part 2 is based on the more detailed findings, per sub-Saharan African country, contained in Annexure I. Included in Part 2 is an outline of the most recent thinking on the public acceptability of carbon pricing and related recommendations, and a review of how these have had particular relevance to the introduction and acceptability of the South African carbon tax. Next, to demonstrate the need to tailor carbon pricing mechanisms to local contexts, Part 3 of this study analyses the cases of seven sub-Saharan African countries with widely-differing GHG emissions and sequestration profiles. The comparative analysis shows that, while the traditional carbon pricing mechanisms might be suitable for some of the countries included in the study, such as Mauritius, carbon pricing that is focused on forestry and the agricultural sectors (including in the form of carbon-credit-generating project activities and REDD+), may be more suitable for others, such as Gabon, the Republic of the Congo, Senegal and Uganda.

Part 4 of the study presents its findings and recommendations. While this study's analysis is not intended to be definitive for each of the sub-Saharan African countries considered herein (as definitive analysis would need to take into account" each country's unique circumstances, sources of emissions, and mitigation profiles), it is intended to evoke further consideration and discussion of the appropriateness of carbon pricing mechanisms across sub-Saharan Africa. Its findings are designed to further deliberation on the potential for alternative carbon pricing instruments to offer more useful benefits and mitigation opportunities, and for these considerations to be included within the wider discussion on carbon pricing in the region.

PART 1 INTRODUCTION

Carbon pricing has achieved global prominence in recent years, and there is an increasing consensus among governments and industry on its fundamental role in the transition to a low-carbon economy. Prior to the Twenty-First Conference of the Parties (COP21) to the United Framework Convention on Climate Change (UNFCCC), held in Paris in November 2015, the call to "put a price on carbon" was repeated by the World Bank Group, business groups and investors as a mechanism to reduce greenhouse gas (GHG) emissions and encourage investment in low-carbon technology and development. Without action, in central case scenarios global average temperatures are projected to rise 4° C above pre-industrial levels during the 21st century (they are already 1° C higher), with increasing (but not well understood) risks of globally catastrophic scenarios.[1] While the Paris Agreement (UNFCCC, Decision 1/CP.21 and Annex) and related UNFCCC negotiations did not usher-in a global carbon price, it did provide renewed impetus to the discussion.[2]

To enhance the implementation of mitigation action under the UNFCCC, notwithstanding the abovementioned temperature-rise projections, the Paris Agreement aimed to achieve a long-term goal of holding the increase in global average temperature to well below 2° C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5° C above pre-industrial levels.[3] In line with this goal (but not necessarily as a result of the Paris Agreement), various countries, particularly those in the developed world, have introduced national and sub-national market incentives to decarbonise their economies.[4] Many countries now have energy efficiency and renewable policies[5] and over 50 national or sub-national governments have implemented carbon pricing in the form of carbon taxation or emissions trading schemes (ETSs). At present, however, the global average carbon price is approximately US$2/t$CO_2$e,[6] (carbon dioxide equivalent) with estimates suggesting that prices of around US$50–100/t$CO_2$e by 2030 would

1. Intergovernmental Panel on Climate Change "Global Warming of 1.5° C" (2018) (Switzerland).

2. UNFCCC Decision 1/CP.21 (Adoption of the Paris Agreement) and Annex (Paris Agreement). The Agreement entered into force on 4 November 2016. Article 6 provides mechanisms for party countries' voluntary cooperation, in implementing their nationally determined contributions, including potential for an international carbon market and (implied) impetus for domestic carbon pricing/taxation.

3. Article 2(1)(a) read with Article 4(1).

4. World Bank "State and Trends of Carbon Pricing 2019", Washington, DC. DOI: 10.1596/978-1-4648-1435-8. (2019).

5. International Energy Agency "Policies and Measures Databases, International Energy Agency" (2018). Paris, France.

6. International Monetary Fund. "Fiscal Policies for Paris Climate Strategies – From principle to practice" (May 2019) and World Bank (see n 4).

(in addition to other policies) be consistent with the Paris Agreement's long-term temperature goal.[7]

The African Climate Reality Project noted that a price on carbon "...helps shifting the burden for the damage back to those who are responsible for it, and who can reduce it. By making sure that the costs of carbon – costs that the public pays for in other ways, such as damage to crops and health care costs from heat waves and droughts or to property from flooding and sea level rise – are no longer ... unaccounted for by the emitters, the goal is to drive emissions down and foster investment in clean energies and low-carbon practices".[8] While most countries stand to be disadvantaged by climate change, there is, at present, no international agreement that requires countries to put a price on carbon, and the decision to do so remains a national imperative. It has been suggested that countries may have an incentive to act unilaterally to price carbon, if this generates substantial domestic environmental co-benefits, mobilises domestic revenues, puts peer pressure on others, and leverages external finance.[9] The decision to do so, particularly in developing and least-developed sub-Saharan African countries, should be seen through this lens, namely that there is no international obligation to introduce a carbon price, but there may be other important considerations, many of which are incentive-driven.

Different pricing mechanisms and models are variously applied worldwide. Carbon pricing includes so-called "explicit" forms of carbon pricing, and entails not only carbon taxation and ETSs (termed the "traditional carbon pricing" mechanisms in this report, for convenience), but also encompasses less traditional forms, such as results-based climate finance (RBCF) and project-based offsetting approaches.[10] "Implicit" carbon pricing includes policies or instruments that impose a compliance cost (an implicit price) on activities that result in GHG emissions. Examples of such forms of implicit pricing include the removal of fossil fuel subsidies, fossil fuel taxes, and regulatory standards, such as performance standards for cars and buildings. The issue of fossil fuel subsidies is of particular interest in sub-Saharan Africa,

7. Stern and Stiglitz "Report of the High-Level Commission on Carbon Pricing" (2017) Paper of the Carbon Pricing Leadership Coalition of the World Bank Group (Washington). and Nordhaus "The Social Cost of Carbon: Updated Estimates," (2017) Proceedings of the US National Academy of Science, Vol. 114, pp. 1518–1523. Nordhaus argues for US$55/$tCO_2e$ by 2030, in order to be consistent with the long-term temperature goal (all prices in US$2015).

8. African Climate Reality Project "Market Incentives to Decarbonise African Economies" (2017). Available at: https://climatereality.co.za/carbon-pricing/.

9. IMF, see n 6.

10. The World Bank notes that RBCF can have a carbon pricing component for mitigation projects, in that the amount of funding received per unit of GHG reduction target achieved incentivises further action (see n 4, page 1). See the discussion of RBCF in Part 2.

where these are relatively high in quantitative terms (although not necessarily when compared to global averages).[11]

Customarily, the traditional carbon pricing mechanisms have consumed the lion's share of the discussion on carbon pricing, and there is a tendency for these to be regarded as the default approaches in most, if not all, circumstances.[12] These mechanisms are not, however, always directly transplantable into developing and least-developed sub-Saharan African economies. This is especially true for economies that lack sources of carbon value (typically industrial-scale GHG emissions), for which taxation and ETSs are the accepted means of imposing a carbon price. This does not imply that the traditional carbon pricing mechanisms are always inappropriate to the sub-Saharan African context. Rather, the proposition is that carbon pricing mechanisms in developing and least-developed economies may need to identify sources of potential carbon value other than industrial emissions and impose a cost on such sources, while recognising that defaulting to the traditional carbon pricing mechanisms may be impractical and impossible in the country context.

For example, where forestry sequestration represents a source of potential carbon value, neither carbon taxation nor an ETS would be appropriate for imposing a cost thereon. Importantly, it is quite possible to cost the potential carbon value of forestry sequestration by means other than carbon taxation and an ETS. Sequestration

11. Estimates of fossil-fuel subsidies, including those related to electricity, in thirty Sub-Saharan African countries were US$32 billion for 2013, dropping to US$26 billion in 2015 due to reform efforts and the failing price of oil, gas and coal (Whitley and van der Burg *Fossil Fuel Subsidy Reform in Sub-Saharan Africa: From Rhetoric to Reality* (2015) New Climate Economy, London and Washington, DC, page 7. Available at: http://newclimateeconomy.report/misc/working-papers).

12. Recently the World Bank Open Learning Campus hosted a useful online webinar entitled "Carbon Pricing 101", focusing on experiences and learnings on the African continent, where explicit carbon pricing was described as "cap and trade, carbon tax or a hybrid of both elements". See further: Carbon Pricing Leadership Coalition *Guide to Communicating Carbon Pricing* (December 2018, Washington, D.C., World Bank), which despite the general term "carbon pricing" in the title, deliberately focusses on carbon taxation and ETS, and pays only lip-service to other carbon pricing approaches. The World Bank's Partnership for Market Readiness, in a technical note entitled *Using Carbon Revenues* (Technical Note 16, August 2019, Washington, D.C., World Bank), also implies that carbon revenue is derived from a variety of approaches to pricing carbon, but maps only examples of carbon taxation and ETS, implemented globally, without recognition of other approaches as revenue-sources. The Organisation for Economic Cooperation and Development (OECD) refers to carbon taxation and ETS as the "building blocks" of any climate policy package (OECD "Improving Economic Efficiency and Climate Mitigation Outcomes through International Co-ordination on Carbon Pricing – Environment Working Paper No. 147" May 2019 [OECD 2019] 8). A recent article posed the question: "Should every country on earth copy Sweden's carbon tax", without considering that implementing the Swedish model, which *inter alia* taxes heating fuels, in developing and least-developed economies would likely have regressive impacts on vulnerable and poor individuals and households who/that rely on heating fuel as their primary source of warmth. The point is that other carbon pricing mechanisms are likely to be more appropriate, in such instances, than a direct application of the experience of a developed country, with high personal and household incomes, into a developing or least-developed economy (Torbjörn Schiebe, on behalf of the Carbon Pricing Leadership Coalition, 18 October 2019. Available at: https://www.carbonpricingleadership.org/blogs/2019/10/18/should-every-country-on-earth-copy-swedens-carbon-tax).

capacities are regularly quantified in terms of tonnes of carbon dioxide equivalent (tCO_2e), making it entirely feasible to impose a cost on forestry sequestration, indexed to a notional carbon price per tCO_2e. Article 3.3 of the Kyoto Protocol to the UNFCCC formally recognised the mitigation potential of forestry sequestration by including "forestry activities" in the list of carbon sinks that remove GHG emissions from the atmosphere, and by permitting the use of such removals to achieve developed-country party mitigation commitments.

This study aims to contribute to the ongoing discussion of the global expansion of carbon pricing, by questioning the appropriateness of the traditional carbon pricing mechanisms for sub-Saharan Africa, and by arguing for an expanded notion of carbon pricing that may be better suited to developing and least-developed economies. One of the main aims of this analysis is to highlight the fact that carbon pricing (by definition) includes several alternative approaches, and that such alternatives should be considered in the discussion, particularly in the sub-Saharan Africa context. Of particular interest is that this analysis has noted that the benefits of the traditional carbon pricing mechanisms have been widely touted of late, especially their ability to raise revenue and support environmental objectives. Such benefits, however, need to be viewed against the GHG emissions base of sub-Saharan African countries, and their potentially negative impacts on low-income and vulnerable groups, should implementation ignore the need for detailed measures to avoid regressive consequences.

The consideration and recognition of alternative models of carbon pricing in sub-Saharan Africa comes at an opportune time. Many countries in Europe and North America have introduced mechanisms that price the impact of GHG emissions on the ecosystem.[13] Some Asian and Southern American countries are cautiously following this path. In sub-Saharan Africa, however, only South Africa has introduced a tax on carbon emissions, while two other countries have conducted feasibility studies without achieving concrete outcomes, and a small handful is tentatively considering such mechanisms. Notwithstanding this factor, 45 out of 54 African countries made mention of the international carbon market in their nationally determined contributions (NDCs) to the UNFCCC,[14] and it is anticipated that such countries' consideration of domestic carbon pricing will gain importance in the future. For this reason, it is useful to engage in dialogue at this early stage, to identify regional synergies, appropriate instrument design and domestic interest in carbon pricing, in order to ascertain the possible benefits, risks and opportunities, and assess capacity and needs in African countries.

13. World Bank, see n 4.

14. See: Climate Focus "Will Carbon Pricing Emerge in Africa as Well?" (2016). Available at: https://climatefocus.com/sites/default/files/IETA%20GHG%20Report%202016%20%28Sandra%29.pdf.

In this context, the objective of this study is to promote and stimulate a political discussion on carbon pricing in sub-Saharan African countries, to create a comprehensive overview of documents published and commitments made by sub-Saharan African countries to reduce carbon emissions, to discuss different models of carbon pricing and their suitability for African countries, including implicit carbon pricing mechanisms, to consider models appropriate to country-specific contexts, and to provide an overview of the current state of carbon pricing in Africa (with a focus on sub-Saharan Africa). The overall objectives of this study are therefore to take a closer look at the current mitigation commitments made by sub-Saharan African countries, to propose innovative carbon pricing mechanisms, suitable to sub-Saharan Africa, that can support mitigation actions, and to inform African and non-African policymakers about the current political and socio-political conversation surrounding carbon pricing in sub-Saharan Africa.

These objectives have been addressed in two phases: The initial phase took the form of a scoping exercise that served as the basis for the more substantial second phase, the findings of which are presented in this study, as follows:

- Part 1 contains an overview of carbon pricing models and related theory, including a discussion of the potential benefits and disadvantages and a brief *status quo* overview of carbon pricing globally.

- Part 2 analyses the extent to which there is a political discussion in sub-Saharan Africa of carbon pricing, based on a review of relevant documentation, including NDCs, national policies and plans, and other grey literature (as set out in more detail in Annexure I). In response to the study's Terms of Reference, Part 2 also contains a review, based on a literature review, of the social acceptance of carbon pricing, focusing specifically on South Africa (as a case study), an overview of potentially applicable carbon pricing approaches and considerations relevant to sub-Saharan African countries, and an overview of the uptake of carbon pricing mechanisms in Africa.

- Part 3 focuses mainly on seven sub-Saharan African countries that display varying emissions and gross domestic product (GDP) profiles. The analysis contains a review of the appropriateness of different carbon pricing models for the seven countries, to advance the proposition that there is a need for tailored carbon pricing approaches, designed in response to specific considerations, for example, emissions and GDP profiles. The countries included in this study are the Gabonese Republic (Gabon), the Republic of Mauritius (Mauritius), the Republic of Namibia (Namibia), the Republic of the Congo, the Republic of Senegal (Senegal), the Republic of Uganda (Uganda) and the Republic of Zambia (Zambia).

- Annexure I contains a more detailed overview of 19 sub-Saharan countries that were considered for this study, with a summary of their mitigation targets and NDC mitigation objectives, sources of emissions, statements of intent relating to carbon pricing, extent of participation in carbon markets and REDD+ (reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks), and fossil fuel subsidies.

This study recommends that, based on their economic circumstances and in view of their low GHG emission profiles, the traditional carbon pricing mechanisms may be inappropriate for, Gabon, Senegal, Uganda and Zambia, and would create unreasonable financial burdens at their current stage of development. Consequently, it is concluded that the most appropriate form of carbon pricing for these countries would be REDD+ and project-based carbon offsetting. The traditional carbon pricing mechanisms may be appropriate for Mauritius and Namibia, which have higher fossil fuel bases and GHG emission profiles, and a greater potential to access sources of alternative energy than the other countries.

1.1 CARBON PRICING GENERALLY

Carbon pricing falls within the category of economic or pricing instruments, which can be used by governments to influence market behaviour.

1.1.1 FORMS OF CARBON PRICING

Although there is no universal definition of "carbon pricing", studies have traditionally tended to focus on explicit forms of pricing such as carbon taxation and ETS, namely the traditional carbon pricing models. However, there is growing recognition of the role and importance of other forms of carbon pricing and, for this reason, the World Bank proposed a relatively expansive definition, which includes initiatives that put an explicit price on GHG emissions expressed in a monetary unit per tCO_2e,[15] such as ETS and carbon taxation, as well as less well recognised forms of pricing, such as offset mechanisms, including those under the international carbon market; and RBCF.[16] This analysis adopts this more expansive approach, in recognition of the fact that the traditional carbon pricing mechanisms are often cited as being the "primary"

15. World Bank, see n 4.

16. Ibid. RBCF is included in this study because it can have a carbon pricing component when applied to mitigation projects, as the amount of funding received per unit of a GHG emission reduction target achieved creates the incentive for following through on the project. The World Bank also includes internal carbon prices within its definition of carbon pricing, for example, internal carbon prices set by public and private organisations to inform their decision-making. The latter are not, however, considered for the purposes of this study.

or "default" approaches in much of the existing literature.[17] It is submitted that this view runs the risk of neglecting the importance of other approaches, particularly where these may be more appropriate to developing and least-developed countries, including those in sub-Saharan Africa.

Arguably, the notion of carbon pricing can also include "implicit" forms, namely instruments that indirectly price GHG emissions, such as the removal of fossil fuel subsidies or fuel taxes.[18] While the traditional carbon pricing mechanisms are the typical focus of academic research, such implicit forms are enjoying recently increased popularity and interest, particularly the removal of fossil fuel subsidies.[19] The section that follows seeks to briefly outline these pricing mechanisms, with a view to illustrating their potential appropriateness or relevance to a developing country context. Before doing so, the analysis sets out some of the overriding theories applicable to the choice of carbon pricing instruments, which, in turn, inform their suitability to a particular jurisdiction.

1.1.2 DESIGN CONSIDERATIONS

A regulator wishing to curb GHG emissions has multiple available options. One prominent option is to use a command-and-control mechanism, while another is to apply a market-based mechanism.

COMMAND AND CONTROL VS MARKET MECHANISMS

Traditional command-and-control mechanisms are either technology-based or performance-based.[20] Technology-based approaches ordinarily require the use of specific equipment, or the implementation of determined procedures and processes. In the context of GHGs, this could require emitters to use certain types of energy-efficient engines, combustion processes or landfill-gas collection technologies.[21] On the other hand, performance-based approaches might prescribe the allowable GHG emission levels but leave it to an emitter to decide how to achieve such levels.[22]

17. See n 12.

18. World Bank, see n 4.

19. Ibid.

20. Aldy J and Stavins R "The promise and problems of pricing carbon: Theory and experience" (2012) *Journal of Environment and Development* 21(2) 152. See also Rumble O, Gilder A and Parker M "Carbon pricing in South Africa" in Humby T, Kotze L, Rumble O and Gilder A (eds.) *Climate Change Law and Governance in South Africa* (2016) Juta, chapter 20.

21. Ibid.

22. Ibid.

By comparison, most carbon pricing mechanisms take the form of market-based instruments, such as the traditional carbon pricing mechanisms.[23] In doing so, an in-country or cross-border price is imposed upon GHG emissions (usually in the form of tCO_2e). Theoretically, market-based instruments are more efficient in achieving GHG emission reductions, as they create a financial incentive for emitters to go beyond levels of mitigation required by regulated standards.[24] As a result of the pricing incentive, emitters are encouraged to explore least-cost mitigation options and to invest in new technologies, processes and ideas that can further enhance emission reductions.[25]

There are hybrid versions of market- and command-and-control-based systems, such as were initially proposed for inter-linked South African carbon budgets and the legal carbon taxation regime, or systems that tax certain fuels but also introduce performance-based thresholds for appliances or equipment that result in GHG emissions. For the purpose of this study, however, we focus primarily on market-based instruments.

FIXING PRICE VS FIXING VOLUME

In an ETS, regulators allocate the quantity, or cap, of allowable emissions (allowances), over a given period (usually annually), exceedances of which, during the period, attract a financial penalty. Affected entities whose emissions fall below their caps can freely trade the balance of their allocated allowances (up to the extent of the cap) with other affected entities, whose emissions are likely to exceed their own caps, and who are permitted, under the ETS rules, to apply purchased allowances to the calculation of their total emissions to offset potential cap exceedances and avoid the financial penalty. Supply and demand in the market determines the actual price of tradable allowances. For these reasons, a typical ETS that displays such features is often referred to as a "cap-and-trade" scheme. Under a taxation scheme, the "carbon price" is in the form of the tax rate per tCO_2e GHG emissions, imposed by the relevant regulator on emitting entities, and the regulator therefore determines the price directly. An ETS is thus described as a "quantity instrument", while carbon taxation is termed a "price instrument".[26] In an ETS, there is more certainty (although not absolute) about the potential volume of emission reductions, while under a carbon tax there is more certainty about the price.

23. Ibid.

24. Centre for Climate and Energy Solutions "Market Mechanisms: Understanding the Options" (2015) 2.

25. Aldy and Stavins, see n 20.

26. Goldblatt M "A comparison of emissions trading and carbon taxation as carbon mitigation options for South Africa" in Winkler H, Marquard A and Jooste M (eds) *Putting a Price on Carbon: Economic instruments to mitigate climate change in South Africa and other developing countries*, Proceedings of a Conference held at the University of Cape Town, 23–24 March 2010, 181–183.

These mechanisms are not mutually exclusive. For example, a country might decide on a hybrid or complementary system and impose a carbon tax on fossil fuels, while simultaneously subjecting other sources of emissions to an ETS. The success of this approach would depend on its design, which would be affected by the concurrent existence of the complementary elements, and the practicality of implementation. Local considerations play an important role in deciding whether to implement an ETS or carbon taxation. For example, the South African National Treasury considered carbon taxation as preferable to an ETS, based on its belief that the oligopolistic structure of the domestic energy sector would likely reduce any efficiency gains that might arise under an ETS.[27] Depending on how they are designed, carbon taxes can also be administratively less burdensome than ETSs, particularly if they build on existing taxation systems, such as fossil fuel levies. Taxes offer more price stability, which can facilitate longer-term investment decisions. ETS (cap-and-trade), however, offers the benefit of increased certainty that emissions will fall below the predetermined mitigation targets.

INCENTIVES VS DISINCENTIVES

The choice of carbon pricing mechanism may also be informed by its inherent punitive, or disincentive, nature, balanced against any incentivisation that may be achieved. Disincentives under the traditional carbon pricing mechanisms include the tax-rate element of carbon taxation and the financial penalty element of an ETS. Incentives, on the other hand, seek to encourage desirable behaviour that results in clean(er) development and GHG emission reductions. These can include mitigation project-based offsetting and market approaches, tax rebates (such as the energy efficiency allowance in Section 12L of the South African Income Tax Act – an income tax deduction allowed to entities that implement energy-efficient interventions that save on energy consumption), subsidies for demand-side energy efficiency management, and renewable energy feed-in tariff programmes.[28] Although subsidies offer the benefit of administrative ease, they are vulnerable to budget cuts by the government and dependent on the prevailing political will, and consequently often lack sufficient certainty to spur investments.[29] While subsidies are usually a cost borne by taxpayers (as they are funded from the national fiscus), they can be more popular than new taxes (such as a new carbon tax), being seen as positive incentives rather than disincentives, representing a "carrot" instead of a

27. South African National Treasury "Discussion Paper: Reducing Greenhouse Gas Emissions: The Carbon Tax Option" (2010).

28. De Serres A, Murtin F and Nicoletti G "A framework for assessing green growth policies" (2010) OECD Economics Department *Working Papers 774*.

29. International Energy Agency *Managing Interactions Between Carbon Pricing and Existing Energy Policies* (2013) 13.

"stick" approach.[30] Incentives may also be funded by recycling revenue from carbon taxation, thereby linking incentives and disincentives constructively, and making the latter more economically palatable.

Commentators have suggested that developing economies appear to avoid using tax penalties, presumably on the basis that such penalties could have, or can be perceived to have, the potential of damaging development and growth prospects.[31] Further, there is a perception that incentives (such as tax subsidies, tax credits and grants), have a much greater impact on consumer behaviour than taxes (disincentives), since they operate as a reward for achieving desirable objectives,[32] while taxes are seen as a punishment for delinquency – although it is conceded that more research is required to substantiate this view. Even where disincentives are implemented, it is useful to link them to incentives, for example, (as abovementioned) in the form of revenue recycling of accrued funds in order to finance government expenditure on low carbon growth initiatives.[33]

CONTROL VARIABLES

A final consideration in the design of the traditional carbon pricing mechanisms would be whether to use caps or targets (based on absolute emissions or emission intensity benchmarks). Absolute emission targets are ideal and useful in mature economies, but can be impractical in developing economies and motivate the latter to prefer emission intensity benchmarks.

SOCIETAL CONSIDERATIONS

Carbon pricing, particularly operating as a disincentive, may also need to be part of a broader fiscal and regulatory reform agenda that is perceived by the public as being fair overall, and it can be difficult to anticipate either public opposition to or support of such approaches.[34] As the International Monetary Fund (IMF) notes, resistance to carbon pricing can be compounded if it is introduced at the same time as tax reforms, which are generally considered as primarily benefitting the wealthy.[35] Consequently, the IMF suggests that, if political obstacles to carbon pricing cannot be overcome, or if securing public acceptance thereof necessitates using the entire fiscal dividend

30. Centre for Climate and Energy Solutions *Market Mechanisms: Understanding the Options* (2015) 2.

31. KPMG *The KPMG Green Tax Index 2013*, available at: https://assets.kpmg.com/content/dam/kpmg/pdf/2013/08/kpmg-green-tax-index-2013.pdf and, as cited in Dippenaar M (2018) "The role of tax incentives in encouraging energy efficiency in the largest listed South African businesses" *South African Journal of Economic and Management Sciences* 21(1) 1723.

32. As suggested by Dippenaar (ibid.).

33. Ibid.

34. IMF, see n 6.

35. Ibid.

(anticipated to be derived from pricing carbon) in universal compensation schemes, then implementing mechanisms that are less efficient at reducing emissions but that avoid economy-wide negative impacts, for example, across-the-board increases in energy prices (which can be obviated by taxing/subsidising activities or products with undesirable emission intensity characteristics), and promulgating regulations that target emissions, for example, by imposing stricter emission standards for vehicles, appliances and power generation, may provide reasonable "second-best" alternatives (to carbon pricing) for achieving the desired mitigation objectives.[36]

1.1.3 EXPLICIT CARBON PRICING

EMISSIONS TRADING SCHEMES

The conventional approach to the design of an ETS (cap-and-trade) is to determine an absolute allocation of GHG emissions for a country or region, over the period of the ETS's full operational life-cycle, and to seek to reduce actual emissions to below the absolute allocation through the implementation of incremental mitigation objectives in subsequent ETS sub-periods (usually annually). The total of each ETS subperiod's incremental mitigation objective is then distributed among participating emitting installations, either by freely allowing prescribed volumes of installation-level emissions (measured in total tCO_2e, individually termed "allowances") or by auction. The amount of the allowances per installation operates as a cap on emissions and cap-exceedances are subject to financial penalties. To be compliant with the ETS rules, participating installations are required to surrender the number of allowances equivalent to or below their emissions for the sub-period, or face incurring the financial penalty for cap exceedances. Where a participating installation's actual emissions fall below its cap (making it compliant), then the ETS rules permit the compliant installation to trade the balance of its allowances (representing the difference between actual emissions and its installation-level cap), with non-compliant participating installations, which can purchase available allowances and apply them to calculating/offsetting their own emissions - thereby achieving technical compliance with their caps, and avoiding the financial penalty for cap exceedances.

