



2018

PPIAF Climate Change  
US\$4 Million CCTFI  
Funding Proposal to  
NORAD  
(Calendar Year 2018)

## Table of Contents

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Acknowledgements.....	iii
Clean Energy Scale-up – Upstream Opportunities and Challenges .....	1
A. Variable Renewable Energy (VRE) Integration.....	2
B. Energy Efficiency (EE).....	3
C. Plug-in Electric Vehicle (PEV) Charging Infrastructure .....	4
D. Energy Access (EA) and Mini-Grids .....	6
PPIAF Climate Change Strategy and Programmatic Initiatives .....	7
A. PICSI – Policy Initiatives for Climate-Smart Infrastructure .....	7
B. BICSI – Building Institutional Capacity for Climate-Smart Infrastructure .....	8
C. SCKI – Strategic Climate Knowledge Initiatives.....	8
Portfolio and Pipeline – A Closer Look .....	9
A. Global Reach of CCTFI’s Programmatic TA Initiatives.....	9
B. CCTFI’s Strategic Partnerships Optimize Co-Financing with World Bank’s Energy GP & Climate Change ..	10
C. Annual Funding Schedule for NORAD – Snapshot of US\$15M CCTFI Funding Proposal from FY18 Q1.....	11
Annex 1: CCTFI TA Grants – Select Activity Snapshots.....	12
Annex 2: CCTFI’s FY18-FY19 Portfolio & Pipeline Outlook .....	16

## Acknowledgements

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As one of the founding donors, Norway helped establish PPIAF's Climate Change Non-Core Trust Fund (CCTF) in November 2008 with an initial contribution of US\$2 million. PPIAF deeply appreciates and acknowledges NORAD's valuable contributions to support upstream work in Climate Change (CC). Through NORAD's continued contributions, PPIAF has begun to scale-up CC work through its dedicated Climate Change Trust Fund for Infrastructure (CCTFI) to help developing countries shift to climate-smart infrastructure through private sector participation.

PPIAF's new Climate Change Strategy and Business Plan for the FY18-FY22 cycle was presented to all donors at the Program Council Meeting in June 2017 with a US\$20 million proposal to support CCTFI's work program. This CC Strategy was formally peer reviewed by a panel of World Bank sector experts across Energy, Transport and Water sectors including the Climate Change group and the PPP team. Based on NORAD's renewed interest in 2017, this original CC business proposal was modified and customized to develop a new US\$15 million funding proposal highlighting NORAD's Energy Sector (Climate Change Mitigation) funding priorities. Accordingly, NORAD provided CCTFI with an initial US\$1 million contribution in December 2017 to show its commitment to help implement the new CC agenda.

This US\$4 million funding proposal for Calendar Year 2018 (covering FY18 Q4 and first half of FY19 for PPIAF) builds on NORAD's support to CCTFI for the FY18-FY22 cycle and ties into the larger US\$15 million funding proposal presented to NORAD on July 27, 2017 (FY18-Q1). It specifically focuses on NORAD's priority areas across Renewable Energy (RE), Energy Efficiency (EE), Electric Vehicle (EV) Infrastructure and Energy Access (EA). Thought leadership for the proposal including establishing PPIAF's Climate Change Programmatic Initiatives and Strategic Partnerships to operationalize CCTFI's operating model was provided by Nuwan Suriyagoda, Senior Climate Change Program Coordinator at PPIAF. He is the lead author of this report. Valuable management inputs and guidance was provided by Francois Bergere, Program Manager at PPIAF. A special thank you also goes to Jeanine Delay and Bruno Bonansea for graphic design and mapping support on this report.

## Clean Energy Scale-up – Upstream Opportunities and Challenges

As the global population grows to 9 billion people by 2040, there is already a significant shift in **Energy Demand Growth** that points directly to key emerging economies. Cities are becoming the epicenters for exponential energy use coupled with shifts towards more “electrified” urban transport infrastructure (e.g. metros, energy-efficient bus fleets, electric vehicles etc.). According to the 2017 World Energy Outlook (WEO 2017), by 2040, an additional 1.7 billion people are projected to join urbanized cities with more than 90% of the increase taking place in developing economies; notably in **India, China, Southeast Asia including parts of Africa and Latin America**. Furthermore, the rising income levels in these economies are also expected to increase appliance ownership rates (e.g. more lighting, mobile devices, air-conditioning, refrigerators, washing machines etc.). As a result, **electricity demand rises by 60% to 2040**, with over 85% of global growth occurring in developing economies<sup>1</sup>. These shifts have **enormous implications on power systems as well as transport infrastructure**.

Today, the power sector is leading the low-carbon transition, with 2016 signaling another record year for renewables (RE), with 165 gigawatts (GW) added to power generation capacity worldwide. Led by private sector’s clean technology innovations, the falling costs in Solar PV and Wind power have reached a sufficient level of price competitiveness. This has resulted in governments moving rapidly to scale-up deployment of renewable energy infrastructure mainly through **auction mechanisms** and/or **competitive tenders**. For example, auction schemes are in use in 70 countries and at least 34 countries conducted new auctions in 2016<sup>2</sup>. These game-changing milestones now allow governments a unique opportunity to shift their trajectory from traditional fossil-fuel based energy supply sources (e.g. coal, oil and gas) to more modern **renewables-rich** power supply sources (e.g. solar pv, wind, geothermal, etc.) that can be combined with more **energy efficient** (EE) end-user solutions across industries, buildings and transportation. Furthermore, such disruptive technologies will enable individual households, communities and businesses to enter the market and help meet their own energy needs. This changes the way utilities manage “electrification of the grid” to meet future energy demand.

The global impetus and political will gained in 2016 with the ratification of both the Sustainable Development Goals (SDGs) and the Paris Climate Agreement have now cemented the foundation to develop sustainable infrastructure projects over the 2020-2030 period. Moreover, the Paris Agreement enabled most governments to establish strong NDC Plans to set the world on course to achieve the Climate Change target of 2 degrees Celsius by 2100. Nevertheless, there are many challenges that still lie ahead with the **alignment of NDC priorities with upstream policy, sector and utility reforms including fiscal reforms**. Therefore, **a top priority for developing country governments during the next 5 years (2018-2022)** will be to reform upstream policies, legal and regulatory frameworks including building critical institutional capacities to manage clean-technology networks. **Such upstream actions by governments will be paramount to remove critical market barriers and downstream investor risks to crowd-in private sector led development of “bankable” RE and EE project pipelines**. Given this urgent upstream challenge, PPIAF through its dedicated Climate Change Trust Fund for Infrastructure (CCTFI) will focus on structuring Technical Assistance (TA) and Knowledge (KM) Solutions to develop **Climate-Smart Enabling Environments** that facilitate Variable Renewable Energy (VRE) Integration, Energy Efficiency (EE), Electric Vehicle (EV) Infrastructure and Energy Access (EA) as outlined below. These

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<sup>1</sup> WEO 2017 – Chapter 6: Power Markets and Electrification

<sup>2</sup> WEO 2017 – Chapter 6.3.8: Support for renewables-based electricity

CCTFI upstream interventions to be implemented during 2018-2022 period will aim to accelerate **decarbonization of energy systems including transport networks while making them more energy efficient.**

