

CLIMATE INVESTMENT FUNDS

CTF/TFC.8/5
October 21, 2011

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Washington, D.C.
November 4, 2011

Agenda Item 5

REVISED CTF INVESTMENT PLAN FOR PHILIPPINES

Proposed Decision by CTF Trust Fund Committee

The Trust Fund Committee reviewed and endorses the *Revised CTF Investment Plan for the Philippines* (document CTF/TFC.8/5) as a basis for the further development of the projects proposed in the plan. The Trust Fund Committee takes note of the status of the project activities under development and implementation and encourages expeditious delivery of the activities in the plan.

**CLEAN TECHNOLOGY FUND
REVISED
INVESTMENT PLAN FOR THE PHILIPPINES**

October 17, 2011

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
CIP	CTF Country Investment Plan
CTF	Clean Technology Fund
EE	Energy Efficiency
GHG	Greenhouse Gas
IBRD	International Bank for Reconstruction and Development
IFC	International Finance Corporation
MtCO ₂ e	Million tons of carbon dioxide equivalent
RE	Renewable Energy
WBG	World Bank Group

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EXECUTIVE SUMMARY

The Government of Philippines (GoP) 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. Table ES1 summarizes the indicative financing plan as endorsed in December 2009. Table ES2 presents the indicative financing plan after the proposed reallocations.

Table ES1: Indicative Financing Plan Endorsed in December 2009 (\$million)

Financing Source	Renewable Energy (WBG)	Urban Transport (WBG)	RE and EE (ADB)	Total
CTF	75	50	125	250
GoP / DBP	180	50	50	280
IBRD Loans	250	250		500
IFC Loans	250			250
ADB Loans			400	400
Private sector	750		350	1,100
Total	1,505	350	925	2,780

Source: CTF Investment Plan for Philippines 2009

ADB=Asian Development Bank, CTF=Clean Technology Fund, DBP=Development Bank of the Philippines, EE=energy efficiency, GoP=Government of the Philippines, IBRD=International Bank for Reconstruction and Development, IFC=International Finance Corporation, RE=renewable energy, WBG=World Bank Group

Table ES2: Indicative Financing Plan After Reallocation (\$million)

Financing Source	Renewable Energy (WBG)	Urban Transport (WBG)	EE (ADB)	E-trikes (ADB)	Total
CTF	75	50	24	101 ^a	250
GoP / DBP	180	50	46	99	375
IBRD Loans	250	180			430
IFC Loans	250				250
ADB Loans			100	300	400
Private sector	750				750
Other cofinancing		20			20
Total	1,505	300	170	500	2,475

Source: MDB teams

ADB=Asian Development Bank, CTF=Clean Technology Fund, DBP=Development Bank of the Philippines, EE=energy efficiency, GoP=Government of the Philippines, IBRD=International Bank for Reconstruction and Development, IFC=International Finance Corporation, RE=renewable energy, WBG=World Bank Group

Notes: ^a A CTF grant of \$1 million is requested for fine-tuning of technology options, technology transfer, local industry support and capacity building (implementation support, including monitoring and evaluation activities will be financed by the ADB loan).

The overall context and objectives of the CIP remain unchanged. No changes have been proposed to the CTF allocation for the World Bank Group (WBG) projects and programs. This document covers the proposed changes and program to be implemented by the Asian Development Bank (ADB). The proposed change will reallocate funds for public sector investments led by Asian Development Bank (ADB) to include energy efficiency (EE) investments and cleaner transport investments, consistent with the long-term objectives of the original CIP. The overall context and objectives of the CIP are the same as the original CIP.

I. INTRODUCTION

1. The Philippines Clean Technology Fund (CTF) Country Investment Plan (CIP) was endorsed by the Trust Fund Committee (TFC) in December 2009, with an envelope of \$250 million in CTF cofinancing. The original CIP comprised clean energy and transport sector investments in both the public and private sector.

2. The proposed change will reallocate funds for public sector investments led by Asian Development Bank (ADB) to include energy efficiency (EE) investments and cleaner transport investments, consistent with the long-term objectives of the original CIP. The overall context and objectives of the CIP are the same as the original CIP. The updated CIP is a business plan owned by the Government of the Philippines (GoP). The updated CIP is a dynamic document with the flexibility to consider changing circumstances and new opportunities.

3. No changes have been proposed to the CTF allocation for the International Bank for Reconstruction and Development (IBRD) and International Finance Corporation (IFC) and the IFC-led investment programs. Therefore, this document covers the proposed changes and program to be implemented by the Asian Development Bank (ADB), and is organized as follows:

- Section II -- Review of the status of the implementation of the original investment plan;
- 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, i.e., proposed reallocation of funds as requested by the GoP through the Ministry of Finance's letter dated 4 October 2011 to the CTF Trust Fund Committee; and
- Section V -- Assessment of the potential impact of the proposed changes on achieving the objectives and targets of the original investment plan.

II. STATUS OF ORIGINAL INVESTMENT PLAN IMPLEMENTATION

4. The status of project development and approvals is presented in Table 1 and briefly discussed below.

Table 1: Processing Status of IBRD and IFC Investment Programs

Project	TFC Approval Date	CTF Amount (\$ million)	Leveraged Funding (\$ million)
IFC RE Accelerator Program	September 2010	20	330
IFC Sustainable Energy Finance Program	February 2011	10	209
IBRD RE/EE Project	May 2012	45	200
IBRD Urban Transport (BRT)	June 2012	50	250

Source: MDB project teams

IBRD Renewable Energy Program

5. The IBRD/CTF operation would support investments in renewable energy generation and in utility-level energy efficiency. The operation would build on IBRD projects that are active in these sub-sectors. In renewable energy (RE), the focus will be on leveraging private sector

investment in the context of the emerging policy and regulatory framework for renewables, and ensuring that CTF is used strategically to leverage as much private investment as possible. In EE, the goal is to scale-up the efforts of electric cooperatives (ECs) to continue to reduce losses, as one key input for enhancing the financial strength of these service providers. Stronger ECs will be better able to expand their customer bases, contributing to critical access objectives, and to serve those new customers with an increasing proportion of clean energy.

