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Integrating Africa's Least Developed Countries into the Global Carbon Market:

Analyzing CDM Implementation Barriers

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CDM Implementation Barriers

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ABBREVIATIONS AND ACRONYMS

BCEAO	Banque Central des Étas de l'Afrique de l'Ouest
BMU	German Ministry for the Environment and Nuclear Safety
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reductions
CO_2e	Carbon Dioxide and Equivalences measured in Carbon Dioxide
CPA	CDM Programme Activity
DNA	Designated National Authority
DRC	Democratic Republic of Congo
FDI	Foreign Direct investment
GCI	Global Competitiveness Index
GEF	Grid Emission Factor
GHG	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IFC	International Financial Cooperation
KfW	Kreditanstalt für Wiederaufbau
LDC	Least Developed Country
LoA	Letter of Approval
MSW	Municipal Solid Waste
MW	Megawatt Installed Capacity
MWh	Megawatt Hour
NAMA	Nationally Appropriate Mitigation Action
PoA	Programme of Activities
SD	Sustainable Development
SSA	Sub-Saharan Africa
UBA	Umweltbundesamt
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollar
WB	World Bank
WEF	World Economic Forum

PREFACE

The African continent belongs to the regions that are most vulnerable towards climate change. Least developed countries in sub-Saharan Africa will be hit hardest and have the least capacity to respond. While international carbon markets cannot provide financing for adaptation efforts, they can play a crucial role in attracting carbon finance, providing innovative green technology and fostering access to renewable energy. These technologies are essential for meeting the increasing energy demand in Africa. While Africa is only responsible for approx. 4% of the world's greenhouse gas emissions, vast emission reduction and carbon sequestration potentials exist in the forestry and agricultural sector. However, there are also opportunities for CDM projects in the sectors energy efficiency and renewable energy, which have been widely disregarded by now.

For the past 14 years, the Clean Development Mechanism (CDM) has been successfully utilized to attract investments into emerging markets and developing countries. Yet, the CDM performance in Africa has been very limited so far: Africa's share in registered CDM projects amounts to only 2% of the global CDM pipeline. However, the African continent is itself by no means homogenous – most of the projects are implemented in North Africa and South Africa, only few are located in Least Developed Countries (LDCs). In general, demand for Certified Emission Reductions (CERs) from African countries currently exceeds supply.

In order to enhance the representation of the continent in the carbon market, the EU directed efforts to improving the investment climate in Africa. With regard to the CDM, the EU Climate and Energy Package, adopted in 2009, foresees special provisions for CERs from LDCs. Even in the absence of an international agreement on climate change, certainty on the acceptance of credits from projects that started in LDCs post-2012 will be provided until 2020 provided that these projects are clearly additional and contribute to sustainable development. The revised EU Emissions Trading Directive and the EU Effort Sharing Decisions both include further provisions to foster CDM project developments in LDCs.

During the climate negotiations at Copenhagen, Parties agreed to further improve regional distribution of the CDM projects and to develop measures for countries with less than ten registered CDM projects. Against this background, the last months have shown a number of steps forward: In July 2011, the CDM Executive Board adopted guidelines for taking into account the concept of 'suppressed demand' in CDM methodologies. This marks an important advancement for acknowledging the particularities of the CDM in African LDCs, where demand for energy is often artificially suppressed due to the prevalence of poverty and lack of economic resources. The concept implies that under such a situation, emissions remain low, while improved access to energy would result in higher emissions.

The ongoing development of standardized baselines on the international level will further contribute to improving the representation of Least Developed Countries in the global carbon market. As mitigation potentials in African LDCs are often high in the complex energy efficiency and renewable energy sectors, standardized baselines lower the complexity of baseline calculations for individual projects or PoAs.

In fact, statistics reveal that 2011 has shown an uptake on the CDM in LDCs: Registration of CDM projects in Africa has increased in relation to previous years. While LDCs have been underrepresented in conventional CDM projects, a good share of Programmes of Activities (PoA) are being developed in LDCs. The programmatic approach which allows to address multiple small emission reduction units in various locations seems well suited to the characteristics of African countries. This is a promising development.

In order to contribute to fostering carbon markets in sub-Saharan African least developed countries, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) decided to expand the scope of its CDM/JI-Initiative to the region. Approaches comprise the development of appropriate methodologies, feasibility studies on CDM potentials

in respective areas and industries, pilot projects on household energy and programmatic CDM. Promising initiatives funded by the BMU's International Climate Initiative are the Gold Standard Foundation's project on "Innovative Tools to Lower the Entry Barriers and Allow for Scaling-up of Carbon Market Activities in Under-Represented Regions" and the "African Carbon Asset Development Facility" (ACAD), a public-private partnership between BMU, UNEP and the Standard Bank aiming at supporting replicable CDM projects and providing carbon finance training to local financial institutions in sub-Saharan Africa.

Complementing the above-mentioned activities, BMU has initiated a research project on the participation of LDCs in sub-Saharan Africa in the carbon market. It has a twofold objective: first, it shall assist BMU in developing its strategy for climate change mitigation activities in Africa with the additional intention that the results will see a wide uptake from other institutional donors and the private sector. BMU hopes that this may serve as a first building block for practical and operational climate mitigation activities. Second, conclusions with relevance for the international debate on climate change and the post-2012 carbon market will be used for valuable policy advice. Wuppertal Institute and GFA ENVEST with their combined knowledge and expertise in the carbon market, climate negotiations, policy advice, sustainable development, as well as practical CDM experience are fulfilling all expectations for successfully conducting the research. Complementary, a network of experts is involved in the process, ensuring that existing knowledge gained in related BMU project activities will be considered and synergies be used.

In a first step, the research team assessed technical CDM project potentials in eleven Sub-Saharan African countries in the renewable energy, energy efficiency, transport, waste management and other selected sectors.

The present report goes beyond looking at the mere technical potential and discusses enabling environments for developing CDM projects in the region. Following a systematic analysis, it identifies barriers for the CDM in the region in each of the eleven countries. Out of these countries, BMU is going to select two countries to be assessed in greater detail. The final aim of the research project is to develop recommendations for further BMU engagement in the region. In addition, we would like to circulate the research studies to relevant actors, such as project developers, policy makers, financial institutions and private actors, to share lessons on the CDM in African LDCs. Since such an analysis of the CDM conditions in sub-Saharan Africa has not been undertaken before, I am sure that the report will also be of interest and use for other actors that aim at fostering carbon markets in Africa.

Berlin, December 2011

Dr. Silke Karcher
BMU, Division KI I 4

EU Affairs and Bilateral Cooperation "Environment and Energy"

EXECUTIVE SUMMARY

This report assesses barriers hampering CDM project development in eleven Least Developed Countries in sub-Saharan Africa: Burkina Faso, DR Congo, Ethiopia, Malawi, Mali, Mozambique, Ruanda, Senegal, Uganda, Tanzania, and Zambia.

This study is based on a set of five criteria, nine sub-criteria and 17 indicators which have been identified in a three-phased process including a practitioner's workshop in Berlin in November 2010. These five criteria range from the basic CDM structures, the overall investment climate and the countries' climate policy up to political preferences such as the contribution to the sustainable development of certain project types and sectors (please refer to Table 2).

The research projects' first report ('The CDM Project Potential in Sub-Saharan Africa with Focus on Selected Least Developed Countries') delivered some of the required data (i.e. for the sub-criteria 'abatement potential' and 'investment needs')

The analysis yielded two different kinds of data:

- The first type consists of cardinal data describing the exact value of specific sub-criteria (e.g. abatement potential described in million Certified Emission Reductions (CERs) per country per year).
- The second data set covers ordinal data (e.g. better or worse, yes or no) describing mostly soft policy sub-criteria.

Merging cardinal and ordinal data is considered to be an unsuitable approach leading either to the inappropriate generalization of findings or to a loss of information. Therefore we did not consolidate the findings in one, overall table. Instead, the project team developed two different final overview tools: a series of diagrams displaying all cardinal data (Figure 1) accompanied with a consolidation table of ordinal findings (Table 1). Please note, the red line represents the average value for all eleven countries involved. Table 1 presents the binary data of the second type.

Figure 1: Consolidation of Quantitative Findings

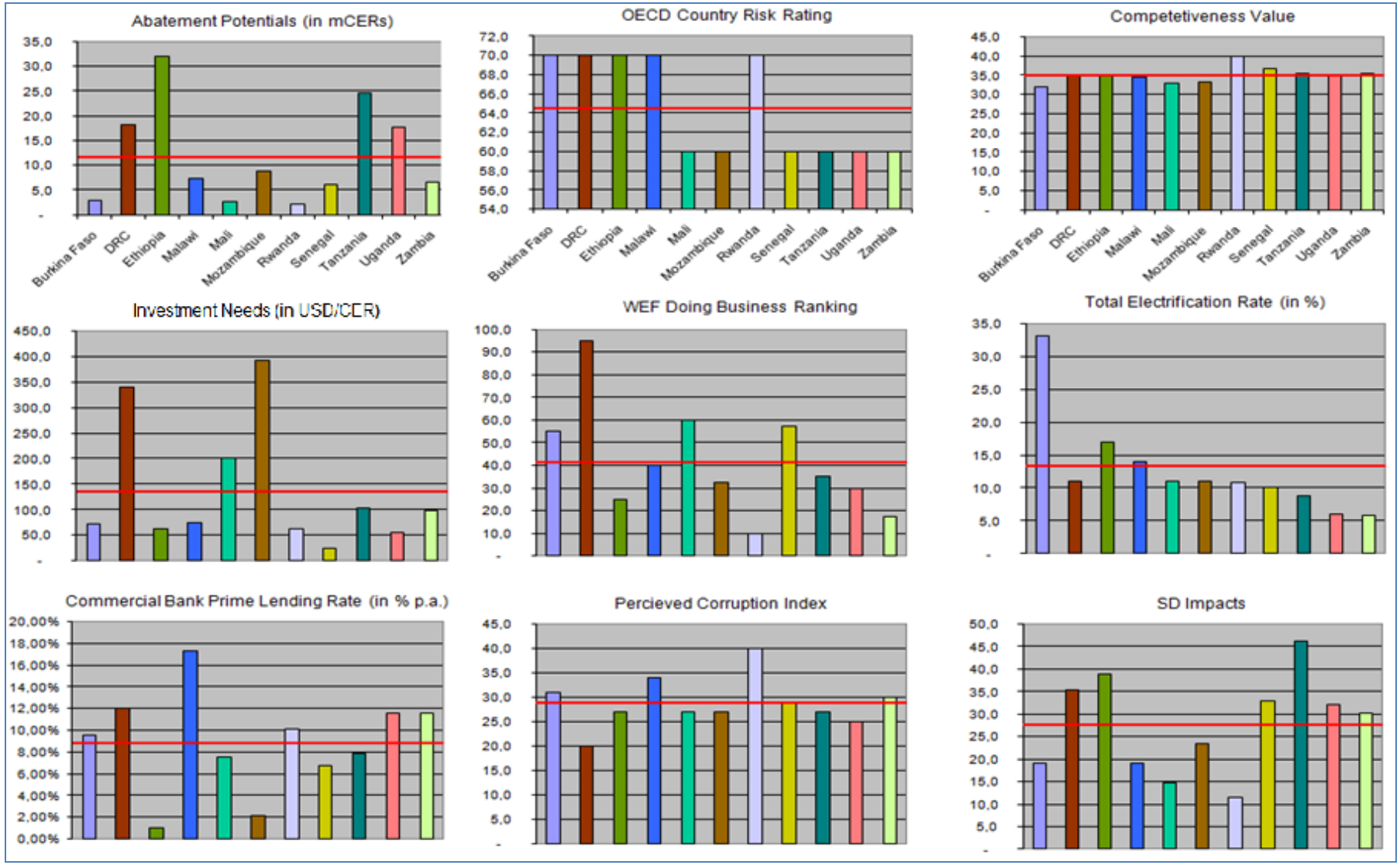


Table 1: Consolidation of Ordinal Findings

		Country										
		Burkina Faso	DRC	Ethiopia	Malawi	Mali	Mozambique	Rwanda	Senegal	Tanzania	Uganda	Zambia
Operational CDM Structures	DNA available (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Existing CDM Projects (Yes/No)	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Binding Timeline for LoA Approval (Yes/No)	No	N/a	No	No	N/a	N/a	N/a	No	Yes	No	Yes
(Pro-active) Role in CDM project development	DNA Website (Yes/No)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes
	CDM promotion entity (Yes/No)	No	N/a	No	No	N/a	N/a	N/a	No	No	Yes	Yes
National Interest in Climate Change Issues	NAMA submission (Yes/No)	No	No	Yes	No	No	No	No	No	No	No	No
	National Climate Policy Existing (Yes/No)	being developed	N/a	being developed	being developed	N/a	N/a	N/a	Yes	Yes *	being developed	being developed
CDM Capacities	Existing CDM Capacities	7	5	6	7	13	16	12	10	23	17	7

As outlined above, this report does not produce one overall table summarizing the results. Instead, we present in the following a synthesis of the results and highlight countries with in our view promising combinations of indicators. Please note that this approach contains a specific weighting of the selected indicators, the choice of which is explained in the respective paragraphs. This weighting contains an element of subjectivity, as different preferences would lead to different weights.

