Climate Investment Funds

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CLEAN TECHNOLOGY FUND
INVESTMENT PLAN FOR NIGERIA

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INTRODUCTION

1. The Clean Technology Fund (CTF)[1] Investment Plan (IP) is a broad "business plan" by the Federal Government of Nigeria (FGN) for the International Bank for Reconstruction and Development (IBRD), the African Development Bank (AfDB), and the International Finance Corporation (IFC). It supports the low-carbon growth objectives and priorities outlined in Nigeria's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). This multi-year Investment Plan (IP) identifies transformational programs to be co-financed by the CTF jointly with the IBRD, AFDB, and IFC. It will be presented to the CTF Trust Fund Committee in November 2010. Specific projects identified under this IP will be developed and processed by the Multilateral Development Banks (MDBs) using their own respective procedures.

2. The IP presented proposes $250 million in CTF lending resources that will leverage $722.3 million in related MDB investments and an additional $344.5 million from other sources (including other development partners, counterpart funds, commercial banks and project sponsor equity). In all, the Investment Plan envisages a total investment of US$1.316 billion leveraged through partners, counterpart funds and the private sector. The IP seeks to help Nigeria further its growth and development aspirations through a low carbon strategic approach of appropriate mitigation actions[2]. In all, the plan will achieve a total of carbon emission reductions of up to 55 million tonnes of CO2-equivalent over ten years.

3. The IP is a dynamic document with the flexibility to take into account changing circumstances and new opportunities. This is particularly important for Nigeria's dynamic urban and private sectors and all the more necessary during the current period of uncertainty associated with worsening global economic conditions and financial markets. Two of the components of the IP (described in Annex 1 and Annex 3) can be processed by the MDBs and ready to be active within a period of 12 months following CTF program approval by the CTF Trust Fund Committee (TFC) and subsequent to the IP being endorsed with funding attached. The remaining component (described in Annex 2) can be processed by the MDBs and ready within a period of 12-24 months following CTF program approval by the CTF Trust Fund Committee (TFC) and subsequent to the IP being endorsed with funding attached.

COUNTRY AND SECTOR CONTEXT

4. Nigeria, with a population of more than 150 million people, is the most populous country in Africa, with more than 73 million living in urban areas. The country's economy is the third largest in Africa, after South Africa and Egypt and one in four Africans in Sub-Saharan Africa is Nigerian. It is estimated that the country's urban areas contribute over 65 percent of the gross

[1] The Clean Technology Fund invests in projects and programs that contribute to the demonstration, deployment, and transfer of low carbon technologies with a significant potential for long term greenhouse gas emission savings. The CTF Trust Fund Committee oversees the operations of the Fund. The World Bank (IBRD) is the Trustee of the Fund.

[2] The World Bank is engaged in carrying out a Climate Change Assessment program in Nigeria. The general objective of the Climate Change Assessment is to develop a solid knowledge platform on:

- Low carbon development options (which could contribute to the FGN's effort to develop Nationally Appropriate Mitigation Actions (NAMA) as envisaged by the UNFCCC)
- Risks to growth from climate variability and change (with particular consideration for coastal zone development and agriculture/ water resource management).

national product, illustrating both their importance and also their potential for contributing further to economic growth. The urban growth rate (4.5 percent per year) is above the national average (three percent per year). There is a global mega city (Lagos), with a population greater than 10 million and five other cities, including Greater Abuja and Greater Kano, with populations between five and 10 million. As the biggest oil producer in Africa, Nigeria's economy is dominated by oil and gas. Nigeria's GHG emissions were estimated in 2000 at about 300 $MtCO_2e$. Nigeria possesses one of the least energy-efficient economies in the world (ranking 21 out of 186 globally) with energy consumption per capita at 138 kg of oil equivalent with an energy intensity of 0.476.[3]

5. Africa's share of global emissions from fossil fuel is under 3% and per capita emissions are among the lowest in the world. The observed growth rate of emissions (above the world average), caused by rapid growth in per capita GDP and the fastest population growth in the world, will likely lead to increased emissions over the next decades. Fossil fuel emissions on the African continent are dominated by South Africa (and Northern African countries), while emissions from land use change are dominated by West and Central African countries such as Nigeria and the Democratic Republic of Congo. Emissions varied among countries: 10 countries were responsible for 90% of all fossil fuel emissions in Africa while 15 countries accounted for 90% of all emissions from land use change. Six countries are in both lists of top emitters: Nigeria, Angola, Zimbabwe, Sudan, Cameroon, and Ghana. Nigeria ranks in the top 3 in both lists, second in total anthropogenic CO2 emissions after South Africa. Although per capita emissions are smaller than those of Africa as a whole, Nigeria may double its current annual emissions by 2025 if [current] population growth rates persist, and faster if consumptions patterns increase.[4]

Figure 1: Total GHG Emissions by Gas for Nigeria in 2005 (excludes land use change and forestry)

Gas	MtCO2	%
CO2	97.7	33.0
CH4	150.5	50.8
N2O	48.1	16.2
PFC	--	--
HFC	0.1	0.0
SF6	0.1	0.0
Total	**296.6**	

Source: Dayo, B; A. Gilau and M. Samec (Sept, 2009); 'Nigeria's Perspective on Climate Change Mitigation', ICEED Working Paper, pg 56, Abuja, Nigeria.

6. Nigeria has developed a "Seven Plus Two Point Agenda" that builds on the National Economic Empowerment and Development Strategy (NEEDS), which is aimed to "transforming Nigeria into a modern economy and an industrial nation by 2015 and one of the top 20 economies by 2020." The World Bank and the United Kingdom's Department for International Development (DfID) have jointly developed the Country Partnership Strategy (CPS), which is aligned with the pillars of both the NEEDS and State Economic Empowerment and Development Strategy. The second pillar of the CPS focuses on improved environment and services for non-

[3] Nigeria's First National Communication, UNFCCC, November 2003
[4] Trends in Greenhouse gas Emissions in Nigeria: 1988-2000. A Canada-Nigeria Climate Change Capacity Building Project (CIDA)

oil growth. Power and energy are prominent on the Government's Agenda, which states that "the infrastructural reforms in this critical sector through the development of sufficient and adequate power supply will be to ensure Nigeria's ability to develop as a modern economy and an industrial nation by 2015." Another major focus of the Agenda is "Mass Transportation," which refers to the need to develop "capacity for the mass movement of goods and people" and mass transit as well as the need to rehabilitate and modernize the existing railway system.[5]

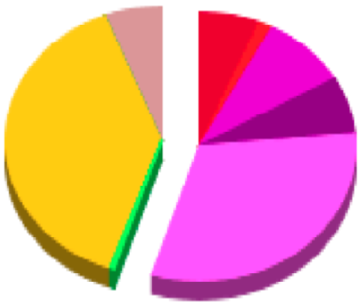
Key Sources of Greenhouse Gas Emissions in Nigeria

7. According to Nigeria's First National Communication to the UNFCCC, CO_2 emissions (excluding other GHGs) accounted for about 192 $MtCO_2e$, of which energy-related CO_2 emissions accounted for more than half, with the remainder coming from land use, land-use change and forestry (mainly deforestation). Recent data suggests that emissions from the combustion of fossil fuels and flaring accounted for just over 107 $MtCO_2e$ in 2005, implying that the energy sector, broadly defined to include fuels for transportation, is the largest source of CO_2 emissions in Nigeria.[6] According to the IEA, gas flaring and other fugitive emissions account for about 29.4% of the national CO2 emissions.[7] At the Copenhagen negotiations, Nigeria stated that "a significant proportion of emissions in the energy sector are from gas flaring, contributing about 31.4 percent of the 54.9% of energy sector emissions." Making it more attractive to capture, process and utilize greater proportions of this associated gas for productive uses instead of continued flaring is an important element of the Government's efforts.

Figure 2: GHG Emissions for Nigeria by Sector in 2005

CO_2, CH_4, N_2O, PFCs, HFCs, SF_6 (excludes land use change)

Sector		MtCO2	%
Energy		162.8	54.9
Electricity & Heat	18.5		6.2
Manufacturing & Construction	4.4		1.5
Transportation	26.5		8.9
Other Fuel Combustion	20.5		6.9
Fugitive Emissions [1]	93.0		31.4
Industrial Processes		1.4	0.5
Agriculture		114.8	38.7
Waste		17.6	5.9
Total		296.6	



[5] Other items on the Agenda refer to food security and agriculture; wealth creation and employment; land reform; security; education plus the issues relating to Niger Delta and disadvantaged groups. The National Transport Policy, which gave rise to the Transport Master Plan, adopts an inter-modal, integrated, holistic, reinforcing and organic system of approach for the development of the sector.

[6] Energy Information Agency, U.S. Department of Energy. See http://www.eia.doe.gov/environment.html

[7] According to the World Resources Institute's Climate Analysis Indicators Tool (CAIT) results, 54.9% of Nigeria's 2005 GHG emissions was produced by activities in the energy sector; 0.5% of the emissions was from the industrial sector; 38.7% of the emissions was contributed by agricultural activities, consisting of: enteric fermentation, manure management, rice cultivation, agricultural soils, and others; and 5.9% of the emissions came from waste management as shown in

Source: Dayo, B., A. Gilau and M. Samec (Sept, 2009); 'Nigeria's Perspective on Climate Change Mitigation', ICEED Working Paper, pg 49, Abuja, Nigeria.

8. Nigeria's economy is growing rapidly, and is highly dependent on oil export and roughly tracks the price of crude oil. The unemployment rate remains one of the highest in the world at 19.7 per cent (2009). Access to finance and infrastructural inadequacies remain inadequate to support the country's entrepreneurial spirit and to sustain non-oil growth.[8]

Transportation

9. Transportation accounts for nearly 9% of Nigeria's GHG emissions and these are expected to double by 2020 with the rapid expansion of megacities such as Lagos and large cities such as Abuja and Kano. Lagos is the largest city in sub-Saharan Africa and the sixth largest city in the world, with a population of over nine million,[9] which has been growing at six percent per annum in the past few years. By 2020, the population of the megacity is projected to be about 25 million, making it the third-largest in the world. Kano is the capital of Kano State in Northern Nigeria. Its metropolitan population of about 4 million is the second largest in Nigeria after Lagos. Abuja is Nigeria's fast–growing capital city, with a 2003 population of well over six million people in the City, including its informal settlements and suburbs in FCT and neighboring states. Of this, approximately 1 million were estimated to be in the master-planned areas (Abuja city), 1.5 million were in informal settlements and 3.5 million were in the satellite towns and border states. For the next 25 years, a growth rate ranging from 2.5% to 3.0% per annum is forecast. By 2030 it was estimated that the population of the region will be approximately 12.2 Million.

10. During the last twenty years, the level of efficiency and productivity in the metropolitan areas has been adversely affected by growing weakness in the physical infrastructure necessary to support basic needs of the population and production sectors. Key issues in the transport systems of the cities are: (a) insufficient and poorly managed and regulated services and infrastructure; (b) lack of clear and coherent policies; and (c) weak and disorganized institutions. Growing urban populations are inadequately served by their urban transport systems, with declining standards of public transport, overlaps and conflicts among the agencies responsible for planning and implementing transport solutions, atomization of transport service provision, growing dependence on private transport (including commercialized private transport, such as cars and motorcycles for hire), increasing congestion, inadequate and deteriorating transport infrastructure, poor facilities for non-motorized transport such as walking and bicycling, and declining ambient air quality. In Lagos, bus fares are high (average fare of US$1 per trip), consuming over 20 percent of the average household disposable income.

[8] About 85 percent of Nigeria's revenue from official receipts and about 90 percent of its foreign exchange receipts are linked to international crude oil prices.

[9] The 2006 Nigerian census puts the population of Lagos at nine million, but the authorities of Lagos have disputed this figure. According to the Lagos Central Bureau of Statistics, the population is closer to 17.5 million (2008) with annual population growth of roughly four percent over the last 10 years. World Urbanization Prospects (2003) estimated the population as 11 million.

Power

11. Infrastructure, in general, and power, in particular, is facing a crisis and is a severe drag on Nigeria's aspirations to be an economic power in 2020[10]. Nigeria is endowed with sufficient energy resources to meet its present and future development requirements. The country possesses the world's sixth largest reserve of crude oil; has proven gas reserves of over 180 trillion cubic feet (TCF); coal and lignite reserves are estimated at 2.7 billion tons; while tar sand reserves represent 31 billion barrels of oil equivalent. Reliable electricity supply is essential to harness opportunities for production, value-addition and employment, particularly in the non-oil sector.

12. Over 80 million people in Nigeria are not served with electricity at all -- only 10 percent of rural households and approximately 40 percent of Nigeria's total population have access to electricity. Per capita consumption of electricity is approximately 100kWh against 4500kWh, 1934 kWh and 1379kWh in South Africa, Brazil and China, respectively. Those who are connected to the electricity grid report long power outages and unreliable quality and service.[11] Nigeria has a total installed electricity generation capacity of about 6,000 MW (67% thermal and the remaining hydro) but because of low availability, actual power generation is between 2,000 to 3,000 MW. The system is characterized by inefficient generation as well as huge technical and non-technical losses in the transmission and distribution of electricity. As a result, only a small percentage of the estimated 10,000 MW demand for power is being met.

13. To cope with the unreliable power supply, almost all private industries and a majority of small businesses as well as commercial entities and households have resorted to using high GHG-emitting off-grid diesel generators[12] at a high cost to themselves and economy (about 35 Nairas a kWh as compared to the current grid based tariff of 6 Naira per kWh).[13] Coupled with the current financial crisis, these high costs are forcing industrial firms to either scale down or exit from the market, leading to job losses and lower economic growth.[14]

14. The high reliance on inefficient diesel back-up generators also results in high GHG per unit of electricity generated. Residential, small business and commercial consumers surveyed consumed 2.6 million litres of diesel per week, according to a June 2009 NRECA study.[15]

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[10] Simulations conducted for the Africa Infrastructure Country Diagnostic (AICD), a flagship report implemented by the World Bank on behalf of a steering committee chaired by the African Union, suggest that if all African countries were to catch up with Mauritius – the regional leader in infrastructure – per capita growth in the region could increase by 2.2 percentage points a year. Catching up with Korea would increase per capita growth by 2.6 percentage points a year. In Côte d'Ivoire, the Democratic Republic of Congo, and Senegal, the impact would be even greater. Africa's firms lose 5% of their sales due to outages – a figure that rises to 20% for informal firms unable to afford backup generation. Overall, the economic costs of outages can easily rise to 1-2% of GDP.(www.infrastructureafrica.org)

[11] The average yearly per capita electricity consumption in the country amounts to 72 kWh and is much less than the corresponding figure for the African continent, which is 512 kWh. This acute power shortage, as a result of low investment in new generation and of poorly maintained existing generation facilities, is inhibiting economic growth and causing tremendous hardship to the Nigerian population.