6. While the Philippines has an advanced framework for private participation and for attraction of private financing, there are significant barriers to the scale-up of renewable energy and utility energy efficiency in the country. For example, for administrative ease, the country has opted for a single, national feed-in tariff (FIT) rate per technology; but supply chain and other costs vary widely in the country, so some economically beneficial projects will not be financially viable under the FIT mechanism. The FIT regime will also not extend to certain renewable technologies (e.g., geothermal), nor will it cover off-grid generation. CTF will be used to provide critical additionality and leverage such that more, good projects will be financed, especially in regions of the country that might not otherwise see much activity. In the EC sector, there are 119 service providers but only about half are currently rated credit-worthy, and investment flows are falling well short of requirements even for the credit-worthy. CTF is targeted at both the supply side – by leveraging the flow of private credit to support investments – and at the demand side, by establishing programmatic eligibility criteria that will help incentivize more ECs to become credit-worthy.

7. GoP has made its formal request for project preparation funds from the CTF, and project preparation work is set to accelerate. Project appraisal is targeted for May 2012 and presentation to the IBRD Board is scheduled for October 2012.

IBRD Urban Transport Program

8. The Program comprises Investment and Advisory Services components to support the implementation of Bus Rapid Transit (BRT) projects in Cebu and Manila. The advisory services component includes support for implementation of the National Environmentally Sustainable Transport Strategy (NESTS). Since the Philippines CIP was prepared in December 2009, there have been a few minor changes made to the scope and design of the urban transport component. These adjustments are outlined below.

9. Through project preparation work undertaken since the initial CTF investment proposal, it has become evident that to ensure successful implementation of a bus rapid transit (BRT) system in the Philippines, substantial capacity and institution building work will be necessary. To this end, it has been agreed with the counterparts that the BRT program would be undertaken in two phases, beginning with a demonstration project in Cebu City, from which lessons learned and institutional structures derived would be applied to the second phase, the development of a BRT in Manila. Given the substantive social and political hurdles involved in the Manila phase, the counterparts agreed that a successful demonstration in Cebu would facilitate more rapid implementation in Manila.

10. Also, for Phase I, to maximize greenhouse gas emissions mitigation benefits, as well as safety, gender, and poverty impacts, the program scope has been slightly expanded to also include upgrading the existing SCATS area traffic control system to better manage traffic and non-motorized transport (NMT) flows, not only on BRT corridors, but for the entire transport network. Further, Phase I will include significant training and capacity building work not just for the local government, but also relevant stakeholders, such as the jeepney operators.

11. Finally, since the initial CTF proposal, a parallel Sustainable Urban Energy Program (P125401) has been undertaken by the IBRD in Cebu City, through which it was determined that the greenhouse gas emissions from the transportation sector were 721,000 tons CO₂e in 2010, about 40 percent of Cebu's total greenhouse gas emissions. While this figure will be verified and refined during the CTF project preparation, the estimate provides a basis upon which to develop preliminary greenhouse gas emissions reduction targets that may be attributable to Phase I in Cebu, versus Phase II in Manila. Through the expanded project scope, a range of 100,000 to 150,000 tons CO₂e emissions reductions per year may be a reasonable estimate for Phase I, with more substantive emissions reductions to be expected in Manila, which is many times the size of Cebu City and has a much higher motorization rate. The success of Phase I is critical to expanding the scope to Phase II. However, in addition to CO₂e emissions reductions, it is expected that Phase I demonstration project would have considerable impact on improving access to the poor, providing a safer and more effective transport services to all residents, and influencing changes in land use design with a long-term impact on the city's ability to address climate change related issues.

12. Since the program will be undertaken in two phases, rather than one, funding allocations have been adjusted accordingly, as shown in Table 2. Further, additional financing and technical assistance funding has been secured from the Agence Française de Développement (AfD), which is also reflected in the revised figures.

Table 2: Revised Financing Plan for IBRD Urban Transport Program (US\$million)

Funding Source	December 2009 Original Proposed Contribution	October 2011 Revised Proposed Contribution	
		Phase I	Phase II
Government of the Philippines	50	15	35
IBRD	250	90	90
Clean Technology Fund	50	25	25
Agence Française de Développement	0	20	<i>tbd</i>
Total	350	150	150

Source: IBRD

13. The CTF funds will continue to be needed to cover part of the additional costs of BRT systems compared to conventional bus networks.

14. Overall progress is shown above in Table 1. Project preparation work is proceeding well and three missions have been undertaken since April 2011. The Government has made a formal request for project preparation funds from the CTF. Appraisal of the project is targeted for June 2012 and presentation to the Bank's Board for November 2012.

IFC Programs

15. As of October 2011, two private sector program proposals have proceeded: \$20 million was approved in September 2010 for the IFC Renewable Energy Accelerator program, and \$10 million was approved in February 2011 for the IFC Sustainable Energy Finance program.

IFC Renewable Energy Accelerator Program (REAP)

16. IFC would provide appropriate incentives for qualified solar, wind, and biomass developers to accelerate the implementation of Renewable Energy projects. These projects would provide immediate GHG reduction impact and provide valuable information on the types

and amounts of incentives required to catalyze Renewable Energy development in the country. IFC will continue to develop projects with CTF support in close coordination with the GoP and the policies that govern private sector growth. The rationale is the same as envisioned in the original CIP. IFC continues to work with project developers and refining financial structures in the development of projects. Overall progress is shown above in Table 1.

IFC Sustainable Energy Financing Program (PSEFP)

17. The program supports the scale up of sustainable energy finance projects in Philippines. It aims to contribute to increasing private sector involvement, support captive and grid-tied RE development, EE market transformation, and enhance energy savings. The CTF funds will continue to be needed to incentivize local financial institutions to undertake financing in lower carbon emitting technologies. The rationale is the same as envisioned in the original CIP. IFC continues to work with various stakeholders in developing projects under the program. IFC has a pipeline of projects that are at various stages of development that would fully utilize IFC's CTF allocation.