- Senegal, for example, combines favorable framework conditions with a broad base of emission reduction potentials, adding up to 6.1 million CERs/yr. Furthermore, the country has the lowest overall investment costs/CER of the countries under consideration (24USD/CER). This is complemented by a good financing framework, covering an interest rate of 6.8%, an average perceived corruption, and a high competitiveness index. Moreover, Senegal shows the largest electrification rate among all study countries (33%). Last but not least, it has operational CDM structures and is one of the only countries in the region with a fully developed national climate policy.
- Tanzania also offers a broad range of sectors suitable for CDM project development[1], very substantial abatement potentials (24.5 million CERs/yr) combined with an above average financing framework. This includes an interest rate of 7.83%, a good doing business ranking, a very good competitiveness index (3.7) which is only hampered by high perceived corruption (2.7). This is complemented by highest sustainable development impacts of the existing CDM potential (461). As for the Kyoto Infrastructure, Tanzania is one of only two countries with fully operational structures including binding timelines for Letter of Approval (LoA).
- Uganda also has considerable abatement potential (about 17.7 million CERs/yr), and the second lowest investment costs per CER (56USD/CER). Uganda's interest rate is comparably high (11.56%), but the country offers good business conditions (high competiveness index, and high doing business ranking). Further, basic CDM infrastructure structure is available. Moreover, the country pursues an active investor outreach policy including a separate investment promotion entity. A national climate policy is under consideration at the moment.
- Ethiopia's overall reduction potential is very high, which is however concentrated on the agricultural sector. It is by far the biggest abatement sector in all countries (11.5 million CERs/yr). The financing conditions in Ethiopia are mediocre: it has the lowest real interest rate (1% p.a.) and an excellent doing business rating (10th in Africa), but the country is plagued by high corruption (2.7). However, the country has quite an active climate policy – Ethiopia is the only country that has submitted a proposal for Nationally Appropriate Mitigation Action (NAMA) under the Copenhagen Accord.
- The wood residue sector in Uganda is also promising. Uganda has low round wood exports and procures large share of its woods within the country. Hence, there is a significant volume of residues available at sawmills. Using these residues may generate up to 1.4 million CERs/yr. Additionally, Uganda offers the above-described favorable conditions.
- Efficient charcoal production in Zambia is yet another promising sector. Among all countries, Zambia offers the largest potential in the charcoal production. Moreover, Zambia pursues quite an active role in CDM project development – it is one of the few countries that have a separate CDM promotion entity.
- In all 11 countries the waste sector shows not only significant abatement potentials (based on a very detailed assessment), it also offers excellent carbon finance opportunities: most projects show a positive net present value, despite a discount rate

1 Hydopower, Geothermal Power, Biofuels, Agricultural Residues, Forest- and Wood Residues, Stoves and Charcoal.

of 15% p.a. combined with an reasonable renewable energy output (322 GWh/yr.). It might be worthwhile investigating the opportunities for a regional approach, e.g. a transnational Programme of Activities (PoA). Such a regional PoA could function as a general carbon umbrella, where national and sub-national waste initiatives (e.g. operated by NGOs) may register with specific CDM Programme Activities (CPAs).

- Cooking stoves not only have shown a large abatement potential, the sector also offers low abatement costs. Investigations have shown that for some countries the net present value would be positive (Arens et al., 2011: DRC, Malawi, Mozambique, Senegal, Tanzania and Uganda). This may not only foster the sustainable use of natural resources (fire wood) and related CERs, it may become financially self reliant in the midterm. Therefore, this sector might also be suited for exploring the possibilities of regional cooperation, as described above (transnational PoAs), regional carbon facility, etc.)

1 INTRODUCTION

Africa is one of the regions which are most severely affected by climate change. Least developed countries (LDCs) in the Sub-Saharan region are especially vulnerable to global warming. They are least able to adapt to altering climatic conditions. While the international carbon market cannot generate funding to assist climate adaptation, it does provide opportunities for the transfer of sustainable technologies and the development of renewable energy sources, and can thus provide stimulus for sustainable development in the Sub-Saharan region.

Over the past decade, the CDM has triggered successful investments in emerging economies and has contributed to emission reductions. The success of the CDM in Africa has, however, been limited: only two percent of all CDM projects have been implemented there. This is despite the strong growth in demand for carbon credits from African countries – not least through special provisions for CERs from LDCs at EU level and due to simplification of the CDM procedures as regards micro projects and countries with less than 10 registered CDM projects.

Against this backdrop, the German Environment Ministry has commissioned a research project to investigate how Africa's least developed countries can be better integrated into the global carbon market. This involves assessing the potential for CDM projects, the obstacles and barriers, and possible solution strategies that go beyond traditional capacity building efforts.

The project is being conducted by a consortium comprising the Wuppertal Institute for Climate, Environment and Energy, and GFA ENVEST, Hamburg. As a first step, the project consortium assessed the technical CDM project potentials in Sub-Saharan Africa. Focusing on eleven LDCs in the region, the study shows the technical potential for CDM projects in the renewable energy, energy efficiency, transport, waste management and other selected sectors. The assessment is supplemented by brief analyses on related subjects such as PoAs, public private partnerships, and alternative financing models (e.g. the potential role of micro financing).

However, the technical potentials only show one part of the picture. Barriers for developing CDM projects in Africa and, in particular, in the countries under consideration, need to be taken into account as well. This comprises, inter alia, the question whether the basic formal requirements for conducting CDM projects are fulfilled, i.e. the installation of the Designated National Authority (DNA) as well as modalities and procedures for approving projects. Also, general investment conditions play an important role as the CDM is a market-based mechanism and as such CDM investments tend to take place where they find favorable macro-economic conditions. These two examples may suffice to illustrate the need to balance the results of the potentials analysis by taking into account further complementing factors.

This report presents the results of this exercise. The project consortium assessed ten additional criteria grouped in five categories, ranging from the overall investment climate and the countries' climate policy up to the sustainable development of certain project types and sectors. These criteria were developed as part of the previous work package (cp. chapter 3). The assessment of the criteria and their indicators results in a much more balanced picture of respective countries capacity regarding the CDM.

2 METHODOLOGY

From a methodological perspective, the evaluation of barriers for Clean Development Mechanism (CDM) implementation is a challenging task. In order to derive empirical validated results, regression analysis techniques should be applied. This would allow for testing the hypothesis that a set of criteria (e.g. abatement potentials, financing conditions, foreign direct investments (FDIs) etc.) determines the actual distribution of CDM projects. Regression analysis would not only verify or falsify the hypothesis. It would also calculate the weight of each of the criteria. Such an analysis is data intensive, complex and time demanding and would be a research project for its own. Still the study team hopes that such a future research activity may use this report as a first approximation for its own analysis.

Instead, barriers were analyzed based on analytical reasoning, on in-depth-interviews of host countries' Designated National Authorities (DNAs) and on expert judgment. This was done in several phases: First the German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the project consortium jointly developed a set of criteria, sub-criteria and indicators. In a second step these were presented to and discussed with energy experts at an international energy meeting in Cape Town, South Africa, leading to a first revision. Finally the revised criteria and indicators were discussed with experts from BMU, GIZ, KfW and the Federal Environment Agency (UBA) in Berlin, Germany. This led to the formulation of a final set of criteria, sub-criteria and indicators (please refer to Section 3.1 for more details).

This process led to the formulation of five major criteria. Each criterion covers one of the general preconditions relevant for CDM project implementation (e.g. abatement potential). Each criterion comprises at least two sub-criteria. For example, the criterion abatement potential comprises the two sub-criteria technical abatement potentials and investment needs per CER. Overall, 12 sub-criteria were identified. Finally, each sub-criterion was evaluated based on at least one indicator. The technical abatement potential, for instance, was evaluated by the CERs that may be generated in the host country per year. In total, 21 indicators were identified (cp. Section 3.1). Various sources were used for the evaluation of the indicators. To some extent this builds on the study's previous findings (recently published by BMU, Arens et al., 2011), consultations with the host countries' DNAs, the UN Framework Convention on Climate Change's (UNFCCC) CDM Database (UNFCCC, 2011c), as well as common country risk rankings, doing business indicators, competitiveness indices etc.

If no cardinal data could be generated,,the indicators were evaluated by applying an ordinal ranking approach. Hence, the country with the best overall results was given 11 points, lowest scoring country ranked with 1 point. If no data was available, the country received the average weighting. A special case occurred regarding the criterion "national climate policy existing"; here, quite a number of countries declared that this policy was under consideration. In this case, half the score of a "yes" answer was awarded. The evaluation of the sub-criteria was conducted as follows:

- The scoring of indicators was aggregated at the level of the sub-criteria. For example, the Operational CDM Structures sub-criterion comprises 3 different indicators (DNA available, Existing CDM Projects, and Binding Timeline for LoA Approval). Let us assume that country A scores 11 points on two indicators and 8 points on one indicator: Aggregating the sum of all indicators, country A's total score on investment climate is 30.
- In a second step, the scoring of the sub-criteria was normalized. The total score was divided by the number of indicators (e.g. 3 for the sub-criteria 'Operational CDM Structures'). Following above example this results in a score for country A's of 10 points. This approach ensures that each sub-criterion has the same weight even if the number of indicators may differ among each sub-criteria.

- In case several countries have the same outcome on one indicator, the average scoring points were considered. For example, if country A and country B both have the best operational CDM structures, then their scoring is 10.5 (11 plus 10 divided by 2).

3 BARRIER ANALYSIS

The analysis of barriers for CDM implementation is structured as follows: Section 3.1 presents the criteria, sub-criteria and their indicators and discusses how these indicators were identified. Sections 3.2 to section 3.6 presents the actual evaluation of the criteria following the structure outlined in Section 3.1.

3.1 Criteria for Country Selection

The first and second work packages of this research investigated the theoretical potential for 16 major CDM sectors in the study region. The analysis shows a huge theoretical potential amounting to 128.6 million CERs/yr. The most significant sectors are agricultural residues, hydropower, forest residues and the distribution of energy efficient cooking stoves.

However, the actual CDM project development in the study region shows a rather limited success comprising 42 projects (registered and under validation), 462 MW installed capacity (electric) and a total of expected 112.2 million CERs up to 2012 (UNEP Risoe, 2011). Up to date no empirical analysis on the success factors for CDM implementation has been conducted. Still, it is obvious that the success of CDM project development is not only bound to CDM potentials. For many project scopes, CDM revenues make up for a minor share of a project's total revenues (e.g. revenues from electricity generation (please refer to Arens et al., 2011, Table 4 for detailed analysis)).

