

**CLEAN TECHNOLOGY FUND
REVISED INVESTMENT PLAN FOR VIET NAM**

September 2013

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AMI	Advanced Metering Infrastructure
CIP	CTF Country Investment Plan
CP	cleaner production
CTF	Clean Technology Fund
DAS	Distribution automation system
EE	Energy Efficiency
EVN	Vietnam Electricity
GHG	Greenhouse Gas
GoV	Government of Vietnam
HCMC	Ho Chi Minh City
HTLS	High temperature / low sag
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
kV	kilovolt
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MtCO ₂ e	Million tons of carbon dioxide equivalent
MW	megawatts
MWh	megawatt-hours
RE	Renewable Energy
SE	Sustainable energy
tCO ₂ e	tons carbon dioxide equivalent
TMP	transport master plan
V-SEF	Vietnam Sustainable Energy Finance Program
\$ M	million US dollars

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EXECUTIVE SUMMARY

The Government of Viet Nam (GoV) proposes to reallocate resources in the Clean Technology Fund (CTF) Country Investment Plan (CIP) which was endorsed by the Trust Fund Committee (TFC) in December 2009 and updated in 2011. Table ES1 summarizes the indicative financing plan as of June 2011. Table ES2 presents the indicative financing plan after the proposed changes.

Table ES1: Indicative Financing Plan Updated June 2011 (\$million)

Financing Source	Proposed Programs and Projects				
	Industrial EE (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: CTF Investment Plan for Viet Nam, Updated 2011.

Table ES2: Indicative Financing Plan September 2013 (\$million)

Financing Source	Proposed Programs and Projects						
	Grid Efficiency Project (ADB)	HCMC Sustainable Urban Transport (ADB)	Hanoi Sustainable Urban Transport (ADB)	Distribution Efficiency Project (IDA)	Private Sector Financing Program for EE, CP, and RE (IFC)	Monitoring and Evaluation TA (ADB)	Total
MDBs	200	550	393	486.9	16	0	1645.9
GOV	100	332.5	267	275.5	0	0	975
CTF^a	60.4	50	100	30	8.6	1.0	250
Other Co-financing	100	508	876.9	7.6	TBD	0	1492.5
TOTAL	460.4	1,440.5	1,636.9	800	24.6	1.0	4,363.4

Source: Joint Mission, September 2013.

Note: ^a The CTF amounts include 2 project preparation grants of \$1 million each for HCMC and Hanoi (\$2 million total).

The overall context and objectives of the CIP are the same as the original CIP and are consistent with the Government of Vietnam's (GoV) evolving climate change policy framework and green growth strategy. No changes have been proposed to the CTF allocation for the World Bank-led investments. The proposed changes consist of (i) reallocating part of IFC's unused allocation to another priority project, and(ii) modification of ADB's programs to include additional funding for urban transport and re-definition of the energy efficiency project (shifting from heavy industries to advanced electricity grid investments). The updated CIP is focused on achievable success in the next 12 to 18 months. More details of the proposed changes are described in the following sections.

I. INTRODUCTION

1. The Clean Technology Fund (CTF) Country Investment Plan (CIP) was endorsed by the Trust Fund Committee (TFC) on 2 December 2009, with an envelope of \$250 million in CTF cofinancing. The CIP presented the following strategic uses for CTF: (i) energy efficiency improvements in the electricity grid and heavy industries, through public sector investments; (ii) acceleration of clean energy financing initiatives through private sector investments using financial intermediaries; and (iii) expansion of urban transport infrastructure through public sector investments. A supplemental note was submitted to the TFC on 7 June 2010; this included a shift of funds from a proposed transmission technology project to the urban transport programs. An Update Note was endorsed by the TFC in June 2011, which provided details on project preparation and processing status, and included a minor change in scope for one of the projects.

2. The proposed changes will relinquish part of the unused funds of the original allocation designated for private sector investments in energy efficiency (EE), cleaner production (CP), and renewable energy (RE) led by International Finance Corporation (IFC), and reallocate those funds to other priority investments. The Asian Development Bank (ADB) allocations have been modified to include additional funding for urban transport and re-definition of the energy efficiency project, shifting from heavy industries to advanced electricity grid investments. No changes are proposed for the International Bank for Reconstruction and Development (IBRD) projects.¹ Concept papers for the relevant projects are presented in the Appendices. This document is organized as follows:

- Section II -- Review of implementation status;
- Section III -- Explanation of the circumstances and rationale for revising the investment plan and making changes to the projects or programs included;
- Section IV -- Description of the proposed changes, and
- Section V -- Assessment of the potential impact of the proposed changes on achieving the objectives and targets of the original investment plan.

3. The overall context and objectives of the CIP are the same as the original CIP and are consistent with the Government of Vietnam's (GoV) evolving climate change policy framework and green growth strategy. The updated CIP is a business plan owned by GoV. The updated CIP is a dynamic document with the flexibility to consider changing circumstances and new opportunities.

II. IMPLEMENTATION STATUS

ADB Industrial Energy Efficiency Project

4. **Description:** Technical assistance studies identified a potential market for improving energy efficiency (EE) in heavy industries, representing investments of about \$1 billion. Of this, about \$100 million in candidate EE projects at cement industries comprise the basis for an investment program to be co-financed with CTF. Details of structuring financial intermediation

¹ As shown in Tables ES1 and ES2, the World Bank Distribution Efficiency project was actually funded with IDA resources rather than IBRD resources.

mechanisms have been discussed by ADB, Ministry of Industry and Trade (MOIT), Vietnamese financial institutions, and the target industrial enterprises.

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

6. **Progress:** The ADB Project Energy Efficiency in the Industry Sector has experienced delays due to a change in implementation arrangements. Ministry of Industry and Trade (MOIT) recently agreed to become the executing agency for the project, taking over from the Ministry of Finance. Subsequent to this change, GoV has decided to drop this project from ADB's country program, and it will not be considered for CTF funding at this time.²

ADB HCMC Sustainable Urban Transport Program

7. **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 Climate Investment Funds (CIF) 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.

8. **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 greenhouse gas (GHG) emissions.

9. **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 14 December 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 concept paper was approved in October 2011 and CTF grant TA of \$1 million for project preparation signed by the government in June 2012. Consultants mobilized in July 2012 and services will be completed in November 2013. CTF funding was approved by the Trust Fund Committee on 19 September 2013. The ADB Board approval is expected in December 2013.

ADB Hanoi Sustainable Urban Transport Project

10. **Description:** The investments are structured similar to those in HCMC: a decision was made to implement the CTF-funded components as a stand-alone project which complements a large project loan which will partly fund urban rail system investments. 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

² Pursuant to the government's Decision 44/2011/QĐ-TTg, the steel and cement sector have been excluded from the list of priority programs and projects which would qualify for Government guarantee as decided by the National Assembly or the Prime Minister. These two industries are experiencing the impacts of economic slowdown through high inventory levels and poor sales.

Office to include the CTF component and increase the total project size, which would have caused significant delays.

11. **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 2010 supplemental note identified the potential of enhancements to the urban rail projects planned in Hanoi.

12. **Progress:** The ADB core project loan for the Hanoi Metro Rail System Project for US\$293 million was approved on 29 March 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 (these arrangements are similar to that for the HCMC program described above). The ADB concept paper for the Hanoi CTF project was approved in October 2011 and CTF grant TA of \$1 million for project preparation signed by the government in June 2012. Consultants mobilized in early August 2012 and services will be completed in December 2013. The CTF funding proposal is expected to be submitted in Q1 2014; ADB Board approval is expected in Q3 2014 at the latest.

IDA Distribution Efficiency Project

13. **Description:** The Distribution Efficiency Project (DEP) comprises three components: (A) System Expansion and Reinforcement; (B) Introduction of Smart Grid Technologies in distribution for system modernization and efficiency; and (C) Technical Assistance and Capacity Building.

