

Clean Technology Fund  
Investment Plan for the Philippines



## TABLE OF CONTENTS

|      |   |    |
|------|---|----|
| I.   | INTRODUCTION .....                                  | 1  |
| II.  | COUNTRY AND SECTOR CONTEXT.....                     | 1  |
|      | Challenges and Opportunities.....                   | 3  |
| III. | PRIORITY SECTORS FOR GHG EMISSION REDUCTION.....    | 6  |
| IV.  | RATIONALE FOR SELECTED SECTORS .....                | 16 |
|      | Energy.....   | 16 |
|      | Transport.....                                      | 19 |
| V.   | ENABLING POLICY AND REGULATORY ENVIRONMENT.....     | 20 |
| VI.  | IMPLEMENTATION POTENTIAL AND RISK ASSESSMENTS ..... | 24 |
| VII. | FINANCING PLAN AND INSTRUMENTS .....                | 25 |
|      | REFERENCES .....                                    | 27 |

### ANNEXES:

|          |  |    |
|----------|--|----|
| Annex 1. | Energy Efficiency and Renewable Energy Program (IBRD/DBP; IFC) ..... | 28 |
| Annex 2: | Mainstreaming Solar Power to Mitigate Climate Change (ADB) .....     | 1  |
| Annex 3: | Urban Transport Program (IBRD) .....                                 | 1  |

**I. INTRODUCTION**

1. This Clean Technology Fund (CTF) Country Investment Plan (CIP) is a proposal for the use of the CTF resources in the Philippines, including a potential pipeline of projects and notional resource envelope. The CIP is a “business plan” developed by the government of the Philippines (GOP) in agreement with the Asian Development Bank (ADB), the International Bank for Reconstruction and Development (IBRD), and the International Finance Corporation (IFC).

2. The CIP is based on the country’s Medium-Term Philippine Development Plan, 2004-2010 and Comprehensive Integrated Infrastructure Program (CIIP) 2009-2013, the Philippine Energy Plan (PEP) 2008-2030, the Climate Change: Philippine Response, Strategic Framework and Action Plan (2007), the National Environmentally Sustainable Transport Strategy (NESTS), and other relevant sector development policies and programs. This CTF investment plan is a dynamic document and this version is based on the economic development plans and the GOP investment programs and mature project proposals considered at this time. This CIP is consistent with, and will be an integral part of the programs of the ADB, IBRD, and IFC.

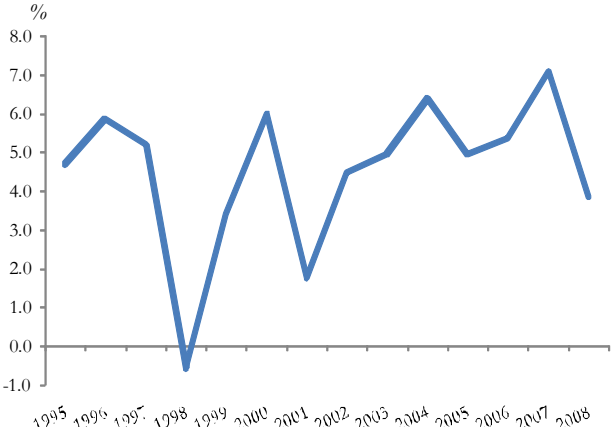
**II. COUNTRY AND SECTOR CONTEXT**

3. The key development objectives of the GOP are elucidated in the Medium-Term Philippine Development Plan 2004-2010 which includes targets for high levels of pro-poor sustainable growth and achieving the Millennium Development Goals (MDGs).

4. The Philippines is the world’s second largest archipelago with a diverse population of 89 million. It is reasonably well-endowed with natural resources including copper, gold, nickel, timber, and marine biodiversity. There are limited commercial reserves of fossil fuel, mainly natural gas and coal, but commercial scale geothermal energy and hydropower resources are currently being harnessed to meet power needs.

5. The country experienced economic contraction in 1998 as an aftermath of the Asian financial crisis, after which the economy has performed reasonably well in the past several years. The year 2007 ended with the highest economic growth in decades, benign inflation, a strong balance of payments position, and an improving public sector fiscal situation. But this strong performance has not translated into poverty reduction. Between 2003 and 2006, poverty incidence increased from 30 percent to 33 percent despite average gross domestic product (GDP) growth of 5.4 percent. Both urban and rural poverty increased on average and only 4 of the 17 regions recorded improvement in the poverty headcount. Falling real incomes of families and compression of public spending contributed

**Figure 1: GDP Growth**

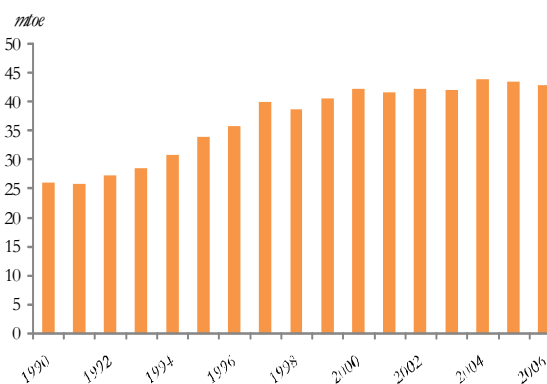


to the rise in poverty. There is mixed progress in achieving the MDGs. It is therefore the aim of the GOP to include poverty alleviation as one of the outcomes of the CTF assistance.

6. As substantial investments in infrastructure are needed, the GOP has sought joint initiatives with the private sector with total investments estimated at US\$5.6 billion under the Comprehensive Integrated Infrastructure Program, 2009-2013. Reforms, including improved investment climate and a more robust financial sector, are being pursued in order to encourage private sector participation. The GOP has fully realized that it needs to boost its development spending to attain the MDGs by 2015 and is implementing a resiliency program to counter the economic downturn.

7. Growth in energy use and the associated greenhouse gas emissions have accompanied the economic expansion seen after the recovery from the Asian financial crisis (see Figures 1, 2, and 6). About 56 percent of the Philippines energy demand is met by indigenous resources including coal, natural gas, hydropower and traditional biomass energy. The Philippines is one of few countries in the world where renewable energy (RE) accounts for the largest share (43 percent) of total primary energy supply (Figure 4). However, starting in 2002, there has been increasing use of natural gas for power generation with the commercial operation of the Malampaya gas fields. Likewise, the share of coal to total primary energy supply has risen from five percent in 1990 to 16 percent in 2007. In terms of overall greenhouse gas (GHGs) emissions, the Philippines is ranked 39th in the world in 2005 with about 142 million tons of carbon dioxide equivalent (MtCO<sub>2</sub>e), excluding emissions due to land use change.<sup>1</sup> Principal GHG emissions sources are the power and transport sectors (Figure 5).

**Figure 2: Energy Consumption**



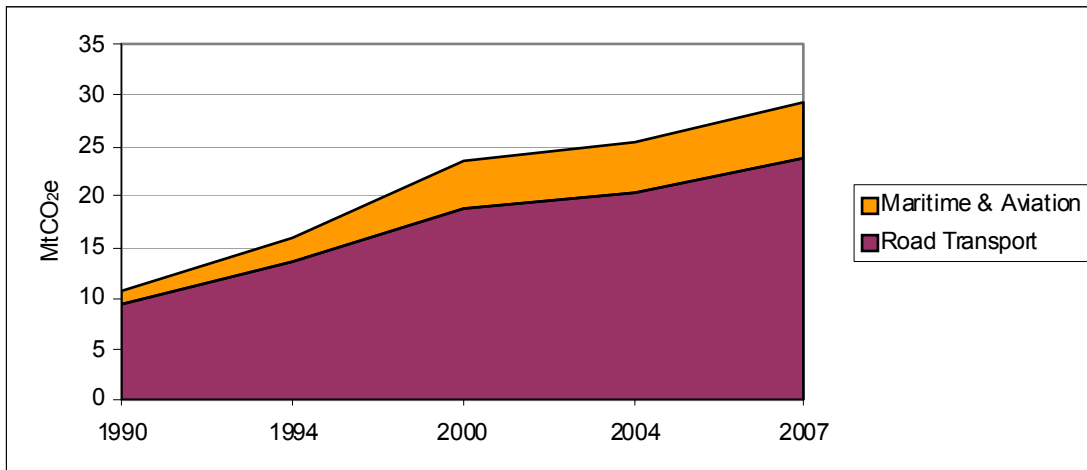
8. The transport sector's contribution to Greenhouse Gas (GHG) emissions in the Philippines has increased significantly both in absolute and relative terms since 1990. CO<sub>2</sub>emissions associated with the transport sector have risen from an estimated 6-10 million tons of CO<sub>2</sub>equivalent (MtCO<sub>2</sub>e) in 1990 to about 29 MtCO<sub>2</sub>e in 2007, an annual increase of about 6-10 percent (see figure 3).<sup>2</sup> Of additional concern to the government is the more than doubling of the relative share of transport in CO<sub>2</sub>emissions from about 15 percent of total emissions (excluding those from land use and forestry) in 1990 to about one third today.

9. Based on the current growth rates in motorization of about 6 percent, and the projected increase in urban population by 35 million by 2030,<sup>3</sup> emission contributions from road transport,

<sup>1</sup> Climate Analysis Indicators Tool (CAIT) Version 6.0. (Washington, DC: World Resources Institute, 2009).  
<sup>2</sup> Six MtCO<sub>2</sub>e is based on the World Resources Institute's estimates, while 10 MtCO<sub>2</sub>e is based on the 2006 IPCC guidelines for estimating fuel emissions.  
<sup>3</sup> Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision, <http://esa.un.org/unup>.

estimated at 24 MtCO<sub>2</sub>e in 2007, are projected to increase to 37 and 87 MtCO<sub>2</sub>e by 2015 and 2030 respectively under a business as usual (BAU) scenario. This would not only result in a rapid increase in the country's carbon footprint, but would further exacerbate air quality, increase the already high levels of congestion leading to significant losses in productivity.<sup>4</sup>

**Figure 3: Growth in Transport GHG Emissions, 1990 to 2007**



### Challenges and Opportunities

10. The Philippines faces substantial challenges in order to maintain economic growth in an environmentally sustainable manner, including the need to hedge against the financial and economic risks associated with increasing fossil fuel imports. The GOP recognizes that a low-carbon growth strategy must also be socially acceptable.

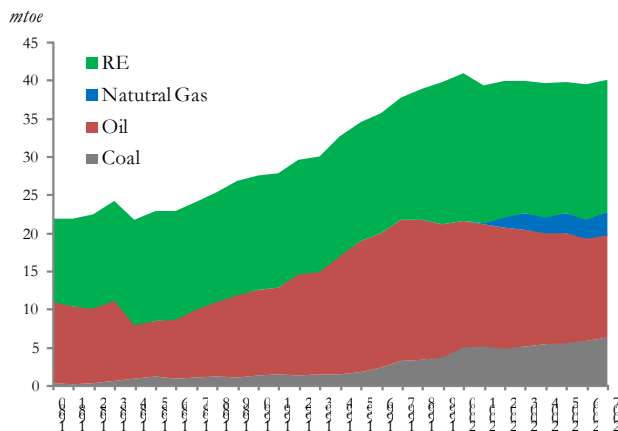
11. Critical reforms have been enacted in the power sector, placing the sector on a full cost recovery basis.<sup>5</sup> By and large, the GOP has implemented substantial power reforms and brought on stream private investment in new power generation projects in keeping with the Philippine Energy Plan 2008-2030. However, the GOP faces considerable challenges in maintaining competitive electricity prices while balancing environmental concerns as RE options have higher capital costs compared with fossil fuel based power generation. The government recognizes that some estimates show that under a business as usual scenario, 50 percent of installed electricity generation capacity by 2030 will be accounted for by coal (APEC, 2006). The shift towards using more coal to meet power expansion needs is primarily driven by cost consideration despite the availability of renewable energy resources. Least-cost expansion scenario for power favors coal with a cost of \$60/MWh over small hydro (\$90/MWh), geothermal (\$100/MWh), biomass

4 A study prepared by the National Center for Transportation Studies for NEDA and the Legislative-Executive Development Advisory Council in 2000 indicated that losses due to congestion in Metro Manila alone were around 100 billion Pesos per year in 1996 prices, about 4.6 percent of GDP.

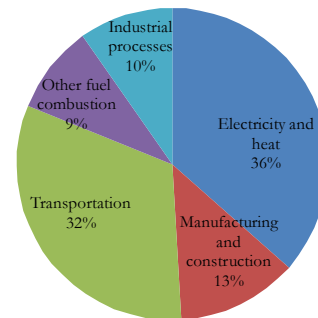
5 The electric power generation subsector has shifted to a purely commercial business with new capacity to be constructed by the private sector. Transmission operations have been converted to a government-owned, concessionaire-operated network, operating on commercial principles with an independent regulator. Distribution systems have been privatized in the major metropolitan areas. Philippine consumers pay some of the highest retail electricity prices in the Southeast Asia region: the average retail tariff is US\$0.22 per kilowatt-hour (kWh).

(\$100/MWh), and Solar (\$160/MWh). The Philippine energy road map, endorsed by the President in 2008, recognizes that technology and modal shifts can be implemented to mitigate power and transport sector emissions growth in the near future with a strong effort to address renewable energy development, transmission and distribution system optimization, transport fuels, vehicle technology, infrastructure, and behavioral changes.