Hence, the success of CDM project development depends not only on CDM related processes (such as capacities for PDD development, DNA procedures) it also depends on the host country's overall framework for the development and finance of renewable energy projects. This comprises a wide range of potential success factors or barriers. The Wuppertal Institute and GFA in close cooperation with the BMU have developed a set of criteria which subsequently have been investigated. These criteria were developed in several steps:

- Wuppertal Institute, GFA and BMU conducted several internal discussion rounds leading to a first draft of appropriate criteria and related indicators.
- BMU presented this draft at the Open Space workshop of GIZ's Sector Energy Program in Sub-Saharan Africa (SSA) leading to a lively discussion among the energy experts working in the region. Subsequently discussion findings were documented and the criteria/indicator list was refined.
- Finally, BMU conducted a workshop in Berlin, Germany inviting in-house experts of various BMU divisions, as well as GIZ and KfW representatives. The set of criteria was discussed and a final version was produced.

This process led to the formulation of the criteria presented in Table 2 below. Please note that these criteria are structured as follows[2]:

- Five categories of criteria were defined (e.g. Kyoto infrastructure, etc.).
- Many of the these comprise further sub-criteria. E.g. the criteria abatement potential comprises the two sub-criteria technical abatement potentials and investment needs.
- Finally each sub-criterion is evaluated based on at least one indicator. E.g. the technical abatement potential is evaluated by the CERs that may be generated in the host country per year.

[2] Please note, the order of appearance does not reflect any ranking.

Table 2: Criteria for Barrier Analysis					
Crit.	Abatement Potential	Kyoto Infrastructure	General Framework	CDM Promotion Activities of other Donors	Political Relevance/Preferences
Sub-Crit.	Technical Abatement Potential (including grid emission factor (GEF))	Operational CDM Structures	Investment Climate	Existing National Capacities	Co-benefits per CDM project type
Indicators	▪ CERs/yr, per Country, per Sector	▪ DNA available ▪ Existing CDM projects in the Country	▪ Interest rates ▪ OECD Country Risk Rating ▪ Doing Business Index ▪ Perceived Corruption Index ▪ WEF Competitiveness Index	▪ CDM capacity building activities in the last 2 years	▪ Sustainable Development Points per CDM sector acc. to Olsen und Fenhann (2008)
Impact	Large/small technical potential	CDM process is/is not operational	Good/bad financing opportunities within the country	Benefits/no benefits and potential competitive advantage	Promotion of CDM projects with high scores -> large sustainable development impacts
Sub-Crit.	Investment Needs	Country is taking a pro-active role in CDM development	Technical Implementation Barriers		
Indicators	▪ CERs/USD per Sector	▪ DNA website available ▪ (No) CDM promotion entity existing	▪ Rural electrification rate		
Impact	Good/bad chance for Implementation	Country shows large/small commitment to promote CDM	Large/small barrier for many relevant CDM sectors		
Sub-Crit.		National Interest in CC Issues per Sector			
Indicators		▪ (No) NAMA proposals submitted to UNFCCC ▪ (No) National climate change strategy available			
Impact		Shows (no) national preference for specific abatement sectors			

The subsequent sections (chapter 3.2 to chapter 3.6) describe the criteria, the sub-criteria and related indicators. Each section provides a detailed description on the significance of the sub-criteria, the related evaluation of the indicator as well as an interpretation of the findings.

3.2 Abatement Potential

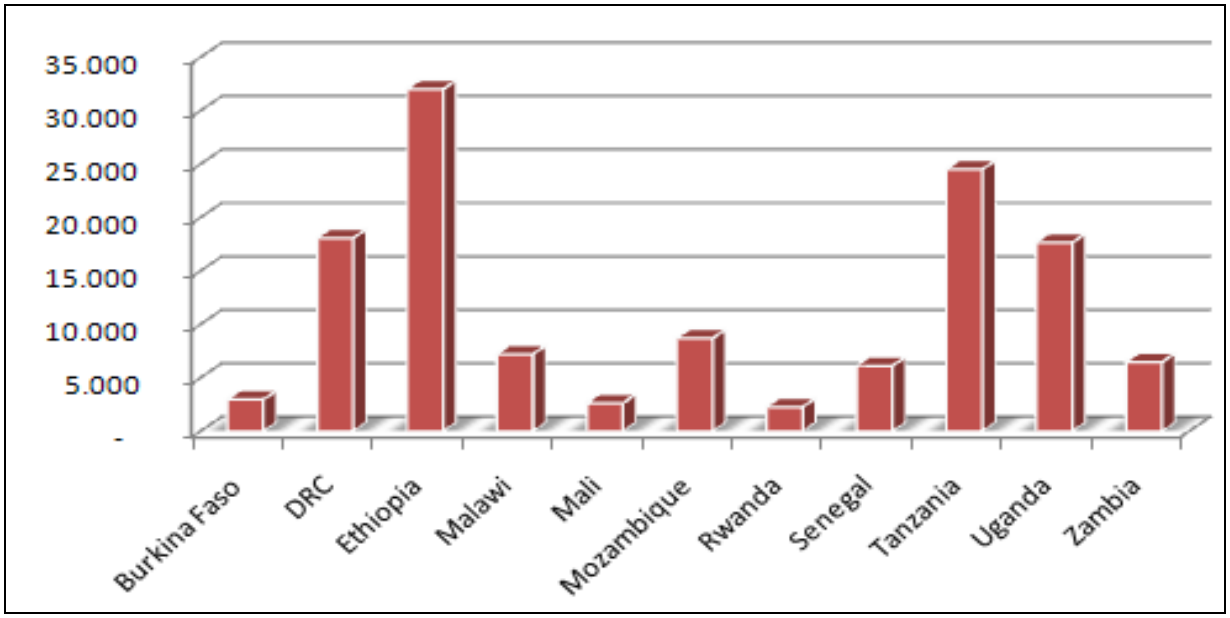
The sub-criteria in this category focus on the technical CDM potentials in the respective countries, expressed in CERs/yr per country. In a subsequent step, the resulting picture of countries with a large or small CDM potential is then complemented by a second sub-criterion which looks at the investment costs required per CER. As high investment costs are a major factor constraining CDM project development in sub-Saharan Africa, this indicator provides valuable insights into the chances for implementing CDM in the respective countries and sectors.

3.2.1 Technical Abatement Potentials

Reasoning. A country's technical abatement potential is one important sub-criterion evaluating the opportunities and barriers for CDM projects. If the country's abatement potential is substantial, there will be many investment opportunities for potential CDM projects fostering e.g. renewable electricity generation. If a county does not have any technical abatement potentials, CDM projects may not be implemented. In this regard, the technical abatement potential is a relevant indicator for the evaluation of a country's attractiveness to CDM investments.

Methodology. The methodology for the evaluation of the technical abatement potential is built on this study's first two work packages, which investigated the theoretical abatement potentials of the selected countries. The results documented in Arens et al. (2011) show a significant theoretical abatement potential amounting to a total 128.6 million CERs/yr. Figure 2 illustrates the emission reduction potential by country in kCERs.

Figure 2: CDM Potentials by Country (in kCER/yr)



A country's overall abatement potential was evaluated by quantifying the abatement potentials of 16 distinct abatement sectors for each country. The detailed findings are presented in Table 3 below. As outlined by the first study report, quite heterogeneous approaches were applied

for evaluating the distinct sector potentials. Some sectors such as agricultural residues and forest residues (being the largest abatement sectors, covering 59% of the total abatement potential) were evaluated by a general approach (starting with the amount of agricultural production, their residues, the net caloric value of their production etc.) whereas other sectors such as cooking stoves and Municipal Solid Waste (MSW) where evaluated following a detailed calculation approach (stating with the investigation of waste volumes for each individual landfill). This results in heterogeneous quality of the sectoral assessments.

Results. Among all 11 selected countries, Ethiopia offers the largest emission reduction potential amounting to 32.0 million CERs/yr. The most significant sector is the energetic use of agricultural residues with 11.6 million CERs/yr. Ethiopia is followed by Tanzania (24.5 million CERs/yr), and by the Democratic Republic of the Congo (DRC) (18.1 million CERs/yr). The average theoretical abatement potential per country was found to be 11.7 million CERs/yr.

Table 3: CERs by Sector and by Country (in kCERs/yr)

Country	Hydropower	CDM Wind Project Potential (y/n)	Geothermal	Biofuels	Agricultural Residues	Sugar Cane	Forest Residues	Wood Residues	Stoves	Distribution Losses	End Use EE	Transportation	MSW	Coal Bed	Mining	Charcoal	Sub-Total by Country
Ethiopia	8.175	N	186	396	11.457	40	8.174	722	1.533	50	130	332	142	-	127	538	32.001
Tanzania	5.471	N	857	342	9.629	100	3.433	902	2.097	20	150	176	140	15	125	1.047	24.506
DRC	1.090	N	-	139	5.720	60	6.029	868	2.561	20	240	147	635	19	20	527	18.075
Uganda	-	Y	2.725	118	4.540	60	6.019	1.403	1.546	-	10	93	72	-	51	1.020	17.657
Mozambique	88	N	-	227	4.850	-	1.486	313	679	-	140	135	53	-	38	686	8.695
Malawi	-	NA	-	77	4.915	100	460	123	720	-	30	62	34	-	20	670	7.211
Zambia	100	N	-	150	3.454	100	664	199	177	10	140	124	63	37	51	1.204	6.473
Senegal	3.035	Y	-	135	1.220	20	-	-	376	240	160	186	93	-	344	312	6.120
Burkina Faso	173	N	-	49	1.574	-	-	-	409	40	550	59	58	-	-	46	2.959
Mali	528	NA	-	25	1.474	-	-	-	278	20	70	48	60	-	-	123	2.626
Rwanda	187	NA	-	52	484	-	849	221	305	-	-	52	33	-	12	69	2.263
Subtotal	1,846		3,768	1,709	49,316	480	27,114	4,752	10,682	400	1,620	1,415	1,383	71	788	6,242	128,586

Source: Arens et al., 2011

3.2.2 Investment Needs

Reasoning. Like for any commercial investment, CDM projects will only be implemented if the project (including carbon revenues) is financially attractive. Hence, the investment costs play a significant role for the implementation of CDM projects. High investment costs often constrain CDM project implementation in SSA. This is underpinned by Arens at al. (2011), who found a negative correlation between high costs of a specific sector (i.e. USD/CER, per sector) and Africa's share in the CDM pipeline for the sector.

Methodology. The assessments of investment costs are based on three data sources: First, the average project size (in MW) and investment volume per project type of the UNEP Risoe CDM Database (UNEP Risoe 2011). Moreover, for several sectors, investment costs were taken from de Gouvello et al. (2008). Finally, for the sectors municipal solid waste (MSW) and cooking stoves own cost assessments were conducted. Please refer to Arens et al (2011) for more details.

The investment needs for realizing the theoretical abatement potential (please refer to section 3.2.1) are outlined in Table 4. The table displays the investment needs per sector and per country resulting in the sum of a country's investment needs (right column).

Table 4: Investment Needs per Sector and Country (in mio. USD)

Country	Hydropower	Geothermal	Biofuels	Agricultural Residues	Sugar Cane	Forest Residues	Wood Residues	Stoves	End Use EE	Transportation	MSW	Coal Bed	Mining	Charcoal	Sub-Total by Country
Burkina Faso	156	-	471	437	-		-	30	146	8	11			0	1,259
DRC	-	-	3,896	1,580	23	2,670	380	103	64	19	44	0	1	5	8,785
Ethiopia	-	798	1,924	3,097	18	3,490	310	195	35	44	11		6	5	9,933
Malawi	-	-	204	1,332	40	200	60	33	8	8	22		1	7	1,915
Mali	-	-	2,130	412		-	-	22	19	6	11			1	2,601
Mozambique	13,086	-	1,347	1,325		660	140	40	37	18	11		2	7	16,673
Rwanda	208	-	43	133		200	50	23	-	7	11		1	1	676
Senegal	-	-	337	37	7	-	-	24	42	25	11		15	3	502
Tanzania	7,102	171	1,522	2,621	41	860	230	86	40	23	11	1	5	11	12,724
Uganda	-	513	343	1,243	24	1,430	330	66	3	12	11		2	10	3,987
Zambia	-	-	1,273	934	40	290	10	23	37	17	11	2	2	12	2,651

Source: Calculated based on Arens et al., 2011. Please note: No country potential data for wind

In a next step, based on the above investment needs, the investment needs per certificate (i.e. in USD/CER) per country were calculated. The following methodology was applied:

- Data on abatement potentials were taken from Table 3. Total potentials over a time period of 10 years per country were calculated assuming a crediting period of 10 years.
- Data on investment needs were taken from Table 4.
- A discount factor was calculated based on the countries' prime lending rate (see Section 3.4.1). Lending rates were used to calculate interest and compound interest of future CERs. The Discount Factor (DF) of a country I was calculated following the below discount formula:

$$DF_i = \frac{\sum_{t=1}^{10} CERs_{i,t}}{1 + lending\ rate_i} 10$$

This discount factor allows for comparing the carbon revenues of e.g. year 10 with the investments needed for project implementation (in year 1). As it is based on each country's lending rates, it considers country specific financing conditions.

