Climate Investment Funds

CTF/TFC.7/7
June 8, 2011

Meeting of the CTF Trust Fund Committee
Cape Town, South Africa
June 22, 2011

Agenda Item 9

UPDATE ON CTF INVESTMENT PLAN FOR VIETNAM

Proposed Decision by CTF Trust Fund Committee

The CTF Trust Fund Committee reviewed the update on the CTF Investment Plan for Vietnam (document CTF/TFC.7/7). It welcomes the progress that has been made in the further development of the investment plan and encourages expeditious delivery of the projects under preparation. The Trust Fund Committee endorses the proposed changes to the investment plan with the understanding that the proposed changes will result in enhanced transformational impact.

CLEAN TECHNOLOGY FUND
INVESTMENT PLAN FOR VIETNAM

Update Note

June, 2011

VIETNAM

CLEAN TECHNOLOGY FUND INVESTMENT PLAN

Update Note

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UPDATE IBRD ANNEX

List of Abbreviations

ADB	Asian Development Bank
ACT	avoided cost tariff
ADB	Asian Development Bank
AMS	Advanced Metering System
BAU	business as usual
CDM	Clean Development Mechanism
CIP	Country Investment Plan
CO2e	carbon dioxide equivalent
CTF	Clean Technology Fund
EE	energy efficiency
EE&C	EE and conservation
EVN	Vietnam Electricity (formerly Electricity of Vietnam)
GHG	greenhouse gas
GOV	Government of Vietnam
GWh	gigawatt-hour
HCMC	Ho Chi Minh City
IBRD	International Bank for Reconstruction and Development (World Bank)
IDA	International Development Association
IFC	International Finance Corporation
kV	kilovolt
kWh	kilowatt-hour
LDUs	local distribution utilities
LV	low voltage
MDM	Meter Data Management
MRT	Mass Rapid Transit
MDBs	multi-lateral development banks
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOT	Ministry of Transport
$MtCO_2e$	million tons carbon dioxide equivalent
MV	medium voltage
MW	megawatt
MWh	megawatt-hour
NCCC	National Climate Change Communication
NPT	National Power Transmission Company
NTP-RCC	National Target Program to Respond to Climate Change
ODA	official development assistance
p.a.	per annum
PCs	Power Companies or Power Corporations
RE	renewable energy
SPPA	standardized power purchase agreement
SP-RCC	Support Program to Respond to Climate Change
T&D	transmission and distribution
TA	technical assistance
tCO_2e	tons of CO_2e
TOU	time-of-use
TWh	terawatt-hour
VNEEP	Vietnam National EE Program
WB	World Bank (IBRD)
/y	per year

EXECUTIVE SUMMARY

This note provides an update on the status, proposed allocation and expected progress of proposed projects in the Country Investment Plan (CIP) of the Government of Vietnam (GOV) under the Clean Technology Fund (CTF) and the overall US$250 million funding endorsed by the CTF Committee (December 2, 2009), and the CIP supplemental note requested by CTF Committee members (June 7, 2010).

The rationale of priority sectors and interventions identified in the CIP for investments in low carbon technologies and measures to reduce energy consumption, improve energy efficiency and scale-up renewable generation remain fully relevant. Proposed projects are consistent with CTF criteria on the potential Greenhouse Gas savings, direct impact and indirectly through replication and scaling up, as quantified in CIP.

CTF Proposed Allocation and Update of Project Financing Plan:

Since the re-prioritization in the supplemental note that reallocated ADB CTF funding from the electricity transmission sector to urban transport sector, the following re-allocations are proposed:

- *IBRD Smart grid technologies in transmission and distribution*: The IBRD proposes for the CTF intervention to target smart grid in distribution rather than in transmission, as the power distribution sub-sector offers a larger replicability potential, impact on electricity consumption reduction and addresses barriers to integration of small renewables to be connected to the distribution network. The proposed IBRD distribution project will include an innovative component (IBRD and CTF co-finance) that demonstrates benefits of investing in smart distribution grid, targeting three of the five Power Corporations (PCs).

- *ADB Urban Transport Enhancement*: Of the US$100 million allocated in the CIP supplemental note, US$50 million have been agreed for Ho Chi Minh City (HCMC) rail project and ADB proposes to allocate the remaining US$50 million to urban transport enhancement project in Hanoi.