The restriction on the amount of available allowances creates market scarcity (supply side), with their desirability (demand side) arising from the negative prospect, to non-compliant participating installations, of incurring the financial penalty imposed upon exceedances of the prescribed caps. Presented with the option of surrendering an allowance, reducing emissions or incurring the financial penalty, installations place an economic value on allowances reflecting the avoided costs (of emission

36. Ibid.

reductions) from surrendering allowances to remain compliant with prescribed caps and negate potential financial penalisation for cap exceedances. Successfully achieving the incremental mitigation objectives in subsequent ETS sub-periods secures the integrity of the country's/region's absolute GHG emission allocation over the ETS's full operational life-cycle. This cap-and-trade approach is followed by the European Union Emissions Trading Scheme (EU ETS).

Another approach is a baseline-and-credit system that prescribes mitigation objectives, either in the form of absolute emission limits or tCO_2e per unit of output, applicable to the country or region covered by the system, and these mitigation objectives are, in turn, distributed/allowed to participating installations. Those with emissions below their prescribed objectives are credited with the balance of their allowable emissions or tCO_2e per unit of output, that can be sold (as carbon offsets) to other participating installations, whose actual emissions exceed their own objectives and which are permitted to achieve technical compliance by purchasing available offsets. The theoretical role of supply and demand in the market is to accord maximum and minimum economic value to such carbon offsets as the impetus for reducing emissions across the entire system. In other words, the market drives their application to offset those emissions that are costlier to reduce, and thereby incentivises emission reductions that can actually be achieved at least cost.[37]

The ETS revenues generated by government, for example, from auctioning allowances and from payments of financial penalties, may be used for ETS-related initiative (supporting emission reductions) or alternative purposes. From an administrative perspective, an ETS requires complex institutional and administrative oversight, and may necessitate establishing (or promoting the use of) an appropriate platform to facilitate the trading of allowances, for example, an electronic exchange.

CARBON TAXATION

A carbon tax has been described as a more "basic form" of market policy,[38] although this is strongly contingent on its design.[39] Carbon taxation imposes a specified tax rate per tCO_2e for GHG emissions from installations covered by the scheme. The extent of tax liability is accordingly informed by the amount of emissions from installation-level and associated activities, as determined by the application of a

37. Aldy J and Stavins R, see n 20.

38. Centre for Climate and Energy Solutions *Market Mechanisms: Understanding the options* (2015) 2. Available at:http://www.c2es.org/docUploads/market-mechanisms-brief.pdf.

39. For example, the South African carbon tax has an extremely complex design being, in effect, a hybrid tax and trading scheme. This is probably the unintended consequence of National Treasury's permitting the application of carbon offsets to reduce taxable emissions and ameliorate tax liability, a situation that is anticipated to create commodity market-like supply-and-demand dynamics in the country for offsets that are eligible for these purposes.

prescribed measuring and reporting methodology for calculating taxable emissions. Installations are incentivised to reduce their taxable emissions by changing operational processes and adopting less carbon-intensive technologies, in order to reduce tax liability. The approach can be direct, that is, a levy based on measured and reported GHG emissions, a tax on fossil fuel inputs based on their carbon content (an upstream tax), or a downstream tax applied to energy outputs such as electricity and transport fuels. Upstream and downstream taxes tend to be favoured as they are proxy taxes and less burdensome from an administrative perspective, although they suffer the risk of being less accurate. The South African carbon tax system recognises that existing emitters lack the ability to change technologies or production processes sufficiently, or that it is financially unfeasible, and so allow for offsets or allowances to reduce liability. Offsets would typically include investments in projects that reduce, avoid or sequester emissions, for example, by using carbon credits derived from renewable energy developments.[40]

Generally speaking, the traditional carbon pricing mechanisms are considered appropriate for countries with industrial-scale sources of GHG emissions, such as from the use of fossil fuels and process emissions. In countries that have, for example, low fossil fuel reliance or low emission profiles but high levels of GHG sequestration potential, such as forestry sequestration potential, the use of either carbon taxation or ETS would likely be both inappropriate for reducing GHG emissions and inefficient compared to other instruments.

OFFSET MECHANISMS

While the traditional carbon pricing mechanisms tend to apply mainly at the national or regional level at present, there are numerous international mechanisms that also serve to put a price on carbon in a wider sense, in the form of offset mechanisms.[41] These include the existing approaches under the Kyoto Protocol, such as the Clean Development Mechanism (CDM), those contemplated under Article 6 of the Paris Agreement, and initiatives outside the ambit of the UNFCCC. Again, the World Bank recognises such offset mechanisms as a form of explicit carbon pricing, as these mechanisms impose an explicit price on GHG emissions expressed in a monetary unit per tCO_2e.

Of growing interest is the role that Article 6 of the Paris Agreement will play in the creation and demand for instruments that parties may use to achieve compliance with their NDCs. In this regard, the Paris Agreement envisaged two mechanisms:

40. For example, in South Africa a tax-liable entity can reduce its liability by relying on certain allowances relating to its potential trade exposure and/or considerations relating to its emissions intensity, in addition to utilising the allowance permitted for eligible carbon offsets.

41. See the definition of carbon pricing as interpreted by the World Bank (n 4) which does not expressly define these "offset mechanisms" but uses them in general reference to the international market.

- Article 6.2 empowers parties to engage in voluntary "cooperative approaches", enabling them to use internationally transferred mitigation outcomes (ITMOs), to meet their NDC goals. ITMOs are, at this stage, a relatively vague concept but it is understood that they can be produced from any mitigation approaches (mechanism, procedure or protocol), and offer the potential to trade the "over achievement" of a Paris country party's NDC mitigation target with another country party, in the form of direct bilateral trading.[42]

- Article 6.4 creates a mechanism for party countries to contribute to GHG mitigation in other party countries, the emission reductions from which can be used to meet the objectives of the NDC of either the host or another party country. Article 6.4 has been seen as the Paris Agreement's successor to the CDM.[43] This centrally governed mechanism can be used by all Paris party countries and is to be supervised by a body designated by the Paris Agreement Conference of the Parties, and will operate according to principles very similar to those of the CDM. For example, implementation of the mechanism must result in real, measurable and long-term emission reductions, activities must be added, and verification and certification of outcomes are to be performed by designated national operational entities. It is also required that they avoid double-counting and pursue the overall mitigation of global emissions.

The above two mechanisms are to be accompanied by the framework for non-market approaches as envisaged in Articles 6.8 and 6.9 of the Paris Agreement. Underpinning the Article 6 mechanisms is hope that lower abatement costs, realised through cooperation between party countries, may increase the political appetite for more ambitious GHG reduction targets in NDCs.[44] There is, however, concern that

42. See Carbon Brief *Bonn Climate Talks Key Outcomes 2019*. Available at: https://www.carbonbrief.org/bonn-climate-talks-key-outcomes-from-june-2019-un-climate-conference .

43. Ibid.

44. International Emissions Trading Assocaition (IETA) "The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges" (2019), University of Maryland and Carbon Pricing Leadership Coalition (CPLC). This analysis, drawing on wider literature on the topic, suggests that such co-operation could take the form of linkages between homogeneous policies (such as multiple market-based policies); linkages between heterogeneous policies (such as carbon tax and performance standards) and, potentially, other innovative approaches (such as regional carbon clubs). The authors further suggest that the "international cooperation" envisaged through Article 6 has the potential to generate cost savings, for the implementation of mitigation ambition, of approximately US$249 billion/year by 2030, US$345 billion/year by 2050 and US$988 billion/year by 2100, representing a significant saving compared to a scenario in which nations do not co-operate on trading. Cooperation was also argued to be able to generate values for the global carbon market of about US$167 billion in 2030, US$347 billion in 2050, and US$1.2 trillion in 2100. Their results also suggest that all party countries could benefit, in terms of GDP growth, from Article 6 co-operation. While the words "market" and "carbon pricing" do not appear in the text of the Paris Agreement, Articles 6.2 to 6.4 are widely interpreted as providing a framework for future carbon markets/carbon pricing. For discussion of such issues, see: Marcu A and Rambharos M *Rulebook for Article 6 in the Paris Agreement* European Roundtable on Climate Change and Sustainable Transition (these authors note that Article 6 is the Agreement's one signal to carbon investors that is linked to carbon pricing – page 4);

the Article 6 mechanisms could incentivise host countries to set less ambitious NDC mitigation targets, in order to be able to "sell" or transfer those mitigation outcomes that are not formally articulated as part of NDCs.[45] In addition, concern has been expressed that acquiring countries may pursue less domestic mitigation, resulting in a "lock-in" of emissions-intensive technologies.[46]

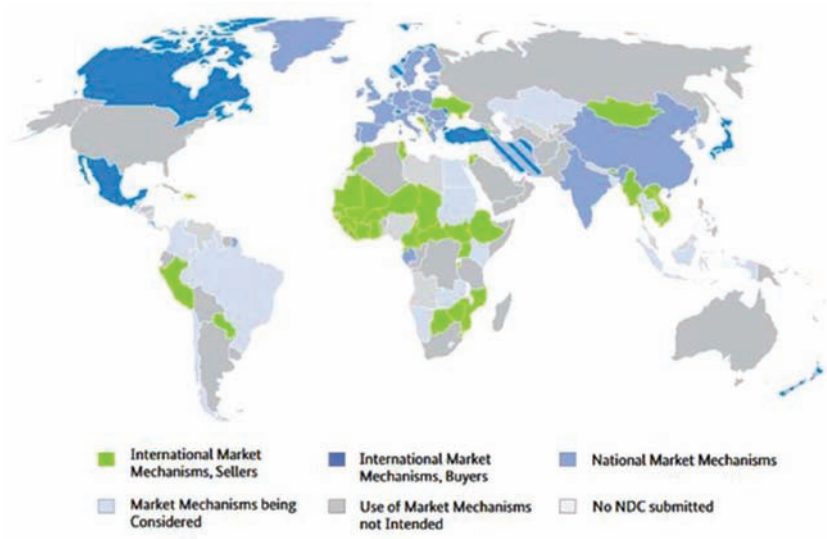

Figure 1 International Market Mechanisms[47]

It is anticipated that Article 6 will stimulate use of ITMOs and a future international carbon market.[48] This has particular relevance to African countries, which, as discussed below, currently consider their role to be very much framed as generators of such offsets. This is illustrated in Figure 1, which provides an overview of how NDCs have expressed an intention to utilise market-based mitigation instruments – note, especially how most African countries are represented as "sellers", within the context of the international market. Article 6, in particular the use of ITMOs, as well as the voluntary carbon market, is of particular interest and relevance to developing countries that have, for example, a high potential to transition to forms of renewable energy, have afforestation or reforestation potential and capacity, have dense forest

and Asian Development Bank *Decoding Article 6 of the Paris Agreement* Technical Support Facility, Carbon Market Programme, Sustainable Development and Climate Change Department, Philippines, April 2018 (this analysis comments that Article 6 creates an enabling framework for the creation of an international carbon market that will lead to a convergence of domestic carbon pricing approaches, including carbon markets – page 1).

45. Fuessler J, Broekhoff D, Kohli A, Kreibich N, Lehmann S and Spalding-Fecher Rl "Trading Up" (2019) 3 *Carbon Mechanisms Review* 4.

46. Ibid.

47. *Figure 1 - Source: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety [2017], Carbon Pricing: Using Market-Based Mechanisms to Mitigate Climate Change.*

48. See World Bank, n 4. Unfortunately, very few NDCs under the Paris Agreement reference the use of international carbon pricing initiatives to meet their mitigation objectives at present (ibid).

coverage, or that, for fiscal or other socio-economic reasons, are not well positioned to impose a tax or an ETS on activities resulting in GHG emissions.

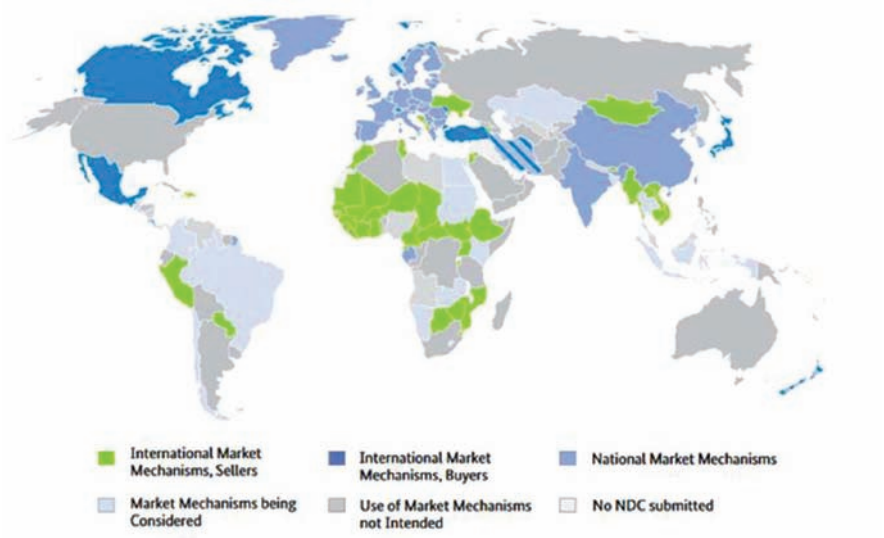

Figure 1 Source: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) 2017, Carbon Pricing: Using Market Based Mechanisms to Mitigate Climate Change

The spread of interest in Article 6, and its importance to the continent as a basis for engaging with international carbon pricing instruments, provides impetus for the need to tailor the relevant rules and procedures of the Article 6 mechanisms to ensure equitable access to and participation by African countries in these mechanisms. For example, commentators have called for the crafting of the rulebook and guidelines for Article 6 to be sensitive to African needs, which could for example take the form of financing of CDM activities with new sources of climate finance. This includes, in particular, financing from the Green Climate Fund (GCF) - including the direct acquisition of Certified Emissions Reductions (CERs) by the GCF - and the incorporation of existing CDM reforms such as the programmatic approach found in CDM Programmes of Activities.[49] The same commentators also suggest that Africa could benefit by using the Sustainability Development Mechanism (Article 6.4. mechanism), in the context of RBCF (discussed below), where any units generated under the SDM could be voluntarily cancelled, and that mitigation actions supported through Article 6 and international climate finance can be counted towards a host country's NDC.[50]

49. A Michaelowa A, S Greiner S, S Hoch S, F Le Saché F, D Brescia D, H Galt H, S Mayr S and, E Mbaye Diagne E "The Paris Agreement: The future relevance of UNFCCC-backed carbon markets for Africa" (2016) *Perspectives Policy Brief* 15. (2016) Available at: https://www.perspectives.cc/fileadmin/Publications/The_Paris_Agreement_The_future_relevance_of_UNFCCC-backed_carbon_markets_for_Africa_Michaelowa_Axel__Hoch_Stephan__Brescia_Dario_2016.pdf. The authors make the further point that the Sustainability Development Mechanism (Article 6.4.), when used in the context of RBCF, gives an opportunity for units generated under the SDM to be voluntarily cancelled.

50. Ibid.

There is, however, very little current certainty as to the substance of Article 6. Notwithstanding the finalisation of a draft text for Article 6 in the Paris Rulebook in Bonn (June 2019), the text was not agreed to at COP25, and the texts will be deliberated again in June 2020.[51] Moreover, in its current form, it does not provide any direction as to the substantive content of the rules, given that many key provisions have multiple optional texts.[52] It is therefore difficult to predict how the international carbon market will evolve. What is apparent from the language of Article 6, however, is a recognition of the relevance and importance of international carbon values, which potentially encompass both market and non-market approaches. This implies that an expanded view of carbon pricing beyond simply carbon taxes and ETSs or the traditional models of the former CDM is already part of the conversation.

Other important sources of both demand and supply of offsets from international carbon pricing mechanisms are the voluntary offset markets, such as the Gold Standard Credits and Verra's Verified Carbon Standard (VCS), as well as those for the aviation sector under the International Civil Aviation Authority's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). They are also identified as being particularly useful to test or pilot new ideas that are not yet recognised under the compliance market (the CDM), such as the buffer system approach to address permanence risks for land-use carbon.[53] While there is uncertainty as to their future status under the Paris Agreement,[54] they are likely to continue to play an important role, particularly in the context of rising demand under regional and domestic carbon pricing initiatives.[55] Sub-Saharan African countries have demonstrated a continuing interest in these crediting systems as a means to generate government revenue, as demonstrated by references in NDCs. This demonstrates the widespread support for the foundational concepts of crediting systems, including both the CDM and its success under Article 6, as a means to inform developing-country carbon values and their mainstreaming as part of a suite of typical financial indicators for carbon values.

RESULTS-BASED CLIMATE FINANCE AND REDD+

Recently, the World Bank has included RBCF as a form of international carbon pricing in its annual analysis of the status and trends of carbon pricing across the globe.[56]

51. Key issues include how to account for bilateral trade between countries and the avoidance of "double counting"; whether host countries of Article 6.4. projects should also undertake "corresponding adjustments"; ensuring an "overall mitigation in global emissions", instead of just offsetting; the future of carbon "units" from the Kyoto Protocol; and references to human rights.

52. Ibid.

53. World Bank, see n 4.

54. Ibid.

55. Ibid.

56. Ibid.

RBCF is a form of climate finance where the provider of climate finance releases funds to the recipient upon its implementation of a pre-agreed set of climate change actions.[57] Since these results are often designed as an output or outcome, the World Bank categorises them as an explicit form of climate finance that can support particular technologies, such as renewable energy, or support an underlying outcome, such as GHG emission reductions.[58] The World Bank also included REDD+ as a form of recognised RBCF project that may qualify as a form of "carbon pricing".[59]

Relevant examples of REDD+ and RBCF include the first REDD+ based RBCF project that was approved under the GCF's REDD+ pilot programme for Brazil.[60] This project demonstrates the first use of RBCF for REDD+ projects, a notion that presents interesting African opportunities. Similarly, the World Bank's Forest Carbon Partnership Facility concluded two emission-reduction purchasing agreements with the DRC and Mozambique for mitigation.[61] The reason for including the above example is to illustrate a recognition that carbon pricing can be imposed so as to place a price on carbon without necessarily requiring a formal domestic architecture for its national application, or a formal national system to collect revenues resulting from the price. Rather, as this example demonstrates, explicit carbon pricing can be outcomes-focused, with the source of revenue derived from a party that is not necessarily resident in the implementing country.

As illustrated in Part 2, there is a particular interest in REDD+ in sub-Saharan Africa, and the recognition of REDD+ as a form of explicit carbon pricing would go a long way to recognise actions taken in respect of GHG sinks, particularly in areas with high forest coverage.

1.1.4 IMPLICIT CARBON PRICING

ETS and carbon taxes are often referred to as forms of explicit carbon pricing. Implicit carbon pricing, on the other hand, can include policies or instruments that impose a compliance cost, in other words, an indirect/implicit price, on activities that result in GHG emissions. Examples of such forms of implicit pricing include the removal

57. Ibid.

58. Ibid. The World Bank notes that RBCF can have a carbon pricing component for mitigation projects, in that the amount of funding received per unit of GHG reduction target achieved incentivises further action (page 19).

59. Ibid.

60. Ibid. It relates to a Brazilian project for 18.8 million tCO2e of emission removals sequestered in the Amazon 2014–2015.

61. World Bank, *Mozambique and Democratic Republic of Congo Sign Landmark Deals with World Bank to Cut Carbon Emissions and Reduce Deforestation*, 12 February 2019. Available at: http://www.worldbank.org/en/news/press-release/2019/02/12/mozambique-and-democratic-republic-of-congo-signlandmark-deals-with-world-bank-to-cut-carbon-emissions-and-reduce-deforestation?CID=CCG_TT_climatechange_EN_EXT.

of fossil fuel subsidies and fossil fuel taxes;[62] support for renewable energy, and energy efficiency certificate trading.[63] Although implicit carbon pricing is already in place in many transactions in the form of a tax,[64] implicit carbon pricing is often excluded in the dialogue on the need to "price carbon"[65] because these instruments do not place an explicit price on carbon, that is, they do not fall within the expanded definition of carbon pricing. Nevertheless, fuel taxes and subsidies have achieved increased attention in recent years, and are now being included in global analyses in recognition of the important role they play in market distortion and the role that their reform will play in supporting low carbon development.[66]

As their name suggests, "fuel taxes" impose a positive price on carbon, while fossil fuel subsidies impose a negative price on carbon. Fossil fuel subsidies have been criticised for distorting the true price of fossil fuels and incentivising the inefficient use of carbon-intensive forms of energy, which in turn may undermine the effectiveness of existing mitigation efforts.[67] Globally, energy subsidies are estimated at US$4.7 trillion (6.3% of world GDP) in 2015 and US$5.2 trillion (6.5% of GDP) in 2017.[68]

While several international organisations and the EU have called for the phase-out of fossil fuel subsidies, the total global volume of such subsidies worldwide increased by approximately half a trillion dollars between 2015 and 2017.[69] An IMF Working Paper makes the compelling case that, if fuel prices had been set at fully efficient levels in 2015, estimated global CO_2 emissions would have been 28% lower, fossil fuel air pollution deaths 46% lower, tax revenues higher by 3.8% of global GDP, and net economic benefits (environmental benefits less economic costs) would have amounted to 1.7% of global GDP.[70]

62. Ibid. Such standards could also impose technology requirements applicable to power generation.

63. World Bank *State and Trends of Carbon Pricing* (2015) 17–28, including for example tax incentives or subsidies for energy efficient appliances and vehicles.

64. OECD Economic Outlook Cool Policy *Climate Change Mitigation Supporting Growth* (2015) Issue 2, 64.

65. World Bank, see n 63 on page 18

66. See for example World Bank, n 4.

67. Ibid.

68. Coady D, Parry I, Le NP and Shang B " Global Fossil Fuel Subsidies Remain Large: An update based on country-level estimates" (2019) IMF Working Paper WP 19/89.

69. Ibid.

70. Ibid. page 18. The authors base their analysis on the wider definition of fossil fuel subsidies, that is, not only the taxation of fuel to accurately reflect supply side costs, but the price added to fuel to reflect the costs of fossil fuels on the environment and human health, which is externalised to other sectors of the economy (referring to externalities as post-tax subsidies). These post-tax subsidies are, according to the authors, 15–20 times larger than pre-tax subsidies, varying between 5.4 and 6.5% of global GDP between 2010 and 2017.

In a developing-country context, appropriately adapted fossil fuel subsidy reforms and energy tax reforms can be used as platforms to introduce carbon pricing mechanisms other than carbon taxation/ETS. In this preliminary report, we primarily focus on fossil fuel subsidies and taxes in analysing implicit carbon pricing impacts and considerations because they are of the greatest relevance and application to the continent.[71] However we are cognisant of the relevance of the numerous other forms of implicit carbon pricing available.

1.2 OPPORTUNITIES AND RISKS OF CARBON PRICING

1.2.1 TRADITIONAL CARBON PRICING

There is a considerable body of literature[72] that addresses the various socio-economic and environmental considerations of carbon pricing approaches. These studies tend to conclude that carbon pricing is the most economically efficient way to address the externalities associated with climate change.[73] However, many studies have been conducted from the perspective of developed countries.[74] This section seeks to provide an overview of some of the benefits and opportunities of carbon pricing in a developing-country context, and underscores some of the risks and concerns.

Carbon pricing has a number of benefits, primarily by motivating emitters to reduce their emissions and by facilitating the internalisation of environmental and social impacts into the costs of goods and services. In turn, it can support economies to meet mitigation goals and to transition towards a low carbon future.

Historically, much attention has been devoted to the efficiency and effectiveness of carbon pricing as a means to mitigate GHGs and to internalise negative environmental

71. And also mindful of the limited scope of this study. See generally Worrall L, Whitley S and Scott A "Reforming Africa's Fossil Fuel Subsidies" (2018) *Bridges Africa* 7(3). Available at shttp://www.ictsd.org/bridges-news/bridges-africa/news/reforming-africa's-fossil-fuel-subsidie.

72. See for example: Frontier Centre for Public Policy "*The Economic, Environmental and Political Consequences of Carbon Pricing Case studies in pricing-based carbon controls*" (2012) available at https://fcpp.org/files/1/PS131_CarbonPricing_FB27F2.pdf*; A Practical Guide To The Economics Of Carbon Pricing* https://www.policyschool.ca/wp-content/uploads/2016/02/Carbon-Pricing-McKitrickFINAL.pdf ; EPRG Working Paper "*The Political Economy of Carbon Pricing: A panel analysis*" (2016) available at: https://www.eprg.group.cam.ac.uk/wp-content/uploads/2016/11/1627-Text.pdf.

73. Metcalf and Weisbach "The design of a carbon tax" (2009) 33(2) *Harvard Environmental Law Review* 499; also see Reuven S and Uhlmann D "Combating Global Climate Change: Why a carbon tax is a better response to global warming than cap and trade" (2009) 28 *Stanford Environmental Law Journal* 3 available at: https://repository.law.umich.edu/articles/52/.

74. See Promethium Carbon and Climate Legal *Synthesis Report: Carbon pricing approaches in eastern and southern Africa* (2019). Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/28237/Carbon.pdf?sequence=1andisAllowed=y.

externalities. The use of carbon pricing is said to promote cost-effective abatement and deliver powerful innovation incentives, as it can spur financial investment in local carbon technologies and energy efficiency measures. Flowing from this incentive effect, carbon pricing also arguably provides the necessary impetus for emitters to go beyond the reductions required by the regulated standard.[75] This, in turn, reduces the burden on policymakers, who would otherwise have to search for and require specific emission reduction measures.[76] Emitters may also support carbon-pricing mechanisms because they have the potential to provide long-term visibility on pricing for investments and allow for market flexibility to invest in low-carbon technologies according to the individual preference and circumstances of the emitter.[77]

More recently, increased attention is also being paid to the potential ability of explicit carbon pricing to deliver co-benefits, including Sustainable Development Goals. Proponents of explicit carbon pricing argue that, if used wisely, it can offer positive gains to an economy: revenues can be used to support industry competitiveness, and to pursue economic and development objectives, such as health, education or infrastructure projects, and therefore assist in the pursuit of the Sustainable Development Goals.[78] Such spending can increase support for carbon pricing where funds are spent on issues of serious public concern. Proponents also argue that carbon pricing is particularly useful and efficient in developing economies (that lack formal tax bases), as it tends to be levied on relatively few large entities, can often be incorporated into existing processes, and is less easily evaded than other taxation.[79]

As noted above, a useful aspect of carbon pricing, particularly for developing countries, is its ability to serve as an important source of government revenue.[80] Developing economies face challenges in generating a sufficient tax base due to large informal sectors.[81]

Risks associated with traditional carbon pricing include concerns about their impact on domestic industries, particularly where they are trade-exposed and where export markets do not impose similar carbon prices on goods and services. Proponents of carbon pricing argue that issues such as these can be addressed, for example,

75. Aldy and Stavins, see n 20.

76. World Bank, see n 4.

77. Baranzini et al "Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations" (2017) WIREs *Climate Change.*

78. World Bank, see n 4.

79. World Bank, see n 4., and the Partnership for Market Readiness, see n 12.

80. A recent analysis by the International Monetary Fund suggests that a carbon price of US$70/t$CO_2$e has the potential to create revenues of 1–3% of GDP for most countries, and approximately 2–4% of GDP in major developing countries such as China, India and South Africa (IMF [2019] "Fiscal Policies for Paris Climate Strategies – From Principle to Practice" Policy Paper No. 19/010.)

