EXECUTIVE SUMMARY

Highlights

- Current commitments in nationally determined contributions (NDCs) are not sufficient to limit global temperature rise to 1.5°C. The Special Report of the Intergovernmental Panel on Climate Change (IPCC) confirms that significantly strengthened mitigation efforts are essential.

- The Climate Vulnerable Forum (CVF) Virtual Summit of November 22, 2018, is an opportune moment to help catalyze global efforts to close the emissions gap to 1.5°C. The 48 members of the CVF can continue their global leadership role by committing to submit new or updated NDCs in 2020, thereby also catalyzing efforts by others.

- This paper explores a range of mitigation and adaptation options that CVF member countries could pursue when submitting new or updated NDCs by 2020.

- It highlights actions in key sectors (energy, transport, forests, food, and agriculture) and specific ways in which CVF countries can help drive the transition to a low-carbon and climate-resilient pathway while supporting sustainable development objectives, including access to energy, health, and transport; sustainable land use; and food security.

- Although individual CVF countries have low greenhouse gas (GHG) emissions, their combined emissions are equivalent to those of the world’s fifth largest emitter. The potential impact of CVF country action is thus highly significant.
Action to Limit Temperature Change to 1.5°C

In 2018, countries will have the opportunity to bring national climate action in line with the goals of the Paris Agreement by committing to submit new or updated NDCs by 2020 that enhance their level of ambition. Multiple studies reveal that current commitments are not sufficient to prevent global temperature from rising beyond 1.5°C to avoid some of the worst impacts of climate change. According to the IPCC Special Report on 1.5°C, full implementation of current NDCs would not be sufficient to limit global warming to 1.5°C, even with ambitious emissions reductions after 2030 (IPCC 2018). It is essential to significantly strengthen global mitigation efforts well before 2030—the best opportunity to do so is through new or updated NDCs in 2020. While it is essential that the largest emitters—particularly developed countries—do the most, each and every country can play a role in mobilizing global action.

The first collective stocktaking exercise, known as the Talanoa Dialogue, is now underway. It provides important content for all countries to explore available opportunities to enhance ambition and achieve the goals of the Paris Agreement. It has highlighted the transformational shift occurring as the low-carbon economy begins to take hold through innovation, new technologies, investments, and private sector and subnational initiatives (NCE 2018). This shift brings with it social, economic, and environmental benefits. Many countries are taking advantage of this transformation to achieve the targets they have communicated in their current NDCs, while also progressing on related development objectives.

By the conclusion of this year’s Conference of the Parties to the United Nations Framework Convention on Climate Change (COP24), it is crucial that countries commit to enhancing their NDCs in 2020, and initiate domestic multistakeholder processes to identify opportunities to strengthen climate action in light of specific national priorities, capabilities, and sustainable development objectives.

Opportunities to enhance ambition should be pursued in parallel to accelerating the implementation of current NDCs. The two are mutually reinforcing.

The CVF Virtual Summit in November 2018 is a key moment for CVF countries to demonstrate leadership in strengthening ambition and to assist in catalyzing the ambition process under the Paris Agreement. At this critical junction, the CVF again has the opportunity to catalyze much needed change. It can help bring about the objectives of the CVF Marrakech Communiqué, which emphasizes that countries should update their contributions by 2020 at the latest to be consistent with the Paris Agreement’s long-term goals (CVF 2016b).

Options for Updating and Enhancing NDCs

As outlined in the World Resources Institute working paper, “Enhancing NDCs by 2020: Achieving the Goals of the Paris Agreement” (Fransen et al. 2017), there is a range of specific options for all countries to consider when deciding whether or not to submit a new or updated NDC in 2020. Countries can enhance their mitigation ambition through pursuing one or more of the options illustrated in Figure ES-1.

Building on the analysis in Fransen et al. (2017) this paper identifies particular options relevant to CVF members in key sectors (i.e., energy, transport, forests, food, and agriculture) that will help steer the transition process toward a low-carbon pathway while enhancing resilience and sustainable development objectives. This can include incorporating or strengthening targets, policies, and actions to achieve the necessary transformational change in key sectors. These options closely align with, and often are driven by, efforts to achieve energy access, health, accessible transport, sustainable land-use, agriculture, and food security. Figure ES-2 provides a snapshot of some of these options.
Which actions will constitute an actual increase in mitigation ambition depends entirely on the national context and content of the current NDC. According to Fransen et al. (2017), an NDC with enhanced mitigation ambition is one that, if fully implemented, would result in lower cumulative emissions than the fully implemented existing NDC.

In addition to mitigation-related opportunities, CVF members can also consider revisiting and updating or elaborating the adaptation-related components of their NDC. This could be done at a sectoral level, pursuing targets, policies, and measures to enhance resilience (in key sectors identified in Figure ES-2 and maximizing mitigation and adaptation co-benefits). Alternatively, CVF members can update national goals and objectives to enhance resilience or update or elaborate the information communicated in the NDC on a country’s vulnerabilities to, and priorities for, responding to climate change impacts.

Finally, updating or submitting a new NDC also provides the opportunity to enhance elements of the NDC related to transparency, clarity, and understanding and the implementation of the NDC targets and actions through the development of robust and nationally appropriate legal and financial frameworks and mechanisms to guide decision-making and investment. Figure ES-1 offers an overview of those options explored in detail in Fransen et al (2017).

In proposing options, the authors expressly acknowledge that CVF members are unable to undertake this process alone. To meet the goals of the Paris Agreement will require the largest emitters to sharply cut their emissions in coming years.

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### Figure ES-1: Menu of Options for Enhancing Nationally Determined Contributions

<table>
<thead>
<tr>
<th>MITIGATION AMBITION</th>
<th>ADAPTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthen or add a GHG target</td>
<td>Update or add information on trends, impacts &amp; vulnerabilities</td>
</tr>
<tr>
<td>Strengthen or add a sectoral non-GHG target</td>
<td>Update or add current &amp; near-term planning and action</td>
</tr>
<tr>
<td>Strengthen or add policies and actions</td>
<td>Update or add national long-term goals or vision</td>
</tr>
<tr>
<td>Align implementation of the existing NDC with long-term goals</td>
<td>Update or add information on gaps &amp; barriers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IMPLEMENTATION</th>
<th>COMMUNICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add actions or measures to strengthen implementation</td>
<td>Provide basic information to enhance clarity, transparency &amp; understanding</td>
</tr>
<tr>
<td>Updated or add monitoring, evaluation &amp; learning plans</td>
<td>Provide additional detail</td>
</tr>
</tbody>
</table>

To bolster efforts to achieve the CVF goal of 100% renewable energy (RE):
- Establish or strengthen quantitative targets to increase the capacity and generation of RE
- Establish or strengthen quantitative targets for energy storage capacity linked to RE sources
- Establish or strengthen quantitative targets to increase energy access through the use of RE sources

To reduce energy demand and costs of energy use and avoid lock-in of inefficient high-emitting technology:
- Commit to introduce building energy codes for new construction
- Commit to introduce mandatory appliance performance standards and put in place associated phase-outs of less efficient appliances to unlock energy savings

To support food security and local livelihoods, protect and increase GHG sinks, and improve resilience of coasts and water systems:
- Establish GHG reduction targets to reduce emissions from deforestation and forest degradation
- Establish or strengthen quantitative non-GHG targets to protect or restore forests (e.g., commitments under the Bonn Challenge)
- Commit to reform fiscal policies to invest in restoration and reduced deforestation
- Commit to pursue a range of policies to empower and encourage community forest restoration and stewardship, including land tenure and legal recognition of indigenous territories
- Commit to create or protect areas of mangroves, saltmarshes, sea grass meadows, and kelp forests (including through Marine Protected Areas)

To reduce postharvest loss and the amount of organic food going to landfill, increase food security, and reduce methane emissions:
- Establish quantitative targets to reduce food loss and waste by 50% by 2030, including postharvest losses
- Commit to promote marketing cooperatives and improve market facilities for smallholder farmers to boost efficiency of transporting fresh produce to market

To improve farmer livelihoods and reduce methane emissions:
- Commit to pursue or scale up specific policies and/or incentives to promote the intermittent flooding of rice paddies where feasible
- Commit to introduce policies and/or incentives to support farmers to implement livestock digestion projects and promote R&D on dietary supplements and shifts that will reduce enteric fermentation in livestock

To reduce harmful emissions and improve air quality and traffic congestion:
- Establish quantitative targets to increase the share of electric vehicles, powered by RE, to a certain percentage of total vehicle fleets by 2030
- Commit to a certain modal share of public transport and/or cycling and walking
- Commit to adopt low-sulfur diesel fuel standards to reduce black carbon emissions

FORESTS AND COASTAL ECOSYSTEMS

EXAMPLES OF OPTIONS

Example of Options

ENERGY

TRANSPORT

FOOD AND AGRICULTURE
Many CVF countries will face complex challenges as they consider how they might enhance their NDCs by 2020. This often can include ongoing challenges in implementing current NDCs; capacity constraints for examining and designing targets, policies, and actions for revised NDCs; legal and regulatory barriers to strengthen action; and lack of support across multiple ministries and agencies.

Given these challenges, it will be essential to ensure that government efforts to develop enhanced NDCs receive adequate support from domestic and international institutions. As CVF members enhance the ambition of their current NDCs, additional finance and support will need to be mobilized. The ability of the international community to mobilize such support, in partnership with and in response to CVF member needs, is an important factor in countries collectively meeting the goals of the Paris Agreement. Further, the ability of CVF members to access this finance and support will need to be increased.

The Vulnerable Twenty (V20) Group of Ministers of Finance of the Climate Vulnerable Forum, which the CVF established in October during the 2015 IMF/World Bank Annual Meetings in Lima, Peru, have been instrumental in strengthening the economic and financial response to climate change in CVF countries. Its aim is to promote the mobilization of public and private climate finance, share and exchange best practices on economic and financial aspects of climate action, and develop new and improved approaches to climate finance (VTG n.d.).

Finance ministries of CVF member countries are thus in a critical position to assist in the delivery of upgraded NDCs, regardless of which options have been adopted by individual countries.

Leading on the Arc of Ambition

The concept of NDC enhancement aligns with the Paris Agreement’s premise that climate action must be progressively enhanced in a virtuous cycle of ambition. All Parties to the agreement have the opportunity to demonstrate their commitment to the goals of the Paris Agreement, including the 1.5°C temperature goal, by raising the level of mitigation ambition of their current NDCs by 2020 and bringing closer their efforts, collectively, to that which is required to avoid the most catastrophic impacts of climate change.

The commitments and statements by CVF members during the CVF Virtual Summit will play a key role in catalyzing the Agreement’s virtuous cycle of ambition (as illustrated in Figure ES-3). They can serve to spur the arc of ambition toward 2050 objectives.

This paper’s assessment of options for enhanced action is premised on the leadership of the CVF, past and present. At the international level, this leadership should steer the large emitters toward the urgent task of responding to those clear messages outlined in the IPCC Special Report relating to the 1.5°C temperature goal. In doing so, CVF members should point to the early progress already made on NDC implementation; new technological advances; rapidly decreasing costs for renewable energy; increasing information and data on possible low carbon pathways; and the considerable efforts of business, cities, and nonstate actors in the drive toward results. At the domestic level, CVF members also can benefit from leading, for instance, by engaging a broader constituency for implementation; sending strong signals to the finance and investment communities; aligning with the sustainable development agenda; and setting a course for a low-carbon and climate-resilient development approach.
1. INTRODUCTION

The Climate Vulnerable Forum (CVF), with its 48 members, is well placed to encourage ambitious action in the coming years on climate change. This paper highlights the progress of the CVF to date and the various options members of the CVF have to submit revised NDCs in 2020.

1.1 Raising Ambition through NDCs

Nationally determined contributions (NDCs) represent the cornerstone of the Paris Agreement. They are the tool countries have to communicate their priorities on climate change. NDCs themselves will not limit climate change; they are commitments to act—their power is in the signals they send to other countries, to investors (both domestic and international), to business and to civil society.

Under the Paris Agreement, countries agreed that their NDC would reflect their highest possible ambition. Being “nationally determined” means that no two NDCs are the same or contain the same targets, actions, or measures. The current set of NDCs was prepared by countries ahead of Paris—representing their best estimation at that time of what a fair and ambitious contribution would be.

The collective ambition of current NDCs, nevertheless, fall short of what is required to achieve the goals of the Paris Agreement, particularly the pursuit of efforts to ensure that temperature does not increase to beyond the pre-industrial level of 1.5°C (Joeri Rogelj 2016).

Limiting the global temperature rise to 1.5°C is critical. The IPCC has examined the impact of a 1.5°C versus a 2.0°C temperature increase by the end of the century. It has established that the increase from 1.5°C to 2.0°C—a third more of an increase—raises the impact of risks by
about that same fraction (IPCC 2018). The additional 0.5°C would mean a 6-centimeter-higher global sea-level rise by 2100, with longer heat waves and a further decline in coral reefs (IPCC 2018; 2014). Passing these tipping point thresholds would likely impact poor and vulnerable communities first and most severely.

According to the Special Report of the Intergovernmental Panel on Climate Change (IPCC), achieving the proposed ambitions of the current NDCs will fall short of limiting global warming to 1.5°C, even if they are supplemented by considerably challenging increases in the scale of emission reductions after 2030 (IPCC 2018). Accordingly, significantly strengthened mitigation efforts are essential well before 2030 to reduce global emissions.

Fortunately, opportunities exist to enhance the ambition of the current NDCs.

The IPCC finds that sustainable development not only supports but often enables the fundamental societal shifts that contribute to limiting global warming to 1.5°C (IPCC 2018).

Much has changed since countries first developed their NDCs ahead of COP21 in 2015. First and foremost, the Paris Agreement establishing a clear direction of travel for all Parties was adopted and subsequently ratified. Second, there have been significant changes in the real economy, such as the price of renewable energy (RE) which continues to fall (Pathi 2017); countries are increasingly decoupling economic growth from greenhouse gas (GHG) emissions (Aden 2016) and instituting strong domestic frameworks for NDC implementation (LSE 2017); and a growing number of long-term, low GHG emission development strategies recognize the need for transformative change to align with Paris Agreement goals.

Analysis from The New Climate Economy indicates that the world could reap US$26 trillion in economic benefits between now and 2030 by taking bold climate action (NCE 2018). Moreover, a focus on sustainable and inclusive development, particularly in terms of citizens’ needs, will benefit the climate.

The provisions of the Paris Agreement provide an important means to capitalize on these opportunities and increase ambition. The Agreement is built on the principle of regular review and revision to close such an ambition gap. The moment for the first review and subsequent revision of NDCs has, indeed, arrived. The Talanoa Dialogue, a year-long collective stocktaking process, commenced in January 2018 and will wrap up following a high-level ministerial dialogue at COP24 in December 2018. Following the Talanoa Dialogue, and informed by its outcome, the Parties—as agreed—will either recommunicate their current NDCs or submit new or updated ones by 2020 per the principle of progression that is embodied in the Paris Agreement. This upward spiral of ambition underpins the delivery of the goals agreed to in Paris.