III. CIRCUMSTANCES AND RATIONALE FOR INVESTMENT PLAN UPDATE

18. The overall rationale for CTF intervention in the energy and transport sectors remains unchanged. GoP has requested that the ADB allocation be revised to accommodate 2 projects, instead of the single intervention proposed in the original CIP. Major changes in circumstances since 2009 are as follows: (i) the specific rules for the Renewable Portfolio Standard (RPS), feed-in tariffs, and net metering have yet to be finalized and become fully effective; (ii) national biofuels production capacity has yet to reach the mandated objectives of 10% ethanol blending with gasoline (E10), and 5% biodiesel blending with petroleum diesel (B5); (iii) development of various proposed BRT lines is not proceeding as fast as anticipated; and (iv) a successful pilot test of electric vehicles (motorcycles with side cars which provide taxi services,¹ known locally as “tricycles”, hereafter referred to as “e-trikes”) conducted with ADB support is ready for scale up. Based on these circumstances, GoP has requested to shift the original \$125 million of CTF resources slated for the net metering program using distributed solar power, and re-direct \$24 million to EE investments and \$101 million to the e-trikes project. The prospective investments are appropriate for CTF support given the transformational nature of the projects and the replication and scale-up potential. The proposed projects are discussed in more detail below and in Appendices 1 and 2.

19. Transport is almost 100% reliant on imported fuels at present, which makes the country vulnerable to energy supply disruptions and global price fluctuations. Electric vehicles are an important step in improving the overall energy efficiency of the public transport sub-sector, and offer significant life-cycle financial advantages to vehicle owners and operators. The proposed e-trikes project is being designed based on a successful demonstration funded by a technical assistance grant from ADB. The project will support commercial deployment of 100,000 e-trikes, which is sufficient to confirm the transformational potential of fleet-scale vehicle electrification. The replication and scale-up potential is more than 20 to 1, as there are more than 200,000 tricycles in the Metro Manila region and more than 3.5 million tricycles nationwide.

20. The EE investments will support accelerated introduction of more efficient appliances (liquid crystal display (LCD) and light-emitting diode (LED) televisions (TVs), computer monitors,

¹ This tricycle design is somewhat unique to the Philippines; however, the transport services provided are similar to auto-rickshaws utilized in other Asian countries including Bangladesh India, Indonesia, and Thailand.

fans, air conditioners and refrigerators, etc.). The proposed investment project will address the market failure for efficient appliances in the Philippines. For example, a conventional 27 inch cathode ray tube (CRT) television contains 2 kilograms of lead and consumes about 125 watts. Consumers are now switching to new generation LCD and LED TVs and literally dumping old TVs in landfills, each with 2 kilograms of lead. However, currently in the domestic market, the most energy efficient 32 inch LCD consumes about 100 Watt and the most efficient LED TV consumes about 72 Watt, while the “best in the world” 32 inch TV consumes 40 Watts. This is an obvious market failure, as substandard products are being brought in the market. Further, a large number of very old CRT TVs (which can be considered electronic waste) are being brought into the country from Japan, Taiwan and South Korea; these obsolete TVs are mostly purchased by the poorest consumers at “throw-away” prices. A key objective of the proposed EE appliances project is to (i) build awareness, (ii) improve local standards (e.g., mainstream 32 inch TVs consuming 40-50 Watts), (iii) reduce price through bulk procurement, and (iv) establish a “hire-purchase” scheme working with local power and cable companies. For example if 10,000 televisions are bought in bulk for \$35 million, it will reduce the electricity demand by 1 MW; the energy savings to the consumer will recover the investment for the TVs within 3 years. The proposed project will be implemented in a manner similar to that being implemented for more efficient lighting and the proposed e-trikes project.²

21. GoP is committed to reducing energy intensity and greenhouse gas (GHG) reductions through a comprehensive policy framework as described in the original CIP. Figure 1 illustrates trends in total primary energy supply, indicating that coal and natural gas have displaced oil for power generation, while the share of renewables has not increased substantially. The trend of increasing coal use is of particular concern with respect to energy security and GHG emissions.

22. The transport sector accounted for about one-third of total GHG emissions in 2009 (excluding emissions from land use change and forestry). Transport sector emissions have increased by about 6-10% per year since 1990, from about 10 million tons per year carbon dioxide equivalent (MtCO₂e/y) in 1990 to about 29 MtCO₂e/y in 2007.³ Vehicles are one of the dominant sources of urban pollution that threatens both people’s health and economic activity. In the Philippines, motorcycles and tricycles comprise more than 52% of vehicle population. Compared to other vehicles, motorcycles and tricycles are less expensive. They are very visible in most cities of the country and play an important role in the transport market particularly used as alternative mode transport for short distances. However, the use of these vehicles contributes to the already declining state of the environment, particularly air quality in urban areas. In an ADB study, transport sector emissions accounted for 30% of air pollution in the Philippines and about 80% of air pollution in Metro Manila.