- Finally, the countries' abatement potential (over 10 years) was multiplied with the discount factor and divided by the country's overall investment needs. This approach finally produces each country's specific investment needs (i.e. the average costs (in USD) of one CER).

Table 5: Investment Needs per Country

Country	Abatement Potential (in kCER/yr)	Investment Need (in mio USD)	Prime Lending Rate (in % p.a.)	Discount Factor	USD/ CER
Senegal	30,851	502	8.00%	0.67	24
Uganda	176,572	3,987	20.96%	0.41	56
Ethiopia	238,262	9,933	8.00%	0.67	62
Rwanda	22,631	676	16.51%	0.47	63
Burkina Faso	29,586	1,259	11.00%	0.59	72
Malawi	72,113	1,915	25.25%	0.35	75
Zambia	63,729	2,651	20.06%	0.42	99
Tanzania	245,056	12,724	15.03%	0.50	104
Mali	20,983	2,601	10.00%	0.61	202
DRC	169,854	8,785	65.42%	0.15	341
Mozambique	86,951	16,673	15.68%	0.49	392

Source: Abatement potential and investment needs taken from Arens et al., 2011, prime lending rate taken from section 3.4.1. Remainder is own calculation.

Please note that for four countries (DRC, Ethiopia, Mali and Senegal), quantitative data on hydropower potential were only given in MWh, not in installed capacity. Hence, it was not possible to calculate the investment needs for realizing the hydropower potential of these four countries. In order to avoid a systematic bias in the calculation of the investment needs per CER, the CERs generated by hydropower were neglected in the calculation of the countries' overall investment needs/CER.

Results. Following this approach allows calculating the weighted, average investment costs[3] for generating one CER for each of the selected countries. As laid out above, the investment needs per CER range from 392 USD/CER to 24 USD/CER.

Senegal features the lowest weighted average investment needs. It combines a range of favorable conditions: First it has a low prime lending rate, leading to favorable discount factor. Moreover it offers a high grid emission factor (GEF) leading to high CER volumes per MWh fed into the grid. This is combined with abatement potentials that are based on the provision of renewable electricity to the grid (hydropower, agricultural residues) and with abatement potentials that feature low investment costs (distribution of efficient cooking stoves, MSW and mining).

The DRC on the other hand features the highest investment needs (392 USD/CER). This is to a large extent due to high prime lending rate (12.02% p.a., inflation taken into account) leading to a discount factor of 0.15. This is combined with a low GEF leading to low CER volumes per MWh fed into the grid.

The countries are ranked according to their weighted, average investment needs per CER. In Senegal, having the lowest costs per CER, the impact of carbon revenues on the project finance is largest.

3.3 Kyoto Infrastructure

The category Kyoto Infrastructure looks at the institutions and procedures needed to conduct CDM projects as well as the way the host countries are promoting the CDM. Three sub-criteria are assessed in order to find out whether the CDM process is operational and to show the countries' outreach to investors:

- As for the first sub-criterion, operational CDM structures, the indicators „DNA available" and „existing CDM projects" were chosen.
- The second sub-criterion measures the commitment to promote the CDM, in that it checks whether or not the DNA has set up a dedicated website and if the country has installed a separate CDM promotion entity.
- The third sub-criterion takes a broader perspective and examines the way the CDM is embedded in the wider context of a national climate change strategy; here, we check whether the countries have submitted NAMA proposals and whether there is a comprehensive national climate change strategy.

3.3.1 Operational CDM Structures

Reasoning. The sub-criterion Operational CDM Structures is meant to analyze whether the basic infrastructure for conducting CDM projects is in place, i.e. whether or not the CDM process is operational. This was evaluated through three indictors:

- Is there DNA Available? This indicator is a basic prerequisite for approving and conducting CDM projects under the UNFCCC. If there is no DNA in place, a proposed CDM project may not receive a LoA and may not be registered by UNFCCC even if it successfully completes the validation process.

[3] Please note, weighted average means that the calculation of investment needs reflects that some abatement sectors (and their costs) contribute more to the overall national value than others.

- Do CDM projects exist in the country that have already been registered? It might be possible that a country notifies a DNA to UNFCCC, but in practice this DNA is not operational (e.g. because the involved Ministries have not specified their internal evaluation/approval procedures). The existence of registered projects shows that the national CDM processes are operational not only on paper, but in practice.
- Are there binding timelines for LoA approval? Binding timelines are internal procedures that stipulate that the DNA will evaluate a CDM project e.g. within 30 days. They indicate that the host country is committed to fostering a sound and efficient CDM implementation process.

In contrast to the set of criteria agreed to at the BMU workshop in Berlin in November 2010, the third indicator was added to the set of criteria by the project team. This seemed justifiable as it improves the validity of the criterion as a whole.

Methodology. The performance of the indicators is checked via a simple binary scale (Yes/No). As described in the methodology section (cp. chapter 2), the results present a normalized scoring, making sure that each indicator has the same weight. The results of the performance in the respective sub-criteria are displayed below. The existence of CDM projects was evaluated through investigation of the UNFCCC CDM database (UNFCCC, 2011). All other indicators were evaluated through interviews with host country DNAs.

Table 6: Operational CDM Structures

Country	DNA available (Yes/No)	Existing CDM Projects (Yes/No)	Binding Timeline for LoA Approval (Yes/No)	Evaluation
Tanzania	Yes	Yes	Yes	10.5
Zambia	Yes	Yes	Yes	10.5
DRC	Yes	Yes	N/a	7.5
Mali	Yes	Yes	N/a	7.5
Mozambique	Yes	Yes	N/a	7.5
Rwanda	Yes	Yes	N/a	7.5
Ethiopia	Yes	Yes	No	4.0
Senegal	Yes	Yes	No	4.0
Uganda	Yes	Yes	No	4.0
Burkina Faso	Yes	No	No	1.5
Malawi	Yes	No	No	1.5

Source: UNFCCC, 2011 and in-depth interviews with host country DNAs.

Results. Table 6 shows two countries fulfilling all three criteria: Tanzania and Zambia. These two are followed by a large group of countries having both a DNA and existing CDM projects but no binding timelines for LoA approval. For DRC, Mali, Mozambique as well as Ruanda, no information was available. Burkina Faso and Malawi show the worst results, as these two countries have a DNA, but they have not approved a single CDM project so far, nor have they introduced a structured process for LoA approval.

3.3.2 Country is Taking Pro-Active Role

Reasoning. This indicator refers to the countries' level of commitment as regards promotion of the CDM. While the existence of a DNA shows that the overall framework for getting host

country approval is there, this fact remains a purely theoretical factor: how and how easily foreign investors can access information on the local CDM policy is indeed a completely different question. In order to account for this investor outreach, two indicators were chosen:

- Is a DNA website available? A website displaying the national procedures and contact persons, a project portfolio as well as further host country information is key to CDM project development which will be financed and planned to a large part from abroad.
- Does the host country have a separate CDM promotion entity? The DNAs are the relevant bodies granting government approval and deciding whether the CDM project contributes to the sustainable development of the host country. The DNAs thus guarantee quality and climate integrity of the respective project. If a DNA at the same time is tasked with promoting the CDM, this can potentially lead to conflicts of interest. This problem is best illustrated by a quote of a DNA representative who was asked whether his country had a separate promotion entity: "the DNA itself is supposed to play that role and it does when situation permits". A separate CDM promotion unit can ease this burden; moreover, an independent promotion agency will be able to better focus on campaigning rather than fulfilling multiple functions with potential conflicts of interests at the same time.

This approach can certainly not serve to get to a comprehensive, in-depth picture of the countries' investor outreach policy. Yet these two indicators provide first insights into the level of dedication the study countries have in promoting CDM project development.

Methodology. The internet addresses of the DNAs were taken from the UNFCCC's DNA database as well as gathered via internet research. As the internet is not always reliable in Africa, the addresses were checked in a six-weeks-corridor between mid February and the end of March 2011. The existence of CDM promotion entities was checked via a survey among the DNAs, complemented by online research. The information on existing promotion entities was collected in the course of interviews with the DNAs.

Table 7: Pro-active Role in CDM Project Development

Country	DNA Website (Yes/No)	CDM promotion entity (Yes/No)	Evaluation
Zambia	Yes	Yes	11.0
DRC	Yes	N/a	8.5
Mali	Yes	N/a	8.5
Mozambique	Yes	N/a	8.5
Rwanda	Yes	N/a	8.5
Burkina Faso	Yes	No	5.0
Senegal	Yes	No	5.0
Uganda	No	Yes	5.0
Ethiopia	No	No	2.0
Malawi	No	No	2.0
Tanzania	No	No	2.0

Source: Internet research and in-depth interviews with DNAs

Results. Two thirds of the countries in question have set up a dedicated CDM website which is permanently available. As for CDM promotion agencies, Uganda and Zambia are the only countries with such a facility. Zambia has a separate Climate Change Facilitation Unit within the Ministry of Tourism, Environment and Natural Resources. Its CDM officer is facilitating the

implementation of CDM projects through capacity building and promotional activities (Zambia 2011).

This leaves Zambia scoring best at this set of indicators, followed by nearly half of the countries (countries where no information was available score better than those with a "no"). Ethiopia, Malawi and Senegal are at the far end with no matches.

3.3.3 National Interest in CC Issues

Reasoning. In the following section, the broader context of the national climate and energy policies in the host countries will be considered. The idea behind this criterion is that countries in which the CDM is embedded in an active climate policy framework will most likely be more successful in attracting CDM projects. Two indicators were chosen to illustrate this:

- Submission of NAMAs under the Copenhagen Accord.
  The submission of Nationally Appropriate Mitigation Actions (NAMAs) under the Copenhagen Accord (UNFCCC 2011b) indicates a countries own commitment to reduce its national emissions. Countries showing such a commitment are considered to be more likely to implement and develop (unilateral) CDM projects.
- Existence of national climate policy framework.
  Countries which have a national climate policy framework show that a country seriously considers climate change adaptation/mitigation. The existing of such a policy is likely to have a favorable impact on CDM project in the country. E.g. if a country develops a feed in tariff system for renewable energy as part of its climate strategy, this will be a positive incentive for CDM project development.

Methodology. The submission of NAMAs under the Copenhagen Accord was evaluated based on the UNFCCC NAMA list (UNFCCC 2011). The existence of a national climate change policy was evaluated through interviews of the DNAs.

Table 8: National Interest in Climate Change

Country	NAMA submission (Yes/No)	National Climate Policy Existing (Yes/No)	Evaluation
Ethiopia	Yes	being developed	11.0
Senegal	No	Yes	9.5
Tanzania	No	Yes[1]	9.5
Burkina Faso	No	being developed	6.5
Malawi	No	being developed	6.5
Uganda	No	being developed	6.5
Zambia	No	being developed	6.5
DRC	No	N/a	2.5
Mali	No	N/a	2.5
Mozambique	No	N/a	2.5
Rwanda	No	N/a	2.5

1: RE Strategy including CDM. Source: UNFCCC, 2011b and interviews of DNAs

Results. Out of the countries considered in this report, only Ethiopia has submitted NAMAs (UNFCCC 2011b). Ethiopia's NAMA plans cover electricity generation from renewable energy

for the grid system and for off-grid use and direct use of renewable energy, bio-fuel development for road transport and for household use, railway projects with trains to run with electricity generated from renewable energy as well as forestry, agriculture and waste management projects (Ethiopia 2010).