1.2 Leadership of the Climate Vulnerable Forum

The coming years will provide the CVF the opportunity to play an integral role in leading collective action on climate change. While individual country GHG emissions may be among the lowest on a global scale, combined total emissions of CVF member countries is approximately 2.5 gross tonnage/year, including those emissions as a result of land use, land-use change, and forestry. This is approximately equivalent to the GHG emissions of Indonesia, the world’s fifth largest emitter (CAIT 2018a). The potential global impact that can be brought about by the CVF collective action should not be discounted.

In addition to contributing to emission reduction, the CVF is able to provide a strong voice in the international climate space, advocating for and leading the way toward the level of ambition that is required. The leadership of the CVF so far has resulted in some of the most ambitious calls to action to date. These include:

- Convening of the Vulnerable 20 (V20) Group of Ministers of Finance of the CVF to strengthen and promote economic and financial cooperation and action to address climate change (V20 2015), including through a series of high-level ministerial dialogues with the Group of Twenty, which has elevated awareness of climate change within finance ministries.
The CVF commitment to stronger climate action in the Marrakech Vision (CVF 2016a), which included a commitment of members to

- strive to meet 100% domestic renewable energy production as rapidly as possible while working to end energy poverty, protect water and food security, while taking into consideration national circumstances; and

- the preparation of long-term strategies “as early as possible before 2020.” This was one of the first international declarations that relates to the joint advancement of the NDCs, sustainable development goals, and long-term strategies to support policy coherence.

The 2016 Marrakech Communiqué (CVF 2016b), which included a commitment from Ministers and high-level leaders of the CVF to strive to lead through greening their economies to contribute toward achieving net carbon neutrality and 100 percent renewable energy and an emphasis on any country with an NDC not yet compliant with the goals of the Paris Agreement to update it by 2020 at the latest.

The urging of the CVF to all countries in May 2018 to step up their existing climate commitments and align their approach to ensure that global temperature does not rise beyond 1.5°C, above preindustrial levels (CVF 2018). Senator Loren Legarda of the Philippines echoed this sentiment, by stating that “1.5°C is completely feasible, but it requires bold political will” (Box 2).

At this critical junction, the 48 member countries of the CVF again have the opportunity to play an integral role in driving ambitious collective action on climate change. It can help bring about the objectives of the CVF Marrakech Communiqué, which emphasizes that any country with an NDC not yet compliant with its fair share—consistent with the Paris Agreement’s long-term goal—must update its contributions by 2020 at the latest (CVF 2016b).

Playing a crucial leadership role in international climate action is not the only reason for CVF members to update their NDC by 2020. Reviewing and revising NDCs by 2020 also makes sound domestic sense in the following ways:

- It will bring countries’ actions into line with the purpose of the Paris Agreement and its long-term goals over coming years. Moreover, if NDC enhancement is framed in the context of delivering on domestic sustainable development objectives, it will enable, for example, increased access to clean and reliable energy, reduced food loss and waste, increased food security, reduced air and water pollution, and new economic opportunities.

- It will increase country attractiveness to public and private investors alike, providing developing countries the opportunity to access financing at scale for emission reduction and resilience projects as part of their broader sustainable development agendas. The Government of Germany’s International Climate Initiative, for example, contributes to mobilizing significant investment for the implementation of NDCs in priority subsectors as part of a three-year project that focuses on interventions within seven target countries (South South North n.d.).

- The process of reviewing the current NDC and identifying additional opportunities for action, in itself, can be sufficiently powerful to re-engage stakeholders and seek consistency in climate action. This not only will tap into additional opportunities based on action from business, cities, and regions it also will strengthen implementation support through greater buy-in and ownership.

While enhancing the mitigation ambition of current NDCs is of utmost urgency, the CVF should also reflect on the goals and plans of current NDCs to reduce vulnerability to the impacts of climate change and update, adjust, or strengthen them to optimize adaptive capacity. The CVF was formed due to the extreme vulnerability of its members to the impacts of climate change. Thus, while demonstrating global leadership on mitigation action is critical, for many members adaptation remains a significant priority. This moment also provides the opportunity to ensure that investments made today are sustainable and adaptive in the long term. NDCs also provide an opportunity to align national development goals with adaptation goals. CVF countries also should take this opportunity to communicate them in such a way as to demonstrate leadership and political will.
1.3 Enhancing Resources to Support Greater Ambition

Before exploring options to enhance the ambition of current NDCs further, it is critically important to emphasize that the majority of CVF countries have expressed the need for finance, technology, and capacity building to implement their current NDC. Of the 48 NDCs submitted by CVF countries, 46 note that they are fully or partially conditional on a range of factors, primarily—although not exclusively—financial support and other means for implementation. The concept of enhanced ambition over time is one half of the deal that was struck under the Paris Agreement. There is also a clear expectation that support also must be enhanced not only to enable full and effective implementation, but also to increase ambition.

Using the revision process to align with V20 efforts, attract finance, and ensure alignment of the NDC with current priorities and objectives can be an effective approach. Targets, actions, and measures that Parties communicate internationally through their respective NDC will play a crucial role to spur the scale and type of innovation and investment that are needed.

1.4 Taking a Longer-Term View

To complement the NDCs, the Paris Agreement and its accompanying decision invite countries to develop mid-century, long-term, low GHG emission development strategies by 2020. These strategies can very usefully guide the enhancement of NDCs, as countries can align their long-term visions with short- and medium-term actions.

Some CVF countries are in the process of developing and communicating their long-term strategies. The Marshall Islands, for example, released its long-term strategy in September 2018; it includes objectives to boost climate resilience and reach net zero emissions by 2050.

Long-term strategies are valuable to all countries, since they set a longer-term agenda that can contribute to the prevention of emissions lock-in and stranded assets (Ross and Fransen 2017). Long-term strategies also play a particularly crucial role for CVF countries by providing a clear signal to the world that a path toward the temperature goals set in the Paris Agreement is, indeed, achievable, and that those countries vulnerable to climate change should commit to achieving them. Furthermore, they can demonstrate that, together, CVF countries are able to pursue ambitious development objectives and climate action, including the transition to 100 percent renewables by 2050.

While an in-depth examination of long-term strategies is outside of the scope of this paper, it is nevertheless essential to note that such strategies play an important role to support—and link—countries’ climate and development agendas and provide guidance toward NDC enhancement. These strategies also are of particular relevance in light of the IPCC Special Report that concludes that net carbon dioxide (CO₂) emissions, on average, will need to be reduced to zero by mid-century to prevent a rise in global warming beyond 1.5°C. For a more detailed discussion of long-term strategies see WRI (2018) and ECF (2018).

1.5 Options for NDC Enhancement

The CVF has a range of options to consider when updating current NDCs, as outlined in Fransen et al. (2017). An NDC with enhanced mitigation ambition is one that once fully implemented, will result in lower cumulative emissions than the current NDC would have (when also fully implemented) (Fransen et al. 2017). Mitigation ambition can be enhanced by strengthening or adding a GHG target, a sectoral non-GHG target, policies and actions, and/or by aligning implementation of an existing NDC with long-term goals (Figure 1). In addition, countries also have the opportunity to update, strengthen, and elaborate the adaptation component of their NDC, as well as improve its clarity, transparency, and understanding (Figure 1). The options presented are not mutually exclusive; in many cases, it will be appropriate and desirable for a Party to enhance its NDC across all dimensions, and to implement more than one option in each dimension.

This paper builds on the menu of options elaborated by Fransen et al. (2017), using it as a base from which to explore specific opportunities for CVF member countries to update and enhance their respective NDC by 2020. First, it examines the key features of current NDCs and presents a mapping of the coverage of sectors and gases. Second, it explores specific options to consider for key sectors (i.e., energy, transport, forests, food, and agriculture), drawing on examples of action already taking place that could inspire countries as they consider how to revise their current NDC.
Determining whether or not an option will enhance a Party’s level of mitigation ambition can be challenging. Consider, for example, a nationally determined contribution that contains a greenhouse gas (GHG) intensity target and a renewable energy (RE) target. If the GHG target is close to current GHG intensity projections, but the RE target vastly exceeds current projections of RE capacity, the RE target will be the key driver of ambition. Raising it will potentially enhance overall ambition. Conversely, if the GHG intensity target is more aggressive and the RE target less so, relative to current projections, raising the RE target may not raise the overall ceiling on ambition. The GHG Protocol Mitigation Goal Standard, together with the Policy and Action Standard, provide guidance for assessing the impact of the measures and can support countries to identify the best options to enhance their level of ambition.

Notes:

a Adapted from Fransen et al. 2017.

b For more information, see GHG Protocol 2014a and GHG Protocol 2014b.

Third, it then explores options to update or elaborate information relating to adaptation and ways in which to improve the clarity, transparency, and understanding of the NDC. Finally, it outlines the relevance of the role of national legal and financial frameworks in support of full and effective implementation, while identifying options to strengthen commitments related to these elements in new or updated NDCs. The paper concludes by setting out next steps and key events from 2018 to 2020 that member countries can capitalize on to spur greater collective ambition.
2. WHAT CLIMATE VULNERABLE FORUM COUNTRIES INCLUDE IN CURRENT NDCS

The targets, policies, and actions communicated by CVF members in their current NDCs are as diverse as are members of the CVF. While this section summarizes the current NDCs based on information from ClimateWatch (2018), it does not assess the ambition of actions; rather, it represents a simple mapping exercise that provides an overview of the various targets, policies and actions, gases, and sectors that members have included. Figure 2 offers a snapshot of five categories of commitments: economy-wide targets, multi-sector targets, sectoral GHG targets, sectoral non-GHG targets, and policies and actions. Note that these categories are not mutually exclusive, since most CVF countries (like other countries) have communicated a range of commitments. Figure 2, nevertheless, demonstrates the significant potential for CVF countries to include additional quantified targets, either GHG and non-GHG targets, at the sectoral level. Annex 1 provides the results of the full mapping exercise undertaken to inform this paper.

- **Economy-wide GHG Targets:** Twenty-two out of the 48 CVF members communicated an economy-wide GHG emission reduction target (CAIT 2018a). Examples of these targets include Tanzania, which committed to a 10–20 percent reduction (GoRT 2018), and Vietnam, which committed from an 8 percent (unconditional) to 25 percent (conditional) reduction (GoV 2016). Both examples are based on a business-as-usual scenario.

- **Sectoral GHG Targets:** In addition to, or in lieu of, an economy-wide GHG target, 11 of the 48 members communicated at least one quantified GHG sectoral target in their NDC (ClimateWatch 2018) (as shown in Figure 3). For some, these sectoral GHG targets are in addition to an economy-wide target, and for others, it represents the main GHG target in the NDC. Examples of sectoral GHG targets include Fiji, which intends to increase “the renewable energy share in electricity generation to approach 100% by 2030 from around 60% in 2013.”

**Figure 2 | Summary of Nationally Determined Contributions of Climate Vulnerable Forum Countries**

![Figure 2](image-url)
**Figure 3 | Number of CVF Countries That Communicated Sectoral Greenhouse Gas Targets**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number</th>
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<tbody>
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<td>TRANSPORT</td>
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<td>AGRICULTURE</td>
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<td>WASTE</td>
<td>3</td>
</tr>
<tr>
<td>INDUSTRIAL PROCESSES</td>
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</table>

*Note:* Communicated by Climate Vulnerable Forum member countries in their current nationally determined contributions.  
*Source:* WRI Authors.

**Figure 4 | Number of CVF Countries That Communicated Sectoral Non-Greenhouse Gas Targets**

<table>
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<th>Number</th>
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</tbody>
</table>

*Note:* Communicated by Climate Vulnerable Forum member countries in their current nationally determined contributions.  
*Source:* WRI authors.
(GoF 2016), and The Gambia, which intends to reduce CO₂ emissions by 2.7 gigagrams equivalent by 2025 through recycling and composting processes (GoTG 2016). The most prevalent sectoral GHG targets relate to the energy sector.

**Sectoral Non-GHG Targets:** In addition to, or in lieu of, GHG emission reduction targets, 34 of the 48 members communicated at least one non-GHG emission reduction target in their respective NDC (i.e., targets that do not specify a particular GHG reduction amount but focus on achieving a particular outcome in a specific sector) (CAIT 2018a) (as shown in Figure 4). An example is Sri Lanka which includes a target to strengthen “sustainable energy related policies with a view to increasing the share of renewable energy from the existing 50%, to 60% in 2020” (GoSL 2016). The most prevalent sectoral non-GHG targets relate to RE.

**Coverage of Gases:** Most CVF countries have explicitly included CO₂, methane, and nitrous oxide in their NDC gas coverage (CAIT 2018a). Despite accounting for less than 1 percent of global F-gas (hydrofluorocarbons, nitrogen trifluoride, sulfur hexafluoride, and perfluorocarbon) emissions, only seven countries explicitly included F-gases in their coverage (Bangladesh, Barbados, Colombia, Costa Rica, Ghana, The Gambia, and Vietnam). This implies the equivalent of approximately 7 percent of UNFCCC Parties (CAIT 2018a). Nepal, the Philippines, and Tanzania have not explicitly specified which gases are covered by their NDCs (CAIT 2018a).

**Adaptation:** Of the Parties, 145 of 197 (74 percent) included an adaptation component in their NDCs (CAIT 2018a). From these, 46 (approximately one-third) are CVF members (CAIT 2018a). Palau and Tuvalu have opted against including an adaptation component in their respective NDC. Figure 5 provides a global comparison of adaptation components in NDCs.

**Conditionality:** Of the CVF members, 46 of 48 have communicated NDCs that are either partially or fully conditional on the receipt of finance, capacity building, or other forms of support for implementation (CAIT 2018a). Costa Rica and Timor-Leste are the only two with fully unconditional contributions.

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**Figure 5 | Comparison of Adaptation Components with Mitigation Components in Current Nationally Determined Contributions**

Note: UNFCCC = United Nations Framework Convention on Climate Change; CVF = Climate Vulnerable Forum.
Source: CAIT Climate data explorer 2018.
3. ENHANCING MITIGATION AMBITION IN KEY SECTORS

The following sections present practical ideas—a “menu of options”—for adding or strengthening targets, policies, and actions in key sectors—energy, transport, forests, waste and agriculture. Figure 6 provides a summary of the breakdown of total emissions from all 48 CVF members in terms of sector. Figure 7 provides a comparison between the total combined emissions from CVF countries by sector to total global emissions by sector, illustrating the potential impact that collective action by the CVF could have in key sectors.

The individual options presented in the following sections are not exhaustive nor are they mutually exclusive. It may be appropriate to pursue multiple options, depending on national circumstances, domestic priorities, respective capabilities, and international support, including financing. Nor are these options the only ones that may support CVF members in their shift to a low-carbon pathway in a manner that also supports the achievement of development objectives and enhances well-being. The sectors and potential actions within them were not only selected, in part, due to their relevance for members in the first round of NDCs but also due to their potential for emission reduction and for contributing to the achievement of CVF goals and priorities, including sustainable development.

Cutting across action in many of the sectors explored below is the relevance of addressing short-lived climate pollutants. Box 2 explores the potential for CVF members to play a particular role in highlighting the need to take urgent action to reduce short-lived climate pollutants (SLCP) as a means to keep temperature rise below 1.5°C in the near term and to reduce the likelihood of overshooting this target.