**Figure 4: Total Primary Energy Supply (1980-2007)**

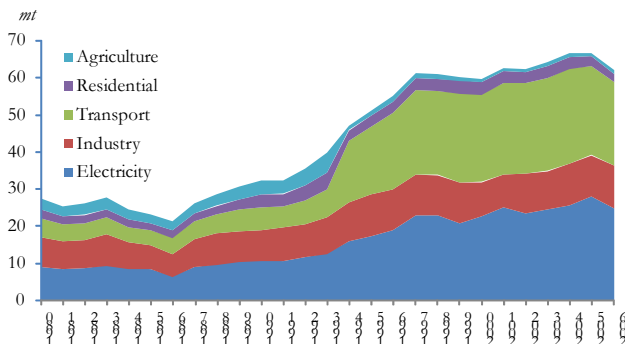


**Figure 5: GHG Emissions by Source, 2005\***



\*excludes land use change, agriculture, and forestry

**Figure 6: CO<sub>2</sub> Emissions From Fossil Fuels**



Source: World Bank, IEA and CAIT/World Resources Institute

12. As part of its low-carbon strategy, the GOP has opted to phase out petroleum as a primary fuel for power generation, with petroleum fuels used primarily for the transport sector. Biofuels have been given a prominent role in liquid fuel supply with the Biofuels Act of 2006 taking effect in early 2007. Substantial private sector investment is being mobilized for development of first generation biofuels, mainly sugar cane and cassava-base ethanol and coconut methyl ester (CME) for biodiesel. The Biofuels Act mandates that gasoline be blended with 10 percent ethanol (E10) and 5 percent biodiesel blend (B5) by 2011.

13. GOP also continues to promote power sector reforms, and development of renewable energy through private sector investment. In January 2009, the Renewable Energy Act of 2008

(the RE Act) became effective, which includes the establishment of an RE Trust Fund to be capitalized in part by levies on fossil energy use. The National Renewable Energy Board was established in February 2009 to attain the objectives of the RE Act. In May 2009, the DOE released the implementing rules and regulations of the RE Act and in July 2009, created the Renewable Energy Management Bureau (REMB). Specific rules for the RE Act relating to Renewable Portfolio Standard (RPS), feed-in tariffs and net metering for qualified end-users are expected to be released in early 2010.

14. In an effort to further reduce the country's carbon footprint and improve local air quality, President Gloria Macapagal-Arroyo instructed the Department of Transportation and Communications (DOTC) and other transport-related agencies to formulate a National Environmentally Sustainable Transport Strategy (NESTS) for the country. NESTS will promote, among others, the development of Bus Rapid Transit (BRT) systems, expansion of the urban rail network in Metro Manila, deployment of hybrid vehicles in the public transport fleet, and acceleration of fuel-switching in certain public transport modes.

15. Apart from these transport and environmental management strategies, technical assistance of development partners such as ADB, AusAID, IBRD, JICA, and USAID have supported the GOP in its pursuit of transport policy and institutional reforms to improve governance, enforcement and ensure efficient and effective transport systems which also contributes to the reduction in GHG emissions. Notable of these are the AusAID Partnership for Economic Governance Reform (PEGR) reform agenda projects, ADB and JICA road sector projects and programs for the country and the IBRD's road policy programs for improving efficiency in the Department of Public Works and Highways (DPWH) and urban transport programs with DOTC and Metro Manila Development Authority (MMDA).

16. The Philippine Government's response to the climate change challenge has been active institutionally noting the recent restructuring of the Presidential Task Force on Climate Change. On October 24, 2009, the Climate Change Act of 2009 was signed into law. Under this new law, a national climate change action plan would be prepared that would include roadmaps for mitigation with emphasis on voluntary reduction of local carbon emissions, and adaptation with focus on disaster risk reduction. The law created a Climate Change Commission, an autonomous policy-making body attached to the Office of the President tasked with coordinating, monitoring and evaluating programs and action plans, and will represent the country in international fora.

17. The international donor community, including development partners such as the ADB, the United Nations International Strategy for Disaster Reduction (ISDR), the Millennium Challenge Corporation (MCC), and the United Nations Development Programme (UNDP), is actively engaged in addressing climate change in the Philippines. There are several initiatives on capacity building for GHG accounting, monitoring and reporting, for preparation of a second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC),<sup>6</sup> governance, renewable energy, urban air quality management, and forest management.

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<sup>6</sup> Philippines' initial national communication on climate change prepared in December 1999 with UNDP/GEF support.

### III. PRIORITY SECTORS FOR GHG EMISSION REDUCTION

18. The GOP recognizes that the power and transport sectors are the highest emitters of GHGs and is focusing its attention on interventions within the three broad areas listed below to reduce GHG emissions.

- (i) Supply and demand side energy efficiency, including grid optimization and initial investments in smart grid technology, as well as urban energy efficiency;
- (ii) Renewable energy, including biomass and solid wastes, geothermal, hydropower, solar, and wind; and
- (iii) Transport systems, including BRT, advanced vehicle technology, urban rail, motor vehicle inspection and emission systems, and wider use of biofuels.

19. The GOP's goals and objectives for RE development are strongly linked to future reductions in GHGs. These objectives are

- (i) Increase RE based capacity by 100 percent in ten years;
- (ii) Be the number one geothermal energy producer in the world;
- (iii) Be the number one wind energy producer in Southeast Asia;
- (iv) Double hydro capacity with additional 3,000 MW;
- (v) Be the solar cell manufacturing hub in ASEAN; and
- (vi) New contribution from biomass, solar, and ocean energy by more than 100 MW.

#### **Emission Reduction Scenarios**

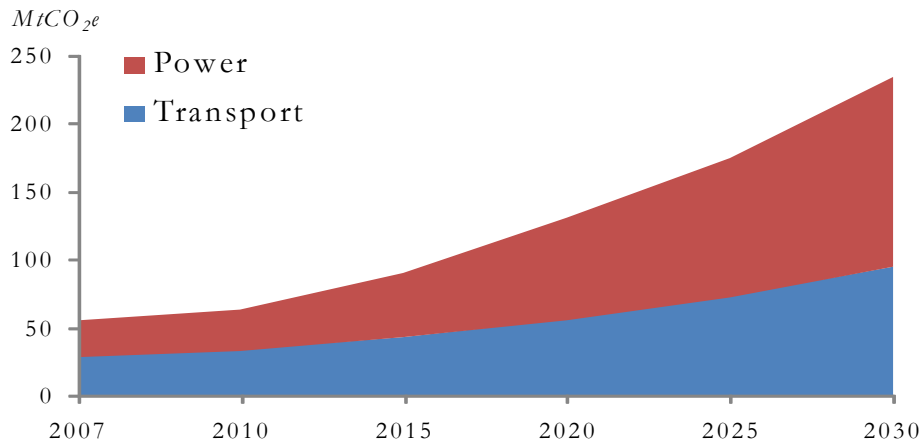
20. Under a business as usual (BAU) scenario (World Bank, 2009), total GHG emissions are projected to increase most rapidly in the power and transport sectors.<sup>7</sup> Dependence on imported coal for power generation and petroleum for transport will increase under this BAU scenario considering least-cost options. During the period 2007-2030, power emissions will increase from less than 30 to about 140 MtCO<sub>2</sub>e/y or more than 400 percent increase, with coal power plants accounting for 96 percent of total CO<sub>2</sub>e emissions by 2030, and transport sector emissions will increase from 37 to over 87 MtCO<sub>2</sub>e/y (or about 133 percent increase (Figure 7)).<sup>8</sup>

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<sup>7</sup> Table 1 presents the details of the interventions considered for all scenarios.

<sup>8</sup> Results from "APEC Energy Demand and Supply Outlook of 2006 (Online at: <http://www.ieej.or.jp/aperc>) are also pointing to similar trends in CO<sub>2</sub> emissions.

**Figure 7: Baseline GHG Emissions Estimates for the Power and Transport Sectors**



Source: World Bank (2009)

21. World Bank (2009) evaluated two alternative scenarios referred to as the medium and aggressive (low-carbon) scenarios. The power sector study's medium scenario aimed for modest reductions targeting 10 percent energy efficiency (EE) across all sectors and doubling RE by 2030. The low-carbon scenario shows an aggressive low-carbon pathway, pushing intensive wind power and solar PV RE generation and 15 percent lowering of demand due to EE, resulting in emission levels at just 30 percent of the BAU level in 2030 (see Figure 8). By 2030, installed RE capacity under the aggressive low-carbon scenario will reach 17GW, a three-fold increase from the baseline scenario

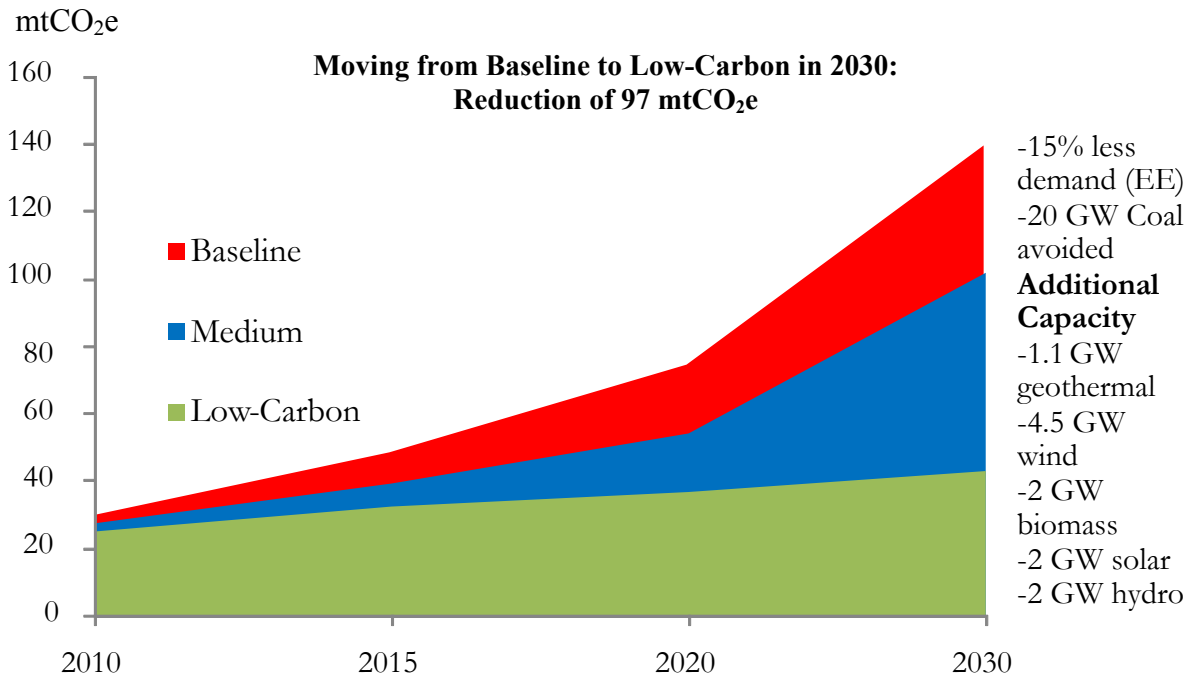
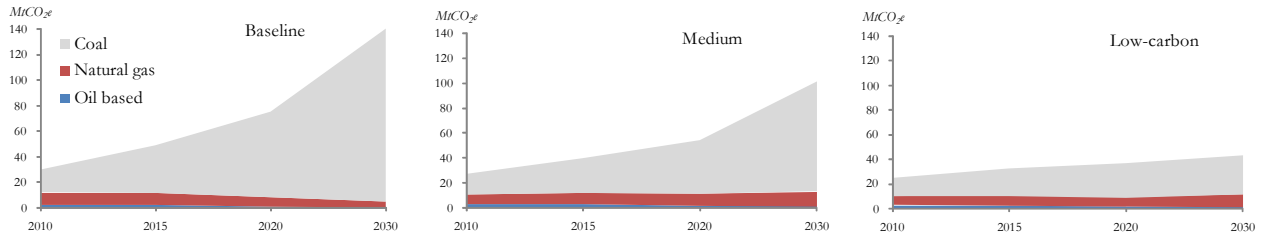
22. For the power sector, energy efficiency programs present a huge potential for mitigation with negative abatement cost (see Figure 10), meaning, the cost of reducing consumption, hence reducing emissions, through energy efficiency is less than the cost of additional coal power plants needed to supply the baseline demand. On the supply side, fuel switching from coal to natural gas, hydro and wind present large mitigation potential at an incremental cost of less than US\$50/tCO<sub>2e</sub>, with wind power providing the highest mitigation potential.

23. The analysis indicates that substantial GHG reductions are possible in the transport sector in the medium and low-carbon scenarios. Transport sector emissions in the low carbon scenario are 62 percent less compared with the BAU level in 2030, due to the use of mass transit systems, traffic demand management schemes, vehicle efficiency measures and a higher mix of biofuels (see Figure 10). The wider use of biofuels would account for about 70 percent of the reduction; while measures to reduce vehicle usage and increase the modal share of mass transit would account for 15 percent of the reduction in GHG emissions. The balance is attributed to measures to enhance the efficiency of vehicles and reduce their gas consumption. Tables 1 and 2 provide the detailed components of the low and medium-carbon scenarios.

24. The main differences between the two scenarios in transport lies in meeting desired targets earlier as well as in scaling up faster under the low carbon scenario. The medium scenario targets, among others, 50 km of BRT systems in Metro Manila and Cebu, organized bus route enhancement, north and south extensions of the Light Rail Transit (LRT) 1, 56 percent inspection of the total vehicle population and 5,000 buses to be converted to compressed natural gas (CNG). Targets for the low carbon scenario include 100 km of BRT systems in Metro Manila, Metro Cebu, and other cities, construction and expansion of more LRT lines, fully financed road maintenance, nationwide coverage of vehicle inspection and conversion of 50 percent of buses into CNG.