14. **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 original CIP.

15. **Progress:** CTF funding was approved on 29 June 2012. IBRD's Board approved the project on 11 September 2012. The loan was declared effective on 7 February 2013. Implementing agencies have mobilized the consultant for the design works, it is expected that the procurement and implementation will be start in 2014.

IFC Vietnam Sustainable Energy Finance Program (V-SEF)

16. **Description:** The CIP included a \$70 million allocation for IFC programs to catalyze private sector investments in EE, CP, and RE. On September 30, 2010, the TFC approved CTF funding of \$30 million for the program entitled *Vietnam Sustainable Energy Finance Program (V-SEF)*. The V-SEF Program aims to implement a comprehensive initiative to help develop Viet Nam's Sustainable Energy (SE) private financing by supporting local financial institutions and addressing market barriers on a programmatic basis. The Program is comprised of a \$28 million investment component and a \$1.4 million advisory service component, plus \$0.6 million allocated to supervision and monitoring. For the investment component, the CTF concessional

funds were proposed to be used alongside with IFC own funds setting up credit lines with three to four commercial banks to finance projects that implement EE and CP measures and technologies, as well as small scale RE projects that reduce fossil fuel consumption. The investment component is complemented by the advisory services program that supports capacity building of financial institutions, capacity building and market awareness for end-users and service/technology providers, sector benchmarking studies, and policy advice to the Government on building the enabling environment to encourage implementation of sustainable energy projects.

17. **Rationale:** The rationale and expected impacts are as envisioned in the original CIP and the program proposal that was approved by the TFC in September 2010.

18. **Progress:** Macro economic conditions (high inflation and high interest rates) have prompted the Government to adopt policy measures to stabilize the economy. These measures include the establishment of caps to credit growth by commercial banks, as well as control of loans in foreign currencies. As a result, commercial banks are reluctant to expand their portfolios and are particularly limited in their ability to start new credit lines for sustainable energy financing. Additionally, due to the continuing economic downturn, private companies, particularly SMEs, are not willing and not able to take loans that are not essential for their business operation. Despite these challenges, since the approval of the Program IFC has undertaken significant business development efforts to establish a pipeline of investment projects and has conducted a number of consultations with potential business partners, project sponsors, and financiers. Two investment projects received Board approval at IFC but were put on hold due to the uncertainties in the market in Vietnam. A third investment project is under negotiation and is expected to move forward. Engagement with other potential clients has been and remains challenging, and therefore IFC does not foresee additional investments in the SE sector in the near future that would merit the remaining CTF allocation under V-SEF Program. IFC's assessment is that improvement of the macroeconomic conditions may take more time before they will enable private sector investments to occur in the SE sector. With a view to accelerate the execution of CTF resources (following CTF pipeline management guidelines), IFC is making \$21.4 million of unused CTF resources available to be allocated to other priority programs or projects as determined by the GoV in coordination with other MDBs.

19. While progress has been slow with the investment component, the advisory services component of the V-SEF Program has been successful. IFC has conducted a number of benchmarking studies and is working with a number of service and technology providers in the areas of technical, financial and risk evaluation of SE projects. IFC has also provided technical support to two local private banks which helped them to develop credit lines for energy efficiency projects. To date, these two banks have committed \$53 million in financing for energy efficiency projects in their client companies, and these loans are expected to result in 160,000 MWh/year in energy savings and 88,000 tons of CO₂e/year of GHG emissions avoided. Most significantly perhaps, the project has had an impact in the enabling environment for investments in EE. IFC has worked with the Ministry of Industry and Trade (MOIT) to develop an energy benchmarking study for the energy intensive sectors (cement, steel, and textile). This work has informed the Prime Minister's decision to set a National Target Program which requires these energy intensive sectors to cut down energy use by 10% by 2015. Also, together with MOIT, IFC has supported the National Energy Efficiency and Conservation awareness campaign. Finally, the project partly contributed to the revision and improvement of the Energy Efficiency Building Code.

20. Given the success of this advisory program, IFC sees an opportunity to build on what has been achieved so far and increase the impact of the Program promoting sustainable private sector growth by further scaling up energy and resource efficiency implementation. IFC proposes to use the part of its remaining CTF allocation (\$1.6 million) to expand the activities of the V-SEF Program. The new activities will conform to the overall objective of the Program and promote an innovative way of addressing energy and resource efficiency/CP at the firm level via a different type of aggregator – Special Economic Zones/Industrial Zones (IZs).

21. Industrial development is the driver of growth with industry contributing 22.7% of the national GDP in 1990 to 41.1% in 2010. A key aspect of this fast industrial growth is the development of IZs, which contribute about 30% of total industrial output. Energy use in IZs is typically characterized by high losses and low efficiencies due to obsolete industrial technologies and hardware as well as lack of demand-side management practices. Government's own studies indicate that sectors such as cement, textile, steel, and food processing each have potential to save at least 20% energy. This is also confirmed by energy benchmarking studies completed by IFC, and financed by CTF, working with local partner banks. There is a significant potential to implement EE/CP practices using IZs to provide a replicable model for faster uptake of EE/CP initiatives in Vietnam's growing industrial sector. This approach also aims to provide a platform for developing new GHG-reduction projects for potential investment by commercial banks and other financial institutions. More details of the new proposed activities can be found in the "Proposed Amendment to the V-SEF Program" (being submitted to the CTF Trust Fund Committee under separate cover).

IFC Renewable Energy Program

22. **Description:** The objective of the RE Program was to deploy CTF funds alongside IFC's own resources to provide appropriate incentives for qualified developers and financiers to fast-track the implementation of RE projects, such as hydro power plants, biomass energy, and wind power projects, among others. These initial projects, in addition to having an immediate GHG emission reduction impact, would provide valuable information on the types and amounts of incentives required to scale up RE development in the country. IFC would work with private sector RE developers, equipment manufacturers, and financial institutions interested in entering the Vietnam power sector, but who need additional incentives or risk mitigation to make their investments feasible.

23. **Rationale:** The rationale and expected impacts are as envisioned in the original CIP.

24. **Progress:** To date, the progress of RE initiatives has been slow. The unfavorable macroeconomic conditions mentioned above together with the lack of conducive policies for RE development have had a negative impact on the implementation of RE programs in Viet Nam. For example, energy prices have been kept below market level to foster competitive industries, but low energy prices have made RE investments less attractive for private investors and project developers. Moreover, there is a lack of a comprehensive set of incentives for development of RE. Only wind power has a feed-in tariff (FiT) (which is low compared to regional standards) and although the Government has introduced new regulations for RE development, incentives are provided for projects up to 30 MW only, which discourages development of large-scale projects.

25. Since the approval of the CIP, IFC has been engaging with different private sector players to assess investment opportunities in the RE sector that merit CTF funds. However, the unfavorable business and policy environment have prevented the program from developing on

the timeline presented in the CIP. IFC's current pipeline is not sufficiently advanced to meet the CTF Trust Fund Committee's guidance to have the CTF funds committed in the near future. And therefore, following discussions with the GoV and other MDBs as part of the IP revision process, IFC is making its RE allocation of \$40 million available to finance other priority programs and projects as determined by the GoV in coordination with the Asian Development Bank.

III. CIRCUMSTANCES AND RATIONALE FOR INVESTMENT PLAN UPDATE

26. Viet Nam has survived the global economic downturn, but as discussed above, high inflation and interest rates are impacting the financial sector which has affected project and program development under the CIP. Gross domestic product (GDP) growth averaged more than 6% per year from 2000 to 2012, with an all-time high of 8.46 % in December 2007, and a low of 3.14% in March 2009.³ GDP is projected to grow by at least 5% in 2013, and moderate growth is expected for the foreseeable future. This 5% growth forecast appears good in the context of continuing global economic uncertainty, but it represents 16.7% lower growth than the 6% annual growth from 2000-2012. At the corporate enterprise level, this lower growth has impacted the development of candidate investments, especially in industrial EE and CP as well as SE financing through commercial banks (as discussed above). GoV energy pricing policy, which is intended to support industrial competitiveness, has had an adverse effect on RE project development as well.