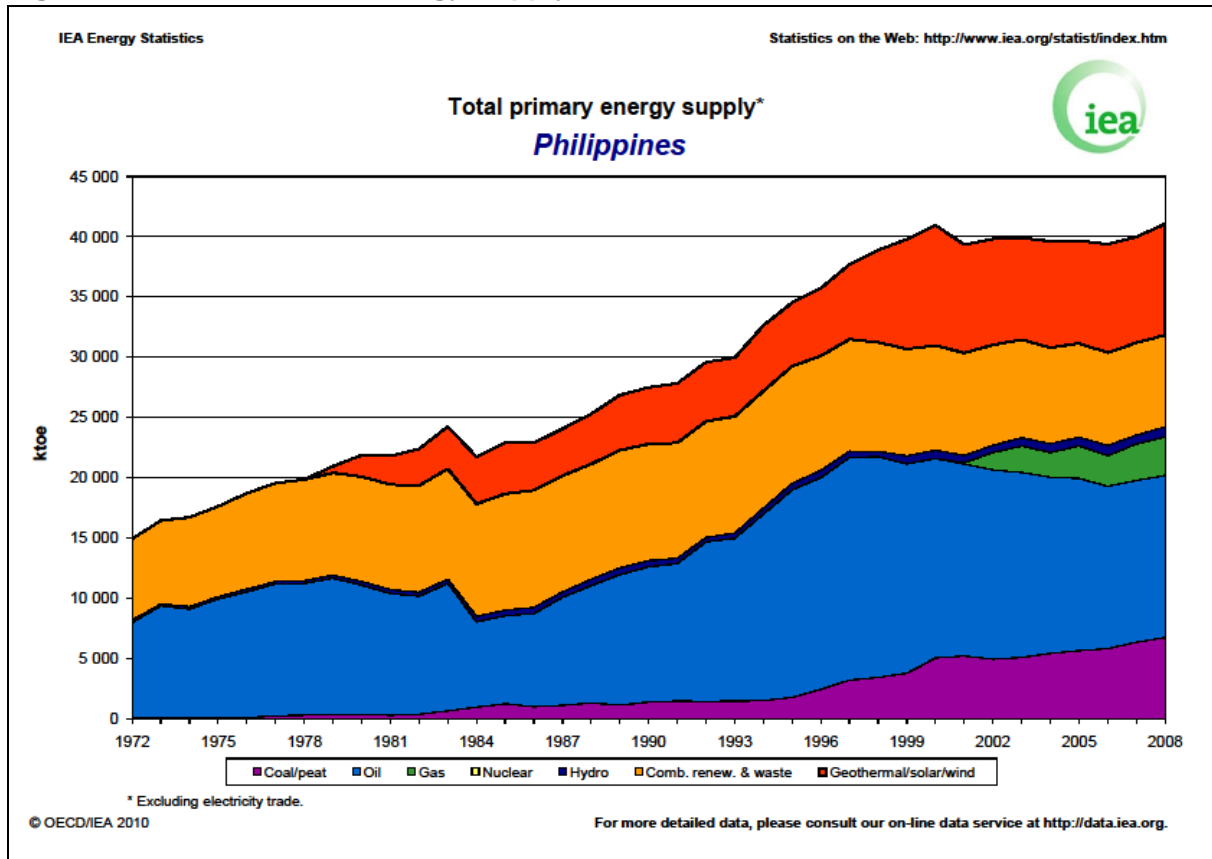
23. In order to improve urban transportation systems, control pollution from fossil fuels, enhance energy security, and mitigate long-term GHG impacts, the GoP has embarked on an ambitious program to introduce electric and compressed natural gas (CNG) vehicles into the public transportation fleet. ADB is supporting a demonstration project for introduction of e-trikes in Mandaluyong City (part of the Metro Manila core urban area). The initial results have been positive, and GoP has requested ADB to provide financial support for the first phase commercial deployment of 100,000 e-trikes.⁴

² The physical investments will be complemented with technical assistance and capacity building including public awareness and retail consumer credit facilitation to ensure that more efficient lighting, appliances, and electric vehicles can be deployed to end-users at scale. Additional notes on recent experience and proposed implementation approaches are included in Appendices 1 and 2.

³ CTF Investment Plan for the Philippines. Paragraph 8 and Figure 3.

⁴ A summary of the initial results and project concept can be found at: <http://www.adb.org/projects/etrike/etrike-industry-presentation.pdf>

Figure 1: Trends in Total Energy Supply



Source: IEA, accessed on 11 August 2011 from: http://www.iea.org/stats/pdf_graphs/PHTPES.pdf

24. **The GoP 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 CTF Investment Plan remain the same. GoP is committed to reducing energy intensity and greenhouse gas (GHG) reductions through a comprehensive policy framework (as described in the original CIP). The energy and transport policy frameworks discussed in the original CIP remain in effect. The GoP 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 CTF Investment Plan remain the same.

25. **The rationale for CTF intervention in the energy and transport sectors remains unchanged.** The transport sector, power generation, and other energy end-use are highly dependent on imported fuels, which render the country vulnerable to energy supply disruptions and global price fluctuations. The Philippines has a variety of RE resources—biomass/biogas, geothermal, small hydropower, and wind—with estimated total potential of about 7400 MW, of which about 60% has been developed. Additional potential from solar and waste-to-energy is high but commercial development of these resources has very high start-up costs; solar and waste-to-energy are not expected to contribute at the gigawatt scale in the foreseeable future. Therefore, investments in EE and more efficient transport systems are critical in the near to medium term.

IV. PROPOSED CHANGES TO THE INVESTMENT PLAN

26. The original CIP identified several prospective interventions in EE, RE, and urban transport. The indicative financing plan endorsed in December 2009 is summarized in Table 3.

Table 3: Indicative Financing Plan Endorsed in December 2009 (\$million)

Financing Source	Renewable Energy (WBG)	Urban Transport (WBG)	RE and EE (ADB)	Total
CTF	75	50	125	250
GoP / DBP	180	50	50	280
IBRD Loans	250	250		500
IFC Loans	250			250
ADB Loans			400	400
Private sector	750		350	1,100
Total	1,505	350	925	2,780

Source: CTF Investment Plan for Philippines 2009

ADB=Asian Development Bank, CTF=Clean Technology Fund, DBP=Development Bank of the Philippines, EE=energy efficiency, GoP=Government of the Philippines, IBRD=International Bank for Reconstruction and Development, IFC=International Finance Corporation, RE=renewable energy, WBG=World Bank Group

27. **The major change proposed is to reallocate CTF funds for the proposed e-trikes and EE projects to be cofinanced with ADB.** In particular, energy efficient electric vehicles promise to transform the way energy is used by light-duty vehicles. For net energy importing countries such as the Philippines, electric vehicles can dramatically reduce the country's dependence on imported energy resources, which in turn will offset some short term price volatility and improve long term energy security. Electric vehicle technology presents the opportunity to transition from conventional fossil-fueled vehicles to vehicles which do not directly generate harmful air and noise pollution and can be powered by indigenous renewable energy resources such as solar, hydropower or geothermal.