25. The cost-effective low-carbon strategy for the transport sector includes a diverse and integrated package of measures that promotes biofuels, low-cost vehicle efficiency improvements and transport demand management, including BRT development, promoting the shift to lower-emitting transport modes (see Figure 10). Similar to energy efficiency interventions, several of the transport mitigation options have negative abatement costs due to the positive economic benefits of these projects.

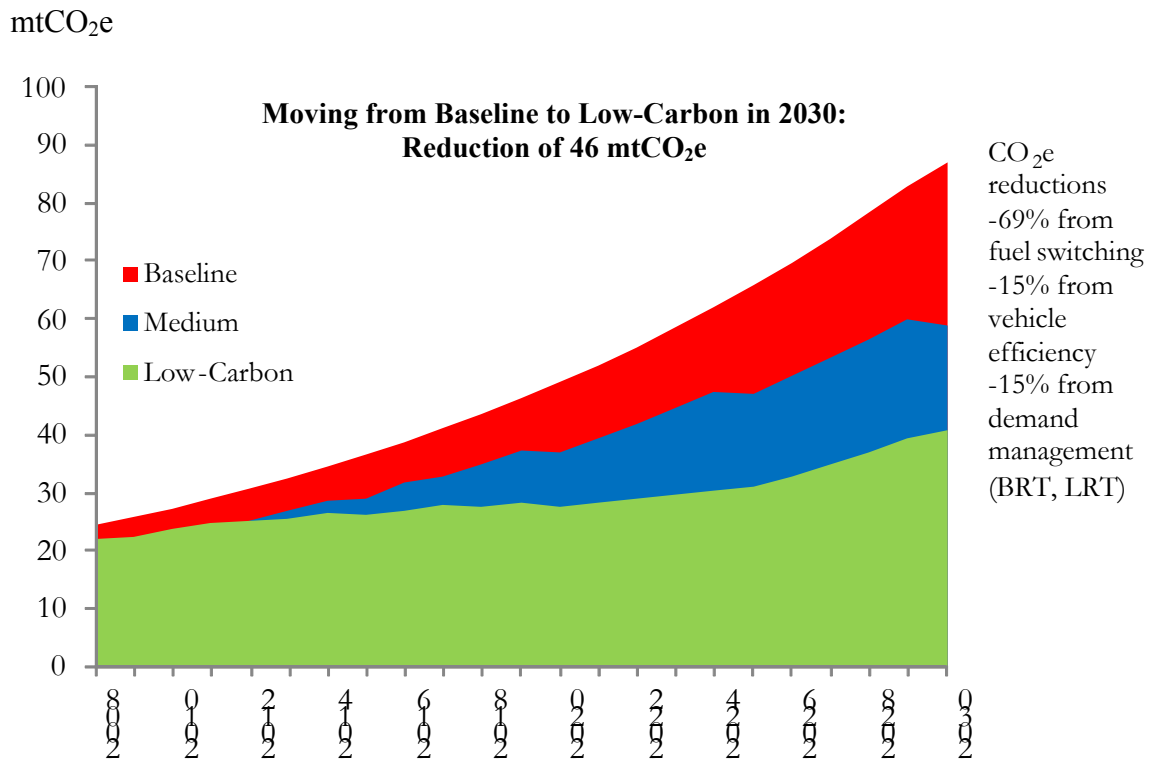
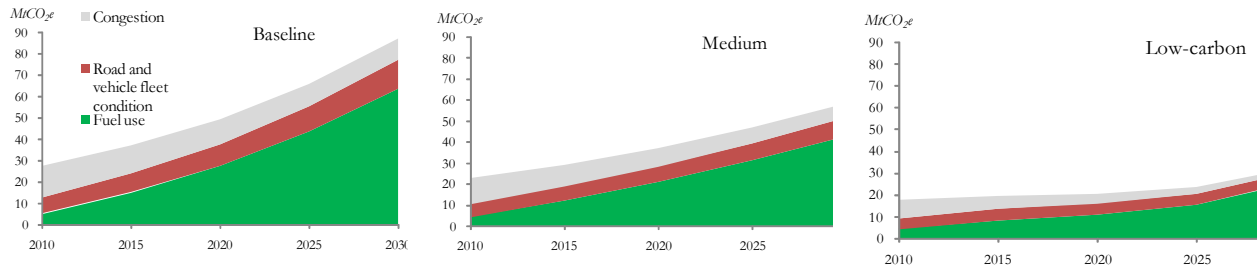
**Figure 8: Power Sector Emissions Reduction Scenarios, 2010–2030**



World Bank (2009)

- \* The medium scenario targets a 10 percent reduction in power demand due to energy efficiency improvements coupled with a shift from coal to lower emission technology like natural gas-based power generation and renewable energy-based power generation that includes hydro, geothermal, wind, and biomass (doubling RE capacity) .
- \*\* The low-carbon targets assumes a 15 percent reduction in power demand due to energy efficiency improvements and an aggressive roll out of wind and biomass (40 times more than the baseline) and an ambitious target of 2,000 MW installed solar power from the baseline projection of 1 MW.

**Figure 9: Transport Sector Emissions Reduction Scenarios, 2010-2030**



Source: World Bank (2009)

\* The medium scenario targets, among others, 50 km of BRT systems in Metro Manila and Cebu, organized bus route enhancement and north and south extensions of the Light Rail Transit (LRT) 1. In addition, 56 percent of total vehicle population will be targeted for inspection and 5,000 buses will be converted to compressed natural gas (CNG).

\*\* The low-carbon scenario targets, among others, 100 km of BRT systems in Metro Manila, Metro Cebu, and other cities. It also includes construction and expansion of more LRT lines, fully financed road maintenance and improvements, nationwide coverage of vehicle inspection and conversion of 50 percent of buses into CNG.

26. Based on the trends in emission growth, policy conditions affecting primary energy supply and demand, and estimated abatement costs, the GHG reduction priorities are in the electric power and transport sectors which account for about 64 percent of total energy CO<sub>2</sub> emissions (see Figure 5). The NEDA Board's Cabinet-level Infrastructure Committee has identified an ambitious CTF Investment Plan that focuses its interventions in laying out the foundations for a transformation of the energy sector in a way that will:

- ***Distributed Generation through Renewable Resources.*** Match the archipelago configuration of the country, this will be done by facilitating, in the short-term, distributed generation projects through scaling-up of renewable energy resources, this will displace about MW 300-400 of coal generation;
- ***Energy Efficiency through:***
  - ***Demand Side Management.*** Address transmission constraints in the short term, particularly those faced in the Visayas and Mindanao regions by starting the development of a Demand Side Management Program (smart grid, demand side management) to improve the creditworthiness of power off-takers in the distribution side of the business, this will displace about MW 150-200 of coal generation.

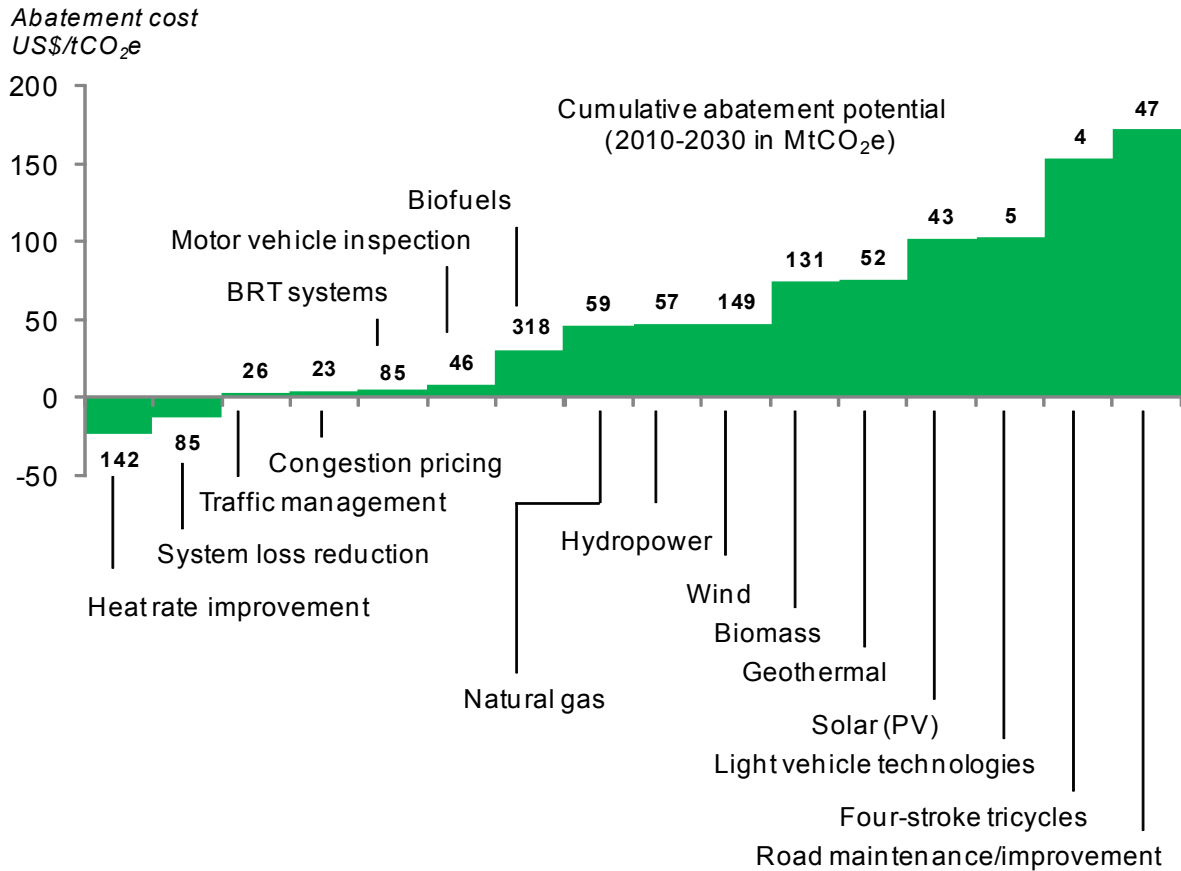
27. The combined impact of the proposed interventions is intended to displace about MW 450-600 of coal generation equivalent to about 3 million tons of CO<sub>2</sub>/yr. More important it will serve as a basis for the government's more ambitious goal of displacing MW 5,000 of coal generation under the low Coal scenario.

28. In the transport sector, the overall goals of the NESTS are to reduce the annual growth rate of energy consumption and associated GHG emissions from the transport sector in the urban areas of the country and to mainstream environmentally sustainable transport which involves the promotion of low-carbon intensity transport systems.

29. The strategy, which is currently being finalized sets outcomes and indicators in several areas including: (i) air quality and public health; (ii) vehicle emission control, inspection and maintenance; (iii) clean(er) fuels; (iv) public transport planning and travel demand management; (v) non-motorized transport; (vi) land use planning; (vii) road safety; (viii) social equity and gender. While targets and indicators are still being developed, some have already been set (for example, the construction of regional motor vehicle inspection centers in major cities and conversion of buses, jeepneys and taxis to use cleaner fuels.)

30. The Biofuels Act of 2006 also sets targets for blending fuels. Specifically, the act calls for 10 percent ethanol blending with gasoline (E10) and 5 percent biodiesel blending (B5) by 2011.

**Figure 10: Abatement Cost and Cumulative Abatement Potential for the Power and Transport Sectors, 2010-2030<sup>\*,\*\*</sup>**



\*when co-benefits of transport sector abatement options are taken into account, most of these costs are negative.

\*\*Based on investment costs without co-benefits except heat rate improvements and system loss reduction.

| <b>Transport Sector Options</b> | <b>Mitigation Cost With Co-Benefits<br/>US\$/tCO<sub>2</sub>e</b> |
|---------------------------------|---|
| Biofuels                        | (9.8)   |
| Road maintenance/improvement    | (2.1)   |
| Motor vehicle inspection        | (5.0)   |
| Congestion pricing              | (0.2)   |
| Public transport improvement    | (19.8)  |
| BRT systems (100 km)            | (29.7)  |
| LRT/MRT lines (46 km)           | (33.8)  |

Source: World Bank (2009)

**Table 1: GHG Abatement Options and Cost-effectiveness at Full Scale-up**

| <b>Energy Sector Options</b>  | <b>Cost Effectiveness (USD/tCO<sub>2</sub>e)</b> | <b>Potential Annual Mitigation (MT/year)</b> | <b>Potential 2010-2030 Mitigation (MT)</b> |
|-------------------------------|--|--|--|
| System Loss Reduction (by 3%) | -14  | 4.1  | 85   |
| Heat Rate Improvement (by 5%) | -24  | 6.8  | 142  |
| Hydro                         | 47   | 2.7  | 57   |
| Geothermal                    | 76   | 2.5  | 52   |
| Wind                          | 47   | 7.1  | 149  |
| Biomass                       | 75   | 6.2  | 131  |
| Solar (PV)                    | 102  | 2.1  | 43   |
| Natural Gas                   | 46   | 2.8  | 59   |
| <b>Total</b>                  |  | <b>34</b>                                    | <b>718</b>                                 |

| <b>Transport Sector Options</b> | <b>Cost Effectiveness (USD/tCO<sub>2</sub>e)</b> | <b>Potential Annual Mitigation (MT/year)</b> | <b>Potential 2010-2030 Mitigation (MT)</b> |
|---------------------------------|--|--|--|
| Traffic management              | 3  | 1.4  | 26   |
| Congestion pricing              | 4  | 1.2  | 23   |
| BRT systems                     | 5  | 2.5  | 53   |
| Motor vehicle inspection        | 8  | 2.5  | 46   |
| Biofuels                        | 31   | 17.4   | 318  |
| Light vehicle technologies      | 104  | 0.2  | 5  |
| Four-stroke tricycles           | 154  | 0.2  | 4  |
| Road maintenance/improvement    | 172  | 2.3  | 47   |
| <b>Total</b>                    |  | <b>28</b>                                    | <b>554</b>                                 |

**Table 2: Details of the Medium and Low-Carbon Scenarios**

**Power Sector**

| <b>Power Sector Scenarios</b> | <b>2030 Installed Capacity in MW (Baseline)</b> | <b>2030 Installed Capacity in MW (Medium)</b> | <b>2030 Installed Capacity in MW (Low-carbon)</b> | <b>2030 CO<sub>2</sub>e Emissions (in million tons) (Baseline)</b> | <b>2030 CO<sub>2</sub>e Emissions (in million tons) (Medium)</b> | <b>2030 CO<sub>2</sub>e Emissions (in million tons) (Low-carbon)</b> |
|-------------------------------|---|---|---|--|--|--|
| <b>Fuel Source</b>            |   |   |   |  |  |  |
| Coal                          | 26,218  | 17,291  | 6,173   | 135  | 89   | 32   |
| Diesel/Oil                    | 756   | 756   | 1,256   | 0.7  | 0.7  | 1.0  |
| Natural gas                   | 1734  | 4,754   | 4,034   | 4  | 12   | 10   |
| Hydro                         | 3170  | 4,209   | 5,589   |  |  |  |
| Geothermal                    | 2168  | 3,108   | 3,304   |  |  |  |
| Wind                          | 111   | 252   | 4,612   |  |  |  |
| Biomass                       | 50  | 179   | 2,127   |  |  |  |
| Solar                         | 1   | 1   | 2,001   |  |  |  |
| <b>Total</b>                  | <b>34,208</b>                                   | <b>30,550</b>                                 | <b>29,095</b>                                     | <b>140</b>   | <b>102</b>   | <b>43</b>  |

\*The medium scenario assumes a 10 percent power demand reduction due to energy efficiency improvements, while the low-carbon scenario assumes a 15 percent power demand reduction. The low-carbon scenario also assumes a more aggressive roll out of RE-based power generation.

