

# MINISTERIAL MEETING and EXPERT ROUNDTABLE



**NEPAD-OECD** AFRICA INVESTMENT INITIATIVE

## BOOSTING AFRICA'S ENERGY SECTOR THROUGH CARBON FINANCE

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## List of Acronyms

AfDB	African Development Bank
AMCEN	African Ministerial Conference on the Environment
CDM	Clean Development Mechanism
CERs	Certified Emission Reduction (credits)
CSP	Concentrated Solar Power
DNA	Designated National Authority
DBSA	Development Bank of Southern Africa
ECA	Export Credit Agency
EUMENA	Europe and Middle East
GWH	Giga Watt Hours
IEA	International Energy Agency
IPP	Independent Power Producer
MDGs	Millennium Development Goals
MIGA	Multilateral Investment Guarantee Agency
NAMAs	Nationally Appropriate Mitigation Actions
NERSA	National Energy Regulator of South Africa
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PPA	Power Purchase Agreement
REC	Regional Economic Community
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VER	Voluntary Emission Reduction (credits)
ZAR	South African Rands

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## A. EXECUTIVE SUMMARY

Carbon finance should be a “win-win” opportunity for Africa and its investors: a way to promote new development initiatives, such as renewable energy projects, while reaping financial benefits and effectively responding to climate change. Indeed, the continent finds itself in a favourable position to benefit from investment opportunities linked to carbon finance. It possesses abundant natural resources suitable for sustainable energy production. The lack of existing energy infrastructure, particularly in Sub-Saharan Africa, makes it possible to leapfrog the emission-intensive stage of economic development to clean technologies. Last but not least, as climate change negotiations intensify in the lead up to Copenhagen in December 2009, carbon markets are likely to expand and increase incentives for investment throughout the continent.

So why does Africa make such little use of the carbon finance mechanisms on offer for investment in the renewable energy sector? Where are the incentives for change and how can these measures be implemented? This paper investigates these questions, beginning with an analysis of available carbon finance instruments as they apply to the African energy sector. It shows how successful implementation of these mechanisms, particularly the Clean Development Mechanism (CDM) has been impaired by combination of financial and capacity barriers encountered by investors. These barriers range from high start-up costs of project development, to limited funding sources, to high risk perception.

Finally, this paper offers concrete recommendations for how African governments and the international community can overcome these barriers and benefit from current carbon financing opportunities. The recommendations range from increasing the development of human resources and strengthening the role of national and regional regulatory bodies, to identifying new opportunities for South-South technology transfer and harnessing new sources of funding and risk mitigation instruments.

Investing in renewable energy and accessing carbon finance is indeed challenging, but the stakes are high and the benefits great. By implementing strategies to overcome barriers, African countries stand to secure significant gains.

## B. BOOSTING AFRICA'S ENERGY SECTOR THROUGH CARBON FINANCE

### 1. Introduction

*Carbon finance should catalyse investment in renewable energy, so why does Africa make such little use of the mechanisms available?*

1. In an era of climate change and fossil fuel depletion, governments and investors have a common interest in identifying the most efficient and reliable energy sources to sustain future growth. According to the International Energy Agency, most of the current world energy infrastructure will need to be replaced by 2030 (World Energy Outlook, 2008). In global terms, it is anticipated that annual investments in renewable energy for electricity capacity will exceed those for fossil-fuel power plants in the projection period between 2007 and 2030 (World Energy Outlook, 2008). Indeed, global investment in renewable power generation, amounting to about USD140 billion, topped investment in fossil fuel technologies for the first time in 2008 (UNEP Global Trends 2009). As renewable energy increases in importance, African governments and the International Community could take measures to boost investment in this area and increase technology transfer for renewable energy development.

2. Stable energy supply is essential for strong economic growth and poverty reduction. Renewable energy is abundant and diverse and has the advantage of reducing reliance on finite or imported energy resources. It includes, but is not limited to biomass, solar power, wind power, hydropower, tide power and geothermal power. It can improve energy security, especially for non-oil producing countries, creates employment and helps fight poverty by improving energy accessibility, particularly for remote or rural populations. Furthermore, the market for clean energy technologies is profitable. Currently valued at USD155 billion, (Global Financial Crisis, 2009) it is expected to reach a global market size of USD1.9 trillion by 2020 (UNEP Finance Initiative CEO Briefing, 2004).

**Box 1: Summary of Barriers and Recommendations**

BARRIERS		STAKEHOLDER	RECOMMENDATIONS	CASE EXAMPLES
CAPACITY BARRIERS	Weak Human Capacity to Meet for Project Needs	African governments	Create vocational programs, training workshops, and supporting research institutions for skills-building	Program in Ghana for training local wind turbine manufacturers
	Lack of Regional and Institutional Coordination	African governments	Design policy for renewable energy Strengthen the role of DNAs	Renewable energy targets in Mali, South Africa and Egypt -Botswana-Brazil Exchange Africa Carbon Forum
		International community	Promote South-South Transfer Expand multilateral programs that boost	CDM South-South Cooperation between China and other developing countries

			capacity	World Bank's Carbon Finance Assist
FINANCIAL BARRIERS	High Start-Up Costs	African governments	Remove barriers to investment, e.g. high import duties for renewable technology	
	Returns are Uncertain and Slow	African governments	Feed-in Tariffs	South Africa, Algeria and Mauritius
	Limited Funding Sources	International Community	Boost international sources of funding from donors and organisations	World Bank Carbon Finance Unit;
	High Perceived Risk	International Community	Risk Mitigation Facilities	MIGA

Source: NEPAD-OECD Africa Investment Initiative, September 2009

*Africa's use of renewable energy sources for power (combustibles and waste aside) is minimal*

3. Yet Africa makes little use of carbon finance mechanisms for investment in the renewable energy sector. While the continent is well endowed with renewable energy prospects, only a very small proportion of sources is currently exploited. Analysis of the International Energy Agency's most recent (2007) statistics shows that although renewable energy makes up 16 percent of all Africa's energy sources used for power generation, the vast majority comes from combustible renewables and waste. In addition, less than one percent of the total figure is made up of hydro electricity. Other forms of renewable energy in the continent (geothermal, solar, tide and wind) are negligible (World Energy Balances, 2009). Box 1 offers an overview of the impediments to expanding renewable energy and accessing carbon finance in Africa, as well as some recommendations to overcome these impediments.

## II. The Kyoto Protocol and Growing Carbon Markets

*Of the various carbon finance mechanisms on offer, the CDM is the most prominent for Africa.*

4. **Defining Kyoto Protocol Mechanisms:** Carbon finance is a relatively recent and highly diverse set of international and national public and private schemes aimed at reducing the economic burden of mitigating climate change resulting from anthropogenic emissions of greenhouse gases (GHG). Based on voluntary and mandatory measures or incentives, carbon finance enables countries, the private sector and even individuals to reduce their GHG emissions in a cost effective manner (CIDA, Carbon Finance for Africa). There are a number of carbon finance mechanisms that can be used to invest in renewable energy, three of which have been well established by the Kyoto Protocol. For a more complete list of mechanisms and options for carbon finance under Kyoto as well as outside Kyoto, see Annex 1.