28. These prospective investments are appropriate for CTF support given the transformational nature of the projects and the replication and scale-up potential. (Pakistan, Indonesia, Malaysia, Bangladesh and Thailand have expressed interest in exploring options for implementing similar projects). The proposed changes will allocate \$101 million to the ADB e-trikes project and \$24 million to the ADB EE project, as shown in Table 4. Concept papers for the candidate investments are presented in Appendices 1 and 2.

Table 4: Indicative Financing Plan After Reallocation (\$million)

Financing Source	Renewable Energy (WBG)	Urban Transport (WBG)	EE (ADB)	E-trikes (ADB)	Total
CTF	75	50	24	101 ^a	250
GoP / DBP	180	50	46	99	375
IBRD Loans	250	180			430
IFC Loans	250				250
ADB Loans			100	300	400
Private sector	750				750
Other cofinancing		20			20
Total	1,505	300	170	500	2,475

Source: MDB teams

ADB=Asian Development Bank, CTF=Clean Technology Fund, DBP=Development Bank of the Philippines, EE=energy efficiency, GoP=Government of the Philippines, IBRD=International Bank for Reconstruction and Development, IFC=International Finance Corporation, RE=renewable energy, WBG=World Bank Group

Note to Table 4: ^a A CTF grant of \$1 million is requested for fine-tuning of technology options, technology transfer, local industry support and capacity building (implementation support, including monitoring and evaluation activities will be financed by the ADB loan).

V. POTENTIAL IMPACTS OF PROPOSED CHANGES ON INVESTMENT PLAN OBJECTIVES

29. The proposed changes will (i) enhance the cleaner transport program by using CTF resources to accelerate investment in advanced electric vehicle systems, and (ii) contribute to the near-term EE investment program. An assessment of potential impact of the proposed changes on achieving the objectives and targets of the original investment plan is summarized in Table 5 and discussed below. A comparison of proposed results indicators is presented in Table 6.

Table 5: Summary Assessment of Proposed Changes

CTF Investment Criteria	Original Investment Plan: Net Metering with Solar PV	Updated Investment Plan: EE and E-trikes Projects
Potential for GHG Emissions Savings	Direct reductions would be relatively modest but replication and scale-up potential is quite high as the investments would promote GHG reductions through RE and EE.	ADB program will target end-use efficiency improvements which represent permanent energy savings via avoided generating capacity and avoided fuel imports. Replication and scale-up potential is high for both EE and electric vehicles.
Cost-effectiveness	Initial direct reductions of 100,000 tCO ₂ e per year with 10 to 1 replication and scale-up potential <u>Cost effectiveness^a</u> : CTF\$125 million / 1 MtCO ₂ e per year = CTF\$125 / ton / year	<u>EE project</u> : 10 – 30% annual electricity savings are expected at a cost of 1/3 or less of new generating capacity. Energy savings of about 250 gigawatt-hour per year are expected to deliver GHG reductions of about 125,000 tCO ₂ e per year. Replication and scale-up potential is at least 10 to 1. <u>Cost effectiveness</u> : CTF\$24 million / 0.125 MtCO ₂ e per year = CTF\$192 / ton / year, declining to CTF\$19 / ton / year with replication and scale-up. <u>E-trikes project</u> : 100,000 vehicles will deliver 500,000 tCO ₂ e per year. Replication and scale-up potential is at least 20 to 1. <u>Cost effectiveness</u> : CTF\$101 million / 0.5 MtCO ₂ e per year = CTF\$202 / ton / year, declining to CTF\$10 / ton /year with replication and scale-up
Demonstration Potential at Scale	Transformation potential ^b of at least 10	Transformation potential is estimated to be > 10 for EE and > 20 for e-trikes
Development Impact	The proposed investment would demonstrate viability of the net metering system (and business model) and accelerate development of the solar PV industry in the Philippines	The EE and E-trikes projects will accelerate growth of the EE and electric vehicle industries in the Philippines by demonstrating new technology / systems and business models. Impacts with respect to energy security and environmental benefits should be higher than the original CIP; impacts on employment also may be higher than the original CIP given the potential benefits accruing to e-trike owner/operators.

Implementation Potential	As the implementing rules and feed-in tariff for net metering have not been finalized, the originally proposed project is not ready for implementation.	The e-trikes project has been developed based on a successful pilot project in the Metro Manila region and is at an advanced stage of preparedness. The EE project is in early development and is tentatively scheduled for ADB Board consideration in 2012. See Table 7 for discussion of implementation risks and mitigation.
Additional Costs and Risk Premium	The additional costs of the solar PV systems and first-mover risk associated with net metering clearly justified the use of CTF resources.	The proposed projects will focus on using CTF for covering additional costs associated with introduction of electric vehicle systems and for covering additional costs and first-mover risks in EE investments (see Appendices 1 and 2).

^a Cost-effectiveness was not clearly elucidated in the original Investment Plan but is calculated here as shown.

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

Table 6: Results Indicators

Results Indicator	Baseline	Expected Program Results in Original CIP: Net Metering with Solar PV	Expected Program Results For EE and E-trikes Projects
Cost of solar power units	\$18,000 with 9.8 year payback	\$10,000 with 2.5 year payback ^a	n/a
Number of commercial buildings with solar panels and net metering	Limited	30,000 buildings	n/a
Number of e-trikes and support infrastructure in commercial operation	20 (with lithium ion batteries, post-pilot test) and about 200 using conventional lead acid batteries and less efficient motors.	n/a	15,000 e-trikes operating by 2013 and about 100,000 by 2016. Public charging infrastructure and battery leasing established in respective regions.
Overall quality of appliances in the Philippines	Most commonly used 32 inch TV wattage is 100 Watt to 125 Watt	n/a	Benchmark Wattage established (40 Watt – 50 Watt). At least 50% of TV Wattage is below 60 Watt by 2015. Similar benchmark for (Computer monitors, refrigerators, room air-conditioners and fans)

Notes: ^a Indicators are from Table 1 of Executive Summary of the original CIP.