In addition, the government is considering to request and utilize lessons learned and knowledge sharing grant to assess and disseminate experience from CTF projects and programs, which will allow for scale up and replication locally and internationally.

Table 1 below summarizes the financing plan in the CIP supplemental note, and Table 2 updates the financing plan to reflect proposed allocations and estimated financing by MDBs.

Table 1: Project Financing Plan June 2010 (indicative, US$ million)

Financing Source	Proposed Programs and Projects				
	Industrial Energy Efficiency (ADB)	Urban Transport Enhancement (ADB)	Smart Grid Technology (IBRD)	Clean Energy Financing Facility (IFC)	Total
MDBs	40	500	180	200	920
GOV	25	100	100	0	225
CTF	50	100	30	70	250
GEF	0	0	0	0	0
Carbon Finance	10	0	0	0	10
Other Co-financing	40	500	0	0	540
Private Sector	100	0	0	900	1,000
TOTAL	265	1,200	310	1,170	2,945

Source: ADB and IBRD country programs; financing plans in Annexes 1-5; ADB, IBRD, and IFC staff estimates; IFC discussions with commercial banks and potential project sponsors.

Table 2: Updated Project Financing Plan June 2011 (indicative, US$ million)

Financing Source	Proposed Programs and Projects				
	Industrial Energy Efficiency (ADB)	Urban Transport Enhancement (ADB)	Smart Grid Technology (IBRD)	Clean Energy Financing Facility (IFC)	Total
MDBs	40	500	**300**	200	1,040
GOV	25	100	**105**	0	230
CTF	50	100	30	70	250
GEF	0	0	0	0	0
Carbon Finance	10	0	0	0	10
Other Co-financing	40	500	0	0	540
Private Sector	100	0	0	900	1,000
TOTAL	265	1,200	**435**	1,170	3,070

Source: update provided by ADB and IBRD country programs and IFC staff estimates.

I. INTRODUCTION

1. This note provides an update on the status and expected progress of projects in the Country Investment Plan (CIP) of the Government of Vietnam (GOV) under the Clean Technology Fund (CTF) and overall US$250 million funding endorsed by the CTF Committee (December 2, 2009), and the supplemental note requested by CTF Committee members (June 7, 2010). The supplemental note reprioritized ADB projects, re-allocating funding for the initially proposed high voltage transmission project (US$50) to the urban transport project. This note also updates proposed allocation within the sectors and activities identified as priorities in the CIP.

2. The CIP and CTF funding will support the Socialist Republic of Vietnam in meeting its mid-term goals on energy savings and mitigation of Greenhouse Gas (GHG) emissions. The CIP identifies the opportunities in Vietnam for investments in low carbon technologies and measures that support the climate change and sustainable development objectives of the GOV, and meet the criteria of the CTF, in particular the potential GHG savings of the proposed projects, directly and indirectly through replication and scale-up.

3. Vietnam's goals and challenges with regard to reducing energy consumption, improving energy efficiency and conservation, and scaling up renewable generation, as well as the opportunities and benefits in GHG reductions as described in the CIP remain fully relevant. The country has continued its fast economic growth. Sustained increase in energy consumption driven by rapid urbanization and expansion in personal transportation use, the success of the electricity access program (leading to growing demand and productive uses in rural areas, which contribute to poverty reduction), improvements in living standards and increasing industrialization is at the core of Vietnam's development challenges.

4. The GOV is pursuing an effective policy framework to achieve its energy savings and climate change mitigation objectives.

- The Energy Efficiency and Conservation Law (discussed in the main text of the CIP) was enacted in 2010, delegating the authority to the Ministry of Industry and Trade (MOIT) to promote and establish energy efficiency and conservation (EE&C) measures in the power sector and industrial sectors, and the authority and responsibilities in the transport sector to the Ministry of Transport (MOT).

- In partnership with donors, the government Support Program to Respond to Climate Change (SP-RCC) is contributing to the development and implementation of climate change related policies and strategies consistent with the National Target Program to Respond to Climate Change (NTP-RCC). Within the framework of the SP-RCC, donor coordination meetings and technical assistance are being provided to relevant ministries to enhance and implement new policies and measures on energy efficiency and conservation, and scale up of renewables, including studies on financial mechanisms to support energy efficiency.