5. **i) Emissions trading:** A market-based instrument that fosters the transition to a more sustainable economy through financial incentives for further emission reduction. It allows Annex B countries<sup>1</sup> with unused emissions (as allocated under the Kyoto Protocol) to sell this excess capacity to countries that have surpassed their allocated targets.

<sup>1</sup> Annex B countries are those with commitments under the Kyoto protocol

6. **ii) Joint Implementation (JI) Mechanism:** A project-based mechanism, the JI is intended for use between Annex I countries in the United Nations Framework Convention on Climate Change<sup>2</sup>. It is the equivalent mechanism of the CDM for industrial countries and allows them to carry out cooperative projects.

7. **iii) Clean Development Mechanism (CDM):** A project-based mechanism which encourages sustainable energy consumption and development by providing incentives for investment. The CDM is the most prominent market instrument involving developing countries. The overarching objective of the CDM is to encourage sustainable development in recipient countries (developing countries) while at the same time enabling Annex I countries to meet emission limitation and reduction requirements. The CDM delivers development dividends by providing credits and offering incentives for the diversifying and increasing reliability of energy supply, reducing dependence on fossil fuels; and increasing rural electrification, among others (Carbon Finance in Africa,). This paper will focus on the CDM, as it is the main driver of carbon finance and investment in renewable energy in developing countries and is the most relevant for African countries.

8. **The CDM can catalyse investment:** The CDM is a project-based mechanism and generates Certified Emission Reduction credits (CERs). Credits may be gained through emissions reduction, such as through investments in renewable energy and energy efficiency. These credits may then be used to either achieve regulatory platforms or else traded on the international carbon market using the emissions trading mechanism. Both options lead to benefits for investors: in the former case, by avoiding fines and penalties; in the latter, through direct monetary gain. Parallel to CERs are Voluntary Emission Reduction (VER) credits for companies wishing to voluntarily reduce greenhouse gas emissions.<sup>3</sup> Although not yet traded on the same carbon markets as CERs, both VERs and CERs are expected to become market compatible.

9. Of all the existing mechanisms under the Kyoto Protocol, the CDM is the only one involving developing countries and constitutes the largest source of mitigation finance for developing countries to date (World Development Report 2010). The CDM has been operational since 2006. It is expected to lead to more than 2.7 billion tonnes of carbon dioxide equivalent in emissions reductions over the period 2008-2012 (the first commitment period of the Protocol). This translates to around USD18 billion in revenues for leveraging investment in developing countries (World Development Report 2010). While the current financial crisis and dipping energy prices have caused fluctuations in the value of primary CDM transactions in 2008-2009, the volume of CDM transactions continues to grow (New Carbon Finance, 2009).

10. **The global carbon market is growing rapidly:** The active creation of carbon finance funds and facilities by the international community has been an important factor

*The CDM can catalyse investment, both through renewable energy and energy efficiency, providing substantial mitigation finance.*

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<sup>2</sup> UNFCCC Annex I Parties include the industrialized countries that were members of the OECD in 1992, plus economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.

<sup>3</sup> The main alternative to CDM for African project developers is the so-called voluntary market. The term “voluntary” refers to the fact that buyers in this market are not constrained by emissions targets or caps which force them to buy credits elsewhere. Rather, they are buying carbon credits voluntarily to offset their emissions as a gesture of corporate good governance to meet international targets for emissions reductions. Source: Pfeifer, G. and Stiles, G. “Carbon Finance in Africa.” Africa Partnership Forum policy paper: 2.

*The ever-enlarging scope and size of carbon funds, combined with a growing carbon market, create a strong incentive for renewable energy investment.*

in the expansion of carbon finance. These funds operate by either directly investing in projects and companies or by buying carbon credits outright, while the facilities help to fund initial project costs such as registration fees and impact assessment studies (State and Trends, 2008). In 2007, a global carbon finance pool of USD9.5 billion was under the management of about 58 public and private funds. A year later, this amount had grown to USD13.8 billion spread over 67 funds. In 2009, the World Bank Group alone is managing over USD 2.2 billion in funds (pledged by 19 governments and 66 firms) for its carbon funds and facilities (World Bank Group Database, 2009).

11. In addition, numerous Annex 1 countries have created or plan to create their own instruments while a number of non-Annex 1 countries are examining options such as carbon taxes and cap and trade systems. For example, South Africa has plans for a carbon tax and a group of least developed countries are looking at various fuel levies (World Development Report 2010). Another mechanism – Nationally Appropriate Mitigation Actions (NAMAs) – has been discussed under the 2007 Bali Action Plan but its scope, scale and funding are yet to be properly defined (Kim et al, 2009). Some of these mechanisms may eventually surpass the CDM.<sup>4</sup>

12. The ever-enlarging scope and size of these funds, combined with improved market access, increased market compatibility and clearly identified emission reduction targets, create a strong incentive for renewable energy investment. Moreover, interest in the voluntary market could sustain much of the carbon market growth. As shown by a Point Carbon survey analysis undertaken in 2009 (see Figure 1), renewable energy projects have a comparatively high exchange value on the voluntary carbon market compared to other projects (Carbon 2009).