[13] By some estimates self generated power now substantially exceeds public sector-delivered power in Nigeria, diverting substantial resources away from productive uses, lowering productivity and competitiveness. Shortfalls in availability have meant that only about 40% of the population has access to electricity and average annual per capita power consumption is only 155 kWh, among the lowest in the world.

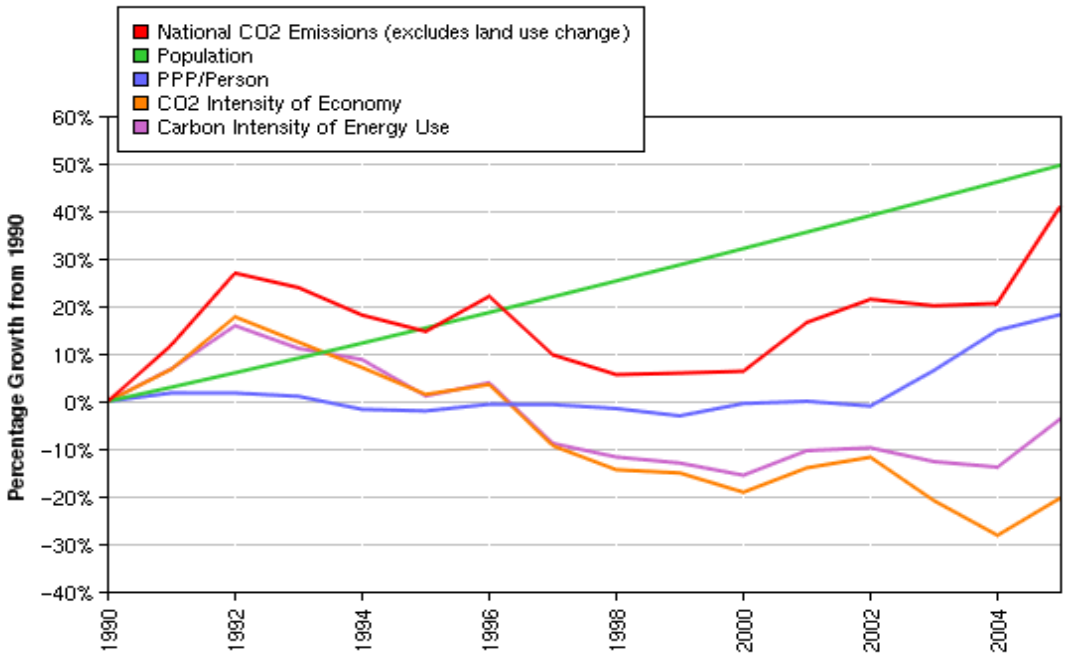
[14] In 2007, close to NGN 800 billion (almost US$ 7 billion or 2.4% of GDP) were spent for fuel for electricity self-generation. For 2008, this bill will be significantly higher as diesel prices peaked in July 2008 at around NGN 200 per litre and are still at a range of 150 to 190 NGN/litre (Oct 2008) and public power generation dropped even further.

[15] Aba Electric Consumer Census (June 2009) report conducted in Nigeria by NRECA International shows the degree to which back-up generators are employed: 61% of all households, small business and commercial establishments in the town surveyed use back-up generation; 20% own and operate multiple generators.

Extrapolating this data assuming five hours of generator use per day, the annual emissions per megawatt hour from existing diesel use is estimated at 1 kilogram per kilowatt hour consumed. This high emission factor[16] of continuing the status quo is comparable to the carbon emissions footprint of generation by the operation of a sub-critical coal-fired power plant.

15. Although CO_2 emissions do not currently make up the majority of Nigeria's GHG emissions, emission trends show that they will become more significant as Nigeria becomes more industrialized. The key drivers of CO_2 emissions are population growth, rapid urbanization, economic activity, and the CO_2 intensity of the economy. According to Nigeria's First National Communication, it is expected that for the coming 30 years, CO_2 emissions from the broadly defined energy sector (which includes power and transportation) will increase exponentially. Recent trends, as illustrated in Figure 3, shows that CO_2 emissions (excluding land use change) will increase rapidly. This is because Nigeria has one of the largest populations in the world that is growing at a faster rate (2.7% on average from 1990 to 2005) than any other country over 100 million people.

Figure 3: Economic, Population and GHG Emission Trends in Nigeria, 1990-2005



Source: Climate Analysis Indicators Tool (CAIT) Version 6.0. (Washington, DC: World Resources Institute, 2009) extract from Dayo, B; A. Gilau and M. Samec (Sept, 2009); 'Nigeria's Perspective on Climate Change Mitigation', ICEED Working Paper, Abuja, Nigeria[17]

[16] This estimate does not take into account calculate the global warming contribution from 'black carbon' which is believed to be the second largest contributor to global warming after CO_2, and is a byproduct of incomplete combustion of biomass and fossil fuels (which, respectively, are widely used for cooking and are combusted in inefficient diesel generators and by motor vehicles in Nigeria).

[17] Note: The variation in emissions for 1993 and 1994 are due to problems in the underlying energy data. Oil export data for these two years are from the Energy Commission of Nigeria, not the International Energy Agency.

Nigeria's Actions on Climate Change

16. The Federal Government of Nigeria (FGN) has taken concrete steps towards doing its part to participate meaningfully in the international effort to reduce global climate change. It is active as a key interlocutor for African countries in the current intergovernmental negotiations on climate change and has taken important domestic policy steps in this area. In particular:

- Nigeria ratified the UNFCCC in August 1994 and ratified the Kyoto Protocol in December 2004

- Nigeria developed and submitted its First National Communication under the Framework Convention on Climate Change in November 2003, which contained an inventory of sources and sinks and broadly identified potential opportunities for climate mitigation and adaptation

- On July 22, 2009, the Nigerian Senate passed a bill to establish the National Climate Change Commission as a statutory body and to vest it with the responsibility to regulate and coordinate policies and actions on climate change. The Commission is also to set up a National Carbon Market Scheme and tackle the effect of global warming and its impact on Nigeria.[18] The commission would be tasked with coordinating resources, policies and actions in the field of climate change, providing advice to the Federal Government and developing a national strategy for the reduction of greenhouse gas emissions and a low carbon economy

- Conventional (oil, gas, coal and nuclear energy), non-conventional (hydropower, solar, wind, and biomass) and electricity are the energy sources within the scope of the Vision 2020 Energy report. The strategic priorities identified for the Nigerian Energy sector are as follows:
  - Provide necessary commercial and market incentives in order to attract private investments (local and foreign) required to facilitate the necessary energy capacity expansions in a rapidly growing economy
  - Consolidation of ongoing structural and economic reforms targeted at establishing effective institutional and regulatory frameworks in the energy sector
  - Achieve energy supply security by utilizing the nation's renewable energy resources (including wind, solar, hydro and biomass) to diversify the energy mix
  - Development of efficient and sustainable energy generation and consumption patterns

- The "Policy Guidelines on Renewable Electricity" is FGN's overarching policy on all electricity derived from renewable energy sources[19]. The FGN's vision of renewable energy in the power sector is the achievement of accelerated sustainable development through increased share of renewable electric power to the national electricity supply. The country's Renewable Energy Master Plan was launched in 2006 and identifies considerable potential for generating solar, small and large hydro, biomass, biogas and wind energy across the country. Small pilots have been identified across the country, and scaled-up, renewable energy has the potential of

[18] The lower chamber, the House of Representatives, had earlier passed a bill for the establishment of a Climate Change body as an agency of the Federal Ministry of Environment. The Senate and the House of Representatives are expected to meet soon to harmonize their bills and conclude the process of establishing a climate change body.

[19] The Policy Guidelines sets out the Federal Government's vision, policies and objectives for promoting renewable energy in the power sector. It is drawn primarily from the National Energy Policy (2003), the National Electric Power Policy (2001), Electric Power Sector Reform Act (2005), the Renewable Energy Master Plan (2005), the draft Rural Electrification Policy.

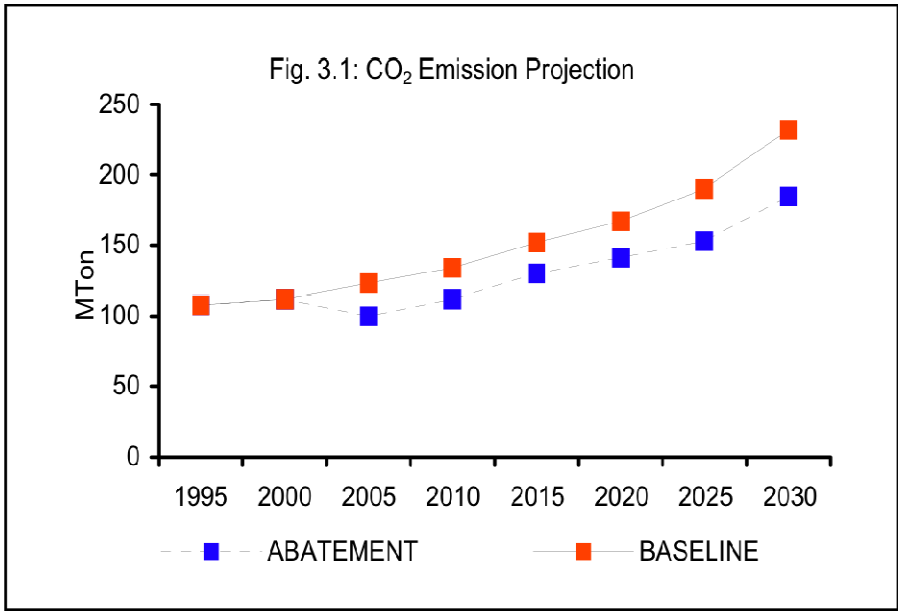
providing clean electricity services, especially to Nigerians living in areas not served by the grid, with the potential of about 100-200 MW over the next 5-10 years

- A key element of the country's strategy is to reduce greenhouse gas emissions while promoting economic development. This is to be accomplished by developing viable domestic markets promoting the use of clean natural gas for productive uses in the power sector; in homes for cooking with Liquified Petroleum Gas (LPG); and in transport as Compressed Natural Gas (CNG).

PRIORITY SECTORS FOR GHG MITIGATION

17. Nigeria's First National Communication presented a baseline scenario and a greenhouse gas abatement scenario. The baseline scenario outlined the most likely development path in the energy system, where inefficiencies in the current system were not necessarily carried into the future. In addition to existing social and economic infrastructures, all firm or proposed projects and policies were incorporated into the baseline scenario.

Figure 4: 2030 CO2 EMISSIONS: BASELINE AND ABATEMENT SCENARIOS



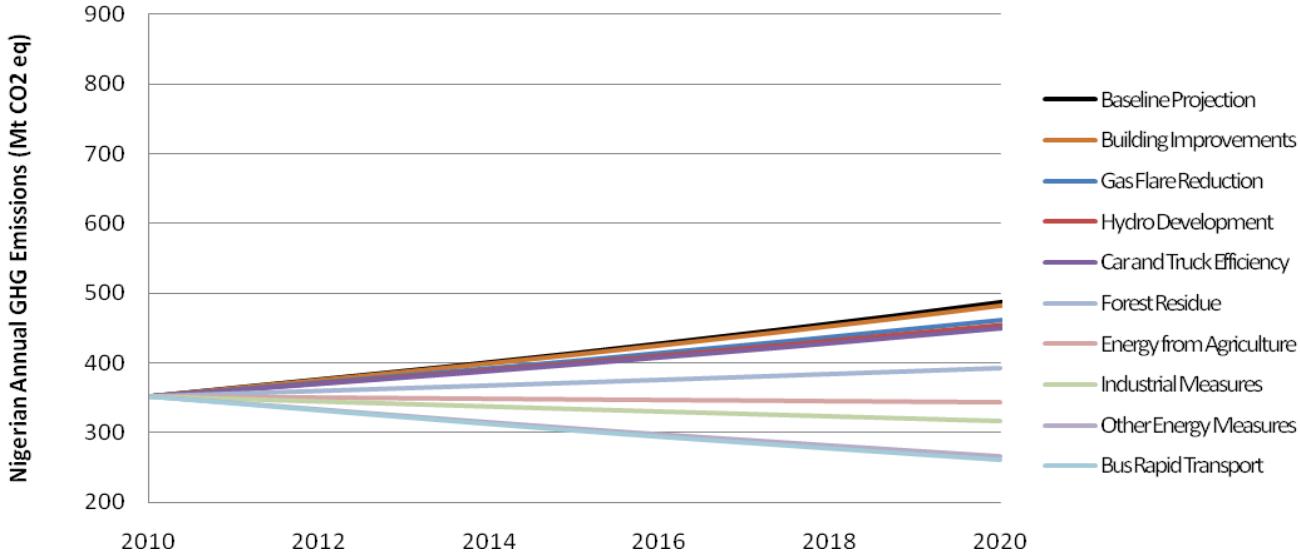
18. The abatement scenario was obtained by the introduction of a number of mitigation options into the baseline scenario, including:
(a) Efficiency improvement options in the residential, industrial and commercial sectors;
(b) Increased use of renewable resources, consisting of the introduction of small-scale hydro plants and solar-electric options;
(c) Supply-side options, especially rehabilitation of some existing oil refineries and power plants, and the introduction of newer technologies;
(d) Options for increased use of natural gas.