3.1 Energy

3.1.1 Increase share of renewable energy

During COP22 in Marrakech in 2016, CVF countries adopted the CVF Vision, a forward-looking and ground-breaking pledge that CVF countries “will strive to meet 100% domestic RE targets as soon as possible, while working to end energy poverty and protect water and food security, taking into consideration national circumstances.” (CVF 2016a). This commitment to RE and the transformational vision have set a marker for the global community and placed CVF countries at the leading edge of the shift toward a zero-emission economy.

Deploying increasing levels of RE in CVF countries would not only take those countries closer to their target of reaching 100 percent, it would also mean that they will reap the economic and development benefits of doing so. As The New Climate Economy 2018 report describes, the price competitiveness of renewables with other sources of electricity has continued to grow, and wind and solar power are reaching cost-competitiveness with fossil fuel–based power generation in many regions—an economic advantage that CVF members can tap into as they build new energy systems (NCE 2018). See, for example, Morocco’s use of concentrated solar power in Box 3.

For CVF countries, adopting a growing share of RE in particular will serve a critical role in addressing energy access issues. These benefits are described below for distributed, off-grid RE systems that are highly relevant for many CVF countries.
Between 2005 and 2015, electricity generation from renewable sources has grown 68.5 percent in the CVF countries, as a whole. As of 2015, total RE generation in the CVF countries is 222,057 gigawatt hours, equivalent to 38.7 percent of all their electricity generation (IRENA 2018a). Percentages for electricity generation from renewables range widely across CVF countries, from below 1 percent to nearly 100 percent, with a median of 25 percent (USEIA 2018).

For some CVF countries with a high level of renewables already in place—often largely from hydropower, as in Nepal—the task of reaching 100 percent renewables may not require shifting current energy sources. Nonetheless, as those countries’ energy demand grows, they will need to further deploy renewables and avoid introducing fossil fuel sources of electricity. Meanwhile, in the large majority of CVF countries, the shift to renewables as a substantial percentage of the energy mix will require increased political will, enabling policies, and financing. Furthermore, for all CVF countries, since solar and wind power are still relatively small fractions of electricity supply, substantially increasing the current share of solar and wind power will require significant policy and financial support (USEIA 2018).

For on-grid renewables, improving grid systems to integrate renewables and increase grid flexibility to address variability of RE sources will be needed (Jairaj 2016; CPI 2017). Efforts such as IRENA’s program to support grid integration of renewables in island countries aim to address these challenges (IRENA 2018b). Grid integration of renewables can also be beneficial for small islands within countries; see Box 5 on renewables and grid integration in the Philippines.

Furthermore, despite the clear long-term economic case for RE, financing to cover upfront investment costs will be needed to enable this energy transition to take place. This will require greater public investment in renewables from domestic and international sources, while new models of private investment and innovative blended finance instruments that bring together multiple finance streams are also key parts of the finance landscape. See the case study for derisking investment in RE in Kenya in Box 4.

Many CVF countries have taken substantial steps to build RE into their NDCs and 2030 objectives as follows:

- Thirty-two include targets in their NDC for the level of RE, low-carbon, and/or nonfossil fuel electricity they aim to achieve by 2030 (ClimateWatch 2018). Some of them include more than one type of target.
Box 2 | Action on Short-Lived Climate Pollutants: Nationally Determined Contributions as a Catalyst to Keep Near-Term Temperature Rise to below 1.5°C

Deep and sustained cuts in carbon dioxide (CO₂) emissions are essential in efforts to limit global temperature rise over the long term. In addition, early action on a set of powerful climate-forcers—often referred to as short-lived climate pollutants (SLCPs)—including methane, black carbon, and tropospheric ozone—can provide important climate and development benefits.

SLCPs have a powerful impact on global temperature and the climate system, despite being short-lived in the atmosphere, as the name suggests. Methane and HFCs have significantly higher global warming potentials than CO₂, particularly over shorter time horizons. Importantly, because these pollutants exist for a relatively short lifetime in the atmosphere, their impact on global temperature rise can be mitigated in a comparatively short time span. This means that early and ambitious efforts to reduce SLCPs are particularly vital for maintaining temperature rise below 1.5°C in the near term; reducing SLCPs is also an essential complement to reducing CO₂ emissions over the long term. Indeed, without significant reductions in SLCPs, together with reductions in CO₂ emissions, global temperature increases are likely to exceed 1.5°C during the 2030s and exceed 2°C by mid-century (Shindell et al. 2017).

Reducing SLCPs will also provide substantial benefits as well as support the achievement of many sustainable development goals (Haines et al. 2017). For example, cutting methane emissions reduces levels of tropospheric ozone—a health hazard that harms crop yields—while reducing black carbon emissions reduces premature deaths from pulmonary and respiratory diseases (CCAC 2018b).

Early and ambitious action to reduce SLCPs is therefore urgently needed to limit near-term temperature rise and support the achievement of development objectives. As described earlier in the paper, commitments made in nationally determined contributions (NDCs) can be a powerful tool to drive action. Accordingly, inclusion of targets, policies, and actions to reduce SLCPs in new or updated NDCs will essentially support global climate goals and national development agendas.

SLCPs were largely underrepresented in the first round of NDCs; this is true across all NDCs, particularly those of CVF countries. Of the 48 current NDCs submitted by CVF countries (CAIT 2018a):

- Thirty-eight Climate Vulnerable Forum NDCs include one or more SLCPs in the coverage of a quantitative emissions reduction target. This target is typically set in terms of carbon dioxide equivalent. Here is an example from Barbados’ NDC:
  - Barbados intends to achieve an economy-wide reduction in greenhouse gas emissions of 44 percent by 2030 compared to its business-as-usual scenario. Barbados includes two SLCPs (methane and HFC) in the coverage of this target. (Additional greenhouse gases are also covered under Barbados’ economy-wide target—CO₂, nitrous oxide and sulphur hexafluoride.)

- Five NDCs include quantitative targets for individual SLCPs (e.g., methane or HFC). Here is an example from Rwanda’s NDC:
  - Rwanda commits to develop and implement landfill regulations in all urban areas and to extract and utilize landfill gas (i.e., methane) for power generation. These actions will reduce approximately 586,000 tons of CO₂ equivalent by 2030.

- Fifteen NDCs include policies and actions that aim to reduce one or more SLCPs. Here is an example from Ghana’s NDC:
  - Ghana highlights the Green Cooling Africa Initiative, whereby it plans to abate fluorinated-gases (HFC-22 and HFC-410) from stationery air conditioners by implementing a national ozone-depleting substance phase-out program and managing product regulation.

There are significant opportunities, therefore, to include strengthened targets, policies, and actions to reduce SLCPs in new or updated NDCs communicated by CVF countries. Due to the diverse nature of SLCPs (different emission sources across all sectors of the economy), these opportunities should be identified after a screening of (a) key emission sources; (b) mitigation potentials; (c) relevant domestic policies; and (d) development objectives. This screening process is further described in Ross et al. (2018). Countries can set targets to reduce black carbon, although these should be reported and accounted for separately from greenhouse gas emissions, since black carbon is not a pollutant covered under the United Nations Framework Convention on Climate Change. As noted earlier, black carbon accounting and warming uncertainties also remain high. Carbon dioxide and black carbon impact the climate in different ways and have very different lifetimes; there is yet to be scientific consensus on appropriate metrics to equate the two. This should be noted explicitly in the NDC. Accordingly, black carbon targets should be in mass units, not in CO₂ equivalent units.

As a first step in playing a leadership role in advancing the inclusion of SLCPs in NDCs, CVF members should assess whether existing economy-wide greenhouse gas emission reduction targets could be expanded to cover methane and HFCs, or whether or not it might be possible to set emission reduction targets for individual SLCPs in light of new information and opportunities that have been uncovered since the current NDC was communicated. Finally, there are opportunities to include policies and actions in various sectors aimed toward reducing specific SLCPs. These options are highlighted throughout the paper (see Sections 3.2 on transport and Section 3.4 on food and agriculture). The options are not mutually exclusive—it may be appropriate to pursue multiple options, depending on national circumstances, domestic priorities, respective capabilities, and international support, including financing.

Notes:

a Methane is emitted during the production and transport of natural gas, oil, and coal; from livestock and other agricultural practices; and by the decay of organic waste in municipal solid waste landfills and wastewater treatment facilities (CCAC 2018b).

b HFCs are used mainly in air conditioning and refrigeration systems (CCAC 2018b).

c Black carbon is a major component of soot and is emitted from incomplete combustion processes; for example, from the burning of biomass for cookstoves, black coal for electricity and household heating, and diesel in cars and trucks (CCAC 2018a).

d Tropospheric ozone is not directly emitted but is formed by the sunlight-driven oxidation of other agents; these are known as ozone precursors and include methane, carbon monoxide, nitrogen oxides, and non-methane volatile organic compounds (CCAC, 2018a).
Twenty-six include RE generation targets. For instance, Tuvalu intends to reach 100 percent renewables for its electricity generation by 2020 (GoT 2016).

Fifteen communicate RE capacity targets. For example, Bangladesh is planning to install 400 MW of wind capacity by 2030 (GoBan 2015).

Enhancing NDCs by 2020 can play a critical role in moving toward 100 percent renewable targets and stimulating the investment needed for increased levels of renewables. In particular, CVF countries can incorporate or strengthen their renewable targets. Based on a linear trajectory from current levels to achieve 100 percent RE for electricity by 2050, NDCs for CVF countries would need to achieve 65 percent in aggregate by 2030 (assuming a constant rate of growth). Trajectories for each individual country, however, will vary considerably, given the range of present levels of renewables across CVF countries.

In their respective NDC, countries can opt to represent their renewable targets in various ways, such as absolute gigawatt hours of capacity or generation, as a percentage of total electricity capacity or generation, or as targets for specific sources of RE, such as solar or wind power. CVF member countries can consider one or more of the following NDC enhancement options to advance action on increasing the share of RE:

Establish or strengthen an existing quantitative non-GHG target to reduce energy sector GHG emissions through an increase in the supply of RE. Sixteen CVF countries do not have an existing target for deploying renewable, low-carbon, or non-fossil energy by 2030. Given the commitment of the CVF countries to achieve 100 percent RE by 2050 at the latest, these countries have an opportunity to set targets for 2030 that place them on a trajectory to accomplish their long-term objective.

Establish or strengthen an existing quantitative non-GHG target to reduce energy sector GHG emissions through an increase in RE capacity and/or generation. For CVF countries that have existing targets to deploy renewable or low-carbon energy, there is an opportunity to strengthen these targets and bring them in line with the 2050 goal. Most existing targets are stated in terms of renewable energy capacity, which could be increased. As only two CVF countries have targets for actual generation from RE, this is another area in which countries can expand the scope of their ambition.

Commit to new or strengthened policies and actions to support an increase in the share of renewable energy in the national energy mix.

- Incorporate policies to improve grid integration of RE.
- Pursue policies to derisk private investment in RE (see Box 4).

Box 3  |  Concentrated Solar Power: Morocco

Morocco, as a member of the Climate Vulnerable Forum, offers an example of groundbreaking efforts to deploy renewable energy by using concentrated solar power (CSP). In Morocco, the Noor 1 Concentrated Solar Power plant, which went online in 2016, is the first phase of what will be the world’s largest solar plant when it is completed in 2019. With 580 megawatts of capacity on its own, the Noor 1 plant will be part of a much larger concentrated solar power project that will ultimately provide electricity to more than a million Moroccans. The ability to incorporate low-cost thermal energy storage will enable the project to perform a variety of roles, including providing high capacities during peak demand hours (IRENA 2017). The project also includes linked training programs that target women in the region and, as a whole, will generate more than 1,000 jobs (NCE 2018).

Box 4  |  Derisking Investments in Renewable Energy: Lake Turkana Wind Power Project in Kenya

The development of the largest wind power plant in Kenya was made possible by a blended finance structure that tied together public and philanthropic capital to derisk private investment. The wind park will produce an expected 310 megawatts of wind energy, equal to 15 percent of Kenya’s current installed energy generation. The total project cost, estimated at US$680 million, includes the cost of the envisaged 400 kilometer transmission line from Lake Turkana to the Susua substation near Nairobi and the investments needed to upgrade 200 kilometers of roads. Blended investment has made this large-scale project possible. Private companies are developing the project, and development finance institutions have helped to reduce risks to private investors through an innovative financing mechanism. The African Development Fund brought to bear a partial risk guarantee of approximately US$24 million (€20 million). Through the use of the EU-Africa Infrastructure Trust Fund financial instrument (which blends public investment funds with grants from the European Commission), the needed equity was provided (NCE 2018).
3.1.2 Investing in energy storage

RE, such as solar and wind power, is variable and therefore requires greater flexibility, particularly to store the energy produced from renewables over days, weeks, or even months. Ways in which to effectively store electricity represent a critical component of transformation in the energy sector, as well as in the achievement of the 100-percent renewables goals in CVF countries. To enable the doubling of the global share of RE by 2030, the International Renewable Energy Agency (IRENA) estimates that electricity storage capacity will need to at least roughly double by 2030 (IRENA 2017). To be sure, though, energy storage cannot stand alone; for on-grid uses, other approaches to improve flexibility in grid systems also will be fundamentally important, pursued in tandem with storage, to enable high rates of renewables.

A variety of approaches to electricity storage will be needed for different power needs, such as for short durations or over longer periods, and for different systems, including grid, minigrids, off-grid renewables, and vehicles. Currently, available storage technologies range from batteries to pumped hydro storage (IRENA 2017). While pumped hydro storage is currently the largest form of energy storage, by 2030 pumped hydro will be equaled or surpassed by battery storage (IRENA 2017).

The Institute for Energy Economics and Financial Analysis has highlighted opportunities in the Philippines to use microgrids powered by solar, wind, and other renewable energy sources to provide electricity for its islands. The Philippines is composed of 7,461 islands, many of which are not connected to the main grid and are served by small grids with generators fueled by imported diesel and bunker oil. Many of these small islands, however, served today by diesel generators, suffer from frequent blackouts and unplanned power outages. Incorporating renewable energy in the grids can reduce dependence on fossil fuel generation, while also helping to address the availability of power and grid reliability. This can include integrating solar photovoltaics, wind turbines, biomass gasification, small hydro installations, and battery storage systems into existing power sources on the islands. Regulatory changes to modernize small-island electricity systems will be needed to enable this kind of grid integration. The Philippines Department of Energy can incentivize distribution utilities under the Small Power Utilities Group, which falls under the National Power Corporation, to accelerate integration of renewables in its power systems (Ahmed and Logarta 2017).

In 2017, the Government of Barbados published its Barbados National Energy Policy 2017–2037, with the aim of providing “a framework for moving the island from a fossil fuel-based economy to one based principally on renewable energy (RE) sources.” The National Energy Policy includes a suite of objectives to promote the use of energy storage to enable the growth of renewable energy on the island, including to establish a transparent decision protocol from which to select energy storage measures; create clear guidelines for battery technology integration in photovoltaic systems; implement proven storage technologies and systems that promote renewable energy and are economically, environmentally, and financially viable; and establish a system to recycle and dispose of batteries at end of use (cradle to cradle). (GoBar n.d.)

This shift will be enabled in large part by the continuing fall in the price of batteries. Since 2014, the price of batteries has been cut in half (BNEF 2018).