## A. Variable Renewable Energy (VRE) Integration

As more developing countries shift away from fossil-fuel based (coal, oil, gas) power generation to increase their share of renewables into their national generation-mix (power supply-mix), the integration of variable renewable energy (VRE) into the power grid becomes more challenging for utilities. Most of these utilities and existing power systems currently have limited technical capacities to operate and respond quickly and efficiently to uncertainty and variability caused by renewables; not mentioning the lack of investments needed to transition towards smart-grid infrastructure. In addition, integrating VRE to existing “centralized” power grids in combination with new Distributed Energy Resources (DER)<sup>3</sup> which are mostly “de-centralized”, further complicates grid operations. They also make power system dynamics for balancing energy supply-demand profiles more challenging. These **technical and investment challenges** are further complicated by **commercial constraints** posed by existing fossil-fuel based (coal, oil, gas) generators having long-term Power Purchase Agreements (PPAs) that limit or crowd-out the up-take of new solar and wind power capacity. Although most of these technical (VRE & DER integration) and commercial (coal or gas PPAs) challenges can be manageable, **if addressed in isolation without concerted and well-designed upstream policy support including targeted regulatory and legal reforms to incentivize RE project developers, they run the risk of RE curtailment while limiting the development of bankable RE project pipelines.**

From an **electricity market** standpoint, there are **significant upstream gaps in power market design** on wholesale electricity pricing and trading that should be addressed to **optimally operate** and **promote competition** to help integrate higher shares of solar and wind power. In this context, upstream **electricity tariff reforms** will play a critical role as governments aim to deploy more renewables and develop smart-grid infrastructure with robust transmission and distribution (T&D) networks.

According to the 2017 World Energy Outlook report, for example, electricity price reforms are on the agenda in many countries, with Argentina and Indonesia showing two prominent examples of reform in 2017. In addition, well over 90% of global power generation investment in 2016 was made by companies operating either under a regime with fully regulated revenues or with some sort of regulatory or contractual mechanism **to manage the “revenue risk” associated with fluctuating wholesale market pricing.** There are **major issues of market design that need to be addressed by policy-makers to ensure that generators have ways to recover their costs,** and that the power system is able to operate with the necessary degree of flexibility(IEA, 2017a)<sup>4</sup>.

In this context, CCTFI will scale-up upstream support in both low-income (LICs) and middle-income (MICs) countries to help accelerate VRE Integration under its new Climate Change Strategy for the FY18-FY22 period. Specifically, CCTFI’s Programmatic Initiatives will focus on policy (PICS), institutional capacity building (BICSI) as well as knowledge exchange (SCKI) solutions for governments and utilities to facilitate VRE integration and

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<sup>3</sup> DER solutions range from distributed generation (off-grid Solar PV), demand response, energy storage, home energy management systems (HEMS) including smart metering, connected appliances and electric vehicle charging stations.

<sup>4</sup> WEO 2017 – Chapter 2.5: How much do energy policies matter?

enable private sector investments. *Please see Annex 1 One-Pager for practical example of CCTFI's TA work on power market reforms: India – VRE Integration Support to POSOCO (India's Power Systems Operator).*

## B. Energy Efficiency (EE)

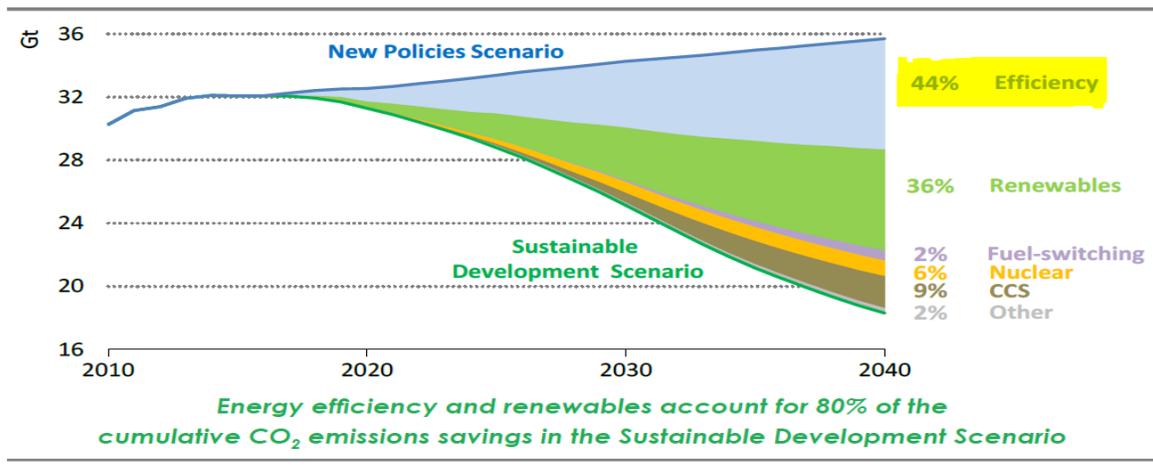
As **Energy Demand** in Emerging Markets and Developing Countries (EMDCs) increases exponentially over the next decade, **proactively managing energy intensity<sup>5</sup> through increased Energy Efficiency (EE) interventions** will be a high priority for EMDC governments. Such efforts will not only be important to make power systems more energy efficient and smart, but also critical to manage imminent “electrification” needs of Electric Vehicles. Furthermore, well-targeted EE measures that complement renewable energy supply across both power and transport sectors will be key to developing modern smart-grid infrastructure. In this context, **“holistic policy packages” that combine renewables-rich Smart-Grid development with Demand-Side Management (DSM) and Demand Response (DR) including other Distributed Energy Resource (DER) solutions should be pursued further to optimize power systems and transport network operations.** As a result, the power sector can also reduce the number of planned fossil fuel-based power plants to be built over the next 3-10 years, all without sacrificing economic growth. Thus, EMDC governments must focus on holistic EE policy planning during the next 5 years (FY18-FY22 period) to **position “Energy Efficiency” as the “First Fuel” to lower electricity demand** and effectively manage energy use of end-consumers.

The latest WEO 2017 report, under its ambitious Sustainable Development Scenario, highlights the lead role to be played by EE to help reduce CO<sub>2</sub> emissions by 44%, compared to RE solutions which offer 36% CO<sub>2</sub> emission reductions. See Figure 3.15 below. Thus, from economic, climate change, environmental and social vantage points, **EE should be the highest impact energy solution** to not only lower energy intensity and improve affordability of energy use but also actively combat global warming as well as address pollution issues **by reducing the overall energy footprint.**

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<sup>5</sup> **Energy Intensity** is the ratio of primary energy supply in tonnes of oil equivalent (toe) per \$1 million of gross domestic product (GDP).

**Figure 3.15** ▸ Global CO<sub>2</sub> emissions reductions in the New Policies and Sustainable Development Scenarios



Stronger policy and regulatory reforms combined with enforceable EE laws to increase EE Standards for appliances, industrial equipment/processes coupled with improved Building Codes that combine RE, DSM and DER solutions, will help countries change their energy demand, production and consumption patterns. In addition, stricter Fuel-Economy Standards and the introduction new policies for Plug-in Electric Vehicles (PEV) will change mobility patterns to transform the transport sector. Such upstream actions will have profound impacts on final consumers with significant cost savings that result from purchasing more energy efficient lighting, appliances and equipment, etc. (e.g. LEDs, energy saving air-conditioners, refrigerators, washing machines) as well as cleaner electric mobility options. Moreover, targeted upstream support on the market-side to facilitate innovative financial mechanisms, such as public-private EE funds that promote private sector-led EE projects including dedicated EE credit lines and partial guarantees schemes will be critical to incentivize and scale-up nascent Energy Services Company (ESCOs) markets across EMDCs.