5. The CIP main document has identified the targeted sectors and the key emission savings interventions as follows: (i) the power sector (renewable generation, transmission and distribution efficiency); (ii) energy efficiency measures in industrial and residential/commercial sectors; and (iii) lower-emission alternatives in the transport sector. The CIP Annexes include the projects proposed by each participating Multilateral Development Bank (MDB), namely the Asian Development Bank (ADB),

the International Finance Corporation (IFC) and the World Bank (IBRD). This update note provides a brief description of progress in the preparation and implementation of each MDB project and proposed allocation within CIP, including the updated IBRD Annex for the proposed smart grid distribution efficiency project.

II. UPDATE ON STATUS OF ENERGY EFFICIENCY PROJECTS

ADB Industrial Energy Efficiency Project:

6. **Description**: Through technical assistance studies, ADB identified a potential market for improving industrial energy efficiency (EE), representing investments of about US$1 billion. Of this, about US$100 million in candidate EE projects at heavy industries comprises the basis for an investment program to be co-financed with CTF. Details of structuring financial intermediation mechanisms are being discussed by ADB, MOIT, Vietnamese financial institutions, and the target industrial enterprises.

7. **Rationale**: The rationale and expected impacts are the same as envisioned in the CIP. The project is replicable and scalable.

8. **Progress:** Project due diligence is expected to be completed in the third quarter of 2011, with ADB Board approval in late 2011 or early 2012. CTF support of US$50 million is proposed, which will be complemented by US$225 million from commercial banks, ADB loan, and other sources.

IFC Energy Efficiency Project

9. **Description**: The CIP of Vietnam indicated US$70 million allocation for IFC programs to catalyze private sector investments in energy efficiency and renewable energy. The IFC prepared the energy efficiency (EE) project as an EE finance program through financial institutions, and proposed US$30 million allocation, which was approved for this program. Of this amount, US$28 will be used to co-finance with IFC setting up EE credit lines with three to four commercial banks; US$1.5 million will be used to provide advisory services to the participating banks as well as support market development activities. The remaining amount of US$0.5 million is earmarked for program supervision and monitoring. In parallel, US$900,000 was provided to co finance the IFC advisory project on EE finance in Vietnam, which will run until mid 2013. The project supports sector benchmarking studies, development of training programs for bankers, and development of partnership between banks and technical service providers/equipment suppliers.

10. **Rationale**: IFC is coordinating with the private sector and the Government so that the CTF programs are implemented in the most efficient and effective manner. The rationale and expected impacts are the same as envisioned in the CIP.

11. **Progress:** The proposed project was submitted to the CTF Committee and approved. To date, IFC has conducted appraisals with two banks (tentatively US$57 million of credit lines, of which CTF portion is approximately US$12-13 million). Final negotiations are currently on hold due to macro conditions in Vietnam (high inflation and high interest rates) and to wait for the results of the stabilization

program of the GOV that has established caps to credit growth by commercial banks as well as control loans in foreign currencies.

12. However, the delays are temporary as the macro-economic conditions improve for private sector investments. The negotiations would resume by the end of the calendar year when the macroeconomic situation is expected to improve. Two more banks are being identified for the next round of appraisals.

III. UPDATE ON STATUS OF POWER SECTOR PROJECTS

IBRD Distribution Smart Grid:

13. **Description**: The CIP established that the IBRD CTF intervention would target transmission and distribution smart grid. Initially, it was proposed smart grid in electricity transmission, with a CTF component added to the proposed IBRD transmission project with EVN transmission subsidiary (NPT). The revised proposal is to apply the CTF funding in a distribution project with an innovative component that demonstrates benefits (in operation, reliability, energy savings and business) of investing in distribution smart grid.

14. Focusing in smart grid technologies for power distribution, the proposed project will enable integration of small renewables, two-way advanced metering to promote efficient use of electricity by end consumers, and enhance the efficient operation of the distribution network to reduce losses. The design of the project will combine a component with traditional loss-reduction investment (reinforcement of the distribution networks, to be fully financed by IBRD) with a smart grid component (IBRD co-financed with CTF) for the introduction of advanced metering technology, automation and information management tools. A third component of the project will provide technical assistance and capacity building. (Details of the CTF smart distribution grid project are available in revised Annex 4 at the end of this update note.)