Importantly for CVF countries, electricity storage can play an especially critical role in addressing energy access issues. It is currently an economic off-grid solution in solar home systems and minigrids (IRENA 2016b). Due to the growth in scale of battery manufacturing for electric vehicles, the cost for stationary batteries could fall by more than half by 2030 (IRENA 2017). In Africa, solar home systems using small batteries are now able to provide better quality energy services to off-grid households at an annual cost that is less than what they pay for inferior lighting (e.g., kerosene lanterns) and other energy services (IRENA 2016). By 2030, uses of storage for solar home systems and minigrids could total as much as half of all uses of storage for solar energy (IRENA 2017).

CVF member countries can consider the following NDC enhancement options to advance action on battery storage:

- **Establish a quantitative non-GHG target for energy storage capacity that is linked to RE sources.** While several CVF countries have included policies and actions regarding energy storage in their respective NDC, none currently have a specific target. Given the need to increase energy storage capacity to address the problem of variability in RE generation, storage linked to renewables will be vital for any country attempting to achieve 100 percent RE.
3.1.3 Pursuit of distributed renewable energy

At the end of 2016, as many as 55 million households, or 275 million people, benefited from the electricity or light provided by solar lanterns, solar home systems, and photovoltaic (PV) minigrids. This has been driven by the fall in the cost of solar PV and the price reductions that have made these systems more affordable (IRENA 2017). Going forward, the installation of off-grid renewables can enable populations with little or no existing connections to electricity grids to access the electricity necessary to improve their quality of life.

Fourteen CVF countries still had less than 50 percent access to electricity as of 2016 (World Bank 2018e). In particular, people in sub-Saharan Africa will make up 90 percent of those without connections to the grid in 2030, meaning that distributed renewables will be essential to provide them with energy access (NCE 2018). Distributed renewable systems can be the fastest and most effective means to provide rural communities with energy access. According to IRENA, 60 percent of the energy generation needed to meet United Nations Sustainable Development Goal (SDG) 7.1 to “ensure access to affordable, reliable, sustainable, and modern energy for all” by 2030 will need to come from off-grid renewables (IRENA n.d.).

The economic case for distributed renewables is stronger than ever as costs of PV panels have fallen dramatically in recent years. According to the World Bank, household solar systems can provide energy for only 4−20 percent of the cost of extending grids, making it the best approach from not only an environmental but also an economic standpoint (World Bank 2017). In some countries, such as Kenya and Uganda, off-grid electricity has already provided energy access to more users than the connections provided by electrification agencies and national utility companies (REN 21 2018). Distributed renewables also will provide a number of development benefits, including reduced chronic and acute health effects, improved lighting quality for households, increased school retention and grades, and increased income for small- and medium-size businesses (REN 21 2018). Box 7 provides examples of the steps that some CVF countries are taking to promote distributed RE.

Six of the CVF countries include targets relating to distributed RE in their respective current NDC (Afghanistan, Nepal, Rwanda, Senegal, Sudan, Yemen) (ClimateWatch 2018). In their 2020 NDCs, CVF member countries can consider the following NDC enhancement option to advance action on distributed RE as part of their overall RE strategy:

- **Establish or strengthen a quantitative non-GHG target for distributed RE sources.** Countries without existing targets for distributed RE in their NDCs can establish or strengthen a target to increase energy access by using distributed RE sources.

### Box 7  Advancing Action on Distributed Renewable Energy: Kenya, Tanzania, and Bangladesh

Several Climate Vulnerable Forum countries, including Kenya, Tanzania, and Bangladesh, have demonstrated success in deploying household solar to underserved populations.

In Kenya and Tanzania, companies using a pay-as-you-go business model have provided electricity to approximately 500,000 households. In a "pay-as-you-go" business model, companies provide consumers with a solar home system that includes a solar panel, battery, LED bulbs, and a mobile charger. Consumers use basic mobile phones to make payments on a regular basis.

Access to finance from multilateral development institutions would significantly aid efforts to expand access to this technology. This approach has been successful in Bangladesh, where the government set up an agency, the Infrastructure Development Company Limited, to channel international finance to the renewable energy sector. Development finance institutions invested US$750 million in the deployment of 3 million solar household solar systems that provide 13 million people with access to energy for the first time (Sanyal 2017).

3.1.4 Improve energy efficiency of buildings and appliances

Buildings and construction account for 36 percent of global final energy use and 39 percent of energy-related CO₂ emissions. Improving building energy efficiency will be critical for limiting global temperature rise to 1.5°C or 2°C and will require serious effort. The energy intensity of buildings, on a global scale, will need to decline an average of 30 percent below 2015 levels by 2030 (UN Environment and IEA 2017).

Many NDC enhancement opportunities exist around building efficiency. While 132 NDCs, globally, make reference to the buildings sector, only 53 mention specific measures and 13 include quantitative mitigation
targets. Together, these measures only cover around 13 percent of global CO$_2$ emissions from the building sector (UN Environment and IEA 2017). Among CVF member countries, 38 include specific efficiency policies and actions or efficiency-related targets, including buildings as well as other sectors. Only six NDCs contain either non-GHG or GHG targets relating to building efficiency (Grenada, Kiribati, Mongolia, Morocco, The Gambia, Yemen).

CVF member countries have the opportunity to lead the way on enhancing building efficiency measures in NDCs. With many of these countries experiencing rapid development and/or urbanization, establishing building energy codes and increasing the use of efficient appliances can provide energy savings for decades while complementing other priorities, including energy access, improved public health, and community resilience to climate change.

Improved efficiency goes hand in hand with access to affordable, reliable, sustainable, and modern energy for all (SDG 7). For CVF member countries experiencing rapid development, harnessing energy efficiency can help stretch resources further to meet rising demand and free resources to invest in other priorities. Increasing energy productivity through building efficiency and other measures has the potential to slow the growth of energy demand in developing countries by more than half by 2020 (Woskow and Weyl forthcoming).

Improving the efficiency of appliances used in homes and other buildings can improve local air quality and access to safe sources of energy, which present a challenge for many developing countries, including some CVF member countries. Appliance standards can prevent used and inefficient products from being imported and sold in the country (Ceesay 2015). In addition, improving the efficiency of refrigeration and air conditioning systems will also reduce hydrofluorocarbons, which are potent GHGs with significantly higher global warming potentials than CO$_2$ (Box 8).

Building efficiency measures can enhance community resilience to the effects of climate change. Demand-side efficiency can improve the stability of the power system during extreme weather events by reducing peak loads and will provide flexibility for utilities to prioritize power for critical infrastructure (e.g., hospitals and water treatment facilities). International Energy Agency modeling found that deployment of high-efficiency lighting, cooling, and appliances over the next decade could save 50 exajoules in electricity demand between now and 2030, the equivalent of three-quarters of today’s global electricity demand (UN Environment and IEA 2017).

Building codes can be designed to withstand and provide protection from severe storms, flooding, and extreme heat, and can be tailored to the unique impacts facing specific geographies (Udvardy and Winkelman 2014; ACEEE 2015). Vietnam, for example, is updating its green building codes and promoting highly efficient buildings (30–50 percent more efficient than current standards) as part of efforts to meet resilience and mitigation goals (Cox et al. 2017). Rwanda passed a mandatory green building certification program in 2017 for buildings occupied by more than 100 people (UN Environment and IEA 2017). The green building certification is part of broader efforts to sustainably develop cities as Rwanda’s rate of urbanization proceeds at double the worldwide average (GGGI 2018a).

A variety of policy tools can drive improved efficiency in buildings, including energy efficiency targets; building energy codes and standards; appliance standards; energy performance labeling, certifications, and information disclosure for buildings and appliances; and incentives and financing options (Woskow and Weyl forthcoming). National governments can establish most of these policies through new legislation and provide support for their implementation, although jurisdiction over implementation often will fall to subnational authorities. Coordination will be critical.

Current NDCs from CVF countries include the following targets and policies:

1. Four CVF member country NDCs include GHG reduction targets involving energy efficiency. Two, Cambodia and Grenada, also include specific GHG reductions that result from building sector-specific actions.

2. Four CVF countries include sectoral non-GHG targets related specifically to building efficiency. For example, Mongolia includes measures to reduce building heat loss by 40 percent by 2030 compared to 2014 levels. Bangladesh and Niger include targets to reduce energy intensity per gross domestic product. Malawi and Senegal include specific targets for penetration of efficient technologies for lighting, cooking, heating, and cooling.
3. Thirteen CVF countries include policies and actions specifically involving the building sector or appliance efficiency.

   a. Tuvalu's NDC, for example, includes legislation to control the import of inefficient electrical appliances, and Palau's includes adoption of the voluntary Energy Star Appliance Standard (Box 9).

   b. Several NDCs, including those of Bangladesh, Palau, and Grenada, include building energy codes. Palau's energy efficiency action plan also includes an energy audit and renovation demonstration project, and Grenada includes an efficiency target to retrofit all buildings.

CVF member countries can consider the following NDC enhancement options to advance action in building efficiency:

- **Establish or strengthen an existing GHG reduction target for energy efficiency in total, or specifically for the building sector or appliance efficiency.**

- **Establish or strengthen an existing quantitative non-GHG target for overall efficiency and/or the building sector.** Targets could include energy intensity or energy consumption targets for the residential, commercial, and/or industrial sectors. Other potential targets could include penetration of efficient technologies for lighting, cooking, heating, and cooling or the percentage of newly constructed buildings that are zero-carbon by 2030.

- **Commit to new or strengthened policies and actions to increase building energy performance and increase the uptake of efficient, low-carbon appliances and equipment in buildings.** Most of these options have already been included in some CVF countries’ NDCs (as noted above) and can be incorporated in others:
  - Building energy codes for new construction could present a critical opportunity for CVF member countries to save energy and avoid decades of lock-in to inefficient technologies. This will be particularly critical in developing economies that are experiencing rapid energy demand growth and where building construction is likely to accelerate.
  - Mandatory appliance performance standards with supportive legislation could unlock enormous energy savings, similar to building codes.
  - Appliance labeling and certification and measures to phase out least-efficient appliances could work in concert with minimum appliance performance standards to encourage more widespread use of highly efficient technologies.
  - Building energy certification programs (e.g., Energy Star) can provide standardized energy performance and/or energy cost information and recognize highly efficient buildings.
  - Measures to promote renovation of existing buildings, including increasing the rate of renovations and level of efficiency achieved by existing buildings (UN Environment and IEA 2017).

### 3.2 Transport

Driving forward sustainable transport policies is essential to achieve a safe greenhouse gas trajectory and transition to a low carbon future, as articulated in the Marrakech Vision where CVF members pledged to help each other transform key sectors, including the transport sector.
(CVF 2016a). Globally, a range of transport measures have been identified that would limit transport emissions (excluding aviation and shipping) to approximately 40 percent below projected business as usual. These policies are based on a set of interlinked sustainable transport objectives to “avoid” (need for trips), “shift” (modes of transport), and “improve” (efficiency and fuel-source, including electrification).

Taking steps to put the world on a sustainable transport trajectory provides substantial economic and development benefits in tandem with greenhouse gas reductions. Policies on public transport and mobility can help achieve the targets in Goal 11 of the 2030 Agenda for Sustainable Development to provide safe, affordable, accessible, and sustainable transport systems for all. Enabling greater public transport, walking, and cycling can benefit low-income groups in particular, given their lack of access to passenger vehicles (Colenbrander 2016). Crucially—and in addition—investments in low-carbon transport infrastructure will provide savings of US$300 billion annually compared to business as usual (Lefevre 2016).

More compact cities and efficient modes of transport will help to address the traffic congestion that already costs some developing countries 2–5 percent of gross domestic product due to lost productivity (Mao et al. 2012). Reducing emissions from the transport sector also results in significant benefits for local air quality and health (poor air quality already costs 7 million premature deaths per annum) and reductions in short-lived climate pollutants (Gota et al. 2015). Putting in place improved amenities for walking and cycling also results in health and energy benefits that are five times greater than initial investment costs (Gouldson et al. 2018).

Increased use of electric vehicles can help substantially reduce greenhouse gases along with local air pollutants (Canales et al. 2017), although this shift is not relevant for reducing emissions from light-duty passenger vehicles. Furthermore, an increase in the use of electric buses also has recently gained significant traction. In many cases—and perhaps particularly so in CVF countries—electrified modes of public transport, including buses, may be a critical entry point for electrification of transport. As electric vehicles become more widespread, it will be important to keep in mind that achieving widespread vehicle electrification depends on adequate grid capacity and charging infrastructure, as well as a shift to renewable electricity sources as an energy source (NCE 2018). See Box 10 on policies in Costa Rica and Box 11 on policies in Nepal to facilitate growth in the use of electric vehicles.
Box 11 | National Action Plan for Electric Mobility: Nepal

Nepal’s first nationally determined contribution includes targets and policies for the transport sector, as well as an increase in the share of electric vehicles up to 20 percent from a 2010 level, and a decrease in fossil fuel use in the transport sector by 50 percent by 2050 through mass public transport, along with energy efficient and electric vehicles. To implement these commitments in its nationally determined contribution, Nepal has released, in 2018, a National Action Plan (NAP) for Electric Mobility, supported by the Global Green Growth Institute. The NAP outlines a set of initiatives to promote and address barriers to the adoption of electric vehicles. Priority actions in the NAP are to (a) establish a national unit and taskforce for electric mobility that will act as a centralized regulatory and promotional entity; (b) establish a national program for electric mobility that will facilitate the public and private acquisition of electric vehicles; (c) invest in infrastructure and push for operational progress; and (d) establish a national financing vehicle to manage and disburse financial support for electric mobility. In addition, the NAP identifies a range of contributing initiatives on policy and governance, infrastructure and markets, and financing and resources (GGGI 2018b) (Rai 2018). Nepal’s Prime Minster recently announced a target for at least 20 percent of public vehicles to be battery operated by 2020.

Box 12 | Reducing Black Carbon Emissions in the Transport Sector

The transport sector is a major contributor to atmospheric pollution and accounts for approximately 19 percent of global black carbon emissions (CCAC 2018a). Black carbon emissions have global climate impacts as well as local health impacts. When deposited on snow and ice, black carbon reduces reflectivity, thereby increasing global atmospheric warming and raising the rate of snow and ice melt in a positive feedback loop. Black carbon also negatively impacts human health, since it makes up the majority of PM 2.5 air pollution, which is a major cause of pulmonary and cardiac disease and premature death at a global scale (CCAC 2018a).

There are a number of ways to reduce black carbon emissions from the transport sector; for example, by promoting electromobility; that is, replacing internal combustion engine vehicles with electric vehicles or, for fossil fuel–powered vehicles that remain, by promoting diesel particulate filters for road and off-road vehicles (UNEP/WMO-2011). The introduction of low-sulfur fuels (fuels with no more than 50 parts per million of sulfur) is also an effective means to reduce black carbon emissions from diesel combustion in vehicles. Many countries, including Climate Vulnerable Forum countries, are shifting to low- and ultra-low-sulfur fuels through updated fuel quality standards and/or by upgrading their refineries to produce low-sulfur fuels (CCAC 2016).