**Transport Sector (Impacts in 2020)**

| <b>Transport Sector Scenarios</b> | <b>Medium Scenario</b>                        | <b>Low-Carbon Scenario</b>  | <b>Energy Use Impact, Fuel Saved/year MTOE (Medium)</b> | <b>Emission Impact, GHG Reduced/year MtCO<sub>2</sub> (Medium)</b> | <b>Energy Use Impact, Fuel Saved/year MTOE (Low carbon)</b> | <b>Emission Impact, GHG Reduced/year MtCO<sub>2</sub> (Low-carbon)</b> |
|-----------------------------------|---|---|---|--|---|--|
| <b>Alternative Fuels</b>          |   |   |   |  |   |  |
| <b>Biodiesel</b>                  | PEP 2008 (20% CME by 2030)                    | 20% CME by 2020   |   | 3.4  | 1.8   | 3.5  |
| <b>Bioethanol</b>                 | PEP 2008 (E85 by 2030)                        | Low-carbon: E85 by 2025   | 1.4   | 5.2  | 4.7   | 11.3   |
| <b>Natural gas</b>                | PEP 2008 (5,000 CNG buses by 2026)            | 10% of all buses and trucks by 2020, 25% by 2025, and 50% by 2030 | .02   | .06  | 1.8 (2020-2030)   | 1.6 (2020-2030)  |
| <b>Auto gas</b>                   | 100% conversion of gasoline-fed taxis by 2015 | 25% conversion of gasoline-fed private cars by 2020, 50% by 2030  | 0   | .04  | 0   | 1.0  |

| <b>Vehicle Efficiency Measures</b>   |  |  |           |           |           |           |
|--|--|--|-----------|-----------|-----------|-----------|
| <b>National road maintenance and improvements including traffic management</b>   | Current investment level for asset preservation (43% of requirements) <sup>9</sup> | 100% of asset preservation needs   | 0.4       | 1.0       | 0.9       | 2.3       |
| <b>Vehicle inspection and maintenance system, including driver training on eco-driving (5% fuel efficiency improvement)<sup>10</sup></b> | Metro Manila and Regions III & IVA (56% of total vehicle population)               | Nationwide coverage  | 11.6      | 1.4       | 20.7      | 2.5       |
| <b>Energy saving technologies for new gasoline cars and utility vehicles</b>   | Direct injection (DI) and variable valve systems (10% fuel efficiency improvement) | Medium and improvements in transmissions, vehicle aerodynamics, tires, and light-weighting (20% fuel efficiency) | 1.2       | 0.1       | 2.5       | 0.2       |
| <b>Four-stroke Tricycles (20% GHG emission reduction)<sup>11</sup></b>   | Metro Manila and Regions III & IVA (53% of total tricycles)                        | Nationwide coverage  | 0.4       | 0.1       | 0.7       | 0.2       |
| <b>Vehicle Demand Reduction Measures</b>   |  |  |           |           |           |           |
| <b>Congestion Pricing for Metro Manila<sup>12</sup></b>  | Within C-3 (G.Araneta Avenue)  | Within C-4 (EDSA)  | 0.2       | 0.6       | 0.4       | 1.2       |
| <b>Public Transport Optimization in Metro Manila</b>   | EDSA Organized Bus Route Enhancement <sup>51</sup>                                 | Metro Manila-wide public transport route restructuring and service optimization                                  | 0.03      | 0.03      | 1.4       | 1.38      |
| <b>Bus Rapid Transit System, including Non-Motorized Transport<sup>52</sup></b>  | Metro Manila (50 kilometers)   | Metro Manila, Metro Cebu and emerging metropolitan areas   | NA        | 0.6-0.8   | NA        | 2-3       |
| <b>Metro Manila LRT/MRT Expansion</b>  | LRT 1 South and North Extensions   | Medium + LRT 7, proposed extensions of LRT 2 and MRT 3   | 0.3       | 0.07      | 0.9       | 0.19      |
| <b>Total</b>   |  |  | <b>16</b> | <b>13</b> | <b>36</b> | <b>28</b> |

<sup>9</sup> World Bank (2009), Philippines Transport for Growth: An Institutional Assessment of Transport Infrastructure.

<sup>10</sup> ADB (2004), Feasibility Study for the Privatization of Metro Manila Airshed MVIS Lanes.

<sup>11</sup> PDD: Envirofit Tricycle-Taxi Retrofit Program for Vigan, Tuguegarao and Puerto Princesa, Version 1-0, October 2008.

<sup>12</sup> Study estimation based on unit costs from London Congestion Pricing.

#### **IV. RATIONALE FOR SELECTED SECTORS**

31. This section of the Investment Plan explains the considerations for selecting the emission reduction opportunities presented to the CTF. The measures put forward fall in three subsectors, namely (i) energy efficiency; (ii) renewable energy; and (iii) urban transport. These are the result of several months of discussions between the GOP and the ADB, IFC, and the World Bank, and build on years of development experience and policy dialogue between these institutions and the Government of Philippines. The choice of programs reflects a combination of the government's priorities and sector implementation readiness, the development banks' capacity and focus, and priorities established by the CTF. The paragraphs below present the rationale for the programs put forward.

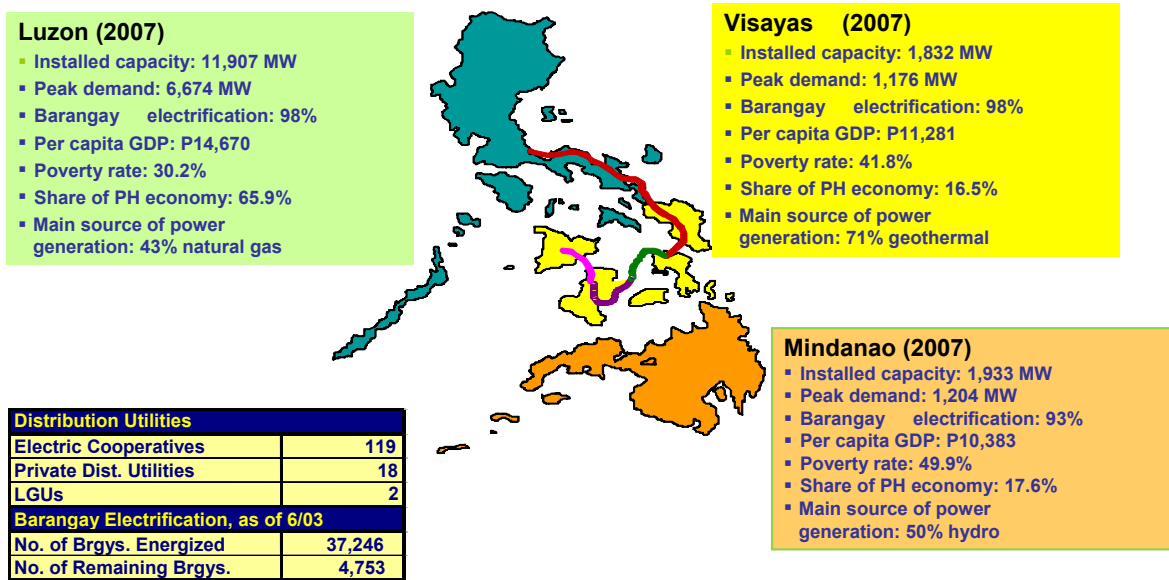
32. The programs proposed for CTF financing do not involve new technology, rather, they involve technology that is readily available to the Philippines, but face institutional, regulatory, or cost barriers (especially upfront investment cost barriers) which must be overcome for replication and scaling up. The GOP envisaged that the support from the CTF would help overcome these barriers and lead to socially-responsive and growth-oriented low-carbon development path.

##### **Energy**

###### *A Transformational Strategy in the Energy Sector to Address Growing Demand*

33. Unlike any other country that has availed itself of CTF support, the Philippines presents a set of unique spatial and market challenges to achieve its low carbon scenario: (i) an archipelago country with very distinct power markets and transmission constraints; (ii) with one of the lowest per capita electricity consumption in the region; (iii) that exhibits also one of the fastest urbanizing trends in East Asia; (iv) while facing severe power supply constraints, particularly in the Visayas and Mindanao regions, which also happen to be home to some of the poorest regions in the country; and (v) where, in a reversal of past trends, new coal power plants are coming, or planned to come, on stream to address part of the short-and medium-term supply constraints.

**Figure 11: Three Regions, Three Different Power Markets**



34. Within this context, CTF-- with its focus on demonstration, deployment and transfer of low carbon technologies--will provide the leverage and initial incentives for the initial stages of sustainable clean technology programs. The Government of Philippines proposes to assign CTF resources as follows:

- **Renewable Energy:** private sector investment in renewable energy including wind, geothermal, biomass, solar power generation and small scale hydro (up to MW 10). CTF funds are proposed to be utilized to leverage IBRD funds to reduce the transaction cost and other financial barriers to attract a larger number of financial intermediary institutions to co-finance, in local currency, a larger portfolio of Renewable Energy Projects. The ADB, IFC and IBRD will leverage CTF support as well, as described in Annex 1 and 2;
- **Energy Efficiency:** private sector investments in energy efficiency including demand side management in the distribution sector, smart grid technology to integrate renewable energy, and energy efficiency in commercial and public sectors. CTF funds are proposed to demonstrate the use of load management and smart grid technology and lower transaction costs in the scaling-up of energy efficiency investments in the public and private sectors. The ADB, IFC and IBRD will leverage CTF financial support, as described in Annex 1 and 2.

35. The government is seeking CTF support to start moving from the BAU case to the medium carbon case first (30 percent below BAU CO<sub>2</sub>e emissions) under the current allocation.

36. Overall, it is expected that as an outcome of CTF leverage, up to 5,000 MW of installed coal based generation capacity will be displaced by 2030 under the more aggressive low-carbon scenario from the replication potential of both renewable and energy efficiency based measures at a cost of about US\$60/ton of CO<sub>2</sub>e avoided.

**Table 3: Results Indicator for RE & EE Interventions**

| <b>Indicators</b>  | <b>Baseline</b>   | <b>Investment Program Results</b>   |
|--|---|---|
| New installed RE-based power generation capacity by 2020   | 340 MW  | 100-150 MW of equivalent installed coal capacity displaced by EE interventions by 2020<br>300-450 MW of installed coal capacity displaced by investments in RE-based generation by 2020                                   |
| Estimated annual GHG emissions reduction   | 0 MtCO <sub>2</sub> e/year  | 3 MtCO <sub>2</sub> e/year  |
| Rapid replication potential towards government goal to move from baseline to medium scenario (e.g. from 5,500 MW to 7,750 MW of installed RE-based generation by 2030) | Zero additional RE-based generation capacity from baseline scenario | Investments in RE & EE would result in displacing 450-600 MW equivalent coal installed capacity. It would jumpstart efforts to reach additional 2,250 MW installed RE-based generation capacity under the medium scenario |

37. The proposed program meets the criteria set forth by the CTF, that is (i) the proposed renewable energy interventions would change the structure of electricity generation into one where RE will be an established form of distributed generation; (ii) GHG emissions savings are expected to reach 3 million tons of CO<sub>2</sub>e/year; (iii) the displacement of the equivalent 450-600 MW of installed coal capacity a year show a high potential for replication to support the government’s target of reducing coal reliance equivalent to 5,000 MW installed capacity; (iv) there is a strong development impact as most of the geographic areas where investments will be mobilized are also home to poverty stricken communities. The proposed energy program also creates a strong link between encouragement of investments in RE power generation and the development of creditworthy off-takers in the electric cooperatives tasked to distribute electricity to rural communities.