27. Despite the recent slowing of the economy, long-term growth is expected to remain relatively robust.⁴ Total energy consumption is expected to track GDP growth and greenhouse gas (GHG) emissions will continue to increase unless further large-scale investments are made in low-carbon development. According to the Second National Communications (SNC) submitted to the UNFCCC in December 2010, total greenhouse gas emissions in 2000 were 150.9 million tones of CO₂ equivalent (tCO₂e), of which 65.1 million tCO₂e came from agriculture, 52.8 million tCO₂e from energy, 15.1 million tCO₂e from LULUCF, 10.0 million tCO₂e from industrial processes, and 7.9 million tCO₂e from waste. If left unchecked, emissions will rise from a low base of 1.94 tCO₂e/capita in 2000 to 4.96 tCO₂e/capita by 2030. Overall GHG emissions will triple by 2030 with energy use accounting for all of the growth: energy-related emissions, including transport, will account for over 80% of the total by 2020 and about 90% of total emissions by 2030 (SNC). Recent analyses and modeling have identified 15 options in the energy and transportation sectors, with mitigation potential of 192 million tCO₂e. Energy and transport sectors remain the highest priority for CTF support.

28. The GOV is taking steps to address the GHG emissions challenges while promoting a low carbon growth path. Highlights of GOV policy actions since 2009 include:

- The Socio-Economic Development Strategy (SEDS) 2011-2020 affirms that “rapid development and sustainable development are critical requirements”.
- The Law on Energy Efficiency and Conservation became effective from 1 January 2011, which institutionalizes state policies in developing national energy resources, ensuring energy security, using and exploiting domestic energy resources rationally to protect environment, and to meet the demand of socio-economic development.⁵

³ GDP statistics accessed on 4 February 2012 from: <http://www.tradingeconomics.com/Viet Nam/gdp-growth>

⁴ Vietnam is expected to benefit from low-cost labor and other relative advantages in the regional and global economy; for example, see Freidman, George, “The PC16: Identifying China's Successors,” Geopolitical Weekly, STRATFOR Global Intelligence, 30 July 2013; available online at: <http://www.stratfor.com/weekly/pc16-identifying-chinas-successors>

⁵ This law ultimately did not include an energy conservation fund, which was anticipated in the original CIP.

- The Law on Environmental Protection Tax became effective from 1 January 2012; the law aims at using an indirect tax for products and goods which have negative impacts on environment when used.
- Viet Nam has new ambitious laws and action programs for EE and large-scale development of RE. This includes enhancing the share of RE in electricity generation from 5.6% in 2020 to 11% in 2030 of which 20,000-22,000 MW is from hydro power-plants, 2,000 MW by biomass, and 6,200 MW by wind power. The mid to long-term objectives of this strategy are (i) to reduce energy consumption per unit of GDP by 2.5-3% per year to 2020 and reduce GHG emissions relative to BAU by 2-3 % per year from 2020 to 2030, and (ii) to bring the share of renewable energy to 5.6% in 2020 and to 11% in 2050.
- Viet Nam is developing initiatives rural areas and the agricultural sector to reduce emissions. The Ministry of Agriculture and Rural Development (MARD), has developed a program to reduce emissions by 20% while reducing rural poverty by 20% and increase rural productivity by 20%.
- Viet Nam is developing a national REDD program. Viet Nam has been a net increase in forest cover and the SNC reports an project net carbon sequestration, the Department of Forestry is developing an inventory of forest-based emisisions.

29. Further, Viet Nam approved a the National Climate Change Strategy in 2011 and Green Growth Strategy in 2012 which identify the energy and transport sectors as strategic priorities for GHG emissions reductions to protect the global climate system with the following targets:

- 2011-2020: Reduce intensity of greenhouse gas (GHG) emissions by 8-10% as compared to 2010 base, energy consumption per unit of gross domestic product (GDP) by 1-1.5% per year. Reduce GHG emissions in the energy sector by 10% relative to business as usual (BAU) and by a further 10% with international support.
- 2030: Reduce GHG emissions by 1.5-2% per year. Reduce GHG emissions in the energy sector by 20% relative to BAU and by a further 10% with international support.
- 2050: Reduce GHG emissions by 1.5-2% per year.
- Secure national energy by uniform development of all energy sources; increase the share of new and renewable energies by 5% of the total commercial primary energies by 2020 and 11% by 2050.
- Develop transportation planning and raise the standard to be in line with the global benchmarks; develop urban public transportation.
- Promote the use of low-carbon fuels for transportation; accelerate the transformation to using compressed natural gas and liquefied gas in buses and taxis, with 20% of buses and taxis by 2020, and 80% by 2050.

30. An Update to the CIP was presented to the TFC and endorsed on 22 June 2011. This update formalized a change in scope for the proposed electricity grid project supported by IBRD, shifting from the high-voltage transmission network to the distribution network. The World Bank loan utilized IDA funds rather IBRD funds with an increase in loan amount, and GOV counterpart funding was increased; the total financing was increased from an estimated \$310 million to \$800 million including \$30 million of CTF cofinancing. No other changes were made to the CIP.

31. The GoV remains fully committed to its development policy framework for energy security, climate change, environmental management, and public health. The general approach and overall objectives for low-carbon development presented in the original CIP remain the same. However, the macro-economic conditions (high inflation and high interest rates) and the

GoV stabilization program noted above will constrain commercial bank participation in new energy investments. The stabilization program presents substantial uncertainty with respect to delivering some of the projects proposed in the original CIP during the next 12 – 18 months.

IV. PROPOSED CHANGES TO THE INVESTMENT PLAN

32. The CIP presented the following strategic uses for CTF: (i) energy efficiency improvements in the electricity grid and heavy industries, through public sector investments; (ii) acceleration of clean energy financing initiatives through private sector investments using financial intermediaries; and (iii) expansion of urban transport infrastructure through public sector investments. The indicative financing plan endorsed in December 2009 and updated in June 2011 is summarized in Table 1.

Table 1: Project Financing Plan June 2011 (indicative, US\$ million)

Financing Source	Proposed Programs and Projects				
	Industrial Energy Efficiency (ADB)	Urban Transport Enhancement (ADB)	Distribution Efficiency Project (IBRD)	Clean Energy Financing Facility (IFC)	Total
MDBs	40	500	300	200	1,040
GOV	25	100	105	0	230
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Private Sector	100	0	0	900	1,000
TOTAL	265	1,200	435	1,170	3,070

Source: Updated CTF Investment Plan for Vietnam; June 2011.

ADB=Asian Development Bank, CP=cleaner production, CTF=Clean Technology Fund, EE=energy efficiency, IBRD=International Bank for Reconstruction and Development, IFC=International Finance Corporation, MDB=multi-lateral development bank, RE=renewable energy

33. The strategic rationale for CTF intervention in the energy and transport sectors remains the same, as these sectors account for the bulk of GHG emissions (excluding agriculture). Viet Nam is a net energy exporter at present but within 20 years will become dependent on imported fuels, particularly for transport which will make the country vulnerable to supply disruptions and global price fluctuations. As noted in the original CIP, Viet Nam has limited RE resources with estimated total potential of less than 10,000 MW (see original CIP, Table 4), based on current technologies and electricity tariff structure. The original CIP also identified energy savings in the power sector and industries as having the greatest potential for large-scale GHG reductions (see original CIP, Figure 3). Thus, the suite of urban transport, sustainable energy, and transmission and distribution efficiency investments are still a high priority. Public sector investments in industrial EE have been given a lower priority for MDB support, while other donor support is expected to continue to some degree.