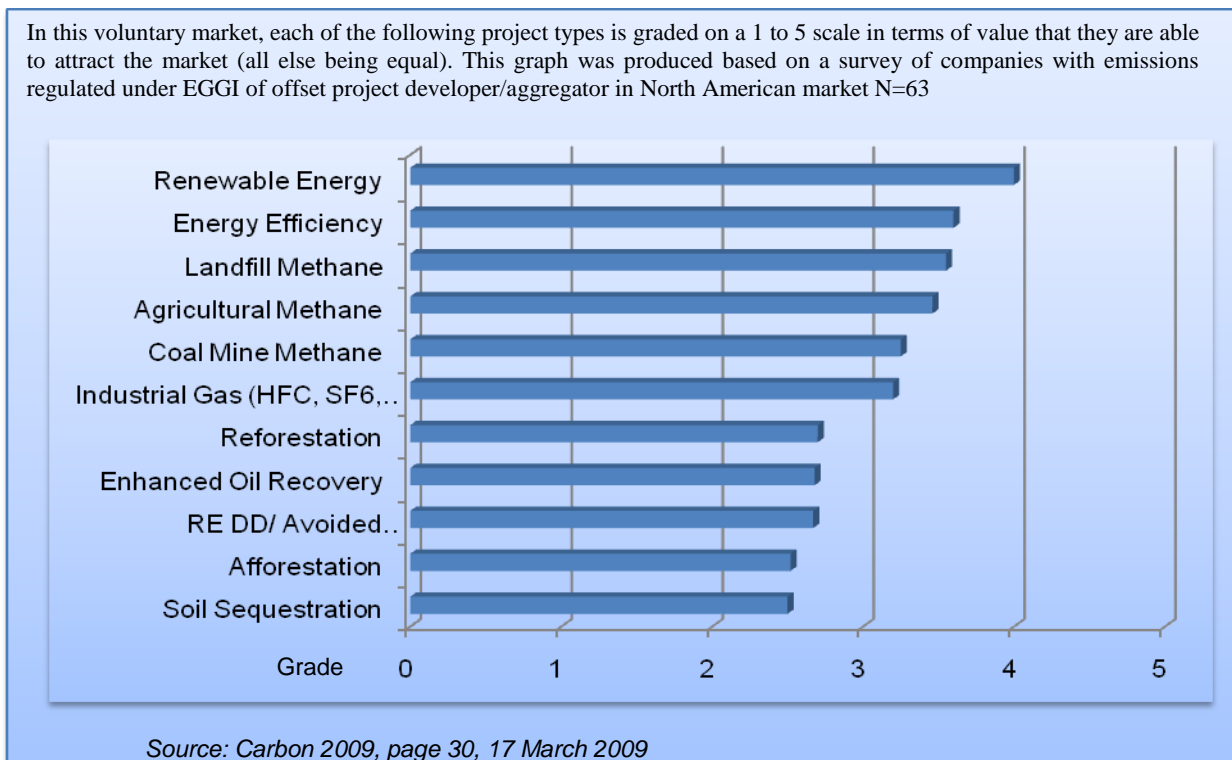
13. While the Kyoto Protocol will expire in 2012 if it is not amended, the international community (including non-members of the Protocol) has already commenced negotiations on a new agreement. The UNFCCC summit in Copenhagen in December 2009 endeavors to enlarge the number of countries committed to emission reduction targets. Most African countries have yet to create their own financial incentives for the carbon market – with good reason. The continent as a whole contributes less than 3 percent of worldwide emissions making direct trading of credits on the carbon market less attractive. Providing these credits to other countries, however, is a market in itself.

*Africa contributes less than 3 percent of worldwide emissions making direct trading of carbon credits unattractive. But providing credits to others is a market in itself.*

<sup>4</sup>

The report Carbon 2009 notes that in its first year of entering into force, the US Regional Greenhouse Gas Initiative volumes traded have already matched the total traded CDM market volume.

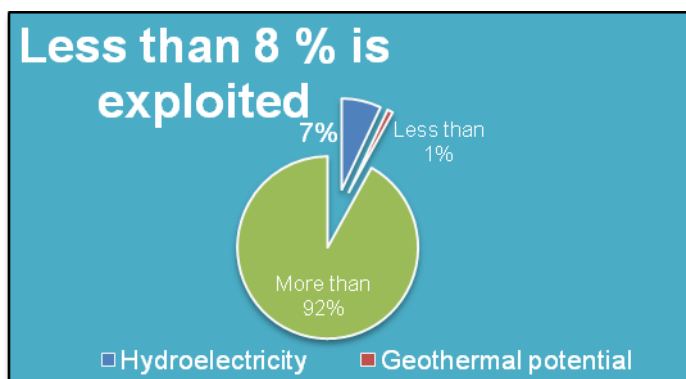
**Figure 1: Grading Projects by the Voluntary Market**



### III. Africa context

14. **Little investment in renewables or use of carbon finance:** While the continent is well endowed with renewable energy prospects, only a very small proportion of renewable energy sources for power generation is currently exploited. For example, as figure 2 shows, only 7% of hydroelectricity and less than 1% of geothermal potential is exploited (UNIDO International Conference, 2008).

**Figure 2: Natural resource potential**



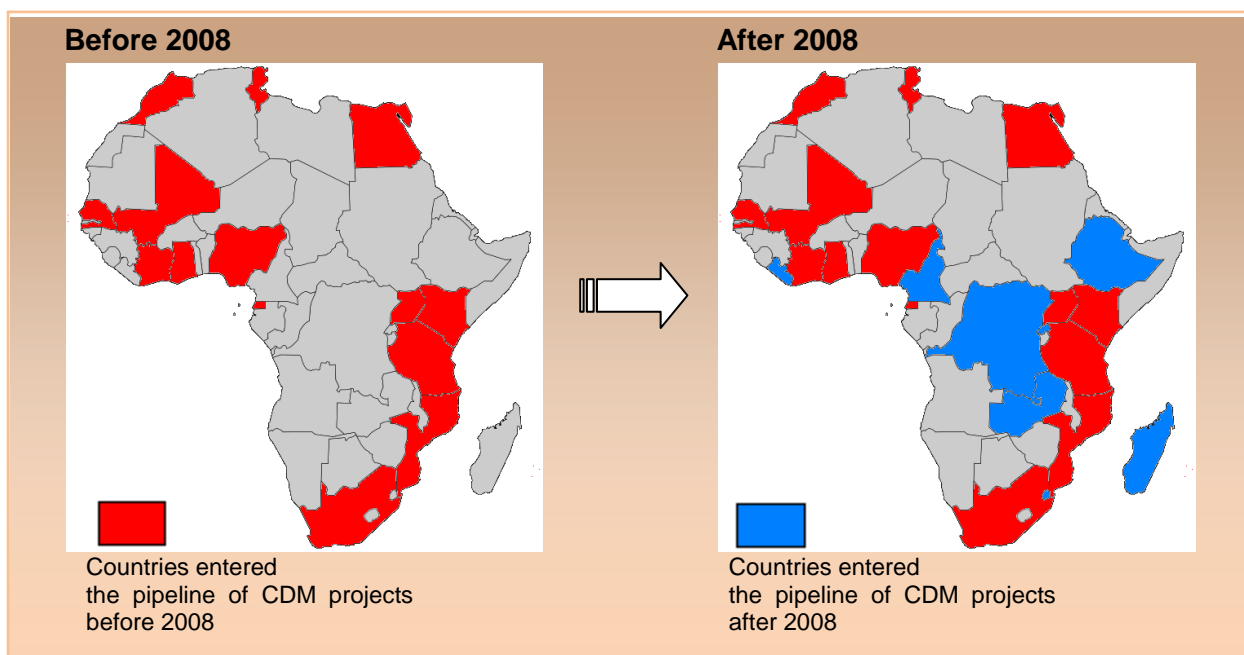
15. Africa makes little use of carbon finance mechanisms for investment in the renewable energy sector. Although the CDM has proven effective in catalysing investment in emerging economies (including South Africa), Africa as a whole holds less



*Uptake of carbon finance for CDM projects in Africa is growing, but comparatively slowly.*

than 2 percent of registered CDM projects and an annual average of about 3 percent of CERs (UNFCCC, CDM Statistics, 2009). However, progress is being made. Several African countries have entered the pipeline of CDM projects (see Figure 3 and Box 2 for more details). Between January 2008 and March 2009, Cameroon, DR Congo, Ethiopia, Liberia, Madagascar, Rwanda, Swaziland and Zambia all joined (State and Trends, 2009).