38. CTF financing is necessary to provide appropriate financing and risk mitigations for local financial institutions to support the private sector’s entry into RE/EE/CP sector. While there is interest in the market, local financial institutions and private developers are limited to scale-up without enabling concessional/TA support.

39. CTF funds are needed to incentivize financial institutions and local developers to undertake investments in lower carbon emitting technologies. Many companies involved in the development of RE, EE, and CP have found it difficult to access local funding support in order to make investment in such projects. CTF financing could fill the financing gaps on concessionary terms that overcome first-mover costs and provide sufficient returns to pioneer projects. CTF funding, and its flexible application, can provide incentive to these local financial institutions and developers to implement projects. With effective financial structuring, CTF funds can address the specific barriers and catalyze the sector’s transition to a lower carbon base. In

addition to transforming Philippines' energy sector, opportunities exist to share lessons learned and replication in other countries for efficient use of resources regionally.

## **Transport**

40. The transport investments proposed for inclusion in the CTF IP are BRT systems in Metro Manila and Cebu. BRT systems are among the most cost-effective public transport systems in the world. A BRT is a mass transit system that mimics the speed and performance of metros or light rail transit (LRT) but uses buses rather than rail vehicles. As such, BRT combines the reliability of rail and the versatility of conventional bus systems at a fraction of the cost of rail. While the development of BRT systems will result in significant reductions in GHG emissions, the introduction of biofuels will have a significantly higher impact (as presented in the previous section). Nevertheless, BRT is being targeted for two main reasons: (1) the program of biofuels is ongoing and progressing well; and (2) the economic development impacts of the BRT, particularly for the poor, are substantial.

41. BRT projects have high replication potential in the Philippines as there is low technology risk and substantial demand and private sector interest. They are expected to have significant development impacts in terms of environmental benefits, reduced traffic congestion, improved traffic safety, potential reduction in travel times, and transport cost savings accruing to end users. The magnitude of the benefits and their share to low income groups will be significantly higher when BRTs are well integrated with public transport systems. Complementary facilities for private vehicle parking and non-motorized transport enhance the potential to attract private transport users to the BRT lines for daily commuting.

42. Recent USAID-funded studies on Metro Manila noted substantial cost savings and economic benefits in pursuing BRT projects when compared to LRT lines or maintaining or to the BAU operation of buses and jeepneys on high-trafficked transport corridors and studies are ongoing for a BRT project in Cebu city. The Makati Central Business District (MCBD) currently experiences severe peak hour traffic congestion and this situation is only expected to deteriorate in the future if nothing further is done. The Bonifacio Global City (BGC) is also growing at a very rapid pace. A high standard public transport linkage between the MCBD and BGC will improve the accessibility to and within these two central business districts and introduce public transport services in its potential extension to Circumferential Route 5 (C-5), thus greatly reducing the dependence on private vehicles and associated CO<sub>2</sub> emissions. The proposed system will have several advantages which will facilitate a modal shift from jeepneys, taxis and potentially private vehicles to public transport. The proposed BRT in Metro Manila is expected to carry up to approximately 5,000 passengers per hour per direction or 75,000 passengers per day by 2030. To give an idea of the impact of not providing the BRT, these 5,000 passengers would require (i) 83 standard buses; (ii) 250 jeepneys; and (iii) 2,500 cars during the peak hours. Such a mode shift would realize considerable CO<sub>2</sub> reductions.

43. In addition to the high GHG mitigation potential and the large development impact of BRT projects, the government has a demonstrated strong record in implementing low carbon transport interventions particularly in urban rail and bus networks and implementation capacity is relatively high due to private sector participation in public transport and vehicle technology development. Nevertheless, the lack of knowledge in the Philippines of BRT systems coupled

with the familiarity with the more expensive LRT has impeded the development of BRTs. In addition, while the economics of BRT projects are generally robust, with large benefits accruing to the lower income groups, a certain level of financial support is often necessary for reasons of affordability to launch BRTs. Unfortunately, carbon finance has not played much of a role in the transport sector.<sup>13</sup>

44. The BRTs systems envisioned for the Philippines have the cumulative GHG emissions abatement potential of about 2-3 Mt CO<sub>2</sub>e/y. However, the proposed investments could lead to more BRTs than is currently envisioned as other cities start to recognize their benefits. Emerging metropolitan areas such as Metro Davao, Naga, Bacolod, Iloilo and Cagayan de Oro have been identified as potential sites for BRT project implementation. (The proposed BRT interventions are estimated to reduce GHG emissions by about 0.6-0.8 Mt CO<sub>2</sub>e/y.)

45. CTF support to the proposed BRT projects is critical as these projects well demonstrate the sound principles for design and integration of BRTs into the public transport system. Several BRT initiatives worldwide have failed because they were neither designed nor implemented adequately, and merely treated as regular buses operating on separate lanes. These failures make it much harder to reconsider BRT initiatives in the future. This is all the more important in the case of the Philippines where GoP has been considering BRT projects for the past 10 years but is yet to implement one. CTF financing is also expected to result in an enhanced design and accelerated implementation of several BRT systems. Implementation in Cebu also supports NESTS policy to increase local government investment in environmentally sustainable transport.

## **V. ENABLING POLICY AND REGULATORY ENVIRONMENT**

46. GOP energy policy emphasizes private sector development and investment, with independent regulation. Fuel subsidies have been largely phased out, although diesel fuel is cross-subsidized and some controls are exercised to prevent rapid price spikes. The overarching paradigm for energy and transport is to (i) use less energy; (ii) use energy in all forms more efficiently; (iii) improve energy independence and security by developing indigenous energy resources; and (iv) maximize private sector investment. Relevant energy and transport policies are summarized in Table 4 and discussed below.

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<sup>13</sup> The “mobile” nature of transport vehicles makes it difficult to isolate reductions in carbon emissions in a corridor that could have resulted from a transport improvement.

**Table 4: GOP Power and Transport Policy Framework**

| Sector/<br>Sub-Sector    | Key Policies, Programs, and Objectives  | Expected Outcomes   | Issues/Comments  |
|--------------------------|---|---|--|
| <b>Energy Efficiency</b> | <p><i>Energy Efficiency and Conservation Plan of Action:</i></p> <p>Objectives:<br/>           Establish legal framework for EE<br/>           Reinstate DSM practice across all sectors<br/>           Establish baseline data and benchmarks<br/>           Scale-up information and education campaign on EE</p> <p>Strategy:<br/>           Higher taxes for inefficient technologies and support implementation of AO183<br/>           Develop and implement lamp waste management policy<br/>           And conduct policy study on Calibrated Phase-out of inefficient technologies<br/>           Develop curriculum and instructional materials<br/>           Initiate social mobilization program for market monitoring<br/>           Push for retrofit program across all sectors</p> <p>National Energy Efficiency and Conservation Program (NEECP):<br/>           promote efficient utilization of all forms of energy;<br/>           Public Awareness and Information Dissemination,<br/>           Voluntary Agreement Program<br/>           Energy Labeling and Efficiency Standards<br/>           Government Energy Management Program (GEMP)<br/>           Energy Management Advisory</p> <p>Philippine Efficient Lighting Market Transformation Project (PELMATP) supported by Global Environment Facility<br/>           Philippines Energy Efficiency Project partly funded by ADB</p> | <p><i>Energy Efficiency and Conservation Plan of Action:</i></p> <p>Use less energy<br/>           Use energy more efficiently<br/>           Implement Heat Rate Improvement Program (HRIP) for power plants<br/>           Restart Distribution Utility Demand Side Management programs and<br/>           Expand System Loss Reduction Program for all utilities<br/>           NEECP:<br/>           achieve a total energy savings of 234 MMBFOE in the ten years from 2005 through 2014<br/>           reduce oil imports by 16%.</p> <p>PELMATP:<br/>           accelerate the integration of energy efficient lighting programs with other planned DOE activities, and enhance the private sector participation in EE through lighting technologies.</p> <p>Net metering to be implemented under the RE Act of 2008</p> <p>Time of use tariffs to be expanded</p> | <p>Lack of an Energy Conservation Law restricts DOE authority to impose mandatory conservation measures, EE standards, and other conservation and/or utilization targets<br/>           EE still faces financing barriers partly due to the “invisibility” of EE measures and difficulty in demonstrating and quantifying results</p> <p>NEECP has had mixed success in implementation: in 2006, the NEECP realized savings of 0.51 MMBFOE and reduced emissions by approximately 188,000 tons of CO<sub>2</sub>.</p> <p>System Loss Reduction Program under NEECP was reasonably successful and could be expanded<br/>           Limited private sector participation to date.<br/>           Expansion of ESCO market being promoted by ADB.</p> |
| <b>Renewable</b>         |   |   |  |

| Sector/<br>Sub-Sector | Key Policies, Programs, and Objectives   | Expected Outcomes  | Issues/Comments   |
|-----------------------|--|--|---|
| <b>Energy</b>         | <p><i>Renewable Energy Act of 2008:</i></p> <p>Income tax holiday, duty-free importation of technology, tax credit on domestic capital equipment and services</p> <p>Ensure open access to connect new RE projects to the grid</p> <p>Implementation of a Renewable Portfolio Standard and creation of a Renewable Energy Market (REM)</p> <p>Feed-in tariffs</p> <p>Green Energy option for end-users</p> <p>Net metering for qualified end-users with RE systems</p> <p>Preferential “must run” dispatch for intermittent RE sources such as wind, solar, run-of-river hydro</p> | <p>Ensure sufficient, stable, secure, accessible and reasonably-priced energy supply</p> <p>Pursue cleaner and efficient energy utilization and clean technologies adoption</p> <p>Diversify energy mix in favor of indigenous RE resources, and promote wide-scale use of RE as alternative fuels and technologies</p> <p>Make the Philippines a manufacturing hub for PV cells to facilitate development of local manufacturing industry for RE equipment and components</p> | <p>RE potential remains underdeveloped and is projected to lose share relative to coal-fired power over the next 2 decades</p> <p>Development barriers include higher capital cost for most RE technologies, cost of transmission access, and off-take risk which constrains commercial bank financing</p>  |
| <b>Transport</b>      | <p>AO254: National Environmentally Sustainable Transport Strategy (NESTS)</p> <p>Draft National Transport Policy Framework (NTPF) and National Transport Plan (NTP), 2011-2016.</p> <p>Biofuels Act of 2006</p>  | <p>Reduced consumption of fossil fuels</p> <p>Reduced local air pollutants and GHG emissions</p> <p>10% ethanol blend with gasoline (E10) and 5% biodiesel blends (B5) by 2011</p>   | <p>Government at all levels are fully supportive of the AO and set to adopt the NTPF and have developed plans to implement sustainable transport projects in several cities across the country</p> <p>Development of new biofuel production plants is being hampered by lack of early project development funding to cover feasibility studies and front-end engineering design</p> |

Source: DOE website; consultants report under ADB TA 6346-REG, March 2008 and AusAID/PEGR RA008-02.

## Policy Context and the Philippine Energy Plan

47. The 2001 passage of the Electric Power Industry Reform Act (EPIRA) marked the beginning of a transformation of the power sector in the Philippines. This process of sector reform is still ongoing. A general principle of EPIRA is to establish an environment and structure where market forces, freedom to choose how and from whom to buy and sell, and effective competition set generation prices, prevail. Among electricity buyers, EPIRA also calls for improvements in Electric Cooperatives (EC) performance, including rehabilitation and restructuring.

48. The power and transport fuel policies are effectively subsets of the overall Philippine Energy Plan (PEP) which was updated in 2008. The PEP update re-affirms the commitment to pursue the energy independence agenda under the Government's Five-Point Reform Package. The energy sector's agenda focuses on attaining a sustainable 60 percent energy self-sufficiency beyond 2010 and promoting a globally competitive energy sector. The first objective is anchored on the effective implementation of the following goals:

- (a) Enhancing energy efficiency and conservation;
- (b) Intensifying renewable energy resource development;
- (c) Increasing the use of alternative fuels; and,
- (d) Accelerating the exploration; development and utilization of indigenous energy resources.

49. The energy sector goals and corresponding strategies both support the Medium-Term Philippine Development Plan (2005-2010) and the Medium-Term Public Investment Program. The PEP is also consistent with international agreements such as the 2002 Johannesburg Summit and the 2000 UN Millennium Development Goals, specifically in addressing poverty, and ensuring environmental sustainability.

50. Recent energy developments include: (i) the landmark passage in January 2007 of Republic Act (R.A.) 9367 or the "*Biofuels Act of 2006*," (ii) renewed interest in the upstream development sector through the Philippine Energy Contracting Round (PECR); (iii) commitments to regional frameworks such as the ASEAN Plan of Action for Energy Cooperation (2004-2009); and (iv) the ASEAN initiative to move forward the harmonization of biofuel standards. The Renewable Energy Act of 2008 (the RE Act) was approved and became effective in January 2009. The implementing rules and regulations were approved in July 2009. The RE Act provides for a variety of fiscal incentives and regulatory measures including:

- A Renewable Portfolio Standard (RPS) mandating a certain share of power to be provided by renewable energy;
- Feed-in tariffs;
- Net metering for qualified end-users;
- Establishment of a RE Trust Fund; and
- Tax holidays and exemptions.

51. The details of the RPS, Feed-in tariffs, net metering, and RE Trust Fund will be developed by the National RE Board.

### **National Environmentally Sustainable Transport Strategy**

52. On January 2009, Administrative Order (AO) 254 was issued by President Gloria Macapagal-Arroyo instructing transport authorities to develop a National Environmentally Sustainable Transport Strategy (NESTS) for the country. The AO requires DOTC to reform the transportation sector, by defining and implementing policies favoring non-motorized transport

and mass transport systems, and leading to lower consumption of fossil fuels. Government at all levels are fully supportive of the AO and set to adopt the National Transport Policy Framework and have developed plans to implement sustainable transport projects in several cities across the country. The Draft National Transport Policy Framework (NTPF) and National Transport Plan (NTP), 2011-2016 are expected contribute to reducing local air pollutants and GHG emissions. In 2006, the Biofuels Act was signed into law calling for 10 percent ethanol blend with gasoline (E10) and 5 percent biodiesel blends (B5) by 2011.