34. The major changes proposed are to relinquish part of unused funds allocated to IFC for private sector clean energy investments and the proposed ADB Industrial EE project, and reallocate those funds to the Hanoi urban transport investments and a new ADB grid efficiency project. Although GoV has decided to drop the industrial EE public sector project from ADB's program, IFC proposes to support private sector industrial EE and CP implementation through the new activities proposed under its advisory services component part of the V-SEF Program. The proposed reallocations are shown in Table 2. The revised financing plan is presented in Table 3.

Table 2: Proposed Reallocation of CTF Resources (US\$ million)

MDB / Program	CTF Funding (Original CIP)	CTF Funding Reallocation			CTF Funding (Revised CIP)
		IBRD	ADB	IFC	
IBRD Distribution Efficiency Project	30				30
ADB Industrial Energy Efficiency Project	50		(-) 50		0
ADB Sustainable Urban Transport Program	100		(+) 50		150
Private Sector Financing Program for EE, CP and RE	70			(-) 61.4	8.6
ADB Grid Efficiency Improvement	0		(+) 60.4		60.4
ADB Monitoring and Evaluation TA	0		(+) 1.0		1.0
Total	250		(+) 61.4	(-) 61.4	250

Source: MDB Joint Mission, September 2013

Table 3: Updated Project Financing Plan September 2013 (indicative, US\$ million)

Financing Source	Proposed Programs and Projects						
	Grid Efficiency Project (ADB)	HCMC Sustainable Urban Transport (ADB)	Hanoi Sustainable Urban Transport (ADB)	Distribution Efficiency Project (IDA)	Private Sector Financing Program for EE, CP, and RE (IFC)	Monitoring and Evaluation TA (ADB)	Total
MDBs	200	550	393	486.9	16	0	1645.9
GOV	100	332.5	267	275.5	0	0	975
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Source: Joint Mission, September 2013.

Note: ^a The CTF amounts include 2 project preparation grants of \$1 million each for HCMC and Hanoi (\$2 million total).

ADB=Asian Development Bank, CP=cleaner production, CTF=Clean Technology Fund, EE=energy efficiency, FI=financial intermediary, IDA=International Development Association (World Bank), IFC=International Finance Corporation, MDB=multi-lateral development bank, RE=renewable energy, TBD=to be determined

35. The revised CIP proposes the following strategic uses for CTF: (i) energy efficiency improvements in the electricity grid, through public sector investments; (ii) expanded support for EE/CP implementation beyond financial intermediaries to private sector firms located in selected

industrial zones (IZs); and (iii) expansion of urban transport infrastructure through public sector investments. The revised financing plan includes a request for up to \$1 million grant to assist GoV in improving its national framework for coordination, capacity building and monitoring and evaluation of climate change mitigation investments, consistent with the CTF Results Framework. These funds could be used to conduct impact evaluations as well as generate lessons learned from IP implementation, which may also help Vietnam to scale up its investments in the priority sectors. These activities would be implemented through technical assistance administered by ADB. Upon endorsement of this revised IP, a technical assistance concept paper will be prepared and submitted for the Trust Fund Committee's approval.

V. POTENTIAL IMPACTS OF PROPOSED CHANGES ON INVESTMENT PLAN OBJECTIVES

36. The proposed changes will preserve the integrity of the CIP, while acknowledging the macro-economic challenges and operational constraints in the financial sector, the RE sector, and recent advances in electricity grid technologies. The updated CIP takes a more realistic view of urban transport, sustainable energy, CP, and EE investment prospects over the next 12 – 18 months. The assessment of potential impact of the proposed changes on achieving the objectives and targets of the original investment plan are summarized in Table 4 and discussed below.

37. Transformational impact will be modified by narrowing the scope of investments somewhat. The proposed changes will mobilize additional resources for sustainable urban transport and accelerate the adoption of advanced grid technologies. The grid efficiency improvement project will address an opportunity for emissions reductions that can be achieved much more quickly than large-scale supply side RE projects. The proposed changes reflect lessons learned and changes in circumstances since the original CIP was prepared, specifically (i) project preparation has taken longer than expected, and (ii) uncertainties in the financial sector have reduced the potential investment scope for EE and RE, in particular for private sector projects and commercial investments in heavy industries. However, as discussed above (Section III), the CIP has facilitated the policy evolution toward the current framework with emphasis on green growth.

38. Total emissions reductions will be lower than in the current CIP. The revised suite of investments will result in avoided GHG emissions of about 10 million tCO₂e. The revised GHG reductions incorporate more detailed estimates for programs and projects already approved (the IDA Distribution Efficiency Project, the IFC VSEF Program, and the HCMC Sustainable Urban Transport program) and for projects at advanced stages of preparation (the Hanoi sustainable urban transport project and ADB's proposed grid efficiency project). The overall nature of the investment portfolio will shift from the "wholesale" GHG reductions anticipated from RE and large-scale industrial EE projects toward "middle market" GHG reductions via grid efficiency improvements, and "retail" reductions from urban transport.⁶

39. Cost-effectiveness will be lower than the current IP, as GHG reductions will be lower while the total amount of proposed CTF funding remains unchanged. This change in cost-effectiveness in part reflects the change in types of physical investments noted above: the

⁶ The IDA Distribution Efficiency Project is limited to the distribution network, and will not enable new RE capacity additions as envisioned in the original CIP.

large-scale GHG reductions expected from RE and large scale public sector industrial EE projects are not expected to be realized, which reduces the overall cost-effectiveness.⁷

Table 4: Assessment of Proposed Changes

CTF Investment Criteria	Original Investment Plan (As Updated in 2011)	Revised Investment Plan 2013
Potential for GHG Emissions Savings	Strategic focus on energy and transport sectors including EE investments in heavy industries and private sector investments in EE, CP, and RE. Aggregate emission reductions estimated at 7.36 MtCO ₂ e/y.	Strategic focus on energy and transport sectors, with more emphasis on GHG reductions via investment in sustainable urban transport and grid efficiency improvements. Aggregate emission reductions estimated at ~ 10 MtCO ₂ e total.
Cost-effectiveness	CTF\$250 M / (7.36 MtCO ₂ e/y x 20 y project lifetime) = CTF\$1.70 / tCO ₂ e before replication and scale up	CTF\$250 M / 10 MtCO ₂ e = CTF\$25 / tCO ₂ e before replication and scale up
Demonstration Potential at Scale^a	Transformation potential of at least 2 for energy sector, but not fully quantified for urban transport program	Potential remains high; revised scope of operations emphasizes sustainable urban transport and grid efficiency improvements
Development Impact	Emphasis on a broad spectrum of energy and transport project supported by public and private sector investments, with co-benefits accruing from energy savings, reduced fossil fuel consumption, and urban environmental improvements	Investment scope will focus more on public sector grid efficiency and urban transport; private sector interventions will focus on EE and CP, with less support for RE. Co-benefits will accrue from improved reliability and quality of grid-supplied electricity, energy savings, reduced fossil fuel consumption, and urban environmental improvements
Implementation Potential	World Bank smart grid project approved and under implementation. IFC Sustainable Energy program approved and under implementation. ADB industrial EE project and IFC private sector RE programs to be dropped.	The only operations sufficiently advanced for approval and initial implementation within 12 – 18 months from endorsement of revised CIP are the ADB Hanoi urban transport and grid efficiency improvement projects, and the new advisory services component part of IFC's V-SEF Program which is sufficiently advanced for implementation within a 6 to 9 month timeframe.
Additional Costs and Risk Premium	Urban transport connectivity investments are clearly additional to the primary costs of metro lines. Additional costs of RE systems and unproven business models for EE present investment barriers.	Urban transport connectivity costs remain additional to primary cost of metro lines. Economic benefits of grid efficiency improvements cannot be readily monetized to cover the additional capital costs of advanced technologies.