Source: October 2011 Joint Mission

30. **Transformational impact will be enhanced.** The scope of transport sector intervention will be expanded relative to the original CIP, bringing additional value by opening a new “window” for deploying sustainable transport systems. More efficient battery technologies are providing a cleaner alternative to pollution-emitting internal combustion engines. In many cases, conventional motorcycles emit more pollution than large SUVs because they are not equipped with equivalent emissions-control technology.⁵ Electric motorcycles and tricycles can

⁵ The Technology Review, published by MIT, 2007, available at: <http://www.technologyreview.com/energy/19069/>

immediately eliminate tailpipe emissions, significantly reducing urban air pollution. Commercial success of e-trikes can be replicated in other types of vehicles, including jeepneys and buses.

31. **Emissions reductions from the EE and e-trikes investments will be higher than the original investment plan, with higher replication and scale-up potential.** The direct investments in EE and E-trikes projects will result in avoided fossil fuel emissions of about 0.86 million tCO_{2e}/y, but with better cost-effectiveness and higher replication and scale-up potential than the original CIP (as shown in Table 4). The e-trikes project will bring environmental and public health co-benefits equal to or greater than that which would be realized under the original Investment Plan.

32. **Replication and scale up potential will be higher than originally planned.** Commercial deployment of e-trikes will expand the urban transport program beyond the original CIP. The replication potential for e-trikes is at least 20 to 1, and replication for EE investments is well over 10 to 1. Using CTF to cofinance investment on these types of pioneer projects will eliminate first-mover risk and will help mobilize future commercial investment for replication and scale up.

33. **Development impacts and co-benefits will be maintained or enhanced.** Expanded investment in EE and new investment in electric vehicles will improve energy security, reduce GHG emissions, and reduce conventional pollutant emissions with substantial public health benefits. Using CTF to cofinance these types of pioneering projects will help mobilize future commercial investments for replication and scale up, which will stimulate economic growth and facilitate the long-term transition to low-carbon development.

34. **Implementation potential for the EE and E-trikes projects is high.** The E-trikes project is nearing the appraisal stage and is scheduled for presentation to ADB's Board of Directors in December 2011. The EE project is under preparation and is expected to be presented for ADB Board consideration in the first half of 2012. Risks and mitigation measures are summarized in Table 7.

35. **Additional costs and risk premiums justify use of CTF.** The e-trikes and EE projects are both first-of-a-kind in the Philippines, and the e-trikes project will be the largest effort in the Asia region to begin electrification of the public vehicle fleet. These pioneer projects face first-mover risk, and present higher-than-normal end-user costs with respect to purchase of new vehicles and appliances. Lower operating costs will offset the initial purchase costs, but at present there is no mechanism to monetize the life-cycle savings to assist end-users in the initial purchase.

36. Carbon finance is increasingly at risk due to post-2012 market uncertainties. Carbon finance opportunities will be pursued but any revenue is expected to be "on delivery" and will not be sufficient to catalyze up-front investment. Also, any CDM funds are uncertain until registration with the UN, which typically occurs after the projects' financial close.

Table 7: Risks and Mitigation Measures

Risk	Mitigation Measure	Residual Risk
Policy and regulatory framework: Clarity of policies related to EE and cleaner transport	<ul style="list-style-type: none"> High energy prices and price volatility provide macro-economic support to end-use efficiency investments Application of innovative financing to cover part of front-end capital costs and to reduce first-mover risks 	L
Implementation Capacity: Readiness of owner-operators to procure and operate electric vehicles	<ul style="list-style-type: none"> Technical assistance to transfer know-how on project planning, financing, risk management, especially for pioneering projects 	L/M
Technology: Limited know-how for after-market service of electric vehicles	<ul style="list-style-type: none"> Technical assistance and know-how transfer for newly-introduced electric vehicles will be provided based on experience from pilot project 	M/H
Finance:	<ul style="list-style-type: none"> E-trike operators are expected to improve net income by 50% Carbon finance will be mobilized to the maximum extent possible, including prospective post-2012 carbon revenue. 	L/M
Environmental Management: Management and disposal of used appliances and batteries	<ul style="list-style-type: none"> Battery leasing and recycling programs are integrated into the e-trikes projects. Recycling / de-manufacturing program will be included in the EE project Rigorous application of GoP regulatory framework and ADB safeguards for environmental and social impact 	L
Development Impact: Mobilization of investment for replication and scale-up	<ul style="list-style-type: none"> Work closely with vehicle owners, business associations, and domestic financial institutions to raise awareness and promote future investment in EE and electric vehicles. 	L
Carbon finance delivery risk: Verification bottlenecks are currently delaying annual payments and affecting the financing structure of large scale transactions. Adders may preclude demonstration of CDM additionality.	<ul style="list-style-type: none"> Coordinate with ADB Future Carbon Fund to identify opportunities to maximize potential carbon revenues, and reduce or eliminate delays in methodology and verification processes Consider voluntary transaction in secondary carbon markets 	M/H
Procurement : Limited number of global suppliers for electric vehicle technologies may limit competition in some instances	<ul style="list-style-type: none"> Competitive bidding will be utilized in accordance with MDB and GoP requirements. 	M/H
Overall risk after mitigation	Moderate	

Appendix 1: Market Transformation with Electric Tricycles (ADB)

Problem Statement

1. The Philippines transport sector accounted for about one-third of total GHG emissions in 2009 (excluding emissions from land use change and forestry); transport sector emissions have increased by about 6-10% per year since 1990, from about 10 million tons per year carbon dioxide equivalent (MtCO₂e/y) in 1990 to about 29 MtCO₂e/y in 2007.⁶ Vehicles are one of the dominant sources of urban pollution that threatens both people's health and economic activity. In the Philippines, motorcycles and tricycles comprise more than 52% of vehicle population. Compared to other vehicles, motorcycles and tricycles are less expensive. They are very visible in most cities of the country and play an important role in the transport market particularly used as alternative mode transport for short distances. However, the use of these vehicles contributes to the already declining state of the environment, particularly air quality in urban areas. In an ADB study, transport sector emissions accounted for 30% of air pollution in the Philippines and about 80% of air pollution in Metro Manila.