81. Partnership for Market Readiness, see n 12.

through free allowances/tax deductions to emission-intensive trade-exposed (EITE) sectors. However, the design process can be complex, particularly for developing countries, as they would need to identify the sectors requiring compensation without undermining the effectiveness and integrity of the carbon price design.[82]

Carbon pricing also requires alignment with existing energy taxes. Such taxes indirectly put a price on carbon and are currently responsible for the largest share of the effective carbon rate.[83] If a country already has relatively high energy-related taxes, then it may not agree to a further explicit carbon pricing instrument that would increase the effective carbon rate even further,[84] on the understandable basis that such taxation might result in undesirable or disproportionate impacts.

Similarly, an ETS and carbon taxes can be administratively burdensome and, subject to their design, can require a complex architecture of institutions. This is particularly the case for ETSs, making carbon tax systems relatively preferable from an implementation perspective. Such systems also require enforcement capacity, again something that is a challenge in a number of developing countries. At a minimum, and subject to the design of the carbon pricing instrument, countries would most likely require a comprehensive monitoring/estimation and reporting framework for the GHGs or inputs/outputs on which the price is imposed, a system that many sub-Saharan countries are still in the process of developing.

In relation to implicit carbon pricing, electricity and fuel taxes, for example, are particularly important sources of revenue for low- and middle-income countries and may be unpalatable to do away with. While this has prompted some to argue that carbon pricing instruments also offer a large potential for revenue generation,[85] if inappropriately designed, they have the potential to be regressive (depending on what they are applied to).[86] Such a regressive effect can affect low-income households particularly. This prompts the need for cautious tax design to ensure that these impacts are addressed through other tax offsets and incentives.

The OECD also highlights that, at least in relation to the need for cooperation between countries regarding carbon pricing, the convergence of carbon prices across jurisdictions might result in undesirable distributional consequences, most notably in the event that low-income countries are faced with a similar carbon price

82. Ibid.

83. OECD, see n 12.

84. Ibid.

85. Partnership for Market Readiness, see n 12.

86. Ibid. For example, it was highlighted that taxes on heating fuels are slightly regressive, while electricity taxes are clearly regressive. However, taxes on transport fuels are not typically found to be regressive, as poorer households are less likely to use transport fuels (Flues F and Thomas A [2015] "The Distributional Impacts of Energy Taxes." OECD Taxation Working Papers 23, OECD Publishing, Paris).

to high-income countries.[87] While uniformity or coherence in the amount of a carbon price may be useful for economic efficiency reasons, it may not be desirable from an equity perspective. This is because carbon prices in low-income countries may have a greater impact on households compared to those in developed countries. It could, for example, aggravate energy poverty and contribute to the lack of access to energy products for some households, which is particularly relevant for low-income households.[88] This underscores the need for the implementation of a carbon price that is suited to domestic needs. It also underscores the fact that carbon pricing can have a disproportionate impact on low-income households (because of energy reliance) and that attempts to align pricing at a global level may have different equity impacts across countries.

As the above illustrates, explicit and implicit carbon pricing can offer considerable opportunities to developing countries, particularly in relation to revenue generation and the achievement of other macro-economic and sustainable development goals. Careful design and consideration of national circumstances, however, is critical to ensure competitiveness and avoid regressive impacts or competitiveness concerns. Further, and as suggested throughout this analysis, the nature of the instrument should not only be tailored to domestic administrative and capacity constraints, but it should also account for the nature of the emission profile, the capacity for sequestration and other variables.

1.3 STATUS OF CARBON PRICING GLOBALLY

Globally, 57 carbon pricing initiatives in the form of either an ETS or a carbon tax or a combination of both have been implemented or are scheduled for implementation.[89] At present, 46 national and 28 subnational jurisdictions have taken such steps, as illustrated in Figure 2. As this figure demonstrates, currently only South Africa has implemented a carbon tax, while Senegal and the *Côte d'Ivoire* are exploring the option of a carbon price.

Of the 181 NDCs submitted under the Paris Agreement, 96 mentioned carbon pricing, either in the form of a domestic carbon price or by referring to carbon markets as a means to achieve the NDC. Nearly half of these NDCs (84) mentioned only the international market as a means, it appears, to achieve the objectives of the NDC.[90] Only five NDCs made any mention of domestic carbon pricing and only seven mentioned both international and domestic carbon pricing. Of these NDCs, *Côte*

87. OECD, see n 12.

88. Ibid.

89. World Bank, see n 4.

90 Ibid.

d'Ivoire and Egypt referred to an ETS, while South Africa and *Côte d'Ivoire* mentioned a carbon tax. To date, there has been little expressed or clear commitment in other countries to developing a carbon tax, an ETS or a hybrid of these instruments at a domestic level.

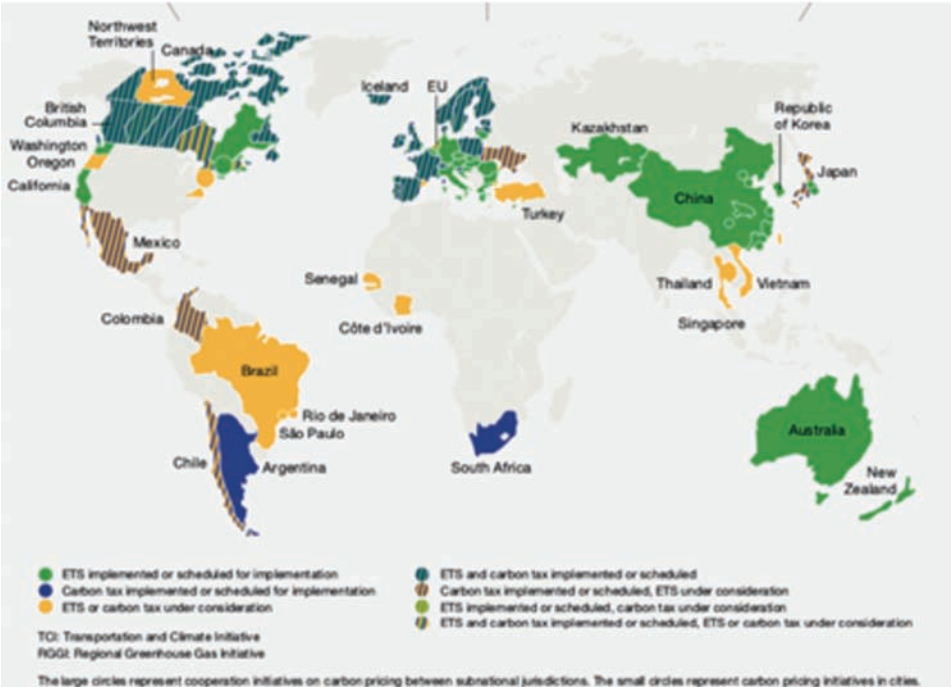

Figure 2, Global Carbon Pricing Initiatives [91]

91. Figure 2 source: World Bank "State and Trends of Carbon Pricing 2019".

PART 2 POLITICAL DISCUSSIONS ON CARBON PRICING IN AFRICA

2.1 INTRODUCTION

There has been considerable discussion around whether African countries should introduce a carbon price within their domestic systems.[92] Moreover, as discussed below, in addition to South Africa's carbon tax, Burkina Faso, *Côte d'Ivoire*, Rwanda, Senegal and Nigeria are ostensibly also considering or advancing carbon pricing.[93] African interest in fossil fuel subsidy reform is also growing. Whether or not there is a wider appetite for introducing carbon pricing at a domestic or regional scale in the form of a tax or ETS, depends on the definition of "carbon pricing" when expressed in regional and national statements of intent, as this is not clearly defined. This is particularly relevant given that many expressions of intent refer to pricing in the context of the international market. The introduction of carbon pricing mechanisms in the form of an ETS or carbon tax both domestically and regionally also requires considered attention to ensure that imposing a domestic price on carbon is appropriate in the first instance and, if it is, that the instrument chosen is suitable to national circumstances and appropriately tailored.

2.2 INTEREST IN AFRICA GENERALLY

While developed countries are taking the lead in the implementation of carbon pricing, developing countries are implementing readiness activities,[94] and early indicators in sub-Saharan Africa suggest a growing appetite for carbon pricing initiatives on the continent. In 2015, NDCs suggested that the majority of African countries (35) sought to rely on international market instruments like the new Article 6 mechanism to help finance mitigation activities. Their collective expression of intent was that they wished to be sellers of carbon credits to the international market (see also above).[95] Of the 7 sub-Saharan African countries reviewed, only South Africa

92. These include the discussions and presentations at the recent Africa Climate Week in Ghana, 2019. See "Climate Action in Africa: A race we can win" (2019) *Carbon Mechanisms Review* 01; and Promethium Carbon and Climate Legal *Synthesis Report: Carbon Pricing Approaches in Eastern and Southern Africa* 2019, available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/28237/Carbon.pdf?sequence=1andisAllowed=y.

93. According to the summary of the Africa Climate Week on 19 March 2019, available at: https://www.carbonpricingleadership.org/news/2019/3/21/africa-climate-week-carbon-pricing-seen-as-key-tool-to-drive-sustainable-development-and-social-benefit.

94. Ibid.

95. Greiner S, Howard A, Hadji Mbaye Diagne E and Martins G "Will Carbon Pricing Emerge in Africa as Well" *Climate Focus* (2016). Available at: https://climatefocus.com/sites/default/files/IETA%20GHG%20Report%202016%20%28Sandra%29.pdf

expressed a firm intention, in its NDC, to pursue domestic carbon pricing in the form of a carbon tax (which came into force on 1 June 2019).

Since the submission of NDCs, a number of countries north of the equator, including Burkina Faso, *Côte d'Ivoire*, Nigeria, Rwanda and Senegal have expressed an interest in advancing carbon pricing at a domestic level.[96]

Nascent interest in carbon pricing at a regional level is slowly emerging, although discussions remain very much in the early stages. For example, two new regional groups, the West African Alliance on Carbon Markets and Climate Finance (WAA), and the East African Alliance on Carbon Markets and Climate Finance (EAA), have expressed an interest in regional carbon pricing initiatives, possibly including traditional carbon pricing mechanisms. To date, however, most countries, particularly those below the equator, have not explored carbon pricing in the form of an ETS or carbon tax. Instead, the focus tends to remain on traditional forms of international carbon pricing such as CDM, or its successor under Article 6 of the Paris Agreement, as well as REDD+, as a form of RBCF.

2.3 SUB-SAHARAN AFRICAN INTEREST

2.3.1 NATIONAL STATEMENTS OF INTENT

A review of the 19 NDCs for sub-Saharan African countries, contained in Annexure 1 to this study, confirms that 12 referred to carbon pricing. However, they primarily did so in the international context, positioning themselves as sellers of credits or offsets to the international market, and thus participating in international carbon pricing. Kenya, Lesotho and Zambia also stated that they did not rule out the possibility of using the international market to meet their mitigation objectives in their NDCs. Only South Africa expressly referred to a carbon tax, and no countries made any reference to an ETS. Many countries, such as Angola, the DRC, Madagascar, Malawi, the Republic of the Congo and Zambia, made express references to the use of REDD+ in their NDCs and they itemised the relevance of various country projects to the realisation of their mitigation goals.

This highlights the potential for RBCF in this area and the role of non-traditional carbon pricing mechanisms. It also demonstrates that, while there may not have been a widespread appetite for domestic carbon taxes and ETSs at the time the NDCs were devised, there was certainly a recognition of the value of sequestration activities, particularly REDD+, in attracting the necessary financial support for such

96. According to the summary of the Africa Climate Week on 19 March 2019, see: https://www.carbonpricingleadership.org/news/2019/3/21/africa-climate-week-carbon-pricing-seen-as-key-tool-to-drive-sustainable-development-and-social-benefit.

measures. In summary, it appears that, where NDCs make mention of carbon pricing, this does not include either a tax or an ETS. Further, while there are limited references to carbon pricing, including tax, in some of the country documents reviewed, these are cursory preliminary expressions of possible intent and are not a detailed exposition of an intention to develop a formal pricing regime at a national level.

Current expressions of intent are limited to Kyoto-derived, project-based activities with the in-country value of carbon understood as that determined by traditional market dynamics underpinning prices of carbon credits. They also anticipate a more expansive carbon pricing future by demanding a material role in negotiations of Article 6. This approach is unsurprising because, among other things, the exposure of many sub-Saharan countries to carbon pricing to date has been to traditional approaches such as the CDM. Article 6 negotiations and their future are still underway and carbon pricing in the literature is typically limited to more elaborate mechanisms such as a tax or an ETS. There is also a paucity of research on or analysis of what might be encompassed by a more expansive view of carbon pricing (to include RBCF, for example), particularly in Africa. Consequently, there is no information that may inform NDC's references to carbon pricing in this expanded sense.

Since 2015, when the INDCs (now the NDCs) were drafted, there appears to have been a small increase in traditional carbon pricing approaches (carbon taxes and ETS), but there is little evidence of this in formal statements, and it is mostly in the form of expressions of intent from regional bodies and forums. For example, at the Africa Climate Week 2019 in Ghana, it was recognised that, given the continent's low contribution of just 3% to global emissions, achieving mitigation is not a central priority.[97] Rather the priority is to make financial resources available to benefit broad sections of the African population and to promote sustainable development.[98] Accounts of the event by the *Carbon Mechanism Review* suggest that the parties considered the introduction of a carbon tax or the withdrawal of fossil fuel subsidies as a means of such revenue generation.[99] Similarly, the World Bank said one of the key outcomes of the event was that "carbon pricing [was] seen as a key tool to drive sustainable development and social benefit" and "[m]omentum for carbon pricing [was] building in Africa, but more [needed] to be done to expand the coverage of initiatives across the continent".[100] Another outcome was continued exploration of

97. See the summary of the Carbon Pricing Leadership Coalition full-day event in: "Climate Action in Africa: A race we can win" (2019) *Carbon Mechanisms Review* 01.

98. Ibid.

99. Ibid.

100. World Bank/Carbon Pricing Leadership Coalition, Africa Climate Week "Carbon pricing seen as key tool to drive sustainable development and social benefit", 21 March 2019. Available at: https://www.carbonpricingleadership.org/news/2019/3/21/africa-climate-week-carbon-pricing-seen-as-key-tool-to-drive-sustainable-development-and-social-benefit.

ways to conduct country- and regionally-specific carbon pricing research in Africa and to increase collaboration and expand capacity building.[101] Analysis of the Week did not unpack what was meant by "carbon pricing", but the nature of discussions implies that it included the traditional carbon pricing mechanisms.[102]

Interest in Article 6 of the Paris Agreement and in practical project implementation is growing in sub-Saharan Africa. Nigeria, for example, is currently being supported by the WAA on the topic of how carbon markets can support NDC implementation, what institutional set-up will need to be established, including Monitoring Reporting and Verification capacities, and how the future of CDM activities can look.[103] Virtual Article 6 pilot projects are also being designed with the support of the Swedish Energy Agency (SEA) in several developing countries. This includes assessing the country context of specific African countries and simulating how their recent experiences with green bonds may be combined and further leveraged by Article 6.[104]

2.3.2 REGIONAL STATEMENTS OF INTENT

Two alliances on carbon markets and climate finance have recently been established in the region, namely the WAA, and the EAA. The WAA has 16 member states and aims to provide the West African Economic Area (ECOWAS) with "early access to carbon markets and climate finance" by means of cooperation and capacity building.[105] Specifically, it seeks:

- to enhance the long-term position of West African countries to participate in international carbon markets, benefit from technology transfer and access results-based climate finance for NDC implementation;
- to promote access to market mechanisms, climate finance and carbon pricing opportunities on a national and regional level; and

101. Ibid.

102. Examples of countries implementing or considering implementing carbon pricing given in the discussion were Burkina Faso, *Côte d'Ivoire*, Rwanda, Senegal and South Africa. These are all countries that are considering/investigating or have implemented an ETS or carbon tax.

103. Krämer N, Hoch S, Fall Sarr O, Chagas T, Hunzai T, Michaelowa A and Greiner S "Policy Brief: Africa is getting Ready for Article 6" *Climate Finance Innovators* (November 2018). Available at: https://www.climatefinanceinnovators.com/publication/africa-is-getting-ready-for-article-6/.

104. Ibid. The United Nations Development Programme (UNDP) describes green bonds as being used to mobilise resources from domestic and international capital markets for climate change adaptation, renewable energy and other environment-friendly projects, by specifying that their proceeds must be invested in projects that generate environmental benefits. Green bonds operate in similar fashion to other financial bonds, in that the bond issuer seeks to raise a fixed amount of capital, by seeking investment in the bond, with the intention of repaying the capital amount and accrued interest, over a set period of time. The issuer will need to generate sufficient cash flows to repay interest and capital (See: https://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/green-bonds.html).

105. See https://www.westafricaclimatealliance.org.

- to manage the transition of CDM-related capacity and projects to the Paris Agreement context, engaging in pilots on the ground.[106]

There is a lack of clarity about what is meant by the objectives of "carbon pricing" for the WAA, however early indicators suggest that it may also include domestic carbon pricing initiatives such as a carbon tax and ETS in some jurisdictions. At the African Climate Week, attendees discussed the possibility of a West African Carbon Facility that, together with green bonds, would assume responsibility for the development and financing of climate project activities and the marketing of ITMOs under Article 6. Attendees discussed the possibility of an exchange of ITMOs within the Climate Alliance to achieve national NDCs, in the sense of creating a form of ETS to meet NDC objectives within the region.[107]

The EAA, with a membership of six East African states,[108] was established in June 2019. Among other things, it seeks to promote a common vision of carbon markets and climate finance in the region. Some of its support functions will include calculating the standardised baseline for the Grid Emission Factor (GEF) for the Republic of Kenya, an upcoming training course for East African negotiators on market mechanisms and Article 6, and increasing knowledge of carbon markets in the transition from the CDM to the Article 6. It is not clear what the common vision is in relation to "carbon pricing" and whether this would include carbon tax/ETS or whether the focus is primarily on mechanisms such as RBCF and Article 6.

Lastly, the Vulnerable Twenty (V20) Group of Ministers of Finance (of the Climate Vulnerable Forum that includes the Comoros, the DRC, Kenya, Madagascar, Malawi, Rwanda and Tanzania) has expressed a regional intention in relation to carbon pricing. Specifically, it has called for:

> fossil fuel subsidies to be removed by no later than 2020, using the Global Twenty to set a deadline for the elimination of such subsidies; and working towards implementing 'carbon pricing mechanisms', by 2025; calling on the G20 to lead, with the V20, in a drive towards 'ensuring all emissions are subjected to carbon pricing'.

The documents underpinning this statement do not elaborate on what is meant by "carbon pricing". The NDCs for these countries suggest that it would entail projects similar to the CDM but, mindful of the expressions of interest in West Africa, it may also be an indication of a desire to implement regional ETS systems.

Based on the above, there appear to be early moves at a regional level to foster momentum for carbon pricing in the form of an ETS or carbon tax, particularly in

106. Ibid.

107. "Climate Action in Africa: A race we can win" (2019) *Carbon Mechanisms Review* 01.

108 Inducing **Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda.**

West Africa. There is also interest in the removal of fossil fuel subsidies. However, the viability of such instruments and approaches, particularly more sophisticated versions, including a carbon tax and an ETS, needs to be considered, particularly taking into account national circumstances, sources of and volume of emissions and sinks, and socio-economic vulnerabilities. The final analysis in Part 3 of this study will attempt to undertake such an exercise in selected countries, where the appropriateness of various carbon pricing mechanisms will be interrogated. In particular, the analysis will seek to approach and consider the suitability of the continuum of carbon pricing instruments, ranging from ETS and taxation to those adopting a more project-based approach, as well as implicit mechanisms. It will also address some of the social aspects of carbon pricing, using South Africa as a case example.

2.4 SOCIAL ACCEPTANCE OF CARBON PRICING

A number of studies on the social acceptance of carbon pricing have risen in prominence as new lessons are being learnt on the importance of designing carbon pricing instruments to facilitate public acceptance and ultimate implementation.[109]

The OECD has also suggested that public acceptance of carbon pricing can be increased through revenue recycling measures, including:

- alleviating the detrimental impacts of carbon prices on income distribution and on poor households by lump-sum transfers, thereby preventing energy poverty;
- redistributing tax revenues by lump-sum transfers, as shown by polls from British Colombia (although lump-sum transfers are economically not as efficient as reducing distortionary taxes, they tend to be more salient, thereby increasing public acceptance and support for higher taxes in the future); and,
- financing public goods, such as investments in infrastructure, education and health.[110]

Revenue recycling and the rectification of distributional impacts are, however, not the only means to achieve public acceptability. As a recent study by Klenert *et al* suggested, [111] the local context (including socio-economic considerations as well attitudinal [including cultural] approaches to carbon pricing) is critical in fostering public acceptability, as are social views in determining the appropriate form of revenue recycling. Their study reviewed the literature on behavioural economics

109. See, in particular, Klenert D, Mattauch L and Combet, E "Making carbon pricing work for citizens" (2018) *Nature Climate Change* 8. DOI: 10.1038/s41558-018-0201-2.

110. OECD 2019, see n 24.

111. Klenert *et al*, see n 111.

and political science and suggested that the primary challenge for policymakers in the passage of a carbon pricing policy is the garnering of political acceptability.[112] In other words, the key issue remains not just efficiency and equity but also how to ensure that carbon pricing reform can be implemented for political reasons.

In this context, the authors pointed to the importance of recycling revenue measures and tailoring these to local perceptions, particularly political, cultural and economic beliefs.[113] They noted that the public has a tendency to become "solution adverse" if a policy solution challenges or contradicts underlying ideological predispositions.[114] For example, in the United States, Conservatives tend to prefer subsidies to taxes, and this can trigger their solution aversion if carbon taxes are proposed. Thus, from an acceptability perspective, the authors advised policymakers to avoid triggering solution aversion when designing revenue recycling measures.[115] The authors also observed that the public have a tendency to cast doubt on the extent to which carbon pricing can correct the negative externalities as it is designed to, and that this needs to be addressed, for example, through revenue earmarking such as green spending or transfers to disadvantaged households. In other words, instead of putting carbon revenues into the general budget, public acceptability increases when revenues are earmarked for specific purposes, such as green investments or transfers to particularly affected groups.[116] A further consideration is that the desirability of the carbon price is impacted by what it is called. For example, calling a tax a "fee", "levy" or "climate contribution" (instead of a tax), could avoid negative public perceptions and increase public acceptability.[117] Further, it has been considered helpful to make carbon pricing revenue recycling more visible; for example, transfers to households or public investment are more visible than tax cuts.[118] All of the above highlight the imperative to introduce forms of carbon pricing that are socially and culturally palatable, and the importance of messaging and incentives in doing so, underscoring the layers of research and in-country knowledge necessary to tailor an appropriate instrument.

Lastly, in relation to economic science, cross-national studies suggest that ambitious levels of carbon pricing are often correlated with high political trust and low corruption levels. If public trust is high in a particular country, then public acceptance of carbon pricing tends to follow suit, and elevated price levels underpin this confidence.[119] If

112. Ibid.
113. Ibid.
114. Ibid.
115. Ibid.
116. Ibid.
117. Ibid.
118. Ibid.
119. Ibid.

public trust in government is low, however, the suggestion is for any carbon revenues to be recycled in a manner that is transparent and engenders trust that revenues will not be used for corrupt purposes. The authors are of the view that the form of revenue recycling should be tailored to the socio-economic context, and should take prevailing local political and behavioural considerations into account. They also comment that policy reform has greater prospects of success if the costs/benefits of that reform are spread across society instead of its benefits being concentrated in one sector, while noting that carbon pricing tends to be the converse of this situation, with concentrated costs and scattered benefits.[120] Scattered beneficiaries were found to be less likely to support carbon pricing policy development process than is a concentrated group of constituencies that anticipate being benefitted, and so are more likely actively to support the passage and preservation of the policy.[121]

The importance of fostering social and, ultimately, political acceptability is highlighted by the promulgation of the South African Carbon Tax Act (no. 15 of 2019). After almost a decade of policy development and public consultation, South Africa finally brought the Carbon Tax Act into effect, on 1 June 2019. The inordinate delay in the promulgation of the tax, flagging economic growth and rising unemployment rates allowed public sentiment against the tax to fester. A critical element in the lack of public support for the tax was civic cynicism and distrust in government, an issue flagged by Klenert *et al* in their study above. In South Africa, the government had specifically eschewed earmarking or dedicating revenue generated as a result of the tax to renewable energy or other revenue recycling measures, preferring rather to "soft earmark" them. Among other things, the amount of revenue that was expected to be generated was insufficient to dedicate to specific programmes.[122] The concession to apply some of the funds generated only arose after considerable debate and criticism by business and the public on the lack of revenue recycling. As a consequence of this original design, the public perceived that the tax was simply a revenue-raising exercise,[123] and the longer-term impacts of this perception have

120. Ibid.

121. Ibid.

122. Namely, "there would be efforts to 'recycle' it to support initiatives such as the installation of solar water geysers and free basic electricity for poor households". At the Parliamentary Portfolio Committee Hearings, it was stated "earmarking it for environmental purposes only would be difficult because the range of incentives meant that as little as 5% of emissions might be taxed. This would be insufficient to support specific programmes. However, Treasury was committed to various ways of recycling the revenue, as outlined in the tax proposals" (see https://pmg.org.za/committee-meeting/28056/). See, however, Ed Stottard "South Africa's carbon tax raises questions and hot air" Daily Maverick 3 June 2019, where it is stated that "…according to February budget forecasts put out by South Africa's Treasury, carbon tax collection for the 2019/20 financial year is estimated to come to R1.8-billion."

123. Parker M, Gilder A and Rumble O "South Africa: Carbon Tax – Meaning and Context" (2015). Available at: http://www.mondaq.com/southafrica/x/450644/Climate+Change/Carbon+Tax+Meaning+And+Context.

yet to be seen, particularly in relation to tax avoidance and simply a refusal to pay it (as a point of moral opposition).

Public attitudes to the tax have also worsened as the costs of electricity dramatically increased prior to the tax's implementation, for reasons unrelated to the tax. These perceptions were fuelled by media statements by entities likely to be heavily impacted by the tax.[124] The negative public sentiment about the tax arose notwithstanding the fact that South Africa had already , for many years, had a form of carbon tax on multiple products, including new vehicles and incandescent lightbulbs, although they were never labelled as "carbon taxes". In consequence, the tax was perceived as being new, draconian, and simply a means of generating revenue for government on an already highly taxed industry base.

The above underscores the importance of avoiding delay, the effects of how a tax is labelled, public consultation on tax design, and the necessity for revenue recycling measures, particularly where there are low levels of confidence in the government. In this context, a particularly important aspect is to ensure that the tax is not regressive and that commitments are made upfront to avoid negative impacts, particularly on energy-reliant low-income households, if indeed a country elects to pursue such a traditional carbon pricing instrument. It also highlights that not only may traditional carbon pricing instruments face challenges in implementation and application in sub-Saharan Africa for financial and emission base reasons, but that considerable effort is also required to foster supportive public sentiment.

