

An Investigation into Kyoto Protocol's Clean Development Mechanism as Kenya's Green Economy Transition Mechanism

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This article focuses on the Kyoto Protocol's Clean Development Mechanism (CDM) as a transition mechanism to Kenya's green economy and the contribution of CDM projects towards sustainable development in Kenya. Accordingly, a positive checklist approach to sustainable development indicators was applied as informed by the United Nations Framework Convention on Climate Change (UNFCCC). The key findings were that the main sustainable development indicators claimed by CDM projects were local economy stimulation, job creation and poverty alleviation.

Introduction

The concept of a green economy has recently found its way to the top of the global political agenda. The United Nations Conference on Sustainable Development that took place in June 2012 (popularized as Rio+20) pointed out that the green economy concept emerged as a result of the realization that there was a need to simultaneously integrate and advance environmental and economic goals.¹ A report by the Rio+20 Preparatory Committee further noted that sustainable development has been the overarching goal of the international community since the Rio Earth Summit in 1992. Hence, both Rio summits recognized that a different approach to development was necessary if countries were to achieve sustainability by integrating economic, social and environmental aspects.² This was to be done through the realization of the inter-linkages of the three sustainable development pillars indicated herein, leading to improved economic outcomes across the world

The undeniable fact that a greenhouse gas (GHG) emission that contribute to global warming and lead to climate change compels the world to work towards a coordinated inter- national response. This has been met by the demand to urgently change the manner in which we live, by moving towards a green and low carbon development pathway.³ Climate change impacts have compelled global, regional and national policy makers to engage and embrace the green economic development framework in efforts to mitigate climate change and attain sustainable development.

According to United Nations Conference on Sustainable Development (UNCSD), a green economy in the context of sustainable development, poverty eradication, employment creation, equity and inclusiveness enhances the ability to manage natural resources sustainably. This implies having lower negative environmental impacts, increased resource efficiency and reduced waste. The undeniable link between green economy and sustainable development, as well as poverty eradication, is well captured in the Rio+20 outcomes document entitled *The future we want*. This document concludes that 'the green economy is a platform for achieving sustainable development in a manner that endeavours to drive sustained, inclusive and equitable economic growth, job creation and poverty eradication'.⁵ This is most significant in the wake of various global crises attributable to climate change.

Linked to the sustainable development agenda and the green economy is the issue of the Kyoto Protocol's Clean Development Mechanism (CDM). One of the CDM projects approval criteria are the sustainable development indicators used during the evaluation by the CDM designated national authority (DNA). In Kenya, the National Environment Management Authority (NEMA) is the DNA and has come up with the sustainable development indicators for CDM project evaluation.

The aim of this article is to evaluate the impact of the CDM on Kenya's green economy transition. The specific objective is to provide insights into sustainable development benefits as outlined in the CDM project design document (PDD) at registration level. Evidence is sought at this point to come up with deductions that reveal how the CDM contributes to Kenya's green economy transition in the context of sustainable development and poverty eradication, as stipulated by Rio+20.

This article is structured as follows. Firstly, it explains the methodological approach and choice of sample to be employed. Secondly, it focuses on the CDM and explores the linkages to trade, sustainable development and the green economy. It then presents key findings of the research and gives the conclusion.

Methodology and Sampling Frameworks

The data and information were generated from publicly available documents that included the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Programme Risoe Centre (UNEP- Risoe) and Kenya's NEMA websites. Altogether, in April 2013, there were 34 CDM projects at various levels of development in Kenya available on the UNEP Risoe CDM website. Of the 34 CDM projects, the article used a sample of fourteen registered projects which had their PDDs available for analysis. Twenty of the CDM projects were still at the validation phase while five projects had their validation terminated.

The question raised for the article is of a qualitative nature and to this end we made use of a positive checklist approach to analyse the sampled PDDs. This approach uses a list of sustainable development indicators drawn on the basis of the indicators felt to be important to ensure sustainable development in Kenya. The approach also checks the CDM project benefits as indicated in the PDD against this list. The list of indicators is presented in Table 1 and has been adopted from a UNFCCC report. The list covers the economic, environmental and social development dimensions of sustainable development, encompassing most of the criteria used by other studies. The data and information were mainly secondary, as outlined in the PDDs of the CDM projects sourced from the UNFCCC website (www.unfccc.int). The results reflect the expected contributions to sustainable development at the time the CDM project is validated.