In this context, CCTFI under its new Climate Change Strategy will prioritize EE related upstream support in middle-income countries (MICs) and targeted low-income countries (LICs) to help accelerate EE solutions. Specifically, CCTFI's Programmatic Initiatives will focus on policy (PICS), institutional capacity building (BICS) as well as knowledge exchange (SCK) solutions for governments, utilities and private stakeholder to facilitate EE scale-up through improved public-private collaboration. *Please see Annex 1 One-Pager for practical example of CCTFI's EE work: Panama – Towards NDC Implementation through Public-Private Collaboration.*

### C. Plug-in Electric Vehicle (PEV) Charging Infrastructure

**Electrification of road transport through the deployment of plug-in electric vehicles (PEVs) represents one of the most promising opportunities for EMDCs to reduce oil demand, cut carbon emissions, and accelerate the transition to electric mobility.** The declining cost of lithium ion batteries combined with breakthroughs in energy storage technology, and the upward trend of global PEV sales<sup>6</sup> including heightened global ambitions

<sup>6</sup> 40% between 2015 and 2016. IEA 2017 Global EV Outlook. <https://www.iea.org/publications/freepublications/publication/GlobalEVOutlook2017.pdf>

through the Paris Declaration, to exceed 100 million electric cars globally by 2030, collectively sends a clear signal for targeted governmental policy and regulatory actions for PEVs.

**The availability and cost of public charging infrastructure** – also known as electric vehicle supply equipment (EVSE) – **is critical to the uptake of PEVs.** EVSE infrastructure policies, incentives, and capacity building therefore must accompany PEV deployment. In 2016, the number of publicly accessible charging points reached record 320,000 units globally, representing a 72% growth since 2015. Based on IEA projections, **there is a risk that the demand for PEVs in the next decade will outpace the deployment of affordable and fast charging public infrastructure,** constraining the PEV markets expansion beyond 2030.

Although the rapid rate at which PEVs are being developed in some countries affirms that strong policy-led drivers can stimulate markets, increased EVSE growth will also require simultaneous and integrated actions to support innovative business models across the auto industry, energy supply system, and transport infrastructure. For example, the fast adoption of PEVs in Norway - the undisputed world leader on PEVs – came as a result of a combination of policy and regulatory reforms, coupled with fiscal and social incentive programs that include free public charging infrastructure. Norway has also set ambitions to become fully-electric by 2025.

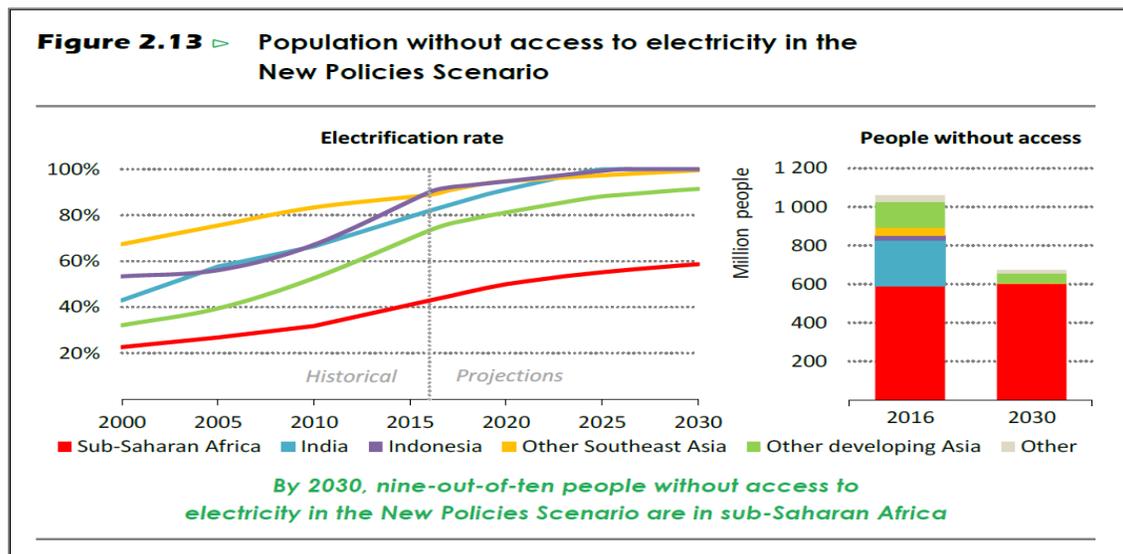
Across EMDCs, concerns continue to mount around what effects an accelerated growth in the PEV market will have on energy supply networks, as realized synergies between PEV and the grid are currently quite limited in scale. Furthermore, how to ensure that PEVs are powered by renewable electricity and smoothly integrated with a growing pool of DER solutions while simultaneously being connected to existing distribution networks, remains a compelling issue, both for the power sector as well as the rapidly changing transport sector. Thus, EMDC government policy-makers should carefully plan and develop new upstream policies and regulations to incentivize private sector participation to enable the uptake of PEVs and their critical charging infrastructure.

CCTFI will provide upstream support through its programmatic initiatives to enable the scale up of PEVs and EVSE in rapidly motorizing countries. This support will focus on national and sub-national policy reforms, development of roadmaps to enable close alignment between transport master plans and power sector expansion plans to promote transformational PEV charging networks including developing innovative EV business models through PPP frameworks. In addition, this upstream work will also encourage coordination between transport sector stakeholders, energy companies, utilities, and distribution system operators (DSOs). Thus, upstream support for PEV deployment will remain a priority for CCTFI during the FY18-FY22 cycle and central to its climate-smart transport strategy. **In March 2018, CCTFI initiated a \$165,000 grant to analyze PPP Business Models to introduce EV Charging Infrastructure and finance EV Bus Fleets in Kolkata, India.** This upstream work is a collaborative effort between PPIAF, ESMAP, IFC and World Bank's Transport Global Practices. The TA activity was initiated through the strategic partnership between CCTFI and ESMAP.

## D. Energy Access (EA) and Mini-Grids

The number of people without access to electricity has fallen from 1.7 billion in 2000 to just below 1.1 billion in 2016. Two trends are coming together that could shorten the pathway considerably. Technologies are getting cheaper and more accessible, which is helping to bring down the costs and barriers to deployment of decentralized renewable solutions that can play a vital role in bringing electricity to remote communities. New entrepreneurial business models are rapidly emerging that pair off-grid systems (typically a small solar PV panel) and energy efficient appliances with innovative financing schemes (typically via mobile phones), enabling millions of people living in rural areas far from an electricity grid to gain affordable access<sup>7</sup>.

Based on Figure 2.13 below, Sub-Saharan Africa will have the largest Energy Access (EA) gap in 2030 with approximately 600 million without access to electricity. In contrast, India and South Asia seem to ramp-up its electrification rates. In particular, India since 2000 has provided access to half a billion people (primarily via extension of the grid) and the latest policy push could put the country on track to provide universal electricity access by around 2025.



In this context, CCTFI will target upstream solutions primarily in Sub-Saharan Africa and South Asia to promote Energy Access (EA) and also promote new Mini-grid solutions under its new Climate Change Strategy for the FY18-FY22 period. Specifically, CCTFI's Programmatic Initiatives will focus on policy (PICS) and knowledge (SCKI) solutions for governments and the private sector to collaborate in developing market-driven business models which also enable to policy reforms to incentivize off-grid mini-grid solutions in the long-run. To this extent, CCTFI will engage IFC teams to develop in business models as well as address upstream regulatory and policy gaps in the off-grid space. As a result, CCTFI will also aim to leverage IFC's Private Sector-Window including World Bank's IDA funding envelopes that directly target Sub-Saharan Africa.

<sup>7</sup> WEO 2017 – Chapter 2.6: Are new technologies bringing us closer to universal access to electricity?