2.5 CARBON PRICING MECHANISMS FOR MITIGATION AND SEQUESTRATION

2.5.1 CARBON SEQUESTRATION

Numerous sub-Saharan African countries are involved in carbon sequestration projects in the forestry sector in recognition of their ability to serve as effective sinks that absorb excess CO_2 from the atmosphere. Finance flows to forest carbon projects developed in these countries based on verified emission reductions (known as "offsets" when purchased by buyers). Beyond these finance flows, such projects also offer co-benefits such as job creation, land tenure reform, women's empowerment and biodiversity protection.[125] Carbon sequestration thus provides economic, social and environmental benefits particularly relevant for sustainable development in Africa.

124. See for example Khumalo S "Sasol says proposed carbon tax will cost it R1 billion a year" 20 August 2018 available at: https://www.fin24.com/Companies/Industrial/sasol-says-proposed-carbon-tax-will-cost-it-r1-billion-a-year-20180820 and Creamer T "SA's leading steel producer gears up for carbon tax battle" 4 June 2013. Available at: http://m.engineeringnews.co.za/article/sas-leading-steel-producer-gears-up-for-carbon-tax-battle-2013-06-04.

125. Goldstein A Not So Niche Co-benefits at the Intersection of Forest Carbon and Sustainable Development, (Ecosystem Marketplace, 2016).

A review of national planning documents highlights that carbon sequestration is a goal or policy objective of many of the countries under review, included both directly and indirectly as a component of many NDCs and other national development plans and strategies. Countries such as Angola, the DRC, Madagascar, Malawi and Zambia make express references to "reducing emissions from deforestation and forest degradation" (REDD+) and itemise the relevance of various country projects to the realisation of their mitigation goals in their NDCs. Other national plans and strategy documents contain provisions on the promotion of afforestation, reforestation and programmes to limit deforestation, as well as provisions for conservation and the sustainable management and utilisation of forests.

Forestry and land use are further recognised as the project category producing the most offsets in Africa, with activities in REDD+, agroforestry, improved forest management, and afforestation/reforestation projects, among others.[126] The instruments used for these activities include offsets sold on the voluntary carbon markets, which typically follow the rules prescribed by one of the voluntary standard bodies such as the Verra VCS and the Climate Community and Biodiversity Standards (CCBs). A review of the Verra project database shows that projects are based in diverse African countries, including the DRC, Ethiopia, Kenya, Madagascar, Mozambique, South Africa, Tanzania, Uganda, Zambia and Zimbabwe. The 2017 State of the Voluntary Carbon Markets report singles out the DRC, Madagascar and Zambia as countries from which over 75% of the volume and value of the country's carbon offsets were from forestry projects.[127]

REDD+ is especially relevant to African countries as it not only makes provision for social and environmental safeguards but also promises financial opportunities through markets, performance-based payments or aid.[128] As large amounts of funds are needed to finance all phases of REDD+, including readiness, capacity building and piloting, countries are currently pursuing projects in REDD+ with support from various initiatives such as the UN-REDD Programme, the Forest Carbon Partnership Facility (FCPF), and the Central African Forest Initiative (CAFI), which seeks to support REDD+ in Central Africa.

Notable projects include Kenya's Wildlife Works *Kasigau* Corridor REDD+ Project, which was successfully validated and verified under the VCS and the CCB, making it the world's first REDD+ project to receive issuance of carbon credits. It is the world's first VCS REDD+ mega-project, resulting in the avoidance of over 1 million tCO_2e

126. Hamrick K and Gallant M *Unlocking Potential: State of the Voluntary Carbon Markets 2017 (Regional Analysis*), (Ecosystem Marketplace, 2017).

127. Ibid., see n 7.

128. Belachew Gizachew *et al*, *REDD+ in Africa: Contexts and Challenges*, (Natural Resources Forum, 2017).

annually for 30 years.[129] It demonstrates the potential for innovation in sequestration projects in the continent and, in November 2016, this project was the subject of the issue of the first REDD-linked bond, by the International Finance Corporation (IFC), after its listing on the London Stock Exchange, with investors having the option to be repaid in either cash or carbon offsets.[130]

Financing is also high for REDD+ projects in countries such as Ethiopia, which has announced a new US$68-million project funded by the World Bank and other donors that leverages carbon offsets to help achieve the country's goal to become net carbon neutral by 2025, while its Oromia Forested Landscape Program is set to receive up to US$50 million over the next ten years for verified carbon offsets, along with an additional US$18 million over five years for REDD+ capacity building.[131] In a first of its kind contract, Gabon is also set to receive financing from Norway in a US$150m contract under CAFI as payment for conserving its forests. Under the contract, Norway will pay Gabon US$10 for every ton of carbon not emitted, relative to Gabon's annual average between 2005–2014, up to a maximum pay-out of US$150 million over ten years.[132] Other active countries include the DRC and Mozambique, which have concluded two emission reduction purchase agreements (ERPAs) with the World Bank for RBCF for mitigation in the forestry sector under the FCPF's Carbon Fund.[133] The two countries are the first of 19 countries in the FCPF Carbon Fund to sign such payment arrangements, with the total value of the ERPA for the DRC being US$55 million, while the value for the ERPA in Mozambique is US$50 million, with a goal to mitigate 10 $MtCO_2e$ of emission by 2024.[134]

However, forestry-based carbon sequestration in Africa faces various challenges that hamper the uptake of this mitigation mechanism. For example, there are countries that have had a low level of participation in carbon sequestration activities as they attract limited climate finance for forest conservation, such as high forest, low deforestation (HFLD) in developing countries like the Seychelles. These countries have adopted the Krutu of Paramaribo Joint Declaration on HFLD Climate Finance Mobilisation in February 2019, to express concern that the pace and scale of REDD+

129. Warner M and Peters-Stanley M *Kenyan Carbon Project Earns First-Ever VCS REDD Credits*. Available at :https://www.ecosystemmarketplace.com/articles/kenyan-carbon-project-earns-first-ever-vcs-redd-credits/.

130. Hamrick K, see n 128.

131. Ibid.

132. Business Day, "Gabon's Poor Shrug Off Efforts to Save Forests", 2 October 2019. Available at: https://www.businesslive.co.za/bd/world/africa/2019-10-02-gabons-poor-shrug-off-efforts-to-save-forests/.

133. World Bank, *Mozambique and Democratic Republic of Congo Sign Landmark Deals with World Bank to Cut Carbon Emissions and Reduce Deforestation*, 12 February 2019. Available at: http://www.worldbank.org/en/news/press-release/2019/02/12/mozambique-and-democratic-republic-of-congo-signlandmark-deals-with-world-bank-to-cut-carbon-emissions-and-reduce-deforestation?CID=CCG_TT_climatechange_EN_EXT.

134. Ibid.

financing are inadequate. They have called for increased financing for sustainable forest management and special consideration to be given to HFLD countries.[135]

2.5.2 CARBON PRICING

The uptake of carbon pricing mechanisms for mitigation in Africa can be categorised as involving explicit carbon pricing instruments, such as South Africa's carbon tax signed into law in May 2019, and indirect instruments, such as taxes imposed on energy-inefficient technologies in Uganda, Kenya and Zambia, as well as taxes on fossil fuels, such as in Mauritius and Zimbabwe, all of which serve to reduce carbon emissions.

South Africa's Carbon Tax Act[136] marks sub-Saharan Africa's first explicit carbon pricing mechanism in the form of a carbon tax. Effective 1 June 2019, the tax aims to provide appropriate price signals to help nudge the South African economy towards a more sustainable growth path. Taxpayers are liable for carbon tax should they conduct one of the activities set out in Schedule 3 of the Act above the threshold for that activity. The carbon tax is levied on the sum of GHG emissions from fuel combustion, industrial processes, and fugitive emissions from these activities, calculated by a method approved by the Department of Environment, Forestry and Fisheries. Emitters are required to make tax payments for the period commencing 1 January of each year and ending on 31 December of that year.

The tax is currently set at ZAR120 rand (US$8.30) per tonne of carbon dioxide. A taxpayer may reduce carbon tax liability by utilising various allowances under the Act, including carbon offsets. Pursuant to this, South Africa's Minister of Finance published regulations in November 2019 regarding the use of offsets under the Carbon Tax Act. The trade of such offsets between private parties is likely to foster the future evolution of a hybrid tax and trading scheme. The carbon tax is complemented by a number of other incentives and disincentives applied nationally in terms of other legislation, including an environmental levy on incandescent light bulbs, a carbon emission tax on new vehicles, income tax exemptions for the sale of carbon credits, an energy efficiency tax deduction, and an accelerated depreciation allowance for investments in renewable energy and biofuels.

Many of the other African countries have taken up sector-specific carbon pricing in the form of taxes on inefficient energy technologies or imposing taxes on fossil fuels. For example, Uganda amended its Traffic and Road Safety Act 1998 to outlaw the import of old cars due to environmental concerns. Under this amendment,

135. Available at: https://www4.unfccc.int/sites/SubmissionsStaging/Documents/201903220903---Krutu%20of%20Paramaribo_13-02-19.pdf.

136. Carbon Tax Act, Act No. 15 of 2019.

vehicles older than eight years would have a 50% environmental tax imposed on them, while vehicles between five and eight years old would be subject to a tax rate of 35%.[137] Kenya's Finance Act 2019 has also increased the tax on vehicles running on petrol and with engine capacities of more than 1.5 litres, setting out that, as from 7 November 2019, they would attract excise tax of 25% compared to the previous 20%.[138] In addition, vehicles running on diesel are now liable to excise duty of 35% compared to the previous 30% that applied to models exceeding 2.5-litre engine capacity and 20% on smaller cars.[139] Conversely, excise duty on fully electric cars has been halved to 10% in a bid to encourage the use of cleaner transport technologies.[140] Malawi recently implemented a tax on vehicles to increase government revenue and mitigate climate change impacts. The amount of the tax depends on the engine size or cylinder capacity (cc) of the motor vehicle.[141]

Zambia has also introduced vehicle taxes that indirectly operate as a form of carbon pricing, setting out a once-off flat tax on vehicles more than five years old. It takes the form of a Motor Vehicle Surtax and it is added to import duty, as well as an annual charge on emissions called the Carbon Emissions Surcharge, that is applied on all vehicles based on their engine displacement.[142] The Zambian government has also zero-rated excise duty for electric vehicles and halved their customs duty.[143] However, there have been concerns that these tax developments in Zambia have not been effective in promoting a shift to cleaner vehicles; for example, there have been no electric vehicles registered in the country despite the incentives.[144] In contrast, Kenya has had electric vehicles introduced into the market, with Nopia Ride, an electric vehicle car-sharing firm, beginning operations in 2019. The company's choice of Kenya as an entry point to Africa has included considerations of the wide mobile phone penetration in the market, an indication that, in addition to an enabling fiscal environment, other market dynamics come into play in a country's uptake of the opportunities presented by incentives for cleaner technologies.[145]

137. Republic of Uganda, Traffic and Road Safety Act 1998 (Amendment Bill) 2018

138. Section 26(a)(ii), Laws of Kenya, Finance Act, Act No. 23 of 2019.

139. Ibid.

140. Ibid. See also Juma V "Car Prices Jump After Uhuru Okays New Tax" Business Daily, 12 November 2019. Available at: https://www.businessdailyafrica.com/news/Car-prices-jump-after-Uhuru-okays-new-tax/539546-5346078-12y2t3ez/index.html.

141. See https://malawi24.com/2019/11/23/mra-to-start-collecting-carbon-tax/.

142. UN Environment, "Zambia Proposes a Review of its Carbon Tax to Promote Cleaner Vehicles", 30 November 2018. Available at: https://www.unenvironment.org/news-and-stories/story/zambia-proposes-review-its-carbon-tax-promote-cleaner-vehicles.

143. Ibid.

144. Ibid.

145. AA Kenya, "Electric Car Taking Root in Kenyan Market", 27 January 2019. Available at https://www.aakenya.co.ke/blog/motoring-trends/electric-car-taking-root-in-kenyan-market/.

On imposing taxes on fossil fuels as a form of carbon pricing, Mauritius stands out for its established *Maurice Ile Durable* (MID) levy. Created in July 2008 to finance clean energy projects such as subsidies for compact fluorescent lamps and solar water heaters,[146] the MID levy is set at a uniform 30 cents per litre on all petroleum products, with the taxes passed forward into the price of fuels.[147] While the MID *de facto* imposes a burden on CO_2 emissions, it is not related to the carbon content of fuels or to valuations of externalities from carbon emissions and therefore does not impose a uniform level of taxation on CO_2 emissions.[148] Calls for reform have been made to transition the levy to a fully-fledged carbon tax so as to correctly internalise the CO_2 externality of distinct fuels, thus conveying the correct price signal to the economy.[149] Since 2001, Zimbabwe has also imposed a "carbon tax" on fuel, though the revenue accrued is not recycled for climate change initiatives. In 2017, it was estimated that the carbon fuel tax was US3 cents per litre of petrol or diesel, equivalent to US$13 per tonne of CO_2e for petrol, and US$11 per tonne of CO_2e for diesel.[150] This carbon tax is payable on every litre of diesel or petrol imported into Zimbabwe, though the Minister of Finance may exempt any licenced power generation project that commenced on or after 1 January 2018 from carbon tax liability for a fixed or indefinite period.

2.5.3 FOSSIL FUEL SUBSIDIES

Part 2 of this study underscored the importance of fossil fuel reform. Deeper consideration, however, needs to be given to the implications of the removal of fossil fuel subsidies in sub-Saharan Africa, and more quantitative data is required[151] to understand the full extent of these subsidies and their nature before generalised statements can reliably be made on their reform. As Coady *et al* have suggested, information on the gap between existing and efficient levels of fossil fuel prices is a key ingredient of an informed debate on the need for, and benefits of, fuel pricing reform.[152]

146. Parry IWH, *Reforming the Tax System to Promote Environmental Objectives: An Application to Mauritius*, (Resources for the Future, 2011).

147. Ibid.

148. UNEP, *Green Economy Fiscal Policy Analysis – Mauritius*, (UNEP, 2016).

149. Ibid.

150. The Herald, "Zimbabwe: What Role Can Carbon Tax Play to Achieve Zim's Climate Goals?" 13 November 2017. Available at https://allafrica.com/stories/201711130436.html.

151. Very little up-to-date granular data is available on a country-by-country basis on the amounts of the fossil fuel subsidies, broken down by fuel in sub-Saharan Africa.

152. Coady et al, see n 68. In their analysis, they highlight that such information "provides a basis for understanding the environmental, fiscal, and economic welfare impacts of moving to more efficient pricing, the likely social and political challenges, and a benchmark against which alternative policies (e.g., less ambitious fuel pricing or the use of non-pricing instruments) can be evaluated. This helps policymakers understand trade-offs, prioritize reforms, understand differences across countries, and communicate the case for reform."

What is known at this stage in relation to these subsidies is that, in absolute terms, Africa is a relatively small contributor. When comparing regions and countries in 2015, China was still, by some magnitude, the largest subsidiser (at US$1.4 trillion), followed by the United States ($649 billion), Russia ($551 billion), the European Union ($289 billion) and India ($209 billion).[153] By region, Emerging/Developing Asia accounts for nearly 40% of global energy subsidies, followed by Advanced Economies (27%), Commonwealth of Independent States (15%), Middle East, North Africa, Afghanistan and Pakistan (9%), Latin America/Caribbean (5%), Emerging/Developing Europe (3%), and Sub-Saharan Africa (2%).[154] These figures suggest that, while the exact amount of fossil fuel subsidies in the region remains opaque, and while removal certainly has the potential to offer some benefits, it may introduce competitiveness and food price concerns and increases, with concomitant benefits that have yet to be determined (but which at this stage are relatively questionable in volumetric and global terms).

Notwithstanding levels of uncertainty as to the extent of current subsidies, the New Climate Economy estimates that the amount of subsidies for fossil fuels in sub-Saharan African countries was US$26 billion in 2015, a decrease from 2013 when it was US$32 billion.[155] This decrease was ascribed to a decrease in the price of fossil fuels, which was compensated to a degree by increased demand for energy.[156] Angola, Côte d'Ivoire, Mozambique, Nigeria, South Africa, Tanzania, Zambia and Zimbabwe were identified as providing more than US$1 billion each in fossil fuel subsidies. South Africa was identified as having a rising trend in subsidies, increasing from US$2.9 billion in 2014 to US$3.5 billion in 2016.[157] Focusing on petroleum, coal and electricity subsidies, the cost for all countries rises to US$75 billion in 2015, if externalities such as local pollution, impacts on climate change, road accidents and congestion are included.[158] While fossil fuel subsidy reform to advance global climate goals is supported as a general proposition, further quantitative analysis and assessment of socio-economic impacts should be undertaken to provide better granularity on the extent of subsidies and the likely household impact were they to be removed, as compared to other environmental and health benefits that reform offers. Such data would then be able to better guide sub-Saharan countries in how

153. Coady et al, see n 68.

154. Ibid.

155. Whitley and van der Burg *Fossil Fuel Subsidy Reform in Sub-Saharan Africa: From Rhetoric to Reality* (2015) (New Climate Economy, London and Washington, DC). Available at http://newclimateeconomy.report/misc/working-papers.

156. Ibid. See also Worrall, Whitley and Scott "Reforming Africa's Fossil Fuel Subsidies" (2018) 7(3) *Bridges Africa.* Available at: http://www.ictsd.org/bridges-news/bridges-africa/news/reforming-africa's-fossil-fuel-subsidies.

157. Ibid.

158. Ibid.

to prioritise mitigation efforts, and enable them to make informed decisions as to whether express or implicit measures (or both) should be adopted and the nature of such measures.

PART 3 SUITABLE FORMS OF CARBON PRICING IN AFRICA

3.1 DIFFERENT MECHANISMS FOR DIFFERENT CHALLENGES

While the traditional carbon pricing mechanisms may offer various benefits in particular economic and policy circumstances, they may be inappropriate for many developing and least-developed countries, such as those in sub-Saharan Africa. This could be especially true for least-developed countries that lack the type of institutional and administrative infrastructure required for their implementation and management. Any introduction of carbon pricing *per se*, both domestically and regionally in sub-Saharan Africa, would first require considered attention to determine whether such measures are appropriate. If they are appropriate, then further attention must be given to mechanism design and implementation, suitably tailored to national circumstances.

In order to establish the current potential for carbon pricing within the countries that are included in this study, it was necessary to analyse, compare and contrast their relevant national and economic circumstances. The analysis contained in this Part 3 has been derived by comparing the prevailing in-country situations of these countries with those found in other jurisdictions, including Brazil, Chile, China, South Africa and Vietnam. Germany was also selected to illustrate the difference between the national circumstances in the selected countries and those of a developed country. The countries used as comparators for this analysis are also in the process of developing carbon pricing mechanisms, according to a report published by the World Bank, *State and Trends of Carbon Pricing, 2019*.[159] This provides a balance of developed and developing country carbon pricing examples against which to evaluate the selected countries.

In order to establish the appropriateness of carbon pricing mechanisms in sub-Saharan African countries, three main aspects were assessed within the contexts of the peer group countries mentioned above, namely:

- social and economic circumstances,
- energy profiles, and
- deforestation.

159. See n 4.

3.1.1 SOCIAL AND ECONOMIC CIRCUMSTANCES

Two of the key considerations that inform the design and implementation of carbon pricing in a country are the extent of the national political will to implement such systems, and the economic circumstances in which such a system must operate. As noted in Part 2, countries with greater public distrust of politicians and perceived corruption have generally been robustly associated with weaker climate policies and higher GHG emissions.[160] Similarly, and as noted earlier in this report, studies have demonstrated that trust in politicians is positively associated with support for carbon taxation, with Sweden being one such example.[161] It must be noted, however, that the exemplary carbon pricing model implemented in Sweden is designed within the context of a high-income developed country. The implementation of carbon pricing in developing and least-developed countries in Africa requires consideration of numerous aspects that are not present in developed countries like Sweden. For this reason, there are compelling economic and political questions that need to be considered when designing a carbon pricing mechanism for a developing country. One such primary question is the potential effect that a carbon pricing mechanism would have on a country's GDP.[162] The economic

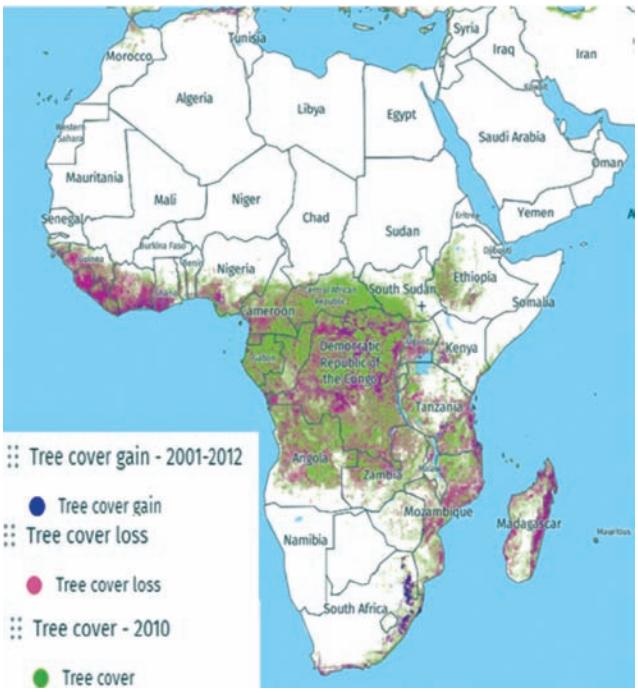

Figure 3. Tree cover and deforestation in Africa (Source: Global Forest Watch https://www.globalforestwatch.org/

160. Klenert *et al,* see n 111.

161. Hammar H and Jagers SC. Can trust in politicians explain individuals' support for climate policy? The case of CO_2 tax. (2006). *Climate Policy* 5, 613–625.

162. The IMF estimates that "the annualized costs of carbon pricing – measured by the economic value of the foregone fossil fuel consumption – are mostly between about 0.1 and 0.5% of GDP for [a]... US$70 carbon price in 2030". These costs can, however, be potentially offset by other co-benefits; for example, domestic environmental co-benefits from reduced fuel use (see IMF above n 6). See also, for example, Mengistu A, Benitez P, Tamru S Medhin H and Toman M "Exploring Carbon Pricing in Developing Countries: A Macroeconomic Analysis in Ethiopia" (2019) 11 (16) *Sustainability*, 4395, where different carbon tax policy options for Ethiopia were analysed. It was noted that in all cases "the impacts of the assumed carbon tax on GDP and its growth are negative, though quite small, across the policy scenarios". Whilst small comparatively, any negative GDP impacts in African countries are to be taken account of when considering policy design. In South Africa, projections estimated that a carbon tax would reduce GDP marginally by

circumstances and data of each of the selected countries were analysed within this context.

3.1.2 ENERGY PROFILES

There is no "one size fits all" carbon pricing mechanism. Being a substantial source of emissions, a country's energy profile is an essential factor to consider when designing a carbon pricing mechanism for a specific country. Many of the selected countries have energy sectors that are emission-intensive, as they rely upon renewable energy resources such as hydro-electric power. As such, an explicit carbon pricing mechanism such as a carbon tax, which is generally implemented in emission-intensive economies with a heavy reliance on fossil fuel-based energy resources, would not be appropriate in countries that rely on renewable energy resources, which are not emission-intensive. In order to establish which carbon pricing mechanism would be most suited to specific energy circumstances, the energy profiles of the countries were compared to one another and to those of the peer group countries mentioned above.

3.1.3 DEFORESTATION

Deforestation is a major concern all over the world. From 2001 to 2018, there was a total of 361 Mha of tree cover loss globally, equivalent to a 9.0% decrease in tree cover since the year 2000 and 98.7 Gt of CO_2 emissions. As can be seen in Figure 8, deforestation is a severe issue in central African countries. However, there are possibilities to develop and implement carbon pricing mechanisms to curb deforestation and incentivise reforestation in these countries. Doing so can contribute significantly to decreasing the concentration of global GHGs.

3.2 METHODOLOGY FOR THE SELECTION OF COUNTRIES

The project team considered two main aspects that determined the countries for further assessment:

- GHG emissions (including land use, land use change and forestry [LULUCF]) per capita (tCO_2e/capita); and
- GHG emissions per GDP (tCO_2e/GDP)

The selection of the countries was informed by the large variability and considerable differences between the countries, in terms of both GHG emissions per capita

between 0.05–0.15 percentage points compared to a BAU scenario (Partnership for Market Readiness "Modelling the Impact on South Africa's Economy of Introducing a Carbon Tax" (2016).

and GDP. By using median approaches and the highest and lowest ranking of each, the analysis was able to reflect this variability. By avoiding countries that are homogenous in terms of GHG emission intensities, the analysis was able to address the full remit of variability in the circumstances and thus the variability in approaches required between countries.

The values for the per capita emissions (including LULUCF) are shown in Table 1 below.[163] In order to obtain a widely representative spread of the GHG emission profiles for the countries, the selection included countries that are furthest from the median, Gabon and Zambia, as well as one of the countries which was closest to the median – the Republic of the Congo.

Table 1: Per capita emissions of sub-Saharan countries (including LULUCF)

Country	Per capita emissions	Comments
Gabon	-46.33 tCO_2e/capita	Selected as furthest from the median on the low side
Kenya	0.64 tCO_2e/capita	
Malawi	0.89 tCO_2e/capita	
Uganda	1.54 tCO_2e/capita	
Lesotho	1.94 tCO_2e/capita	
Madagascar	2.06 tCO_2e/capita	
Madagascar	2.06 tCO_2e/capita	
DRC	2.80 tCO_2e/capita	
Median value	3.96 tCO_2e/capita	
Republic of the Congo	3.96 tCO_2e/capita	Selected as closest to the median
Zimbabwe	4.14 tCO_2e/capita	
Mauritius & Senegal	4.62 tCO_2e/capita	
Tanzania	5.48 tCO_2e/capita	
Namibia	8.29 tCO_2e/capita	
Angola	9.36 tCO_2e/capita	
South Africa	9.74 tCO_2e/capita	
Seychelles	15.51 tCO_2ecapita	
Botswana	16.83 tCO_2e/capita	
Zambia	24.32 tCO_2e/capita	Selected as furthest from the median on the high side

163. CAIT Climate Data Explorer (2017). Washington, DC: World Resources Institute. Available online at http://cait.wri.org.CAIT data is derived from several sources. In relation to LULUCF, sources include FAO 2016, FAOSTAT Emissions Database and, in relation to CO_2 emissions from fuel combustion, from CO_2 Emissions from Fuel Combustion, OECD/IEA, 2016.

The values for the emission intensity of the respective country GDPs are set out in Table 2 below.[164] In order to ensure a widely-representative spread of the emission-intensity profiles for the economies of the countries, the countries that are furthest from the median, namely Gabon and Zambia were selected, as well as the country closest to the median, but not selected from the per capita emission list – Namibia.