Source: Joint MDB mission, September 2013

Note: ^a Transformation potential is defined in paragraphs 15 - 17 of the *CTF Investment Criteria for Public Sector Operations* dated 9 February 2009.

40. Demonstration potential at scale remains high for transport and energy sectors, but -- with the benefit of hindsight -- the original CIP was overoptimistic with respect to achievable results in the near term. The energy conservation law ultimately did not include an investment fund which was expected to be support accelerated investments in industrial and other EE projects; commercial banks have been reluctant to expand their sustainable energy financing portfolios; energy pricing in general and lack of feed-in tariffs (except for wind) and renewable portfolio standards discourage accelerated investment in EE and RE. The ADB grid efficiency project provides opportunities for reducing the emissions intensity of the grid while increasing

⁷ A comparison of the Ho Chi Minh City urban transport project, the Philippines EEEVs project, and the India Rajasthan Solar Transmission program suggest that cost-effectiveness (CTF\$ per ton CO₂e reduced) is better for investments supporting large-scale RE development than for urban transport.

transmission capacity and reducing the need for back-up diesel generation. The improved grid efficiency will avoid the need for new fossil power capacity while enabling connection of new RE capacity to the grid. Upgrading existing transmission lines will postpone the need for new lines, and with sufficient scale of deployment could also delay the need for high-voltage direct current (HVDC) lines. The transformation potential for the HCMC and Hanoi urban transport projects are estimated to be greater than 6 and 2 respectively. The transformation potential for high-voltage transmission upgrades is at least 5.

41. Development impacts and co-benefits will be maintained or enhanced. Expanded investment in urban transport and grid efficiency will improve energy security, reduce GHG emissions, and reduce conventional pollutant emissions with substantial public health benefits, especially in the case of urban transport interventions. Using CTF to cofinance these investments will facilitate the long-term transition to low-carbon development. Results indicators and performance indicators are presented in Table 5.

42. Implementation potential for expanded urban transport program and grid efficiency upgrades is high. The executing and implementing agencies for the proposed projects (Hanoi Peoples Committee and EVN subsidiaries) have sufficient institutional capacity and technical expertise to manage the proposed investments. The urban transport and grid efficiency projects will utilize proven technologies and systems that are commercially available and do not pose extraordinary risks. The Hanoi urban transport and grid efficiency projects are both scheduled for ADB Board consideration by the third quarter of 2014.

43. Additional costs and risk premiums justify use of CTF. The urban transport and grid efficiency projects are a subset of a group of pioneering projects in Viet Nam. The urban transport program is a capital intensive endeavor with massive upfront capital costs (as has been discussed in detail on the recently approved HCMC project). The grid efficiency project will build upon prototype projects recently implemented by EVN's subsidiary utility companies, and will accelerate the deployment of advanced conductor and grid automation technologies. The capital costs remain higher than business-as-usual, and the economic benefits cannot be readily monetized as upfront project cofinancing; hence these projects face some first-mover risk. Risks and mitigation measures of the updated CIP are summarized in Table 6.

Table 5: Results Indicators and Performance Indicators

Result	Indicator	Baseline ^a	Target ^a	Data Source & Means of verification
Transformational Impact				
Transformed low carbon economy	Country level GHG / unit of GDP	0.0004 MtCO ₂ e / \$million GDP	0.0004 MtCO ₂ e / \$million GDP	[Central statistics office] [3 rd party verification TBD]
CTF Program Outcomes				
Avoided GHG emissions	tCO ₂ e reduced or avoided	0	> 10 MtCO ₂ e	MONRE
Increased Financing mobilized for low-carbon development	Leverage factor of CTF Funding	n/a	> 1:4	MDB cofinancing agreements
Increased access to public transport (Hanoi) ^b	Number of additional passengers using low-carbon transport as a result of CTF interventions	5% of motorized trips by public transport	15% of motorized trips by public transport by 2022 35% share by 2038	Benefit monitoring and post-evaluation reports
Increased access to public transport (HCMC) ^b	Number of additional passengers using low-carbon transport as a result of CTF interventions	7% of motorized trips by public transport	15% of motorized trips by public transport by 2022 30% share by 2038	Benefit monitoring and post-evaluation reports
Increased EE (WB & IFC) ^c	Design Output (GWh/y)	n/a	826 GWh/y	MDB project Monitoring
Increased EE (ADB) ^d	Design Output (GWh/y)	n/a	140 GWh/y	MDB project Monitoring

Source: MDB staff estimates.

Notes:

^a Baselines are set in 2012 unless otherwise noted. Targets are the incremental changes relative to the baseline. GDP is on purchasing power parity basis. Avoided GHG emissions target is the sum of reductions directly resulting from CTF-funded investments, before replication and scale up.

^b Emissions reductions from HCMC transport program are estimated to be 586,500 tCO₂e total; reductions from Hanoi transport program are estimated to be 663,000 tCO₂e total. These estimates do not include consideration of black carbon.

^c The IFC VSEF program envisions a mix of avoided generation capacity through EE and new RE output which delivers the equivalent of 461GWh/y (based on 0.3 MtCO₂e/y and 0.65 tCO₂e/MWh grid emissions factor); this estimate will be further revised as the program goes forward. Additional reductions of at least 1 MtCO₂e are expected from the updated V-SEF program. The IBRD smart grid project will have direct energy savings of 365 - 732 Gwh/y and GHG reductions of 237,839 – 475,800 tCO₂e/y for at least 10 years (2.37 – 4.75 MtCO₂e total).

^d The ADB grid efficiency project is expected to deliver savings of at least 140 GWh/y. GHG reductions assuming 0.65 tons CO₂e/MWh and 20 year project lifetime are 1.8 million tons CO₂e.

Table 6: ADB RE Program Risks and Mitigation Measures

Risk	Mitigation Measure	Residual Risk
Policy and regulatory framework: Urban transport policy may not evolve sufficiently to achieve sustainability objectives. Grid efficiency improvements are not explicitly supported by EE policy.	<ul style="list-style-type: none"> • Urban transport policy evolution will be enhanced with advisory support services, knowledge transfer, and adoption of best practices between cities in Vietnam and other cities in the region • Advisory support mobilized to assist EVN in developing new grid efficiency standards covering smart grid, advanced conductors, and other innovative technology and practices 	L
Technology: Limited experience with integrating sustainable transport measures with MRT lines; limited experience with advanced grid systems	<ul style="list-style-type: none"> • Urban transport policy evolution will be enhanced with advisory support services, knowledge transfer, and adoption of best practices between cities in Vietnam and other cities in the region • Technology and installation and maintenance know-how will be included in goods and supply contracts for advanced transmission and distribution systems. 	L/M
Environmental and social impacts: urban transport interventions may have land acquisition and resettlement challenges	<ul style="list-style-type: none"> • Rigorous application of GoV regulatory framework and ADB safeguards for environmental and social impact assessment, including land acquisition and resettlement • Working closely with local communities to ensure sound environmental and social management practices. 	L
Development Impact: Large- scale infrastructure investments have good development potential with close linkage to community participation, but may face community resistance due to construction scale.	<ul style="list-style-type: none"> • Work closely with local communities including early consultation at project conception and planning stages, especially for urban transport. • Enhance public awareness of grid efficiency benefits. 	L
Overall risk after mitigation	Low	

APPENDIX 1: URBAN TRANSPORT PROGRAM (ADB)⁸

Problem Statement

1. The transport sector in Vietnam currently accounts for nearly 10% of the country's total GHG emissions, and a quarter of the energy-related emissions. The rate of public transport use in urban centers in Vietnam is very low compared to other parts of Asia, with around 90% of all trips being taken by private transport. The majority of these are by motorcycle, but the country's recent economic growth is resulting in rapidly increasing car ownership. This is placing enormous strain on infrastructure in the main urban areas of Hanoi, Ho Chi Minh City (HCMC), and other cities, in particular on the road networks. Traffic volumes well in excess of the networks' capacities result in congestion and high levels of mobile source pollutant emissions, including GHGs, which will increase significantly unless the traffic issues are addressed urgently.