19. For the National Communication analysis, total CO2 emissions in the energy sector were 108 million tonnes of CO2 in 1995, and this was expected to grow at an average annual growth rate of 2.2% before doubling at 232 million tonnes of CO2 by year 2030 in the baseline scenario. Under an abatement scenario, cumulative reduction from baseline by 2030 is 887 million tonnes CO2. *No-regrets* abatement options contribute only 76 million tonnes of CO2 or 8% of total reduction, while gas-flare reduction in the oil industry is expected to be responsible for the rest.[20]

[20] Only the emissions of carbon dioxide from the energy sector are considered in this analysis and in assessing CO2 emissions, the IPCC Reference Approach was used in emissions accounting. In this case, only the carbon in fuels supplied to the economy was accounted for,

A more recent analysis of baseline emissions growth (see Figure 3 below) shows that Nigeria's GHG emissions will rise to nearly 500 MTCO2e by as early as 2020.[21] Investments to reduce emissions from transportation (especially bus transit solutions) and industrial energy efficiency reduce the trajectory dramatically over time as urbanization and industrialization rapidly grow. The increased gas-use options considered in this analysis focused on finding domestic economic uses for the associated natural gas that is currently being flared in the oil fields. The options considered in this category include liquefied petroleum gas and methanol extraction plants, substitution of fuel-oil for natural gas in the industry for process heat generation and the introduction of compressed natural gas vehicles in the transport sector.[22]

Figure 5: Reductions Resulting from Mitigation Measures (2010 – 2020, excluding Land Use Change and Forestry)



Source: Dayo, B; A. Gilau and M. Samec (Sept, 2009); 'Nigeria's Perspective on Climate Change Mitigation', ICEED Working Paper, pg 56, Abuja, Nigeria.

20. These measures are not exhaustive, but provide an overview of many of the options that are possible in Nigeria. Thus, it should be noted that this approach is meant to provide an overview of different mitigation measures (scenario setting) and their potentials over a definite period of time, based on appropriate policies.

Government's Climate Mitigation Strategy

21. The Government's strategy for climate change mitigation was outlined in Nigeria's First National Communication to the UNFCCC (2003) and included the following interventions:

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irrespective of the technologies consuming the fuels or whatever transformations they went through before. In addition the IPCC default CO2 emission factors were adopted.

[21] Dayo, B; A. Gilau and M. Samec (Sept, 2009); 'Nigeria's Perspective on Climate Change Mitigation', ICEED Working Paper, pg 56, Abuja, Nigeria.

[22] There have been various attempts by the government to reduce gas flaring in the past, including introduction of penalties for the amount of gas flared by the producing companies and the abatement scenario assumed elimination of gas flaring by 2010.

Transportation: (a) Expansion of Bus Rapid Transport - expanding the scope of the Lagos urban transport project and improving transportation efficiency of other metropolitan areas (e.g. Kano and Abuja); (b) Rail - rehabilitation of existing infrastructure for bulk goods transport and construction of a new corridor (in line with the Railway Master Plan); (c) increased inland water transport; and (d) sea transport.

Energy: (a) Efficiency improvement options in the residential, industrial and commercial sectors; (b) increased use of renewable resources, by introducing small-scale hydropower plants and solar-electric options; (c) supply-side options, especially rehabilitation of some existing oil refineries and power plants, and the introduction of newer combined-cycle technologies and cogeneration at industrial facilities; and (d) increased use of associated gas "to reduce gas flaring."[23]

22. Nigeria has the world's seventh largest proven gas reserves of 182 TCF[24], which is a high quality, low sulfur-content gas that is rich in liquids. With almost 60% of currently available natural gas being flared, only about 300 mmscfd of gas is available for domestic consumption against a current demand of 600 mmscfd. It is a priority for the Federal Government of Nigeria (FGN) to exploit the potential of gas to accelerate economic development, with a focus on viable domestic, regional and other export markets.

23. Availability of affordable financing will allow energy service companies and Nigerian industry to borrow to make their operations more efficient. This transformation to a more efficient – and competitive -- economy, if successful, will signal a shift from the high emitting and expensive diesel generators that are a drag on business growth and the aspirations and dignity of ordinary citizens[25]. Likewise, a more efficient transport system will improve the lives of urban Nigerians within a low carbon emissions trajectory.[26]

24. There are several barriers that inhibit upstream investment required for the supply and productive use of gas for domestic markets. The Government's Gas Master Plan cites several areas of reform that have the potential to unlock these markets. For one, Nigeria has identified and initiated several planned key upstream infrastructure investments in gas gathering, processing and transportation. Secondly, Nigeria has recognized that the low domestic price of gas has discouraged suppliers from supplying gas for productive domestic uses. In response, the Government enacted a transitional domestic gas pricing framework that moves prices progressively to cost-reflective levels. To kick-start the implementation of the strategy, a domestic supply obligation has been placed upon all producers and a transitional higher gas tariff is planned. The recent gas policy gradually increases the price of gas for electricity from

[23] First National Communication, UNFCCC
[24] Gas Master Plan Nigeria, Investor Roadshow

[26] At recent international climate change negotiations in Copenhagen in December 2009, the Nigerian delegation read out its position paper which stated: "As Nigeria strives to develop its national economy, we are fully aware of the huge responsibility to address the incidence of carbon emissions through gas flaring in the oil sector. Much of this is gas that is inevitably associated with oil drilling that has created a major challenge for us which can only be addressed through an aggressive implementation of an ambitious gas master-plan."

US$0.10 to US$1.0 per mmbtu[27] by 2012. These create a more sustainable basis and climate for private investment in downstream infrastructure projects for energy and transportation in Nigeria.

25. The Government's gas sector strategy is to directly address the barriers by supplying gas to the domestic market and investing in gas infrastructure by the International Oil Companies (IOCs),[28] which are the major gas producers in the country. Upstream gas infrastructure investments by the Government, by state-owned enterprises and by IOCs are planned and the World Bank has recently approved a new package for Nigeria that includes a Partial Risk Guarantee (PRG) that would guarantee that suppliers would be paid for downstream gas sales to power plants. These developments should provide the incentives required to stimulate upstream investments that would be required to increase energy efficiency by expanding the supply of gas to the domestic markets. As a result of these upstream interventions, supply of gas is expected to increase rapidly over the next decade. Many of these interventions made by Government are challenging and complex, require implementation of regulatory reform and can be expected to bear fruit over the next several years.

[27] This pseudo regulated price is designed to match the netback from LNG to IOCs, i.e. to remove the large price discrepancy between domestic supply obligations and foregone export opportunities.

[28] Shell, Exxon-Mobil, Chevron and Total are the major gas producers as almost all of the currently produced gas is associated gas that comes as a byproduct with oil extraction (stand alone dry gas fields are yet to be exploited).

RATIONALE FOR SELECTED SECTOR(S)

26. Transport and industry were selected as the key sectors for this IP both they are both end users of energy and are central to the country's economy, its development and environment. Expanding transportation choices in Nigeria's growing cities, shifting future modal distribution, and improving vehicle operating conditions provide the opportunity to help leapfrog efforts to bend Nigeria's emissions trajectory significantly in this sector for decades, while contributing to a better quality of life in the short-to-medium term. Likewise, catalyzing markets for energy efficiency creates an opportunity for increased competitiveness for Nigeria's industry, with the opportunity to leverage private sector capital to scale-up these low-carbon investments in a reasonable timeframe.

27. Reducing gas flaring from interventions in the broader energy sector (both upstream gas and downstream power) is also critically important to Nigeria's economic growth and competitiveness – arguably more so than the sectors selected for inclusion in the current IP – and would be a source of very significant GHG reductions if such measures could be successfully implemented. Because of the potential magnitude of emissions reductions involved, both upstream gas and downstream power sector interventions were indeed considered by the MDB team for inclusion under this IP. In particular, there was significant interest expressed in finding a scalable approach to reducing gas flaring and processing the associated gas for much needed power investment. For example, a power sector investment which would have utilized associated gas for generation was considered. This would have demonstrated the opportunity to expand power generation using natural gas for the domestic power markets, utilizing Independent Power Production (IPP), embedded generation, integrated distribution and generation as well as other innovative business models.

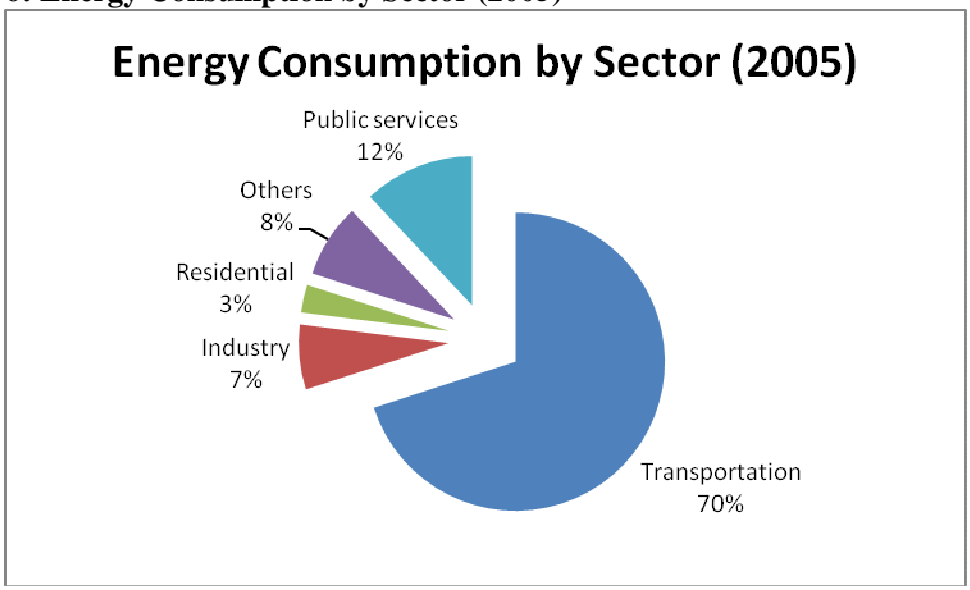
28. However, interventions to address gas flaring specifically were not included in the IP for three principal reasons. First, eliminating gas flaring requires both a very long lead time and a substantial overall investment of well over US$10 billion. A CTF intervention by its nature, therefore, would not have the requisite transformational impact on the sector. Second, energy and power sector reforms are still underway, and would need to be worked through before significant new investment can be programmed. Several policy and regulatory signals need to be sorted out in order to restore the sector's proper functioning to attract sufficient scale-up over a reasonable time-scale.[29] Third, since natural gas is a fossil fuel, its use is constrained by current CTF investment criteria. Because of these three factors, the team concluded that, while gas flaring reduction is critically important to both Nigeria and the global climate agenda, the CTF would be an inappropriate instrument for addressing it.

[29] The power sector is an example of a sector which has been undergoing reform for a few years. The Government has initiated several reforms in the power sector since 2005 such as the enactment of the Electric Power Reform (EPSR) Act in 2005. Reforms called for the unbundling of the Power Holding Company of Nigeria (PHCN) into 18 companies (6 generating, 1 transmission, and 11 distribution), open access to the grid, bilateral contracts between power producers and main power users (still pending), and competition among power producers (pending). The results over the past several years on the ground have been modest but incremental. They include: (a) increase in monthly revenues collection from N 2.8 billion to N 7.75 billion; (b) rise in metered customers from 40 to 67 percent; (c) reduction in system losses from an average of 45% to around 34%. The Government plans to develop the sector are now focused on reducing the generation capacity shortage and implementing public private partnerships.

29. Support for rural and renewable energy was also considered very important for both increasing access and supporting clean technology diffusion, but was not included in this IP because of the relatively long time-frame (five toten years from now) that it would likely take to bring 200-500 MW of clean generation online,[30] provided there is adequate regulation for small and independent power. With a longer implementation time-frame, this area could be very attractive for inclusion in a subsequent phase of the Nigeria CTF IP.

30. It is proposed, instead, to target CTF resources to stimulate investment in selected downstream opportunities that would lead to the use of cleaner, more efficient alternatives for industry and solutions for transport. Besides being part of the country's 2020 development strategy, these sectors have been selected both because of the near-term impact and visibility of the efficiency measures as well as the longer-term impact through the opportunity for scale-up on sustainability both from a planning and investment perspective. Improving the efficiency and sustainability of transport and industry sectors have been selected as the key objective for CTF investment, leading to greater competitiveness and improved quality of life on a reasonable time-scale. In so doing, the CTF could leverage traditional ODA funds as well as private and commercial resources to complement the Government's efforts to reform the sectors as well as develop new markets in industry for clean and efficient energy use (including clean fuels, renewable energy and energy efficiency).

Figure 6: Energy Consumption by Sector (2005)



Source: Energy Efficiency Programme in Nigerian Industries: A Lesson from India by Peter Olabisi Oluseyi, Ogbonnaya I Okoro, E Chikuni. University of Lagos, Nigeria, University of Nigeria, Nsukka, Polytechnic of Namibia, Windhoek, Namibia

[30] The World Bank is in the process of preparing a Rural Access and Renewable Energy project ($200 million) with an expected Board date of December 2011.

31. The CTF investment creates an opportunity to de-link emissions growth from rapidly growing urbanization and economic development, while providing citizens with safe, reliable and affordable alternatives. CTF resources will also be used to stimulate investment in downstream opportunities that would lead to greater energy efficiency in transportation, in manufacturing and service industries and in buildings. This includes utilizing a range of technologies, including industrial energy efficiency investments, renewable energy, renewable energy-based hybrid systems and the use of cleaner fuels and combustion processes in service and manufacturing industries. The objective is to stimulate alternative and efficient ways to generate electricity and investments in energy efficiency to reduce dependence on inefficient and expensive small diesel and fuel oil generators which contribute significantly to GHG emissions.

32. A key rationale for selecting the interventions identified in this IP is the ability to actually implement and achieve transformative change within a reasonable time-frame.[31] By definition, this led to the focus on those opportunities that promoted economic growth; that visibly improved the daily lives of stakeholders (either through improved commutes, through the creation and/or retention of industrial activity and creation of jobs); and/or that helped demonstrate that improved development outcomes and environmental progress can go hand-in-hand and can serve as replicable models.