Table 2: Emission intensities of the economies of sub-Saharan countries

Country	Emission intensity of GDP	Comments
Gabon	-2 778 tCO_2e/US$ GDP	Selected as furthest from the median on the low side
Kenya	231 tCO_2e/US$ GDP	
Mauritius	253 tCO_2e/US$ GDP	
Lesotho	416 tCO_2e/US$ GDP	
Seychelles	680 tCO_2e/US$ GDP	
Republic of the Congo	715 tCO_2e/US$ GDP	
South Africa	781 tCO_2e/US$ GDP	
Malawi	821 tCO_2e/US$ GDP	
Namibia	861 tCO_2e/US$ GDP	Selected as close to the median
Median Value	926 tCO_2e/US$ GDP	
Uganda	926 tCO_2e/US$ GDP	(already selected in per capita emission list)
Botswana	1 058 tCO_2e/US$ GDP	
Angola	1 496 tCO_2e/US$ GDP	
Madagascar	1 498 tCO_2e/US$ GDP	
Madagascar	1 498 tCO_2e/US$ GDP	
Zimbabwe	2 169 tCO_2e/US$ GDP	
Mozambique	2 318 tCO_2e/US$ GDP	
Tanzania	2 352 tCO_2e/US$ GDP	
DRC	3 864 tCO_2e/US$ GDP	
Zambia	6 695 tCO_2e/US$ GDP	Selected as furthest from the median on the high side

164. Source: Our World in Data. Available at: https://ourworldindata.org/grapher/average-real-gdp-per-capita-across-countries-and-regions (Note Senegal was included at a later stage of developing this report and thus was not addressed in this table)

Mauritius was selected in addition to the above as it represents a further outlier with respect to the structure of the economy, and it is a small island developing state (SIDS). Similarly, Senegal was added on the basis that it is currently considering a carbon tax and because it offers a north-equatorial perspective.

The final selection of seven countries was therefore:

- The Republic of the Congo
- Gabon
- Mauritius
- Namibia
- Senegal
- Uganda
- Zambia.

3.3 ECONOMIC CIRCUMSTANCES IN SUB-SAHARAN AFRICA

This study was premised on the assumption that any market-based mechanism must be appropriate and adaptable according to the economic condition of a country. Ideally, any carbon pricing mechanism would need to foster a transition to a low carbon economy and society, while stimulating economic growth and creating the least possible negative economic disruption. Although growth in sub-Saharan Africa is generally recovering, the economic circumstances in the selected countries are still weak in comparison with other developing countries where a carbon price has been implemented, as illustrated by Figure 4, below. Given the financial constraints of these countries and the likely expense of a traditional carbon pricing mechanism (as well as the risks and uncertainties associated with shifting or reducing existing taxes in order to mitigate such impacts), and the general lack of available financial resources to fund emission-reduction projects that have the potential to stimulate national carbon markets, RBCF (as discussed in Part 1) is considered to be the most appropriate form of carbon pricing in countries with low GDP per capita figures.

Based on Figure 4 below and on international best practice, it must also be noted that the development and implementation of explicit carbon pricing mechanisms in developing countries are not impossible. There are examples developing countries whose economic and other national circumstances allowed them to implement explicit carbon pricing mechanisms successfully. One such example is China, which has continued to work on the implementation of its national ETS since its

official launch in December 2017. As illustrated in Figure 5, however, China has experienced a consistent increase in its GDP/capita rate since 2000, which creates a favourable environment for implementing a carbon pricing mechanism. Considering this, economic growth within a developing country is key when considering the implantation of an explicit carbon pricing mechanism.

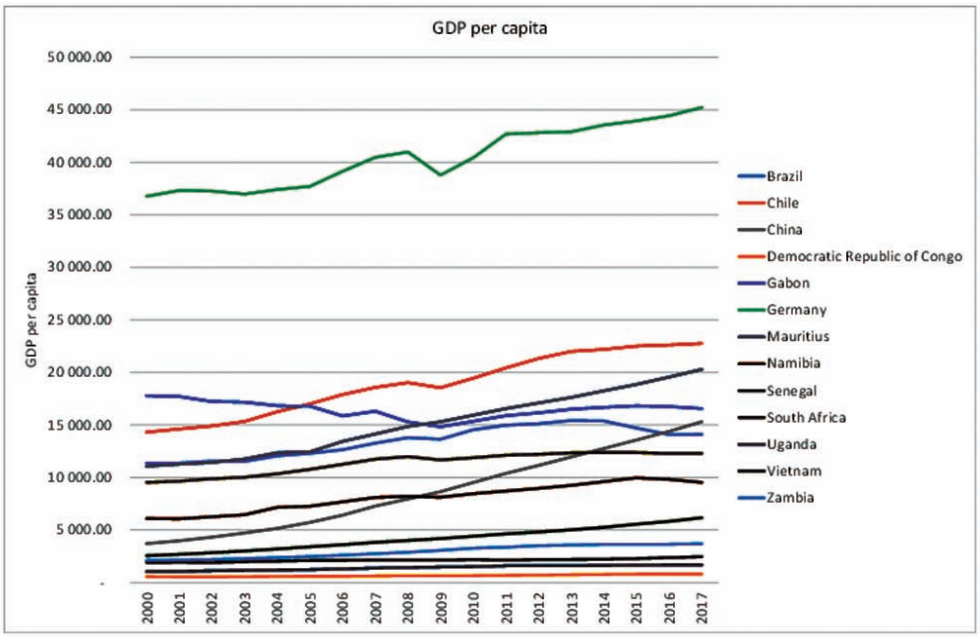

Figure 4: Per Capita GDP of Developing Countries[165]

An additional economic consideration that must be taken into account when considering the implementation of any carbon pricing mechanism is the emissions of that country in relation to its economic circumstances. Where the country is a developing country but its emissions are considerably higher than those of other developing countries, in accordance with the principle of common-but-differentiated responsibilities and respective capabilities, such countries would need to account for their contribution to GHG emissions. South Africa and China are two such countries, as can be seen in Figure 5 below. Therefore, although South Africa and China are both still considered to be developing countries, they have started the process of implementing explicit forms of carbon pricing in order to account for their emissions. In addition, developed economies that may currently have low emissions historically benefitted from high emissions and consequently grew their economies. As such, these developed economies should also account for their historic emissions by

165. Source: Our World in Data. Available at: https://ourworldindata.org/grapher/average-real-gdp-per-capita-across-countries-and-regions

implementing a carbon pricing mechanism. In Figure 5 below, Germany can be considered to be one such developed country.

Considering the above, and as illustrated by the sections that follow, the selected countries' emissions in comparison to their economic circumstances do not warrant the implementation of explicit forms of carbon pricing, such as a carbon tax, as their emissions are low, and they do not have the economic capability to carry the cost burden associated with such forms of carbon pricing.

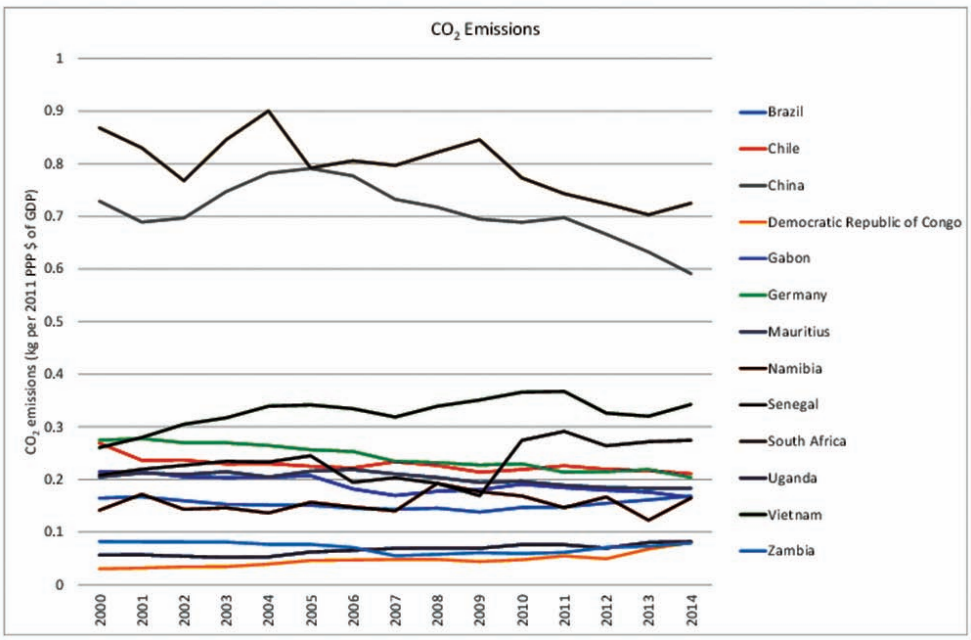

Figure 5: CO_2 Emission per GDP[166]

Lastly, during the assessment of carbon pricing approaches internationally, a general trend was observed in the price of carbon, which is illustrated in Figure 6 below.[167] The trend shows that developed countries with higher GDP per capita rates generally have a higher carbon price, where developing countries with lower GDP per capita rates tend to have lower carbon prices. Within this context, and given the extremely low per capita GDP of the selected countries (indicated in orange), it would not be reasonable to enforce traditional carbon pricing policies that would further burden the economic development of the countries.

166. Source: Our World in Data https://ourworldindata.org/

167. It will be noted in Figure 6 that some of the developed countries listed therein have more than one tax rate. Generally, as is the case in Norway, the country has a upper as well as a lower carbon tax rate, where the upper tax rate applies to petroleum production and natural gas extraction, and where other industries, such as the fisheries industry, are taxed at the lower rate. By comparison, in Canada, provinces and territories have the flexibility to develop their own carbon pricing initiatives, which results in varying carbon prices in different provinces.

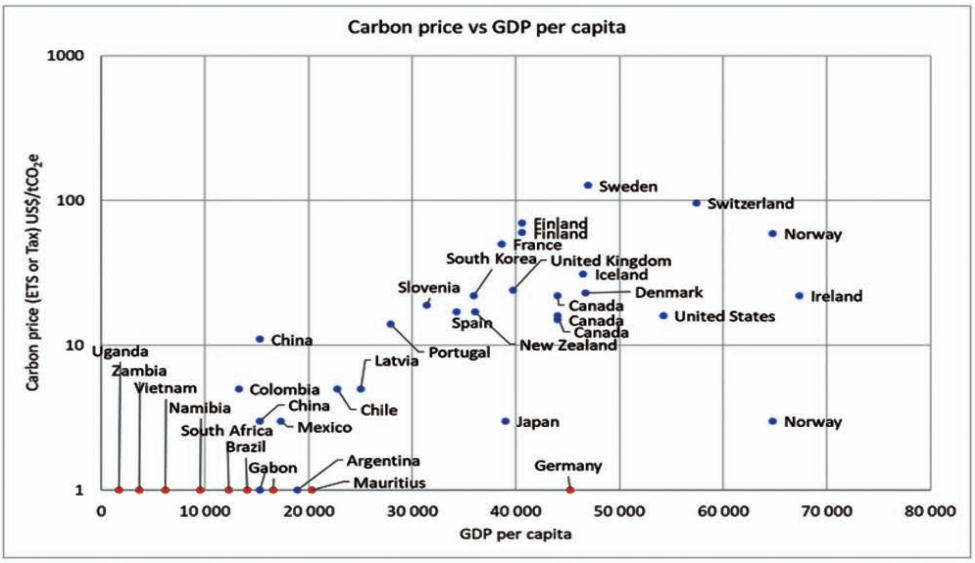

Figure 6: Carbon Pricing vs GDP per Capita

3.4 ENERGY AND CARBON PRICING IN SUB-SAHARAN AFRICA

One of the basic principles upon which a carbon pricing mechanism is founded is the concept that a price on carbon helps shift the burden for the damage back to those who are responsible for it and who can reduce it, internalising negative externalities.[168] The energy sector is considered to be one of the most emission-intensive sectors in most countries. In this regard, sub-Saharan Africa is incredibly rich in potential power-generation capacity. In this context, instead of using regulatory measures to directing which entities are required to reduce emissions and how they should do so, a carbon price provides an economic signal to emitters within the energy sector, giving them an incentive to alter activities and processes in order to avoid or reduce their financial liability.

However, many countries in sub-Saharan Africa lack fossil fuel-intensive economies with large emitting entities,[169] and this is likely to continue into the future. In 2040, even in the absence of active incentives, more than 25% of total energy in sub-Saharan Africa would come from clean sources – geothermal, hydro, solar and wind.[170] As discussed below, many of the countries that were analysed either implement or plan to implement renewable energy technologies as their main sources of energy. For example, many of the countries analysed utilise hydropower as the main energy source.

168. African Climate Reality Project, see n 8.

169. Mckinsey and Company *Electric Power and Natural. Gas Brighter Africa: The growth potential of the sub-Saharan electricity sector* (2015).

170. Ibid.

Furthermore, energy recovered from biomass is a major energy source in many sub-Saharan African countries. As alluded to below, this reliance on biomass makes certain countries better candidates for REDD+ Projects, where offset credits may be generated from reforestation projects or projects involving the introduction of clean cook stoves.[171]

There are, however, instances where African countries are reliant upon and use considerable volumes of fossil fuels in order to meet domestic energy needs. While the general findings in the previous paragraph still apply (in relation to the economic complexities of carbon pricing to developing economies), such countries would be better suited to a traditional carbon pricing mechanism as compared to others.

It is clear from the above that fossil fuel-based economies are generally suited to an explicit carbon pricing mechanism such as a carbon tax (in the context of other considerable aspects such as economic circumstances, etc.). However, Figure 7 below indicates that all the selected countries use far less fossil fuel (in the form of petroleum products) than other developing countries, such as China. Therefore, although a carbon tax might be a suitable form of taxation for some countries, such as Mauritius, it must be stated that, because its use of petroleum products is still far below that of other developed countries, it can be argued that sub-Saharan carbon tax policies should be less punitive than policies implemented in countries that use large amounts of petroleum products and other forms of fossil fuel.

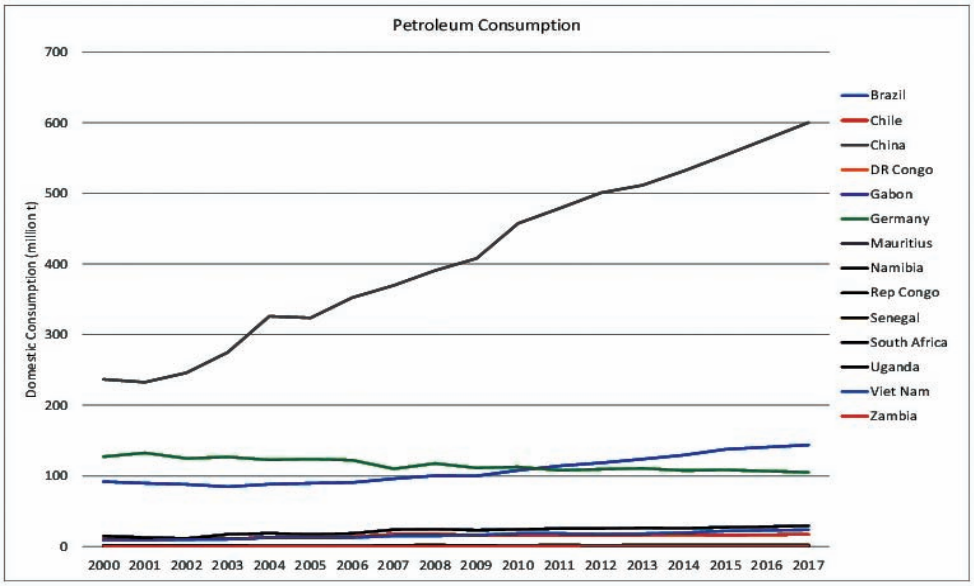

Figure 7: Petroleum Consumption of the Selected Countries[172]

171. This would also ensure that communities who are dependent on biomass as their main source of energy are introduced to less emission-intensive energy alternatives such as cook-stoves.

172. Source: Our World in Data https://ourworldindata.org/

3.5 DEFORESTATION AND CARBON PRICING

Deforestation is not only a significant contributor to the rise in global GHG concentrations, but the protection and restoration of forests could play an outsized role in mitigating climate change. The IPCC's *Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*[173] was released on 7 August 2019. The report is not only significant for connecting forests to reduced emissions, but it also demonstrates how forest coverage can have significant impacts on the improvement of micro-climates. While much attention is appropriately focused on the Paris Agreement's long-term temperature goal, the IPCC report makes clear that greater attention should be paid to the positive impact of forests on local and regional temperatures and rainfall. For example, the report finds that forests consistently diminish heat extremes.[174] A carbon pricing mechanism linked to deforestation can therefore not only result in decreased emissions but also be of value to the inhabitants of tropical African countries such as Uganda, where ambient temperatures are already hotter, and access to healthcare is more limited.[175]

Many countries have already included forest-related targets in their NDCs. Financing such targets remains a challenge, especially for developing and least-developed countries in Africa. As such, their efforts should be supported, and their success rewarded, with financing consistent with the UNFCCC's REDD+ framework, which has already stimulated investment in sustainable land use.

Another barrier that curbs efforts to reduce deforestation is the lack of knowledge of indigenous people living in forested countries. The IPCC Special Report identified indigenous knowledge and practices as important contributors to climate resilience. It concludes that strengthening indigenous communities' tenure security and improving their knowledge of climate issues can lead to better forest management, especially by empowering them to exclude outside actors seeking to appropriate their land and resources.[176]

173. Intergovernmental Panel on Climate Change "Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems" (Draft) (2019). Available at https://www.ipcc.ch/srccl-report-download-page/

174. Ibid.

175. K Zinszer, United States Agency for International Development (USAID), *An Overview of Climate Change and Health in Uganda*, July 2014. Available at: https://www.climatelinks.org/sites/default/files/asset/document/Uganda%2520CC%2520and%2520Health%2520Overview_CLEARED.pdf

176. IPCC, see n 174.

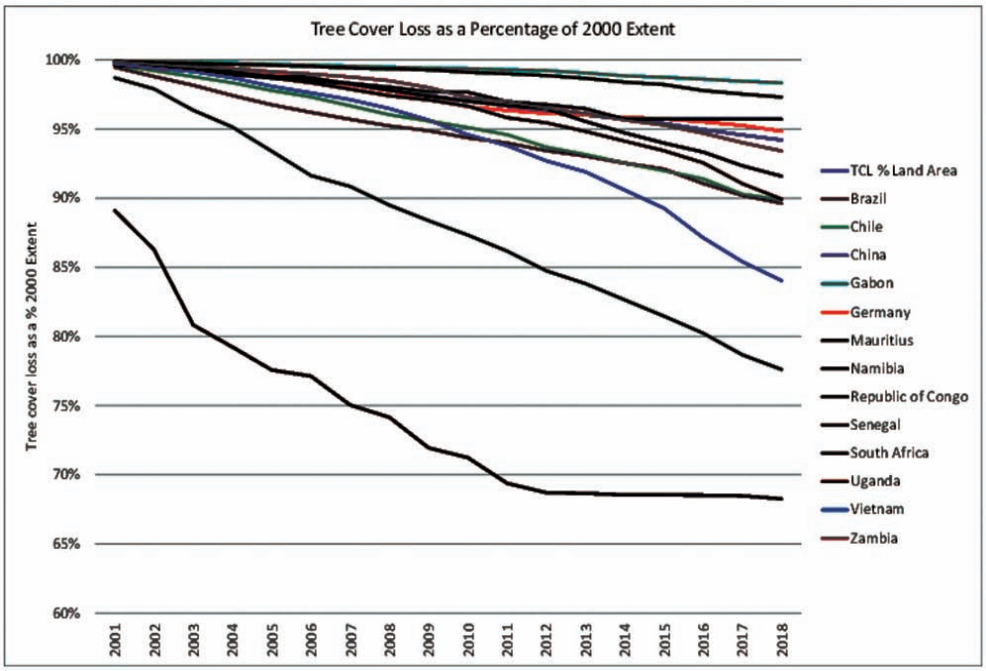

Figure 8: Tree Cover Loss as a Percentage (2000 as baseline year) [177]

It must be noted, however, that forests themselves are threatened by climate change, and thus a lack of progress in reducing emissions from other sources will increase the demand for forest-based mitigation while simultaneously undermining its potential. Investing in forests and other land sector mitigation options can only be effective as part of a both/and climate change strategy.

Figure 8 above represents the total percentage of tree cover lost in the selected countries since the year 2000.[178] This figure illustrates the immense potential for certain sub-Saharan African countries to implement carbon credit projects in their forestry and agricultural sectors and utilise existing carbon pricing mechanisms such as the REDD+ mechanism.

In the context of the above, this section now turns to a country-by-country summary of the key carbon pricing considerations as they apply to domestic contexts.

177. Figure 8 source: Our World in Data- dataset derived from the UN Food and Agricultural Organisation Forestry Database. Available at: https://ourworldindata.org/forests and http://www.fao.org/faostat/en/#data

178. Note that, although it may seem as though a significant amount of tree cover has been lost in Namibia when considering Figure 6, only 0.1% of Namibia was tree-covered in 2000. As such, tree cover loss in the area has not been as substantial as Figure 6 may indicate.

3.6 GABON

Gabon plays the role of a sink by absorbing more than four times more CO_2 than it emits. When LULUCF is taken into account, its total emissions profile is 46.33 tCO_2e per capita. It was selected for review because its emission profile was low (as a result of its sink capacity) as compared to other sub-Saharan African country averages. In terms of its NDC, Gabon seeks to reduce its GHG emissions, including from LULUCF subsectors, by at least 50% below business as usual (BAU) by 2025.[179] This is equivalent to 3% above 2000 levels across all covered sectors, or a 72% increase, if LULUCF emissions are excluded. While Gabon claims that it has put measures in place to protect the role of its forests in order to increase forest carbon stocks, it has chosen to exclude this activity from its NDC.[180]

Prioritised sectors for mitigation in the country include renewable energy, in particular hydroelectricity, treatment of waste water and other waste, energy efficiency, technology transfer and land use (both in land-use planning and in agricultural and forestry projects). Gabon seeks to obtain 20% of electricity from gas, and the remaining 80% from hydropower, by 2025. In relation to LULUCF, it seeks to have reduced emissions 68% by 2020 compared to the baseline scenario, and for waste, the percentage reduction target is 16%. Sustainable forestry remains a priority and it is also part of the "Emerging Gabon" development programme, launched in 2010. This programme seeks to make Gabon an emerging economy by 2025. Green Gabon is one of the programme's three pillars and it addresses food security, sustainable fisheries, and instituting sustainable forest management practices. The Climate Plan 2012 also seeks to preserve the rainforests and manage industrial emissions.

Gabon is one of the 11 countries of the Congo Basin. The Congo Basin is the second largest tropical forest after the Amazon Basin, with an area of 250m hectares. Eleven per cent of the country was allocated to form 13 national parks in 2002. Much of the remainder has been designated for industrial logging and mining concessions. The expansion of forestry and mining is expected to increase due to economic growth and the structural dependency on natural resources. The sectors are also expected to increase their relative contribution to the economy due to a continued decline in oil production. In recognition of this, the government has put the preservation and sustainable use of the natural heritage at the heart of its development strategy.

179. BAU means baseline case representing the level of emissions that would result if future development trends follow those of the past and no changes in policies take place.

180. UNDP "Gabon commits to protect its forests, gets funds to reduce emissions by 50%", 27 June 2017, at: https://www.undp.org/content/undp/en/home/presscenter/articles/2017/06/27/le-gabon-s-engage-pr-server-sa-for-t-et-r-duire-ses-missions-de-co2.html.

Economy	Although relatively higher than its peers, compared to more developed countries, Gabon's relatively low GDP suggests that a traditional carbon pricing mechanism may not be the most efficient form of carbon pricing for the country and that funded models (such as RBCF) may be more appropriate.
Energy	Approximately 51.7% of Gabon's total produced electricity in 2015 was generated from hydropower, and 48.2% was derived from fossil fuels.(1) It accordingly does not have an extensive fossil fuel base on which to implement a carbon price, indicating that alternative forms of pricing may be more efficient.
Deforestation	Although Figure 8 above shows that Gabon only lost approximately 2% of its total tree cover after 2000, this represents a total of 176 Mt of CO_2 (9.77 Mt per year) that was released into the atmosphere as a result of tree cover loss in the country. The country accordingly has a strong potential for REDD+ projects, and these would be well suited to RBCF as a form of carbon pricing. At present Gabon does not appear to have any registered REDD projects. In October 2019, however, Norway announced a US$150m contract with Gabon under CAFI, in terms of which Gabon will receive payments to conserve its forests. Norway will pay Gabon US$10 for every ton of carbon not emitted, relative to Gabon's annual average between 2005 and 2014, and up to a maximum pay-out of US$150m over ten years. According to media reports, Gabon is the first African country to receive payments of this nature. (2) Again this illustrates the potential for RBCF and REDD+ in the country.
Recommended Instrument	RBCF and REDD+

(1) See Energypedia, https://energypedia.info/wiki/Main_Page

(2) Business Day "Gabon's poor shrug off efforts to save forests" 2 October 2019. Available at: https://www.businesslive.co.za/bd/world/africa/2019-10-02-gabons-poor-shrug-off-efforts-to-save-forests/.

3.7 MAURITIUS

Mauritius has a per capita emissions profile of 4.62 tCO_2e. The energy sector accounts for the largest share of emissions (76%), followed by the waste sector (20%) and the agricultural and industrial process sectors at 2.4% and 0.8% respectively[181]. It was selected for review as it represents a further outlier with respect to the structure of

181. Government of Mauritius, Environment Statistics 2017. Available at www.statsmauritius.govmu.org/English/Publications/Documents/2018/EI1400/Env_Yr17.pdf.

the economy, and because it is an SIDS. In terms of its NDC, Mauritius aims to reduce its GHG emissions by 30% by the year 2030, relative to the BAU scenario of 7 million $MtCO_2e$. In order to achieve this target, the mitigation contribution has prioritised actions within the following sectors: Energy, Transportation, Industry, Solid Waste Management, and Agriculture, Forestry and Other Land Use (AFOLU). Activities to achieve this include smart use of marine resources, expansion of renewable energy sources, sustainable consumption and production, sustainable transportation, climate-smart agriculture, sustainable and integrated waste management, sustained tree planting and the use of low global warming potential refrigerants.