## PPIAF Climate Change Strategy and Programmatic Initiatives

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The driving force behind PPIAF's new Climate Change (CC) Strategy and its dedicated Climate Change Trust Fund for Infrastructure (CCTFI) is its robust **Operational Model** which focuses on **Programmatic Initiatives** and **Strategic Partnerships** (e.g. ESMAP and NDC-P SF). This new operational model was carefully thought-through and developed by PPIAF's climate change team and launched during the FY17 Q4 period.

In essence, PPIAF's CC Strategy for the FY18-FY22 cycle targets **"Upstream Solutions"** to address root causes to systemic market failures and downstream investor risks in order to facilitate the development of **"bankable" clean technology project pipelines** in Emerging Markets and Developing Countries (EMDCs). Moreover, the CC Strategy closely incorporates new thinking by World Bank's Senior Management to **"Mainstream the Upstream"** and leverages the Bank's Sector-focused **Global Practices** in combination with the new **"Maximizing Finance for Development (MFD)"** approach to catalyze private sector-led sustainable infrastructure financing. As a result, **CCTFI actively aligns its Programmatic Initiatives with the World Bank's multi-level client country interventions from upstream policies to downstream project structuring**. In this context, CCTFI's three main (3) Programmatic Initiatives primarily target climate-smart upstream solutions across **Energy** and **Transport sectors** to fast-track priority sustainable infrastructure projects in Renewable Energy (RE), Energy Efficiency (EE), Electric Vehicle (EV) Infrastructure and Energy Access (EA). Such an approach enables CCTFI to not only align the World Bank **Client Country's climate-focused NDC Infrastructure Priorities** but also help achieve the broader **Sustainable Development Goals (SDG 7, 9, 11 and 13)** outlined in PPIAF's Climate Change Strategy.

### A. PICS – Policy Initiatives for Climate-Smart Infrastructure

The primary objective of the PICS Programmatic Initiative is to develop climate-smart enabling environments that target policy, regulatory and legal reforms to crowd-in private capital for fast-tracking RE and EE investments through public-private collaboration models (e.g. PPPs). In this context, PICS will have the flexibility to structure innovative TA solutions on power systems planning, RE and EE policies and critical regulatory and sector reforms (e.g. tariff reforms, regional power trading, RE auction mechanisms, etc.). PICS will also focus on legal and regulatory reforms to develop market incentives for smart-grid technologies that can accelerate integration of VRE (solar PV and wind) and DER with optimal PPA structures. In Energy Efficiency (EE), PICS will support the development of upstream Standards and Codes including addressing regulatory gaps to EE financing through innovative public-private market mechanisms. These TA solutions will aim to improve the overall power system operations and transform traditional utility business models to integrate higher shares of renewables.

Policies, regulations and incentive structures to promote private-sector led off-grid Solar PV solutions and Energy Storage options will be of key importance under PICS. Another area will be to facilitate upstream solutions to decarbonize the transport sector through Electric Vehicles by leveraging smart-grid infrastructure. In addition, PICS will look at policy, regulatory and legal reforms to align Carbon Taxes (Fiscal Policies) with Climate Finance and Green Banking mechanisms. Such TA solutions will collectively aim to catalyze global and local private sector financing solutions to mobilize RE and EE infrastructure investments at scale.

Thus, PICS work entails developing market assessments, pre-feasibility studies, including various technical studies to inform government decision-makers as well as energy and transport stakeholders to facilitate VRE and DER integration for Smart-Grid Infrastructure development. The PICS operational model will leverage key partnerships with World Bank's Energy, Transport, Urban and Financial Markets GPs as well as ESMAP (Energy GP) including the NDC Partnership Support Facility (WBG Climate Change practice). Key IFC teams will also be leveraged to ensure upstream solutions are used effectively by downstream partners. PICS will be the flagship programmatic initiative under CCTFI's Climate Change agenda. The BICSI and SCKI Programmatic Initiatives outlined below will complement PICS through their respective Capacity Building and Knowledge initiatives.

## B. BICSI – Building Institutional Capacity for Climate-Smart Infrastructure

The objective of the BICSI Programmatic initiative is to address gaps in Institutional Frameworks by building capacity of government decision-makers as well as local utility stakeholders within the energy sector. BICSI will promote international best practices through **knowledge exchange workshops** between global practitioners targeting RE and EE technical and financing solutions. In this context, BICSI will focus on **capacity building** for setting up Smart-Grid Infrastructure, RE Auctions mechanisms, innovative EE Funding models, Carbon Pricing, EV infrastructure, etc. and host of other solutions to fast-track sustainable infrastructure development through structured Public-Private Partnerships (PPPs). The BICSI operational model will leverage key partnerships within the World Bank's Global Practices as well as IFC. In addition, BICSI will work closely with World Bank's Infrastructure, PPP and Guarantees (IPG) group to leverage their expertise and suite of tools to develop PPP capacity of governments. These tools would include Infrastructure Sector Assessment Program (InfraSAP), PPP Project Screening tool and host of others. BICSI initiatives will build on work done through PICS and SCKI to plug-in knowledge and capacity gaps to drive energy sector transformations.

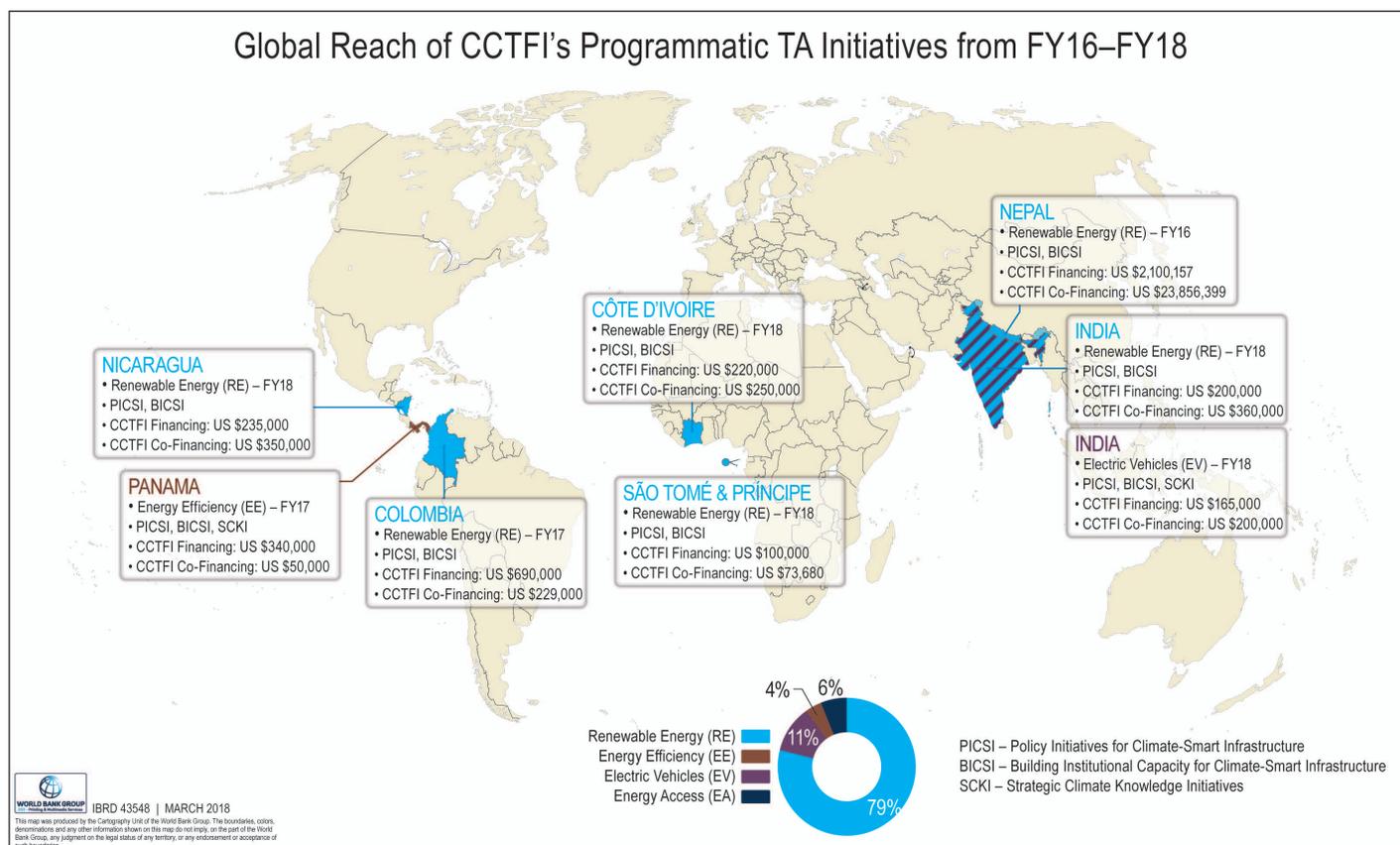
## C. SCKI – Strategic Climate Knowledge Initiatives