Countries like Rwanda, Tanzania and Uganda belonging to the East African Community also note their interest to develop a comprehensive climate policy including NAMAs (focusing on Energy, Transport and Forestry) as a contribution to climate change mitigation (EAC, 2010). However, as these activities are strategic in nature and related actions are to take place at the regional level, they could not score within our scheme.

So far, the majority of the eleven study countries has not defined a comprehensive mitigation strategy yet. Ethiopia, by contrast, has set itself the goal to become carbon neutral by 2025. Yet, a detailed description on how this goal is to be achieved is still missing, despite the rather elaborated NAMA plans. According to a DNA representative, an Ethiopian climate change policy framework is currently being developed (Ethiopia, 2011). The same applies to Burkina Faso, Malawi, Uganda, and Zambia; these countries are currently in the process of finalizing and / or developing national climate policies. (Burkina Faso 2011, Malawi, 2011, Uganda, 2011, Zambia, 2011a). Tanzania, on the other hand, does not have a dedicated climate change program. However, there is a Renewable Energy strategy, which includes the CDM. This strategy has four priority areas: biofuels, municipal solid waste, solar, as well as wind energy. Therefore, this policy was awarded a “Yes” in the subsequent evaluation. For DRC, Mali, Mozambique, as well as Rwanda, no information was available. As the results on national climate policies were ambiguous, it was decided to award the answer “policy under development” half the points of a “Yes”.

Ethiopia scores best in this case, being the only country with a NAMA and a national climate change policy currently under development. The only other countries with a climate / renewable energy strategy are Senegal and Tanzania. These two therefore score second best. Burkina Faso, Malawi, Uganda and Zambia get points for the CC strategies being developed at the moment.

3.4 General Framework

This section screens some general finance and doing-business criteria as well as some technical preconditions for the development of energy projects. The sub-criterion investment climate analyses financing conditions in the respective countries through five indicators which play a major role not only for investors in CDM projects but for every investment decision in the region. The second sub-criterion assesses technical implementation barriers. Here, we look at the countries’ electrification rate, as many CDM project activities involve feeding renewable electricity into the grid.

3.4.1 Investment Climate

Reasoning. Sub-Saharan African countries are often hobbled by a weak institutional framework resulting in difficult financing conditions for investment projects. As shown above, for most of the CDM sectors investigated, investment needs are significantly higher than expected carbon revenues. This is demonstrated by the analysis of average investment needs/CER for the study countries. The countries’ average investment costs per CER (neglecting any other revenues such as electricity generation) amounts to 135 USD whereas the price per CER amounts to 16.7 USD (CER spot market price of 11.92€/CER). Consequently, CDM projects have to rely on other financing sources and the country’s financing condition are crucial for project implementation.

As such, CDM investors, like any business people, go to places where the net profitability is highest, not necessarily where the costs are the lowest (cp. Sun, 2002). They transmit low emission technologies and best practice when it is advantageous for them to do so, not necessarily when host countries would need it most. Hence host countries face the important task to create the pre-conditions (i.e. the institutional framework) for beneficial (CDM) investments to play a significant role.

Like for any Foreign Direct Investment, an enabling framework for CDM investments (Sun, 2002) requires first of all political and macroeconomic stability. Second, a sound regulatory framework and efficient supporting institutions enforcing the relevant laws and regulations are a key ingredient for attracting investments. Finally (cp. Sun, 2002) a good physical and social infrastructure complements the policy/regulatory framework including roads, communication systems and skilled labor. Hence, taking above considerations into account, the section below investigates the financing conditions for the selected study countries.

Methodology. The investment climate was evaluated by screening five commonly recognized indicators:

- Interest rates (i.e. prime lending rates)
- OECD - Country Risk Rating
- International Finance Corporation and World Bank - Doing Business Index
- Transparency International - Perceived Corruption Index
- World Economic Forum - Competitiveness Index

Each of these indicators has a specific significance, so that e.g. a country may have a good overall doing business scoring (how quickly is it possible to open, operate and close a business) even though a country may have e.g. a comparably bad Perceived Corruption Index rating. Some of these indicators are developed based on a larger sub-set of indicators. Overall the indicators were chosen so that they complement each other and draw a holistic picture of a country's financing framework. The specific indicators are discussed below.

Prime Lending Rates

Large investment projects, such as renewable energy facilities, are usually financed through a combination of equity (minor share, e.g. 30% of total investment volume) and debt capital (larger share). Hence, conditions for the acquisition of debt capital may be crucial for the implementation of a renewable energy project.

There is no unique interest rate for lending money. Banks always evaluate the risk of an investment project and add a case specific risk premium to the interest rate. Hence in order to evaluate financing conditions in the selected LDCs, we investigated the countries' prime lending rates, i.e. the average interest rate that commercial banks charge their most credit-worthy clients. As the prime lending rate incorporates the inflation, and as the inflation changes from country to country, the countries' actual interest rate was subtracted from the countries' prime lending rate. This results in a country's 'real' prime lending rate allowing to compare countries' values.

Table 9 shows the prime lending rates for the study countries as well as the respective data sources. Rates range from 7% (Ethiopia: lending rate 8.0%, inflation rate 7.0%) to 17.25% in Malawi (lending rate 25.25%, inflation 8.0%). Such a high interest rate is a very substantial barrier for financing renewable energy projects through debt capital within the country. On the other hand, Ethiopia and members of the Banque Central des États de l'Afrique de l'Ouest ((BCEAO) Burkina Faso, Mali and Senegal) show low prime lending rates which indicate low risk premiums and an independent monetary policy.

Country Risk Rating

In a next step the countries' risk ratings were evaluated. Country risk ratings evaluate the risk of investing in a country considering that a country's business environment may negatively or positively affect the generation of revenues, profits as well as the value of assets.

Typically, the ratings are conducted by major rating agencies (Fitch, Moody's and Standard and Poor's). But as it was found that these rating agencies cover only a minor share of the selected study countries, the OECD country risk ranking was evaluated. The OECD (2011) rating offers 8 risk classes (0-7) with 0 showing the lowest risk and 7 having the highest risk. The rankings are calculated based on a (non-disclosed) model which accounts for country's financial risk (payment experience, financial situation and economic situation of the country) as well as for the country's political risk.

Evaluating OECD's country risk ratings for the selected countries show that all countries involve a high risk. Five countries are listed in the worst risk class (7) and 6 countries are listed in the second worst class (6). This shows first that, according to OECD's assessment there is a high risk of non-payback of loans and, second, that the overall economic and financial situation in the countries is highly unfavorable. It is concluded that all countries offer high risks. Hence only CDM projects generating significant profits may be able to attract loan financing.

Doing Business

Doing Business is a joint project of the World Bank (WB) and the International Finance Cooperation (IFC) ranking the ease of doing business. The results are published annually (IFC, WB, 2011). For Africa, this ranking ranges from 1 (best) to 46 (worst) comprising the following eight indicators:

- Starting a Business includes obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions for the company and employees with relevant authorities.
- Dealing with Construction Permits includes submitting all relevant project-specific documents (for example, building plans and site maps) to the authorities; obtaining all necessary clearances, licenses, permits and certificates; completing all required notifications; and receiving all necessary inspections. Doing Business also records procedures for obtaining connections for electricity, water, sewerage and a fixed land line. Finally this covers necessary procedures to register the property so that it can be used as collateral or transferred to another entity.
- Registering Property records the full sequence of procedures necessary for a business (buyer) to purchase a property from another business (seller) and to transfer the property title to the buyer's name so that the buyer can use the property for expanding its business, use the property as collateral in taking new loans or, if necessary, sell the property to another business.
- Getting Credit measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the sharing of credit information through another.
- Protecting Investors measures the strength of minority shareholder protections against directors' misuse of corporate assets for personal gain.
- Trading Across Borders measures procedural requirements for exporting and importing a standardized cargo of goods by ocean transport.
- Enforcing Contracts measures the efficiency of the judicial system in resolving a commercial dispute.
- Closing Business studies the time, cost and outcome of insolvency proceedings involving domestic entities.

These indicators are aggregated to the final 'Doing Business' ranking. The results for the selected study countries are presented in Table 9. Despite being classified as Least Developed Countries, Rwanda, Zambia and Ethiopia are among SSA's best-performing countries (including middle income countries like South Africa). DRC (38th out of 46 countries) offers the most difficult doing business conditions followed by Mozambique, Senegal and Burkina Faso ranging in the middle field of SSA.

Perceived Corruption Index

On an annual basis, Transparency International evaluates the perceived corruption in almost all countries. The index ranges from 10 (no perceived corruption) to 0 (high perceived corruption). The index draws upon business opinion surveys comprising questions on bribery of public officials, kickbacks in public procurement, fraudulent conversion of public funds and questions related to the anti-corruption efforts of the public sector (Transparency International, 2010).

Table 9 presents the findings for the study countries. Rwanda is ranked best with an overall value of 4 (out of 10) followed by nine countries ranked with 3. DRC is ranked last with a value of 2 out of 10. Overall it is concluded that the perceived corruption in the selected countries is high to very high which is considered as a significant barrier for financing renewable energy projects.

Competitiveness Index

Finally, the Global Competitiveness Index (GCI) was evaluated. The GCI was developed by the World Economic Forum (WEF) in order to measure the competitiveness of the world's countries. WEF defines competitiveness (WEF, 2010) 'as the set of institutions, policies, and factors that determine the level of productivity of a country'. The GCI is based on 12 pillars of competitiveness:

- Institutions
- Infrastructure
- Macroeconomic environment
- Health and primary education
- Higher education and training
- Goods market efficiency
- Labor market efficiency
- Financial market development
- Technological readiness
- Market size
- Business sophistication
- Innovation

All of the 12 above-mentioned pillars are quantified in close cooperation between the WEF and research institutions of the covered countries. Finally the results are aggregated to the GCI. The index itself is an absolute value ranging from 0 to 7 (best). Among all countries Switzerland ranks best with a GCI of 5.63 and Chad ranks worst with a GCI of 2.73 (WEF, 2010).

Evaluating the GCI for the study countries shows that Rwanda offers the highest competitiveness with a GCI of 4.0 followed by Senegal (3.7) and Tanzania (3.6). Countries showing the lowest GCI are Mali (3.3) and Burkina Faso with a GCI of 3.2. Overall the competitiveness of the study countries ranges in the lowest 40%.

Table 9: Financing- and Doing Business Indicators					
Country	Prime Lending Rate (in % p.a.)	Country Risk Rating[3]	Doing Business[4]	Corruption Value[5]	Competitiveness Value[6]
Burkina Faso	9,60[2]	7	22	3,1	3,2
DRC	12,02[1]	7	38	2,0	N.A.
Ethiopia	1,00[1]	7	10	2,7	3,5
Malawi	17,25[1]	7	16	3,4	3,5
Mali	7,50[1]	6	24	2,7	3,3
Mozambique	2,68[1]	6	13	2,7	3,3
Rwanda	10,11[1]	7	4	4,0	4,0
Senegal	6,80[2]	6	23	2,9	3,7
Tanzania	7,83[1]	6	14	2,7	3,6
Uganda	11,56[1]	6	12	2,5	3,5
Zambia	11,56[1]	6	7	3,0	3,6
Sources: 1: CIA, 2011, 2: BEACO, 2010, 3: OECD, 2011, 4: IFC and WB, 2010, 5: Transparency International 2010, 6: WEF, 2010. Please note: All prime lending rates have been corrected by the countries' inflation, so that the prime lending rate shows the 'real' lending rate allowing.					

Results. Rwanda offers the best financing- and doing business conditions, mainly due to comparably medium lending rate of 10.11% and the best Doing Business- Corruption- and Competitiveness Index. Rwanda is followed by Senegal, Zambia, Tanzania and Ethiopia scoring nearly identically. These countries are characterized by good doing business index values and moderate corruption values. Mozambique, Uganda, Mali, Burkina Faso and Malawi are in the middle, while DRC scores worst with its high interest rate and its very bad doing business score of 38 (46 is the worst possible score.)