2. A study of the existing traffic congestion in HCMC⁹ has shown that it is already having serious economic consequences. The average delay at peak times was 45 minutes and points to the lack of traffic discipline as well as overall traffic volume and the low share of public transport in the modal split as the source of the problem. The socio-economic cost was about VND14,000 billion a year (equivalent to some US\$0.8 billion), 6.25% of the total GDP of HCMC. Traffic congestion in Hanoi has yet to reach the level of that in HCMC, but there is obvious need for sustainable modes of urban transport that provide both effective, efficient and safe means of mobility within the cities and links to external transport networks linking cities and regions of Vietnam, Southeast Asia, and the rest of the world. Without these, the economic potential of urban centers will be constrained; competitiveness, congestion, air pollution and safety will be compromised; and there will be consequential negative effects on wealth generation, household incomes, the urban environment, and quality of life.

Proposed Transformation

3. GoV has recognized the need for improved public transport in urban areas. Transport Master Plans (TMPs) have been approved for both Hanoi and HCMC in 2008, with updates in 2012 to extend the date to 2030. These TMPs set targets of 30-40% modal share for public transport by 2030 (which is high by international standards). The TMPs are based on networks of new urban mass rapid transit (MRT) lines, nine in both HCMC and Hanoi. These will contribute significantly to increasing the role of public transport and thereby the reduction of GHG emissions. However, the urban MRT projects alone will not achieve GoV's targets by 2030. The urban MRT lines will need to be fully integrated within a comprehensive transport system that includes buses, other public transport and linkages with private transport modes. These will all contribute to increasing the catchment areas of the urban MRT network. The feasibility study for the HCMC Line estimates that failure to organize the bus routes and other linking transport modes with the urban MRT lines would result in reduced rail ridership projections of about 40%.

4. The proposed CTF co-financed program will put in place the catalysts to achieving a transformational modal shift to public transport. The investments will focus on the TMP for Hanoi. As described above, the proposed urban MRT lines will need to be backed up by a range of other physical and policy initiatives in order to meet the government's modal split targets and thereby reduce GHG and other transport-related emissions. The range of potential interventions is illustrated in Box 1. The base case in Hanoi is the current MRT line 3 (MRT3) design, which is shorter than originally envisioned. The "with CTF" scenario is the MRT3 line extended with an additional 3 stations, plus connectivity enhancements along the full length. The CTF-induced transformation is these enhancements replicated across all urban rail lines in Hanoi, plus potential for replication of some features in other cities.

⁸ The CTF funding for Ho Chi Minh City was approved by the CTF Trust Fund Committee in September 2013. This concept paper covers the proposed investments in Hanoi.

⁹ National University, HCMC (2008). Study on Public Transport Structure by Bus in Ho Chi Min City.

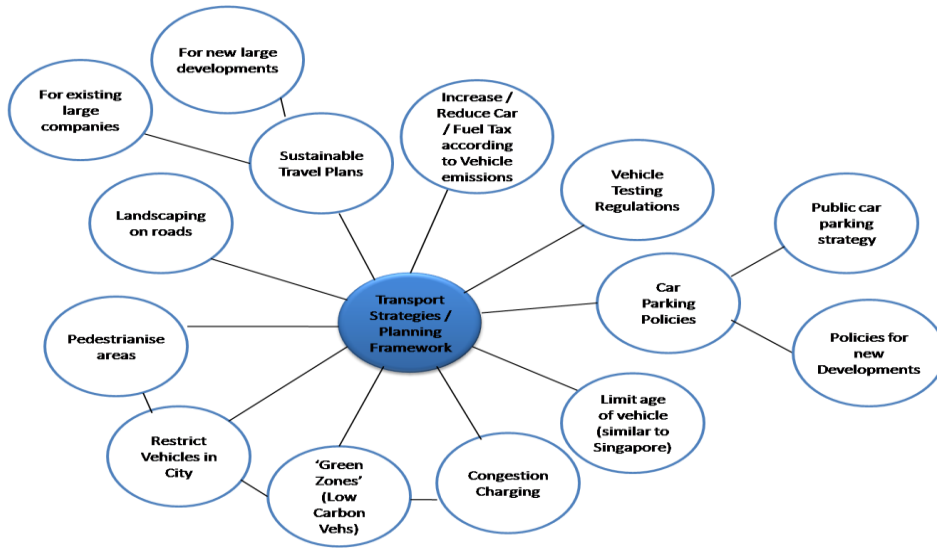
Box 1: Opportunities and Strategies for Public Transport Optimization

The two diagrams below illustrate the range of supporting mechanisms that could be introduced in order to maximize patronage and effectiveness of the proposed urban rail systems.

Opportunities to maximize usage and impact of urban rail systems:



Transport strategies to support public transport projects:



5. Hanoi is the second largest city in Vietnam and is now experiencing rapid urbanization and development. The population of Hanoi at the start of 2008 was estimated at 3.5 million people residing in 14 districts with a total surface area of 921 km². As of August 1st 2008, Hanoi increased over three times in size as a result of the inclusion of several districts of adjoining provinces into the Hanoi Metropolitan area. 'New Hanoi' comprises an area of 3,324 km² with a population estimate of 6.2 million. Car ownership levels have been climbing in Hanoi recently, by as much as 14% a year and this is expected to continue.

6. The TMP for Hanoi to 2030 includes a comprehensive improvement program for transport infrastructure. Nine (9) urban MRT lines as well as two Bus Rapid Transit (BRT) lines are proposed along with improvements to bus services. However, the feasibility of the proposed urban MRT lines recognizes that certain enhancements such as station accessibility measures, information system integration, park and ride and feeder bus services, will create a more substantial modal shift towards public transport and ultimately increase the ridership and value of the urban MRT system.

7. The proposed CTF project comprises a number of components which will enhance existing and planned public transport programs and strategies in Hanoi. These components are aimed at increasing the patronage of the urban MRT systems and reaching the Government targets of 30% public transport mode share by 2030, along with significant environmental benefits including additional reduction in transport sector GHG emissions. The components are as follows:

- Planning of and investment in new feeder bus routes to increase the catchment areas (and hence patronage) of the urban MRT lines (including potential bus priority routes). This will include a comprehensive review of current public transport plans. Forecasting assumptions and parameters for the future year models for the "trend" and "policy" modal split scenarios were prepared. In particular, during implementation a review of policy changes to achieve these scenarios, and options for bus restructuring and feeder systems, would be needed.
- Development of three strategically located transit orientated development transport hubs, including park and ride facilities to allow private vehicles to park and connect to the urban MRT for travel into the cities. Additional measures to meet demand for other interchange services at MRT3 stations, such as taxi, private car, motorcycle drop-off, etc., and other commercial and private sector developments.
- Introduction of new bus technology such as electric/hybrid, LNG or CNG buses, which can deliver substantial reductions in GHG and conventional criteria pollutant emissions. The project will support part of the incremental cost in comparison to the standard technology buses, thus making it possible to initiate operation at a commercial scale and providing an experience of global value while reducing its cost. CTF would provide additional funding to cover procurement of a limited number of buses.
- Policy review and recommendations for incentives and enforcements to restrict private vehicle usage within the city centers. This includes extensive public consultation, as well as programs for public information and education aimed at encouraging public transport use.
- Plan integration and capacity building. This will include measures to ensure greater integration of planning and policy within the urban transport sector and with other sectors. It will also provide support for the development of a rational framework to address overarching urban transport issues in the metropolitan areas in order to maximize cost-effectiveness for the institutional and financial resources allocated to the sector. The project will also support capacity building and training to ensure a sustainable operation of new bus and other system technologies.
- Continuation of Hanoi Line 3 to Line 1 under phase 1 implementation. This extension will create a direct link to another MRT line, which will expand ridership of the whole MRT system more than five years earlier than the revised MRT network program. It will ensure connectivity to the national rail network at the terminus station and improve the system integration with bus network and enhance operational efficiency of the MRT network in inner city areas of Hanoi, where private vehicle congestion is high.