The SCKI Programmatic initiative will look at **international best practices** and **lessons learned** to crowd-in private sector led RE and EE investments. In this context, SCKI will have latitude to structure global **Knowledge Solutions** that target smart-grid infrastructure planning; VRE (solar PV and wind) and DER integration; RE Auction mechanisms; EE and Energy Storage; Electric Vehicle infrastructure including innovative Carbon Pricing, Green Banking and Municipal Infrastructure Financing frameworks to drive climate-smart infrastructure solutions. To this extent, SCKI will aim to develop Strategic Knowledge Partnerships with a host of external entities that can range from IRENA, Climate Policy Initiative, C40, Global Covenant of Mayors for Energy and Climate, to name a few. SCKI will closely complement work done through PICS and BICSI.

# Portfolio and Pipeline – A Closer Look

## A. Global Reach of CCTFI’s Programmatic TA Initiatives

Figure 1



The creation of 3 Programmatic Initiatives through PICSI (policy), BICSI (institutional building) and SCKI (knowledge) as the foundation for PPIAF’s new Climate Change Strategy has enabled CCTFI to create a cohesive strategic framework. This innovative approach in combination with CCTFI’s two Strategic Partnerships (see next section on partnership co-financing) have now become a “game changing” Operational Model. As a result, **CCTFI is effectively channeling all of its limited resources – while leveraging significant co-financing – to optimize upstream TA and Knowledge solutions across RE, EE, EV and EA.** This CCTFI approach is precisely in-line with regional and NDC focused clean technology priorities outlined in PPIAF’s Climate Change Strategy.

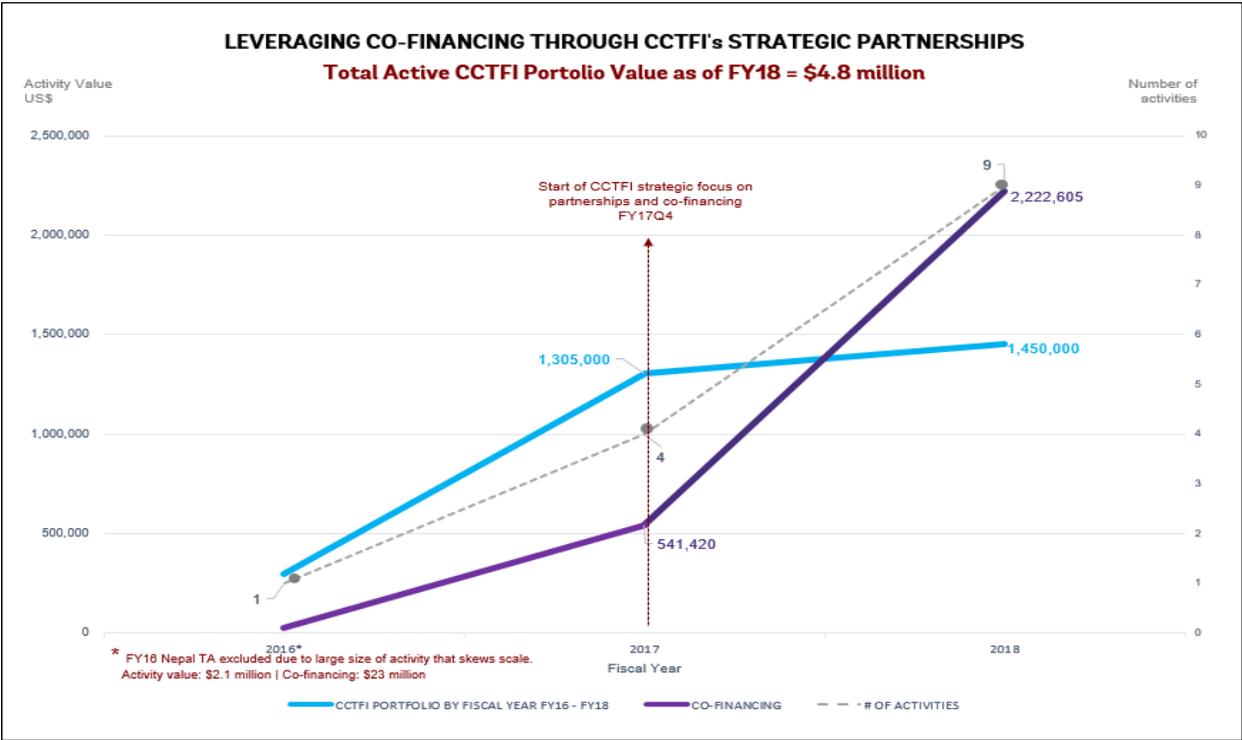
As evidenced in Fig 1 above, with less than a year since operationalization of this model, CCTFI in FY18 Q3 alone has added **5 new TA activities** across **Asia** (2x India), **Sub-Saharan Africa** (Cote d’Ivoire and Sao Tome & Principe) and **Latin America** (Nicaragua). In addition, **4 new Knowledge activities** were also added in FY18 (Fig 1 does not show Knowledge activities). Thus, CCTFI’s overall Portfolio now has a broad global reach as well as a rich selection of clean technology TA activities that range from Scaling Solar PV Initiatives, Grid Integration of Renewables to Energy Efficiency and Electric Vehicle Charging Infrastructure deployment. Furthermore, **most of these TAs have direct links to downstream World Bank project lending envelopes (e.g. \$150-\$400 million project size average)** and/or IFC investments and advisory engagements.

The doughnut diagram in Fig 1 highlights **CCTFI’s Portfolio with 79% renewables, 11% energy efficiency and 4% electric vehicles** respectively. Based on the client country needs, these different types of clean technology TAs also leverage a combination of PICSI, BICSI and SCKI programmatic solutions to deliver holistic upstream interventions. The **6% Energy Access** covered through Knowledge activities are not highlighted in Fig 1 as it only shows TA activities.

The power of this new operational model is further evidenced in **Annex 3: CCTFI’s FY18-FY19 Portfolio and Pipeline Outlook** which values **CCTFI’s total FY18 Portfolio at approximately \$4.8 million** with an **additional Pipeline until FY19 Q1 of approximately \$2 million**. These values clearly signal the rapid growth of CCTFI’s climate-smart upstream support over the past year, since FY17 Q4. Based on the fast-growing Pipeline, it is also clear that **CCTFI will require additional funding to maintain this growth trajectory beyond FY19 Q1**.