2. Accounting for the total energy consumed from well to wheel⁷, electric vehicles can reduce energy consumption by up to 50% and greenhouse gas emissions by up to 60% compared to internal combustion engine (ICE) vehicles. Electric vehicles will also reduce greenhouse gases and other harmful emissions because: (i) electric vehicles use no electricity while stranded in traffic jams (no air conditioning), (ii) electric motors have higher efficiencies than internal combustion engines, and (iii) transmission and distribution of electricity is more efficient and cost effective than transportation of liquid fuels to the end user.

3. In the Philippines, a typical tricycle driver uses about \$5 worth (20 liters) of gasoline to drive 100 km in a day and can save about \$4 a day by switching to an electric tricycle—for 100 km, an electric tricycle will consume about 5 kWh of power costing about \$1⁸. With large-scale adoption, these individual savings would accumulate to a significant national savings. Replacement of 100,000 gasoline tricycles with electric tricycles at a cost of about \$450 million, for example, can generate about \$175 million each year from avoided fuel costs. Although the daily and life-cycle cost savings favor electric tricycles, there is no ready mechanism to monetize these savings for acquisition and deployment of electric vehicles at fleet scale.

Proposed Transformation

4. CTF cofinancing will be utilized to overcome the first-mover risks and cost barriers associated with introducing electric tricycles as a first step in electrification of the public vehicle fleet: the proposed project will facilitate deployment of 100,000 e-trikes. This will be the largest known project of this scope implemented in the Asia-Pacific region. The project outputs include: (i) e-trike procurement, (ii) battery leasing, (iii) efficient electric motor supply chain, (iv) public charging stations, (v) recycling and disposal, and (vi) communication, social mobilization, and technology transfer. CTF funds will be used alongside ADB's loan to amortize up-front capital costs over a longer period than otherwise possible.

5. Successful demonstration of the electric vehicles at this scale will facilitate replication and scale up of e-trikes and other public vehicles including jeepneys and buses. Further, development of local battery suppliers and maintenance/service industries will be fostered.

⁶ CTF Investment Plan for the Philippines. Paragraph 8 and Figure 3.

⁷ Energy consumed and greenhouse gases (GHGs) emitted from the time a vehicle's energy source leaves the well to the time it is consumed by the vehicle, details available at: http://web.mit.edu/evt/summary_wtw.pdf

⁸ Assuming cost of electricity of \$0.20 / kWh in the Philippines.

Implementation Readiness

6. The E-trikes project is nearing the appraisal stage and is scheduled for presentation to ADB's Board of Directors in December 2011. The Government is working on an electric vehicle policy⁹, which among others, will exempt importation of all electric and vehicle free of taxes for 9 years. In addition there will be others incentives to set up electric vehicle businesses in the Philippines.

Rationale for CTF Financing

7. Electric vehicle deployment is both constrained and favored by several factors:

- Commercial development and deployment of electric vehicles will increase Philippines's energy security, save foreign exchange, and protect against global price fluctuations by using non-tradable domestic energy sources.
- Fleet-scale electric vehicle projects are at the pioneer stage and face additional costs and risks which are not being covered by conventional project financing. Creative financing approaches, including the use of concessional funds, are needed overcome first-mover risks and mainstream large-scale vehicle fleet financing.
- Carbon finance can provide some financial support, but is not sufficient to overcome the cost and risk barriers noted above.
- CTF can provide a catalytic role in reducing or eliminating first mover risk for fleet-scale projects, and foster accelerated replication and scale-up in the near term.
- The replication potential for e-trikes alone more than 20 to 1.
- GHG reductions and cost-effectiveness are comparable to or better than the original CIP (as discussed in the main text).

Financing Plan

Source	Amount (US \$ million)
GoP	99
ADB	300
CTF (loan)	100
CTF (grant) ^a	1
Total	500
Carbon Finance ^b	20

^a A CTF grant of \$1 million is requested for fine-tuning of technology options, technology transfer, local industry support and capacity building (implementation support, including monitoring and evaluation activities will be financed by the ADB loan).

^b No provision has been made for the carbon finance risks associated with possible lack of agreement on a post-2012 successor to the Kyoto Protocol. The carbon finance estimate is preliminary and subject to further revision, and is not included as upfront project co-financing.

Project Preparation Timetable

Milestone	Date
ADB Project Identification	May 2011
Appraisal / Negotiations	November 2011
ADB Board Consideration (Approval)	December 2011
Project Completion	December 2015

⁹ Senate Committee Report No. 44 on Senate Bill No. 285–Electric, Hybrid and Other Alternative Fuel Vehicles Incentives Act of 2011.

Appendix 2: Accelerated Introduction of Energy Efficient Appliances (ADB)