## VI. IMPLEMENTATION POTENTIAL AND RISK ASSESSMENTS

53. Implementation potential and risk are centered around a few key issues: (i) readiness of proposed CTF supported projects in an election year; (ii) the policy framework for EE is somewhat immature, and new legislation is not expected until after mid-2010; (iii) key provisions of the RE Act of 2008 will not be in place until 2010 (e.g., the RPS and Feed-in tariffs); (iv) RE projects must deliver electricity below current retail tariffs; and (v) the institutional arrangements for BRT projects and the roles of national and local governments as far as project ownership, implementation responsibilities and assumption of debt. The government is working on resolving these issues to tap the large potential of BRT projects in the Philippines by formulating the regulatory and institutional framework under the DOTC study on public transport strategic development.

54. The overall implementation risk is considered to be medium. New business models are being utilized, and prevailing energy prices, especially electricity tariffs, clearly favor scale-up and replication of RE and EE activities. The Philippines is an early adopter of RE technologies and systems such as geothermal power; biomass, small hydropower, and wind power technologies are now being deployed. Sufficient private sector expertise exists to implement new RE projects and programs, and there is substantial private investment in transport systems (buses, jeepneys, and tricycles). Crude oil and petroleum product prices have increased by more than 50 percent from late 2008 lows, and are expected to remain stable for the next 2-3 years. Implementation Potential and Risks are summarized in Table 4.

**Table 5: Implementation Potential and Risk Summary**

| <b>Risk</b>                  | <b>Mitigation</b>  | <b>Residual Risk</b> |
|------------------------------|--|----------------------|
| <b>Project Readiness</b>     | Selecting proposed CTF supported projects with high GHG mitigation potential that had been under preparation and enjoy GOP support.<br><br>Portfolio of alternative projects for CTF support are ready to take the place of existing proposals that might encounter project readiness issues | Medium               |
| <b>Government engagement</b> | Mitigation of this risk is done by careful selection of projects that have high level of implementation readiness  | Medium               |

| <b>Risk</b>  | <b>Mitigation</b>   | <b>Residual Risk</b> |
|--|---|----------------------|
| <p><b>Policy and Regulatory Framework:</b></p> <p>Clarity of policies related to RE, EE, and BRT</p> | <p>GOP with the help of international consultants funded by the World Bank are undertaking work that will lead to clarity in policies related to RPS and feed-in tariffs.</p> <p>MDBs will bring global best practice in EE.</p> <p>With support from a DOTC-financed study, GOP will clarify the regulatory and institutional frameworks for BRTs.</p> | Medium               |
| <p><b>Implementation Capacity:</b></p>   | <p>LGUs involved in the implementation of BRT projects will receive the necessary support through the project to further build their implementation capacity. Initial capacity development is focus on DOTC and Metro Cebu technical staff.</p>   | Medium               |
| <p><b>Finance:</b></p> <p>Commercial banks are reluctant to lend for EE and some RE projects</p>     | <p>Innovative financial products will be offered to address financial sector's reluctance to lend to EE and RE proponents. Technical assistance will be provided as necessary to upgrade commercial bank capacity to assess and mitigate project risk.</p>  | Medium               |
| <p><b>Scale-up and Replication:</b></p>  | <p>Perceived financial risk will be reduced as successful project implementation will demonstrate that financing of EE, RE, and low-carbon transport projects are good business opportunities for the domestic financing sector.</p>  | Medium               |
| <p><b>Safeguards</b></p>   | <p>Project design will follow GOP and multi-lateral bank safeguards. Appropriate environmental management measures will be incorporated into project design</p>   | Low                  |

## VII. FINANCING PLAN AND INSTRUMENTS

55. Financial instruments anticipated for the Philippines CIP include grants, loans, and guarantees. Other innovative financing mechanisms may be developed for private sector projects. Grants will be utilized for project preparation covering feasibility studies, due diligence, and structuring of private sector projects e.g., power off-take guarantees. Project preparation is expected to require a total of US\$3.5 million: US\$2.5 million for RE, and US\$1 million each for transport sector projects. These preparation funds will be complemented by other donor funds from ADB, JICA, PPIAF, and others.

56. Loans will comprise the bulk of project and program financing, and could include project loans, and sector loans. Program loans may be employed in parallel to support policy development and implementation costs. Co-financing will be mobilized to the maximum extent

possible from other IBRD, IFC, JICA/JBIC, private sector investors, and other donors. The draft investment plan envisions US\$250 million in CTF funding as shown in Table 5 below.

57. Guarantees will be used for private sector projects to mobilize commercial bank lending and project developers' equity. Guarantees may include partial credit guarantees, risk sharing, and other innovative forms depending on project structuring.

**Table 6: Program Financing (US\$ million)**

| <b>Financing Source</b> | <b>Renewable Energy (WBG)</b> | <b>Urban Transport (WBG)</b> | <b>RE and EE (ADB)</b> | <b>TOTAL</b> |
|-------------------------|-------------------------------|------------------------------|------------------------|--------------|
| <b>CTF</b>              | 75                            | 50                           | 125                    | 250          |
| <b>GOP/DBP</b>          | 180                           | 50                           | 50                     | 280          |
| <b>IBRD</b>             | 250                           | 250                          |                        | 500          |
| <b>IFC</b>              | 250                           |                              |                        | 250          |
| <b>ADB</b>              |                               |                              | 400                    | 400          |
| <b>Others</b>           | 750                           |                              | 350                    | 1,100        |
| <b>TOTAL</b>            | 1,505                         | 350                          | 925                    | 2,780        |

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## Annex 1: Energy Efficiency and Renewable Energy Program (IBRD; IFC)

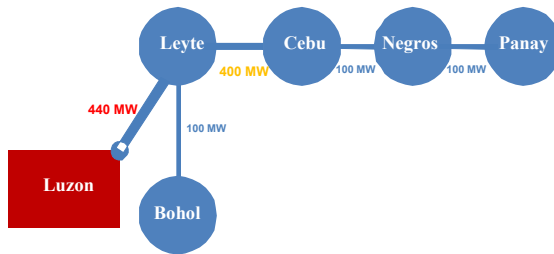
### Problem Statement

1. **Removing Supply Shortages.** The tightening electricity supply/demand situation, particularly in the Mindanao and Visayas regions call for a rapid mobilization of resources to facilitate new supply investments. As a short-term response, private sector led new investments in coal power generation are being developed in both Cebu (MW 200) and Mindanao, even though the latter is endowed with ample renewable energy resources such as hydro, biomass and geothermal. The shift towards using more coal to meet power expansion needs is primarily driven by cost consideration despite the availability of renewable energy resources. Least-cost expansion scenario for power favors coal with a cost of \$60/MWh over small hydro (\$90/MWh), geothermal (\$100/MWh), biomass (\$100/MWh), and Solar (\$160/MWh).

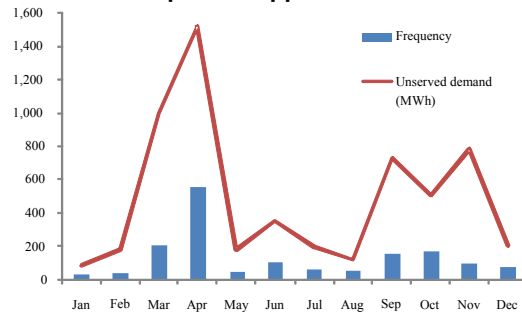
### Unmet Demand

The problem of unmet demand:

#### Inadequate transmission infrastructure

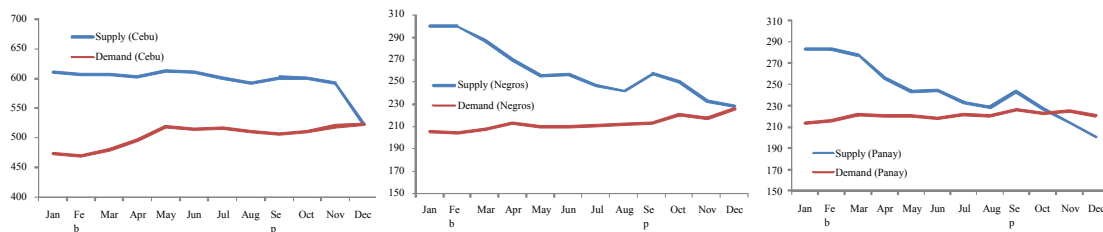


#### ...leads to frequent dropped load and unmet demand



It does not appear to be getting better...

Demand and Supply Balance for 2009 (Transco projections)



2. **Ensuring Efficient & Viable off-takers.** The Renewable Energy Act of 2008 has set forth a supportive policy environment to allow RE based power generation to develop and grow. However, for this to be fully sustained, creditworthy off-takers from the distribution side of the electricity business must be cultivated. No significant new RE generation investments will take place if investors are not assured that financially viable counterparts exist.

3. Currently, there are 119 electric cooperatives (EC) responsible for distributing electricity to 80% of the barangays in the Philippines. Based on National Electrification Administration data in 2007, the financial and operational position of the ECs vary widely. About 63 ECs had insufficient revenues to cover their operating and debt service costs while 32 ECs were unable to cover even their operating costs. The collection efficiencies of ECs are lower compared to private investor-owned utilities. In addition, 61 ECs reported power losses greater than 14% regulatory cap, with 11 ECs reporting system losses higher than 20%. Under these conditions, investors face significant risk and have refrained from entering the market, even if supported by concessional funds and regulations. Therefore, the viability of ECs is a critical factor in scaling-up renewable energy in the Philippines.

### **Proposed Transformation**

4. It is proposed that CTF co-financing support a two-pronged approach:

(a) Accelerate deployment of renewable energy as an established form of distributed generation at sufficient scale in the country to encourage new investments. **If scaled-up to its full potential, the generation of power based on renewable energy resources including biomass, geothermal, hydro, solar, and wind can add up to mitigating 20 MtCO<sub>2</sub>e of emissions per annum.**

(b) Institutional transformation of electric cooperatives and improvements in their operations, including demand side management, smart metering technology, and managerial capacity necessary to compete after full realization of EPIRA, so that the off-taker risk is mitigated for potential RE investors. **Word Bank (2009) estimates that as a result of project support a 3 percent improvement in load management and system loss reductions practices can potentially lead to 1 million MtCO<sub>2</sub>e emissions reductions per annum.**

5. IBRD/CTF funds will be directed towards addressing long-term credit access and credit enhancement facilities in small and medium size projects, focusing on private developers and on ECs which have limited access to commercial financing. IFC/CTF funds will be directed towards the provision of risk sharing capital in partnership with local commercial banks for medium to large size projects in the renewable and energy efficiency arena.

6. IFC has identified various areas where the use of CTF funded interventions in the private sector can have a transformational impact on the carbon footprint of the country. Different sectors will require different interventions to address their specific needs. The proposals of private sector products in the Philippines will retain the flexibility to respond to dynamic market conditions and unidentified market opportunities. The proposed interventions will therefore be illustrative only, with more implementation details to be developed as each of the investments and advisory service projects is processed.

7. Scaling-up the renewable energy market requires a solid EC market as off-taker. The ECs cover close to 75 percent of Philippines consumers, mostly outside Manila, yet only close to 20-30% of the 119 ECs are financially viable to have access to commercial borrowing. Concessional financing in large scale is a building block required in bringing about a

transformation of the distribution sector in Philippines, and consequently securing a growing renewable energy market.

8. The ongoing Rural Power Project through DBP, and Guarantee program through LGUGC, have demonstrated that CO<sub>2</sub> emissions reductions can be delivered -- and sustained -- by ECs investing in improvements in rationalization of the sub-transmission assets, introducing smart metering technology, bringing in the discipline of commercial financing and in particular improving corporate Governance practices. *This proposed energy program envisages a large-scale flagship program to buy down the cost and provide credit enhancement facilities to scale-up an aggregation of sub-transmission assets, installation of smart meters, mobilizing domestic commercial financing and continued improvement of technical and management capabilities of ECs through different business models.*

### **Implementation Readiness**

9. DBP has a track record in efficient implementation of renewable and energy efficiency projects. The successful implementation of the first phase of the Philippine Rural Power Project, collaboration among DBP, IBRD and GEF showed that commercial financing of renewable energy can be a viable business line for financial intermediaries. The initial amount of US\$10 million was subscribed to by sub-borrowers a year ahead of schedule, and additional financing of US\$40 million was approved by the World Bank in 2009, suggesting that the business model now needs support to go to scale.

10. There are a number of private sector RE/EE/CP projects that could be implemented during 2009/2010 with the appropriate financial / risk incentives. Many of these companies have already approached IFC for assistance in obtaining financing on terms that would make the project feasible. IFC believes it could support three to five RE/EE/CP projects in the short term if the requested CTF resources were available

### **Rationale for CTF Financing**

11. The proposed program meets the criteria set forth by the CTF, that is: (i) the proposed renewable energy interventions would change the structure of electricity generation into one where RE will be an established form of distributed generation, (ii) GHG emissions savings are expected to reach 3 million tons of CO<sub>2</sub>e/year, (iii) the displacement of the equivalent 450-600 MW of installed coal capacity a year show a high potential for replication to support the government's target of reducing coal reliance equivalent to 5,000 MW installed capacity, (iv) there is a strong development impact as most of the geographic areas where investments will be mobilized are also home to poverty stricken communities. The proposed energy program also creates a strong link between encouragement of investments in RE power generation and the development of creditworthy off-takers in the electric cooperatives tasked to distribute electricity to rural communities.