## B. CCTFI’s Strategic Partnerships Optimize Co-Financing with World Bank’s Energy GP & Climate Change

Figure 2



The two Strategic Partnerships established by CCTFI in FY17 Q4 with ESMAP and the NDC-Partnership Support Facility (NDCP-SF) enabled CCTFI to directly align its operational model with the larger work programs of World Bank’s Energy Global Practice (Energy GP) and Climate Change Groups (includes IFC Climate Business Groups). As a result, CCTFI has radically increased its upstream solutions to address regional market barriers and downstream investor risks through well-targeted sector and institutional reforms across the energy and transport sectors. Furthermore, in cooperation with ESMAP, CCTFI has identified synergies to crowd-in efforts for scaling-up deployment of renewable energy and energy efficiency. CCTFI’s comparative advantage to

combine Climate Change-Private Sector and Infrastructure angles (through PPP frameworks) also optimize ESMAP’s TA solutions directed towards Energy GP projects. In addition, the NDCP-SF partnership recognizes the common agenda prompted by the Global Agreement on Climate Change to help countries achieve their national climate commitments by ensuring both financial and technical assistance is delivered as efficiently as possible. To this extent CCTFI focuses on identifying opportunities and gaps in upstream planning including policy and regulatory reforms needed in the next 5 years to scale-up NDC infrastructure investment priorities. **At the heart of this partnership model is CCTFI’s ability to leverage significant amounts of co-financing.** This has now resulted in a winning strategy that combines CCTFI’s limited resources with ESMAP and NDCP-SF co-financing to implement energy and transport sector reforms as well as achieve climate change mitigations targets. Moreover, **the co-financing enables CCTFI to not only reduce its TA funding obligations but also optimally allocate its scarce resources across more TA and Knowledge activities to support additional client countries with increased global reach.**

The inflection point shown in Fig 2 at FY17 Q4 indicates the beginning of CCTFI’s Strategic Partnerships with ESMAP and NDCP-SF. It is very clear that these partnerships have optimized CCTFI’s own funds to not only leverage co-financing but also **accelerated the rate of co-financing relative CCTFI funding while increasing number of TA activities.** Based on Fig 2 for FY18, for example, the total TA and Knowledge activities in FY18 co-financed amount through partnerships, thus far are **US\$ 2,222,605.** This amount has been successfully leveraged with only **US\$ 1,450,000** of CCTFI’s own funds; thus, achieving a leverage of approximately **1.5 : 1.** This is a significant of donor resources saved and re-channeled through CCTFI. Moreover, it also clearly indicates the success achieved through these partnerships within just less than a year (since FY17 Q4). In comparison to the FY15-FY17 funding approach, where TA funding was directed randomly on an ad-hoc project-by-project basis, CCTFI’s current Portfolio and Pipeline are driven exclusively by programmatic initiatives that not only leverage significant co-financing but also closely aligns with pre-identified downstream projects supported through WBG sectoral, country and regional engagements. **In essence, the two strategic partnerships focus on collaborating on complementary activities to coordinate and optimize resource allocation between partners to deliver results to client countries.**

### C. Annual Funding Schedule for NORAD – Snapshot of US\$15M CCTFI Funding Proposal from FY18 Q1

CCTFI Funding Needs for FY 2018-FY 2022 Cycle (in Millions of US\$)					
2018	2019	2020	2021	2022	TOTAL
5	4	3	1.5	1.5	15

## Annex 1: CCTFI TA Grants – Select Activity Snapshots

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# CCTFI – Climate Change Trust Fund for Infrastructure

## TECHNICAL ASSISTANCE (TA) ACTIVITY SNAPSHOT

### COTE D'IVOIRE: Unlocking Private Investment to Achieve 42% Renewable Energy NDC Target

#### OVERVIEW

<b>Country</b>	Cote D'Ivoire
<b>Region</b>	Sub-Saharan Africa
<b>Sector(s)</b>	Renewable Energy (RE)
<b>Partnerships</b>	World Bank NDC- Partnership Support Framework, IFC Climate Business
<b>Activity Type</b>	Technical Assistance (TA)
<b>Approval Period</b>	FY 18 Q2 (Oct-Dec 2017)
<b>Task Team Lead</b>	Thomas Kerr, Principal Policy Officer, IFC Climate Business

#### FINANCIALS

<b>Total TA Activity Size</b>	\$470k
<b>CCTFI Grant</b>	\$220k
<b>Co-funding</b>	\$250k
<b>Co-funding Partner(s)</b>	NDC-PSF
<b>Co-funding Ratio</b>	1: 1.14
<b>WBG/IDA DPC Envelope:</b>	\$325 million
<b>Project ID</b>	P157055
<b>Project Name</b>	Electricity Transmission and Access Project

#### CONTEXT

This TA is the second activity originated as part of the strategic partnership between CCTFI and World Bank's NDC-Partnership Support Facility (NDC-P SF), and represents a collaborative effort with IFC's Climate Business Group. The TA aims to fast-track Cote d'Ivoire's NDC implementation and achieve its NDC target of 42% RE generation by 2030.

Côte d'Ivoire is one of the world's fastest growing economies, and aims to sustain economic growth and improve its investment climate. The country has strong ambitions to accelerate renewable energy market development, and has some of the key elements in place: strong NDC target, independent regulator (CI-Energies), IPP regulations, and growing private sector interest and capacity. However, to date only 57 MW of renewables capacity exists, representing 3% of national power generation. In order to continue to meet surging national demand while expanding its power exports, the country needs to add an estimated 1.3 GW of new capacity before 2020 with an additional 2 GWs to be added in the next decade to bring its total RE installed capacity up to 5.3 GW by 2030.

In order to further streamline and optimize all the country's energy sector ambitions, this activity led by IFC's Climate Business will manage a structured public-private dialogue process to help deliver an Energy Sector "Roadmap" to dramatically increase RE penetration, and design targeted solutions on: key policies, market/investment actions, and financial innovations that can be undertaken to unlock private investment. Phase II of this TA will aim to identify a pipeline of "bankable" RE projects that can be mobilized through IFC-led private sector investments. IFC's main client for this upstream support will be the Ministry of Energy, Petroleum and Renewable Energy Development in Cote d'Ivoire.

#### TA COMPONENTS

**PPIAF will support Phase I to develop the Roadmap, which comprises the following components:**

1. Stocktaking exercise around three priority areas: (i) Policy Reforms; (ii) Investment Climate Reforms (including financial sector capacity building); and (iii) Financial Innovations to Attract Private Capital;
2. Development of detailed solutions for each priority area as well as consensus building through workshops;
3. Presentation of "Roadmap" and project pipeline development to government officials, private sector RE developers and other stakeholders.

#### ADDITIONALITY

- **Downstream IFC/ World Bank Project Engagement:** This TA will complement on-going World Bank initiatives tied to recently approved IDA Loan of \$325 million to Cote d'Ivoire for the Electricity Transmission and Access project (P157055) in support of their Electricity Access agenda.
- **Partnership and Donor Coordination:** A 4-day workshop was held in Abidjan on Feb 27-Mar 2, 2018 to establish RE working groups to shape the road map in 5 areas: 1) Hydropower 2) Biomass, 3) Grid-connected Solar & Wind, 4) Off-grid Solar PV & Mini Grids, 5) Policy & Finance. There was active participation from donors: AFD, AFDB, EIB & WB.