For example, Ghana adopted low-sulfur diesel fuel standards in 2017, and has committed to implement cleaner vehicle policies and work with the Economic Community of West African States (ECOWAS) Commission toward fuel and vehicle standard harmonization by 2020. Malawi switched to low-sulfur diesel fuels in June 2017 (CCAC 2017). Many of these shifts toward low-sulfur fuels have occurred since first nationally determined contributions (NDC) were communicated in 2015/2016. There is, therefore, opportunity to capture this early progress in subsequent NDCs, while identifying opportunities to strengthen actions to reduce transport sector emissions. Countries can highlight policies and actions to tackle black carbon in their NDCs. Countries can also set targets to reduce black carbon, although these should be reported and accounted for separately from greenhouse gas emissions, since black carbon is not a pollutant covered under the United Nations Framework Convention on Climate Change. As noted earlier, black carbon accounting and warming uncertainties remain high—carbon dioxide and black carbon impact the climate in different ways and have very different lifetimes; there is yet to be scientific consensus on appropriate metrics to equate the two. This should be noted explicitly in the NDC. Accordingly, black carbon targets should be in mass units, not in carbon dioxide equivalent units.

In the first round of NDCs, 29 CVF members included targets or policies and actions relating to transport. Of these, 10 include targets specifically relating to the transport sector, including the following countries:

- Only The Gambia, Cambodia, and Grenada include targets for GHG reductions in the transport sector specifically, to be achieved through the use of cleaner, fuel-efficient, and other transport policies.

- Nepal includes a quantitative target for increasing the share of electric vehicles (Box 11), and Bangladesh, Barbados and Mongolia include specific quantitative targets for cleaner and more efficient vehicles.

- Bangladesh, Malawi, Nepal, Palestine, and Rwanda include quantitative targets for public transport.
CVF countries have an opportunity in their NDCs to shape their transport trajectory in critical ways. They can consider the following NDC enhancement options to advance action in transport:

- **Establish or strengthen an existing GHG reduction target for the transport sector.**
- **Establish or strengthen an existing quantitative non-GHG target for the transport sector:**
  - Increase the share of electric vehicles powered by RE to a certain percentage of total vehicle fleet by 2030 (e.g., replacement of a certain percentage of the light private vehicles by electric vehicles by 2030).
  - Commit to a certain modal share of public transport, cycling, and walking (e.g., shift a certain percentage from private transport to public transport).
- **Commit to new or strengthened policies and actions to reduce emissions from and improve the resilience of the transport sector:**
  - Improve energy efficiency of vehicle fleet by proposing fuel economy standards (including for heavy duty vehicles).
  - Enforce measures to avoid emissions by promoting better urban planning through compact, coordinated, and connected cities.
- **Increase coverage of climate pollutants by addressing black carbon emissions from transport,** either through separate targets (accounted for separately) or additional policies and measures aimed specifically at reducing black carbon (Box 12).

### 3.3 Forests and Coastal Ecosystems

#### 3.3.1 Restore terrestrial forests and reduce deforestation

Spanning 4 billion hectares, or roughly 31 percent of global land area, forests and their soils lock in a staggering 296 gigatons of carbon, and are crucial to maintaining carbon and water cycles that support life (FAO 2015; Project Gaia Team 2015). Forests hold particular relevance for CVF countries, where fuelwood is often a critical energy source. In Tanzania, for example, 88 percent of total energy consumption derives from fuelwood (Project Gaia, 2015). Similarly, worldwide, low- and lower-middle-income countries removed over 1 billion cubic meters in 2011 alone (FAO 2015). This reliance on fuelwood means that sustainable forest management must be a key component of CVF countries’ RE strategies; maintaining forests for fuelwood is indispensable to ensure their energy security.

Unfortunately, despite growing awareness of forests’ importance and efforts to restore them, the rate of net deforestation—driven by issues such as conversion to agriculture, illegal logging and unsustainable fuelwood harvesting—remains alarmingly high (Gibbs et al. 2018). Studies have estimated that annual carbon dioxide emissions from deforestation and forest degradation total 1.0 billion tons per annum, equivalent to 8 percent of the global total (Seymour and Busch 2016).

In 2017, CVF countries lost a collective total of 3.75 million hectares of tree cover, emitting an estimated 376 million tons of CO$_2$ as a result (Hansen et al. 2013). Twenty CVF member countries had a forest cover of 33 percent or more in 2015 (World Bank 2018e), providing a significant opportunity for CVF to continue to demonstrate climate leadership by taking action to protect and restore these ecosystems. A recent study found that natural climate solutions—land use strategies for climate mitigation, such as reducing emissions from deforestation or restoring forests—can provide up to 37 percent of cost-effective carbon sequestration needed through 2030 to keep global temperature rise below 2 degrees C (Griscom et al. 2017). The potential upside for global emission reduction is remarkable. This is a sector where CVF countries can be particularly impactful, given their share of global emissions in this sector (Figure 8).

REDD+ programs (Reducing Emissions from Deforestation and forest Degradation) are a key tool to unlock forests’ carbon sequestration potential in CVF countries. Developed by the United Nations Framework Convention on Climate Change (UNFCCC), REDD+ gives results-based payments to developing countries to incentivize action on reducing forest carbon emissions (UN-REDD, 2018). Considerable financing has been established for REDD+ programs, with public and private pledges and investments totaling US$9.8 billion between 2006–2014 (Norman & Nakhooda 2015). These efforts have already produced results: according to the UNFCCC Lima Hub, REDD+ efforts in Colombia, Brazil, Ecuador,
and Malaysia have resulted in 6.3 billion tons of carbon dioxide emission reductions since 2012 (UNEP 2018). Many CVF countries have acknowledged the value of REDD+, with 28 CVF countries participating in the UN-REDD program and 20 CVF countries participating in the Forest Carbon Partnership Facility, a REDD+ program led by the World Bank.

In addition to their provision of fuelwood and carbon sequestration value, forests also provide a vast number of essential ecosystem services, including non-timber forest products, such as fruits and nuts, and the regulation of water and air cycles. Estimates suggest that over 60 million indigenous people—primarily in developing countries—are wholly dependent on nontimber forest products for survival, with another 350 million people being highly reliant (World Bank 2004). In addition, evapotranspiration from forests plays a significant role in determining rainfall, heavily impacting agriculture and food security.

The positive side is that CVF countries already have a strong foundation to build from. The majority (35) included actions in their NDCs aiming to reforest lands or reduce emissions from deforestation, thus signaling widespread acknowledgement of the importance of forests for the climate, as well as alignment with SDG 15.2. These include the following types of targets and actions:

1. In its NDC, Morocco states its target to restore or afforest 50,000 hectares per annum, prioritizing the use of native species. Madagascar’s NDC states its intention to utilize large-scale reforestation and conservation of indigenous species as a climate mitigation strategy.

2. Papua New Guinea’s NDC signals its commitment to develop a national REDD+ strategy, emphasizing REDD+ activities as the primary means of reducing emissions from the forest sector. Together with announcing its creation of a REDD+ Directorate within its Office for Climate Change and Development, Papua New Guinea indicates that further REDD+ implementation necessitates an increase in international financial support.

3. The Democratic Republic of the Congo’s NDC highlights its development of a measurement, reporting, and verification system relating to REDD+ activities.

4. Comoros emphasizes a systematic approach toward restoring and reducing deforestation, outlining measures to reforest and protect forest areas while making an effort to reduce wood consumption from forests.

Meanwhile, 12 CVF member countries are also signatories of the Bonn Challenge, a global restoration movement that aims to bring 150 million hectares (371 million acres) into restoration by 2020 and 350 million hectares (865 million acres) into restoration by 2030. Most of these CVF countries have also signed onto AFR100 or Initiative 20x20, regional restoration initiatives that support the Bonn Challenge.

The economic case for restoration and reduced deforestation can prove challenging when existing policies and subsidies incentivize deforestation and unsustainable land use practices (Ding et al. 2017). To address this, countries can signal their commitment to shift financing toward restoration and REDD+ projects, including the implementation of Bonn Challenge commitments where applicable. Costa Rica

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**Box 13 | Forest Restoration: Costa Rica**

Costa Rica’s forests are a national treasure, known for having the highest density of diverse species in the world (Kohlmann 2018). Yet, over the mid-twentieth century, ranching and agriculture emerged as key drivers of deforestation (World Bank 2000). Over the decades, the country faced a dramatic decline of forest cover, from 77 percent in 1943 to 21 percent in 1987 (GOCR 2011).

This changed with the phaseout of beef subsidies in the 1980s, causing the economics of ranching to swing out of favor and the country’s cattle population to decline. In addition to this, the government realized the cultural and economic value of the country’s forests and passed a 3.5 percent tax on fossil fuels in 1997 to fund the restoration and conservation of its forests (GOCR 1996). Combined with the growth of the ecotourism industry in the nation, these structural changes have led to a revival of the country’s forests, with an increase in forest cover from 29 percent in 1991 to 54 percent in 2015.

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Costa Rica also mentions its National Forestry Financing Fund (Fondo Nacional de Financiamiento Forestal, or FONAFIFO) as a key funding mechanism for its forest sinks. These programs aim to help keep 1 million hectares under forest cover and increase national forest coverage to 60 percent, ultimately contributing to the government’s primary NDC target of achieving a carbon neutral economy by 2021 (ClimateWatch 2018).
is a prime example of how alignment of economic incentives for restoration and reduced deforestation can lead to a pronounced increase in tree cover (Box 13). Vietnam is also looking to implement a payment scheme for forest environmental services. Such measures signal financial commitment for restoration, enabling work to be implemented on the ground.

CVF members stand to benefit from pursuing NDC enhancement options around forests and landscapes. Those with high forest cover can consider focusing on REDD opportunities, while those with low forest cover should explore opportunities for reforesting previously deforested land.

CVF member countries can consider the following NDC enhancement options to advance action on restoration and reducing deforestation:

- **Establish an unconditional GHG reduction target to reduce emissions from deforestation or forest degradation.**

  - Strengthen an existing conditional GHG reduction target contingent on receiving additional REDD+ finance, with commitments to meet REDD+ financing eligibility requirements: CVF countries can commit to engage with REDD+ programs, while linking more ambitious climate action with REDD+ financing.

  - **Establish or strengthen an existing quantitative non-GHG target for the protection or restoration of forests.** This could include existing 2030 Bonn Challenge restoration commitments or the establishment of and inclusion in the NDC of new Bonn Challenge restoration commitments for 2030. For example, Tanzania has committed, under the Bonn Challenge, to restore 5.2 million hectares by 2030. This option is closely linked to SDG 15.

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**Box 14 | Enhancing Resilience through Landscape Restoration: Malawi, Ethiopia, and Niger**

Ethiopia, Malawi, and Niger are highly vulnerable to climate change. The three countries are subject to intense droughts and floods. For instance, droughts in Malawi could lead to a gross domestic product loss of almost 1 percent every year (World Bank 2018c). In Niger, average economic losses reported in 2012 due to drought amounted to over US$70 million, which corresponds to about 1 percent of Niger’s gross domestic product in 2017 (World Bank 2018d). In southern Ethiopia, by the year 2100, an increase of more than 20 percent in the very extreme (once in 100 years) high rainfall events, is expected (World Bank 2018b). In 2015, 1.1 million people in Malawi were affected by floods in 15 of 28 districts (GoM 2016b). The total cost of damages due to severe floods that year was estimated at US$335 million (GoM 2016).

Countries such as Ethiopia, Malawi, and Niger are scaling up efforts to restore trees on farms and forest landscapes to bring back ecosystem services to address climate change. Trees not only offer services to sequester carbon dioxide to mitigate climate change, but they also contribute to climate change adaptation. Trees can potentially lead to cooler temperatures (Reij and Garritty 2016); contribute to local rainfall (Reij and Winterbottom 2015); regulate water flows; recharge groundwater; and reduce the impacts of heavy rainfall by preventing floods (Forbes and Broadhead 2011). Mangroves, in particular, offer coastal protection from storm surges and cyclones by acting as windbreaks and reducing wave action (Blankespoo et al. 2017).

Ethiopia, Malawi, and Niger form part of a movement to restore forests and landscapes by planting trees to benefit from their ecosystem services. These countries fall under the African Forest and Landscape Restoration Initiative (AFR100), a pan-African initiative to restore 100 million hectares of land by 2030. Ethiopia has committed to restore 15 million hectares (mha); Malawi, 4.5 mha; and Niger, 3.2 mha (AFR100 n.d.). A key reason for this interest in restoration is because of the ability to mitigate and adapt to climate change. For example, Ethiopia’s Climate-Resilient Green Economy strategy and its NDC mention the need to increase resilience of communities by protecting ecosystems to address droughts and floods (GoE 2011). Malawi’s National Climate Change Investment Plan supports afforestation to increase climate resilience (GoM 2013).

A couple of ways exist for countries to communicate the importance of restoration as a potential adaptation activity in the future. For instance, countries can update or add national long-term goals and visions to their NDCs by including their commitments to long-term restoration initiatives, such as AFR100. Countries also can update or add current and near-term planning and action by stating how their current forest protection activities are supporting mitigation targets and adaptation goals alike.
Commit to new or strengthened policies and actions to capture the carbon sequestration potential and climate resilience benefits of protecting forest ecosystems:

- Reform fiscal policies to invest in restoration and reduced deforestation, shifting from incentives to deforest to incentives to maintain or increase forest cover (see example in Box 13).
- Address forest issues through a systematic, landscape approach to limit leakage. If carried out in isolation, the efficacy of forestry projects risks being diminished by leakages, wherein economic forces cause the restoration or reduced deforestation of one area to create more deforestation pressure in another. The Forest Carbon Partnership Facility and the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation (UN-REDD) directly address the issue, emphasizing the need for consistency between national strategies and subnational projects, together with the establishment of reference emission levels and monitoring, reporting, and verification systems to minimize leakage risk (FCPF 2017). A number of tools, such as the Restoration Diagnostic, developed by the World Resources Institute (WRI) and the International Union for Conservation of Nature, are available to assist countries in systematically analyzing their domestic restoration potential (Hanson et al. 2015).
- Emphasize the use of native species and supporting biodiverse restoration. Restoration efforts that emphasize a diverse set of species, as opposed to monocultures, are more resilient to disease and other environmental shocks. Native species are also generally well-adapted to the local environment and can help preserve a nation’s natural heritage.
- Empower and encourage community forest restoration and stewardship, including improvements in land tenure and legal recognition of indigenous territories. Rwanda’s NDC acknowledges the role of land reforms in addressing land pressure, committing to implementing rigorous planning and zoning frameworks, systematically registering land, and regularizing land tenure reform. Without robust systems of land tenure, environmentally destructive practices can emerge as landowners are disincentivized from implementing long-term land stewardship practices (FAO 2002).

3.3.2 Protect and restore coastal ecosystems

Marine and coastal ecosystems offer significant mitigation and adaptation opportunities that should be reflected in a country’s NDC. Given that 39 of 48 CVF member countries are islands or coastal communities, the options associated with protecting and restoring coastal ecosystems represents a significant opportunity. Furthermore, 32 CVF member countries currently have mangrove forests along their coasts (UN Environment 2018).