33. The IP's focus in the Nigerian transportation sector is to help transform the sector by accelerating the opportunities and broadening the reach provided by recent innovations in urban transport provision. CTF investment in the sector will focus on the three principal cities of Lagos, Kano, and Abuja. In concert with conventional ODA financing from IDA, the African Development Bank, and the Agence Francaise de Developpement (AFD), it will be oriented to strengthening bus-based mass transport provision in these cities, allowing them to respond to the same level of demand for mobility while reducing the total number of vehicle kilometers plying the streets, and reducing the energy intensity of those vehicles by improving operating conditions. In doing so, such investments will potentially help improve circumstances for the urban poor in the three cities, by enhancing their accessibility and reducing the prices they are facing for at least some transport services. CTF funds will also be used strategically to improve the availability of high quality, high-capacity buses, and possibly demonstrate the operational viability of alternative vehicle / fuel technologies which have the potential to reduce operational CO_2 intensity.

[31] The power sector is an example of a sector which has been undergoing reform for several years. The Government has initiated several reforms in the power sector since 2005 such as the enactment of the Electric Power Reform (EPSR) Act in 2005. Reforms called for the unbundling of the Power Holding Company of Nigeria (PHCN) into 18 companies (6 generating, 1 transmission, and 11 distribution), open access to the grid, bilateral contracts between power producers and main power users (still pending), and competition among power producers (pending). The results over the past several years on the ground have been modest but incremental. They include: (a) increase in monthly revenues collection from N 2.8 billion to N 7.75 billion; (b) rise in metered customers from 40 to 67 percent; (c) reduction in system losses from an average of 45% to around 34%. The Government plans to develop the sector are now focused on reducing the generation capacity shortage and implementing public private partnerships.

Box 1: The ABCs of Transport Sector Interventions to reduce GHG Emissions

The most straightforward framework for analysis of GHG emissions from the transport sector is the ABC decomposition, where A represents the overall level of motorized activity in the sector (measured in units of vehicle kilometers traveled), B represents the specific energy consumption of those units (the "Brawn" of the vehicles, measured in units of liters of fuel per vehicle kilometer) and C represents the lifecycle carbon content of each unit of energy utilized (measured as lifecycle grams of CO2 emitted per liter of fuel consumed). This framework is shown in the following equation:

$$G = \sum_b A\ B\ C \qquad [1]$$

Where:
G = total CO_2 emissions from transport in study boundary;
b = vehicle binning characteristics, such as mode, size, fuel type, etc.;
A = vehicle **A**ctivity (vehicle kilometers of travel)*;*
B = energy intensity per unit of vehicle activity (the "**B**rawn" of vehicles in the bin);
C = lifecycle **C**arbon content of fuel used per unit of energy consumed in bin.

Proposed transport interventions for the CTF investment plan in Nigeria are intended to help bend the trajectory of either A, B, or C downward, i.e. either fewer vehicle kilometers traveled ("A") because of modal shift[32]; improved technology and / or operating conditions, leading to lower fuel consumption per vehicle kilometer; or cleaner fuels used ("C"). In order to take advantage of synergies with local developmental priorities, the CTF investment plan focuses on transport interventions in urban areas, namely Lagos, Kano, and Abuja.

34. The incremental importance and additionality of CTF funding in the transport sector is related to how urban transport improvements affect different segments of the transport market. Bus-based public transport improvements can potentially head off CO_2 emissions from two separate segments of the transport market: "captive" riders and "choice" riders, in the terminology of urban transport experts. Captive riders are those travelers who would be taking public transport in the future even in the counterfactual (that is, absent a concerted investment). Choice riders in this case can be considered those who would not take public transport in the counterfactual, but who might be induced to make the shift of mode given the right set of policy and investment initiatives. Bus-based public transport investments can reduce the CO_2 emissions trajectories from captive riders, by reducing the total number of bus vehicle kilometers needed to meet their mobility demands (through service rationalization) and by reducing energy consumption per vehicle kilometer (through improved road management and operational improvement). Beyond that, however, bus-based transport investments can also potentially reduce the CO_2 emission trajectories of choice riders, by inducing a modal shift, if certain thresholds can be met. Past experience has shown that choice riders switch to public transport if the transport facilities themselves (stations, buses, etc.) meet their expectations for a quality service, and if the door-to-door service time is at least competitive with their private, motorized

[32] "Modal shift" as used in this document refers to influencing the modal distribution of trips between hypothetical future conditions (e.g. project investment scenario v. no-project scenario). It should not be construed necessarily as an effort to convince specific current travelers to change specific behaviors.

alternatives (that is, it provides good access to their origins and destinations, with high speed services, and minimal required changes and walking at both ends.) This, in turn, means improving the network connectivity of the public transport system.

35. Generally, basic investment in bus-based public transport services such as BRT will rationalize service and improve bus operations. Further investment that improves both network connectivity and the quality and image of public transport would induce modal shifting among choice riders. There is no hard threshold in this distinction, but, generally, the more a metropolitan region's public transport network can be developed and interlinked, the more of a transformative effect that investment has in reducing CO_2 emissions from choice, as well as captive, riders. The CTF investments proposed under the current IP have been conceived with this incrementality in mind; the "underlying" investment – the LUTP II and proposed NUTP projects – have potential to reduce CO_2 emissions along the particularly corridors or intervention areas where they are programmed through operational improvements and VKT reduction, but the CTF investment would facilitate additional CO_2 reductions by affecting choice riders. The CTF will also help finance the long-term institutional capability to plan and manage increasingly complex networks as a sustainable means of addressing a critical and long-term urban challenge that will only grow over time. CTF support for transport, and the ODA to which it is linked, will promote economic growth, support mobility (social co-benefit), and result in both local and global environmental benefits.

(a) Bus Rapid Transit: Lagos

36. Lagos State Government has successfully introduced a form of Bus Rapid Transit along one corridor in Lagos. This BRT-Lite line has had enormous demonstrative impact, not just for Lagosians, but for Nigeria as a whole. The Government has proposed to expand this kernel into a full-fledged integrated multi-modal transport system by extending the BRT along two additional corridors (27 Km), upgrading some of the BRT-Lite infrastructure to "full" BRT conditions, and developing two commuter rail lines integrated with the system. The expansion of the BRT provides a substantial opportunity to demonstrate the ability to scale-up to help meet the ever-growing needs for mobility in Lagos in a low carbon manner, with many more well-developed interfaces to existing modes of transport as well as to newer modes planned for the future.

37. The experience from BRT projects in many countries is that reduced global or local emissions can be obtained as a significant subset of the overall benefits of such as investment. The primary benefit usually is improved mobility (travel + access time savings) with operational cost savings (fuel, maintenance, etc.) next. One area of identified CTF investment is to expand the overall infrastructure of the BRT in order to attract more riders by creating a viable, reliable, safe and attractive alternative to Lagosians, currently using inefficient vans, motor cycles and cars. This includes investing in bus depots for maintenance of cleaner and more reliable operations; better lighting (including solar lighting) at bus stops to increase perception of safety; parking spaces, stations and terminals for feeder routes, rehabilitation and expansion of bus service lanes, etc. These interventions are intended to reduce the A term in the ABC formulation presented in Box 1, by allowing for better organization of services which, in turn, can allow the mass transport system to meet the same demand for mobility with fewer vehicle kilometers. It also helps make the system more attractive to people who might otherwise choose to use their own private vehicles, thus potentially reducing some of those private vehicle trips. Overall

emission reductions from bus modal shift nationally are estimated to be in the average range of 1-1.5 $MtCO_2e$ annually or 12-15 $MtCO_2e$ over ten years. Once this level of modal shift is achieved, the cumulative emission reductions will continue to rise over time.

38. The BRT intervention also provides an opportunity to improve the availability of high-quality buses. Currently, buses used in Nigeria – high kilometrage, diesel buses – are relatively carbon inefficient and cost between US$70,000 – US$75,000 each. Buses that provide high comfort to users – and potentially with greater energy efficiency – could cost double or triple that amount. Demonstrating the commercial viability of such buses (necessary to attract choice riders), including testing the operation of buses that use cleaner engine technologies that could permit an overall lower carbon footprint, such as retrofitting buses to use CNG, would also be considered for CTF investment.[33] Demonstrating the profitability of the life cycle economics for operating such buses in Lagos is an important precursor for private concessioners to shift to such potential low carbon alternatives for the entire fleet, which includes private sector concessioners licensed by LAMATA and with financing from commercial banks supported by lines of credit from IFC and AfDB. This set of interventions facilitates reduction of the "B" term in the ABC formulation presented in Box 1, by encouraging the use of more fuel efficient technology. It also potentially reduces the "C" term, as well, if there are opportunities to use associated gas in the CNG fuel cycle. Preliminary analysis indicates that the emission reduction for the proposed expansion using CNG obtained from associated gas sources in Lagos is about 300,000 – 400,000 tCO_2e per year (3-4 million tonnes of CO_2 over 10 years) with the potential to grow significantly over time.

(b) Bus-based Urban Transport Improvements: Kano and Abuja

39. Similar opportunities exist to transform the growth of transport-related emissions in Kano, (the second most populated city in Nigeria) and in Abuja (one of the fastest growing cities on the continent). Commuter services are inefficient and informal supply by far outpaces demand. Minibuses, taxis and three-wheelers make up the bulk of the fleet. The use of motorcycles for commercial transport has grown very rapidly in both metropolitan areas in recent years, mainly as a consequence of the poor state of the roads and the inability of bus companies to meet growing demand. Most of the motorcycles and three-wheelers in commercial service use inefficient and highly polluting 2-stroke engines (less than 100cc) and operate in the informal, unregulated economy with low safety, high risk and high emissions.

40. Because Kano and Abuja are at an earlier phase in their institutional development, CTF investment in these urban areas will be of a somewhat different character than in Lagos. The transformational impact of the investment will come partly from activities to support establishment of an urban transport institutional authority similar to that of LAMATA in Lagos -- one with broad authority to engage in regulatory and long-term planning activities for transport on behalf of the general public. As has been shown in Lagos, having such an authority is a necessary condition to being able to make transformational investments on the ground, investments that can reorganize public transport service delivery to enable greater passenger mobility with fewer actual vehicle kilometers (i.e. the A term in the ABC framework presented in Box 1), improve operating conditions to allow public transport (and other) vehicles to operate

[33] The specific engine technologies are still being evaluated in the specific context of Lagos. However, the project will introduce more efficient and large size buses, to replace small buses, with its impact on reducing local pollution and reducing VKM travelled.

with less friction, and therefore fewer emissions per kilometer traveled (i.e. the B term in the ABC framework), and improve the potential for operators to provide services and accumulate surplus, thereby enabling them to invest in more advanced vehicle technology (potentially reducing the "B" and "C" terms in the ABC framework). The CTF Investment will consciously build-in sensitivity to carbon emissions as part and parcel of the planning and institutional process in Abuja and Kano.

41. As in Lagos, the blended package of CTF investment in Kano and Abuja will partly focus on supporting institutional change along with targeted investments leading to lower emissions and demand-management measures leading to lower emissions through operational improvements and modal shift. The value-added of the CTF financing will be to ensure that the above-enumerated climate-related objectives, in terms of the ABC framework above, are fully and explicitly incorporated into the investment program. In addition, the IP will support the demonstration, deployment and transfer of low carbon technologies with significant potential for long-term GHG emissions savings. The specific opportunities for CTF-financed interventions will be identified, prepared and financed as the blended projects are developed, and are likely to include optimizing bus routes and schedules to reduce congestion and idling, replacing inefficient two-stroke motorcycles and three-wheelers with more efficient, larger buses, improving overall traffic management in the cities to ensure smoother flowing traffic, demonstrating the economic viability of lower carbon engine and fuel technologies, and improving the capacity to monitor climate and other environmental impacts of transport policies, programs, and investments. These will also likely include better maintenance of buses and the depots, better lighting to increase perception of safety around bus stations as ways to attract more people away from inefficient modes to an efficient and managed bus system. Together, these should provide a safe and clean alternative to persuade passengers to shift to this mode of transport from other, less reliable, high emission modes of transport.

(c) Catalyzing energy efficiency and renewable energy through Financial Intermediation

42. Strong and sustainable economic growth is usually driven by technological innovation. The rate at which Nigerian businesses absorb new technology for efficient production remains below the world's median value.[34] Inflow of FDI is largely restricted to telecommunications and oil industries. On average, 35% of Nigerian industry's cost structure is due to the high cost of inefficiently generated energy (primarily electricity).[35] The IP proposes to help industries to become more efficient by switching to low-carbon and cleaner fuels and by encouraging industrial energy efficiency measures (including cogeneration of electricity and heat). These investments will also help businesses migrate to a more competitive cost structure at a time when several high-profile industries have begun to migrate to neighboring Ghana.[36]

[34] Global Competitiveness Report 2010-11, World Economic Forum

[35] Energy Efficiency Programme in Nigerian Industries: A Lesson from India by Peter Olabisi Oluseyi, Ogbonnaya I Okoro, E Chikuni. University of Lagos, Nigeria, University of Nigeria, Nsukka, Polytechnic of Namibia, Windhoek, Namibia

[36] Ghana has proactively launched an investment drive to attract Nigerian manufacturing firms to its major cities. The drive includes tax and other incentives as well as better operating conditions, which included reliable power supply. OK Foods, Dunlop Nigeria and Unilever Nigeria have been cited in the national press as establishing new manufacturing facilities in Ghana, while reducing manufacturing in Nigeria. (http://www.punchng.com/Articl.aspx?theartic=Art20090622371226)

43. Numerous studies have shown that the attention given to energy-efficiency investments in industry is often very low and heavily influenced by the priorities of those responsible for the company or building management. Studies also show that usually small firms, including Small & Medium Enterprises (SMEs) bear a relatively higher cost of infrastructure failures. A study of 179 manufacturing establishments in Nigeria found that the impact of infrastructure deficiencies of all types was consistently higher for small firms.[37] Small firms were found to generate a larger percentage of their power needs privately than larger firms and to pay a higher premium for doing so, as measured by the excess costs of privately generated power over that of publicly provided.