15. **Rationale**: The power distribution corporations (PCs) are prioritizing their large investment needs to rehabilitate low voltage network and reduce losses in rural areas. The CTF financing will enable to demonstrate the benefits of investments in smart distribution grid technologies, through sub-projects in three PCs. The CTF component will contribute to GHG reductions via loss reduction by modernizing the operation of key substations in the distribution grid, integration of small renewable energy connected directly to PC networks, and reduction in electricity consumption through incorporating large consumers into the operation of the system and introduction of demand response programs. At the same time, the project will support the country development objectives by improving electricity supply reliability and quality of service. By targeting the distribution sub-sector, and initially only key substations and the largest electricity consumers of three PCs, there is large potential for replication and scalability. The expected impacts are consistent with the CIP. (Details on impact assessment and replicability are available in the revised Annex 4 included at the end of this note.)

16. **Progress:** The World Bank review of the distribution project concept note is scheduled for end of June 2011. It was agreed with EVN that the preparation will take place during 2011-2012. World Bank Executive Board approval is expected in September 2012.

IFC Renewable Energy Project

17. **Description**: The CIP of Vietnam indicated US$70 million allocation for IFC programs to catalyze private sector investments in energy efficiency and renewable energy. After the US$30 million allocation to the Energy Efficiency Project, US$40 million could be allocated to the Renewable Energy Project. IFC is working on several projects, including hydro and biomass projects. The scope of the project is under discussion to take into consideration developments in renewable support policies.

18. **Rationale**: IFC will continue to move the CTF project in close alignment with Government policies that manage private sector growth. The rationale is the same as envisioned in the CIP.

19. **Progress:** To ensure alignment with Government policies, the project may experience further delay as and when Government policies on RE projects are refined.

IV. UPDATE ON STATUS OF TRANSPORT SECTOR PROJECTS

20. As mentioned in the CIP supplemental document, ADB is considering the US$ 100 million under the urban transport project for Ho Chi Minh City (HCMC) urban rail project, with the possibility of being split with Hanoi urban transport project. MONRE has approved this reallocation.

ADB HCMC urban rail project:

21. **Description**: The scope of the intervention is as proposed in the CIP, but will be implemented as a stand-alone project, complementing the core ADB project loan for the HCMC Urban Mass Rapid Transit (MRT) Line 2 Investment Program. After extensive discussions with the GOV (and the CTF Administrative Unit) in 2010, a decision was made to implement the CTF-funded components as a stand-alone loan project to avoid significant delays that would have been caused in obtaining approval from the Prime Minister to increase the total project size. The alternative would have been to re-initiate the project identification and processing approval within the Vietnamese government system, which would have resulted in at least one year delay.

22. **Rationale**: The rationale and expected impacts are as envisioned in the CIP, and its 2010 supplemental note. To lower-emissions in the transport sector, the CIP identified as priority intervention enhancements to the urban rail projects being planned in HCMC. This intervention will address the growth in energy use due to fast expansion of motorized personal transport, which has led to the transport sector contributing about one fourth of energy-related GHG emissions.

23. **Progress:** The ADB Loan for the HCMC Urban Mass Rapid Transit (MRT) Line 2 Investment Program for US$540 million was approved by ADB's Board on December 14, 2010. The CTF funded project is explicitly indicated in the approved ADB loan, with specific covenants that it must be implemented or the core MRT loan funds would be suspended. The HCMC CTF project will be prepared in 2011-2012 with grant support from CTF (request to be submitted in June 2011). ADB Board approval is expected in May 2012.

ADB Hanoi transport project:

24. **Description**: Similar to HCMC, a decision was made to implement the CTF-funded components as a stand-alone project. The Hanoi metro project scope and other non-CTF cofinancing had already been agreed by 2009, design was at an advanced stage, and there would be a need to obtain new approval from the Prime Minister Office to include the CTF component and increase the total project size, which would have caused significant delays.