# CCTFI – Climate Change Trust Fund for Infrastructure

## TECHNICAL ASSISTANCE (TA) ACTIVITY SNAPSHOT

### INDIA: Variable Renewable Energy Grid Integration support for POSOCO

#### OVERVIEW

<b>Country</b>	India
<b>Region</b>	South Asia
<b>Sector(s)</b>	Renewable Energy (RE)
<b>Partnerships</b>	Energy Global Practice, ESMAP, IFC
<b>Activity Type</b>	Technical Assistance (TA)
<b>Approval Period</b>	FY 18 Q3 (Jan-Mar 18)
<b>Task Team Lead</b>	Surbhi Goyal, Senior Energy Specialist, Energy Global Practice

#### FINANCIALS

<b>Total TA Activity Size</b>	\$560k
<b>CCTFI Grant</b>	\$200k
<b>Co-funding</b>	\$360k
<b>Co-funding Partner(s)</b>	ESMAP
<b>Co-funding Ratio</b>	1: 1.8
<b>WBG/ IBRD DPL Envelope</b>	\$150 million
<b>Project ID</b>	P160379
<b>Project Name</b>	Innovation in Solar Power and Hybrid Technologies

#### CONTEXT

This Technical Assistance (TA) activity was originated under a newly established strategic partnership between CCTFI and ESMAP to jointly address India's barriers for variable renewable energy (VRE) grid integration.

The Government of India (GoI) set an ambitious target to attain 175 GW of installed (VRE) capacity by 2022. 160 GW of this target is expected to be met from wind and solar resources. India also established a NDC target to have 40% renewables by 2030. At present, the installed RE capacity is around 60GW, or 37% of the national target. In addition, existing thermal/coal plants make up a large part of India's power market. As a result, existing coal PPAs pose a serious commercial constraint for VRE integration. Operating these coal plants at a high-level means, wind and solar generation must be curtailed – a phenomenon that will become far more serious when India achieves its 160 GW RE target.

To allow for more grid flexibility and stability, when integrating higher shares of VRE from solar and wind, and to create a more level-playing field for VRE developers, the Indian government is considering the introduction of Contract-for-Differences (CfDs) for coal PPA suppliers. It is also looking to simultaneously create an ancillary services market to re-channel displaced coal supply as higher shares of VRE are brought into the energy-mix. This activity provides upstream TA support to scale-up VRE through power systems planning and market design. Specifically, it supports POSOCO – the national power systems operator – to finalize a set of technical, regulatory and market policy recommendations – to significantly scale-up and sustain high-levels of variable renewable energy generation.

#### TA COMPONENTS

**This TA comprises the following components\*:**

- (1) The analysis of commercial constraints around restructuring of coal PPA's to facilitate RE uptake;
- (2) Recommend changes to wholesale electricity market design and introduce an ancillary services market to optimize VRE integration to maintain system stability through thermal and hydro-power plants

\*Additional ESMAP funded Component: Power Systems Analysis under High RE Scenario

#### ADDITIONALITY

- **Country Transformation:** This TA will be transformative for India to develop next generation smart-grid infrastructure that also creates a level-playing field for public-private investment in VRE. It will directly inform the implementation of new market mechanisms and support structures, including new tools and proposed integration of a new Market Management Systems (MMS) with the existing Energy Management Systems (EMS) at POSOCO.
- **Downstream World Bank Project Engagement:** The activity will supplement components under the existing World Bank project P160379 – Innovation in Solar Power and Hybrid Technologies which is a \$150 million bank lending operation (Exp. Board Approval-Sep 2018) with high potential to be identified as a "Maximizing Finance for Development" or MFD enabling project. This project aims to demonstrate large-scale innovation in renewable energy technologies in India as well as increase the share of renewables in the country's energy mix.

# CCTFI – Climate Change Trust Fund for Infrastructure

## TECHNICAL ASSISTANCE (TA) ACTIVITY SNAPSHOT

### PANAMA: Towards NDC Implementation Through Public-Private Energy Efficiency (EE) Initiatives

#### OVERVIEW

<b>Country</b>	Panama
<b>Region</b>	Latin America & The Caribbean
<b>Sector(s)</b>	Energy Efficiency (EE)
<b>Partnerships</b>	NDC-PSF/CC Group, IFC, ESMAP
<b>Activity Type</b>	Technical Assistance (TA)
<b>Approval Period</b>	FY 17 Q4 (Apr-Jun 17)
<b>Task Team Lead</b>	Mariano Gonzalez, Sr. Energy Specialist, Energy Global Practice

#### FINANCIALS

<b>Total TA Activity Size</b>	\$390k
<b>CCTFI Grant</b>	\$340k
<b>Co-funding</b>	\$50k (BB)
<b>Co-funding Partner(s)</b>	Bank Budget (BB)
<b>Co-funding Ratio</b>	1: 0.15
<b>WBG/ IBRD DPL Envelope</b>	\$300 million
<b>Project ID</b>	P154819
<b>Project Name</b>	Panama Second Shared Prosperity DPL

#### CONTEXT

This TA activity was originated under a newly established strategic partnership between CCTFI and World Bank's NDC-Partnership Support Facility (NDC-P SF) to jointly address upstream Energy Efficiency (EE) barriers in Panama.

Energy Efficiency is a high priority to achieve the 2 degrees Celsius climate change target and requires an estimated global investment of \$14 trillion from now to 2030. Given the scale of investment, mobilization of the private sector will be paramount. Panama has a strong regulatory framework for EE, a sophisticated financial sector, and a legal mandate (e.g. Law 69-12) to create an EE Fund. Thus, Panama represents an ideal country environment to pilot a pioneering and timely initiative for EE infrastructure development that could be replicated across Central America and other Regions.

The objective of this initiative is to address upstream financial barriers for unlocking private sector investments for EE scale-up by structuring an EE Fund in Panama (Fondo UREE) with a collaborative Public-Private approach. The design of this EE Fund will entail i) engaging local authorities to leverage \$10 million in public funds to help mobilize additional private sector capital at scale from local and institutional investors, (ii) facilitate funding of private sector-led EE projects through the EE fund by developing specific credit lines and partial guarantees schemes and, (iii) stimulating the scale-up of the nascent market for Energy Services Companies (ESCOs) in Panama.

#### TA COMPONENTS

**This TA comprises the following components:**

1. Prefeasibility study to support the structuring of an Energy Efficiency (EE) fund
2. Definition of EE standards and setting-up a robust regulatory framework to enable private investment in EE
3. Capacity Building to main government and private sector stakeholders
4. Road Show to mobilize private sector investors (e.g. Institutional Investors)

#### ADDITIONALITY

- **Downstream World Bank Project Engagement:** The activity is strongly linked to and will support the achievement and ensure the quality of the energy prior actions (triggers) of the Bank's Second Programmatic Shared Prosperity Development Policy Financing (P154819). Additionally, this activity is being conducted in parallel to Bank supported regional EE initiatives within the "Central America Energy Assessments - 6C Project" (P155068) valued at \$450k. The development objective of this programmatic approach is to inform energy related engagements with governments in Central America and to strengthen capacity within the sector to address critical development challenges.
- **Regional Integration and Transformation:** This activity represents a pioneering and replicable initiative in Central America, envisioned to be carried out in Panama as a pilot, with the potential to share and replicate the experience and financial instruments developed in other IDA countries such as Honduras and Nicaragua.