3.4.2 Technical Implementation

Reasoning. Considering the scope of the 16 CDM sectors discussed by Arens et al. 2011, there is a wide range of potential technical barriers that may hamper CDM project implementation. However, many of the sectors investigated are based on feeding renewable electricity in the grid. Displacing fossil fuels from the build margin and from the operational margin allows for the generation of CERs. Even though some study countries have high GEF, the lack of electricity transmission and distribution infrastructure may be a significant bottleneck for CDM implementation in the study countries. If a country has a low electrification rate, this may render many potential CDM projects unfeasible. E.g. even with excellent hydrological conditions (in remote areas), a hydro power project will need a grid to be connected to. If this grid is not there, or if the local substation does not have the capacity to transfer the electricity, the project may not be implemented.

Methodology. The existing literature and publications were screened with respect to data on total electricity consumption per capita, per year, as well as rural-, urban- and total electrification rate.

Table 10: Electrification Rates				
Country	El. Consumption (in kWh/capita/yr)	Rural Electrification Rate (in %)	Urban Electrification Rate (in %)	Total Electrification Rate (in %)
Burkina Faso	25	NA	NA	10%
DRC	95[4]	NA	NA	11%[3]
Ethiopia[1]	28	NA	NA	14%
Malawi	99	NA	NA	6%
Mali	62	5.0%	NA	17%
Mozambique	474[4]	NA	NA	9%
Rwanda	25	1.0%	35%	6%
Senegal[2]	158[4]	12,5%	74%	33%
Tanzania	82	2.0%	30%	11%
Uganda	57	5.0%	42%	11%
Zambia	602[4]	NA	NA	18%

Sources: GTZ, 2009, Renewable Energies in East Africa, (based on data from EAC, 2008 and UNCTAD, 2005), 1: UNCTAD, 2004, Investment Guide 2: GTZ, 2009b, Energy Policy Framework Conditions for Electricity Markets and Renewable Energies 3: World Energy Outlook, 2010 4: IEA 2010, Key World Energy Statistics

Results. Many SSA countries have insufficient electricity transmission and distribution capacities. Often, more remote areas are not connected to the grid. Rural electrification ranges from 1% in Rwanda to 12.5% in Senegal[4]. Even in cities many households are not connected to the grid. Urban electrification rates range from 30% in Tanzania to 74% in Senegal. Finally the total electrification rate ranges from 6% in Malawi and Rwanda to 33% in Senegal.

Given these low electrification rates it will often not be feasible to feed renewable electricity in remote areas into the grid. Yet, the existence of good hydropower sites, or agricultural-, forest- and wood residues is not necessarily linked to well-developed areas. It is concluded that the low electrification rates are a significant constraint for CDM project development in SSA.

Table 10 shows low electrification rates for all study countries, whereas – for those countries where data is available – rural electrification amounts only to a fraction of urban electrification. The weighted average [5] is presented in the total electrification rate which shows significant variation among countries.

Table 11: Electrification Rate	
Country	Total Electrification Rate (in %)
Senegal	33%
Zambia	18%
Mali	17%
Ethiopia	14%
Tanzania	11%
Uganda	11%
Burkina Faso	10%
Mozambique	9%
Malawi	6%
Rwanda	6%
DRC	NA

[4] Please note that for some countries rural electrification rates are not available.

[5] The analysis did not build on the average electrification rate (sum of rural and urban electrification rate, divided by two) but used the weighted average (considering the size of rural- and urban population).

3.5 CDM Promotion Activities

In this chapter, we look at the countries' needs for support activities. We assessed the CDM capacity building activities in the region in the last two years conducted by both German as well as other international donor organizations, be they national governments or multilateral organizations such as the World Bank, UNEP or others. The aim is to get a clear picture on whether further support is needed.

3.5.1 Existing National Capacities

Reasoning. This category addresses the question if a host county has sufficient existing capacities to facilitate/develop CDM projects or if external support activities are needed. A country which has strong CDM capacities will not encounter often cited problems such as difficulties in the identification of applicable CDM methodologies. A country which has strong CDM capacities will also be well connected among the international stakeholders and may efficiently identify the solution to a barrier for CDM project development.

Methodology. A large dataset of numerous activities in various fields was found during the research. These data will be analyzed and evaluated in detail in the subsequent work package 2.2.3 "Support Activities of Other International Donors", which will be conducted in a subsequent work step. The work package will also include a detailed 'donor activities map' of the region. The research related to the aforementioned separate work package was carried out now in order to produce data for the indicator in question in this chapter. The raw data were collected and grouped into three categories:

- Classical CDM 'capacity building'
- Support for the development of special technologies/sectors, i.e. cooking stoves
- Support activities in the financing sector, such as the African Carbon Asset Development Facility

Still it is unclear what the exact implication of many CDM capacity building activities is. Two different interpretations are possible:

- A large number of support activities implies that the country has a huge need for capacity building activities. Or,
- Numerous support activities in one country imply that capacity has already been built successfully and that there is no need for further external support.

In absence of a capacity building evaluation, the study team follows the second interpretation. That is, for the time being, we assumed that the support measures under consideration were successful. This results in a ranking placing countries with a lot of support activities at end. The rationale behind this is that BMU will not want to engage in a country where sufficient capacity has been built up already.

We assessed all support activities carried out in the study countries within the last five years. The scope includes all BMU activities as well as actions by other German institutions such as GIZ or KfW. Moreover, activities by other (European) Governments and their institutions as well as those carried by multilateral organizations such as the World Bank or UNEP were analyzed.

In the following, we present an overview of related activities in the eleven study countries. Donor activities may include more than one scope category. Thus, one capacity building program may e.g. score in "capacity building" as well as in "technology" and "finance".

Table 12: Capacity Building by Scope and Country					
County	Capacity Building	Finance	Technology	Total[6]	Evaluation
Regional Programmes	42	10	11	46	N.A.
DRC	5	2	2	*5*	*11*
Ethiopia	6	3	2	6	9,5
Malawi	6		3	*6*	*9,5*
Burkina Faso	7	2	4	7	7,5
Zambia	6		3	*7*	7,5
Senegal	9	2	5	10	6
Rwanda	12	3	4	*12*	*5*
Mali	13	5	7	13	4
Mozambique	15	4	4	*16*	*3*
Uganda	17	6	8	17	2
Tanzania	23	2	2	*23*	*1*
Total	161	39	55	168	N.A.

Results. As explained above, a high number of support activities is evaluated with less points than few activities, as we assume that the support activities were successful. Therefore, Tanzania and Uganda score best, followed by Mozambique, Mali and Zambia. Senegal has a middle position, while Rwanda, Ethiopia, Burkina Faso, DRC, and Malawi are at the end, i.e. still in need of support activities.

3.6 Political Preferences

This category assesses the importance of political preferences, which can lead to privileging certain countries and / or sectors. For example, the CDM projects' contribution to sustainable development (SD) can be one factor for preferring one project against another. We therefore re-evaluated the technical CDM potentials as shown by the very first indicator of this analysis and weighed them according to a typology measuring the SD impact of certain project types.

3.6.1 Co-Benefits per Sector

Reasoning. Apart from assisting industrialized countries in achieving their emission targets, the CDM also has the objective to promote host countries' sustainable development (SD). The contribution to sustainable development crucially depends on the project type. For example, renewable energy projects typically make a higher contribution to sustainable development than HFC projects, as they usually deliver benefits such as increased energy access, employment, and improved air quality.

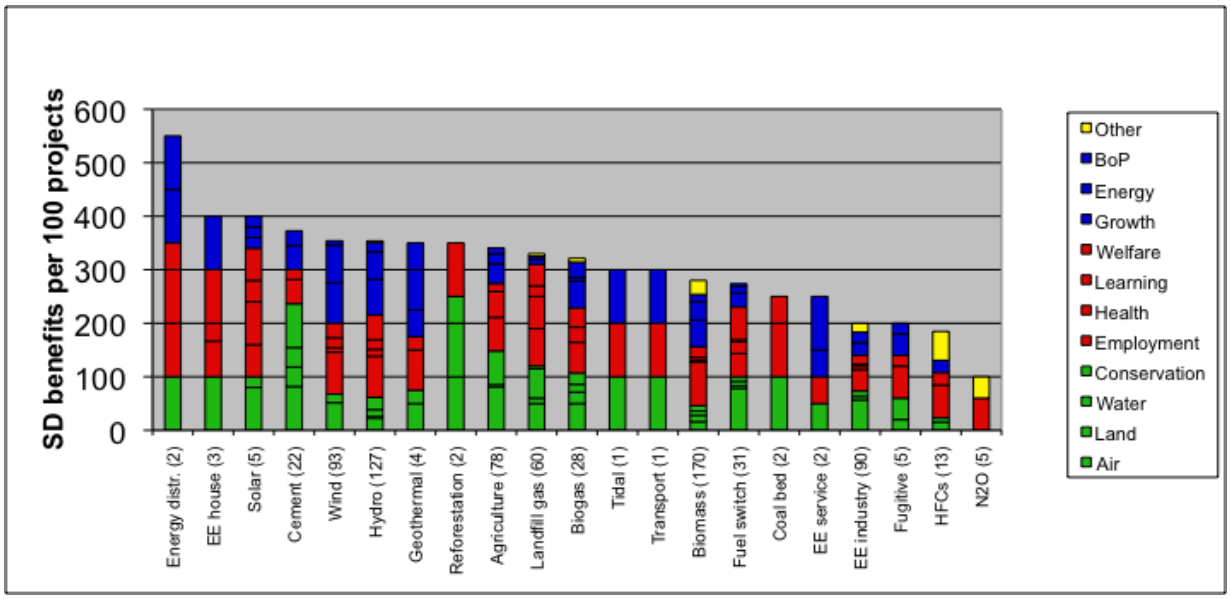
Olsen and Fenhann (2008) developed a taxonomy of sustainable development benefits of CDM projects and on this basis assess the benefits of the projects that were in the pipeline at that time per project type. In the taxonomy, sustainable development benefits are grouped according to the following dimensions: Environmental, social, economic, and other. Each

[6]Please note, the total was aggregated without double-counting.

dimension has several criteria, for example the environmental dimension has the criteria air, land, water, and conservation.

Olsen and Fenhann then analyze a set of 714 PDDs with a YES/NO scoring system. For each criterion a YES is noted if the project makes a positive contribution and a NO is noted if it does not. The results for each project are then aggregated according to project types. Figure 3shows the SD benefits per 100 projects.

Figure 3: Evaluation of CDM's Sustainable Development Impacts



Source: Ohlsen and Fenhann et al. 2008

It has to be noted that Olsen and Fenhann's study has several weaknesses. First, an analysis of PDDs only yields potential SD benefits. As SD benefits of CDM projects do not need to be monitored there is no guarantee that the benefits claimed in the PDDs are actually achieved. Second, all SD benefits are equally weighted and there is no distinction according to project sizes. Finally, for many project types only a few projects were available for the analysis, as denoted by the numbers in brackets in Figure 1. Additional projects might therefore significantly change the ranking. Nevertheless, to the knowledge of the authors this study is the best assessment of the SD benefits of different project types that is currently available.

A look at Figure 3 lead to the conclusion that the CDM potential of the eleven countries considered in this study is mainly focused on project types that promise comparatively many SD benefits. The SD potential of the various project types raises the question whether the project potential of the countries considered in this study can be differentiated according to their SD potential. In order to assess the potential SD contribution, we combine the profiles of project types according to Olsen and Fenhann with our analysis of project potential per project type.

Methodology. Olsen and Fenhann assign SD values per project. By contrast, Arens et al., assessed the volume of emission reductions, not projects. We therefore combine the SD values per project type with the country abatement potentials per project type as shown in Table 13 below. As the project categories of Olsen and Fenhann do not fully match our categories, we have made the following adjustments: our categories of stoves and charcoal are grouped under Olsen and Fenhann's category energy efficiency in housing, biofuels is grouped together with biomass, and municipal solid waste is grouped together with landfills.