Economy	Although an explicit carbon pricing mechanism in the form of a carbon tax may not be appropriate in countries with extremely low GDP figures, this is not the case for Mauritius. Its GDP per capita rate was the highest of all the selected countries. Although the commentary in section 3.3 remains relevant to Mauritius, Mauritius is more economically suited to a traditional carbon price than its peers.
Energy	In 2017, electricity generation in the country increased by 3.8% from 3,042 GWh (262 ktoe) in 2016 to 3,157 GWh (272 ktoe). In 2018, 79% (2,483 GWh or 213 ktoe) of the country's electricity capacity was generated from non-renewable sources and only 21% (649 GWh or 56 ktoe) from renewable sources. As such, the factor that distinguishes Mauritius from the other selected countries is that it has the requisite fossil fuel-derived energy base upon which to levy an explicit carbon price. Therefore, an explicit carbon pricing mechanism such as a carbon tax could be considered as a means to reduce domestic reliance upon fossil fuel-based energy resources.
Deforestation	Between 2001 and 2018, Mauritius lost 3.05 kha of tree cover, a 4.3% decrease in tree cover since 2000 (equivalent to 1.05Mt of CO_2 emissions). In light thereof, there is a potential to generate carbon offsets within the forestry and agricultural sectors through mechanisms such as REDD+. As such, and following the example of South Africa, where carbon tax liable entities are able to offset their carbon tax by surrendering carbon credits, Mauritius has the potential to link an explicit mechanism such as a carbon tax to an emission offset scheme. This will allow Mauritian emitters to purchase carbon offsets generated by REDD+ projects (there are currently four REDD+ projects in the country) and use such credits to offset their tax liability. Such a hybrid system would not only result in a reduction of emission in the energy sector but also encourage reforestation and climate-smart agricultural practices in the country.
Recommended Instrument	Carbon Tax and tax offset mechanism (for example, REDD+)

3.8 NAMIBIA

Namibia has a per capita emission rate of 8.29 $MtCO_2e$ (including LULUCF). In terms of emission intensity per unit of GDP, the country represents a median among those reviewed, which is one of the reasons it was selected for review. Between 1994 and 2014, Namibia remained a net GHG sink. During this period, the AFOLU sector remained the leading emitter followed by the energy, waste and industrial process and product use sectors. In terms of its NDC, Namibia targeted a reduction of approximately 89% by 2030 compared to BAU in 2010, projected at 20 000 Gg CO_2e in 2030, inclusive of sequestration in AFOLU. In order to achieve this target, the country prioritised mitigation by an increase in the share of renewables in electricity production from 33% to 70% by 2030, as well as via energy efficiency targets. In relation to LULUCF, it proposed to reduce deforestation by 75% by 2030 and had sought to have 20 000 hectares reforested per year by 2018. Smaller targets were imposed for reducing agricultural emissions, as well as transport targets for reductions in trucks and private vehicles. The NDC also aimed to convert 50% of waste to energy.

Economy	Figure 4 above illustrates that the per capita GDP for Namibia is very low, especially in comparison with developed countries. On the basis of its relatively low GDP, a traditional carbon pricing instrument is considered less efficient than alternative carbon pricing options.
Energy	Namibia is a unique case, in the sense that its primary energy sources are petroleum, hydropower, imported electricity and imported coal.(1) Namibia's generated electricity is derived mainly from a 240-MW hydroelectric power plant, a 120-MW coal-powered plant, and a 24-MW power plant fuelled by heavy fuel-oil. Given the country's climatic conditions, it has immense solar power generation potential. The country is also one of the top 10 listed countries that possess uranium resources worldwide, and it supplies about 8.2% of the global uranium production. Therefore, given the country's potential for alternative energy sources, and its current dependence on fossil fuel-based energy sources, an explicit form of carbon pricing, such as a carbon tax, coupled with an offset mechanism to encourage the uptake of renewable energy technologies, may be appropriate in the country. Therefore, although a carbon tax might be a suitable form of taxation for some African countries, such as Mauritius, it must be stated that Namibia's use of petroleum products is still far below that of other developed countries, which can arguably imply that its carbon tax policy should be less punitive in comparison with policies implemented in countries that use large amounts of petroleum products and other forms of fossil fuels.

Deforestation	Carbon credits from the REDD+ market are not applicable to Namibia, where only 0.1% of the country was covered in natural forest cover in 2000. For this reason, Namibia does not have any REDD+ projects registered. Given the country's climatic and geographic circumstances, alternative carbon credit projects such as solar panelling would be a more viable option to consider.
Recommended Instrument	Carbon tax and tax offset mechanism (for example, CDM/VCS)

(1) Energypedia, Namibia Energy Situation. Available at: https://energypedia.info/wiki/Namibia_Energy_Situation,

3.9 REPUBLIC OF THE CONGO

The Republic of the Congo represents a median among the reviewed countries in terms of its per capita emissions profile: Its per capita emissions rate, including LULUCF, is 3.96 tCO_2e. Deforestation amounts to 81% of the country's emissions. In terms of its NDC target, the country aims to have reduced its emissions by at least 48% compared to a BAU scenario by 2025, and 55% by 2035, conditional upon receipt of international support. Without support, emissions will be BAU. The NDC seeks to achieve mitigation across all sectors, but focuses on energy and unplanned deforestation. In respect of energy, this includes the control of energy consumption and increased uptake of renewable energy. It also entails maintaining, or even enhancing, the potential for carbon sequestration by forests by better management of the sector, as well as reforestation.

Economy	The GDP of the Republic of the Congo is one of the lowest in the reviewed countries, as illustrated in Figure 4.
Energy	The country has a high potential to generate energy from both renewable and non-renewable resources, since 99% of electricity is generated from hydropower. Domestic demand is the highest consumer. However, 80% of domestic fuel use is wood energy, indicating a strong potential to switch from biomass to other renewable resources. Based on a BAU scenario, the country intends to derive 70% primarily from renewable energy (including hydro) by 2025 and 80% by 2030.

Deforestation	The Republic of the Congo contains a large portion of the remaining Congo Basin rainforest, the second largest tropical forest on earth. It has only lost an approximate 2.7% of its total tree cover since the year 2000.(1) However, this represents a total of 271 Mt of CO_2 (15.1 Mt per year) that was released into the atmosphere. Tree cover loss reached a high in 2016 and 2017 as a result of agriculture, and forestry.(2) The Republic of the Congo is also part of CAVI, which seeks to support REDD+ in central Africa. This includes developing commitments to national investment frameworks. The Republic of the Congo is currently finalising its National Investment Framework for REDD+.
Recommended Instruments	RBCF and REDD+

(1) Global Forest Watch. Republic of the Congo – Forest Change, avaiable at: https://www.globalforestwatch.org/dashboards/

(2) Ibid.

3.10 SENEGAL

Senegal was included in the reviewed countries because it represents a north equatorial perspective and because it is currently considering the implementation of a carbon tax. Total GHG emissions (including LULUCF) per capita are similar to those of Mauritius, at 4.62 tCO_2e. The country's main sources of GHG emissions (with associated percentage contributions to the overall national emission profile) are: agriculture (36%), energy (27%), LULUCF (22%), waste (9%) and the industrial processes sectors (7%). Senegal's economy emitted approximately three times more GHGs relative to GDP than the world average, suggesting that there may be room for improvement in its emissions.[182]

In terms of its NDC, Senegal unconditionally seeks to reduce its GHG emissions by 3%, 4% and 5% in 2020, 2025 and 2030 respectively, relative to BAU. Under the conditional scenario where support is provided, Senegal may reduce up to 7%, 15% and 21% for the same periods. It seeks to achieve these reductions through electricity production, energy efficiency and transport, AFOLU, through manure management, rice cultivation, agricultural soils, organic fertilisers, forest lands and plantations, and industry and waste management. Specifically, Senegal is seeking to implement the Recovery and Acceleration Program of Senegalese Agriculture to address mitigation in the agricultural sector. In the energy sector, Senegal will focus on rural electrification, and will support a renewable energy programme (solar, wind and hydro).

182. World Resources Institute Climate Analysis Indicators Tool 2.0, 2016.

Economy	Figure 4 illustrates that the per capita GDP for Senegal is very low, especially in comparison with developed countries. Equally, we note the findings of the policy recommendations in the recent study in Senegal on the potential for the introduction of a carbon pricing instrument, which concluded that a carbon tax would be the most appropriate mechanism.(1) The study did not entail an assessment of the macro-economic impact of the proposed tax and was devised on the basis of Senegal's decision and declaration in the V20 to implement a carbon pricing instrument by 2025 and to fulfil the country's NDC objectives.(2) Notwithstanding such a voluntary decision, and like Uganda and Zambia, Senegal's GDP is relatively low and it is questionable whether a carbon tax, even if structured with recycling measures and at a low rate, would be economically the most efficient measure.(3)
Energy	As of 2011, 84% of electricity generation was by oil, 8% by hydropower, and 8% by a combination of natural gas, biofuels, and other sources.(4) Over 50% of Senegal's primary energy provision is, however, from biomass.(5) Considering this, there are opportunities to develop carbon pricing mechanisms that would address the biomass energy nexus. Opportunities within the REDD+ mechanism allow for carbon offsets to be generated through reforestation. This would also ensure that communities who are dependent on biomass as their main source of energy are introduced to less emission-intensive energy alternatives such as cook-stoves.
Deforestation	Senegal has lost approximately 3.3% of its total tree cover since 2000. This represents a total of 670 kt of CO_2 (37.2 kt per year) that was released into the atmosphere as a result of tree cover loss in the country.(6) Senegal has one REDD and four afforestation, reforestation and revegetation projects registered on the International Database of REDD+ projects and programmes. There appears to be a strong REDD+ potential in the country.
Recommended Instrument	RBCF and REDD+.

(1) Perspectives Climate Research "Etude d'opportunité sur la mise en place d'un instrument de tarification carbon au Sénégal" (January 2019) (unofficial translation relied on). Available at : https://www.perspectives.cc/fileadmin/user_upload/CI-ACA_Senegal_carbon_pricing.pdf. Notably the study recommended a carbon tax over an ETS, tax reform and a baseline and credit system, on the basis (amongst other things) of the simple design of the instrument. The study was conducted partly because Senegal had indicated through its declaration via the V20 of 23 April 2017 (discussed above and in Annexure I) that it intended to implement a carbon pricing mechanism by 2025, but without confirmation of the nature of such mechanism. The findings in relation to a tax were that it would increase state revenue and that it presented opportunities for revenue recycling, which could align economic, environmental and social goals. It also offered the opportunity to abolish other taxes to facilitate tax neutrality. Importantly, the study also highlighted the risk of (unquantified) socio-economic implications as a result of rises in electricity prices in the absence of tax planning.

(2) Senegal's NDC is apparently under review. The intended nationally determined contribution has a mitigation reduction objective of 3% (unconditional) to 7% (conditional) reduction of GHG emissions

compared to baseline projections in 2020, 4% (unconditional) to 15% (conditional) reduction in 2025, and 5% (unconditional) to 21% (conditional) reduction in 2030.

(3) It is acknowledged that this section of the study does not purport to do an exhaustive review of national circumstances, nor does it take political will and appetite for such a tax into account in the context of considering which mechanism is best suited to domestic circumstances.

(4) International Energy Agency. Statistics Senegal: Electricity and Heat, 2011.

(5)Energypedia, Senegal Energy Situation. Available at: https://energypedia.info/wiki/Senegal_Energy_Situation

(6) See Global Forest Watch datasets available at: https://www.globalforestwatch.org/

3.11 UGANDA

Uganda was selected for review because its emission intensity is close to the median among the reviewed countries. Per capita, its emissions are relatively low at 1.54 tCO_2e (including LULUCF). Its main source of emissions is the agricultural sector, which was responsible for 48% of emissions, followed by LULUCF responsible for 38% of emissions. The national target for emission reduction under the NDC is a 22% reduction of GHG emissions by 2030 compared to BAU estimated emissions of 77.3 $MtCO_2eq/yr$. To achieve this, emission reduction priority areas are energy, forestry and wetland restoration.

While Uganda does not have an express carbon price, the Traffic and Road Safety Act 1998 sought to outlaw the import of old cars due to environmental concerns. Vehicles older than eight years are subject to a 50% environmental tax, while vehicles between five and eight years old are subject to a tax rate of 35%. However, industrial vehicles and goods trucks pay lower taxes. As a result, there is no financial incentive to migrate to more efficient technologies to reduce emissions for this category of vehicles.

Economy	Figure 4 illustrates that the per capita GDP for Uganda is very low, especially in comparison with developed countries. Uganda, which has significantly different national circumstances than other selected countries such as Mauritius, has a GDP per capita figure that is approximately 4 factors less than that of Mauritius.
Energy	Uganda has an installed capacity of 822 MW, mostly consisting of hydropower of 692 MW, representing approximately 84% of national capacity. Approximately 90% of the total primary energy consumption in Uganda is generated through biomass, which can be separated into firewood (78.6%), charcoal (5.6%) and crop residues (4.7%).(1) The energy sector provides a major contribution to the National Treasury's financial resources arising from fuel taxes, VAT on electricity, levies on the transmission bulk purchases of electricity, and licence fees , royalties and foreign exchange earnings from power exports. The addition of a further environmental levy such as a carbon tax may burden already strained economies and would require careful coordination with existing mechanisms to avoid its becoming regressive**.**

Deforestation	Uganda has lost more than 10% of its tree cover in the period since the year 2000. Although the country has relatively less tree coverage than Gabon and the Republic of the Congo, this figure represents a total of 205 Mt of CO_2 that was released into the atmosphere as a result of tree cover loss. As such, there are significant opportunities to generate carbon offsets in Uganda within the forestry and agriculture sector, particularly in relation to offsets generated through reforestation. Communities that are dependent on biomass as their main source of energy (as is the case in Uganda) could also be introduced to less emission-intensive energy alternatives such as cook stoves.
Recommended Instrument	RBCF and REDD+

Energypedia, Uganda Energy Situation - https://energypedia.info/wiki/Uganda_Energy_Situation

3.12 ZAMBIA

Zambian per capita emissions (excluding LULUCF) are relatively low (3.28 tCO_2e). However, once LULUCF is included, they rise dramatically to 24.32 tCO_2e. It is because of this relatively high per capita emissions rate (including LULUCF) compared to its peers, that Zambia has been included within this review. As this figure suggests, the largest source of emissions in the country is LULUCF (328 $MtCO_2e$); followed by energy (24.9 $MtCO_2e$), and then agriculture (22.9 $MtCO_2e$).

In terms of its NDC, Zambia aims to achieve a 25% reduction by 2030 compared to 2010 base year emission levels, and this target may rise to 47% (subject to international support). In order to achieve this, the NDC prioritises actions across all sectors, including actions within the energy, agriculture, LULUCF and waste sectors.

Zambia has one of the highest rates of deforestation globally. A trend analysis from 2000 to 2030 predicts a continued increase in the deforestation rate, with the Copperbelt Province being the most affected.[183]

Zambia has introduced vehicle taxes as a form of carbon pricing. Specifically, it has introduced a once-off flat tax on vehicles more than five years old, called the Motor Vehicle Surtax. This tax is added to import duty. Furthermore, an annual charge on emissions, called the Carbon Emissions Surcharge, is applied to all vehicles based on their engine displacement. The government has also zero-rated excise duty for electric vehicles and halved their customs duty.

183. UN-REDD, 2012. UN-REDD Zambia National Programme Policy Brief: Drivers of Deforestation and Potential for REDD+ Interventions in Zambia.

Economy	Figure 4 illustrates that the per capita GDP for Zambia is very low, especially in comparison with developed countries. The country's economic circumstances are similar to Uganda's, such as the rate of deforestation and the hydro-powered energy sector, coupled with a low GDP.
Energy	The total primary energy supply in 2013 consisted of biofuels/ waste (76%), hydro (12%), oil (10%), and coal (2%).(1) Zambia has 2,411 MW of installed capacity, virtually all of which is hydropower**.**
Deforestation	Zambia has lost approximately 6.5% of its tree cover since 2000. As a result of this, a total of 435 Mt of CO_2 (24.2 Mt per year) was released into the atmosphere. Zambia developed a Zambian National Strategy to reduce emissions from deforestation and forest degradation (REDD+) in 2015. It also developed a REDD+ Strategy Investment Plan in 2017. It has finalised a policy brief on key investment options in participatory forest management and has developed an Integrated Forest Landscape Project. It has three REDD+ projects registered.
Recommended Instrument	RBCF and REDD+

(1) International Energy Agency, 2015. Statistics for Zambia.

PART 4 FINDINGS AND RECOMMENDATIONS

This study questions the use of the traditional carbon pricing mechanisms as the global default, which is viewed as suitable to most, if not all, national circumstances. It argues for a more expansive approach to the design and implementation of carbon pricing initiatives, particularly in developing and least-developed economies without the high levels of industrial-scale GHG emissions that are typically associated with the traditional carbon pricing mechanisms. The more expansive approach proposed by this study is for the design and implementation of carbon pricing initiatives in developing and least developed countries to be country/economy appropriate. Where the traditional carbon pricing mechanisms are found to be either marginally or completely inappropriate, then other design and implementation alternatives should be preferred. Such other options include weaving together country-relevant schemes that combine various elements of those approaches not usually considered as part of the mainstream of carbon pricing. The latter include mitigation-project offset-generating activities, RBCF, REDD+, and the re-orientation of implicit forms of carbon pricing to take account of jurisdiction-specific circumstances.

The study, amongst others things, demonstrates that:

1. while sub-Saharan African NDCs initially did not express an intention to adopt traditional carbon pricing mechanisms, such as carbon taxation and ETS, there is growing interest in the region in the possibility of doing so, particularly in West Africa;

2. such interest is still within its very early stages, however, and the focus of many sub-Saharan African countries at present remains on how they can benefit from other forms of carbon pricing; for example, the international carbon market, developments under Article 6 of the Paris Agreement and the successor to the CDM, and project-based and -funded activities, including those now supported in some RBCF initiatives;

3. such approaches warrant consideration by developing and least developed countries as appropriate carbon pricing, and should be viewed in the context of country-level GHG emission profiles, national policy objectives, sectors at risk, and other national circumstances. While the benefits of the traditional carbon pricing mechanisms are certainly acknowledged, not least of which is the ability to generate revenue to be applied to worthy development goals, the introduction of such measures in developing and least-developed country contexts requires careful consideration and deliberation;

4. Article 6 of the Paris Agreement, in particular its combination with RBCF and other forms of climate finance, has the potential to support strong forms of carbon pricing in sub-Saharan Africa that might not be feasible otherwise; for example, mitigation actions financed by the GCF resulting in units that are voluntarily cancelled. This potential demands imaginative and creative application of climate finance to offsetting, and ensuring that Article 6 mechanism rules are crafted to facilitate effective sub-Saharan African participation;

5. there is scope for carbon pricing instruments to be tailored to appropriate sectors or products in the sub-Saharan African context. Such tailoring is required because so-called "primary' or "traditional" pricing mechanisms, such as an ETS and carbon tax, are insufficiently nuanced to derive an adequate carbon value in developing country contexts, providing further support for the proposition that an expanded notion of carbon pricing, applicable across a continuum of mechanisms, is warranted;

6. in relation to fossil fuel subsidy reform, greater granularity and more up-to-date information are required on the extent and possible regressive impacts of such subsidies and their reforms. The lack of information, particularly in sub-Saharan Africa, on the extent and coverage of such subsidies, as well as the political sensitivity to their removal (notwithstanding support by some countries within the V20 group), may prove this issue difficult to address at this stage;

7. not only is the suitability of design important for economic and emission-profile reasons, but the manner in which carbon pricing is presented to the public, how it is labelled, and how revenues are spent are all integral to ensuring the passage of any proposed instrument. Where there are social acceptability concerns regarding rises in energy prices, alternative instruments that do not have the effect of raising energy prices may be more feasible. These types of approach have already proven to have a degree of uptake in sub-Saharan Africa, particularly the now relatively popular "carbon tax" on vehicles, and similar product taxes may be seen as more palatable to the public than, for example, taxes on fossil fuels; and

8. the traditional carbon pricing mechanisms are not uniformly suitable to all countries. Rather, a limited review of seven countries, namely the Republic of the Congo, Gabon, Mauritius, Namibia, Senegal, Uganda and Zambia, indicates that:

    a. generally speaking, a comparison of these countries' GHG emission profiles with their economic circumstances suggests low imperatives for the introduction of explicit forms of carbon pricing, such as carbon taxation and ETS, in the short-to-medium term;

b. notwithstanding the above, if there was sufficient economic capacity to introduce such a mechanism, it would be most appropriately implemented in Mauritius and Namibia. Both countries have the requisite fossil fuel-derived energy base upon which to levy an explicit carbon price, such as a carbon tax. Mauritius has the potential to link an explicit mechanism such as a carbon tax, to an emission offset scheme. Similarly, Namibia has a high potential in alternative energy sources. A carbon tax, coupled with an offset mechanism to encourage the uptake of renewable energy technologies, may accordingly be appropriate in the country; and

c. in Gabon, the Republic of the Congo, Senegal, Uganda and Zambia, there is considerable potential to implement carbon credit projects within the forestry and agricultural sectors, and TO utilise existing carbon pricing mechanisms, such as the REDD+ mechanism. Given the likely inability of these countries to implement expensive carbon pricing mechanisms and the general lack of financial resources available to fund emission reduction projects that have the potential to stimulate national carbon markets, RBCF may be an exceptionally appropriate form of carbon pricing. This is particularly the case for countries with low GDP per capita figures, such as Senegal, Uganda and Zambia.

ANNEXURE : COUNTRY OVERVIEWS: SUB-EQUATORIAL AFRICA AND CARBON PRICING

Country: Angola		
1	GHG Emissions and Country GDP Data (1)	Total GHG excluding LULUCF: 157.82 MtCO_2e / Per Capita: 5.86 tCO_2e Total GHG Including LULUCF: 252.09 MtCO_2e / Per Capita: 9.36 tCO_2e Population: 26 920 466 GDP- PPP (Million Int$(2011),2014): $ 168 525.69
2	Main source of emissions	• Over 59% of emissions are a result of fossil fuel combustion (primarily related to fugitive emissions). The NDC provides that 58.3% of electricity is diesel-generated. 80% of the population, however, depend on biomass for their everyday energy purposes. The remainder of emissions is primarily from agriculture (36%).
3	NDC mitigation objectives	• Target: To reduce GHG emissions up to 35% unconditionally by 2030 as compared to the Business As Usual (BAU) scenario (base year 2005) and an additional 15% below BAU emission levels by 2030 upon conditional support. • Prioritized Mitigation Sectors: include power generation from renewable energy (potentially 8,491MW, including hydropower) and replacing diesel fuelled off grid generation, as well as reforestation. In relation to Energy, the NDC seeks to Produce 100 megawatts of solar power to all rural areas by 2025. It also seeks to Increase carbon sink to 5 MtCO2e per year by 2030.
4	NDC references to carbon pricing	• "The Republic of Angola recognizes the roll that Carbon Market can play for the mobilization of resources and promotion of the development and transfers of climate friendly technology."
5	Documents/ policies/statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• None
5	Existing participation in carbon markets and REDD+	• CDM: Angola has one registered CDM project with the UNFCCC, the Gove Hydroelectric powerplant which was registered in 2014. It does not have any VERRA projects. • REDD: Angola has one REDD project, the Canjombe Community Ecosystem Services project with IFM, registered under the Plan Vivo Standard. Whilst it only has one project, the potential income from REDD+ projects in the country is considered to be substantial. According to the NDC, the country is committed to increase carbon sequestration from the forestry sector to 5 million tons of CO_2e per year by 2030. In 2010 the

<table>
<tr><td></td><td></td><td>government published its National Policy for Forestry, Wildlife and Conservation Areas and the National Afforestation and Reforestation Strategy. The Afforestation and Reforestation Strategy requires the increase of commercial or industrial forests, as well as protection and conservation of native forests. Angola's National Adaptation Programme of Action (NAPA), published in 2011, lists within its priorities the promotion of alternative renewable energies to avoid deforestation, and the promotion of sustainable land management to increase agricultural yields.</td></tr>
<tr><td>6</td><td>Existing forms of negative carbon pricing</td><td>• The IEA estimated that Angola has recently dramatically increased its fossil fuel subsidies to oil in 2018.(2) In 2015, IMF identified total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 6.3%.(3)
<table>
<tr><th>IEA Fossil Fuel Subsidies in USD Million</th><th>2016</th><th>2017</th><th>2018</th></tr>
<tr><td>Oil</td><td>2,6</td><td>6,3</td><td>1 382,4</td></tr>
<tr><td>Electricity</td><td>527,5</td><td>216,3</td><td>517,1</td></tr>
<tr><td colspan="4">Subsidy/capita: $62/pp</td></tr>
<tr><td colspan="4">Total subsidy as share of GDP (%): 1.8%</td></tr>
<tr><td colspan="4"></td></tr>
</table></td></tr>
</table>

(1) All GHG, GDP and Population data is sourced from: CAIT Climate Data Explorer. 2017. Washington, DC: World Resources Institute. Available online at http://cait.wri.org. CAIT data is derived from several sources. In relation to LULUCF, sources include FAO 2016, FAOSTAT Emissions Database, and in relation to CO2 emissions from fuel combustion, from CO2 Emissions from Fuel Combustion, OECD/IEA, 2016.

(2) IEA Fossil Fuel Subsidies Database (2019) available at: https://www.iea.org/weo/energysubsidies/

(3) IMF "How large are Global Energy Subsidies- Country Level Subsidy Estimates" (2015).

<table>
<tr><th colspan="3">2. Country: Botswana</th></tr>
<tr><td>1</td><td>GHG Emissions and Country GDP Data</td><td>Total GHG excluding LULUCF: 14.8 $MtCO_2e$ / 6.54 Per Capita: tCO_2e
Total GHG Including LULUCF: 36.5 $MtCO_2e$ / 16.86 Per Capita: tCO_2e
Population: 2 168 573
GDP- PPP (Million Int$(2011),2014): $34 512.12</td></tr>
<tr><td>2</td><td>Main source of emissions</td><td>• None (TBC)</td></tr>
<tr><td>3</td><td>NDC mitigation objectives</td><td>• Target: Reduce emissions by 15% by 2030, with 2010 as the base year. Mitigation is directed at achieving a reduction in emissions from energy generation, both stationary and mobile. In addition (although not related to its 15% reduction goal) Botswana is considering the reduction of emissions from the livestock sector's emissions associated with enteric fermentation</td></tr>
</table>

		• Prioritized Mitigation Sectors: priority sectors include energy (mobile and stationary); waste and agriculture. The National Climate Change Strategy and Action Plan which is intended to elaborate on how mitigation will be achieved in these sectors, is still under development. In the absence of this plan the National Development Plan (NDP) has emphasised the increased use of renewable energy, in particular solar energy and biofuels, to improve energy supply security. It also focuses on energy efficiency and demand side management. In terms of its NDP, Angola also sought to have 5% of total diesel consumption made up of biodiesel by 2016.
4	NDC references to carbon pricing	• No, there is no express intention to introduce a domestic carbon price. The NDC does however refer to reliance on international mechanisms and provides that : "Botswana will use market mechanisms under the convention "
5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• None
6	Existing participation in carbon markets and REDD+	• CDM: Botswana does not have any registered CDM projects with the UNFCCC. It is part of one multi-national POA. • REDD: There are no formally registered REDD projects in Botswana on the international REDD database. The government has however declared conservation and the sustainable management and utilisation of forests as one of its main policy goals. One of the flagship initiatives listed in NDP10 is the Community-Based Natural Resource Management Programme, which promotes the sustainable use of forestry resources. Through government-initiated afforestation efforts more than 120, 000 seedlings were planted in 2012; and Botswana was one of the pilot countries in a programme supported by the South African Development Community to reduce emissions from deforestation and forest degradation (REDD+) for the period 2012-2015.
7	Existing forms of negative carbon pricing	• Fossil Fuel Subsidies: no detailed breakdowns are available from the IEA, however a 2015 IMF study estimated total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 5.35%.(4)

(1) Ibid.