**Figure 3: CDM Projects in Africa**



Source: NEPAD-OECD Africa Investment Initiative

16. **Great potential...and benefits:** Africa is in a position to take advantage of carbon finance mechanisms to expand investment in (and access to) energy throughout the continent. The potential of renewable energy sources is great, with an estimated potential of 7,000MW from geothermal alone (UNEP Press Release, 2008). The World Bank estimates that Sub-Saharan African has the technical potential for more than 3,200 CDM projects, which could add more than 170GW of power – more than twice the current installed generation capacity (State and Trends, 2009). Production costs are lower and existing infrastructure is often limited, opening the way for the continent to “leapfrog” over old technologies to new ones.

*Renewable energy has many benefits for Africa, including access to energy for rural populations and energy security.*

17. Renewable energy also provides a unique opportunity to reach Africa’s rural populations because project size is flexible and often independent of a centralized infrastructure. Small projects, for example hydropower from local rivers or isolated solar power systems, do not need to be connected to a regional or national power grid. Biomass and solar power can also provide a sustainable energy supply for remote villages in oil-importing landlocked countries with limited costs compared to fossil fuels. By comparison, many sites suitable for renewable energy in OECD countries are costly to exploit and face legislative challenges such as strict environmental regulations.

18. Investing in renewable energy also helps to reduce poverty. The extent to which energy scarcity impacts the day-to-day survival of the severely impoverished has led the United Nations, through the Millennium Development Goals (MDG) framework for action, to directly link poverty reduction to increased energy capacity and distribution through renewable energy sources (see Box 3).

**Box 2: Sample of CDM Projects in Africa**

Host Country	Project Type	Activity Scale	Sectorial Scope	Reduction Amount	Parties Involved	Crediting Period
United Republic of Tanzania	Landfill gas recovery and electricity generation at "Mtoni Dumpsite", Dar Es Salaam	Large	Waste handling and disposal	202,271	<b>United republic of Tanzania</b> Dar es Salaam City Council  Consorzio Stable Globus	01 Jul 07 – 30 Jun 17 (Fixed)
Uganda	West Nile Electrification Project (WNEP)	Small	Energy industries (renewable – non-renewable sources)	36,210	<b>Uganda</b> West Nile Rural Electrification Company Limited (WENRECo)  The Prototype Carbon Fund, a private-public partnership operated by the World Bank. The PCF includes Finland, the Netherlands and Japan among others, as well as several private companies.	01 Jan 05 – 31 Dec 11 (Renewable)
Cote d'Ivoire	Abidjan Municipal Solid Waste-To-Energy Project	Large	Energy industries (renewable – non-renewable sources) Waste handling and disposal	71,760	<b>Cote d'Ivoire</b> Sitrade  <b>Switzerland</b> Green Hercules Trading Limited CO Cargill PLC	24 Jun 09 – 23 Jun 16 (Renewable)
Kenya	35 MW Bagasse Based Cogeneration Project	Large	Energy industries (renewable – non-renewable sources)	129,591	<b>Kenya</b> Mumias Sugar Company Limited  <b>Japan</b> Japan Carbon Finance Limited	01 Oct 08 – 30 Sep 18 (Fixed)
Nigeria	Efficient Fuel Wood Stoves	Small	Energy demand	31,309	<b>Nigeria</b> Developmental Association for Renewable Energies  <b>Germany</b> Atmosfair gGmbH  Lemen-Helfen-Leben e.V.	01 Aug 09 – 31 Jul 19 (Fixed)

Reduction measured in metric tonnes CO2 equivalent per annum

Source: NEPAD-OECD Africa Investment Initiative, September 2009

### Box 3: Linking Renewable Energy to the Millennium Development Goals

The UNDP Millennium Development Goals Carbon Facility is one example of a one-stop mechanism that focuses on developing carbon finance mechanism projects. Specifically, the fund focuses on carbon finance projects with sustainable development benefits that make a significant contribution to the MDGs. For example, renewable energy projects can increase energy supply such that health clinics can refrigerate vaccines and medicines, which would facilitate the realization of the 6th MDG: Combating HIV/AIDS, malaria, and other diseases. Certain types of poverty reducing renewable energy projects are therefore eligible for funding. In addition, the projects that make the MDG grade and receive funding will be showcased, providing important host country examples to prospective investors. The facility strongly endorses private sector partnerships (i.e. Banking and financial institutions) because it recognizes the necessity of the private sector role in purchasing and marketing emission offsets.

Prospective projects must meet several criteria such as carbon potential, technical feasibility, finance and legal restrictions, MDG and environmental contributions as well as country risk assessments. Projects are thoroughly screened for their ability to contribute to human development. Currently targeted renewable energy projects include grid connected electricity, off-grid electricity (for example solar PV, hydro, etc.), thermal solar and biomass energy. The UNDP provides due diligence, technical assistance as well as monitoring system establishment services. Fortis bank has been selected as the principal banking and financial service sector partner.

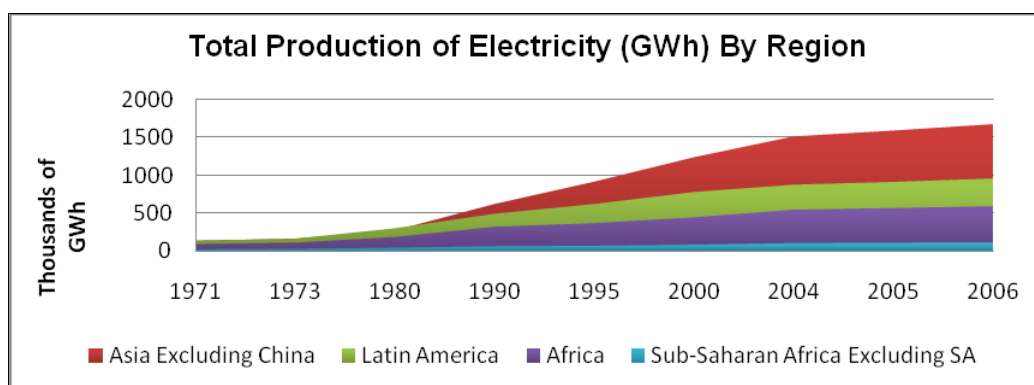
Source : <http://www.mdgcarbonfacility.org>

19. **But this potential is currently not being met:** Despite these significant comparative advantages, Africa's potential in the renewable energy sector is under-exploited. To give a well-known example, only one percent of the Democratic Republic of Congo's 77,810 square kilometres of water is converted into hydropower while 94 percent of the population goes without electricity (CIA World Factbook, 2009; World Energy Outlook, 2008). In terms of African wind energy, Egypt, Morocco and Tunisia account for 95% of the total installed capacity on the continent (World Wind Energy Report, 2009). Countries in western and eastern Africa, which could greatly benefit from wind energy to relieve pressure on hydropower during drought periods, have little or no access to wind energy.