Table 13: Country Potential Weighted by SD Benefits

Country	Hydropower	Wind Potential	Geothermal	Biofuels	Agricultural Residues	Sugar Cane	Forest Residues	Wood Residues	Stoves	Distribution Losses	End Use EE	Transportation	MSW	Coal Bed	Mining	Charcoal	Country Total
Burkina Faso	28	0	-	6	11	0	3	3	20	50	44	9	13	0	-	4	190
DRC	-	0	-	20	25	22	28	25	44	33	40	24	36	25	10	20	353
Ethiopia	-	0	32	31	31	17	31	22	36	55	20	33	33	-	25	24	389
Malawi	-	0	-	11	22	31	11	11	28	6	12	12	7	-	13	28	191
Mali	32	0	-	3	8	-	3	3	8	44	16	3	17	-	-	12	148
Mozambique	18	0	-	25	20	-	20	20	24	6	24	21	10	-	15	32	233
Rwanda	25	0	-	8	3	-	17	17	12	6	4	6	3	-	8	8	116
Senegal	35	39	-	17	6	14	3	3	16	61	36	30	26	-	28	16	329
Tanzania	39	4	35	28	28	25	22	28	40	39	32	27	30	23	23	40	461
Uganda	-	39	39	14	17	20	25	31	32	6	8	15	23	-	18	36	321
Zambia	21	0	-	22	14	28	14	14	4	28	28	18	20	28	20	44	302
Sector Total	198	81	105	185	185	157	176	176	264	330	264	198	218	75	158	264	

Source: Calculated based on Arens et al 2011 and based on Ohlsen et al. 2008

The results of this approach strongly depend on a country's abatement potential. Therefore, additional calculations are made to provide an overview of how sustainable projects in a country are on average. For this purpose, the share a sector has of a country's abatement potential is weighted for each country by the respective sector's SD values provided by Olsen and Fenhann. As no quantitative data is available on the potential of wind projects, these are not included in this part of the analysis.

Results. The matrix in Table 13 yields the ranking shown in the column "SD Value of Accumulated Sustainable Development Points" Table 14. The way it is calculated, it is basically a ranking of project potential, weighted by the SD values of the individual project types. Therefore, the countries with the highest abatement potential generally rank highest on this indicator as well whereas the countries with the lowest abatement potential rank lowest. The higher the number of potential projects, the higher the potential contribution to sustainable development, corrected by the SD values of the individual project types. The main difference to the ranking of abatement potential is Senegal, which moves ahead by two ranks.

Additional calculations yield the SD benefits which projects have on average in each country (right column in Table 14). These are relatively high for all countries examined. This is caused by the sectors considered in this study and the sectoral distribution of the abatement potential within the countries. The average SD benefits of projects in a country do not differ substantially between the countries considered: While most countries' average SD benefits lie between 3.02 and 3.10, the values for Tanzania (3.16), Mali (3.20), Burkina Faso (3.30) and Senegal (3.44) are only slightly higher (the average SD benefits per project type in Olsen and Fenhann (2008) range from 1 to 5.5).

Table 14: Accumulated Sustainable

Country	SD Value of Accumulated Sustainable Development Points	Average SD Benefits of Projects
Tanzania	461	3.16
Ethiopia	389	3.08
DRC	353	3.09
Senegal	329	3.44
Uganda	321	3.09
Zambia	302	3.10
Mozambique	233	3.02
Malawi	191	3.04
Burkina Faso	190	3.30
Mali	148	3.20
Rwanda	116	3.07

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Consolidation of Findings

This section consolidates the study's findings. The analysis carried out yielded two kinds of data. Therefore, we propose specific interpretation approaches for each category of data:

- The first type consists of cardinal data describing the specific sub-criteria (e.g. abatement potential described in million CERs per country per year).
- The second data set covers ordinal data (e.g. better or worse) describing mostly soft policy sub-criteria.

In the following, we present the different types of data in two separate sections. As a result, the original order of the criteria table presented at the beginning is lost. However, in the name of clarity and transparency, this approach seemed appropriate.

4.1.1 Cardinal Data

In the figure below, the analysis of the cardinal data is presented. Each country is represented by a colored line. The specific indicators are shown by the specific axes. The average of all eleven countries is represented by the orange line. This illustration allows for comparing a country's performance in one indicator with all other countries and the overall average. Figure 5 presents one criterion per diagram, see next page. The red line represents the average value of the criterion for all countries involved.

Figure 4: Comparison of Cardinal Data per Country

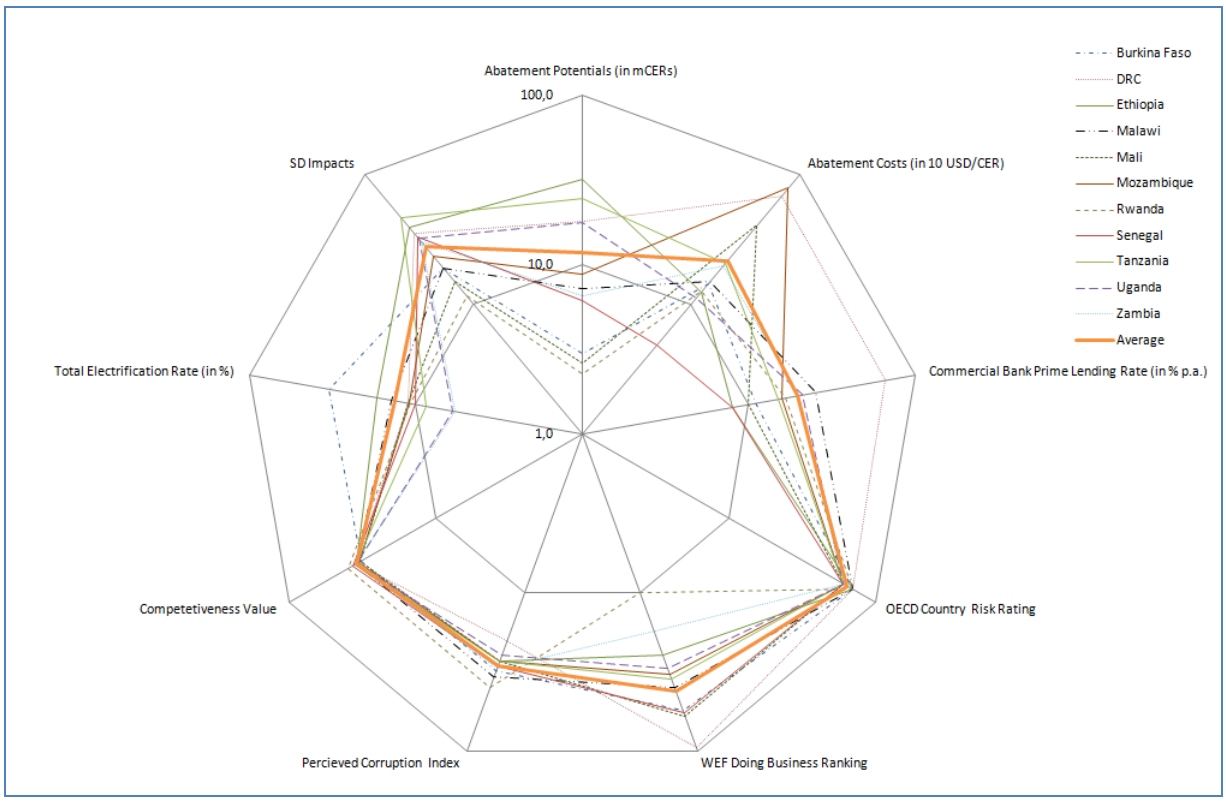
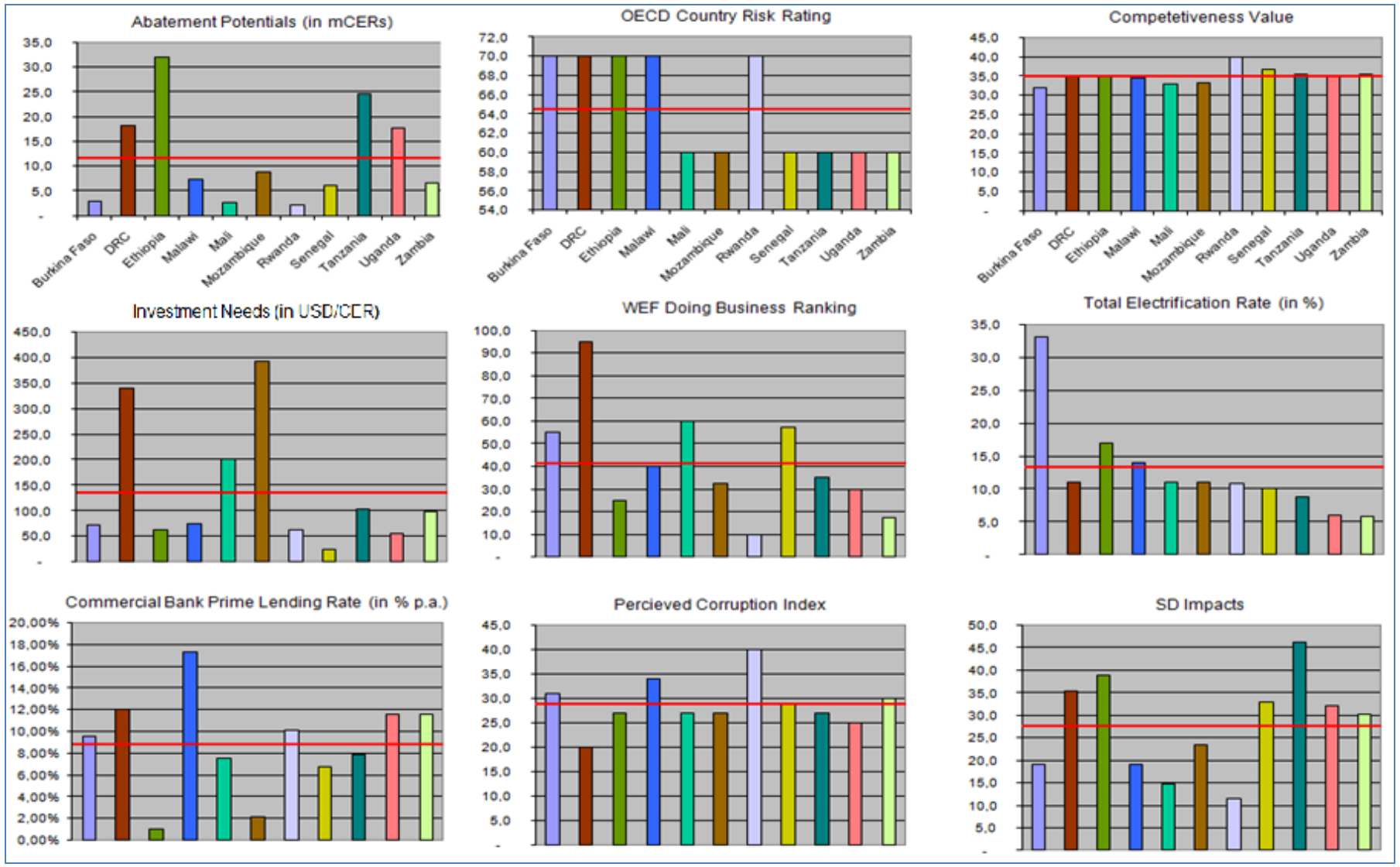


Figure 5: Consolidation of Quantitative Findings



The following sub-sections offer a possible interpretation of above findings. However, it shall be noted, that based on different weighting of the specific indicators, the countries' overall evaluation remains subjective.

Technical Abatement Potential. The study found a very high abatement potential amounting to 128.6 million CERs in the 11 study countries. The evaluation shows a wide range of findings, Ethiopia offering 32 million CERs/yr while Rwanda offers only 2.3 million CERs/yr. The countries with the highest potentials are:

- Ethiopia - 87% of Ethiopia's potential arises from agricultural residues (11.5 million CERs/yr), hydropower and forest residues (8.2 million each).
- Tanzania is second with 24.5 million CERs/yr. The vast abatement potential is distributed among several sectors. The most important sectors are agricultural residues (9.6), hydropower (5.5) and forest residues (3.4) making up for 76%. Other important sectors are stoves (2.1) and charcoal (1.0).
- DRC's potential amounts to 18.1 million CERs/yr. 79% comprise forest residues (6.0) agricultural residues (5.7) and stoves (2.6).
- Uganda's abatement potential amounts to 17.7 million CERs/yr comprising forest residues (6.0) agricultural residues (4.5) and geothermal (2.7). These sectors make up for 73% of the total abatement potential.