3. Country: Democratic Republic of the Congo		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 41.20 $MtCO_2e$ / Per Capita: 0.56 tCO_2e Total GHG Including LULUCF: 206.75 $MtCO_2e$ / Per Capita: 2.8 tCO_2e Population: 73 722 860 GDP- PPP (Million Int$(2011),2014): $ 53 502.90
2	Main source of emissions	• Primary source of emissions is LULUCF "by far" followed by agriculture and energy. Deforestation and forest degradation are as a result of commercial activities (40%); food (20%) and agriculture and firewood (20%)
3	NDC mitigation objectives	• Target: The DRC targets the reduction of its emissions by 17% by 2030 compared to the status quo scenario (430 Mt CO2e). The Industrial Processes and Waste sectors have not been accounted for given their minimal contribution to the GHG emissions footprint of the DRC. • Prioritized Mitigation Sectors: Main areas of intervention are LULUCF, Agriculture and Energy. This includes a reforestation project (3 million ha by 2025). The DRC has sectoral mitigation plans for intensive agriculture and livestock (17MtCO2e potential); clean cooking and heating (0.15MtCO2e potential); hydro energy (9.65 MtCO2e); and Urban Transport (10MTCO2e potential).
4	NDC references to carbon pricing	• None
5	Documents/policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• None
6	Existing participation in carbon markets and REDD+	• CDM: The country has two registered CDM projects with the UFCCC, including the Ibi Bateke afforestation project and Kinshasa Landfill gas project. It is part of one country POA and one multi-national POA. • REDD: The DRC has 19 REDD/ ARR (VCS) projects, about half of which are REDD projects, and most of which are ongoing. DRC's forests are the second largest in the world by area, extending over more than 100 million ha. Due to the pressures of agriculture and resource extraction, DRC is amongst the top 10 countries in terms of loss of forest cover (measured on an annual basis), with an estimated deforestation of more than 350,000 ha per annum from 2000-2010. After being approved by the UN-REDD Programme Policy Board, DRC's National Programme (Readiness Plan) was signed and funds were disbursed in 2012. However, given DRC's weak institutional capacity for sustainable forest governance and low level of private sector involvement in REDD+ related activities, ensuring the sustainable management of DRC's forests in practice

		represents a continuous challenge. The DRC's investment plan was finalised in 2011, with the programme receiving USD58.4m. The goal is to support the DRC's REDD+ initiatives, including the AfDB's project addressing deforestation and degradation in the Mbuji Mayi/Kananga and Kisangani areas. In addition, the Carbon Fund has approved an investment of USD50-USD70m for the DRC for a new REDD+ pilot project to tackle deforestation around the capital, Kinshasa Decree No. 09/40 also established a management structure (National REDD Committee and Inter-ministerial REDD Committee) to implement the REDD process. These structures lead the development of an implementation framework for REDD+ • The DRC is also part of the Central African Forests Initiative (CAVI) which seeks to support REDD+ in central Africa, which includes, amongst others developing commitments to national investment frameworks. The DRC is currently implementing its National Investment Framework through various programmes. It is developing its first methodology to determine and map forest degradation
7	Existing forms of negative carbon pricing	• Fossil Fuel Subsidies: no detailed breakdowns are available from the IEA, however a 2013 IMF study,(5) estimates that fossil fuel subsidies are were approximately 0.8% of GDP in 2012.

(5) IMF (2013), supra.

30,971 mm		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 7.26 $MtCO_2e$ / Per Capita: 3.87 tCO_2e Total GHG Including LULUCF: -86.9 $MtCO_2e$ / Per Capita: -46.33 tCO_2e Population: 1875 713 GDP- PPP (Million Int$(2011),2014): $31 284.00
2	Main source of emissions	Gabon plays the role of a sink by absorbing more than 4 times more CO_2 than it emits. Excluding biomass sinks, its emissions profile is primarily LULUCF (63%).
3	NDC mitigation objectives	• Target: to reduce GHG emissions including subsectors from LULUCF by at least 50% below business as usual by 2025. This is equivalent to 3% above 2000 levels across all covered sectors, or a 72% increase if LULUCF emissions are excluded. While Gabon states that it has put measures in place to protect the role of its forests in increasing carbon stocks, it has chosen to exclude this activity from its NDC. • Prioritised Sectors for Mitigation: renewable energy, in particular hydroelectric, treatment of waste water and other waste, energy efficiency, technology transfer, land use, both in land use planning, and agricultural and forestry projects. It seeks to obtain 20% electricity from gas by 2025, 80%

		hydropower by 2025. In relation to LULUCF, to have -68% emissions by 2020 compared to the baseline scenario. In relation to waste, -16% emissions by 2020 compared to the baseline scenario. Sustainable forestry is a large component. Sustainable forestry remains a priority and it is also part of the "Emerging Gabon" development programme, launched in 2010. This programme seeks to make Gabon an emerging economy by 2025. Green Gabon, is one of the programme's three pillars and addresses food security, sustainable fisheries, and instituting sustainable forest management practices. The Climate Plan 2012 also seeks to preserve the rainforests and manage industrial emissions. In relation to hydroelectricity targets, in 2010, fossil fuels made up 59% of the total installed electricity generating capacity, while the remaining 41% of installed capacity came from hydroelectric plants.
4	NDC references to carbon pricing	• No, the NDC does not contemplate any form of domestic carbon pricing. It does however briefly discuss international carbon markets and provides that non-national credits cannot be used to assess national emissions reduction objectives under the NDC, i.e. it expressly disallows reliance on the international market to meet the domestic target. It makes no other mention of carbon pricing. • Although the translated NDC states that the country is considering "implementation of a market mechanism induced by the Law on Orientation of Sustainable Development" the NDC describes the mechanism of this law as simply requiring an Environmental Impact Assessment which requires mitigation and compensation for unavoidable environmental impacts, and it is argued in the NDC that this is similar to the measure, reduce and compensate approach of other examples of carbon pricing. The EIA is not what would typically be considered as form of carbon pricing.
5	Documents/ policies/statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Vulnerable Twenty (V20) *4th Ministerial Communique,* Bali -Indonesia, 14th October 2018- The Gabon is a member of the V20 Group of Ministers of Finance. The 4th Communique sets out a direct goal to accelerate fossil fuel subsidy reform and support carbon pricing efforts. The V20 commit to advancing with implementing domestic carbon pricing mechanisms.
6	Existing participation in carbon markets and REDD+	• CDM: Gabon does not have any registered individual CDM projects with the UNFCCC nor does it have any POAs. • REDD+: At present Gabon does not appear to have any registered REDD projects, however it has recently concluded a transaction with Norway (as discussed below). Gabon is one of the 11 countries of the Congo Basin, the second largest tropical

<table>
<tr><td>6</td><td></td><td>forest after the Amazon Basin, with an area of 250m ha. Some 11% of the country was allocated to form 13 national parks in 2002. Much of the remainder has been designated for industrial logging, and mining concessions. The expansion of forestry and mining is expected to increase due to economic growth and the structural dependency on natural resources. The sectors are also expected to increase their relative contribution to the economy due to continued decline in oil production. In recognition of this, the government has put the preservation and sustainable use of natural heritage at the heart of its development strategy.
• At present, Gabon is part of the Central African Forests Initiative (CAFI) which seeks to support REDD+ in central Africa, which includes, amongst others developing commitments to national investment frameworks. Gabon is preparing a National Investment Framework for consideration by the CAFI. It is intended for it to include a long-term Natural Resources Monitoring and Observation System
• In October 2019, Norway announced a $150m contract with Gabon under CAFI in terms of which it will receive payments to conserve its forests. Norway will pay Gabon $10 for every ton of carbon not emitted, relative to the Central African country's annual average between 2005-2014, and up to a maximum pay-out of $150m over 10 years. According to media reports, Gabon is the first African country to receive payments of this nature.(6)</td></tr>
<tr><td>7</td><td>Existing forms of negative carbon pricing</td><td>
<table>
<tr><th>IEA Fossil Fuel Subsidies in USD Million</th><th>2016</th><th>2017</th><th>2018</th></tr>
<tr><td>Oil</td><td>141,2</td><td>129,9</td><td>121,3</td></tr>
<tr><td>Electricity</td><td>-</td><td>-</td><td>0,9</td></tr>
<tr><td>Gas</td><td>0,6</td><td>0,7</td><td>0,8</td></tr>
<tr><td colspan="4">Subsidy per capita ($/person): 59</td></tr>
<tr><td colspan="4">Total subsidy as share of GDP (%): 0.7 %</td></tr>
<tr><td colspan="4">In 2015, IMF identified total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 1.31% of GDP.(7)</td></tr>
</table>
</td></tr>
</table>

(6) Business Day "Gabon's poor shrug off efforts to save forests" 2 October 2019, available at: https://www.businesslive.co.za/bd/world/africa/2019-10-02-gabons-poor-shrug-off-efforts-to-save-forests/

(7) Ibid.

<table>
<tr><th colspan="3">5. Country: Kenya</th></tr>
<tr><td>1</td><td>GHG Emissions and Country GDP Data</td><td>Total GHG excluding LULUCF: 60.53 $MtCO_2e$ / Per Capita: 1.32 tCO_2e
Total GHG Including LULUCF: 29.29 $MtCO_2e$ / Per Capita: 0.64 tCO_2e
Population: 46 024 250
GDP- PPP (Million Int$(2011),2014): $ 126 706.00</td></tr>
</table>

2	Main source of emissions	Out of total emissions, 75% are LULUCF and the agricultural sectors. The agricultural sector contributed 33% (90% from livestock) and forestry contributed 32% (mainly through deforestation, forest degradation, charcoal production, creation of agricultural land) of total emissions in 2010.
3	NDC mitigation objectives	• Target: The NDC target is to reduce GHG emissions by 30% by 2030 relative to the BAU scenario of 143 MtCO2eq. • Prioritised Sectors for Mitigation: promotion of clean energy, energy efficiency, low carbon transportation, forestry, climate smart agriculture and sustainable waste management. In this regard the NDC contains the following: a target to reach 10% tree cover of land areas (as supported by other targets relating to cropland to agroforest conversion and forest restoration in the National Climate Change Response Strategy). The NDC does not contain any other quantifiable targets, however the Climate Change Response Strategy makes mention of a desire to develop 2,275 MW geothermal capacity development by 2030.
4	NDC references to carbon pricing	• None, in relation to domestic pricing. However, it makes provision for the contribution of international market-based mechanisms and expressly provides that "Kenya does not rule out the use of international market-based mechanisms in line with agreed accounting rules." • It also indirectly leaves the option of domestic carbon pricing open as it recognizes domestic contributions to the NDC, with the nature of support to be determined by further analysis.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Government of Kenya, Ministry of Environment and Forestry, *National Climate Change Action Plan* (NCCAP) (2018-2022) – direct interest in carbon pricing. The plan aims to enhance Kenya's participation in the international carbon markets, the generation of carbon units and access to carbon finance. • Government of Kenya, *Climate Finance Policy*, National Treasury (2016)- This plan directly references carbon pricing by recognizing that the government has tools to generate carbon finance, including encouraging the generation and sale of carbon credits, putting a price on carbon, and establishing an emissions trading system. However, the policy clarifies that a domestic cap and trade system is not likely in the foreseeable future. • Capital Markets Authority, *Policy Guidance Note (PGN) on Issuance of Green Bonds* (2019)– Demonstrates an indirect interest in carbon pricing as the launch of green bonds indirectly places a cost on GHG emissions. • Kenya's *Finance Act 2019* has increased the tax on imported vehicles running on petrol and with engine capacities of more than 1.5 litres, setting out that as from 7 November 2019, they would attract excise tax of 25 percent compared to the previous 20 percent. In addition to this, vehicles running on diesel are now liable to excise duty of 35 percent compared to the previous 30

		percent that applied on models exceeding 2.5 litre engines and 20 percent on smaller cars, demonstrating a political willingness to impose taxes on the basis of energy inefficient technology. Also under the Act, excise duty on fully electric vehicles has been halved to 10 percent in a bid to encourage use of cleaner transport technologies. • Announcement in 2016 that Kenya's stock market would be launching an emissions trading platform which would be aimed at providing companies with a platform to sell their carbon credits to foreign buyers demonstrates direct interest in carbon pricing.(8) • Vulnerable Twenty (V20) *4th Ministerial Communique,* Bali -Indonesia, 14th October 2018- Kenya is a member of the V20 Group of Ministers of Finance. The 4th Communique sets out a direct goal to accelerate fossil fuel subsidy reform and support carbon pricing efforts. The V20 commit to advancing with implementing domestic carbon pricing mechanisms. • Kenya is a member of the East African Alliance on Carbon Markets and Climate Finance launched in June 2019. Its aim is to promote a common vision on carbon markets and climate finance and increasing knowledge based on Article 6 market mechanisms and the transition from the CDM to the mechanisms in Article 6 of the Paris Agreement thus indirectly pointing to an intention to develop carbon pricing.
6	Existing participation in carbon markets and REDD+	• CDM: There are currently 20 standalone projects registered with the CDM in which Kenya is the host country. Kenya is also host country to 24 PoAs. Activities are in biomass energy, energy efficiency, geothermal, hydro, wind, methane avoidance and reforestation. Kenya has also been actively involved in voluntary markets. • REDD: Kenya has three projects registered as REDD/REDD+ projects under the VCS, with one other REDD project registered under the Plan Vivo standard. Kenya has signed partnership agreements with Japan to develop projects under its Joint Crediting Scheme and has developed numerous NAMAs for various sectors, including transport, waste, agriculture and energy. Even though there is no specific REDD+ legal framework, the constitution mandates a forest cover of 10% from the existing 6% through an aggressive afforestation, reforestation and restoration programme. Kenya is developing its National REDD+ Strategy and implementation framework.
	Existing forms of negative carbon pricing	Fossil Fuel Subsidies: no detailed breakdowns are available from the IEA, however a 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 1.73% of GDP.(9)

(8) Brittlebank "Kenya to launch new emissions trading scheme" (26 February 2016)

http://www.climateaction.org/news/kenya_to_launch_new_emissions_trading_scheme

(9) IMF (2015), supra.

6. Country: Lesotho		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 2.07 $MtCO_2e$ / Per Capita: 1.01 tCO_2e Total GHG Including LULUCF: 2.04 $MtCO_2e$ / Per Capita: 0.99 tCO_2e Population: 1 051 545 GDP- PPP (Million Int$(2011),2014): $ 4 904.00
2	Main source of emissions	Agriculture (63%), energy (31%) and waste management (6%)
3	NDC mitigation objectives	• Target: The conditional target is 35% by 2030 compared to a BAU scenario. The unconditional target is 10% by 2030. • Prioritised Sectors for Mitigation: The main opportunities for mitigation consist of energy efficiency and demand management, coupled with increasing investment in a renewable energy programme in the electricity, Buildings (Residential, Commercial and Institutional) and Waste sectors In relation to LULUCF, the NDC seeks to achieve 120,000 ha reforestation from 2015 to 2030. In relation to energy, the NDC contains various detailed renewable energy, clean cooking and energy efficiency targets. In relation to industry, the NDC contains targets to reduce energy demand.
4	NDC references to carbon pricing	• No domestic pricing envisaged. Lesotho considers the establishment of an international market mechanism vital to reduce the total costs to achieve the target of limiting the temperature increase to 2°C. Thus the country remains open to the possibility of using of international market-based mechanisms in line with agreed accounting rules to achieve its conditional and/or unconditional targets.
5	Documents/ policies/statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	None
6	Existing participation in carbon markets and REDD+	• CDM: Lesotho has one registered individual CDM project relating to fuel efficient cook stoves. It is also part of three multinational POAs. • REDD: There do not appear to be any REDD or similar projects registered in Lesotho. Lesotho's Vision 2020 nevertheless aims to have 21,000 hectares of forested areas by 2020.
7	Existing forms of negative carbon pricing	• Fossil Fuel Subsidies: no detailed breakdowns are available from the IEA, however a 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 1.88% of GDP.(10)

(10) IMF (2015), supra.

7. Country: Madagascar		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 26.82 $MtCO_2e$ / Per Capita: 1.14 tCO_2e Total GHG Including LULUCF: 48.50 $MtCO_2e$ / Per Capita: 2.06 tCO_2e Population: 23 589 801 GDP- PPP (Million Int$(2011),2014): $ 32 365.70
2	Main source of emissions	• The main source of emissions in Madagascar is from LULUCF and agriculture, which combined contribute 98% of total GHG emissions.
3	NDC mitigation objectives	• Target: In 2030, Madagascar aims to reduce approximately 30 $MtCO_2$ of GHGs, representing 14% of national emissions, compared to the BAU scenario. This reduction is additive to the absorptions increase of the LULUCF sector, which is estimated at 61 $MtCO_2$ in 2030. Total increases in GHG absorption is expected at 32%, compared to the BAU scenario. • Prioritised Sectors for Mitigation: Madagascar's objective is green growth. Mitigation sectors which have been prioritised include energy, agriculture, LULUCF and waste. Activities for mitigation include reforestation, enhanced forest and grassland monitoring, climate-smart rice farming techniques, increased hydropower and solar energy, sustainable cookstoves, and energy efficiency.
4	NDC references to carbon pricing	• No domestic pricing measures mentioned. The NDC does indirectly address the international market but only states that there shall be no national reductions based on carbon credits purchased outside of Madagascar. It does not make any express intention of seeking to rely on carbon pricing either domestically or internationally.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Republic of Madagascar, *National Climate Change Policy*, 18th November 2010- The Policy indirectly indicates interest in carbon pricing as it aims to promote mitigation and develop funding instruments for activities under the policy. • Vulnerable Twenty (V20) *4th Ministerial Communique,* Bali -Indonesia, 14th October 2018- Madagascar is a member of the V20 Group of Ministers of Finance indicating a direct intention to advance carbon pricing in the country. The V20 have committed to promoting ambitious efforts to address the global threat of climate change and the 4th Communique sets out the V20 goal to accelerate fossil fuel subsidy reform and support carbon pricing efforts. The V20 commit to advancing the implementation of domestic carbon pricing mechanisms.
6	Existing participation in carbon markets and REDD+	• CDM: Madagascar participates in the CDM and has 4 CDM projects (hydropower and solar) and six individual and multi-country POA projects. It also has two VCS projects.

		• REDD: The NDC specifies that it aims to reduce GHG emissions through the promotion of among other activities, REDD+. Madagascar is active in REDD+ and has five ongoing REDD+ pilot projects in the country and at least six more being developed.(11) There are currently three VERRA REDD projects in Madagascar. • There are no Malagasy NAMAs listed in the NAMA pipeline.
7	Existing forms of negative carbon pricing	• When oil prices started rising in 2010, the Malagasy government introduced fuel subsidies to keep energy prices low. When global oil prices fell in 2015, fuel subsidies were removed and the government is now focused on sustaining effective energy subsidy reform.(12) • A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 1.32% of GDP.(13)

(1) USAID, Greenhouse Gas Emissions in Madagascar, (USAID 2016)
(2) ESMAP, Energy Subsidy Reform Facility Country Brief: Madagascar, Energy Subsidy Reform Facility (ESRF) (World Bank 2018). Available at http://documents.worldbank.org/curated/en/194781525420767595/Energy-Subsidy-Reform-Facility-Country-Brief-Madagascar
(3) IMF (2015), supra.

8. Country: Malawi		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 10.13 $MtCO_2e$ / Per Capita: 0.63 tCO_2e Total GHG Including LULUCF: 14.45 $MtCO_2e$ / Per Capita: 0.89 tCO_2e Population: 16 190 126 GDP- PPP (Million Int$(2011),2014): $ 17 607.66
2	Main source of emissions	• Forestry (78%) and agriculture (16)%. The largest sectoral increase will likely take place in the energy sector as new coal-based generation capacity by independent power producers (IPPs) comes on line to meet immediate energy deficits currently being experienced in Malawi, projected to increase to a share of 17% of the country's emissions by 2040. (97% of Malawians rely on biomass energy for cooking fuel). Of electricity which is supplied 90% is from hydropower. Poor agricultural practices also result in a high rate of deforestation and forest degradation.
3	NDC mitigation objectives	• Target: No economy wide target (The NDC contains a general undertaking to mitigate in line with the UNFCCC). It does contain targets for Agriculture ((-0.4MtCO2e/annum by 2040) • Prioritised Sectors for Mitigation: Priorities range across an array of sectors including agriculture, energy, LULUCF and transport. In relation to energy, objectives include clean cookstoves, increasing hydro-powered energy, and solar water heaters. Industry targets includes the production of blended cement,

		and LULUCF includes a target of 2% increase in forest cover as well as -2.6MT reduction as a result of afforestation In relation to transport, the NDC aims to increase the percentage of the population using public transport to 30%.
4	NDC references to carbon pricing	• None
5	Documents/ policies/statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Vulnerable Twenty (V20) *4th Ministerial Communique,* Bali -Indonesia, 14th October 2018- Malawi is a member of the V20 Group of Ministers of Finance. The 4th Communique sets out a direct goal to accelerate fossil fuel subsidy reform and support carbon pricing efforts. The V20 commit to advancing with implementing domestic carbon pricing mechanisms.
6	Existing participation in carbon markets and REDD+	• CDM: Malawi has two CDM cookstove projects. It is also part of eight POAs. • REDD: Malawi has 2 REDD projects and 2 ARR projects, they are all ongoing. The recently approved Malawi REDD+ Programme Action Plan includes the protection and conservation (of existing forests); and, afforestation (covering tree planting, as well as natural and assisted regeneration).
7	Existing forms of negative carbon pricing	A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 3.62% of GDP.(14)

(14) IMF (2015), supra.

9. Country: Mauritius		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 5.84 $MtCO_2e$ / Per Capita: 4.63 tCO_2e Total GHG Including LULUCF: 5.83 $MtCO_2e$ / Per Capita: 4.62 tCO_2e Population: 1 260 934 GDP- PPP (Million Int$(2011),2014): $ 23 019.45
2	Main source of emissions	• The NDC set out that in 2014, the total GHG emissions for the Republic of Mauritius were approximately 5.1 MtC02e.The NDC is silent on the main source of emissions. According to the government of Mauritius environment statistics for 2017, the energy sector accounted for the largest share of emissions (76%) followed by the waste sector (20%) and the agricultural and industrial process sectors at 2.4% and 08% respectively(15).
3	NDC mitigation objectives	• Target: Mauritius aims to abate its greenhouse gas emissions by 30%, by the year 2030, relative to the business as usual scenario of 7 million MtC02e.

		• Prioritised Sectors for Mitigation: The mitigation contribution prioritises actions within the following sectors: Energy, Transportation, Industry, AFOLU and solid waste management. Activities include smart use of marine resources; expansion in renewable energy sources; sustainable consumption and production; sustainable transportation, climate smart agriculture; sustainable and integrated waste management; sustained tree planting and use of low global warming potential refrigerants. The objective is green growth and sustainable development.
4	NDC references to carbon pricing	• No. The NDC does not contain reference to carbon pricing and makes no mention of an intention to use/not use market-based mechanisms to meet the target set out in the NDC.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Finance and Audit Act and MID Fund Regulations, 2008 - Sets up the Maurice Ile Durable (MID) levy which operates as an indirect form of carbon pricing. It is a tax on fossil fuels established in July 2008 to finance clean energy projects such as subsidies for compact fluorescent lamps and solar water heaters. • Republic of Mauritius, *Long-Term Energy Strategy* (2009-2025)- indirectly references carbon pricing by specifically identifying the CDM as a (carbon) financial mechanism and sets out environmental subsidies as a further financial mechanism.
6	Existing participation in carbon markets and REDD+	• CDM: Mauritius is active in the CDM. The country has six standalone projects and one multinational PoA that have been registered under the CDM including for landfill gas and carbon dioxide capture. There is only one Mauritian project registered under the Verified Carbon Standard (VCS) (a solar photovoltaic project which is also registered under the CDM). There are no Mauritian projects listed in the VCS pipeline • REDD: There are four ongoing REDD/ARR projects in Mauritius • Mauritius has received financial assistance from the Green Environment Facility for a capacity building on NAMAs.
7	Existing forms of negative carbon pricing	• A 2013 IMF study,(16) estimates that fossil fuel subsidies were negative, constituting approximately -1.0% of GDP in 2012. (the 2015 study does not cite it) • Mauritius has embarked on fossil fuel subsidy reform. However whereas the Mauritius Long-Term Energy Strategy (2009-2025) proposes the establishment of subsidies and fiscal incentives for green projects and also lays out that preference for government financial support should be given to energy efficiency and renewable energy projects over conventional fossil fuel projects, no specific amounts or budget allocations have been committed to over the time frame.(17)

(15) Government of Mauritius, Environment Statistics- 2017. Available at www.statsmauritius.govmu.org/English/Publications/Documents/2018/EI1400/Env_Yr17.pdf

(16) IMF (2013), supra.

(17) GIZ and UNEP, Mauritius: Country Profile, Green Fiscal Policy Network. Available at http://www.greenfiscalpolicy.org/countries/mauritius-country-profile/

10. Country: Mozambique		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 28.43 $MtCO_2e$ / Per Capita: 1.04 tCO_2e Total GHG Including LULUCF: 68.10 $MtCO_2e$ / Per Capita: 2.50 tCO_2e Population: 27 212 382 GDP- PPP (Million Int$(2011),2014): $ 29 384.52
2	Main source of emissions	• GHG emissions came primarily from the land-use change and forestry (LULUCF) sector, which accounted for 58.8% of the country's total emissions. Within the LULUCF sector, changes in forest land contributed 95% of emissions. Agriculture was the second highest emitting sector (26.8%). Energy, waste, and industrial processes (IP) accounted for 8.9%, 4%, and 1.5%, respectively.
3	NDC mitigation objectives	• Target: a total reduction of about 76.5 MtCO2eq in the period from 2020 to 2030, with 23.0 MtCO2eq by 2024 and 53.4 MtCO2eq from 2025 to 2030. • Prioritised Sectors for Mitigation: policies and programmes in energy (electricity production, transports and other – residential, commercial and institutional), land use, land use change and forestry (REDD+) and waste (solid waste disposal and treatment) with the aim of low carbon development and a green economy.
4	NDC references to carbon pricing	• No reference to domestic carbon pricing. It does mention that Mozambique is willing to participate in the international market mechanisms to be established which would allow access to clean technologies in order to mitigate the emissions arising from exploiting, managing and using the natural capital that is available.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Republic of Mozambique, *National Climate Change Adaptation and Mitigation Strategy*, Council of Ministers (November, 2012)- The strategy covers the periods 2013-2025 and indirectly references carbon pricing as it highlights that programmes associated with voluntary carbon and other certification procedures should be promoted and may be implemented by various public or private operators. It also highlights the recognition of opportunities in mitigation by giving the example of the Energy Strategy which refers to carbon tax.