8. Estimated emissions reductions are 663,000 tCO₂e in the Hanoi urban area. With replication and scale-up on other MRT lines in the Hanoi urban area, total reductions of at least 1.2 MtCO₂e are possible; this estimate is based only on the phase 1 MRT development, with a total of 42 km of lines. The second, third, and fourth phases will add another 230 km to the 9 line network over the next 20 years, indicating potential for replication and scale up should be at least 5 times higher, i.e., 6 MtCO₂e in avoided GHG emissions. Further reductions could be achieved through expanded future investments in advanced vehicle technologies and renewable fuels. Additional favorable reductions in GHG intensity would be expected if land use planning can effectively capitalize on accessibility improvements conferred by MRT with increases in development densities at MRT stations. These GHG estimates do not include consideration of black carbon, which has much higher global warming potential than CO₂.¹⁰ Additional details of the GHG analysis will be provided when the project reaches the appraisal stage and is presented for CTF funding approval.

Implementation Readiness

9. New feeder bus routes utilizing low carbon buses will be implemented prior to operation of the first urban MRT lines in Hanoi. The provision of new buses and station accessibility and integration facilities is relatively simple to implement compared to large scale infrastructure projects.

10. A strategy for reducing cars within the cities, such as restrictions on car and motorcycle parking, will be implemented prior to the opening of the urban rail lines, new bus routes and park-and-ride sites, with a phased approach to match direct urban transport service development in each district of Hanoi.

11. ADB approved the first project loan for MRT3 in 2011. After extensive discussions with the GoV (and the CIF Administrative Unit) in 2010, a decision was made to implement the CTF-funded components as a follow-on to the project approved in 2011. This financing approach was necessary to avoid obtaining approval from the Prime Minister's Office to increase the total project size; the alternative would have been to re-initiate the project identification and processing within the Vietnamese system, which would have resulted in at least a 1-year delay.¹¹ The Hanoi project is at an advanced preparation stage, and is expected to reach the appraisal stage in the first quarter of 2014. ADB Board approval is expected in the third quarter of 2014.

12. The extension of MRT3 has been incorporated into bidding documents, with all additional ADB and cofinancing to be approved in 2014. The contract for the underground section will be awarded in mid 2014; work is expected to commence in fourth quarter 2014 and be completed by 2017.

Rationale for CTF Funding

13. CTF resources can help to overcome financial and institutional barriers to the realization of a major modal shift in urban transportation. These include:

- (i) The expansion and integration of bus services with urban rail lines will face institutional and political economy barriers, requiring fiscal measures that may not prove popular in the absence of financial and regulatory incentives.
- (ii) Replacement of existing equipment is capital intensive, involving the purchase of many new vehicles, scrapping of old vehicles, and large transaction costs.
- (iii) Adoption of low-carbon technologies (e.g., hybrid drives) is currently up to 50% more expensive than regular drives, even though their use would typically reduce maintenance expenditures by a similar margin. The additional upfront capital costs constitute a significant financial barrier as there is no ready mechanism to monetize the environmental and economic benefits of the more expensive lower-carbon technologies.

¹⁰ The GHG analysis utilizes the TEEMP model, which was utilized for the HCMC sustainable urban transport program (approved by the CTF Trust Fund Committee in September 2013). For the HCMC program, an additional 9.5 million tCO₂e reductions were estimated from black carbon, before replication and scale up.

¹¹ These decision-making and funding arrangements are similar to that for the recently HCMC program approved in September 2013.

- (iv) Harmonization of sector plans and policies in urban development, air quality planning, transport planning and climate change, requires an additional effort that will not be undertaken unless there is a strong program that coalesces these different sectors toward common goals.
- (v) Expansion of various integration measures for MRT stations in inner city areas, and direct linkages to national railway network to improve integration with inner city MRT stations.

14. The availability of the CTF cofinancing will encourage and accelerate the adoption of projects and policy measures that would otherwise be unattractive to city governments. For instance, authorities will be more likely to enforce stricter tail-pipe emission standards if they are able to demonstrate that public transport vehicles are meeting the standards. The proposed enhancements to the urban rail lines will be directly and immediately replicable for other lines in Hanoi, and certain aspects, such as the low-carbon technologies and policy measures, will have the potential for replication in other cities and towns. Proposed results and performance indicators are presented in Table A1.1.

Table A1.1: Results and Performance Indicators for Urban Transport Investments

Result	Indicator	Baseline ^a	Target ^b	Data Source & Means of verification
Avoided GHG emissions	tCO ₂ e reduced or avoided annually	0	> 663,000 tCO ₂ e	Project monitoring plans MONRE
Increased Financing mobilized for low-carbon development	Leverage factor	n/a	> 1:15	MDB cofinancing agreements
Increased access to public transport	Number of additional passengers using low-carbon transport as a result of CTF interventions	5% of motorized trips by public transport ^b	15% of motorized trips by public transport by 2022 35% share by 2038	Benefit monitoring and post-evaluation reports

Source: MDB staff estimates and project preparation consultants reports

Notes: ^a Baseline year is 2007.

^b Cost Avoided GHG emissions do not include consideration of black carbon and do not include replication and scale up. Cost effectiveness before replication and scale up: CTF\$100 M / 663,000 tCO₂e = CTF\$151 / tCO₂e

Financing Plan

15. The indicative financing plan for the total investments in Hanoi is shown in the table below.

Source	(US\$ million)
ADB	393
GoV	267
CTF	100
Other co-financing	876.9
Total	1,636.9

Project Preparation Timetable

16. The indicative processing schedule is shown in the table below.

Milestone	Hanoi Dates
Appraisal / CTF Approval	Q1 2014
ADB Board Consideration	Q3 2014

Appendix 2: Electricity Grid Efficiency Project (ADB)

Problem Statement

1. Meeting future electricity demand growth will require expansion of total system capacity including generation, transmission and distribution subsectors. Development and construction of new power plants may be relatively straightforward, but acquisition of right-of-way for new transmission and distribution (T&D) lines can be extremely challenging due to competing land uses. Analysis of potential abatement opportunities indicate that as much as 67 MtCO₂e/y of GHG reductions may be possible via power system efficiency improvements at a marginal abatement cost of \$40/tCO₂e or less¹². Potential investments include upgrade of existing power plants, fuel switching, and T&D loss reductions.

2. Smart grid technologies including advanced metering infrastructure (AMI), distribution automation systems (DAS), and high temperature / low-sag (HTLS) conductors are attractive because they can be implemented via retrofits without the major interruptions and massive investments required for power plant upgrades and fuel switching. It is possible to increase grid system capacity while reducing line losses by about 25% with smart grid technologies, which have substantial economic benefits but high upfront capital costs. According to independent tests reported by the Electric Power Research Institute¹³, most varieties of HTLS conductors cost 2 to 6 times as much as conventional conductors, but can carry 2 to 3 times more electricity than conventional conductors of the same diameter and weight. HTLS conductors provide a quicker route to reducing emissions intensity of a grid than most other alternatives, as transmission upgrades can be accomplished in a matter of months compared to multi-year development and commissioning for large-scale fuel switching or RE projects and demand-side management interventions that require a very large number of small-scale actions, e.g., residential switching from incandescent to CFL or LED lighting. Under the existing policy and regulatory framework, the potential economic benefits of smart grid technologies cannot be readily monetized (there is no market for “negawatts”) and potential GHG reductions are largely unexploited.