44. In other cases, the project-based economic evaluations often do not consider the relatively high transaction costs of the investor and also the substantial risks involved in the case of long-term investments; both aspects may be decisive for small efficiency-investments.[38] Over 40% of energy used is wasted in old, ageing and obsolete industrial equipment which are most of the times very much inefficient. There is up to a 25% saving potential from good house-keeping measures. Retrofitting in industries would be able to save about 35% of energy currently in use, including investments in lighting system using compact fluorescent lamps, energy-efficient motors, improved steam boilers, etc.

45. Energy service companies and Nigerian industries that want to make the transition to a cleaner, cheaper and more competitive future find that they operate in an environment where they can only borrow for such investments at nominally high interest rates and only on the short-term. Loans from banks for such energy efficiency investments are usually for tenors no longer than 1 to 3 years (at nominal interest rates of 20%-22 % per annum) for projects that have a longer investment horizon, among other barriers. Similar challenges are faced by transport operators facing the higher upfront costs of CNG and high efficiency buses providing cleaner yet reliable alternatives. As a result, there have been very few investments made to implement clean investment opportunities. Catalyzing these downstream markets for clean energy through targeted CTF support to commercial banks provide an important area for transformative investment in Nigeria and an important pathway toward growth with a low carbon footprint.

46. Industries as varied as cement, flour, telecom, retail, housing etc. are burdened by high energy costs and could be encouraged to switch fuels from inefficient diesel to renewable energy and other lower carbon fuels and/or implement energy efficiency measures. New investment in construction of mass housing and in retail sectors could also encourage green outcomes through the installation of energy efficient technology. The barriers tend to be largely financial (high rates and low tenors on loans) as well as market (limited or no experience with clean technologies).[39] Commercial banks are reluctant to lend to EE projects, which typically do not involve physical assets and conventional revenue streams.

47. CTF resources could be used to catalyze a shift towards cleaner energy sources such as efficient on-site cogeneration, solar panels or wind, or more efficient hybrid generators (e.g. battery and diesel). Small projects would typically be supported through lines of credit to one or

[37] http://www.aercafrica.org/documents/RP148.pdf

[38] Energy Efficiency Programme in Nigerian Industries: A Lesson from India by Peter Olabisi Oluseyi, Ogbonnaya I Okoro, E Chikuni. University of Lagos, Nigeria, University of Nigeria, Nsukka, Polytechnic of Namibia, Windhoek, Namibia

[39] Implementing technologies such as improving boiler efficiency alone in a beverage plant studied in Nigeria showed that it could obtain a fuel saving of 12% alone.

more commercial banks with a CTF component. The IFC and AfDB's private sector window are considering financing such activities by utilizing local commercial banks as financial intermediaries which could on-lend CTF and MDB resources to projects seeking more favorable terms for energy efficiency and clean energy investments.[40] The rationale is to provide additionality of CTF resources to help break out of the short tenor-high interest rate cycle that has currently trapped Nigerian firms into an uncompetitive, high cost, low efficiency and high carbon emissions production cycle. As banks and projects get more experience with these types of projects, they could make such projects part of their regular lines of business, providing replicability, scale-up and sustainability in this area.

Emphasis on private sector solutions, including involvement of commercial banks

48. A major barrier to successful implementation of low carbon projects by Nigeria's dynamic private sector is the availability of long-term credit on affordable terms. High hurdle rates and short loan tenors combine to make clean and efficient project development, virtually impossible, unless financed directly by the International Oil Companies (IOCs) and other large, global companies. Typical terms available for financing clean infrastructure investments tend to approximate those for trade finance, with typical loan tenors of one to three years which do not match the longer-term characteristics of infrastructure investments. The recent liquidity squeeze in the market has further led to a severe contraction of domestic credit private sector development. This creates an excellent opportunity and a platform for the CTF to help strong banks with a good track record, proven risk management and corporate governance systems to diversify their products and support the transformation of Nigerian industry through the growth of markets for clean energy and an efficient transport sector.

49. The private sector has successfully developed several models which seek to enhance their access to energy in the face of the current power situation. However, there is a dearth of funding to support the adoption, replication and transformation of such benefits in the real sector, especially in relatively unfamiliar areas such as energy efficiency and clean energy. Even though there are reasonable financial benefits associated with energy efficiency and renewable energy initiatives, there is very little experience with and a significant dearth of funding from the financial institutions, which inhibits any meaningful scale-up or transformation of energy efficiency efforts. Some of the barriers responsible for the lack of funding for energy efficiency and renewable energy initiatives are: (a) the lack of long term financing sources for the local financial institutions; (b) the perceived technology risk associated with such initiatives; (c) the lack of awareness by commercial and industrial players of the opportunities to reduce power consumption; and, (d) the drive towards organizational expansion rather than huge capital investments for long term operational cost reduction.

[40] Another example of a value-added CTF intervention is the generation of electricity to a regional distribution company. Such smaller-scale projects (e.g. up to 20 MW each) would ideally use clean fuels such as natural gas and ideally would be able to co-generate electricity for a range of customers and steam for nearby industries. The combined efficiency of generating electricity and gas would result in low emissions in the range of 0.260 tonnes per megawatt hour. CTF resources could help finance the higher upfront costs for cogeneration and potentially provide support for other projects, including landfill gas.

ENABLING POLICY AND REGULATORY ENVIRONMENT

(a) Transport Sector Issues and Reforms

50. Creating the right type of institutional and planning capacity is a key success factor for any improvements in the transport sector. The issues which have affected the transport sector in Nigeria over the years[41] could be summarized as follows:

- Absence of an articulated and adopted policy and strategic framework for the transport sector;
- Absence of an articulated and adopted policy and strategic framework for vehicular emissions and fuel economy;
- Fragmentation of institutional responsibilities between various agencies at various levels of government with no coordination framework;
- Absence of well-equipped traffic management institutions; inadequately trained transport/traffic engineering staff;
- Inadequately defined public transport planning and regulatory function;
- Absence of standard procedures for the technical and economic evaluation of programs and projects resulting in a strong bias toward capital expenditure rather than making better use of existing investments through better management and maintenance practices; and
- Involvement of a multitude of agencies at local, state and federal government levels in transport provision and/or service delivery in the city. Often the agencies develop and implement their own policies and programs in isolation, without much regard for the effect on other policies.

51. In response to the growing problems with the management and delivery of transport services, a number of studies have been conducted over the past decade by the Lagos State Government to develop a strategy and propose appropriate solutions. The Lagos Mass Transit and Transport Systems Management Program study was undertaken in 1992. This work set out to identify actions necessary to address the complex transport situation in Lagos. The study had as one of its recommendations, the creation of LAMATA to coordinate transport policies, programs and actions of all agencies at the different tiers of government. It was the recognition that these issues needed to be resolved, lest transport in Lagos deteriorated to intolerable levels that ultimately inspired the creation of LAMATA.[42]

52. Encouraged by the marked and visible improvements in transportation within Lagos State and, particularly the ongoing transformation at LAMATA, other cities in Nigeria have also begun to coordinate their long-term master planning and coordination functions. In particular, the recently approved World Bank operation in Lagos includes a small component for capacity building in Kano, funded through the Global Environment Facility (GEF). This component will

[41] In Lagos, these issues have been substantially mitigated in recent years by the strengthening of, and subsequent actions by, LAMATA.

[42] The World Bank Urban Transport Strategy Review, "Cities on the Move" (2002) identifies institutional weakness at the heart of growing transport problems in cities. It states that, "institutional weaknesses are the source of many observed failures in urban transport in developing countries. At the municipal level, institutional structures for transport are weak and inadequately staffed. The need to integrate policies both within the transport sector and between transport and other aspects of urban development calls for the development of institutions that minimize jurisdictional and functional impediments to policy integration and allow for extension of the role of the private sector within an integrated strategy." It goes on to add that, "cities that have failed to find acceptable institutional mechanisms have also frequently failed to address the problems of increasing road congestion, environmental deterioration, and the decline of public transport."

strengthen the capacity of Kano in urban transport planning and management and to prepare feasibility reports. Furthermore, LAMATA is playing a greater role in national urban transport planning, organizing workshops on a regular basis to disseminate lessons learned with the participation of staff from both Kano and Abuja Federal Capital Territory.

53. Kano and Abuja are ready to embark on a similar planning and investment process as Lagos. Each would like to set up adequate institutional arrangements and define a sector strategy, and both have requested support of the MDBs to finance specific activities to improve the quality, scope, sustainability and efficiency of transportation in those metro areas, including development of strategic, long-term transport plans. It is expected that these activities will provide quality, accessible and affordable mass transport system and supporting interventions for the residents of Abuja and Kano and their suburbs which will subsequently contribute to poverty reduction, improve standards of living, lead to sustainable economic growth and act as a pioneer of private and public investment partnership in the transport sector.

(b) Renewable Energy Development

54. The Country's Renewable Energy Master Plan (to be formally adopted) will provide a policy framework that would encourage these investments, as will the World Bank's expected engagement in Rural Energy scale-up. The Federal Government of Nigeria sets the following 10-year targets for the contribution of renewable electricity to the economy (2007 – 2016):

5% contribution to total electricity generating capacity, excluding large hydropower:

- Up to 735 MW cumulative renewable electricity generating capacity
- 5TWh of energy
- 2 Million new connections
- 1 Million Solar Home Systems
- 2000 Rural solar school electrification
- 2000 Rural solar clinics electrification
- 10,000 solar street lights
- 500,000 jobs
- 100 billion Naira renewable electricity companies
- 1.2 MT CO2 emission reduction

In the absence of an overall strategy, including a framework that addresses tariff issues, it is likely to be challenging for the Government to meet this goal. A forthcoming World Bank project on rural energy development will attempt to address some of these institutional issues and develop a commercial framework for such potential investments.

(c) Enabling Environment for Energy Efficiency[43]

The Federal Government of Nigeria and the Energy Commission of Nigeria have developed a framework to address the issue of energy efficiency. A series of actions has been defined in the National Energy Master Plan recently produced by the Energy Commission of Nigeria (ECN), certain courses of action considered germane to this topical issue are as listed hereunder.

i. Encourage compliance with the regulations of the power sector and regulatory agencies on electricity utilization and the environment
ii. Create and strengthen institutional framework and incentives for the promotion of electricity conservation and the use of modern efficient methods
iii. Set up mandatory energy audit and consumption reporting programme for large electricity customers
iv. Put in place incentives for the manufacture and utilization of energy saving products.
v. Develop building codes for efficient building designs within the limits of climatic change imperatives to reduce electricity wastages.
vi. Promote activities that encourage building industry professionals and other stakeholders to engage in modeling energy efficient buildings.

It is of prime importance for competitiveness of Nigerian industries and improvement of living standards of Nigerian citizens to implement those measures in Nigeria.

(d) Financial Sector reform

55. The concept and practice of energy efficiency and renewable energy are relatively new to financial institutions, and in general the private sector, in Nigeria. Until recently, financial institutions were averse to investments in energy efficiency and renewable energy initiatives; this was due to the lack of clear government policies incenting renewable energy, technology risks, the general bias towards corporate finance and the lack of long term funding sources and the lack of diversified financial products. However, with their clients beginning to recognize the underlying benefits of such solutions, local institutions are beginning to be more receptive to these opportunities.

Box 2: The Health of the Nigerian Financial System

The financial system in Nigeria is dominated largely by the banking sector which accounts for up to 90% of the total assets. According to local banking sector analysts, the total assets and contingents of the Nigerian banking sector was well over US$130 billion as of 2008. The banking sector in Nigeria is one of the largest in Africa and has experienced high nominal growth since the Central Bank of Nigeria ("CBN") began its banking sector reforms in 2005. The sector successfully mobilized local currency deposits of US$78 billion (10 banks control 75% of this deposit base) which funded a gross loan portfolio of US$36 billion in 2008. Agusto

[43] A more detailed discussion of challenges and opportunities for the development of renewable energies and deploying energy efficiency can be found in the forthcoming World Bank/ESMAP publication, Moving towards Low-Carbon Power Sector Development in Nigeria: Issues and Challenges Setting the Stage for Nigeria's Low-Carbon Power System Planning Studies: Review of the Institutional Process for Planning, Preliminary Data Gathering

and Co., a local credit rating agency, reports that the Nigerian banking system continues to be among the most profitable in the world, with pre-tax return of equity at 22% in 2008. Though diversifying to other countries has been top of the burner for the industry, the revenue is generated predominantly from the domestic market. The focus on the domestic market is still appropriate given that the Nigerian market is large and there is ample room for further growth.

In August 2009, due to the (i) huge exposure of banks to the capital market; (ii) liquidity squeeze in the financial system; (iii) high degree of credit risk; (iv) high cost of operations; and, (v) growing nonperforming loans ("NPLs") and low profit figures, experienced in the industry in recent times, the Central Bank of Nigeria ("CBN") decided to intervene through far reaching measures aimed at restoring confidence in the financial system by improving regulatory oversight, corporate governance, risk management and financial disclosure. Although the central bank's action has begun a desirable restructuring of the banking system, it reveals deep problems in Nigeria's credit markets that would in the short-term result in the contraction of domestic credit private sector development.

Generally, about 14 of the 24 Nigerian banks have been certified "strong" by the CBN and have sufficient capital to meet the existing demand. Within the financial services industry, the CTF strategy will emphasize diversification of products to encourage the strong financial intermediaries to further support the growth of real sectors such as energy (power and energy efficiency) and transport. Concurrently, advisory and investment services will be integrated to enhance funding and co-financing of transformational investments to catalyze the deployment, diffusion and transfer of sustainable low-carbon technologies and initiatives through risk sharing facilities or on-lending programs. The plan is that IFC and AfDB will work closely with the strong banks with good track record, proven risk management and corporate governance systems to provide financing to the underserved energy and transport sectors through well-structured financial products.

56. The MDBs, notably IFC and the AfDB private sector window, have engaged local financial institutions in the sector to develop, promote and diversify financial products to bridge the funding gap that has deterred the development of the real sector in Nigeria. The CTF could complement these efforts through the development and implementation of an initiative for funding energy efficiency projects specifically in various sectors, such as power, agribusiness, transport, telecommunications and education. The initiative will be a part of the MDBs commitment to address energy efficiency for the commercial, industrial and education sectors. The program will seek to target two to four financial institutions to promote investments in clean energy and energy efficiency projects through on lending programs as well as risk sharing products.