25. **Rationale**: The rationale and expected impacts are the same as envisioned in the CIP and its 2010 supplemental note. The CIP identified as priority intervention lower-emission alternatives in the transport sector, and the supplemental note identified the potential of enhancements to the urban rail projects planned in Hanoi.

26. **Progress:** The ADB core project loan for the Hanoi Metro Rail System Project for US$297 million was approved on March 29, 2011. The CTF funded project is explicitly indicated in the approved ADB loan with covenants that it must be implemented or the core Metro loan funds would be suspended. The ADB concept paper for the Hanoi CTF project is scheduled for approval in June 2011. The Hanoi CTF project will be prepared in 2011-2012 with grant support from CTF (request to be submitted in June 2011). ADB Board approval is expected in March 2012.

UPDATE IBRD ANNEX

ANNEX 4: SUPPORTING DEVELOPMENT OF A SMARTER DISTRIBUTION GRID (IBRD)

Problem Statement

1. The growth of demand for electric power of about 15 percent per year over the past decade has mirrored the country's rapid economic development. The power sector has tried to respond through ambitious investments plans to build, upgrade, maintain and operate the infrastructure (generation, transmission and distribution) required to supply electricity consumers. Efforts in the power distribution subsector have focused on rural electrification, with the country being close to achieving universal access to electricity services, and in the rehabilitation and upgrade of medium and low voltage systems to eliminate bottlenecks, reduce high technical losses in rural areas, and improve reliability and quality of service.

2. The magnitude of the challenge has compelled the allocation of almost all the available resources to investments in supply facilities. As a consequence, measures and actions on the demand side have been limited. Consumption has been fully supplied when possible, and curtailed when there is insufficient generation or bottlenecks in transmission or distribution networks. The system and consumers are experiencing periods of shortages.

3. To increase Vietnam's capacity to finance the investments in the power system required to support economic growth beyond the more traditional sources of retained earnings, local banks and ODA, the government has embarked on an ambitious power sector reform program. Key components include electricity tariff reform and strengthening the sector players to develop the power market. On tariffs, the reform comprises transition to tariffs reflective of efficient costs combined with subsidies to provide social protection to the poor, national tariffs that apply to all residential consumers (ensuring similar prices for rural and urban households), and implementing tariffs with pricing differentiated by time of use (TOU tariffs) to all large electricity consumers. The strengthening of distribution and retail companies, to become the buyers of small scale renewable generation (less than 30MW) and the future wholesale purchasers in the market is being implemented. Power companies responsible for electricity distribution networks (voltage 110 kV down to 0.4 kV) and the supply of customers within their area have been consolidated into 5 Power Corporations (PCs), subsidiaries of EVN. Financially weak local distribution utilities (LDUs), servicing mainly rural areas, are being absorbed by PCs to invest in improvements in their low voltage (LV) systems.

4. As part of the reform program, a new regulatory regime is being put in place, including the Vietnam Distribution Code establishing network and metering standards, and commercial and technical performance obligations for PCs. Combined with tariff regulations, the medium and long term vision is for the power sector to contribute to the targets of Vietnam Energy Efficiency Program (VNEEP) Phase 2 (5% to 8% energy savings between 2011 and 2015), and to the Energy Efficiency and Conservation Law (enacted in 2010) requiring efficiency in all economic sectors and across society as a whole.

5. As the country is facing a constrained financial scenario, it becomes crucial to optimize the use of the existing infrastructure for electricity supply, minimizing the country's operating costs and postponing as far as possible infrastructure expansion investments. Within that objective and to achieve sustainable electricity supply security, increasing the efficiency in the operation of the distribution system on the demand side has become a high priority for Vietnam. However, effective application of demand-side energy efficiency programs and in distribution operation will not be possible without reliable information on network loads and hourly consumption patterns of electricity consumers.

6. Until now, there has been limited incorporation of advanced metering and control elements in the electricity distribution systems. This prevents the PCs from optimizing the planning and operation of their network. Sub-optimal operation has direct impact on technical losses (due to overloaded equipment), as well as on quality and reliability of service. Addressing the information gap could benefit supply security in the country, as it will make possible the optimum use of the existing infrastructure, deferring expansion investments and reducing required power generation through network configurations that minimize technical losses.