A key point to note is that assessing the PDDs involves some subjectivity and therefore the researchers made the following assumptions:

- Since project developers do not state negative statements in the PDDs, this study only considered and assessed positive contributions to sustainable development
- Claims of reduction in GHG emissions were not treated as sustainable development since this is a prerequisite for a CDM project.
- Each claim to more than one indicator in each sustainable development criteria was considered.

Table 1: Sustainable development dimensions and indicators positive checklist

Dimension	Indicator	Description
Economic	Stimulation of the local economy including job creation and poverty alleviation	Economic improvements for the population through: direct or indirect job creation or retention of jobs during the operation and construction phases; domestic or community cost savings; poverty reduction; financial benefits of the project for the national economy of the host country; enhancement of local investment and tourism; improvement of trade balance for the country; reinvestment of clean development mechanism proceeds into the community; creation of tax revenue for the community
	Development and diffusion of technology	Development, use, improvement and/or diffusion of a new local or international technology, international technology transfer or development of an in-house innovative technology
	Improvement to infrastructure	Creation of infrastructure (e.g. roads and bridges) and improved service availability (e.g. health centres and water availability)
Environment	Reduction of pollution	Supplying more or making less use of energy; stabilizing energy for the promotion of local enterprises; diversifying the sources of electricity generation
	Promotion of reliable and renewable energy	Converting or adding to the country's energy capacity that is generated from renewable sources; reducing dependence on fossil fuels; helping to stimulate the growth of the renewable power industries
	Preservation of natural resources	Promoting comprehensive utilization of the local natural resources (i.e. utilizing discarded biomass for energy rather than leaving it to decay, utilizing water and solar resources); promoting efficiency (e.g. compact fluorescent lamps rather than incandescent lamps); recycling; creating positive by-products; improvement and/or protection of natural resources, including the security of non-renewable resources such as fossil fuels, or of renewable resources such as soil and soil fertility; biodiversity (e.g. genetic diversity, species, alteration or preservation of habitats existing within the project's impact boundaries and depletion level of renewable stocks like water, forests and fisheries); water, availability of water and water quality
Social	Improvement of health and safety	Improvements to health, safety and welfare of local people through a reduction in exposure to factors impacting on health and safety, and/or changes that improve their lifestyles, especially for the poorest and most vulnerable members of society; improved human rights
	Engagement of local population	Community or local/regional involvement in decision-making; respect and consideration of the rights of local/indigenous people; promotion of social harmony; education and awareness of local

Dimension	Indicator	Description
	Promotion of education	environmental issues; professional training of unskilled workers; reduction of urban migration Improved accessibility of educational resources (reducing time and energy spent by children in collecting firewood for cooking, having access to electricity to study at night, and supplementing other educational opportunities); donating resources for local education
	Empowerment of women, care of children and the frail	Provision of and improvements in access to education and training for young people and women; enhancement of the position of women and children in society.

Source: UNFCCC9

Theoretical Underpinnings

The concept of a green economy has surfaced prominently in recent policy discourse following the 2007/8 to 2011 economic, food, fuel and climate change related crises. To address these multiple crises, world leaders sought a holistic approach that would answer the questions about the sustainability of current economic development models. This comprehensive approach entailed the transformation of economies into green economies to enhance sustainability and eradicate poverty. The design and purpose of the CDM, as stipulated under Article 12 of the Kyoto Protocol, was to provide developing (CDM host) countries with an avenue to enhance sustainable development. According to UNFCCC, the CDM projects offer developing countries benefits that include, among others, the transfer of climate and environmentally compatible technologies, improved livelihoods, job creation, increased investments (attracting foreign direct investment) and increased economic activity.

The Clean Development Mechanism (CDM)

Being a relatively new concept, the CDM, under the dispensation of a green economy, has not received much publicized attention, especially for Kenya. The studies in place have assessed the benefits of CDM projects in general and looked at the forestry sector and the geothermal sector as a means to greening the economy in Kenya, as well as CDM governance in the country. This gap in the literature has informed the need for this study to try and bring to light the contribution of the CDM projects to sustainable development in Kenya. The study aims at offering practical guidance to policy makers and state players by assessing the realization of the benefits of CDM projects as stipulated in the project PDDs.