Proposed Transformation

3. A shift to advanced grid technologies will have economic benefits that could offset most of the additional upfront costs over the long-term, but the higher capital costs remain a barrier and concessional financing is needed to accelerate the adoption of these systems. The proposed Ha Noi and Ho Chi Minh City Power Grid Development Sector Project will include concessional cofinancing to accelerate market penetration of proven smart grid technologies in the service areas in and around Ho Chi Minh City (HCMC) and Hanoi. CTF co-financing is proposed to cover the additional costs of DAS and HTLS components. In these urban areas, right-of-way availability constrains grid expansion, therefore advanced grid systems are an attractive solution for increasing grid capacity, improving service reliability and quality, and reducing systems losses without major disturbances caused by large-scale construction.

4. Various smart grid systems, including DAS and HTLS, are commercially demonstrated but are still at an early stage of deployment in Vietnam. The main electric utility, Vietnam Electricity (EVN), is interested in mainstreaming these types of advanced systems which are ready for market “takeoff” but present upfront capital cost barriers. The potential energy savings can be estimated assuming future annual electricity generation of 330 terawatt-hours (TWh/y) in 2020¹⁴, possible reduction of T&D system losses by 1%, and a grid emissions factor of 0.65 tCO₂e/MWh as follows:

$$330 \text{ TWh/y} \times (1,000,000 \text{ MWh} / \text{TWh}) \times 0.01 \times 0.65 \text{ tCO}_2\text{e/MWh} = 2.145 \text{ M tCO}_2\text{e/y}$$

¹² See Figure 3 of the Vietnam CIP, 2009, which is derived from: ADB. 2009. *The Economics of Climate Change in Southeast Asia: A Regional Review*. Manila (April 2009).

¹³ Clairmont, Bernie. 2008. *High-Temperature Low-Sag Conductors*, Electric Power Research Institute (EPRI), Transmission Research Program Colloquium, Sacramento California, 11 September 2008.

¹⁴ Lower end of the projection (330-362 TWh) in the National Power Development Plan between 2010 and 2020 with Orientation Toward to 2030 (Prime Minister Decision 1208/QD-TTg), Hanoi, 21 July 2011..

5. Information from technology vendors show that for a typical 100 km installation, single circuit, 3-phase line, with 300,000 meters total conductor length, carrying 1600 amps of electric current, the loss reductions from replacement of conventional conductors with HTLS conductors is more than 70,000 MWh/y. The proposed project component is expected to achieve savings of 140,000 MWh/y, with GHG reductions of about 1.8 MtCO₂e over the project lifetime.¹⁵ Cost effectiveness is estimated as CTF\$61 M / 1.8 MtCO₂e = CTF\$33 / tCO₂e before replication and scale up. Replication and scale-up potential includes upgrade of several thousand circuit-kilometers of the existing high-voltage transmission network, deployment of HTLS conductors for new lines, and connection of new RE capacity to the transmission network. The transformation potential¹⁶ is at least 5, based on total circuit-kilometers of line in the 110 kV network in the Hanoi and HCMC Power Companies' service areas. Viet Nam has more than 30,000 kilometers of transmission lines with voltage ratings of 110 kV, 220 kV, and 500 kV, and essentially all of these lines are candidates for upgrading with HTLS conductors. The potential GHG reductions are being further evaluated under the ongoing project preparation technical assistance; details will be provided when the project reaches the appraisal stage and is presented for CTF funding approval.

Implementation Readiness

6. EVN has requested CTF cofinancing to expand the scope of an ADB sector loan which is currently in the early project preparation stage. EVN has prior experience with DAS and HTLS on a demonstration / prototype basis, and is ready to begin accelerated deployment of these components. CTF cofinancing would be used to cover the additional costs of these components to be included as non-core subprojects. The physical investments proposed will be complementary to smart grid components in other projects which are under implementation or have been completed.¹⁷ The proposed Ha Noi and Ho Chi Minh City Power Grid Development Sector Project is included in ADB's country operations business plan and is scheduled for ADB Board consideration in mid-2014.

Rationale for CTF Financing

7. The GHG reduction potential is large as noted above, especially considering that most of the existing high-voltage network (110 kV and above) could be upgraded with HTLS conductors, postponing the need for some new transmission lines. Most of the lower voltage distribution network (less than 110 kV) in urban and industrial areas could be upgraded using DAS and AMI. The energy savings from these types of grid efficiency improvements are essentially permanent. The proposed investments are replicable and scalable at the country, regional, and global level. Replacement of conventional conductors with HTLS conductors represents one of the world's single largest unexploited opportunities for GHG emissions reductions.

8. The proposed DAS and HTLS investments have substantial economic benefits but high upfront capital costs: assuming wholesale cost of supply of \$50/MWh, energy savings of 140,000 MWh/y are worth \$7 million per year; however, these benefits cannot be readily monetized and delivered as upfront project co-financing. These systems, especially HTLS conductors, are technically viable, commercially available, and offer the potential for large-scale GHG emissions, consistent with CTF operational criteria.¹⁸ The technological risk may be low, but in the absence of robust policy support, these potential savings will remain unexploited. CTF co-financing can be catalytic in supporting accelerated deployment of smart grid systems and mainstreaming these types of grid efficiency improvements in the near term. Development impacts from such investments would accrue from improved system reliability (reduced grid

¹⁵ This estimate is for HTLS only. Reduction potential from DAS investments is lower than that for HTLS, but is still expected to be significant with respect to economic value and environmental benefits of reduced power interruptions and reduced need for diesel-fired back up generators.

¹⁶ Transformation potential is defined in paragraphs 15 - 17 of the *CTF Investment Criteria for Public Sector Operations* dated 9 February 2009.

¹⁷ E.g., World Bank's smart grid project is utilizing CTF cofinancing for the AMI components.

¹⁸ See paragraphs 9 and 10 of *CTF Investment Criteria for Public Sector Operations* dated 9 February 2009.

outages), improved power quality (stable voltage and frequency), reduced energy losses, and reduced consumption of fossil fuels. Results and performance indicators are presented in Table A2.1.

Table A2.1: Results Indicators and Performance Indicators

Result	Indicator	Baseline ^a	Target ^a	Data Source & Means of verification
Avoided GHG emissions	tCO ₂ e reduced or avoided	0	1.8 MtCO ₂ e	MONRE
Increased Financing mobilized for low-carbon development	Leverage factor of CTF Funding	n/a	> 1:6	MDB cofinancing agreements
Increased EE ^b	Design Output (GWh/y)	n/a	140 GWh/y	MDB project Monitoring

Source: MDB staff estimates.

Notes:

^a Baselines are set in 2012 unless otherwise noted. Targets are the incremental changes relative to the baseline. The baseline does not include the World Bank Distribution Efficiency Project, as the CTF-supported Components in that project are considered to be additional to the baseline. Target indicators do not include replication and scale up.

^b The ADB grid efficiency project is expected to deliver savings of at least 140 GWh/y; this estimate is based on information from HTLS vendors and other publicly available information. Assuming 0.65 tons CO₂e/MWh and 20 year project lifetime, total GHG reductions would be 1.82 million tons CO₂e. Cost effectiveness is estimated as CTF\$61 M / 1.8 MtCO₂e = CTF\$33 / tCO₂e.

Financing Plan

9. The indicative financing plan for the project is shown in the table below.

Source	Total (US\$ million)
GOV / EVN	100
ADB	200
Co-financing	100
CTF	60.4
Total	460.4

Project Preparation Timetable

10. The indicative processing schedule for the project is shown in the table below.

Milestone	Date
Project preparation	September 2013 - onwards
Appraisal / negotiations	February 2014
CTF funding approval	March 2014
ADB Board consideration	June 2014
Project completion	December 2019