Attachment-2

Addressing the Climate Vulnerability of Africa's Infrastructure: A Strategic Regional Approach

Summary Concept Note

Context of proposed work: The proposed work on climate vulnerability of Africa's infrastructure takes place in the context of on-going discussions between the World Bank and the Africa Union on a strategic partnership in the area of climate change, including collaboration on the Durban climate summit (COP17) and longer term engagement on Africa's low-carbon, climate resilient development.

Background: Africa's infrastructure is at present inadequate, both in terms of physical stock and quality of service, to support sustained growth in the years to come, both under current and future climate. Yet, relatively little is known on how climate change may affect the desirable design, location, timing, and composition of the stock of infrastructure that will need to be built in the short to medium term. A better understanding of the range of climate impacts on infrastructure development, and of the approach to deal with climate uncertainty, is thus necessary in order to inform future investment decisions and to avoid locking Africa in a pattern of climate-vulnerable development that will be very costly, or in some cases impossible, to repair in the future. It will be increasingly important to have a solid analytical base to inform decisions on how scarce climate finance flows will be used to enhance the climate resilience of Africa and other parts of the developing world.

Objectives: The objective of this work is to strengthen the analytical base for investments in Africa's infrastructure under a future uncertain climate. More specifically, the program seeks to:

a) Evaluate a range of impacts of climate change on a subset of infrastructures (roads, hydro-power, irrigation) over a range of climate scenarios;
b) Develop and test a framework for investment decision that can be "robust" under a wide range of climate outcomes
c) Enhance the "investment readiness" of African countries to use climate finance resources geared at increasing their resilience to climate variability and change

Description of the proposed work: The analysis will build upon the data platform already established under the Africa Infrastructure Country Diagnostic (AICD). The first set of activities will consist in a review and analysis of climate models to define a set of projections, at the required scale of spatial and time disaggregation, of relevant climate variables including temperature and precipitation, capable of adequately reproducing key uncertainties and disagreements among General Circulation Models (GCMs). The projections will include both averages (at the monthly, seasonal and yearly time step), as well as extremes (e.g. the one in 10, 20 and 50 years precipitation event); these variables will be assessed in terms of percentage change compared to a historical reference period (e.g. over the 1970-2000 period). Next, the following impact analysis will be undertaken:

- **Roads:** The continental spatial dataset, developed under the AICD and covering road network location, design, surface condition and traffic levels, will be extended and enhanced to address the effects of climate change on plans for expanding, and maintaining, the road network. In particular, the following tasks will be carried out: (i) Analysis of the impact of climate change on road surfacing thresholds; (ii) Analysis of the effects on road design standards; (iii) Estimate of the economic impact of climate change on road development plans; and (iv) Analysis of the impact of climate change on road demand patterns
- **Water resource:** The water resource analysis will focus on the region's major basins (e.g. Congo, Niger, Nile, Senegal, Volta and Zambezi), and will include the following steps: (i) Estimate of storage-yield relationships at the sub-basin level; (ii) Model impact of climate change on basin-level storage-yield relationships; (iii) Evaluation of the climate risks on the delivery of water related services; and (iv) Estimate of change in investment required to deliver desired storage level.

- **Power:** Large part of Africa's power sector growth will depend on the development of regional power pools. Power pools are institutional and commercial arrangements that enable the optimization of each of Africa's sub-regions endowment of energy resources. Because climate change is likely to bring about changes in the potential of some of these energy sources (notably hydro-power), this will make it necessary to come up with strategies to re-define, for each power pool, the optimal energy mix under a reasonably large range of climate outcomes. The following tasks will be conducted: (i) Update of the AICD power sector models; and (ii) Estimate of impacts of climate change on power sector investment plans.
- **Irrigation:** The economic models that were developed as part of the AICD will be augmented with the results of the analysis of water storage potential under a range of climate change scenarios.

Expected outcomes: The proposed work will provide a consistent data set to be used in the analysis of sector impacts, to determine the envelope of variability of climate outcomes across different models. The technical work (review and analysis of climate models) for the four sectors will be undertaken in 2012. The final synthesis report, that brings together the main findings and conclusions of the technical work and draws out the key policy messages, will be prepared by mid 2013, and the full range of review and dissemination activities completed by late 2013.

Partnership with AUC and other regional organizations: It is proposed that the work be undertaken in partnership with the African Climate Policy Centre (ACPC), which brings together the Africa Union Commission (AUC), the UN Economic Commission for Africa (UNECA), and the Africa Development Bank (AfDB). ACPC would provide strategic direction to ensure that the work would generate insights on areas such as the following:

- African common position on climate negotiations. An improved understanding of climate change effects on a strategic issue such as infrastructure development can contribute to inform the deliberation of Africa's negotiators and facilitate the formation of a political consensus on priorities for action. This is fully in line with the goal of the recently launched Joint Secretariat Support Office (JSSO) to the AUC, the AfDB and the UNECA to develop a common African position on infrastructure development and climate change in Africa.
- Investment readiness. The proposed analysis will generate insights on investment decisions under climate uncertainty that will strengthen the ability of African countries to define a pipeline of climate-resilient infrastructure projects; this will in turn attract fast start climate financing, since this will presumably be prioritized towards countries and sector where diagnostics of climate impacts and adaptation options are readily available.

In addition to the institutions forming the African Climate Policy Centre, the target audiences for the work are African ministers of Finance/ Planning; and of Water, Energy, Transport, Multilateral and Bilateral donors, Regional Economic Communities, River Basin Organizations, Power Pools, African and international private sector operators with an interest in investing in the different infrastructure sectors being analyzed, and the academic, research and practitioners community working on applied research on climate change impact and adaptation.

Funding: Funding for the proposed work has already been mobilized through the generous support of the Nordic Development Fund, the Government of Germany, the Government of France, and the Trust Fund for Environmentally and Socially Sustainable Development (TFESSD). A multi-donor trust fund is being established to enable the World Bank to administer the resources. The contributing donors will be invited to participate to the next stages of the work, including provision of technical and policy inputs, review of reports, discussion of implications for development policies, etc.