57. Without the additionality provided by CTF financing support for the initiative, the financing gaps in clean energy and energy efficiency investments will be difficult, if not impossible, to fill. The concessionality in CTF financing, which will be transferred to the end-users, could help overcome the perceived risk in kick-starting the market and create a replicable model for scaling up clean energy and energy efficiency investments in the real sector. The proposed program could also cover the initial first-mover high capital costs in breaking the financial barrier for developers in the power sector (renewable energy such as agricultural by-

products, biomass etc and energy efficiency), and assist in creating a replicable model in clean power generation that the country lacks. In order to ensure the replication effect and the wide transformational impact, the program will be complemented with a technical assistance program tailor-made for the local financial institution partners.

IMPLEMENTATION POTENTIAL, INCLUDING RISK ASSESSMENT

58. Overall risk of the Investment Plan, as designed, is **Moderate**.

Focus on Downstream Energy Markets

59. The IP focuses on the downstream energy markets, in part, as a recognition that limited CTF resources can only play a marginal role in catalyzing the vast and complex upstream energy sector. The upstream energy sector is dominated by the Government, the state-owned Nigeria National Petroleum Corporation (NNPC) and the International Oil Companies (IOCs). The resources involved in creating the upstream infrastructure are enormous and CTF participation would not be particularly catalytic in leveraging them. Several key issues in the sector involve the three main interlocutors identified above and private investments in the sector will necessarily require a satisfactory progression in the agreed reform agenda.[44] The value-added of CTF in shaping this upstream context is limited and unclear – simply adding more money from the CTF to the ongoing upstream reform efforts underway would not be especially value-added.[45]

60. The downstream part of the energy sector (including natural gas for industry and transport) has been explored for its potential in this Investment Plan because of the opportunity it presents for the CTF to catalyze and demonstrate, for the first time, a commercially viable market for efficient use of low carbon alternatives in Nigeria. However, many potential areas of investment in these downstream markets depend upon regulatory reform, which is well underway, but may take a few more years to realize in full. Instead of relying on full, regulatory reform of all the downstream sectors in Nigeria, the Plan focuses on that sub-set of downstream activities which does not require long periods of sector reform in order to be transformative. Rather, it selects interventions in sectors that have demonstrated the ability to support investment (e.g. LAMATA), demonstrated keen interest in moving down that road (Abuja and Kano) or that need knowledge, demonstration and capital to catalyze private investments (energy efficiency).This Investment Plan minimizes regulatory risk by maintaining its focus on catalyzing private activity by manufacturing and service industries (as well as the transportation sector), to invest in efficient energy technologies directly. In transport, similarly, it focuses on building upon a track record of early success with State-based agencies with a view to attracting private sector participation. The experience of investments in Lagos also provides the teams of the MDBs and partner bilateral with an enhanced learning and understanding of the types of approaches more likely to succeed in such investments.

[44] In conjunction with its reform initiatives, the Government also approached private investors, including international oil companies, to develop additional power generation capacity of about 3,000 MW in the form of private or Joint Venture power plants.

[45] As discussed by the World Bank in its recent Project Appraisal Document (PAD) of the Bank's Nigeria Electricity and Gas Improvement Project, natural gas availability and quality are critical constraints to power sector performance. Out of installed power generation capacity of 5,700 MW actual power supply tends to be only 2,000-3,000 MW on account of insufficient gas supply among other causes. The World Bank's analysis shows that, apart from inefficiencies arising out of poor maintenance and management, existing thermal power plants are losing one half of their capacity due to gas supply shortages. The poor quality of gas supplied is also reducing the operational and technical integrity of these plants. Similarly, shortage of gas will also limit production from the six new public-sector gas-fired power plants being constructed under the NIPP. Therefore, increasing gas supply for power generation is an essential part of the Government's strategy to address problems in the power sector.

61. The IP clearly identifies financing risk as the key barrier for industries to switch to more efficient production and seeks to address that risk head-on. In so doing, it demonstrates the underlying value proposition and business model to increase efficiency, improve productivity, enhance competitiveness and help create value for Nigerian industry. If efficient industry can demonstrate higher competitiveness through lower operating and maintenance costs, then this model could be replicated across other industry throughout the country. It may also demonstrate that strong local markets for clean energy, including clean fuels, renewable energy and energy efficiency are key for industry as well as for the power sector.

62. CTF interventions will leverage a number of selective, modular investments in both the public and private sectors. For example, in the public sector, the additionality of the CTF resources will help create a model for the deployment of CNG technology on buses even though the capital costs of acquiring such buses is easily twice as high as the existing buses. If the efficient buses can demonstrate significantly lower operating and maintenance costs, then this model could be replicated across Lagos and in other cities over the next several years. Likewise in the private sector, the CTF will demonstrate cleaner electricity generation options and reduce dependence on inefficient small generators, which contribute significantly to GHG emissions.

63. Downstream investments are also generally smaller than those required upstream and their success is not fully dependent on the whole energy sector reform agenda being implemented overnight. This also reduces the risk of having an entire investment plan resting on a single project that presupposes it can promote and achieve full sector reform in a short period of time. Rather, the modular nature of the CTF Investment Plan makes it likely that the proposed investments will succeed in a timely manner, even if the full reform agenda takes time to implement. For this reason, the CTF in Nigeria is to be deployed in a manner that will demonstrate a number of decentralized business models, encouraging results from initiatives in both the public and private sectors, and, where appropriate, through states and local communities. However, by focusing in key areas such as private industries and buses for clean energy and energy efficiency, the success of the program does not rest on the immediate implementation of the whole national reform agenda. This provides a degree of regulatory inoculation and risk reduction for the Investment Plan as a whole.

64. Success in implementing the priorities described in this Investment Plan through supply-side and demand-side energy efficiency and demonstrated success of sustainable transport alternatives would not only support the overall reform efforts but also strengthen areas of necessary policy support for more sustainable planning and identification of investments in the future. They will demonstrate how key downstream investments can influence further regulatory and policy development to further scale-up markets for low-carbon development, along with other market-based and technology-based approaches to lower emissions intensity. In so doing, the CTF would complement the Government's efforts to reform the broader sector by helping to develop downstream markets for clean fuel and technology alternatives and enable their replication across the economy.

65. The proposed transport sector investments are being made in the context of an initial investment with an implementation partner with a track record of success in a long-term World Bank engagement through the LUTP and LUTP2 projects. LAMATA has been successful in (a) preparing a strategic long-term plan for the transport sector in Lagos; (b) coordinating activities

of the multiple agencies involved in the sector; (c) rationalizing motor vehicle tax administration, resulting in a substantial increase in revenues; (d) maintaining, upgrading, and rehabilitating 632 km of the declared road network; (e) implementing a pilot Bus Rapid Transit (BRT) "Lite" system (see Annex 1); and (f) most important, changing the attitude among users towards bus travel and its potential.

66. Kano and Abuja will be able to benefit from the nearby example of Lagos, not only as a physical or operational model, but also – and more importantly – administratively and institutionally. Indeed, both have been receiving technical assistance from Lagos and have indicated a desire to develop an institution similar in character and breadth as LAMATA. In that respect, they stand to benefit from Lagos' experience and this will help them leapfrog their current path of sector readiness and transportation planning.

67. Notwithstanding some recent troubles in the Nigerian banking sector, several banks remain healthy. Both the IFC and the AfDB maintain strong, existing banking portfolios in Nigeria. The CTF strategy will focus on partnering with the healthiest of these banks and will provide a range of potential products, e.g. lines of credit, portfolio guarantees and targeted capacity building to encourage investment in selected sectors.

TABLE 1: RISK ASSESSMENT

Potential Risks	Mitigation Measures	Rating After Mitigation
Strength of banks and credit quality	MDBs and CTF to target strongest banks, including existing clients, and help them diversify product line	Low
Perceived operational risk of adopting and utilizing higher efficiency buses by private sector	CTF will demonstrate the life cycle economics of operating high efficiency buses so that private sector can scale up future purchases	Low to Moderate
Capacity of Partner Agencies in Transport	LAMATA has proven a capable partner and is assisting other cities with knowledge and capacity	Moderate
Kano and Abuja are unable or unwilling to put in place appropriate institutional frameworks	Success of LAMATA in Lagos provides catalyst and model for such a framework	Moderate

68. The Nigeria CTF investment plan is designed to be positive from an environmental and social point of view, as it assists Nigeria in achieving low-carbon growth objectives and priorities in the transportation and energy sectors, consistent with its national communications under the UNFCCC. The eventual investments under the Nigeria CTF are expected to trigger MDB safeguards policies. In the case of the World Bank, for example, OP 4.01 (Environmental Assessment) and/or other safeguards policies may be triggered,

depending on the activities undertaken through the program. As the specific activities are not known yet, the environmental categorization will be determined at the time project proposals are prepared and appropriate safeguards documents will be prepared, as per the MDBs safeguards policies.

FINANCING PLAN

69. Nigeria seeks $250 million of CTF financing to leverage an additional $722.3 million in multilateral support (IDA, IFC and AfDB private sector window) and a further $344.5 million from other resources (including from bilateral partners, counterpart funds, sponsor equity and commercial banks).

TABLE 2: INVESTMENT COSTS & SOURCES OF FINANCING
(US$ million)

	CTF			MDBs			OTHER	TOTAL
Component	**WB**	**AfDB**	**IFC**	WB	AfDB	IFC	Other	
Bus Rapid Transit (LUTP2)	**50***			190			139.50 (Lagos state, AFD + GEF)	**379.50**
Bus-based mass transport support for Abuja, Kano and Lagos (NUTP)	**50**†**	**50†**		200	82.3		tbd	**382.30**
Financial Intermediation for Clean Energy/Energy Efficiency		**50**	**50**		125	125	205 (local banks; sponsor equity)	**555**
TOTAL	**100**	**100**	**50**	390	207.3	125	344.50	**1316.80**

* An option would be to process this component as Additional Financing to Lagos Urban Transport Project 2, approved 29 June, 2010 (World Bank). CTF funds will be for Lagos BRT and low-carbon bus project.

** This could be processed with proposed National Urban Transport Project, anticipated approval September 2012 (World Bank).

† CTF funds would be for improved bus transit systems in Kano and Abuja.

70. Recognizing the CTF framework and the overall envelope of CTF resources, the Nigeria the $250 million Nigeria CTF Investment Plan is based on an assessment of which potential projects can expect to be processed by the MDBs over a relatively short time horizon, ranging from 12 months to 24 months following confirmation of the CTF TFC and attachment of funding.

71. Nigeria's CTF proposal includes additional requests for grant assistance to support the preparation of detailed project descriptions[46] for:

- BRT extension Lagos ($1,000,000)

[46] For collaborative projects, MDBs will coordinate with client on consultant terms of reference etc.

- Bus-based mass transport support for Abuja and/or Kano ($1,000,000);
- Financial Intermediation for Energy Efficiency and Clean Energy ($1,000,000);

72. While it is expected that several projects identified under the CTF Investment Plan will also seek carbon market financing, it is unclear at this stage which ones will be eligible, pending post-2012 international negotiations. Nevertheless, the MDB team noted that several stakeholders, including those in the upstream and downstream energy sector, requested the assistance of the MDBs to access the global carbon market.

73. The Joint Mission of the MDBs organized a Meeting of Donors supporting Nigeria's energy sector on September 30, 2009 at the offices of the African Development Bank in Abuja. Potential investment ideas were discussed, including those that supported the GHG mitigation objectives of other donors, including DFID, GTZ, JICA, the Embassy of Japan, the Embassy of Cuba and UNDP, among others. A Representative from Nigeria's Ministry of Finance and a representative of the Ministry of Environment (Special Climate Change Unit) also attended the meeting. A separate meeting with UNIDO was also held.

74. The Finance Ministry and the Special Climate Change Unit of the Ministry of Environment informed the Joint MDB Team that that Nigeria intends to develop an action plan containing nationally appropriate actions. Further, they confirmed that the investments in the Nigeria CTF Plan were consistent with and supported the development objectives of Nigeria and the country's climate strategies.

ANNEX 1: EXPANSION OF BUS RAPID TRANSIT AND IMPROVED BUSES IN LAGOS

US$ 50 million (CTF) with $190 million (IDA) and $139.50 million (AFD, GEF and Lagos State)

Project Description

Lagos is the largest city in sub-Saharan Africa and the sixth largest city in the world, with a population of over 15 million, which is growing at six percent per annum. By 2015, the population of the megacity is projected to be about 25 million, making it the third-largest in the world.[47] Although Lagos State is the smallest state with a land mass of only 3577 square kilometers, it is very densely populated (over 2400 people per square kilometer) and is a major contributor to Nigeria's CO2 emissions and to its likely future growth. Lagos is the commercial pulse of Nigeria, and about 70% of the nation's industries and commercial activities are carried out in the state. The city accounts for 40% of Nigeria's total fuel consumption and about 40% of all new vehicle registration in the country. Lagos has the highest vehicular density of 222 vehicles per square kilometer and the average age of cars plying Lagos streets is 15 years.

Public transport operation in Lagos is almost entirely owned and managed by the private sector[48]—principally, individuals with one or two second-hand vehicles that they rent out to drivers on a daily basis. Minibuses (*danfos*) make up the bulk of the fleet, and are increasingly supplanting midi-buses (*molues*) because of their relatively lower cost. Every *danfo* and *molue* is affiliated with one of several associations, the largest being the National Union of Road Transport Workers (NURTW). The use of motorcycles for commercial transport has grown very rapidly in recent years, mainly as a consequence of the poor state of the roads and the inability of bus companies to meet growing demand. Most of the motorcycles used for urban public transport have small and inefficient engines (less than 100cc) and contribute to poor health outcomes for the poor. During the last twenty years, the level of efficiency and productivity in the metropolitan area has been adversely affected by in the deterioration of the physical infrastructure necessary to support basic needs of the population and the production sectors. As a result, transport emissions are projected to **more than double** over the next decade.