7. In addition to energy efficiency and conservation measures, the government is pursuing climate change mitigation through the development of small renewables. Through the current avoided cost tariff (ACT) and Standardized Power Purchase Agreement (SPPA) support program, in only two years (by December 2010) 727 MW of small hydro had been enabled, mainly in the North and Central regions, of which 29 projects totaling 249 MW are in operation, and the remaining have signed the SPPA and are under construction. It is estimated that in total around 2,000 – 3,000MW of small hydropower plants may be developed and connected to PCs networks (including 110 kV). Additionally, the government is considering special support mechanism to promote wind power, expected to connect to distribution grid. However, connecting and integrating the variability of small hydro and wind generation will require investment and modernization of the distribution system and operation.

Proposed Transformation

8. Internationally, there have been many recent advances in distribution system automation and control, metering and demand management, data acquisition and analysis technology, allowing major improvements in real-time dispatch and capability to accommodate small distributed generation, reconfiguration of networks to avoid or reduce overloads, and integrating the consumer to enable more sophisticated and widespread demand response programs and efficient use of electricity. All of these improvements add up to efficiency gains, reductions in thermal generation through scale up of renewable energy, and the incentives and measures for reduction in electricity consumption. These "smart grid" technologies involve combining advanced hardware (especially for meters, controls and automation) with the intelligence of information technology including software and data analysis techniques that lead to better load forecasting and dispatch, more efficient and dynamic operating practices, and demand integration.

9. The proposed transformation is to support PCs toward adopting smarter grid technologies in their networks (from 110 kV down to 0.4 kV) to maximize efficiency in distribution operation

and end use of electricity. It would enable smart distribution and metering technologies at key points in 110 kV, 35 kV and 22 kV networks (such as connection points where energy is exchanged with other PCs and transmission, 110 kV substations and MV feeders) and advanced metering system (AMS) for large consumers. Integrated metering centers in PCs for the data receiving, storing and processing, using a state-of-art meter data management (MDM) software, will transform the data collected into useful information to improve and promote efficiency and reduce electricity generation.

10. Particular areas for focus would include control and metering that directly improve the efficient operation of the distribution system; the AMS for large electricity consumers with two-way communication with the PC; and data processing providing information on consumption patterns and costs of enhancing electricity management, and enabling new demand response and control programs.

11. The proposed AMS for systematic recording and monitoring of network loads and electricity consumption is aimed at achieving the efficiency gains and demand side response transformation through overcoming the existing information gap. The system will initially focus on the main network assets, and on large electricity consumers of selected PCs (consumers with time-of-use tariffs. The AMS will enhance load forecasting and provide the daily load curves for each consumer, which are required to effectively implement demand response programs and develop energy efficiency actions to reduce consumption. Experience in other emerging countries show that reduction in consumption can be very significant, depending on the starting condition, type of energy intensive processes and pricing incentives applied. Additionally, data collected will ensure elimination of unmetered consumption in a sustainable manner.

12. The incorporation of the AMS will also provide PCs the load curves of main network assets, allowing to optimize planning and operation of their distribution grids, minimizing technical losses, avoiding overloads, improving service reliability and quality, and postponing new investment.

13. The program is proposed for implementation in three PCs, namely Hanoi PC, Northern PC and Ho Chi Minh City (HCMC) PC, by installing (i) advanced metering systems in key points in the distribution network (110 kV, 35 kV, 22 kV) and in bordering points, and for large consumers; (ii) data transfer equipment for remote reading and two way communication, and (iii) data receiving and processing tools to introduce integrated metering centers.

Implementation Readiness

14. PCs have significant experience in implementing projects, and have worked with the World Bank and ADB since 1995. Each PC has a Power Project Management Board with experienced staff to administer project implementation. Additionally, in Vietnam the power sector is one of the most effective in project implementation and consistently achieves progress and disbursement comparable with other countries in the region.

15. From a technical standpoint, the proposed equipment and software tools are readily available off the shelf from a variety of manufacturers and developers. Because the investments involve improvements in existing PCs facilities and metering systems, environment and social

issues, if any, are expected to be minimal. The PCs have initiated the identification of subprojects for the preparation of feasibility studies.