12. CTF financing is necessary to provide appropriate financing and risk mitigations for local financial institutions to support the private sector's entry into RE/EE/CP sector. Many companies involved in the development of RE, EE, and CP have found it difficult to access local funding support in order to make investment in such projects. CTF financing could fill the

financing gaps on concessionary terms that overcome first-movers and provide sufficient returns to pioneer projects. CTF funding, and its flexible application, can provide incentive to these local financial institutions and developers to implement projects. With effective financial structuring, CTF funds can address the specific barriers and catalyze the sector's transition to a lower carbon base. CTF concessional finance also helps to expand the number of ECs whose operations can be strengthened as renewable energy off-takers, thereby reducing investor risk and enlarging the market for power producers.

13. In addition to transforming Philippines' energy sector, opportunities exist to share lessons learned and replication in other countries for efficient use of resources regionally.

14. *Technical Assistance*: About 5 percent of the proposed CTF funding will be used to

- Development of a Project Preparation Facility with DBP and other FIs; and
- On the ground advisory services.

#### **Program Financing (US\$ million)**

| <b>Source</b> | <b>RE</b>    |
|---------------|--------------|
| CTF           | 45-55 (IBRD) |
|               | 20-30 (IFC)  |
| IBRD          | 250          |
| IFC           | 250          |
| GOP/DBP       | 180          |
| Others        | 750          |
| <b>Total</b>  | <b>1,505</b> |

#### **Program Preparation Timetable**

| <b>Milestones</b>                               | <b>Dates</b>            |
|---|-------------------------|
| Government concept approval/Bank concept review | October 2009            |
| Project preparation                             | November 2009-July 2010 |
| Appraisal/Negotiations                          | October-November 2010   |
| Approval  | December 2010           |
| Project Implementation Start                    | March 2011              |



## **Annex 2: Mainstreaming Solar Power to Mitigate Climate Change (ADB)**

### **Problem Statement**

1. 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). The country has firmed up its lead by enacting the new Renewable Energy Law (Dec. 2008) and the necessary implementing rules and regulations (July 2009). While the legal framework and political willingness are in place, the country needs large investments to put its policy intentions into practice, and mainstream the use of renewable energy in all segments of the sector. Under the business-as-usual scenario (2010 – 2030), energy-related emissions from the commercial, industry, power, and residential sectors will increase by 123 percent from 77.4 MtCO<sub>2</sub>e/y to 172.5 MtCO<sub>2</sub>e/y.<sup>14</sup>
2. The Philippines is the second largest geothermal power producer in the world, has the highest wind power potential in the region, large potential for solar power, and abundant hydro power and biomass resources. Despite these resources, the Philippines was only 45 percent self-sufficient in energy in 2001, which rose to 57 percent in 2007. The Government is aiming to reach 60 percent self-sufficiency by 2010, In 2008, about 26 percent of power generation was from imported coal and about 23 percent from oil. In 2008, the country imported about 101.4 million barrels of oil, costing US\$7.5 billion.
3. According to the Philippines Department of Energy (DOE) and the US National Renewable Energy Laboratory (NREL), the potential for renewable energy (RE) is significant: about 4,500 MW from geothermal; 13,000 MW from hydropower, 5.0-5.1 kWh/m<sup>2</sup>/day from solar; about 75,000 MW from wind and 170,000 MW from oceanic currents.
4. The Philippines Renewable Energy Act of 2008 is considered to be the first and most comprehensive renewable energy law in South-East Asia. It has already helped mobilize new investments: as of October 2009, the Philippines Department of Energy (DOE) has signed US\$2.2 billion worth of new renewable energy (RE) contracts with 18 power companies.
5. The new law provides a seven-year income tax holiday and tax exemptions for the carbon credits generated from renewable energy sources. A 10 percent corporate income tax (compared against 30 percent regular tax), is also provided once the income tax holiday expires. In addition the law provides: (i) a 1.5 percent realty tax cap on original cost of equipment and facilities to produce renewable energy; (ii) prioritizes the purchase, grid connection and transmission of electricity generated by companies from renewable energy sources; and (iii) power generation exempted from value added tax.
6. The most interesting provision is a net metering scheme that will allow consumers the option to generate their own power and transfer excess power to the grid. A customer, as an independent power producer, will be able to earn from the power they contribute to the grid at approved feed-in tariff. The feed in tariff will provide a guaranteed fixed price for at least 12

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<sup>14</sup> Emissions data are from APEC Energy Demand and Supply Outlook of 2006.

years for electricity produced from emerging renewable resources (wind, solar, ocean, run-of-river hydro and biomass).

7. Electricity retailers will also be required to maintain a minimum amount of generation from renewable energy sources, commonly known as the Renewable Portfolio Standard (RPS) ensuring that the retailers have incentive to use renewable energy at approved feed-in tariff rates in its generation portfolio. Under the same law, a submarket of the Wholesale Electricity Spot Market (WESM) will be created for trading Renewable Energy Certificates.

8. A study done by the WWF and the University of the Philippines National Engineering Center showed that the country can save as much as US\$2.9 billion annually from avoided importation of fossil fuel if the country's renewable energy share in its power generation mix is increased from less than 1 percent to about 40 percent.

9. In March 2009, ADB approved a loan project and a grant (Philippine Energy Efficiency Project, PEEP),<sup>15</sup> to start up a comprehensive energy efficiency program to identify a range of pilot which could be scaled up later. The project will (i) retrofit about 40 government-owned office buildings with efficient lighting; (ii) procure 13 million compact fluorescent lamps (CFLs) for distribution to residential and other customers to reduce peak power demand; (iii) introduce energy efficient lamps for public lighting; (iv) set up a laboratory for testing energy-efficient appliances and a lamp waste management facility; (v) establish a super energy service company (ESCO) to support ESCO development; (vi) promote an efficient-building initiative; and (vii) develop and implement a communication and social mobilization program. This project will result in savings of about US\$100 million per annum from avoided fuel cost and deferral of an investment of US\$450 million in power generation and associated network capacity of 450 megawatts, which is about 3 percent of the Philippines' total generation capacity. Poor customers would particularly benefit as lighting is a significant component of their electricity consumption. The distribution of the CFLs was formally launched<sup>16</sup> on 26 September 2009, after a year-long preparation and procurement of the CFLs. The Project has transformed the market for efficient lighting in the Philippines and expects similar result from the proposed large scale implementation of solar power with the support of the Philippines Renewable Energy Law.

### **Proposed Transformation**

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

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<sup>15</sup> 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.

<sup>16</sup> Details available at: [http://rtvm.gov.ph/index.php?option=com\\_content&view=article&id=1763percent3Apublic-launch-of-the-switch-to-compact-fluorescent-lamps-cfls-program&Itemid=61](http://rtvm.gov.ph/index.php?option=com_content&view=article&id=1763percent3Apublic-launch-of-the-switch-to-compact-fluorescent-lamps-cfls-program&Itemid=61).

implementation) and education (through awareness). In addition, it 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 units 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.

11. With that spirit, the Philippines Department of Energy (DOE) and ADB have decided to focus on a single well-proven technology solution that is well established but still remains outside the reach of ordinary citizens. As part of government's scale up plan for PEEP, the government is preparing a new multi-tranche financing facility (MFF) to support the long-term EE and RE investment program which is scheduled for ADB Board approval in 2010. The MFF will provide up to US\$200 million in loan funding which will leverage a US\$1 billion investment program over a seven-year period. The first tranche of the MFF will provide technical assistance (TA) and financing to scale up some of the existing programs and other programs under the title of “New Energy Technology to Mitigate Climate Change” and would cover among others, the following key components: (i) Energy Efficiency in Buildings; (ii) Solar Power Generation with Net Metering; (iii) Hybrid Off-grid Generation; and (iv) Mindanao Mini Hydro Program. While some of all of proposed components will increase energy efficiency, the Solar Power Generation component needs support to transform the existing dynamics: the actors, the economics, the supply chain, and over all, how consumers perceive this technology.

12. The proposed allocation for US\$125 million CTF fund for the energy sector will be used to cover part of the additional cost of solar power generation through large-scale implementation of the net metering program under the new Philippine Renewable Energy Law.

13. As explained earlier, that the Philippines Renewable Energy Law with its RPS and Feed-in Tariffs with net metering<sup>17</sup> is a pioneering framework for the entire ASEAN region. This Law also provides for establishing a voluntary market for Renewable Energy Certificates. These provisions will not bring any fruit without appropriate investments in the sector. ADB will support this market creation opportunity with a Government-led project that will quantify the benefits of net metering with solar technology to consumers, establish product quality benchmarks in the market and develop secondary supply and maintenance chains. Currently the specialized electronic meters (that can record electricity flow in both directions) and solar panel are not readily available in the retail market in the Philippines, and are controlled by a small number of technology vendors and service providers. A large scale project will bring in more players and choices to the market and improve sector efficiency. CTF is proposed to fund start-up of the net metering program in commercial buildings. CTF co-financing will accelerate

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<sup>17</sup> Net Metering” refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged for his net electricity consumption and is credited for any overall contribution to the electricity grid; (Source: Section 4 (gg), Philippine Renewable Energy Act of 2008 )

transformation of this market by reducing the time needed to have 30,000 solar generation installations (residential and commercial) from 10 years to about 2 years.

14. Prices for solar panels are relatively high in the Philippines and only a handful of businesses are actively pursuing the market. Despite the high cost of electricity, customers have not installed distributed solar generation as its high initial capital cost makes it financially unattractive due to long pay-back periods. The overall installation cost also remained high as the previous legal framework did not allow selling of excess power back to the grid, hence consumers needed batteries for storing excess generation when supply exceeded demand and or for storing for evening use. In 2009, an average size installation with 4.5 kW installed capacity will cost about US\$18,000 in the retail market and it will take about 14 years (FIRR: 5.4 percent) to recover the initial amount of the capital cost (US\$18,000) through annual benefits of about US\$1,300. Consumers are unwilling to invest in new technology projects with such long return periods.

15. The net metering provision of the Philippine Renewable Energy Law provides the legal and regulatory enabling environment for significant change in the RE market, but external financing is needed to jump-start the transformation. Assuming a feed-in tariff 30c/kWh (WACC: 10 percent, depreciation 4 percent, and 4 hours of use each day) for 12 years—as per the provisions of the law—the payback period reduces to about 10 years (FIRR: 8 percent). This will provide some incentives to large commercial installations and will help the market to grow, but it may take at least 5 years, before the market will reach the threshold where economies of scale and competition will reduce prices. For example, if the local solar generation market were large enough, the competitive price could reduce the pay-back period to 7.5 years (FIRR: 17 percent).

16. The proposed investment program will (i) reduce the initial capital cost with a large single procurement through international bidding; and (ii) provide additional tariff support above the regulatory feed-in tariff for the first three years to transform this market by accelerating the penetration of solar power in the country. This transformation will target implementation of about 30,000 office buildings, factories and large houses. The recent price reductions in solar panels and global competition for market share will deliver large discount from bulk procurement. As a result, CTF co-financing will help reduce the price of the US\$18,000 initial outlay to US\$10,000 (removing the need for battery based storage), and cover a supplement to the net feed-in tariff to the gross amount generated for the first three-years of operation (above the fair and reasonable tariff level that would be set by ERC, the regulator), thereby reducing the payback period to about 2.5 years (FIRR: 50 percent). The tariff and pay-back scenarios are summarized in Table 1.

17. Consumers will be made aware of the benefits, favorable pricing and technical quality aspects of the solar panels. The market will be transformed: the skyline of the city will change as consumers take advantage of this one-time offer. Each panel will also be attached with the Renewable Energy Certificate (REC) as allowed under the RE Law, so that retailers will be able to meet the requirements of the Renewable Portfolio Standards using the RECs. RECs may be

used by consumers to offset the installation cost of the panels, as it is commonly used in countries like Australia.<sup>18</sup> A summary of the various scenarios is shown below:

**Table 1: Summary of Tariff Incentives and Financial Return**

|                | Baseline | Regulated      | Feed-in +     | Feed-in + bulk  | Feed-in + bulk |       |
|----------------|----------|----------------|---------------|-----------------|----------------|-------|
|                |          | feed-in tariff | bulk purchase | + CTF incentive | +CTF + REC     | Units |
| <b>Cost</b>    | 18,000   | 18,000         | 10,000        | 10,000          | 10,000         | \$    |
| <b>Payback</b> | 13.5     | 9.8            | 7.5           | 2.5             | 2.3            | years |
| <b>FIRR</b>    | 5.4      | 8.0            | 17.4          | 50.8            | 64.2           | %     |

18. ADB will design the MFF to facilitate investment in other sub-sectors and to mobilize private sector investment in EE. CTF will co-finance only the component for solar power net metering that will transform the market and may work with the Super ESCO established under the PEEP. The details of this arrangement will be finalized during project preparation.

19. CTF resources are proposed to enhance the MFF investment program design as follows:

- CTF investments will bring down the cost of these technically proven projects through bulk procurement and public awareness “packaging” (described in para 10 above) to be finally and technically viable in the Philippines, reduce pay-back period for the customers, and increase credibility of the technology by maintaining (or improving) standards and providing direct incentives to try the new technology
- CTF resources will cover additional costs associated with the core investments outlined above and encourage the government to lead and allocate resources for mainstreaming energy efficiency.
- CTF resources will improve the “depth” of the ADB project by increasing the economies of scale and scope for the high-cost investments, which will shorten the pay-back period and increase the financial rates of return.
- CTF will allow capturing of CDM benefits for all activities, which in turn will reduce upfront cost because of its scale.
- The proposed market transformational initiative would cover about 30,000 commercial, government offices and large residences savings in excess of 100,000 tons per year of CO<sub>2</sub> or about 2.5 million tons over the life of the project costing about US\$50 per ton. It will encourage other customers to switch, as the market transforms and the prices fall. This is expected to bring in at least another 300,000 (10-to-1) customers to opt for net metering with RE systems, which will avoid about 25 million tons at a cost just below US\$5 per tons of CO<sub>2</sub>.