Proposed transformation

The recent implementation of a BRT-Lite system in Lagos is the first example of a comprehensive and integrated approach to improving public transport in Sub-Saharan Africa. Relative to light rail which has approximately five times the capital costs, bus transit is a cost-effective means of providing mass transit services and a cost-effective means of emissions abatement. BRT emulates the performance and amenity characteristics of a modern rail-based transit system, but at a fraction of the cost. A bus-based mass transit system that delivers fast,

[47] Lagos's seaport and international airport handle more than 70 percent of the nation's cargo. It contains the largest manufacturing sector and provides employment for over 45 percent of the skilled manpower of the country.

[48] Prior to independence, the city relied on a monopoly supplier of large-bus service as the backbone of its urban transport system. This company was nationalized as the Lagos State Transport Corporation in the process of decolonization, ushering in a regulated regime of public transport in the immediate postcolonial era. Fares were regulated, and government was often reluctant to increase them. Initially, the state-owned bus company was able to operate without subsidy, but, as deficits grew and public subsidies did not grow commensurately, it had difficulty maintaining and renewing its fleet, resulting in deterioration in service coverage and quality. It eventually collapsed in the 1980s, leaving no major fleet operator, and giving way to the unregulated private sector.

comfortable and cost-effective service, it provides exclusive right-of-way lanes and excellence in customer service. Expansion of the BRT-Lite system already in place (27 km) provides an opportunity to demonstrate scaling up of a mass transit solution, its managed interface with other informal and unorganized means of transport, and the ability to test out efficient technologies for future deployment. The CTF proposes to leverage the early successes of the BRT-Lite system and offer a sustainable alternative for a broad spectrum of Lagosians to use an expanded system to replace and to complement other existing modes of transport. It is one of a handful of recent visible improvements in infrastructure in Nigeria and the ability to expand it in a sustainable manner provides an early opportunity to create a model of success for other Nigerian cities.

The early success of the BRT-Lite has exceeded expectations. Even incremental investments in improving the passenger experience are likely to multiply the benefits which are expected to grow with increasing urbanization in Lagos. Passenger patronage has exceeded expectations: average weekday ridership is twice of what had been forecasted; passengers now **pay on average of 30 percent less in fares**, and enjoy a greater degree of fare stability, **even though fuel costs have risen by over 100 percent in the past few years**. They have also experienced an average reduction in journey time of 40 percent, in average waiting time of 35 percent, and decreased incidents of theft on public transport.[49]

Additionality

The use of CTF resources will leverage this momentum to expand the BRT system and to make it more accessible and attractive to a wider community of users. The project will enable additional GHG reductions because of the modal shift of passengers currently using inefficient buses, vans, motor cycles, and private automobiles to an organized, safe, reliable and well-maintained system. Climate benefits also accrue as a reduction of black carbon from partially combusted fuels in inefficient motor cycle and other vehicle engines.

The scheme's additionality partly comes from the use of CTF resources to increase patronage from sectors that had traditionally shied away from public transport, i.e. children, car-owning middle class, elderly and the mobility-impaired. In particular, improvement of infrastructure such as depots, better lighting (using solar lighting), rehabilitation of BRT lane surface to improve bus operations, and supporting interchange facilities for greater integration with other transport modes, e.g. vans and private cars will help attract middle class riders, students and other parts of the population which have so far not used BRT much. These riders will displace emissions from other modes and help solidify BRT as a viable alternative in the mind of Lagosians. The experience from BRT projects in many countries is that reduced global or local emissions can be obtained as a significant subset of the overall benefits of such as investment. The primary benefit usually is improved mobility (travel + access time savings) with operational cost savings (fuel, maintenance, etc.) next. One area of identified CTF investment is to expand the overall infrastructure of the BRT in order to attract more riders by creating a viable, reliable, safe and attractive alternative to Lagosians, currently using inefficient vans, motor cycles and cars. This includes investing in bus depots for maintenance of cleaner and more reliable operations; better

[49] Typical responses from public in support of the project include, "safer", "faster", "stress free", "save fuel cost", "reliability" etc.; priority seating for, young, old, women, and disabled.

lighting (including solar lighting) at bus stops to increase perception of safety; parking spaces, stations and terminals for feeder routes, rehabilitation and expansion of bus service lanes, etc. Overall emission reductions from bus modal shift nationally are estimated to be in the average range of 1-1.5 $MtCO_2e$ annually or 12-15 $MtCO_2e$ over ten years. Once this level of modal shift is achieved, the cumulative emission reductions will continue to rise over time.

The BRT-Lite scheme has demonstrated the capacity of local operators to successfully run formal public transport operations and has subsequently generated intense interest from local banks and financiers and vehicle suppliers for other planned BRT schemes. CTF resources will buy down the significantly higher additional costs of capital required for high quality, high efficiency buses and thereby encourage operators to test the reliability and lower operating costs of low emission vehicles (possibly including CNG). This will provide an opportunity to further demonstrate and confirm the strategic role of public transportation in the future of a lower carbon and more livable Lagos into the future.

Rationale for CTF

Lagos has already invested a significant part of its budget resources on BRT-Lite. The World Bank and Agence Française de Développement (AFD), among others are financing the LUTP2 project. A financing gap in the expansion of the project, if met by CTF, will enable and accelerate the transformation of the transport market in Lagos. It will add a new component to the planned operation, which will include the purchase of highly efficient and CNG/dual fuel buses to demonstrate that the substantially higher initial cost of acquiring efficient buses masks that efficient buses actually cost less to operate and maintain over time. Pending the final results of an ongoing feasibility study, it is envisaged that 100 existing buses could be retrofitted for CNG use at a cost of $4.5 - $5 million; 50 brand new CNG/dual fuel buses could be procured at a cost of about $10 million and 150 new high efficiency buses could be purchased at a cost of about $15 million. These measures alone could bring 300 highly efficient buses into the fleet at a cost of about $30 million. Analysis shows that with current fuel consumption at 45 litres/100km (as provided by LAMATA) and fuel at $0.7/litre, the current operating cost of buses is $0.315/km. CNG buses will be priced to half that operational cost rate, Assuming a projection of only 60% rate of substitution to CNG (because of high idling time) and a cost saving of just $0.1/km and 200 km/bus/day provides a savings of $20/bus/day or $6,000/bus/year.

These savings could, of course, be greater if bus productivity were greater - both because of better consumption with less idling, as well as higher kilometers traveled. If BRT-Lite infrastructure capacity were improved for this purpose, savings could rise to $0.125/km (80% substitution) on 280km/bus/day - or $35/bus/day, and $10,500/bus/year. Extra productivity should translate direct into extra revenue, as BRT is currently only meeting part of intra-corridor demand. Assuming 40% extra passengers is $540/bus/day at $0.4 average fare, or $216 per day. Even if BRT would only achieve 60% of that, it could save $130/bus/day, or $39,000/bus/year.

The proposed second component of the project will focus on public transport and traffic management by improving the interface of the BRT with existing modes of traffic, including the development of bus feeder system, stations and terminals. This will help improve the infrastructure of the BRT and make it more attractive to even more riders, thereby expanding ridership and reducing the growth rate of other, smaller vehicular modes of transport. The additional impact from CTF resources will make the BRT a more attractive alternative to private

vehicles and reduce per unit cost of bus operations, helping to make it more sustainable for many years to come.

Implementation Readiness

The project will be implemented by LAMATA, which has been implementing the on-going Lagos Urban Transport Project. The CTF component is likely be processed as an Additional Financing along with the Lagos Urban Transport Project 2 (LUTP 2) investment, which has already been approved by the World Bank Board.[50] The on-going investment (LUTP) is now widely recognized by the government, participating communities and development partners as an efficient and well performing initiative that has significantly contributed to the city's poverty reduction goals notably by improving accessibility in low-income areas, involving communities in identification of priority programs and improving sector management.

LAMATA is a corporate body with an independent Board responsible for formulation, coordination and implementation of urban transport policies and programs in the Lagos metropolitan area. It was created by an act signed into law which prescribes a 13-member Board of Directors for the Authority. The Board, which is fairly representative of the Authority's stakeholders, comprises representatives of transport operators, transport unions in Lagos State, the organized private sector, the general public, local government areas, and transport related local agencies.

Over the past five years, LAMATA has been able to provide an overall vision and strategic direction for addressing the long neglected transport needs of the metropolis and to coordinate activities of the different executing agencies to provide a common and consistent basis for implementation. The Authority has matured into a professional organization, winning respect of other state departments and the citizens. LAMATA has succeeded in contributing to increased awareness about the need for traffic management, transparency and discipline in procurement processes and involving the users in decision making processes. LAMATA has started, for first time in the country, the design and execution of maintenance work with participation of private sector through awarding contracts to the local consultants and contractors. Experience has shown that the output of maintenance works through contracts is more efficient, cost effective and better in quality compared with the traditional methods of using force accounts procedures.

Segregated bus-ways, rationalization of public transport operations, and feeder services have enormous potential for replication in other corridors within the city and other sub-Saharan Africa countries. Most cities in sub-Saharan Africa share common characteristics: (a) a growing urban population inadequately served by the transport system; (b) declining standards in public transport system; (c) multiplicity of agencies responsible for planning and implementing transport solutions; (d) massive growth in informal privately operated bus services, (e) an increasing dependence on private transport modes; and (f) consequent deteriorating environmental quality and safety standards. Furthermore, the project is focused on integrating existing operators into the service plan, thereby avoiding the sentiment that the BRT scheme is a threat to their livelihoods. Evidence suggests that introduction of BRT systems coupled with feeder systems is one way to check the rapid growth of private vehicles, bring discipline to

[50] Alternatively, it may be processed with the National Urban Transportation Project (NUTP), which is anticipated to be prepared for the World Bank Board in 18-24 months.

private bus operations, reduce GHG emissions, and provide an organizing basis for land-use planning in the long run.

Implementation of a BRT system on Lagos corridors would be of high interest to other cities faced with similar problems. The project is designed at low cost per kilometer as compared to BRT projects in other parts of the world (about US$3-4 million/km[51] as compared to US$10-15 million in similar schemes in others parts of the world), this makes it easier to be replicated along other corridors and low-income countries in sub-Saharan Africa. The Bank has already begun to partner with LAMATA, bus operators and driver union representatives in capacity building events, e.g., in Washington, elsewhere in sub-Sahara Africa and in South Asia. One of the potential outcomes would be a step-by-step procedure for planning and designing a BRT system in an African context, which can be used as an example by other cities (including, in the future, for Abuja and Kano). A dissemination plan and a set of activities will be developed during project implementation to replicate the proposed pilot project on other corridors in the city. Elsewhere in sub-Saharan Africa, a number of cities including Accra, Tshwane, Dar-es-Salaam, and Addis Ababa are cross-fertilizing from experience in Lagos.

FINANCING SUMMARY
(US$ million)

	CTF			MDBs			OTHER	**TOTAL**
Component	**WB**	**AfDB (pvt)**	**IFC**	WB	AfDB (pvt)	IFC	Other	**Total**
Bus Rapid Transit	**50**			190 *			139.50 (Lagos state, AFD + GEF)	**409.50**

*World Bank LUTP2 project, already approved in June 2010.

Proposed Implementation Schedule

The CTF component can potentially be processed as an Additional Financing to the already approved World Bank Lagos Urban Transport Project 2 (LUTP) or as part of the proposed World Bank National Urban Transport Project (NUTP), currently scheduled for the Board in July 2012.

Proposed Results Indicators

Proposed Results Indicators for this investment project will include:
- GHG reduced or avoided (tonnes of CO2-equivalent)
- $/tonne of GHG (CO2-equivalent) reduced or avoided
- # of additional passengers using public transit

[51] Design concept is based on maximum reallocation of existing road space, and avoidance of new bridge structures, resulting in a lower cost of implementation.

ANNEX 2: IMPROVED BUS TRANSIT SYSTEMS: KANO AND ABUJA.

US$ 382.3 million: **US$ 100 million (CTF)**, $282.3 million (IDA and ADF) + additional from states, pvt

- US$ 50 million CTF (AfDB) with US$ 82.3 million ADF resources
- US$ 50 million CTF (World Bank) with US$ 200 million (IDA)
- Additional Investment (exact amounts to be determined) by Kano State, FCTA, Equity, Commercial Banks)

Project description

Abuja is Nigeria's capital city, with a population of over 1 million. Including its informal settlements and suburbs in FCTA, Niger and Nasarawa States, the regional population exceeded 6 million in 2003. Of this, approximately 1 million were estimated to be in the master-planned areas, 1.5 million were in informal settlements and 3.5 million were in the satellite towns and border states. For the next 25 years, a growth rate ranging from 2.5% to 3.0% per annum is forecast. By 2030, the population of the region is estimated to be approximately 12.2 Million. The Abuja metropolitan area has already grown beyond the physical boundaries of the Federal Capital Territory (FCT), spilling over into the adjoining states of Nasarawa (Nyanya) and Niger (Suleja).

Public transport operation in Abuja is mostly entirely owned and managed by the private sector—principally, individuals with one or two second-hand vehicles that they rent out to drivers on a daily basis. About 155 medium-capacity urban commuter buses are operated by one public and two private concessionaires. Commuter services are inefficient and supply by far outstrips demand. Minibuses, taxis and three-wheelers make up the bulk of the fleet. The use of motorcycles for commercial transport has grown very rapidly in recent years, mainly as a consequence of the poor state of the roads and the inability of bus companies to meet growing demand. While there are many motorcycles providing commercial passenger services, these have been banned in the city, so they operate exclusively in suburbs.

A commuter mobility crisis is actually being witnessed in the city suburbs, even though some parts of the city center are also affected. On all major corridors, commuter vehicular demand largely outstrips supply of road space during peak hours, resulting in long queues and excessive waiting times. A typical bus rotation to suburbs located at about 30 to 40 km from the city centre takes 3 to 4 hours, as buses get stuck in the rush hour traffic.

Kano is the largest city in Africa's Sahel belt, with about 4 million people living there, but with a daytime population probably substantially higher, as Kano is a major trading destination for northern Nigeria and surrounding countries. Public transport in the city is highly atomized, being served primarily by a combination of individually owned and operated mini-buses, (3-wheel) cycle rickshaws, and motorcycles. The main challenges facing Kano are how to manage long-distance freight movements in the city, how to provide affordable intra-city mobility to residents, and how to manage the large and growing fleet of two-stroke vehicles, and grapple with the congestion and air quality problems they cause.