*Africa's potential in renewable energy is currently under-exploited, with the continent lagging behind other developing regions.*

20. By comparison, South Asia, with a similar per capita income to Sub-Saharan Africa, has almost twice the generating capacity per million people. This was not always the case. In 1970, Sub-Saharan countries had nearly three times the generating capacity of South Asia. As shown by the graph below, Africa lags behind other developing regions with gaps widening each year.

Figure 4: Africa's Electricity Production in Comparison



#### IV. Navigating the obstacles: The way forward

21. This section identifies individual bottlenecks and charts a way through them with recommendations for action, drawing on success stories.

22. There are many reasons why Africa's use of carbon finance mechanisms is still relatively limited. These bottlenecks can be broken down into **a) capacity barriers** (lack of human capital and weak regional coordination) and **b) financial barriers** (high start-up costs, insufficient domestic funding, and high perceived risk). For each barrier identified, this paper proposes actions on the part of relevant stakeholders, and highlights best practices to help overcome the bottlenecks. The Bethlehem Hydroelectric Project in South Africa (Box 4) is an example of how private developers can enter an otherwise challenging market and launch a successful CDM project. It also illustrates the capacity and financial barriers that this paper outlined, and how they can be resolved.

##### Box 4: Bethlehem Hydroelectric Project, South Africa

The Bethlehem project is the first hydropower project to be launched by an IPP in South Africa. Despite significant start-up challenges, such as licensing and cost competitiveness, the project has succeeded in improving access to electricity and supporting the local community. The project is comprised of 2 facilities in the town of Bethlehem and a transmission line linking to the national grid. It was financed mainly by the Development Bank of Southern Africa (DBSA, who provided 70% of the finance, and by local equity investors.

The project developer, NuPlanet (Pty) Ltd, is a South African IPP, who owns, develops and operates hydro plants and is the first IPP to launch a hydropower project in South Africa. They entered a market with low tariffs for coal-based electricity, making it difficult to find customers willing to pay for higher prices. In the planning phase, the developer had to apply for IPP license from the national energy regulator and negotiate access to the grid. Moreover, they negotiated a PPA with the local municipality, which did not have the experience or knowledge of dealing with this kind of project. The long lead time to the start of the project (4 to 5 years) and the slow response of the bank in releasing the funds all added to the costs and complexity of the project.

Nevertheless, the developer overcame these challenges. Carbon credits and power off-take agreements were used as security against the loans; environmental assessments were undertaken to satisfy the prerequisites for licensing; and agreements were forged with local communities for land leases.

The benefits of the project are substantial. Not only does the hydro plant contribute to the South African goal of 10,000 GWH by 2013 in renewable energy input into final energy consumption, but it is also responsible for injecting ZAR 60 million in investment into the poor and rural local community. The project has created 40 skilled and 100-160 unskilled jobs in the construction phase, as well as 3 permanent jobs thereafter.

The experience gained through the Bethlehem project has allowed NuPlanet to provide valuable support and expertise to other projects in the region. A recent example is that of the Zengamina small, non-profit hydro power project in rural Zambia that Bethlehem Hydro assisted in terms of finding carbon financing in the voluntary market.

Source: UNEP Finance Initiative: Environment and Social Responsibility Observatory; Project Document 15 July 2009; Contributors: Anton-Lewis Olivier, NuPlanet and Charles Rea, North West Zambia Development Trust (NWZDT) <http://www.nwzdt.org/>; Bethlehem Hydro Project and Development Bank of Southern Africa.

#### V. Overcoming capacity barriers to Carbon Financing

23. **There are two related types of capacity barriers:** those involving human capital and those related to institutional coordination.

24. **Human capital insufficient to respond to project-specific needs:** In Africa there is in general a lack of knowledge and skills for operating and maintaining renewable energy plants. Some projects, especially those for cogeneration, require skills for technology operations – such as for operating and maintaining high-pressure, high-temperature boilers used in bagasse projects.<sup>5</sup> Project developers are also facing a shortage of local skills in relation to wind power technology – the machinery used often has to be assembled on site, presenting an opportunity for technology transfer, but local workers may not know how to do so. Other CDM related tasks, such as conducting financial appraisals, determining baselines of anthropogenic emissions, and the process of validation, verification and monitoring, can be skill-intensive; but because of the dearth of local knowledge, developers often have to hire foreigners to do the job.

25. **Lack of regional coordination undercuts potential projects:** Currently, each host country has discretion over sustainability criteria – the myriad of factors countries consider in assessing whether a proposed CDM project complements their sustainable development priorities and national regulations. There is a lack of consistency in regional or sector-specific sustainability criteria, resulting in increased project development costs and obstacles in project duplication in different countries.

26. A current project that is being planned under the initiative of the Club of Rome is DESERTEC, a 400 billion euro initiative to exploit the solar resources in the Sahara desert to produce electricity through Concentrated Solar Power (CSP) technologies that can then be exported to Europe, the Middle East and North Africa. The project stands to have an enormous impact on the EUMENA region: it would meet 15 percent of Europe's energy demands by 2050 and the heat generated from CSP can be used for desalination, thus improving the amount of potable water available for the region. The revenue earned from the project could spearhead economic development. But the DESERTEC project illustrates the importance of coordination among all the countries involved if the project is to succeed. Egypt, Jordan and Morocco have converged somewhat in their energy law reforms, but this kind of coordination has not extended to other EUMENA countries. Moreover, countries need to harmonize policy frameworks to remove barriers: high import duties, low coal-based electricity prices, and high taxes on capital investments could hinder against the use of solar energy in the region. Without such harmonization, it will also be more difficult for countries to access the carbon finance market and benefit in that way.

### *How African Governments can overcome capacity impediments*

27. **Develop human resources and expertise:** Carbon financing is still a novelty to many African countries but the growing importance of investing in renewable energy and tapping into financing options like the CDM necessitate new skills among those dealing with energy and climate change issues. Governments should create policy frameworks that facilitate the creation of pools of experts and retain individuals who have worked on CDM projects in the past. Governments should support research institutions such as universities by providing grants for skills-based courses and seminars relevant to climate change and carbon financing. Vocational programs focused on renewable energy projects are a good way of building skills in a sustainable way, especially if these programs are supported with financing and teaching staff over time.