6	Existing participation in carbon markets and REDD+	• CDM: Mozambique is engaged in the CDM with 4 projects registered in energy efficiency in the household sector (clean cookstoves) and reforestation. It is not party to any POAs. There is one VCS cookstoves project for Mozambique. • REDD: Mozambique is also actively engaged in REDD+. It has five REDD/ARR registered projects. Between 2013 and 2018, Mozambique received $8 million in grants from the Forest Carbon Partnership Facility (FCPF) to prepare a National REDD+ Strategy (The REDD+ Strategy Action Plan 2016 – 2030), a forest monitoring system, a forest reference emissions level, and to consult different stakeholders regarding the strategies to reduce deforestation. Mozambique is engaged in a pilot project for REDD+ for the implementation of the Zambézia Landscape Program, and in February 2019 signed one of the first Emission Reduction Payment Agreements (ERPA) with the FCPF.
7	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 7.19% of GDP.(18). • As of 2015, Mozambique was among countries that provided fossil fuel subsidies in excess of US$1 billion in 2015. (19) • The country has embarked on reform and is among the countries that have endorsed the "Friends of Fossil Fuel Subsidy Reform communique calling for accelerated action in the phase out of fossil fuel subsidies.(20) • There has been elimination of a general fuel subsidy, however the government still subsidises the diesel used in key economic areas – in agriculture, in artisanal fishing, and in those places not yet linked to the national grid which depend on diesel-fired power stations for their electricity as well as subsidies of the diesel used in the commonly used privately owned minibuses. (21)

(18) IMF (2015), supra.

(19) Leah Worrall et al, Reforming Africa's Fossil Fuel Subsidies, Bridges Africa Volume 7-Number 3. Available at http://www.ictsd.org/bridges-news/bridges-africa/news/reforming-africa%E2%80%99s-fossil-fuel-subsidies

(20) Ibid

(21) Club of Mozambique, Fuel Subsidies Cost Mozambique Huge Sums – Govt, 17 April 2018. Available at https://clubofmozambique.com/news/fuel-subsidies-cost-mozambique-huge-sums-govt/

11. Country: Namibia		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 10.71 $MtCO_2e$ / Per Capita: 4.52 tCO_2e Total GHG Including LULUCF: 19.66 $MtCO_2e$ / Per Capita: 8.29 tCO_2e Population: 2 370 992 GDP- PPP (Million Int$(2011),2014): $ 22 834.31
2	Main source of emissions	• Namibia remained a net GHG sink over the period 2000 to 2010. During this period, the AFOLU sector remained the leading emitter (27028 Gg of CO2e) followed by Energy, Waste and IPPU.
3	NDC mitigation objectives	• Target: A reduction of approximately 89% by 2030 compared to BAU (2010), projected at 20 000 Gg CO2e in 2030, inclusive of sequestration in AFOLU. • Priority Sectors for Mitigation: Energy: to increase the share of renewables in electricity production from 33% to 70% by 2030, as well as via energy efficiency targets. In relation to LULUCF, to reduce deforestation by 75% by 2030 and 20 000 ha reforested per year by 2018. Smaller targets are imposed for reducing agricultural emissions, as well as transport targets for reductions in trucks and private vehicles. The NDC also aims to convert 50% of waste to energy.
4	NDC references to carbon pricing	• Yes, the NDC provides: The country is setting up a register of emission reduction/removal activities which will be used for emissions "offsets and trading on the international market". The country intends to "review the taxation policy and legislation to promote the [uptake] of cleaner technologies and promote energy savings". The latter implies an interest in carbon taxation or other such fiscal policies/laws. The NDC also provides that: "Namibia does not rule out the use of international market based mechanisms to achieve its 2030 target in accordance with agreed accounting rules".
5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• Namibia currently imposes a tax on the import of electric filament lamps, new and used (re-treaded) pneumatic tyres and new and used motor vehicles. It is domestically referred to as a carbon emission tax, although it only applies to a limited number of products. This evidences an interest in the concept of carbon pricing generally. There does not, however, appear to be any active interest in expanding the application of this tax to other sectors or products, save for the reference in the NDC above regarding possible the taxation policy reform for cleaner technologies and to promote energy savings. There is, to date, no clarity on what such reform would entail.

6	Existing participation in carbon markets and REDD+	• CDM: There are two registered CDM projects for Biogas and Methane recovery. There do not appear to be any VCS projects registered. Namibia is part of four multinational POAs. • REDD: There are no registered REDD projects in Namibia.
7	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 3.86% of GDP.(22)

(22) IMF (2015), supra.

12. Country: Republic of the Congo		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 7.00 $MtCO_2e$ / Per Capita: 1.44 tCO_2e Total GHG Including LULUCF: 19.29 $MtCO_2e$ / Per Capita: 3.96 tCO_2e Population: 4 871 101 GDP- PPP (Million Int$(2011),2014): $ 26 976.43
2	Main source of emissions	• Deforestation amounts to 81% of the country's emissions. Based on BAU energy is likely to be derived 70% primarily from renewable energy (including hydro) in 2025 and 80% in 2030. Renewable energy is anticipated to increase this to 90%. However 80% of domestic fuel use is wood energy.
3	NDC mitigation objectives	• Target: At least 48% reduction in emissions compared to the development scenario uncontrolled (trend) in 2025 and 55% in 2035, conditional upon receipt of international support. Without support emissions will be BAU. • Priority Sectors for Mitigation: Mitigation will be across all sectors focusing on energy sectors and fight against deforestation unplanned (REDD). This entails controlling energy consumption and increased uptake of renewable energies. It also entails maintaining, or even enhancing, the potential for carbon sequestration by forests, by better management of the sector, as well as reforestation.
4	NDC references to carbon pricing	• None
5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• None

6	Existing participation in carbon markets and REDD+	• CDM: There are no registered CDM projects or POAs in the country. There is one VCS REDD+ project. • REDD: There is currently one registered IFM/REDD project in the Republic of Congo. The Republic is also part of the Central African Forests Initiative (CAVI) which seeks to support REDD+ in central Africa, which includes, amongst others developing commitments to national investment frameworks. The Republic of Congo is currently finalising its National Investment Framework.
	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 6.26% of GDP.(23)

(23) IMF (2015), supra.

13. Country: Senegal		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 25.32 $MtCO_2e$ / Per Capita: 4.63 tCO_2e Total GHG Including LULUCF: 30.45 $MtCO_2e$ / Per Capita: 4.62 tCO_2e Population: 14,546,111 GDP- PPP (Million Int$(2011),2014): $ 32,303
2	Main source of emissions	• The country's main sources of emissions are agriculture (36%); energy (27%) and LULUCF (22%) forestry, waste, and industrial processes sectors which contributed 27 percent, 22 percent, 9 percent and 7 percent respectively to GHG emissions.
3	NDC mitigation objectives	• Target: Under the unconditional scenario (INDC) emission reductions relative to baseline projections will be 3%, 4% and 5% in 2020, 2025 and 2030 respectively. Under the conditional scenario (INDC+), expected emission reductions will be 7%, 15% and 21% for the same year • Priority Sectors for Mitigation: (1) Energy, through electricity production, energy efficiency and transport (2) Agriculture, Forestry and Other Land Use (AFOLU), through manure management, rice cultivation, agricultural soils, organic fertilizers, forest lands and plantations, (3) Industry and (4) Waste management, through the treatment of solid waste, industrial waste water, domestic and commercial waste.
4	NDC references to carbon pricing	No.

5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Through national participation in a 2018 study by the UNFCCC Secretariat , the Regional Collaboration Centre of Lomé, Perspectives Climate Research gGmbH, Afrique Energy Environnement, the government of Sengeal has expressed an interest in Carbon Pricing. Specifically, the Department of Environment and Classified Establishments (DEEC) Senegal and the National Committee on Climate Change partnered in the study to determine the potential for introducing carbon pricing policies. The stuy recommended the implementation of a carbon tax.
6	Existing participation in carbon markets and REDD+	• Senegal has a number of renewable energy CDM projects, with six such projects registered with the CDM as well as a mangrove restoration project. • Senegal has one REDD and four ARR projects registered on the International Database of REDD+ projects and programmes.
7	Existing forms of negative carbon pricing	A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 3.63% of GDP.(24)

(24) IMF (2015), supra.

14. Country: Seychelles		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 1.37 $MtCO_2e$ / Per Capita: 15.53 tCO_2e Total GHG Including LULUCF: 1.37 $MtCO_2e$ / Per Capita: 15.53 tCO_2e Population: 88 303 GDP- PPP (Million Int$(2011),2014): $ 2 016.00
2	Main source of emissions	• Approximately 95% of all national emissions are in the energy sector. The remaining 5% of national emissions are accounted for by forestry. Emissions from industrial processes and agriculture are insignificant in Seychelles.
3	NDC mitigation objectives	• Target: The NDCs goal is to reduce its economy- wide absolute GHG emissions by 122.5 ktCO2e (21.4%) in 2025 and estimated 188 ktCO2e in 2030 (29.0%) relative to baseline emissions. • Priority Sectors for Mitigation: Absolute economy-wide emission reductions set out in the NDC cover public electricity, land transport and solid waste management (LULUCF is excluded). The Main goal is green growth. Decarbonization is not a primary objective but is viewed as a by-product /outcome of pursuing green growth.

4	NDC references to carbon pricing	• None. The NDC expressly states that Seychelles has no intention to use market-based mechanisms to meet the set-out emissions target. It does not set out an intention to make use of market mechanisms in any other form.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Republic of Seychelles, *National Climate Change Strategy*, National Climate Change Committee, 2009 – The strategy does not directly mention carbon pricing, but it highlights the opportunity for Seychelles to earn from a suitably developed carbon finance framework and sets an action plan of moderate priority to establish a carbon market in Seychelles within 2 years, and to develop on an ongoing basis education and communication to build capacity for emissions trading and carbon management with focus on CDM, NAMA and other mechanisms. • International Monetary Fund (IMF), *Seychelles Climate Change Policy Assessment*, (IMF, 2017)- The IMF consulted with the government of Seychelles to develop this assessment report which recommends the introduction of a carbon tax to complement NDC mitigation plans and highlights that an ETS would not be feasible for Seychelles given the inadequate size of trading markets—unless Seychelles could find other partners. • Republic of Seychelles, *Seychelles Government Budget for the Fiscal Year 2017*, Ministry of Finance, Trade, Investment and Economic Planning, December 2016-The Government of Seychelles has taken steps toward direct carbon pricing with a 50-cent increase in excise tax on fuel. • Republic of Seychelles, *Seychelles Government Budget for the Fiscal Year 2019*, Ministry of Finance, Trade, Investment and Economic Planning, November 2018 -The Government of Seychelles has taking steps towards indirect carbon pricing by announcing a phased -out approach to remove fuel concessions and exemptions for certain businesses and persons entitled to exemptions under law, to make them liable to full taxes on fuel purchased.
6	Existing participation in carbon markets and REDD+	• CDM and REDD: Low participation in CDM and REDD+. Seychelles is a signatory to the *Krutu of Paramaribo Joint Declaration on HFLD Climate Finance Mobilization* adopted on February 14 2019. As a high forest, low deforestation developing country (HFLD), Seychelles has attracted limited climate finance for forest conservation. The Declaration expresses concern that the pace and scale of REDD+ financing is inadequate and calls for increased financing for sustainable forest management and special consideration to be given to HFLD countries.

7	Existing forms of negative carbon pricing	• A 2013 IMF study,(25)[25] estimates that fossil fuel subsidies constituted approximately -0,7% of GDP in 2012. • Negative carbon pricing exists such as light fuel taxes in the case of LPG and power generation (fuel oil and diesel used by the Seychelles PUC- Public Utilities Corporation) and subsidies in the system whereby certain categories of businesses and persons are entitled to fuel concessions and exemptions under the Excise Tax (Fuel concession/Exemption) Regulation of 2018.

(25) IMF (2015), supra.

15. Country: South Africa		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 524.89 $MtCO_2e$ / Per Capita: 9.69 tCO_2e Total GHG Including LULUCF: 527.22 $MtCO_2e$ / Per Capita: 9.74 tCO_2e Population: 54 146 735 GDP- PPP (Million Int$(2011),2014): $ 674 778.04
2	Main source of emissions	• The primary source of emissions is energy (86%); followed by IPPU (7%); AFOLU (5%, including LULUCF) and waste (2%).
3	NDC mitigation objectives	• Target: A peak, plateau and decline GHG emissions trajectory range. South Africa's emissions by 2025 and 2030 will be in a range between 398 and 614 Mt CO2–eq • Priority Sectors for Mitigation: Expansion of renewable energy and decarbonisation of electricity sector are the main objectives, as supported by CCS technology and low emissions transport.
4	NDC references to carbon pricing	• The NDC expressly refers to the introduction of a carbon tax, as a form of carbon pricing which the country was intending to implement. The tax was finally introduced and implemented in 2019.
5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• Since 2006 South Africa has been considering the introduction of a carbon price. In 2010, a policy paper was published, confirming intentions to implement such a price in the form of a carbon tax. In the ensuing years, South Africa developed further policy papers, design documents and draft Bills to implement the carbon tax. The Carbon Tax Act was brought into force on 1 June 2019. The carbon tax is complemented by a number of other incentives and disincentives, including an environmental levy on incandescent light bulbs, a CO_2 emissions tax on new vehicles, income tax exemptions for the sale of carbon credits, an energy efficiency tax deduction, and an accelerated deprecation allowance for investments in renewable energy and biofuels.

<table>
<tr><td></td><td></td><td>• In view of the fact that the carbon tax allows for carbon offsets to reduce a tax liability, it is possible that the trade of such offsets between private parties may foster the future evolution of a hybrid tax and trading scheme.</td></tr>
<tr><td>6</td><td>Existing participation in carbon markets and REDD+</td><td>• CDM: South Africa had approximately 60 individual CDM projects registered with the UNFCCC and approximately 35 POAs registered, which are a combination of single country and multi-country POAs. The country also has 17 VCS projects, relating to a range of different activities.
• REDD: South Africa has 7 ARR projects according to the REDD+ international database.</td></tr>
<tr><td>7</td><td>Existing forms of negative carbon pricing</td><td>
<table>
<tr><th>IEA Fossil Fuel Subsidies in USD Million</th><th>2016</th><th>2017</th><th>2018</th></tr>
<tr><td>Oil</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Electricity</td><td>6 014,2</td><td>5 324,3</td><td>4 157,9</td></tr>
<tr><td>Gas</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Coal</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="4">Subsidy per capita ($/person): 72</td></tr>
<tr><td colspan="4">Total subsidy as share of GDP (%): 1.1 %</td></tr>
<tr><td colspan="4">The 2015 IMF study does not include Seychelles.</td></tr>
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<table>
<tr><th colspan="3">16. Country: Tanzania</th></tr>
<tr><td>1</td><td>GHG Emissions and Country GDP Data</td><td>Total GHG excluding LULUCF: 78.08 MtCO_2e / Per Capita: 1.49 tCO_2e
Total GHG Including LULUCF: 286.49 MtCO_2e / Per Capita: 5.48 tCO_2e
Population: 52 234 869
GDP- PPP (Million Int$(2011),2014): $ 121 819.90</td></tr>
<tr><td>2</td><td>Main source of emissions</td><td>• According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), as at 2014, 72.7 percent of Tanzania's emissions are from the land-use change and forestry sector, followed by agriculture, energy, waste and industrial processes which contribute 17.3 percent, 7.8 percent, 1.6 and 0.5 percent respectively.</td></tr>
<tr><td>3</td><td>NDC mitigation objectives</td><td>• Target: Tanzania seeks to reduce GHG emissions by 10% to 20% by 2030, relative to the projected 2030 business-as-usual emissions of 138-153 MtCO2e.</td></tr>
</table>

		• Priority Sectors for Mitigation: Intended contributions are in the sectors of energy (embarking on enhanced use of natural gas and renewable energy sources), transport (improvement of the rapid transport and mass marine transport systems), forestry (enhancing carbon sinks through forest conservation, afforestation and reforestation) and waste management (enhancing waste recycling and re-use; mapping. identifying informal dump sites; and implementing landfill gas recovery as well as electricity generation programmes).
4	NDC references to carbon pricing	• No: The NDC makes no explicit mention of domestic carbon pricing. • Notwithstanding the above, intended mitigation activities set out however have a bearing on carbon pricing, for example in the forestry sector among the specific actions to be implemented is the enhancement of REDD+ related activities. In the energy sector the government speaks generally of exploring and investing in the energy diversification system to contribute towards energy emissions intensity reduction over time. This general statement leaves carbon pricing initiatives as an open avenue for consideration, but there is no express reference to carbon pricing either domestically or internationally.
5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• United Republic of Tanzania, *National Climate Change Strategy*, Division of Environment (2012). The strategy directly indicates interest in carbon pricing as it calls for Tanzania's participating in mitigation initiatives, such as the CDM, NAMAs, REDD+, and other carbon markets or trading activities. Introduction of special tax for investments on climate change mitigation initiatives is also one of the strategic interventions set out, and indirectly points to an interest in carbon taxes as one of the options to raise revenue for green development. • Vulnerable Twenty (V20) *4th Ministerial Communique,* Bali -Indonesia, 14th October 2018- Tanzania is a member of the V20 Group of Ministers of Finance committed to promoting ambitious efforts to address the global threat of climate change. The 4th Communique sets out the V20 goal to accelerate fossil fuel subsidy reform and support carbon pricing efforts. The V20 commit to advancing with implementing domestic carbon pricing mechanisms and fostering exchange and capacity to further this with the support of partners. • Tanzania is a member of the East African Alliance on Carbon Markets and Climate Finance launched in June 2019. The alliance promotes a common vision on carbon markets and climate finance and increasing knowledge based on Article 6 market mechanisms and the transition from the CDM to the mechanisms in Article 6 of the Paris Agreement thus indirectly pointing to an intention to develop carbon pricing.

6	Existing participation in carbon markets and REDD+	• CDM: Registered CDM projects are in biomass energy, landfill gas, hydro and reforestation. Interest in NAMAs exists and with the support of UNDP Tanzania is developing a bus rapid transit (BRT) system NAMA. • REDD: Since 2008, Tanzania has been implementing REDD+ initiatives including establishing a national monitoring, reporting, and verification system and the National REDD+ Strategy and Action Plan (2013). Example of projects -The Kolo Hills REDD+ project
7	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 4.12% of GDP.(26) [26]

(26) IMF (2015), supra.

17. Country: Uganda		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 34.11 $MtCO_2e$ / Per Capita: 0.88 tCO_2e Total GHG Including LULUCF: 59.92 $MtCO_2e$ / Per Capita: 1.54 tCO_2e Population: 38 833 338 GDP- PPP (Million Int$(2011),2014): $ 64 714.90
2	Main source of emissions	• The World Resources Institute Climate Analysis Indicators Tool (WRI CAIT) highlights that Uganda emitted 49 million MtCO2e of greenhouse gases in 2012, with the main source of emissions being the agriculture sector which was responsible for 48 percent of emissions, followed by the land-use change and forestry sector with 38 percent of emissions.
3	NDC mitigation objectives	• Target: The target is 22% reduction of national GHG emissions in 2030 compared to business-as-usual estimated emissions of 77.3 MtCO2eq/yr. • Priority Sectors for Mitigation: The NDC mitigation objective is green growth and emission reduction priority areas are energy, forestry and wetlands restoration.
4	NDC references to carbon pricing	• No, there are no references to domestic carbon pricing. The NDC makes reference to international carbon markets and the CDM. It highlights that Uganda intends to meet its commitments and/or increase the level of its contribution through the use of international market mechanisms where appropriate, building upon the experience of the Clean Development Mechanism and other existing market mechanisms. It does not make any mention of a domestic carbon price.

5	Documents/ policies/ statements/ initiatives indicating an interest/intention in developing direct and indirect carbon pricing	• Republic of Uganda, *National Climate Change Policy*, Ministry of Water and Environment (April 2015)- Indirect reference to carbon pricing by highlighting that funding for policy priorities will come from market-based mechanisms for climate-related actions, such as CDM, REDD+, emissions-trading revenues, tax incentive and tariff schemes. • Uganda is a member of the East African Alliance on Carbon Markets and Climate Finance launched in June 2019. The Alliance demonstrates an indirect intention to pursue carbon pricing by member countries as it promotes a common vision on carbon markets and climate finance and increasing knowledge based on Article 6 market mechanisms and the transition from the CDM to the mechanisms in Article 6 of the Paris Agreement. • Whilst Uganda does not have an express carbon price, the Traffic and Road Safety Act seeks to outlaw the import of old cars due to environmental concerns. Vehicles older than eight years would be hit by a 50 percent environmental tax, while vehicles between five and eight years old would be subject to a tax rate of 35 percent. Industrial vehicles and goods trucks however pay lower taxes thus failing to dissuade the importation of inefficient technologies that result in higher emissions for this category of vehicles. Notwithstanding the above, the introduction of such a tax demonstrates a political willingness to impose taxes on the basis of energy inefficient technology.
6	Existing participation in carbon markets and REDD+	• CDM: Uganda has registered 19 standalone projects and 11 PoAs. Projects include hydro, clean cookstoves, landfill gas, methane avoidance, and reforestation. Eleven projects have been registered with the VCS. • REDD: While Uganda has various forestry projects, it doesn't have any registered as REDD/REDD+ projects. Uganda's NDC highlights a keen interest to develop two specific NAMAs contingent upon receipt of sufficient international support. Currently, Uganda has 9 NAMAs in the Nama pipeline seeking support. Uganda launched a National REDD+ Strategy in November 2017.
7	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 1.64% of GDP.(27)

(27) IMF (2015), supra.

18. Country: Zambia		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 51.20 $MtCO_2e$ / Per Capita: 3.28 tCO_2e Total GHG Including LULUCF: 379.89 $MtCO_2e$ / Per Capita: 24.32 tCO_2e Population: 15 620 974 GDP- PPP (Million Int$(2011),2014): $ 56 743.25
2	Main source of emissions	• The largest source is LULUCF (328 MtCO2e); followed by energy (24.9 MtCO2e), and then agriculture (22.9 MtCO2e)
3	NDC mitigation objectives	• Target: 25% by 2030 compared to 2010 base year emission levels, and up to 47% (subject to international support) against 2010 as a base year, • Priority Sectors: All sectors including energy, agriculture, waste and LULUCF
4	NDC references to carbon pricing	• No, no references to domestic carbon pricing are made. However reference to the international market is made, whereby the country states that it "does not rule out the possibility of using market based mechanisms in meeting emission reduction targets."
5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• Zambia has introduced vehicle taxes as a form of carbon pricing. Specifically it has introduced a once off flat tax on vehicles more than five years, called the Motor Vehicle Surtax. This tax is added to import duty. In addition, an annual charge on emissions, called the Carbon Emissions Surcharge, is applied on all vehicles based on their engine displacement. Government has also zero-rated excise duty for electric vehicles and halved their customs duty (Zambian electricity is primarily hydro-electric). • Aside from this tax and annual increases thereto, there does not appear to be any other expression of intent to introduce another form of carbon pricing. For example the 2016 National Policy on Climate Change makes no mention of carbon pricing. • The Zambian National Strategy to reduce emissions from deforestation and forest degradation (REDD+) 2015, does however briefly refer to carbon pricing domestically as a source of finance for REDD+, specifically it states "To guarantee sustainability of donor funded programmes, there is an increasing need for sourcing financial needs for REDD+ Programmes from domestic sources. Such sources in Zambia could include Government budgetary allocations, the carbon tax, and capitalized environmental funds. Another important source of finance could be through Public-Private Partnerships combining public resources with private sector resources." Since this document there does not appear to have been any traction on developing a form of carbon pricing to finance REDD. This is probably because in respect of the proposed carbon tax, the REDD+ strategy points to the existing tax on vehicles as being representative of a tax from which funding could be drawn.

6	Existing participation in carbon markets and REDD+	• CDM: Zambia has 8 registered POAs which are a combination of in country and multi-country POAs. It has had three CDM individual projects registered with the UNFCCC. Zambia also has five VERRA VCS projects mainly for cookstoves, as well as one landscape management and one REDD+ project with this standard. • REDD: Zambia has a REDD+ Strategy Investment Plan in 2017 and a policy brief on key investment options in participatory forest management was finalized. Zambia developed an Integrated Forest Landscape Project. Zambia has three REDD projects registered.
	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 8.15% of GDP.(28)

(28) IMF (2015), supra.

19. Country: Zimbabwe		
1	GHG Emissions and Country GDP Data	Total GHG excluding LULUCF: 27.72 $MtCO_2e$ / Per Capita: 1.80 tCO_2e Total GHG Including LULUCF: 63.79$MtCO_2e$ / Per Capita: 4.14 tCO_2e Population: 15 411 675 GDP- PPP (Million Int$(2011),2014): $ 29 412.84
2	Main source of emissions	• 49% of emissions are from energy, 40 % are from agriculture and the remainder are industry and waste. In relation to energy, 40 % are from "thermal" sources whilst 60% is from hydropower. The majority of rural electrification needs are from firewood. The country is, however, a net carbon sink with a high potential sequestration capacity
3	NDC mitigation objectives	• Target: 33% below the projected Business As Usual energy emissions per capita by 2030. • Priority sectors for Mitigation: Mitigation efforts are focused on the energy sector particularly the development of dams for hydropower and biogas digesters. Related measures include energy efficiency and the promotion of LPG.
4	NDC references to carbon pricing	• No, in the sense that it does not contemplate direct carbon taxes or other domestic carbon pricing mechanisms. It does however express an interest to rely on the international market. Specifically it states: "Zimbabwe … intends to leverage on its resources including carbon credits or sell of emission reductions units through international and regional carbon markets and/ or carbon pricing mechanisms to mobilise more resources for managing climate change. "

5	Documents/ policies/ statements/ initiatives indicating an interest/ intention in developing direct and indirect carbon pricing	• In 2001 Zimbabwe imposed a "carbon tax" on fuel, ostensibly to reduce GHGs. There is no intention to recycle accrued revenues for climate change initiatives. In 2017 it was estimated that the carbon fuel tax was US3 cents per litre of petrol or diesel, equivalent $13 per tonne of CO2e for petrol, and $11 per tonne of CO2 emissions for diesel.(29) Carbon tax is payable on every litre of diesel or petrol imported in Zimbabwe. The Minister of Finance may exempt any licenced power generation project that commenced on or after 1 January 2018 from carbon tax liability for a fixed or indefinite period. • In the 2018 National Climate Policy, government expressed an intention to introduce a "0.005% levy of net profit for industries towards national green growth." The levy will be directed towards a proposed "National Climate Fund". It is not clear to what extent the levy will depend on the GHG emissions profile or nature/fuel inputs/or activity of the industry subject to the levy. Theoretically this could be a form of intended carbon pricing but more information would need to be published regarding the nature and application and scope of the levy in order to assess whether it would serve as a carbon price. Presumably because it is included in the National Climate Policy the levy will bear some direct or indirect relationship to GHG emissions. • In addition to the proposed 0.005% levy on industry profit, the Policy also provides that government will "develop, review and implement policies to enhance the country's capacity to engage in carbon market activities, strengthen the viability of domestic carbon asset production and increase access to international carbon markets and green bonds... and Build capacity to access international climate funds through upscaling REDD+, CDM, GCF and GEF-financed projects."
6	Existing participation in carbon markets and REDD+	• CDM: Zimbabwe has one CDM project registered with the UNFCCC. The country is also party to three multi-country POAs. • REDD: Zimbabwe has one registered VERRA REDD project.
7	Existing forms of negative carbon pricing	• A 2015 IMF study, estimates that total post tax subsidies on fossil fuel products (petroleum, coal, natural gas and electricity) as 23.74% of GDP.(30)

(29) The Herald "Zimbabwe: What Role Can Carbon Tax Play to Achieve Zim's Climate Goals?" 13 November 2017 https://allafrica.com/stories/201711130436.html
(30) IMF (2015), supra.

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