Rationale for CTF Financing

16. The PCs are keen in modernizing their systems and introducing smart grid technologies. However, other investment needs in rural and low voltage (LV) networks are considered a first priority. The project would help bring down several barriers to scale up, most particularly uncertainty about the costs and benefits of smarter grid investments, and the effectiveness of control and demand reductions. Through CTF co-financing, the demonstration and initial deployment of the advanced metering systems (AMS) and control, aimed mainly at showing the costs and benefits to the PCs business and for providing reliable and quality supply, will be made possible. Combined with proposed technical assistance in the project, the CTF funded demonstration will also provide a learning opportunity for PCs to further scale up and enhance the smart grid approach. CTF co-financing would overcome a viability/credibility gap by demonstrating at sufficient scale the benefits of advanced metering and other smart grid technology with the potential to transform the operations and management of Vietnam's electricity distribution and retail business, and implementation of measures on the demand side.

17. The cost of smarter grid technologies is considerably higher than those in current use. A 'smart meter' with data collection, storage and transfer capabilities may cost four or five times as much as a normal meter. In addition to the cost of a smart meter, to obtain the full efficiency benefits, the data communication system and center with adequate management software for receiving, storing and processing data also need to be set up.

18. PCs estimate that the development of a full scale advanced metering system covering all 17 million customers countrywide could require around US$ 1 billion. More critical infrastructure investments, in particular in LV networks to reduce technical losses, are considered a priority due to scarce financing resources. The CTF is proposed to co-finance the first phase of a full scale transformation to advanced metering systems and modern distribution operation and control by all PCs. By targeting installation of advanced metering systems for the large electricity consumers (currently representing more than 50% of total electricity consumption), the project is expected to contribute to reducing generation costs, demonstrate the benefits of demand response programs and provide information for consumers to become aware of and manage their electricity consumption.

19. The three PCs in the proposed project totaled around 45.9 TWh in 2010, with average losses of 6.5%. The advanced metering and load monitoring of the main network assets (such as substations transformers and outgoing feeders, large distribution transformers) will provide timely and reliable information for the PCs to optimize network operations, minimizing overloads that are a source of technical losses. Reduction of losses from optimized distribution network configuration and operation can be conservatively estimated at 0.5%. For the 3 PCs in the project, the lower losses would represent reduction of generation about 229.5 GWh/year with

annual saving 137,700 tCO2, or about 2.754 MtCO2 over the 20 year lifetime of the project using 2010 energy[1] demand (a conservative assumption, as demand is expected to grow).

20. Additionally, the AMS for large electricity consumers, including industrial that represent currently around 50% of total demand, will bring benefits in consumption reductions. Information on typical load profiles will enable improvement of the design and pricing signals in each block of the time-of-use (TOU) tariff. Experience in a number of emerging countries (such as Brazil, Chile, and others) shows that response to price signals has lead up to 10% reduction in consumption by large consumers. Assuming 5% reduction in the consumption of the large electricity consumers (under AMS), total electricity consumption of the selected 3 PCs would decrease by 2.5% (representing in 2010 a total reduction of 1,147.5 GWH) with savings of about 688,500 tCO2/year, or 14.5 MtCO2 over the 20 year project lifetime. This is a conservative estimation as consumption is expected to grow.

21. In addition to reductions in technical losses and electricity consumption, the proposed transformation will create other substantial co-benefits, specifically enabling the integration and dispatch of energy from small renewables, which will displace thermal generation. This will lead to reduction in CO2 emissions from thermal power generation, consistent with the objectives of the CTF.

22. Replication has a large potential. Estimated values of savings in CO2 emissions could be at least doubled when the program is scaled up to all large consumers and main network assets of all five PCs in Vietnam.

Financing Plan

23. The following table shows the estimated financing plan.

Source	Amount (US$ million)
PCs	105
IBRD/IDA	300
CTF	30
Total	435

Program Preparation Timetable

24. The project is expected to be prepared along the following timeframe.

Key Step	Date

[1] Based on coefficient 0.6 tCO_2/MW for Vietnam and energy in 2010.

Pre-identification Mission	January 2011
Identification Mission	April 2011
Concept Review	June 2011
Preparation Mission	December 2011
CTF Committee Approval	March 2011
Appraisal	April 2012
Negotiations	June 2012
Board	September 2012
Effectiveness	December 2012