*There are currently many bottlenecks to improving access to carbon finance in Africa, but coordinated action from key stakeholders can help to overcome these.*

*Reforms are needed for developing country capacity through the creation of expert groups and vocational training programs.*

<sup>5</sup> As a project design paper for a biomass CDM project in Kenya points out. *Source: 35 MW Bagasse Based Cogeneration project by Mumias Sugar Company Limited (MSCL); Project 1404, UNFCCC database*

28. In Ghana, a domestic company, Rural Energy and Environmental Systems (REES) and Scoraig Wind Electric, a British company, co-developed a wind power project. Scoraig launched a training programme for technicians from local enterprises in the design, construction, manufacture and installation of the wind turbines using locally sourced materials. As a result, the first local wind turbine was manufactured by the trainees of this programme. The success of this particular training programme is encouraging, but training should extend beyond individual projects to a more national scale if it is to be sustainable. Similarly, establishing training programs within relevant ministries, including environment, energy and finance, will boost human capacity in public service. These programs should extend to local authorities, who are the most involved in the maintenance of power plants and need to learn the relevant management skills to carry out this task.

29. **Design policy for renewable energy:** Proper policy design and implementation on the part of African governments is critical for the success of renewable energy projects. For instance, Mali has formulated the Action Plan for Renewable Energy Promotion, a policy plan which sets a target of increasing the contribution of renewable energy to total energy supply from less than 1% in 2002 to 15% by 2020. South Africa and Egypt also have national targets for renewable energy production (Renewables Global Status Report, 2007). In addition, African governments would benefit from better definition of the mitigation actions that could function as Nationally Appropriate Mitigation Actions (NAMAs). As UNFCCC Executive Secretary Yvo de Boer pointed out at a recent meeting of African Environment Ministers, NAMAs can potentially provide great benefits for African countries in improving access to energy and driving economic development (De Boer, 2009).

30. **Strengthen the role of Designated National Authorities (DNAs):** Designated National Authorities (DNAs), the bodies that oversee the approval and registration of CDM projects, deserve special attention from governments because of their position as the nexus of all CDM issues. While DNAs are quite prevalent in Africa – with 41 on the continent - (see Annex 2), governments should strengthen the regulatory, promotional, and coordinating roles the DNAs play (see Box 5).

*The creation of NAMAs can also help improve access to energy and drive economic development.*

#### Box 5: The Role of DNAs

DNAs serve a number of functions: regulatory, promotional, and coordinative. On the regulatory side, DNAs facilitate the process of registering CDM projects. They harmonize standards for technological developments and facilitate trade between African and international partners. On the promotional side, DNAs can be a vehicle for creating a knowledge platform for the CDM, by managing a joint database at regional level for highlighting projects and investment opportunities and sharing methodologies and best practices for different aspects of the CDM. On the coordination part, DNAs can bring together various agencies working on environmental issues or renewable energy projects. They can do so while housed in a specific ministry or in a specially-created inter-ministerial structure comprised of several different agencies. DNAs can also coordinate domestic efforts with those of other countries working on similar projects. A recent example to this type of coordination was a South-South capacity exchange between the DNAs of Botswana and Brazil. As part of a capacity-building initiative, the DNA of Botswana sent a six-member delegation to visit Brazil for two weeks in August 2008. The delegation visited many pioneering projects throughout Brazil and exchanged ideas and perspectives with their Brazilian colleagues. Upon returning to Botswana, the delegation was able to share its findings with other government officials, which resulted in subsequent adjustments concerning the way in which the DNA operated. Both Botswana and Brazil DNAs maintain strong communication links and regularly consult one another on relevant issues.

Source: Balisi Gopolang; 17 September 2009; Department of Meteorological Services – DNA of the Republic of Botswana

*Improved regional coordination and exchange of best practice are particularly powerful tools. Technology transfer is another important instrument.*

31. **Improve regional coordination:** As renewable energy becomes more important, and the debates around climate change more salient, African governments should coordinate among themselves to find common policies and a vision for the future. A good example is the recent nomination of Prime Minister Zenawi of Ethiopia to lead a team of African environment ministers for a common African position at the UNFCCC negotiations to be held in Copenhagen in December 2009 (APF Report, 2009). But to make such coordination sustainable, there needs to be an institutional framework at regional level for issues of common concern. The Inter-Agency Nairobi Framework for Capacity for Carbon Market Development in Sub-Saharan Africa (Nairobi Framework) provides capacity building resources through a regrouping of the UNDP, UNEP, the World Bank Group, AfDB and UNFCCC. There should also be more meetings for experience sharing such as the Africa Carbon Forum, which was held in September 2008 under the aegis of the Nairobi Framework and organized by the International Emissions Trading Association (IETA) and the UNFCCC Secretariat. It presented an opportunity for African countries to present their CDM projects at a carbon investment trade fair; allowed DNAs to share their experiences; and brought together project developers, financial firms, and key policymakers. More forums should be held and existing ones expanded to encompass all stakeholders.

#### ***How the International Community can overcome capacity impediments***

32. **Promote south-south transfer:** A South-South transfer of capacity would encourage and foster the transfer of expertise and experience between countries that stand to gain the most from the use of carbon finance mechanisms for renewable energy investment. This can be done on an intergovernmental level through DNAs or regionally. The launch of the CDM South-South Cooperation between China and Other Developing Countries in May 2009 is an example. The initiative is a way for China, which has enjoyed tremendous success with CDM projects, to share its experiences with developing countries, including those from Africa, Asia, Central Asia and the Middle East. Regionally, the South African DNA has hosted delegates from African countries such as Mozambique and Zambia, whose DNA officials made visits to the South African DNA in 2009.

33. **Expand multilateral programs for boosting capacity:** The development community can make an important contribution to building capacity in African countries. Another example is the World Bank's Carbon Finance Assist Programme (see Box 6). In addition, at the 2009 International Energy Agency (IEA) Ministerial meeting, Ministers committed to engaging with developing countries to promote the deployment of renewable energy technologies and to support policy development. This encompasses the creation of a new training and capacity building programme with regional organizations including the African Union (IEA Communique, 2009).

#### **Box 6: World Bank's Carbon Finance Assist**

Carbon Finance-Assist supports country programs, delivers training modules and takes part in knowledge-sharing events in developing regions. In 2006, Carbon Finance-Assist launched a sub-program for Africa to address the substantial challenges that African countries face. The WB team delivered a program in Senegal on carbon financing opportunities for rural electrification to delegations from rural electrification agencies in 19 Africa countries. As a result:

- 3 new DNAs have been established (Botswana, Sierra Leone, and the Gambia)
- 11 country programs have been implemented
- 65 carbon finance projects have been identified
- 16 national training workshops and 4 regional workshops have been held.