The term “blue carbon ecosystems” most commonly refers to mangroves (coastal wetlands), tidal saltmarshes, and seagrass meadows which, like the terrestrial ecosystems discussed in the previous section, act as natural sinks of carbon dioxide (Howard et al. 2017). Research is increasingly exploring accounting methodologies for seaweed and kelp as potential additional blue carbon ecosystems (Howard et al. 2017).

Although estimates vary, blue carbon ecosystems are approximately 10 times more effective at sequestering carbon dioxide on a per area basis per annum than boreal, temperate, or tropical forests (Mcleod et al. 2011), and about twice as effective at storing carbon in their soil and biomass (Murray et al. 2011). They also play a crucial role in protecting coastal infrastructure and communities from climate impacts, including extreme weather events.

Twenty-one CVF member countries communicated at least one action relating to blue carbon ecosystems in their respective NDC, while many included multiple targets, policies, and measures aimed at protecting, restoring, and managing these ecosystems for either mitigation and/or adaptation purposes. A number of CVF members (in addition to 25 non-CVF members) are also members of initiatives aimed at further enhancing ocean action and the blue carbon economy, including the Because the Ocean Declarations that have been signed by Costa Rica, Fiji, Haiti, Honduras, the Marshall Islands, Morocco, Palau, and Senegal (Because the Ocean 2016). Kenya is hosting the first high-level conference on the Sustainable Blue Economy in November 2018, offering the potential for key advances and initiatives on the sustainable use and management of coastal ecosystems to emerge through CVF leadership (GoK 2018).
The protection of blue carbon ecosystems provides significant economic and development benefits. Coastal wetlands are an important component of building resilient coastal communities (including infrastructure and improved fisheries and livelihoods), and they can provide resilience to storms (mangroves absorb the energy of storm-driven waves and wind), flooding, erosion and fire (CoA 2016). Wetlands also play a crucial role in supporting aquaculture and sustainable fish stocks by providing the nursery that is critical for the survival of many fish species. The creation of marine-protected areas and the protection or restoration of coastal ecosystems can contribute to biodiversity preservation (e.g., kelp forests can influence coastal oceanographic patterns and provide many ecosystem services) and enhanced fish stocks (NOAA 2018).

CVF member countries can consider the following NDC enhancement options to advance action in blue carbon ecosystems:

- **Establish or strengthen an existing GHG reduction target for coastal ecosystems** (where there is the ability to account for such emissions in national inventories) through the protection or restoration of mangrove forests, tidal salt marshes, and/or seagrass meadows or other coastal ecosystems. Furthermore, accounting for the carbon sequestration potential of existing coastal ecosystem interventions for adaptation could be an additional opportunity for NDC enhancement.

- **Establish or strengthen an existing quantitative non-GHG targets for protection or restoration of coastal ecosystems**; for example, Haiti’s proposal to protect, conserve and expand existing mangrove forests (19,500 hectares [ha]) by 2030, and Vietnam’s to increase forest protection in coastal areas to 380,000 ha, including 20,000 to 50,000 ha of additional mangrove planting.

- **Commit to new or strengthened policies and actions to capture the carbon sequestration potential and climate resilience benefits of blue carbon ecosystems**:
  - Create or protect mangroves, saltmarshes, seagrass meadows, and kelp forests (including through Marine Protected Areas).
  - Restore or rehabilitate degraded areas (prior to protection).

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**Box 15 | Advancing Blue Carbon Ecosystems: The Dominican Republic and Kiribati**

The Dominican Republic is an island of 48,320 square kilometers, consisting of rich terrestrial biodiversity. It is also one of 124 countries in which mangrove forests are developed. Coastal and marine ecosystems provide many valuable services to the people and economy of the Dominican Republic (Wielgus 2010). The Dominican Republic has submitted a Blue Carbon Nationally Appropriate Mitigation Action (NAMA) for the conservation and restoration of its mangroves. The objective is to enable the Dominican Republic to sequester and store substantial blue carbon through the conservation and restoration of mangroves along its coastline (NAMA 2015b). In addition to conservation and restoration benefits, the NAMA would be used to pursue potential income from carbon credits and as a participatory role for local communities. The largest threat to mangroves in the Dominican Republic is the extensive development of the tourism industry (Meyer-Arendt, Byrd, and Hamilton 2013). The Dominican Republic seeks to quantify the carbon sink capacity of its mangroves through a comprehensive inventory and analysis of ecological conditions and carbon stocks that are intact, under threat, or notably degraded. Any strategies would be focused on community engagement and economic incentives for mangrove ecosystem conservation and reforestation with improved livelihoods (NAMA 2015a). Protecting coastal ecosystems will provide the long-term, most cost-effective solution to problems of beach erosion, while also sustaining fisheries, improving biodiversity, and enhancing other ecosystem services (Wielgus 2010).

Kiribati is one of the most vulnerable islands to climate change. Consisting of 33 atolls and reef islands, most of the land is less than 3 meters above sea level and vulnerable to sea level rise (Croaky 2018). Kiribati is committed to reducing its emissions by 13.7 percent by 2025 and 12.8 percent by 2030 compared to a business-as-usual projection (conditional). NDC mitigation actions focus on two key sectors: energy (to increase access to solar energy and develop biofuel from coconut oil) and the maritime and coastal, including mangroves, coastal vegetation, and seagrass beds. In addition to including its coastal ecosystems in its mitigation contribution, Kiribati has also taken steps to restore and manage its mangroves to support its vulnerability to sea level rise. In 2011, Kiribati planted 37,000 mangroves, involving the local communities, which are economically and culturally dependent on the coastal ecosystems. One of the key components of the Kiribati Adaptation Program is to increase coastal resilience by using mangrove planting to reduce coastal erosion and protect native habitats for sea life and fish that are crucial to food security in Kiribati.
Introduce incentives to create new or protect existing coastal ecosystems on privately owned land, in particular in aquaculture.

Apply accounting guidance for wetlands to be included in the national GHG inventory.

Manage mangroves by controlling human stresses; this can be achieved by establishing inshore buffer zones to reduce impacts from adjacent land use, allowing mangroves to migrate in response to sea level rise.

3.4 Food and Agriculture

Food security is of paramount concern for all countries, but particularly so for CVF countries as temperature increase threatens global food production. Any interventions aimed at reducing emissions from food and agriculture must therefore not jeopardize the ability to feed current and future populations. This section explores options to reduce emissions, notably methane, from the food and agriculture sector that also deliver significant sustainable development benefits—primarily through increased food security, reduced water usage, and increased animal health.

3.4.1 Reduce postharvest food loss

Globally, approximately one billion tons of food produced for human consumption (approximately one-third of all food) is wasted each year (Gustavsson et al. 2011). This costs the global economy approximately US$9.40 billion, consumes nearly a quarter of all the water used in agriculture, contributes to food insecurity, and produces 8 percent of global greenhouse gas emissions (Gustavsson et al. 2011).

Food loss and waste can occur at every point along the supply and consumption chain (CoA 2017). Food losses take place at production, postharvest, and processing stages in the food supply chain, whereas losses occurring at the end of the food chain (retail and final consumption) are referred to as “food waste” which relates to retailer and consumer behaviors. Food loss is mainly a result of the food production and supply system, whereas food waste is mainly caused by economic and social behaviors, poor stock management, or neglect.

Most relevant for CVF countries is food loss that occurs as a result of postharvest loss (due to inadequate technology, knowledge, and storage infrastructure) rather than food being wasted. In developed countries and most urban areas, most food is wasted at the consumption stage of the food chain (Kalita 2017). Currently, more than 40 percent of fruits and vegetables spoil before they can be consumed, reducing the income of smallholder farmers by 15 percent. Given that many smallholder farmers in developing countries live on the margins of food insecurity, a reduction in food losses could have an immediate and significant impact on their livelihood. A report from the Food and Agriculture Organization of the United Nations, using the life cycle perspective, estimates that approximately 3.3 gigatons of CO₂ equivalent emissions are attributable to food that was produced but not eaten, and this is especially without considering the climate impacts of the related land use change (FAO 2013). Similarly, the land used to grow the food is another valuable resource that is wasted due to these losses. Reducing such loss where possible, therefore, is not only a valuable contribution to global mitigation efforts, it also is an imperative in terms of development and food security.

CVF member countries have already led global efforts to integrate commitments on food loss in NDCs. Of the 17 countries that included targets, policies, or measures in their current NDC, 9 were CVF members (Bhutan, Burkina Faso, Ethiopia, Ghana, Honduras, Maldives, Palestine, Rwanda, and Sri Lanka). These NDCs include commitments to improve traditional methods to prevent food deterioration (e.g., Ethiopia), establish cold storage facilities (Bhutan), promote innovations in postharvest storage and food processing in 43 administrative districts (Ghana), and establish strategic food storage and distribution centers (Maldives).

In addition, a number of member countries have signed up to commitments or initiatives in other forums that could be the basis for incorporating relevant measures in updated NDCs. For instance, the Malabo Declaration, signed by all members of the African Union in 2014— including 13 CVF members—incorporates a commitment to halve the current level of postharvest loss by the year 2025 as a strategy to end hunger in Africa (AUC 2014). To support the achievement of this target, the African Union Commission has launched the Continental Post Harvest Management Strategy to assist African Union members to develop policies to address postharvest loss (Reliefweb 2018). The African Union Commission published, in January 2018, the first (draft) Biennial Review Report (AUC 2018), which tracks progress toward achieving the 2025 Malabo goals, including the goal to reduce food loss. Two
of the five countries that are on track toward achieving the postharvest loss reduction target by 2025 are CVF member countries Malawi and Rwanda (Flanagan 2018). Kenya and Tanzania have also developed national strategies to measure and reduce postharvest loss, with efforts including the creation of a monitoring and evaluation framework and the training of over 100 technical staff in postharvest management.

CVF member countries can consider adding new or strengthening existing targets, policies, and measures in their NDC aimed to achieve and/or capture the mitigation impact of reducing food loss and waste along the value chain, such as the following:

- **Establish a national non-GHG reduction target to reduce food loss and waste by 50 percent by 2030, including postharvest loss.** Ensuring alignment with existing efforts to achieve SDG target 12.3 “by 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including postharvest losses.”

- ** Commit to new or strengthened policies and actions to reduce food loss and waste, with a particular focus on stimulating innovation to reduce postharvest food loss:**
  - Support smallholder farmers to organize and diversify their production and marketing. Smallholder, resource-poor farmers can be organized in groups to produce a variety of significant quantities of cash crops or animals.
  - Develop contract farming linkages between processors and farmers. National governments can create supportive enabling environments and investment opportunities to stimulate the private sector to invest in the food industry and to work more closely with farmers to address supply issues and the lack of processing facilities to preserve fresh produce.
  - Improve the efficiency of getting fresh produce to markets through the promotion of marketing cooperatives for smallholder farmers and improved market facilities. Marketing cooperatives are organizations that provide a central point to assemble the produce from smallholder farmers and prepare the commodities for transportation to markets and other distribution channels. Marketing cooperatives should be able to reduce food loss by increasing the efficiency of these activities.
  - Establish a program that requires signatories (including business, industry, community groups, and households) to voluntarily commit to a set of measurable actions that are known to achieve reductions in food waste.
  - Develop new legislation to provide more flexibility or incentives to redirect food waste to charities, or convert it for other purposes, thus avoiding its disposal in landfills.

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**Box 16 | YieldWise Initiative—Preventing Postharvest Food Loss and Improving the Economic Livelihood of Smallholder Farmers: Kenya and Tanzania**

While significant resources have been invested to increase food production in response to food security concerns, less attention has been paid to what happens to that food once produced. In Kenya and Tanzania, somewhere between 30 percent and 50 percent of the food produced is lost during initial storage, processing, and distribution before ever reaching the consumer (Landesa 2018). A new initiative by The Rockefeller Foundation is seeking to reduce postharvest loss by supporting a cohesive, targeted suite of interventions by the public, private, and non-profit sectors at different points of the supply chain. In Kenya, this will focus on mango and in Tanzania on maize (Landesa 2018). Early results are encouraging, indicating loss reduction of between 20 percent and 30 percent, according to maize and mango catalytic demonstrations.

In Tanzania the focus is on assisting smallholder farmers to access technologies and solutions to curb preventable crop loss, such as access to proper storage solutions such as metal silos and hermetic cocoons. High uptake and utilization of loss-reducing technologies has been critical to early success in both countries.

As part of the initiative in Kenya, efforts are being made to understand the role of land tenure in the ability to implement the necessary changes in the value chain to reduce postharvest loss. Early findings suggest that because women lack secure land and tree rights, they are not able to fully engage in agricultural productivity and value chain enhancement projects (Landesa 2018). Any comprehensive efforts to improve productivity and reduce waste should therefore also consider how to concurrently advance land rights and the participation of women.
3.4.2 Reduce water use in rice production

Worldwide, rice cultivation accounts for approximately 11 percent of annual anthropogenic emissions of methane (IPCC 2013). This represents one of the highest greenhouse gas “footprints” among commodity crops (Carlson et al. 2017). In terms of CVF countries, the Food and Agriculture Organization estimates that rice cultivation contributes up to 15 percent (or 113 metric tons of CO$_2$ equivalent) of emissions in the agriculture sector (Figure 9) (FAO 2017). It is also a significant economy for CVF countries, with 31 member countries producing rice, the largest of which are Bangladesh, Colombia, and Vietnam (IRRI n.d.).

Estimates suggest that approximately one-quarter of the emissions associated with rice could be abated at low or zero cost, making it a prime mitigation opportunity for CVF countries that produce rice (USEPA 2013). The primary mechanism for doing so involves reducing water use and the time rice paddies are submerged during the growing process. Practices such as alternate wetting and drying (AWD), the system of rice intensification, dry seeding, and performing a single mid-season drawdown can reduce methane emissions from rice production while also reducing water use (Adhya et al. 2014; TEEB 2015; Uphoff et al. 2011). The ability to not only cut down on methane emissions through AWD or through the system of rice intensification (SRI) but also to reduce water usage represents an opportunity to strengthen the resilience of rice production in CVF countries that are highly vulnerable to reduced rainfall or water availability due to climate impact.

A number of CVF members include specific targets and actions in their current NDCs that relate to reducing emissions from rice production. Bangladesh, The Gambia, Madagascar, and Senegal identified measures relating to AWD irrigation or improved rice farming techniques as part of their mitigation contribution to reduce emissions in rice production and reduce water use. Colombia and Kenya identify rice and measures to improve resilience of rice production as key for adaptation.

CVF member countries can consider the following NDC enhancement options to advance action in the agricultural sector:

- **Establish a GHG reduction target for rice production.** Target to reduce a set percentage or tonnage of emissions according to a set baseline by 2030.

- **Commit to new or strengthened policies and actions to reduce emissions from and improve the resilience of rice production:**
  - Pursue or scale up specific policies and/or associated incentives to promote the intermittent aeration of continuously flooded rice paddies, such as SRI or AWD.

3.4.3 Reduce methane emissions from beef and cattle production

Ruminant livestock (mainly cattle, sheep, and goats) generate roughly half of all agricultural emissions and 30 percent of global methane emissions (or 5.5 percent of total global GHG emissions), 77 percent of which are from cattle (FAO 2016). The largest share is generated from enteric fermentation, the methane that is produced from incomplete digestion (FAO 2016).