CTF investment in improved bus transit systems for Kano and Abuja will be developed in the context of a larger project to be financed by both the World Bank and the African Development Bank. Such a project is likely to include many, if not all, of the following components. Items

listed in parentheses are examples of the kinds of specific activities that are likely to be financed under a given component.

1. Institutional development (training, transport planning tools, transport secretariat implementation support)
2. Public transport and traffic management (improved bus transit infrastructure, mass transport alternative analysis studies, complimentary feeder bus systems, public consultation, communications and media strategy, traffic control systems, traffic management investments)
3. Road network improvements (improvements to public transport serving infrastructure, rehabilitation of feeder roads)
4. Rolling Stock (vehicle consolidation and renewal, technology demonstration investments)
5. Project management and system monitoring (technical assistance, equipment and other operational support, auditing services, outcome monitoring)
6. Other investments including solar lighting of bus stops; better interface with existing modes of transport)

Proposed transformation

CTF investment in Kano and Abuja will facilitate transformation in urban transport to reduce CO_2 emissions from transport by reducing growth trajectories in both the total amount of vehicle kilometers plying the streets in Kano and Abuja, and the amount of fuel consumption per vehicle kilometer. Larger and more efficient vehicles will transport greater numbers of people more efficiently than before. Improved public transport organization, management, and service delivery will allow the cities to meet growing mobility needs with fewer vehicle kilometers than current trajectories. Improved traffic management, strategic road network improvements, and targeted rolling stock investments will reduce fuel consumption per vehicle kilometer, by improving traffic flow and vehicle technologies. The project will also facilitate transformation by helping to establish institutions for long-term, sustainable planning and coordinated implementation of urban transport policies and programs.

Rationale for CTF

The additionality of the CTF investment would be threefold. First, it would ensure active and early consideration of GHG mitigation in the overall agenda for the development of an investment program for urban transport improvement in two important and rapidly growing cities in sub-Saharan Africa. This early consideration is critical for ensuring more sustainable development patterns that can affect transport-related GHG emissions for decades. Second, following on from the success of Lagos' BRT-lite, Kano and Abuja would seek to develop efficient, bus-based mass transport facilities and services. The engagement of the CTF would help ensure that this development be done appropriately. Third, CTF involvement would help ensure better integration of urban transport policy into national climate policy.

Implementation readiness

Improvement in transport planning, optimization of existing bus routes and formalization of the transport sector are manageable tasks with the potential of transforming the sector. The CTF-related project team recognizes that acquisition of dedicated bus corridors in Abuja and Kano for a Bus Rapid Transit (BRT) system similar to the one in Lagos may take a few years to

accomplish. As such, it seeks to improve the transport system in a manner that is likely to be sustainable and be scalable to meet the challenges of rapid urbanization ahead.

Within the World Bank, a Board date for a proposed Nigeria Urban Transport Project (NUTP) has been tentatively targeted for early July 2012. Needs assessments are underway for both Abuja and Kano; the results of such assessments will form the basis of the specific components the NUTP, by January 2011. It is anticipated that such an assessment will point to the need for bus-based investments in urban and metropolitan public transport, traffic engineering, and demand management for both city regions, and exact measures within these broad categories will be included in the actual CTF-related investment project. The precise needs will be determined through contextual study, and might be quite different for each city. Once recommended, the specific investments will be prepared for project approval from the World Bank and African Development Banks through the third and fourth quarters of 2011, in parallel with institutional preparation for the implementation units, with the anticipation of meeting the above-referenced project approval date, and effectiveness by the third quarter of 2012.

Financing Summary
(US$ millions)

	CTF			MDBs			OTHER	**TOTAL**
Component	**WB**	**AfDB**	**IFC**	WB	AfDB	IFC	Other	**Total**
Improved Urban Bus Transit: Abuja and Kano	**50**	**50**		200 *	82.3		TBD	**382.3**

*Proposed envelope for Nigeria Urban Transport Project (NUTP)

Proposed Implementation Schedule

It is anticipated that the CTF component will be processed along with a proposed World Bank investment of US$ 200 million for the Nigeria Urban Transport Project (NUTP). This is expected to be processed and approved within 18-24 months of the approval of this IP by CTF TFC subsequent to IP being endorsed with funding attached.

Proposed Results Indicators

Proposed Results Indicators for this investment project will include:
- GHG reduced or avoided (in tonnes of CO2-equivalent)
- $/tonne of GHG (CO2-e) reduced or avoided
- # of additional passengers using public transit

ANNEX 3: FINANCIAL INTERMEDIATION: CLEAN ENERGY AND ENERGY EFFICIENCY

US$ 100 million (CTF), $250 million (IFC, AfDB private sector), $205 million (commercial banks, sponsors equity)

Background

The Nigeria CTF investment plan has identified several areas where the use of CTF funded interventions can have a transformational impact on the carbon footprint of the country through projects directly and through financial institutions. This Annex outlines broadly where the MDBs could leverage their skills, relationships and financing with private sector stakeholders to fast-track and support these initiatives in a combined effort to transform Nigeria's energy generation and consumption. It should be noted that for sustainable transformation to occur in Nigeria's clean energy sector, financial institutions (FIs) will need to become active in this space - both as providers of credit and promoters of project implementation at scale among their client base.

This Annex outlines the role that CTF would need to play in order to catalyze FI involvement. It also recognizes that given Nigeria's recent financial crisis and the need for further assessment and identification of appropriate target sectors, implementing this program will require that further work be done in dialogue with MDB public sector colleagues and bilaterals active in Nigeria. Once this is done, (and consistent with resource flows into the CTF Trust Fund), the MDBs would submit a program proposal which specifies the barriers to be addressed, details the approach to be taken in Nigeria and notes the specific end user markets to be targeted. The investments outlined in this Annex will therefore retain flexibility to respond to the dynamic market conditions and potentially unidentified market opportunities. For this reason, proposed interventions will be illustrative only and reflect possible interventions as currently envisioned rather than certain programmatic engagements. It is envisaged that the FI program will pursue several private sector-led initiatives that enhance and promote clean energy and energy efficiency across key sectors of the economy.

Under a programmatic approach, the MDBs will promote demand and enable uptake by working with local companies, SMEs, system integrators and financial institutions. CTF funds would be used to provide a range of potential financial incentives, risk products or lines of credit as well as capacity building and market focused advisory services programs. As the program is further developed, the MDBs will select the appropriate financing instrument that is most effective to encourage financial institutions to finance clean energy and energy efficient technologies. CTF investments may be preceded by market awareness raising and capacity building work to help establish energy efficiency standards and benchmarks and promote awareness to pave the way for clean energy investments. This would allow for wider adoption and replication of energy efficiency investments. Despite recent troubles in the Nigerian banking sector, IFC and the AfDB maintain banking portfolios in Nigeria. The CTF interventions will focus on partnering with the healthiest banks that have the most commitment and capacity in promoting clean energy and energy efficiency financings.

Project Description

The CTF FI initiative in Nigeria is intended to help overcome the financing and market barriers for low carbon investments (such as unfamiliarity with clean energy and energy efficiency as

lines of business, high nominal interest rates and short loan tenors) through a combination of financial incentives, risk products or lines of credit, as well as institutional and market based capacity building and advisory services programs. This additionality will support the deployment and application of clean energy and energy efficiency solutions and fuel switching in various industrial and service sectors and in households. In the absence of this project, industry will continue to struggle with energy supply at any cost and inertia will continue to hinder the development of any demonstrable models of successful investment in this critical area.

In energy efficiency, the CTF investment would provide concessionary terms that will help overcome the concerns that Nigerian industry has about the high initial capital outlay of the technologies. In renewable energy, CTF financing would help to fill financing gaps that may result from lack of familiarity and support for such projects from financial institutions. It would also provide concessionary terms that overcome the additional cost barriers of employing, for example, energy efficient boilers for agriculture and food processing companies. CTF resources could also be used to provide appropriate incentives for qualified waste-to-energy developers and local financial intermediaries to ensure timely and sustainable delivery of such projects. In transport, the private sector program could support public sector CTF initiatives by facilitating private sector modal shift by incentivizing the purchase of efficient rolling stock. Finally, targeted capacity building will help local bank staff to identify and assess low carbon opportunities as new lines of business enabling replication and market transformation.

Proposed Transformation

The proposed programs, backed by CTF resources, are aimed to help transform the behavior of local financial institutions so that they will build up their in-house capacity to assess the perceived technical and market risks of energy efficiency investments and become financiers for the sector. A CTF intervention will be designed to address existing market barriers and support energy efficiency solution providers in order to bring about a transformational impact on key markets. CTF interventions would also be designed to address the particular hurdles faced by each technology.

IFC and AFDB will seek to scale-up energy efficient and clean energy technologies in Nigeria by engaging FIs. FIs have large client bases and can potentially influence investment decisions. By increasing access to credit to end users, project implementation can be scaled up. The program would also work on the demand side directly, potentially through industry associations, universities or other knowledge bodies that can promote technology uptake. Capacity building and the institutional and market level may also be incorporated as needed.

Scalability

In terms of target sectors, Nigeria's energy intensity translates into large scalability potential in clean energy and energy efficiency investments. The CTF could be used to encourage private investors and companies to scale-up investments in projects of energy efficiency in the industrial, commercial, service and retail sectors, through the proposed program. A reduction in energy consumption by investments in high-efficiency air conditioning systems, cogeneration and

energy efficient boilers will be targeted in industrial sectors. In the commercial sector, services and retail sectors, investments in energy efficient lighting as well as efficient appliances with cleaner fuel applications with hybrid solutions will be targeted. This will enable selected sectors of Nigerian industry, including SMEs, to be more competitive while reducing energy costs of production.

Significant carbon reductions may also be achieved as the Nigerian commercial and residential sector grows through the development of energy efficient buildings. Developers of energy efficiency solutions within the private sector have identified various opportunities and benefits in developing green buildings in various sectors including, education, financial services, retail, hospitality and residential. In the commercial and retail sectors, investments in energy efficient lighting, cogeneration systems, efficient appliances with cleaner fuel applications and hybrid solutions using cleaner sources will be targeted. If the program is well implemented, the CTF could provide aggregate emissions savings from energy efficiency in the industrial and household sector in the range of one to three million tons of CO_2 depending upon how fast the economy will grow in Nigeria or 10-30 MtCO2e over ten years.

Rationale for CTF

The Nigerian government is reviewing its Renewable Energy Master Plan in order to expedite the development of clean energy resources and limit its growth in greenhouse gas emissions. However, private sector led projects have been limited due to lack of sector capacity, experience, and funding support from local financial intermediaries. The financial institutions lack the capacity to properly assess the risks related to investments in clean energy and provide the much needed financing to the sector. Major industries such as fast moving consumer goods in food and beverage processing, transport, telecoms, and cement sectors are energy intensive in their operations. When power is unavailable, such industries and households use polluting coal, diesel, wood fuel, animal dung and kerosene. Significant inefficiencies exist in the use of energy and are inhibiting growth of the sectors and the economy as a whole. Without the CTF financing support for these initiatives, the financing gaps in clean energy investments will not be prioritized by industry and will be difficult to fill. Without models of successful investment in energy efficiency, the inertia in industry in this regard will likely continue.

Additionality

The CTF will meet the needs of jumpstarting the clean energy and energy efficiency market through a combination of financial incentives, risk products or lines of credit, and capacity building programs. This will support the deployment and application of energy efficiency solutions and fuel switching in various sectors. It could also provide concessionary terms to help overcome the high initial capital outlay of technology investments or help overcome the perceived risk in kick-starting the market and creating a replicable model for scaling up energy efficiency investments in the real sector.

The proposed program could cover the initial first-mover high capital costs in breaking the financial barrier for project developers (including renewable energy such as agricultural by-products and/or biomass), and assist in creating a replicable model in clean power generation that

the country lacks. In order to ensure the replication effect and the wide transformational impact, the program will be complemented with a technical assistance program tailor-made for local financial institution partners and other market players.

Implementation Readiness

IFC and AfDB's private sector window are in discussion with several advanced clean energy/ efficiency private sector developers as well as local commercial banks with interest in unleashing Nigeria's potential in clean energy and energy efficiency in the industrial, transport, commercial, and retail sectors. Projects could be implemented from late 2011-2014 with the appropriate financial / risk incentives. Four to six strong local banks have expressed interest in partnering with IFC and AfDB under programs of risk sharing facilities or line of credit facilities to initiate financing to companies implementing energy efficiency solutions and developers of renewable energy projects. The MDBs consider this initiative highly scalable, partly because Nigerian industry pays very high costs for the electricity it consumes, including high cost for back-up diesel-powered back-up generators. Strong initial uptake of this program is likely to encourage even further such investment into the initiative. IFC and AfDB will target either existing FI clients or other strong FIs with known strategic interest and/or pipelines in developing this business.

Through their global practices, the MDBs have developed a knowledge base in various developing and developed countries where clean energy initiatives and solutions have been successfully implemented through local financial institutions. As part of the proposed Nigeria CTF program, the MDBs are committed to developing advisory programs which will be used to further develop local capacity within the financial institutions and the real sector.

FINANCING SUMMARY

(US$ million)

		CTF			MDBs		OTHER	**TOTAL**
Component	**WB**	**AfDB (pvt)**	**IFC**	WB	AfDB (pvt)	IFC	Other	**Total**
Financial Intermediation for Clean Energy/EE		**50**	**50**		125	125	205 (local banks; sponsor equity)	**555**

Proposed Implementation Schedule

These programs are expected to be initiated by the IFC and the AfDB beginning in late 2011 based on cash flows into the CTF Trust Fund and following submission of a detailed program proposal.

Proposed Results Indicators

Proposed Results Indicators for this investment project(s) will include:

- GHG reduced or avoided (tonnes of CO2-equivalent)
- $/tonne of CO2-equivalent reduced or avoided

- Reduction in energy cost per unit of production