20. The impact of this investment will be displacement of grid-supplied fossil power with distributed solar power in net metering installations. The project supported by CTF can be replicated and scaled-up as knowledge and operational experience increase. As shown in Table 2, replication of initial investments could deliver reductions of about 1MtCO<sub>2</sub>e/year, representing an aggregate mitigation cost of about US\$5 per ton.

<sup>18</sup> Office of the Australian Renewable Energy Regulator, available: <http://www.orer.gov.au/recs/>

**Table 1: Summary of Mitigation Cost-effectiveness (estimates)**

| <b>Component / CTF Contribution</b>                                   | <b>Direct GHG Reduction (tons CO<sub>2</sub>e/y)</b> | <b>GHG Reduction with Replication &amp; Scale Up (tons CO<sub>2</sub>e/y)</b> | <b>Net Mitigation cost per ton per CTF US\$</b> |
|---|--|---|---|
| <b>Solar Generation with Net Metering US\$50 million 10,000 units</b> | 100,000  | 25 million  | \$5   |

### **Implementation Readiness**

21. The implementation of the project will be led by DOE in partnership with other stakeholders including private sector investors, and local government units as appropriate. DOE has sufficient expertise to manage the ADB investment project, and project management support will be included in the MFF scope, including capacity building for financial institutions and ESCOs. The preparation stage for the MFF and parallel TA will identify candidate sub-projects partly based on enterprise management capacity to implement the proposed EE investments.

22. ADB has initiated preparation of the MFF to support the long-term investment program. ADB will implement a project preparation TA which will finance initial design of projects for air-conditioning upgrades in public buildings, solar net metering in office buildings, and hybrid power generation in SPUG areas. The MFF is scheduled for approval by ADB’s Board of Directors in 2010; the investments to be supported by CTF will be prepared and approved by year-end 2010 and begin implementation in early 2011.

### **Rationale for CTF Financing**

23. A combination of factors and constraints are barriers to large scale EE investment:

- Lack of management and technical expertise to identify new opportunities;
- Perceived financial risk, i.e., payback periods on large capital investments may be in the range of seven-eight years or longer versus less than three years desired by building and plant owners.
- Limited commercial financing for candidate investments.
- Limited policy support: energy conservation and EE efforts are essentially “all voluntary” at the moment, with the exception of a more efficient lighting program (supported by the ADB Philippines Energy Efficiency Project). The government is considering a formal policy and/or energy conservation law to create the enabling framework for expanded conservation and efficiency programs. In the absence of a more formal policy, large-scale EE interventions are clearly not business as usual.
- Capital cost barriers: despite long-term cost savings, the proposed investments such as solar PV and other RE technologies and systems do present a cost barrier to some enterprises. Small and medium-scale enterprises have limited capital reserves and limited access to commercial financing. Carbon finance may provide some financial support but revenue would be “on delivery” and not on an up-front basis.

- Perceived risks: the energy service company (ESCO) model is in early operational stages, and is not considered “commercially” proven for purposes of conventional bank financing. Likewise, net metering is a new concept in the Philippines and is not yet being supported by commercial financing. CTF support will help remove “first mover” risk.
- The subprojects supported by CTF are replicable and scale-able without long-term concessional financing. As the more efficient building owners’ enterprises gain comparative advantage, intra-sector competition will help drive replication. Commercial financing of EE will also increase as banks and other financial institutions gain experience on the CTF-supported project, and as government-sponsored RE and EE funds are replenished through taxation mechanisms.

## Financing Plan

24. The indicative financing plan for the project is shown in the tables below.

**Table 3: Financing Plan**

|                   | <b>Stage 1</b> | <b>Stage 2</b> | <b>Total: MFF</b> |
|-------------------|----------------|----------------|-------------------|
|                   | (2010-2012)    | (2013-2018)    | (2010-2018)       |
| ADB               | 200            | 200            | 400               |
| CTF               | 125            |                | 125               |
| Government        | 50             |                | 50                |
| Carbon Finance    | 50             |                | 50                |
| Other Cofinancing |                | 300            | 300               |
|                   | 425            | 500            | 925               |

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

| <b>Milestone</b>         | <b>Date</b>              |
|--------------------------|--------------------------|
| ADB PPTA TA Approval     | December 2009            |
| Preparation Stage        | October 2009 – July 2010 |
| Appraisal / Negotiations | August – September 2010  |
| Approvals                | October 2010             |
| Project Completion       | December 2015            |

## **Annex 3: Urban Transport Program (IBRD)**

### **I Problem Statement**

1. Vehicle ownership in the Philippines has been growing at the rate of 6 percent over the past two decades and is not expected to slow down over the next 10-15 years. Moreover, the urban population in the Philippines is expected to grow by over 35 million people by 2030. Metro Manila at about 12 million today faces serious congestion, air quality and traffic safety issues and is a major contributor to GHG emissions in the Philippines.

2. The transport sector's contribution to Greenhouse Gas (GHG) emissions in the Philippines has increased significantly both in absolute and relative terms since 1990. CO<sub>2</sub> emissions associated with the transport sector have risen from an estimated 6-10 million tons of CO<sub>2</sub> equivalent (MtCO<sub>2</sub>e) in 1990 to about 29 MtCO<sub>2</sub>e in 2007, an annual increase of about 6-10 percent.<sup>19</sup> Of additional concern is the more than doubling of the relative share of transport in CO<sub>2</sub> emissions from about 15 percent of total emissions (excluding those from land use and forestry) in 1990 to about one third today.

3. Based on the current growth rates in motorization, emission contributions from road transport, estimated at 24 MtCO<sub>2</sub>e in 2007, are projected to increase to 37 and 87 MtCO<sub>2</sub>e by 2015 and 2030 respectively under a business as usual (BAU) scenario. This would not only result in a rapid increase in the country's carbon footprint, but would further exacerbate air quality and increase the already high levels of congestion leading to significant losses in productivity.<sup>20</sup> To minimize these negative impacts, a concerted effort from both the private and public sectors is required to maximize the modal shift toward mass transit and the use of fuel-efficient vehicles.

### **II Proposed Transformation**

4. In an effort to reduce the country's carbon footprint and improve air quality, President Gloria Macapagal-Arroyo issued an Administrative Order (AO) in January 2009 instructing transport authorities to develop a National Environmentally Sustainable Transport Strategy (NESTS) for the country. The AO requires DOTC to reform the transportation sector, by defining and implementing policies favoring non-motorized transport and mass transport systems, and leading to lower consumption of fossil fuels. In line with this initiative, the first draft of the strategy report was prepared by DOTC in collaboration with the Department of the Environment and National Resources (DENR), the Department of Health (DOH) and the Department of Energy (DOE) with the assistance of the University of the Philippines' National Center for Transportation Studies (UPNCTS). The final draft is expected to be completed by early 2010.

5. The first draft of the strategy identifies three broad areas where policies could lead to the reduction in GHG emissions (i) the use of alternative fuels following DOE's Alternative Fuels

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<sup>19</sup> Six MtCO<sub>2</sub>e is based on the World Resources Institute's estimates, while 10 MtCO<sub>2</sub>e is based on the 2006 IPCC guidelines for estimating fuel emissions.

<sup>20</sup> A study prepared by the National Center for Transportation Studies for NEDA and the Legislative-Executive Development Advisory Council in 2000 indicated that losses due to congestion in Metro Manila alone were around 100 billion Pesos per year in 1996 prices, about 4.6 percent of GDP.

Program (covering Bioethanol, Biodiesel, Natural Gas for public transport and Autogas); (ii) enhancing the efficiency of vehicles and tricycles; and (iii) traffic demand management (including BRTs, LRTs, enhanced public transport planning). A June 2009 study commissioned by the World Bank estimated the potential reductions in GHG emissions that would result from adopting such policies. Using two scenarios, an aggressive-reduction scenario and a medium-reduction scenario, the estimated reductions in GHGs for the year 2020 are 29 and 12 MtCO<sub>2</sub>e respectively. By 2030, these reductions would increase to 54 and 28 MtCO<sub>2</sub>e for the aggressive and medium scenarios respectively.<sup>21</sup> This demonstrates the transformational impact that NESTS could have in reducing greenhouse gases.

6. In particular, the successful introduction of BRT systems as part of a well integrated public transport system in the Philippines starting with Cebu and followed by Metro Manila is expected to increase the awareness and acceptance of these systems as well as the realization of their cost effectiveness and attractiveness. The transformational impact of these mass transit systems lies as much in the reduction of GHGs (estimated at about 2-3 MtCO<sub>2</sub>e per annum), as in their large development potential in providing better and safer mobility, particularly for the poor, a cleaner environment and increased economic productivity.

7. As far as the direct benefits of the BRT investments proposed for CTF financing in Metro Manila and Cebu City, the expected reduction in GHG emissions in the early years is about 600,000-800,000 tCO<sub>2</sub>e per annum. The gains would be expected to increase as traffic conditions and congestion would worsen over time. Moreover, replication potential is high, as there is low technology risk and substantial private sector interest.

8. The introduction of BRT in Metro Manila and Cebu City is an integral part of the national strategy (NESTS) to improve livability in the cities through better mobility, a reduction in pollution and an increase in the cities' productivity. This is particularly clear in Cebu City, which has a population of about 900,000 and is only served by an informal public transit system consisting of motorized tricycles, jeepneys, and taxis. The situation is unlikely to improve, without the development and implementation of a comprehensive urban transport plan, as most of the economic and land development in Cebu City continues to occur at the city's fringes, particularly in the northeast. This sprawling pattern of urban development will only exacerbate the negative conditions if not promptly addressed.

9. Cebu City has chosen to take an aggressive approach to improve its public transport system and use the inducement of public transport and other traffic management schemes to promote sustainable land use patterns in rapidly urbanizing parts of the city such as the northeast as well as in the planned new development in the South Reclamation Project Area.

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<sup>21</sup> The two scenarios are presented in detail in section III on the Priority Sectors for GHG Emission Reductions. The main differences in the two scenarios are in the time trajectory for meeting certain targets in a number of areas (biofuel use, asset preservation, inspected vehicles, tricycle conversion from two to four strokes, the deployment of BRT and LRT, and the introduction of traffic management).

10. Similarly in the case of Metro Manila, the proposed BRT is the backbone of integrated public transport plan aimed at enhancing mobility. The plan includes feeder routes, pedestrian and commuter access stations and terminals as well as non motorized transport requirements.

11. Specifically, the proposed CTF co-financed investments will include:

- a. Investments in about 50 km of BRT systems in three main corridors in Manila and Cebu City, as part of system-wide transformation of urban transport in these cities. The more advanced Corridor in Cebu City could become a model for other BRT systems in the country. Investments will include busways, terminals, stations, control systems, the development of a feeder route system, pedestrian and commuter access.
- b. Institutional development to strengthen the capacity of transport officials from DoTC and other major cities in planning for, and implementing, NESTS and the National Transport Plan (2011-2016) and in general transport planning, regulation, monitoring and administration.

### **III. Implementation Readiness**

12. As demonstrated in the IP, there is strong ownership of the proposed investment interventions by the government of the Philippines and the enabling environment to support implementation. Moreover, the Philippines experience in implementing LRT and bus projects demonstrates the capacity of the project management unit to implement the proposed projects.

### **IV. Rationale for CTF Financing**

13. Despite the large development impact of BRTs in these corridors, their high level of GHG reduction and high replication potential, the lack of knowledge in the Philippines of BRT systems coupled with the familiarity with the more expensive LRT has impeded the development of BRTs.

14. In addition, while the investment cost of BRT systems is significantly cheaper than that of rail projects, the costs are still high compared to regular buses and often beyond the financial capacity of local governments with tight budgets and large demands. Carbon finance has not been effective in mobilizing the necessary investments for large scale emissions in the transport sector.

15. Given that the Philippines is yet to develop a BRT system, CTF financing and support is crucial to help overcome some of the initial financial and institutional barriers and would help demonstrate at scale successful deployment for BRT systems in the Philippines. CTF will help support municipal governments in speeding and scaling up BRT investments. Key to the success of this planned deployment is an enhanced design of the BRT system that is fully integrated into the public transport system. In the case of secondary cities such as Cebu, the BRT design will be used to influence land use planning and management in an environmentally sustainable manner. This would in turn lead to more BRTs than is currently envisioned as other cities start to recognize their benefits. Emerging metropolitan areas such as Metro Davao, Naga, Bacolod,

Iloilo and Cagayan de Oro have been identified as potential sites for BRT project implementation.

**V. Financing Plan**

| <b>Source</b> | <b>Total</b> |
|---------------|--------------|
| GOP           | 50           |
| IBRD          | 250          |
| CTF           | 50           |
| <b>Total</b>  | <b>350</b>   |

**VI. Program Preparation Timetable**

| <b>Milestones</b>                               | <b>Dates</b>            |
|---|-------------------------|
| Government concept approval/Bank concept review | November 2009           |
| Project preparation                             | November 2009-June 2010 |
| Appraisal/Negotiations                          | March-June 2010         |
| Approval  | December 2010           |
| Project Implementation Start                    | March 2011              |