Although the production of cattle in CVF countries is negligible compared to larger producers, such as the United States and Europe, emissions from livestock are responsible for a staggering 71 percent of total emissions in the agriculture sector for CVF countries (Figure 8). This is based on data from the Foreign Agricultural Service of the United States Department of Agriculture, whereby CVF countries, combined (contributing 19.6 percent), only equal 1.3 percent of global production compared to the United States alone (Cook 2017). Most of these emissions are caused by enteric fermentation (41 percent, or 311 metric tons of CO$_2$ equivalent of total emission from agriculture in CVF countries) (FAO 2017).

The benefit of possible interventions to reduce emissions from livestock is that they are predominantly based on technologies and practices that improve productivity and, therefore, offer significant co-benefits for farmers and the environment in terms of food security and economic development (FAO 2016). They include improving the feed quality, breeding, and animal health (the last of which is to help reduce unproductive members of the herd) and genetics such as live-weight gain and milk yield (see Figure 9 below).
Breeding can also help adapt animals to local conditions as well as address issues associated with reproduction, vulnerability to stress, adaptability to climate change, and disease incidence (Gerber 2013; FAO 2016). Importantly, these interventions can result in emission reductions per unit output; for instance, as a result of improving practices rather than changing production systems, which are very important for developing economies, such as CVF members.

In terms of including commitments relating to livestock production in the first round of NDCs, Bhutan, Ethiopia, and Malawi have identified measures aimed at sustainable intensification, improved feeding and breeding, and manure management. Timor Leste has listed “Promotion of Biogas and composting for reduction of agricultural emissions” as a livestock management strategy. Vietnam will “research and develop solutions to reduce GHG emissions in farming, livestock, fisheries and animal feed and food processing.” Colombia and Kenya have included livestock in their respective adaptation strategies.

CVF member countries can consider the following NDC enhancement options to advance action to reduce emissions from the production of livestock:

- **Establish a GHG reduction target for livestock production.** Target to reduce a set percentage or tonnage of emissions according to a set baseline by 2030.

- **Commit to new or strengthened policies and actions to reduce emissions from livestock production:**
  - Promote biogas and composting for the reduction of agricultural emissions.
  - Promote improved animal husbandry – including feed quality, breeding, and animal health.
  - Promoting research and development (R&D) on dietary supplements and shifts that will reduce enteric fermentation in livestock.
  - Introduce a policy and/or associated incentives to support farmers to implement livestock anaerobic digestion projects.

### 4. Enhancing the Adaptation Component of an NDC

The 2014 Lima Call for Climate Action invited “all Parties to consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions” (UN Climate Change 2018; 1/COP.20, para 12). There is an opportunity for CVF members, as they consider whether and how to enhance their NDCs by 2020, to take this opportunity to update, strengthen, and/or elaborate the adaptation content communicated.
in their NDC. This could be done at a sectoral level, pursuing targets, policies, and measures to enhance resilience (some key sectors identified in the previous section). Alternatively, CVF members can update national goals and objectives to enhance resilience or update or elaborate the information communicated in the NDC on a country’s vulnerabilities to, and priorities for, responding to climate change impacts. This section examines the adaptation component of an NDC, suggesting areas that CVF members can consider if they wish to enhance the adaptation component on their respective NDC.

Note that these are suggestions only. Parties continue to retain flexibility in the adaptation information they opt to include in NDCs, and how existing content can be enhanced. The Paris Agreement indicates that NDCs are a vehicle for the adaptation communications called for in Article 7, guidance for which is forthcoming. Such guidance may prescribe elements to include in the NDC for Parties that choose to use NDCs as the vehicle for adaptation communications. In the event of further guidance, CVF members will want to review the adaptation component in light of any prescribed elements (as relevant and appropriate).

The design and content of an NDC adaptation component and its enhancement should reflect a Party’s rationale for using the NDC to communicate adaptation information. Inclusion of adaptation in an NDC can enable a Party to do the following:

1. Strengthen, streamline, and raise the profile of adaptation policies, planning, action, and needs at the national level.
2. Realize co-benefits with mitigation opportunities and strengthen alignment with sustainable development objectives.
3. Articulate a long-term vision of nationally appropriate, climate-resilient development.
4. Advance adaptation planning by outlining goals, objectives, activities, and/or a timeline to achieve the vision, which may be based upon a national action plan (NAP) or equivalent national planning process.
5. Use the domestic political momentum associated with the NDC process to outline a process and timeline for developing a long-term vision and associated planning efforts in cases where a process has not been established.

6. Gain international recognition for existing national actions and investments on adaptation.

7. Explicitly consider links between mitigation actions/objectives and adaptation actions/objectives.

8. Contribute to a platform to share lessons learned, address shared challenges, and document progress toward the Paris Agreement’s long-term adaptation goal (Levin et al. 2015).

The decisions a Party makes regarding whether and how to enhance the adaptation component of its NDC may depend on the nature and extent of adaptation planning underway in the country. For Parties that have begun a NAP or equivalent process, much of the information for an enhanced NDC can be drawn from progress in that process. Drawing from the NAP or equivalent process offers Parties several benefits. By building on existing efforts, Parties can minimize the need for additional analysis, planning, and coordination, and the inclusion of NAP elements in a high-profile document such as the NDC can bring greater attention, domestically and internationally, to the value and importance of national adaptation efforts.

For Parties that do not have a NAP or equivalent process, updating the NDC offers an opportunity to lay the groundwork for such a process. This could mean outlining a planning process, selecting a planning timeline, synthesizing existing climate vulnerability and risk analyses, reviewing adaptation activities underway in the country, or otherwise taking early steps toward planning. Drawing from documentation of adaptation-related policies, actions, and measures outside of a national adaptation planning process may also offer an opportunity. This could include actions in climate-sensitive sectors (e.g., agriculture, health, tourism) that result in outcomes that reduce vulnerability and build resilience to climate risk. Guidance developed by WRI and the United Nations Development Programme (Levin et al. 2015) for shaping NDC content in these general categories could be applied as Parties assess opportunities for enhancement. Five options for enhancing adaptation are identified in Table 1.

5. Enhancing the Clarity, Transparency, and Understanding of an NDC

While Parties may not have raised the level of ambition of their NDC by providing additional information to enhance clarity, transparency, and understanding, they may enhance, however, other critical aspects of their NDC. Information to facilitate clarity, transparency, and understanding of NDCs will contribute to fulfilling several purposes, including holding Parties accountable to their contribution; enabling an assessment of global emissions; providing context for a Party’s NDC; understanding plans and actions for implementation; sharing needs associated with the achievement of the NDC; and enabling an assessment of individual effort. Parties can enhance clarity, transparency, and understanding in several ways, as explored below.

At a minimum, Parties are able to meet the basic information provided under paragraph 27 of Decision 1/CP.21 and any subsequent COP decisions relevant to their NDC. The information indicated in paragraph 27 is the same as the one that Parties used to prepare their respective INDC, per paragraph 14 of the Lima Call for Climate Action. This information includes the following:

- Quantifiable information on the reference point (including, as appropriate, a base year).
- Time frames and/or periods for implementation.
- Scope and coverage.
- Planning processes.
- Assumptions and methodological approaches, including those for estimating and accounting for anthropogenic GHG emissions and, as appropriate, removals.
- How the Party considers that its own NDC is fair and ambitious in light of its national circumstances.
- How it contributes toward achieving the objective of the Convention as set out in its Article 2.
### Table 1 | Options for Enhancing the Adaptation Component of a Nationally Determined Contribution

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<th>OPTION</th>
<th>DESCRIPTION</th>
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<tr>
<td>Update or add information on trends, impacts, and vulnerabilities</td>
<td>Climate Vulnerable Forum (CVF) member countries can enhance their NDC by providing an updated summary of current and projected climate change threats and impacts, as well as their effects on vulnerable groups and sectors. In the case of Parties with a national action Plan (NAP) or equivalent process, analysis of trends, impacts, and vulnerable sectors and groups has likely taken place.</td>
<td>▪ Update existing analyses. Update or summarize existing analyses or emphasize specific findings that link to goals, priorities, actions, and plans communicated in the nationally determined contribution (NDC). ▪ Draw on regional or international sources. If detailed data on specific trends, impacts, and vulnerabilities have not yet been collected, draw on regional or international sources. ▪ Examine long-term trends, impacts, and vulnerabilities. Identify where changes in natural, social, and human-built systems may take place so that they can help generate adaptation options to transform economic and livelihood strategies, safeguard the delivery of public services, and protect lives.</td>
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<td>Update or add national long-term goals or vision</td>
<td>NAPs, or equivalent processes, usually include a vision statement and/or sectoral goals and objectives. These can be included in the NDC or can be further refined or prioritized as described below. For CVF member countries without a national adaptation planning process, the NDC can include a process-oriented goal that outlines those intentions.</td>
<td>▪ Articulate or update a long-term goal or vision. Outline the national vision for enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change, including a description of nationally determined needs, options, and priorities for vulnerable communities, regions, or sectors. ▪ Align adaptation goals with development goals. Consider alignment with broader development objectives, including the United Nations Sustainable Development Goals (Northrop 2016). ▪ Make goals specific and measurable. Ensure that goals are stated in ways that are specific and measurable, and linked to quantitative and/or qualitative measures of progress.</td>
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<td>Update or add current and near-term planning and action</td>
<td>CVF member countries can enhance their NDC by demonstrating the scale of its domestic engagement in building resilience to a changing climate. Domestic engagement includes ongoing and planned actions (changes in institutions, modified policies and measures, major projects/programs, planning processes, and financial investments). Such information can include a description of recently completed, ongoing, and planned domestic adaptation efforts and national investments, as well as other contributions to their implementation. The description can also include domestic support for regional activities that enhance climate resilience.</td>
<td>▪ Articulate planning milestones. For Parties with a NAP or equivalent planning process, enhancements in this category can draw on activities underway by highlighting major planning milestones, expected outputs, and major projects planned or under implementation. ▪ Outline planning intentions. Parties without a process or plan in place can articulate elements of an intended planning process, including timeline, focal areas, ministries and stakeholders with which to engage, and an outline of the process. ▪ Cite successes. Where planning is advanced, Parties can cite significant sectoral investments, innovations, and other successes, including examples where adaptation has been mainstreamed into budget cycles or sectoral planning processes. ▪ Highlight adaptation-mitigation synergies. Highlight and/or prioritize adaptation actions that contribute to mitigation targets, or mitigation actions that have taken climate risks into consideration; for example, integrated landscape management, which can provide adaptation and mitigation benefits alike (Box 14).</td>
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<tr>
<td>Update or add information on gaps and barriers</td>
<td>CVF member countries can enhance their NDC by including a description of gaps and barriers to adaptation action or planning. In the case of Parties with a NAP or equivalent planning process, this information might be included in planning documents; it can also be elaborated through stakeholder engagement or interviews.</td>
<td>▪ Outline requirements for long-term action or planning. An assessment of the needs (e.g., information, finance, capacity, technology) to carry out planned actions, as well as to achieve the integration of adaptation in development planning. In cases where the analysis includes an assessment of financial costs for specific activities, include a brief description of the core assumptions and methods used to prioritize options for action. ▪ Cross-reference other plans or analyses. For Parties without a NAP or equivalent process, the absence of a plan may itself be described as a gap; or specific gaps might be identified in sector-, project-, or location-specific studies.</td>
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<tr>
<td>Update or add monitoring, evaluation, and learning plans</td>
<td>Adaptation planning is an iterative process, gradually growing in scope and learning from the monitoring and review of ongoing adaptation actions. A description of how adaptation progress will be nationally monitored, reviewed, updated, and reported can be an important element in an enhanced NDC.</td>
<td>▪ Summarize monitoring plans from national adaptation planning processes. For Parties with a NAP or equivalent process, information about monitoring may be included in the plan. A monitoring plan also can be tailored specifically to the information included in the NDC. ▪ Signal intent to measure progress. Parties without a NAP may describe a basic plan for monitoring progress toward the goal/vision outlined in the NDC, such as identification of key milestones in a future NAP process.</td>
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Source: Drawn from Fransen et al. 2017.
Further details on how to provide the information listed above is available in “Open Book,” WRI’s initiative to enhance NDC transparency,” and in Levin et al. (2015). Through consultation with government representatives, WRI had developed a list of information for countries to provide when communicating their INDCs in 2015 (Levin et al. 2015).

6. CREATING SUPPORTING ENVIRONMENTS: THE ROLE OF LEGAL AND FINANCIAL FRAMEWORKS FOR NDC IMPLEMENTATION

Despite NDCs originating from national decision-making processes, countries may not have in place the legal, institutional, or financial framework required for successful implementation. As CVF member countries examine whether to update or submit a new NDC by 2020 along the lines outlined in previous sections of this paper, the existence of adequate legal, institutional, and financial frameworks and mechanisms is a prerequisite for effective implementation. CVF members can include new actions or measures in their NDCs designed to strengthen implementation, such as strengthened governance arrangements, legal frameworks, and the introduction of mechanisms aimed at mobilizing finance for NDC implementation. Not that the introduction of such measures should be considered enhancement of mitigation ambition; rather, these measures should be examined in addition to the strengthening of the implementation of options identified in the rest of the paper.

6.1 Legal Frameworks

As CVF members consider updating or submitting a new NDC they should consider including new commitments that relate to the introduction of laws that will support full and effective implementation of the NDC. Benefits of having clear legal frameworks for implementation include determining the appropriate legal status of entities expected to implement the NDC; establishing coordination mechanisms among key line ministries (e.g., energy, health, infrastructure, transportation, and agriculture); ensuring public participation in the decision-making process (e.g., through mandatory consultation processes and periods and/or establishing multistakeholder advisory committees); ensuring access to information and relevant data for climate change (e.g., requiring information sharing within government and relevant climate data to be made accessible to the public); and securing budget allocation and tracking expenditure against those priorities (e.g., establishing compliance mechanisms to review sectoral budgets against policy or budgetary objectives).

Increasingly, countries (including CVF member countries) are enacting comprehensive climate change frameworks (e.g., Kenya’s Climate Change Act 2016, which presents a series of objectives and establishes new coordination bodies and institutional mandates, as well as a national climate change fund to support implementation), although traditionally, the majority of climate-related laws are sectoral in nature (e.g., energy, forestry, and transport laws). For example, between 1994 and 2016, Costa Rica promulgated 16 laws and decrees that relate (either directly or indirectly) to climate change (Jimenez n.d.). These laws address issues such as liquid biofuels and their blends, the use of hybrid-electric vehicles as part of the use of clean technologies, and, most recently, reducing emissions from the transport sector through rail electrification (LSE 2016). Despite the progress being made, many countries have yet to include their NDC targets, policies, and actions in national legal frameworks, either through the creation of new laws or through amendments to existing sectoral laws.

CVF members should consider the following measures aimed at strengthening implementation of their new or updated NDC:

- Establish and/or align national regulatory frameworks (including legal instruments) with the long-term goals of the Paris Agreement.
- Include NDC targets in national laws and regulations.
- Introduce robust accountability mechanisms (e.g., access to justice, anticorruption measures, freedom of information, financial disclosure).
- Introduce mechanisms to promote greater inclusion and participation in decision-making and implementation of climate policy, particularly by those most vulnerable to climate change (i.e., marginalized communities, indigenous people). Including such a commitment in an NDC offers the opportunity to further align with SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities).
- Establish coordination mechanisms for NDC implementation, including that among ministries and with local governments to ensure that climate action is aligned and integrated into the decision-making. Such
coordination mechanisms would ideally be contained in a legal instrument to ensure enforceability.