Source: World Bank Carbon Finance Assist website: accessed 14 September 2009

## VI. Overcoming financial barriers to carbon finance

34. **High start-up costs of investments:** Renewable energy projects in Africa carry massive start-up costs: transaction costs for small, decentralized renewable energy facilities, for example, can make projects very capital intensive (World Bank Toolkit, 2008). Equipment such as photo-voltaic panels, wind turbines, and connectors are all expensive. In the planning phase, a developer would have to pay for: permits (health and safety); environmental licenses; technical feasibility studies; contracts for technology and fuel supplies; and equipment for the power plant. These costs can run into the hundreds of thousands of dollars in the planning phase. In the construction phase, where the largest costs are incurred, a relatively small engineering project can cost many millions of dollars. Moreover, financial institutions require feasibility studies (technical, environmental and financial) to be conducted before a project is considered for funding, further adding to the financial challenges for developers.

35. **Returns take a long time:** Carbon financing is typically paid only after delivery of the emission reductions, so investors need to commit significant costs at the beginning of a project but without seeing returns for some time. Carbon financing is therefore most useful in improving the cash-flow once a project is up and running.

36. **Funding sources are limited:** Financing for large infrastructure projects is not easy to obtain in Africa, even in countries where financial markets are well developed and mature. This trend is notable in sectors that require or make use of new technology. The funding for renewable energy projects is often insufficient and carbon finance provides only a portion of the required funding, compelling developers to find other sources of funding. There are examples, where financial mechanisms exist for an advance payment for CERs to be delivered in the future. All the same, supplementary multilateral financing resources and government resources are not enough to satisfy investment needs. As a consequence, the funding gap must be met by other forms of investment, namely private sector participation.

37. **High perceived risk:** With the exception of a few cases, most African countries do not have sovereign credit ratings, which are important for boosting investor confidence. High investment risk may result in undervalued CERs and reduced financial incentives for the investor. There is in fact also a high probability that the necessary permits for a project will not be issued and the project cannot continue. Added to this, inadequate policy frameworks in host countries are a major impediment to predictability. Some of the policies that can discourage renewable energy investment through carbon finance range from high levels of taxation and interest rates, to lack of support for foreign direct investment and unstable fiscal policy.

### *How African Governments can overcome financial impediments*

38. **Consider feed-in tariffs:** Feed-in tariffs are mandated by legislation for renewable energy. They are set to cover the cost of generation plus a reasonable profit margin in order to give an incentive for developers to invest. A few African countries have already introduced them. The Kenyan government introduced feed-in tariffs for wind, biomass and small hydropower generation in March 2008, with guaranteed prices for 15 years. Algeria and Mauritius also have feed-in tariffs while Nigeria and Ghana are making plans to introduce them. Box 7 explains how feed-in tariffs work in South Africa.

*By implementing strategies to overcome investment barriers, African countries can benefit more from carbon finance opportunities.*



### Box 7: Feed-in Tariffs in South Africa

The national energy regulator of South Africa, NERSA, introduced feed-in tariffs in March 2009, following a consultation paper, public hearings and deliberations with major stakeholders. The tariffs are set at above-market rates and are guaranteed for a period of 20 years. They comprise: Wind: 1.25 ZAR/kWh (€0.104/kWh, 0.14 USD/kWh): higher than a similar tariff in Germany (€0.092/kWh), a pioneer in feed-in tariffs Concentrated Solar: 2.10 ZAR/kWh (€0.175/kWh) Small Hydro: R0.94/kWh Landfill Gas: R0.90/kWh In addition, a Renewable Energy Power Purchase Agency was set up in Eskom's Single Buyer Office, which will also be responsible for monitoring and verification. The tariffs are intended only for IPPs and do not include Solar Photovoltaics. This limits the extent of the tariffs.

Source: NERSA Media Statement: NERSA Decision on Renewable Energy Feed-in Tariff; 31 March 2009; Miguel Mendonca, World Future Council; Feed-in Tariffs Global Update; June 3 2008

39. **Incentives for New Technologies:** African governments should take steps to develop green technology industries and encourage the transfer and diffusion of technologies from other parts of the world. One possible measure in this view is to cease subsidies on petroleum products, as Ghana did in 2005, and divert those resources to developing clean technology.<sup>6</sup> Another option is to relax import barriers such as high import duties on products used in renewable energy production. The US and the EU are currently holding talks to forge a pact with China and OECD countries that would eliminate import tariffs on green goods and technologies such as wind turbines (Reuters, 28 Sept 2009). African countries could draw lessons from such a plan and potentially adopt something similar regionally. It is important that this effort be coordinated regionally because in many cases, companies pay to import products, warehouse them, and then export them within the region, incurring further customs costs. The development of custom unions by several Regional Economic Communities is a progress in this regard. Also, investing in assembling facilities for solar panels is a way to ensure sustainable production of green technology domestically. Intellectual property rights are also important for encouraging domestic innovation and the diffusion of technological innovations<sup>7</sup>.

#### *How the International Community can overcome financial impediments*

40. **The Role of International Sources for Carbon Financing:** Given that carbon finance only supplies a marginal portion of the required finance for renewable energy investments, it is important to explore alternative funding sources to close the funding gap. Official Development Assistance (ODA), even though ineligible for funding CDM projects, could nonetheless play a big role in funding renewable energy projects, especially small-scale or rural projects that might not be attractive to private developers. Some financing organizations, like the World Bank, have combined contributions from private companies and from governments in OECD countries to purchase emissions reductions in developing countries. Box 8 describes some projects that have been funded in this way in Africa.

*Access to carbon finance can be facilitated through international partnerships, provision of new global incentives for green growth, and better risk mitigation instruments.*

<sup>6</sup> At their 2009 meeting, G20 leaders pledged to phase out subsidies for fossil fuels in the “medium term”

<sup>7</sup> Source: Ronald Steenblik, OECD Trade Policy and Linkages Division

### Box 8: The World Bank Carbon Finance Unit

A bundle of projects in Kenya - *Olkaria, Kiambere, Tana* – are being funded by the WB's Carbon Finance Unit. The projects involve expanding the capacity of *Olkaria Geothermal power plant*; upgrading of the *Kiambere power station*, and redeveloping the *Tana power plant* with new generators which will contribute additional output to the Kenyan grid. The CDCF will purchase a total of 1,341,000 tCO<sub>2</sub>e in emission reductions from the projects by December 2014. All three projects are associated with community benefit deliverables: the building of a health centre, water supply facilities and two dorms at the local primary school (*Olkaria*); a water line; addition of maternity and other wards to an existing health centre; and the building of a new dispensary and primary school (*Kiambere*); and access to potable water, rehabilitation of a 16k road; and completion of a local dispensary (*Tana*).