It is concluded that all 11 countries offer significant abatement potentials whereas the first 8 countries offer significant potentials in several sectors. Some countries such as Tanzania, Uganda and Senegal combine favorable framework conditions with a broad base of emission reduction potentials across several sectors. In other countries, such as Ethiopia, certain sectors stand out and recommend themselves; in this case, the agricultural residue sector.

Investment needs per CER are an important factor for the implementation of a CDM strategy. CDM projects will only be implemented if the project is financially attractive. Hence, the investment costs play a significant role for the implementation of CDM projects. High investment costs often constrain CDM project implementation in SSA (Arens et al., 2011). Calculating the weighted, average investment costs for generating one CER for each of the selected countries shows that abatement costs range from 392 USD/CER to 24 USD/CER.

- With only 24 USD/CER Senegal features the lowest weighted average abatement costs. It combines a range of favorable conditions: First, it has a low prime lending rate, leading to a favorable discount factor and second, it offers a high GEF, leading to high CER volumes per MWh fed into the grid. This is combined with abatement potentials that are based on the provision of renewable electricity to the grid (hydropower, agricultural residues) and with abatement potentials that feature low investment costs (distribution of efficient cooking stoves, MSW and mining).
- The DRC on the other hand features the highest abatement costs (392USD/CER). This is to a large extent due to high prime lending rate (12.02% p.a., inflation taken into account) leading to a discount factor of 0.15. This is combined with a low GEF leading to low CER volumes per MWh fed into the grid.
- Senegal, Uganda; Ethiopia, Rwanda, Burkina Faso, Malawi and Zambia have average abatement costs below 100USD/CER showing that the CDM can contribute significantly to the overall financing of renewable energy project activities.

Investment Climate. Sub-Saharan African countries are often hobbled by a weak institutional framework resulting in difficult financing conditions for investment projects. For most of the CDM sectors investigated, the investment needs are significantly higher than the expected carbon revenues. In addition, CDM revenues usually accrue ex-post and not ex ante, when

financing is most urgently required. Consequently, CDM projects often require additional revenue sources and the country's financing condition are crucial for project implementation.

- Among all countries, Rwanda offers the best financing conditions. Arguably one of the most important financing indicators, it shows an excellent WEF Doing Business rating (4th out of 56 African countries). So the procedures for creating, operating and closing business are well defined and operational. It also shows a low rending rate (16.5% p.a., 10.11% taking inflation into account), the lowest perceived corruption among all study countries and (score of 4.0 on a scale from 7 (best) to 1 (worst)), despite its small size, the best competitiveness ranking (4.0).
- Also Senegal offers good financing conditions. It offers a low lending rate (8% p.a.), an average doing business rating (23rd out of 46), average perceived corruption (2.9) and the second best competitiveness rating (3.7).
- Though Zambia shows high interest rates (11.56% p.a.), it combines a very good doing business rating (7th out of 46), average perceived corruption (3.0), and a good competitiveness rating (3.6).
- Tanzania combines an average lending rate (15.0% p.a.), good doing business rating (1th out of 46) and a good competitiveness framework (3.6).
- Among all countries, DRC is hobbled by the most disadvantageous financing framework. It is characterized by extremely high lending rates (65.4% p.a., 12.02% p.a. if adjusted for inflation). Establishing and operating business in DRC is a major challenge (38th out of 46 countries in Africa) and corruption is a major issue (2.0, lowest ranking among all study countries) combined with a low competitiveness ranking (3.5).

Technical Implementation. Even though some study countries have high GEF, the lack of electricity transmission and distribution infrastructure may be a significant bottleneck for CDM implementation in the study countries.

Many SSA countries have insufficient electricity transmission and distribution capacities. Often more remote areas are not connected to the grid. Rural electrification ranges from 1% in Rwanda to 12.5% in Senegal[7]. Even in cities many households are not connected to the grid. Urban electrification rates range from 30% in Tanzania to 74% in Senegal. Finally the total electrification rate ranges from 6% in Malawi and Rwanda to 33% in Senegal.

Given these low electrification rates it will often not be feasible to feed renewable electricity in remote areas into the grid. Yet, the existence of good hydropower sites, or agricultural-, forest- and wood residues is not necessarily linked to well-developed areas. Even if a project opportunity is located in an electrified area, it may be the case that transmission sub-stations may not allow for feeding additional electricity into the grid. It is concluded that the low electrification rates are a significant constraint for CDM project development in SSA.

[7] Please note that for some countries rural electrification rates are not available.

4.1.2 Ordinal Data

Table 14 below illustrates the non-cardinal findings. “Yes”-answers are marked in green, “no” answers accordingly are marked by a red-colored cell, with deviations in the form of “information not available n/a” and “being developed” in the case of national climate policies. The different colors of the respective table cells allow for a first impression on the countries’ scoring regarding the ordinal data.

As for the indicator CDM Capacities, the cardinal numbers (i.e. numbers of capacity building programs) is presented. These numbers appear in this table as the general message of the indicator is “capacities existing” or “deficient capacities”, i.e. yielding a binary type of data. It is purely for accuracy reasons that the exact numbers are included in the table.

Table 15: Consolidation of Ordinal Data

		Country									
		Burkina Faso	DRC	Ethiopia	Malawi	Mali	Mozambique	Rwanda	Senegal	Tanzania	Uganda	Zambia
Operational CDM Structures	DNA available (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Existing CDM Projects (Yes/No)	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Binding Timeline for LoA Approval (Yes/No)	No	N/a	No	No	N/a	N/a	N/a	No	Yes	No	Yes
(Pro-active) Role in CDM project development	DNA Website (Yes/No)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes
	CDM promotion entity (Yes/No)	No	N/a	No	No	N/a	N/a	N/a	No	No	Yes	Yes
National Interest in Climate Change Issues	NAMA submission (Yes/No)	No	No	Yes	No	No	No	No	No	No	No	No
	National Climate Policy Existing (Yes/No)	being developed	N/a	being developed	being developed	N/a	N/a	N/a	Yes	Yes *	being developed	being developed
CDM Capacities	Existing CDM Capacities	7	5	6	7	13	16	12	10	23	17	7

Results: Zambia clearly leads the field. This is mainly due to its operational CDM structures and its pro-active role regarding investor outreach: the country has a functional DNA, which also has in fact registered CDM projects, it has an informative website, and, moreover, a dedicated CDM promotion facility.

Zambia is followed by Ethiopia, DRC, as well as Rwanda and Senegal. Ethiopia stands out due to its active climate policy (“interest in cc”); it is the only country which has submitted NAMA proposals under the Copenhagen Accord.

Burkina Faso, Mali, Mozambique and Tanzania form a group in the middle: the countries score average both as concerns active investor outreach (“Pro-active role”) and active climate policy. Burkina Faso gets points due to the few capacity building measures carried out in the country so far, indicating a need for external support.

Uganda and Malawi find themselves at the end of the ranking. Uganda, an otherwise promising CDM host country, gets discounts for its mediocre CDM structures and its low-key climate policy. Malawi, finally, has installed a DNA, which has not approved a single CDM project yet, and the DNA website is offline. Moreover, there are no binding timelines for LoA Approval and a CDM promoting entity is absent as well.

This consolidated overview of the ordinal indicators completes the network diagrams presented in section 4.1.1. As explained above, we decided not to produce an overall ranking table, as the two different types of data are difficult to compare and too much subjectivity would be involved. Therefore, the two overview sections have to be seen together. The following recommendations include a synthesis of them.

4.2 Recommendations

In order to come up with an overall ranking of the countries, it would be necessary to weight the specific sub-criteria by rather subjective preferences (e.g. the development impacts are more important than the abatement potentials). Such a weighting is per se not feasible without close consultations with the BMU. Hence the following section proposes a range of countries which may be of interest for the country studies, sectors in specific countries that may be of interest for sector studies as well as some regional ideas:

- Senegal, for example, combines favorable framework conditions with a broad base of emission reduction potentials, adding up to 6.1 million CERs/yr. Furthermore, the country has the lowest overall investment costs/CER of the countries under consideration (24USD/CER). This is complemented by a good financing framework, covering an interest rate of 6.8%, an average perceived corruption, and a high competitiveness index. Moreover, Senegal shows the largest electrification rate among all study countries (33%). Last but not least, it has operational CDM structures and is one of the only countries in the region with a fully developed national climate policy.
- Tanzania also offers a broad range of sectors suitable for CDM project development[8], very substantial abatement potentials (24.5 million CERs/yr) combined with an above average financing framework. This includes an interest rate of 7.83%, a good doing business ranking, a very good competitiveness index (3.7) which is only hampered by high perceived corruption (2.7). This is complemented by highest sustainable development impacts of the existing CDM potential (461). As for the Kyoto Infrastructure, Tanzania is one of only two countries with fully operational structures including binding timelines for Letter of Approval (LoA).
- Uganda also has considerable abatement potential (about 17.7 million CERs/yr), and the second lowest investment costs per CER (56USD/CER). Uganda's interest rate is comparably high (11.56%), but the country offers good business conditions (high competiveness index, and high doing business ranking). Further, basic CDM infrastructure structure is available. Moreover, the country pursues an active investor outreach policy including a separate investment promotion entity. A national climate policy is under consideration at the moment.
- Ethiopia's overall reduction potential is very high, which is however concentrated on the agricultural sector. It is by far the biggest abatement sector in all countries (11.5 million CERs/yr). The financing conditions in Ethiopia are mediocre: it has the lowest real interest rate (1% p.a.) and an excellent doing business rating (10th in Africa), but the country is plagued by high corruption (2.7). However, the country has quite an active climate policy – Ethiopia is the only country that has submitted a proposal for Nationally Appropriate Mitigation Action (NAMA) under the Copenhagen Accord.
- The wood residue sector in Uganda is also promising. Uganda has low round wood exports and procures large share of its woods within the country. Hence, there is a significant volume of residues available at sawmills. Using these residues may generate up to 1.4 million CERs/yr. Additionally, Uganda offers the above-described favorable conditions.
- Efficient charcoal production in Zambia is yet another promising sector. Among all countries, Zambia offers the largest potential in the charcoal production. Moreover, Zambia pursues quite an active role in CDM project development – it is one of the few countries that have a separate CDM promotion entity.
- In all 11 countries the waste sector shows not only significant abatement potentials (based on a very detailed assessment), it also offers excellent carbon finance

8 Hydopower, Geothermal Power, Biofuels, Agricultural Residues, Forest- and Wood Residues, Stoves and Charcoal.

opportunities: most projects show a positive net present value, despite a discount rate of 15% p.a. combined with an reasonable renewable energy output (322 GWh/yr.). It might be worthwhile investigating the opportunities for a regional approach, e.g. a transnational Programme of Activities (PoA). Such a regional PoA could function as a general carbon umbrella, where national and sub-national stove initiatives (e.g. operated by NGOs) may register with specific CPAs, cp. the follow-up activities to the ProBec Initiative in the region.

- Cooking stoves not only have shown a large abatement potential, they also offer low abatement costs. Investigations have shown, that the Net Present Value for some national programs would be positive (Arens et al., 2011: DRC, Malawi, Mozambique, Senegal, Tanzania and Uganda). This may not only foster the sustainable use of natural resources (fire wood) and related CERs, it may become financially self reliant in the midterm. Therefore, this sector might also be suited for exploring the possibilities of regional cooperation, as described above (transnational PoA, regional carbon facility, etc.)

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The Project

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has commissioned Wuppertal Institute and GFA Envest a research project on suitable supporting activities that contribute to the enhancement of CDM in sub-Saharan African least developed countries. The main aim of the research is to assist BMU in developing its strategy for climate change mitigation activities on the African continent.

The results and findings of the research project will be published and circulated to all project developers, political decision makers, companies, financial institutions and everyone else interested in finding ways of how to best approach the CDM in Africa.

More information on the project, all publications and further resources can be found at www.jiko-bmu.de/996

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