Annex 2: CCTFI's FY18-FY19 Portfolio & Pipeline Outlook

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## CLIMATE CHANGE TRUST FUND FOR INFRASTRUCTURE (CCTFI)

### ACTIVITY PIPELINE (FY18 Q3 & Q4)

#### CC TECHNICAL ASSISTANCE (TA)

Region	Sector	Clean Technology	FY18 Quarter	Activity Title	PPIAF (CCTFI \$)	Co-Financing (Non PPIAF \$)	Leverage Ratio	Partnerships	Current Status
LAC	Energy	RE	FY 18 Q4	HAITI: Enabling local private sector participation in PPP-structured renewable energy municipal grids, including regulation and capacity building	\$ 250,000	\$ 350,000	1.40	ESMAP, SREP, CTF	Application Development
SSA	Energy	RE	FY 18 Q4	LIBERIA: National Electrification Strategy with Geospatial Planning	\$ 300,000	\$ 170,000	0.57	SE4ALL, WB	Application Development
SSA	Energy	RE	FY 18 Q4	SIERRA LEONE: Unlock the Potential for Grid Connected Solar PV through Private Sector	\$ 300,000	\$ 30,000	0.10	WB	Application Development
LAC	Energy Climate Change (Resilience)	RE	FY 18 Q4	ST. LUCIA & GRENADA: Energy Sector Resilience in Eastern Caribbean	\$ 100,000	\$ 260,000	2.60	CCG + Energy GP + IFC	FY19 Q1
SAR	Energy	RE	FY 18 Q4	SRI LANKA: Scale-up of Renewable Energy development through Private Sector Engagement (1000 MW Solar Park)	\$ 350,000	\$ 200,000	0.57	ESMAP + Energy GP	FY19 Q1
SAR	Energy	RE	FY 18 Q4	NEPAL: Power Sector Reform and Sustainable Hydropower Development Project (PHASE 2)	\$ 500,000	\$ 400,000	0.80	WB IDA + Energy GP + IFC	FY19 Q1
					<b>\$ 1,800,000</b>	<b>\$ 1,410,000</b>			
CC KNOWLEDGE (KM)									
Region	Sector	Clean Technology	FY18 Quarter	Activity Title	PPIAF (CCTFI \$)	Co-Financing (Non PPIAF \$)	Leverage Ratio	Partnerships	Current Status
GLOBAL	Multi-sector	EE	FY 18 Q4	GLOBAL: Toolkit on How to develop Roadmap for Urban Energy Efficiency through PPP Models	\$ 250,000	\$ 50,000	0.20	Climate Policy Initiative (CPI) + Energy GPs	FY18 Q4 Application
					<b>\$ 250,000</b>	<b>\$ 50,000</b>			
<b>PIPELINE TOTAL</b>					<b>\$ 2,050,000</b>	<b>\$ 1,460,000</b>			

#### Acronyms

EAP - East Asia Pacific  
SAR - South Asia  
SSA - Sub-Saharan Africa  
LAC - Latin America & Caribbean

#### Acronyms

RE - Renewable Energy  
EE - Energy Efficiency  
EV - Electric Vehicles  
EA - Energy Access

#### Acronyms

ESMAP - Energy Sector Management Assistance Program  
GP - World Bank Global Practice  
IPG - Infrastructure, PPPs & Guarantees Group  
NDC-P SF - World Bank's NDC Partnership Support Facility  
CCG - World Bank Climate Change

## CLIMATE CHANGE TRUST FUND FOR INFRASTRUCTURE (CCTFI)

### ACTIVITY PORTFOLIO (FY16 - FY18 Q3)

#### CC TECHNICAL ASSISTANCE (TA)

Region	Sector	Clean Technology	Quarter	Activity Title	PPIAF (CCTFI \$)	Co-Financing (Non PPIAF \$)	Leverage Ratio	Partnerships	Current Status
SAR	Energy	RE	FY16Q2	NEPAL: Power Sector Reform and Sustainable Hydropower Development Project	\$ 2,100,157	\$ 23,800,000	11.33	WB IDA + SAWI + GoN	FY16Q2 PORTFOLIO
LAC	Energy	RE + EE	FY17Q2	COLOMBIA: Review of institutional, policy and regulatory framework to support private sector participation in clean energy	\$ 690,000	\$ 229,000	0.33	CTF + Energy GP	FY17Q2 PORTFOLIO
LAC	Energy	EE	FY17Q4	PANAMA: Towards NDC Implementation Through Public – Private Energy Efficiency Initiatives	\$ 340,000	\$ 50,000	0.15	NDC-PSF+ ESMAP+ IFC+ Energy GP	FY17Q4 PORTFOLIO
SSA	Energy	RE	FY 18 Q2	COTE D'IVOIRE: Unlocking private investment to achieve the 42% Renewable Energy Target	\$ 220,000	\$ 250,000	1.14	NDCP-SF + IFC + Energy GP + CCG	FY18 Q3 PORTFOLIO
SAR	Energy	RE	FY 18 Q3	INDIA: Improving markets and addressing commercial constraints to increase system flexibility for integration of renewables (Grid Integration Support for POSOCO)	\$ 200,000	\$ 360,000	1.80	ESMAP + Energy GP + IFC	FY18 Q3 Application Feb 15 TRP
SAR	Energy-Transport	EV	FY 18 Q3	INDIA: Analysis of PPP Business Models for Charging Infrastructure to Introduce Electric Vehicle (EV) Fleet in Kolkata	\$ 165,000	\$ 200,000	1.21	ESMAP + Transport & Energy GPs	FY18 Q3 Application Feb 15 TRP
SSA	Energy	RE	FY 18 Q3	SAO TOME PRINCIPE: Private Sector Participation options to foster Renewable Energy and achieve NDC targets	\$ 100,000	\$ 73,680	0.74	ESMAP	FY18 Q3 Application Feb 28 TRP
LAC	Energy	RE + EE	FY 18 Q3	NICARAGUA: Enabling Environment for Mainstreaming Private Investment to scale Solar PV	\$ 235,000	\$ 200,000	0.85	NDCP-SF + IFC + Energy GP + CCG	FY18 Q3 Application Mar 14 TRP
					\$ 4,050,157	\$ 25,162,680			

#### CC KNOWLEDGE (KM)

Region	Sector	Clean Technology	Quarter	Activity Title	PPIAF (CCTFI \$)	Co-Financing (Non PPIAF \$)	Leverage Ratio	Partnerships	Current Status
GLOBAL	Energy	EA	FY17 Q4	GLOBAL: How to Foster Private Sector Participation in Nascent Sectors by Creating Data Sharing and Reporting Standards: The Off-Grid PAYG Solar Case Study	\$ 200,000	\$ 224,870	1.12	IFC/T&I+ DEC Statistical Trust+ ESMAP	FY17Q4 PORTFOLIO
GLOBAL	Energy	RE	FY18 Q1	GLOBAL: Assessment of the Effectiveness of Public Financing Instruments in Leveraging Private Sector Investment for grid connected solar Projects	\$ 100,000	\$ 350,000	3.50	CIFs + ESMAP	FY18Q1 PORTFOLIO
GLOBAL	Energy	EA	FY18 Q1	GLOBAL: Lighting Africa - PAYGO Market Attractiveness Index	\$ 80,000	\$ 70,375	0.88	IFC + Italy Ministry of Foreign Affairs	FY18Q1 PORTFOLIO
GLOBAL	Energy	RE	FY 18 Q1	GLOBAL: Innovative approaches to PPPs in Smart-Grid Investments - Best Practice experiences from government collaboration with privately owned utilities	\$ 150,000	\$ 50,000	0.33	ESMAP + Energy GP + IFC	FY18 Q2 PORTFOLIO
GLOBAL	Transport	EE	FY18 Q2	GLOBAL: Benchmarking Study of Trucking Sector Productivity, PPP potential and Carbon Sector Emissions	\$ 200,000	\$ 550,000	2.75	KGTTF + MDTF Sust. Logistics	FY18Q2 PORTFOLIO
					\$ 730,000	\$ 1,245,245			

**PORTFOLIO TOTAL**

**\$ 4,780,157    \$ 26,407,925**