- Establish comprehensive legal mandates, systems, and plans to collect data, and transparently report on progress toward achieving the targets, measures, and actions in the NDC (e.g., mandates for data sharing; enhanced systems for data collection and dissemination; development of a monitoring plan, which will be adhered to on a regular, ongoing basis, ensuring open and accessible data to stakeholders outside of government).

6.2 Financial frameworks and mechanisms

The Paris Agreement includes commitments on the mobilization of climate finance to support the full and effective implementation of obligations under the Agreement, including NDCs (Article 9). In order to enable every country to enhance its ambition, there is a need for increased investment, including from public and international climate finance (Ballesteros 2012). Countries will have to evaluate their financing needs associated with enhancing their NDC ambition. It may be useful to update finance needs assessments and conditional components of NDCs in light of better understanding of opportunities, changes in technology costs, additional potential funding sources, and improved domestic capacities to attract and deploy finance.

The V20 has shown particular leadership in climate finance by holding high-level dialogues with the Group of Twenty that has raised the profile of climate action within finance ministries of CVF countries and beyond. The V20’s work program focuses on three areas: mobilizing climate finance, sharing and exchanging best practices on economic and financial aspects of climate action, and engaging in advocacy on climate change (V20 2015). The V20 is also developing an Accelerated Financing Mechanism for Maximal Resilience and 100% Renewable Energy (V20 2018).

International public finance from bilateral and multilateral sources—including multilateral climate funds and development banks—while able to support existing NDC implementation, also has the potential to enable countries to enhance their NDC ambition. The Green Climate Fund’s (GCF) mandate to “promote the paradigm shift towards low-emission and climate-resilient development pathways” (GCF n.d., para 2) means it should be supporting projects and programs that deliver the kind of transformative climate actions that would be included in enhanced NDCs. CVF members can consider making a multicountry programmatic proposal to the GCF to support some of the sectoral enhancement options identified earlier in this paper.

The GCF, however, is only one among many potential sources of public and private finance. The international climate finance landscape is complex, with many entities and differing procedures for accessing funding, which makes it difficult for prospective recipients to know which best to approach to support their various needs (Amerasinghe et al. 2017). While such institutions are making efforts to improve their complementarity and coherence, tools such as the NDC Partnership’s Funding and Initiatives Navigator database can help countries identify prospective funders that match their needs (NDC Partnership 2018). In addition, readiness funding and capacity building support can help build the domestic capacities necessary to access international climate finance, including assessing and prioritizing various options.

In addition to accessing international funds, several CVF countries have established national climate funds to support local needs. They may be capitalized by domestic or international resources, or a mix of the two. FONERWA is Rwanda’s Green Fund—established by Law No 16/2012 of May 22, 2012—that determines the organization, function, and mission of the national fund for the environment (GoR 2012). It identifies public and private resources that include the national budget; grants and subsidies; donations and bequests; fines from different environmental, water, and forestry laws; and fees on logging and on projects for which an environmental impact assessment is required.

It also is important to integrate climate change priorities into national budgets, sectoral investment plans, financial regulations, and fiscal policies, in order to ensure that public and private finance becomes aligned with Paris Agreement goals, particularly Article 2.1c, which calls for “making finance flows consistent with a pathway toward low GHG emissions and climate-resilient development.” Countries can review how national policies and actions can support the achievement of this goal (Whitley 2018). In its NDC, Bangladesh expresses the will to integrate the Climate Fiscal Framework into its national planning and budgeting process to determine and disburse a suitable yearly allocation for the implementation of mitigation and adaptation projects/programs within this stipulated time-frame.
CVF members can include the following measures aimed at strengthening implementation of their NDC, in a new or updated NDC:

- Improve national frameworks to prioritize, plan for, access, deliver, and monitor climate finance, which can help increase flows (Kasiita Ssemulema 2018).
- Establish a national climate change fund to support implementation of the NDC.
- Commit to align sectoral investment plans, public budgets, financial sector regulations, and fiscal policies with the NDC.
- Explore the potential for a multicountry programmatic proposal to the Green Climate Fund to support paradigm-shifting action in selected sectors across the CVF.

7. NEXT STEPS: LEVERAGING CVF AMBITION TO DRIVE GLOBAL MOMENTUM

The year 2020 will be a test of country commitment to the goals agreed in the Paris Agreement. In particular, this will include the commitment to pursue efforts to keep warming to 1.5°C.

CVF member countries are among the least responsible and most vulnerable to climate change, and yet the leadership of CVF countries has resulted in the most ambitious global calls to action to date. These include clear examples of action at the domestic level to help drive the narrative around action on climate change.

Leading the way in exploring opportunities to enhance ambition through new or updated NDCs in 2020 in a manner that aligns with national priorities and sustainable development objectives can be a powerful contribution from CVF members. The aim of this paper has been to explore specific opportunities that align with existing CVF member priorities—including achieving 100% RE, enhancing resilience, and limiting global temperature increase to 1.5°C.

This paper has focused on options at the sectoral level, as well as through the inclusion of actions to reduce short-lived climate pollutants that are critical for limiting warming in the short term and avoiding overshoot of the 1.5°C goal. The options identified in this paper, however, do not represent all possible options that CVF member countries can explore themselves to enhance their respective NDC in 2020. It is also important to reiterate that the options identified in this paper may or may not enhance the ambition of a particular NDC. Whether or not additional targets, policies, or actions enhance ambition or support further implementation of the NDC can only be determined on a case-by-case basis, considering the cumulative impact of full implementation of the new or updated NDC when compared to the cumulative impact of full implementation of the existing one. See Box 1 for a further exploration of this concept and the definition of “enhanced ambition” in terms of mitigation.

This paper has not only explored options to enhance the mitigation ambition of the NDC; it also presents options to update or strengthen the adaptation component of an NDC for those countries that have chosen to include information on adaptation in their NDC and options to improve the clarity, transparency, and understanding of it. Each of these elements will be important if, collectively, CVF members are to strengthen the response to climate change and align their efforts with the goals of the Paris Agreement.

Finally, it will be important to situate NDC enhancement in the context of a long-term view, out to 2050 and beyond. This is particularly important in light of the new IPCC Special Report that concludes that net CO₂ emissions will, on average, need to be reduced to zero by mid-century. The long-term strategies called for under the Paris Agreement not only provide an ideal opportunity to connect countries’ climate and development agendas, they also contribute a means to align short- and medium-term actions (i.e., their NDCs).

The CVF Summit that will take place on November 22, 2018, will provide a global platform for CVF members to elevate what is at stake if the 1.5°C target is overshot and there is failure to deliver on the Paris Agreement. The Summit will provide the opportunity for CVF members to call on intensified global action in the coming years—enhanced mitigation ambition; greater cooperation to strengthen resilience and respond to loss and damage; and an increase in the scale of finance and support to enable all countries to realize their ambition.

CVF members can also use the CVF Summit to signal their intent to review and revise their respective NDC, highlighting the opportunities that have arisen since NDCs were first communicated in 2015. Such a signal from those most vulnerable to, and least responsible
for, climate change will be a powerful call to action for other countries to do the same at upcoming global events. In recognizing the role that CVF member countries can play in taking the lead on global efforts to commit to submitting new or updated NDCs in 2020, it is crucial to underscore the role that support—including finance, capacity building, and technology transfer—will play in enabling CVF countries to realize not only their current levels of ambition but also any enhanced level of ambition communicated through new or updated NDCs submitted in 2020. CVF member countries are already among the most ambitious to date—the fact that there is room for greater ambition must be a discussion held in conjunction with those on support needs.

Key events in the lead-up to 2020 are opportunities to signal ambition and associated support. These include the following:

- **CVF Summit (November 2018):** Commitments from the CVF members and other high-ambition countries to elevate their ambition through new or updated NDCs in 2020 that are in line with the goals of the Paris Agreement.

- **Talanoa Dialogue (December 2018):** Strong call to action from the Presidencies of the COP, based on the key messages and opportunities that have emerged throughout the entire Talanoa Dialogue process, including the high-level dialogue among Ministers at COP24.

- **COP24 (December 2018):** Strong signal of the collective commitment to strengthen ambition by countries outlining what domestic steps they will take in 2019 and 2020 to review and revise their NDC, including the initiation of multistakeholder national dialogues to identify and agree on opportunities for enhanced ambition in new or updated NDCs in 2020. Strong signals and commitments regarding support for means of implementation will also be necessary.

- **Release of IPCC Special Reports on (a) Climate Change and Land and (b) the Ocean and Cryosphere in a Changing Climate (September 2019):** IPCC will release two additional special reports, the first of which includes desertification, land degradation, sustainable land management, food security, and GHG fluxes in terrestrial ecosystems, and the second of which relates to the oceans and the cryosphere.

- **UN Secretary-General’s Climate Summit (September 2019):** Opportunity for countries to share progress, commit to a timetable for submission of their new or updated NDC, and/or submit the NDC itself.

- **COP25 (November 2019):** Opportunity for countries to submit the new or updated NDC.

As highlighted throughout this paper, all countries, including CVF member countries, have a multitude of options to consider when assessing whether and how to update their NDCs in a manner that brings collective efforts closer to the goal of the Paris Agreement. Strengthened ambition communicated through updated NDCs is not only necessary to reduce the emissions gap between current ambition and the goals of the Paris Agreement, it also can be a driver of greater policy coherence at the national level; support alignment with sustainable development objectives; attract the type and scale of investment necessary; and support research and development in new technologies and methodologies, thus making implementation cheaper and more effective over time.

Through the Talanoa Dialogue, countries have shared their vision of where they want to go. This vision outlines a future where there is reduced inequality, prosperity, healthy communities and ecosystems, enhanced resilience, and a just transition to low-carbon opportunities. The window of opportunity to realize this vision of the future is rapidly closing. It is absolutely imperative that all countries embark on a pathway toward making this a reality. The leadership of CVF member countries will play an essential role in raising the urgency of action and highlighting the opportunity for all countries to enhance their ambition. CVF members, nevertheless, must not be the only ones to boost their ambition and re-commit to what was agreed to in Paris.
The table in this Annex reflects targets and policies/actions relevant for mitigation in the NDCs of CVF member countries. The table provides information that can be used by CVF countries to identify opportunities to incorporate or strengthen targets and policies/actions in specific sectors. The information here is drawn from emissions reduction-related targets and policies/action in both mitigation and adaptation components of the NDCs, and both conditional and unconditional elements are included. Targets and policies/actions where the sole purpose is to enhance resilience were not captured in this mapping exercise.

**KEY:**  
- = Sectoral GHG Target  
- = Sectoral Non-GHG Target  
▲ = Sectoral Policy/Action
## Annex 1 | Mapping of Targets and Policies and Actions Communicated by CVF Members in Current NDCs

<table>
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<th>COUNTRIES</th>
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ENDNOTES


2. Paris Agreement, Article 4.3.

3. Recent analyses reveal that 14 new laws and 33 new executive policies relating to climate change have been introduced since the Paris Agreement was adopted in December 2016, with four of these specifically relating to NDCs (see http://blogs.law.columbia.edu/climatechange/2017/05/09/more-countries-are-backing-their-paris-pledges-with-national-laws/).

4. The goals of the Paris Agreement include those in Article 2 as well as those in Article 4.1 and 7.1.

5. Decision 1/CP.21, Adoption of the Paris Agreement, FCCC/CP/2015/10/Add.1 (January 29, 2016), paragraphs 23 and 24.


9. REDD+ programs (Reducing Emissions from Deforestation and forest Degradation) are a key tool for unlocking the potential of forest carbon sequestration in CVF countries. Considerable financing has been established for REDD+ programs, with public and private pledges and investments totaling US$9.8 billion between 2006 and 2014 (Norman and Nakhhooda 2015). Many CVF countries have acknowledged the value of REDD+, with 28 CVF countries participating in the UN-REDD program and 20 CVF in the Forest Carbon Partnership Facility, a REDD+ program led by the World Bank.

10. Mangroves and saltmarshes are coastal wetlands. Intertidal communities of plants grow on the foreshores of coastal lakes and estuaries.

11. Seaweed is increasingly receiving attention for its ability to sequester carbon. Macroalgae could represent an important source of the carbon sequestered in marine sediments and the deep ocean. A recent study estimates that approximately 11 percent of total seaweed production may be sequestered, most of it after it sinks down into the deep sea (see Nature Geoscience at https://www.nature.com/articles/ngeo2790).


13. Mangroves stabilize and improve soil, as well as protect shorelines from erosion. Their root systems slow water flow, aiding the deposition of sediment.

14. Methods to measure and monitor the blue carbon stored in the vegetative biomass and the deep soils of mangroves, tidal marshes, and seagrasses do exist, as do methods to estimate the loss of carbon from these systems if they are degraded or converted (Gattuso et al. 2018). Protocols for measuring blue carbon stored in mangroves have been established, and related methods for tidal marshes and seagrass meadows are now becoming standardized (BLC n.d.). A detailed field guide for assessing carbon stocks and emission factors in these areas has been developed by Conservation International, Intergovernmental Oceanographic Commission of UNESCO, and International Union for Conservation of Nature (Howard et al. 2014). The methodologies outlined are consistent with those of the IPCC (Blaau et al. n.d.). Two non-CVF countries have started to incorporate their blue carbon ecosystems into their national GHG inventory system using this IPCC guidance, thus accounting for the mitigation potential of these ecosystems and offering prospects for other countries to follow suit.

15. Other vehicles that countries can select for adaptation communications include national communications or NAPs.

REFERENCES


ABBREVIATIONS

AWD alternate wetting and drying
CO$_2$ carbon dioxide
COP Conference of the Parties
CVF Climate Vulnerable Forum
GHG greenhouse gas
GCF Green Climate Fund
ha hectare
HFC hydrofluorocarbon
IPCC Intergovernmental Panel on Climate Change
IRENA International Renewable Energy Agency
mha million hectares
NAP national action plan
NDC nationally determined contribution
PV photovoltaic
RE renewable energy
SDG Sustainable Development Goal
SLCP short-lived climate pollutant
SRI system of rice intensification
V20 Vulnerable Twenty (V20) Group (of Ministers of Finance of Climate Vulnerable Forum)
WRI World Resources Institute
ACKNOWLEDGMENTS

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ABOUT THE AUTHORS

Eliza Northrop is an Associate with WRI's International Climate Action Initiative

Contact: enorthrop@wri.org

David Waskow is the Director of WRI's International Climate Action Initiative

Contact: dwaskow@wri.org

Katie Ross is an Associate with WRI's Climate Program

Contact: kross@wri.org

Rebecca Gasper is an Associate with WRI's US Climate Initiative

Contact: rgasper@wri.org

Andrew Wu is a Research Analyst with WRI's New Restoration Economy

Contact: andrew.wu@wri.org

Alexander Tankou is a Research Assistant with WRI's Climate Program

Contact: atankou@wri.org

ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT
We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT
We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT
We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.

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