Problem Statement

1. Under the business-as-usual scenario (2010 – 2030), energy-related emissions from the commercial, industry, power, and residential sectors will increase by 123% from 77.4 MtCO₂e/y to 172.5 MtCO₂e/y.¹⁰ Aggressive development of RE resources and investments in EE throughout the supply chain are necessary to promote energy security and reduce the economic and financial impacts of energy imports and price volatility.
2. The Philippines is leading energy efficiency and use of indigenous renewable energy in the ASEAN region: it was the first country to declare plans to phase out incandescent bulbs and was the first country to establish energy labeling for air-conditioners (1992). In March 2009 ADB approved a loan project and a grant (Philippine Energy Efficiency Project, PEEP),¹¹ to start up a comprehensive energy efficiency program to identify a range of pilot which could be scaled up later.
3. Retail electricity tariffs are the highest in the region after Japan, which should provide a ready market for the most efficient appliances; unfortunately the reality is quite different. The power consumption (wattage) of locally available “best” main consumer appliances (TVs, fans, computer monitor, air-conditioners, refrigerators etc.) consume more than 100% of the “world’s best”. For example, the local “best” of commonly used 32 inch TV (100 Watt) consumes 150% more energy than the world’s best (40 Watt).
4. Based on a recent Lawrence Berkeley Lab report, the global TV market has undergone a quantum transition from cathode ray tube (CRT) TVs to Liquid Crystal Displays (LCDs). It is expected that LCD TVs will represent 90% of global TV market through 2012. At the same time, LCDs using cold cathode florescent lamp backlights are rapidly being replaced by LCDs using light emitting diode (LED) backlights¹². Based on market research, without government intervention, the average power consumption of a typical 32 inch TV will not fall below 100 Watts, as the manufacturers are unwilling to bring the more efficient products to this price-sensitive market. Improving appliance efficiencies requires market intervention and transformation.
5. The Government of the Philippines (GoP) has requested ADB assistance in a longer-term investment program which will build on the success of the PEEP, including accelerated introduction of more efficient appliances - especially TVs, air conditioners, and refrigerators - which account for the bulk of residential electricity consumption. More efficient appliances can reduce household consumption by an estimated 10 - 30%, but the upfront cost presents a barrier to most consumers. At present there is no mechanism to monetize the life-cycle savings of more efficient appliances to support consumer purchases.

Proposed Transformation

6. The legal framework and the economic incentives provided by high energy cost have not been sufficient for adoption of clean energy and EE by ordinary citizens and businesses. The recent development in EE actually is growing the technology divide, most evident by average citizen's ignorance not just of how to utilize EE in everyday life but more importantly in even

¹⁰ Emissions data are from APEC Energy Demand and Supply Outlook of 2006.

¹¹ ADB 2009. Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Republic of the Philippines for the Philippine Energy Efficiency Project.

¹² Display Research (2011) Global TV Shipment Growth Improves to 15% Y/Y in Q4'10 as LCD Share Surges http://www.displaysearch.com/cps/rde/xchg/displaysearch/hs.xml/110222_global_tv_shipment_growth_improves_to_15_y_y_in_q4_10_as_lcd_share_surges.asp

knowing what technology choices they have. The proposed project will bridge the growing technology-divide between the informed (often public sector and the rich among the population) and the ill-informed (non-urban and poor) by attacking it from two different angles: usability (through implementation) and education (through awareness). In addition, the project will incorporate the three proven elements from the CFL distribution component of the PEEP which set it apart from similar initiatives: (i) *scale economy*-bulk procurement of 13 million CFLs reduced unit cost by more than 60 percent of the retail price, (ii) *improve technology credibility*-the consumer markets were made aware of the benefits of the technology and pushed "10,000 hour" bulbs when the local market only carries CFLs with life between 1000 and 6,000 hours, and (iii) *CDM ready*-being a large project, it qualified and was able to finance the initial costs for CDM under the "Program of Activities" approach. The "CFL experience" has taught all a lesson: compelling economics, short-payback periods and friendly regulation is not sufficient for "big-bang" large impact changes, which is only possible with large investments that can "shake up" the existing paradigm and mindsets which are often the main barrier to new technology investments.

7. As part of GoP's plan to scale up the PEEP success, a new project is being prepared to support the long-term EE investment program. The proposed project will transform the appliance market which comprises (i) about 5 million air-conditioners which are more than 5 years old, (ii) 10-15 million refrigerators in the market, (iii) 7 million TV sets (with 1 million cable subscribers), (iv) more than 2 million computer monitors, and (v) close to 30 million in-efficient fans.

8. The project will purchase about 200,000 efficient air-conditioners, 150,000 refrigerators, 350,000 fans and 100,000 televisions under the program and a revolving energy efficiency trust fund will be established. The consumers will pay for the appliances over a 36 months hire-purchase scheme. Collectively, the avoided energy consumption will be about 250 GWh and GHG reductions are estimated at 125,000 tCO_{2e} per year.

9. CTF cofinancing will be utilized to support accelerated introduction of more efficient appliances by overcoming the cost barriers to consumers. CTF funds will be used alongside ADB's loan to amortize up-front capital costs over a longer period than otherwise possible. The proposed project is still at the definitional stage; lessons learned from PEEP implementation will be incorporated into project design.¹³

Implementation Readiness

10. The EE project is under preparation and is expected to be presented for ADB Board consideration in the first half of 2012. The GoP is working on additional incentive policies to promote EE investments, including possible import tax waivers for a limited period.

Rationale for CTF Financing

11. Introduction of more efficient appliances is both constrained and favored by several factors:

- Accelerated introduction of more efficient appliances will increase Philippines's energy security, save foreign exchange, and protect against global price fluctuations by using non-tradable domestic energy sources.

¹³ The general approach for accelerated introduction of appliances is not unlike the "cash for clunkers" program for introduction of more fuel efficient vehicles in the United States.

- Consumers face additional costs for more efficient appliances which are not being covered by conventional supplier credit or other retail financing. Creative financing approaches, including the use of concessional funds, are needed to cover additional up-front capital costs to consumers.
- Carbon finance is not expected to overcome the cost barriers noted above.
- CTF can provide a catalytic role in removing the cost barriers for wide scale adoption of more efficient appliances, and foster accelerated replication and scale-up in the near term.
- The replication potential is at least 10 to 1.
- GHG reductions and cost-effectiveness are comparable to or better than the original CIP (as discussed in the main text).

Financing Plan

Source	Amount (US \$ million)
GoP	46
ADB	100
CTF	24
Carbon Finance ^a	5
Total	175

^a No provision has been made for the carbon finance risks associated with possible lack of agreement on a post-2012 successor to the Kyoto Protocol. Carbon finance estimate is preliminary and subject to further revision.

Project Preparation Timetable

Milestone	Date
ADB Project Identification	March 2011
Pilot Project ("TV Olympics")	November 2011
Appraisal / Negotiations	April 2012
ADB Board Consideration (Approval)	December 2012
Project Completion	June 2016