Source: World Bank Carbon Finance Unit website, accessed 14 September 2009

41. **Strengthen risk mitigation instruments:** To mitigate the risk concern of private investors, existing risk mitigation and insurance programmes should be expanded. An example of an insurer that has recently provided insurance to a renewable energy project is the Multilateral Investment Guarantee Agency (MIGA). MIGA is a member of the World Bank Group and it supplies guarantees to protect cross-border investment and associated risks in developing countries. Another risk mitigation resource is export credit guarantees, managed by Export Credit Agencies (ECA). ECAs foster the development of export markets by domestic companies while providing different forms of finance and insurance. Export credit guarantees can insure projects involving trade of green technologies against risks such as non-payment, bank loans or risk insurance to investors in overseas markets.

### VII. Conclusion

*While it is not certain how carbon finance mechanisms will evolve, it is clear that African countries can begin to take steps to increase their share in the potential benefits.*

42. This paper has outlined the huge potential of the carbon finance to catalyse investment in renewable energy in Africa. It also describes how significant capacity and financial barriers impede progress and suggests ways for African Governments and International Community to improve the framework for investment in renewable energy. As climate change negotiations intensify, new opportunities to overcome these barriers may arise. Simplifying the procedures for applying to the CDM and meeting its requirements could significantly increase the share of CDM projects for Africa. This is being considered for a new post-Kyoto architecture and will be discussed at the Copenhagen meeting in December. While we cannot foretell with certainty how the CDM will evolve, it is clear that African countries can begin to take preparatory steps to benefit from financing mechanisms and increased emphasis on renewable energy.

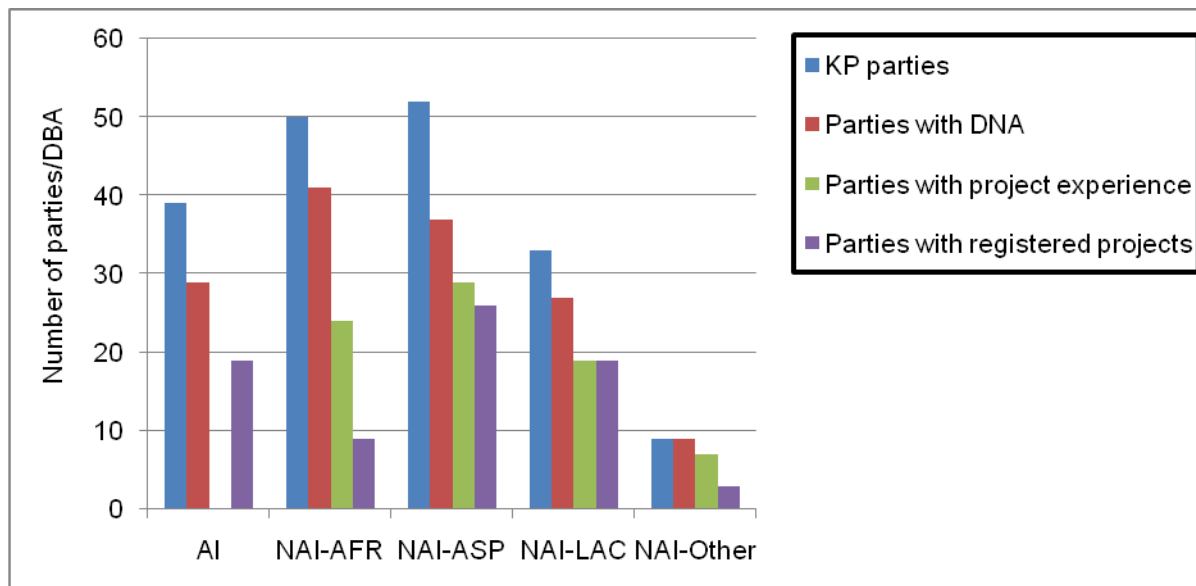
## ANNEX

### ANNEX 1: Summary of Carbon Finance Mechanisms and Funding Sources

Option	Under Convention	
<b>Increasing the Scale of Existing Mechanisms</b>		
The Global Environment Facility Trust Fund (GEFTF)	Yes	
Special Climate Change Fund (SCCF)	Yes	
The CDM and Other Possible Crediting Mechanisms	Yes	
Least Developed Country Fund	Yes	
<b>New Bilateral and Multilateral Funds</b>		
Cool Earth Partnership (Japan)		No
UNDP-Spain MDG Achievement Fund		No
International Climate Protection Initiative		No
Clean Investment Funds		No
Global Climate Financing Mechanism		No
New Post-2012 Carbon Fund (European Investment Bank)		No
Global Energy Efficiency and Renewable Energy Fund (EU)		No
Carbon Partnership Facility (World Bank)		No
Climate Investment Fund (Run by WB)		No
-Strategic Climate Fund		No
-Clean Technology Fund		No
<b>Proposals Funded by defined Contributions from Developed Countries</b>		
Convention Adaptation Fund, Technology Fund and Insurance Mechanism	Yes	
Adaptation Fund and Multilateral Technology Acquisition Fund	Yes	
Mechanism for Meeting Financial Commitments Under the Convention		No
Efficiency Penny		No
<b>Countries</b>		
World Climate Change Fund	Yes	
Multilateral Adaptation Fund	Yes	
<b>More Stringent Commitments by Developed Countries</b>		
Auction of Assigned Amount Units	Yes	
Nationally Appropriate Mitigation Actions	Yes	
Carbon Market Expansion (RGGI, Western Climate Initiative)		No
<b>Other Possible Sources of Funding</b>		
Extension of the 2% levy on CDM to other Market Mechanisms	Yes	
International Air Travel Adaptation Levy		No
International Maritime Emission Reduction Scheme		No
Auction of Allowances for International Aviation and Marine Emissions		No
Funds to Invest Foreign Exchange Reserves		No
Access to Renewables Programmes in Developed Countries		No
Tobin Tax		No
Donated Special Drawing Rights		No
Debt-for-clean-energy Swap		No

Sources: Haites (2008). "Negotiations on additional investment and financial flows to address climate change in developing countries." UNDP Environment and Energy group publication. World Development Report 2010. World Bank

## ANNEX 2: Number of parties/DNAs by Region



Region	KP parties	Parties with DNA	Parties with project experience	Parties with registered projects
Annex 1 parties (AI)	39	29	n/a*	19
NAI-Africa (NAI-AFR)	50	41	24	9
NAI-Asia and the Pacific (NAI-ASP)	52	37	29	26
NAI-Latin America and the Caribbean (NAI-LAC)	33	27	19	19
NAI-Other	9	9	7	3

\*number of parties with project experience can not be calculated due to lack of information

Source: UNFCCC website, CDM Statistics: DNAs;  
<http://cdm.unfccc.int/Statistics/dna/DNAByRegionBarChart.html>

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