The CDM is supervised by the CDM Executive Board and supported by various expert working groups and the UNFCCC Secretariat. The CDM Executive Board works under the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP) to the UNFCCC (www.unfccc.org). Each CDM project undergoes the 'CDM project cycle' before the Executive Board can issue carbon credits. Licensed auditors (designated operational entities [DOEs]) then validate and verify this information to ensure the projects are additional to 'business-as-usual' scenarios. CDM host governments retain control over individual projects through domestic sectoral regulation and their designated national authority (DNA). The DNAs then issue 'letters of approval' (LoA) to certify a project's contribution to sustainable development as defined by the host country. For the projects to be registered with the UNFCCC, LoAs are required. In Kenya, the NEMA serves as the DNA.

Three common forms of CDM projects exist: carbon sinks, energy efficiency projects, and renewable energy. In as much as the CDM in developed countries has been a hive of activity, there has been strong opposition from experts in developing countries. The experts are of the view that CDM projects sell off low hanging fruit (cheap to implement) CDM projects, while the hosts are forced to invest in more expensive measures to meet their future reduction targets. According to the Institute for Security Studies (ISS), energy efficient CDM projects top the list of the most favoured, as opposed to renewable energy CDM projects from wind, solar, or geothermal energy. The latter set of CDM projects are costly and take longer to realize emission reductions.

Since its inception in 1997, the CDM has experienced rapid growth and has become an immense global market, with 6 755 registered projects as at April 2013. The associated carbon trade market was said to be worth US\$84 billion in 2012, with the African continent having received a 2,2% share of total investments in CDM projects. The continent was hosting a mere 149 projects of the total registered CDM projects, of which the majority were in South Africa. Most CDM projects go to bigger developing economies such as China and India as opposed to those in Africa (to the extent that one may be forgiven for thinking of the CDM as the 'China Development Mechanism'). There are a number of reasons for this phenomenon and these are the focus of the following few paragraphs.

China is the world's largest GHG emitter after the United State of America (USA) and the European Union (EU). Nevertheless, the country has received much of the carbon finance and has accounted for 60% of transacted Certified Emission Reductions (CER) volume. This is because countries such as China and India are able to offer buyers of carbon credits low transaction costs and major industrial opportunities as a result of economies of scale. CDM projects of this nature involve emissions-saving technologies or investment in large hydroelectricity projects that 'replace' electricity generated by fossil fuels.

Schneider and Grashof point out that CDM projects that involve the destruction of hydro- fluorocarbon-23 (HFC-23) in HCFC-22 facilities have very low abatement costs of less than 1 US\$/tCO₂e and hold a very significant share of the CDM. China and India are therefore big hydro chlorofluorocarbon (HCFC) producers and receive significant CER revenue from HFC-23 destruction and nitrous oxide (N₂O) from projects which currently make up 67% of all CERs issued to date. These CDM-type projects contribute very little or not at all to sustainable development and, as noted by CDM Watch, credits from projects like these have flooded carbon markets without delivering any development benefits. Such countries are incentivized to artificially increase the production of HFC-23 in order to maximize profits. Since most Sub-Saharan African (SSA) countries are agro-based economies, CDM projects seeking to reduce huge amounts of GHGs are limited. While CDM projects in renewable energy and other small-scale energy projects have the potential to deliver livelihood benefits to African countries, they are relatively expensive. The equipment cost is significantly high and the revenue from CERs comparatively lower as compared to other project types. Since the CDM is a market and ultimately geared to maximizing profits, this project type is therefore less likely to attract the big investors. According to Willis et al., large- scale renewable energy CDM projects have a long operation life and, due to the uncertainty of the future of the Kyoto Protocol, there has been insufficient financial incentives created by CERs from such projects.

Kenya is among the few African countries that have taken up CDM project development seriously. Interest in the CDM and clean renewable energy project development in Kenya stems from the year 2000 when Kenya energy generating company (KenGen) showed interest in obtaining benefits from CDM projects to develop energy resources. In 2005, the country ratified the Kyoto Protocol, a move that facilitated engagement with CDM project development initiatives. To this end, the Kenya National CDM Guidelines were formulated in 2001 and refined through DNA in 2007.

CDM and trade linkages

Other green economy transition benefits related to CDM projects are brought about by the dual relationship between trade and the CDM. While the CDM may influence trade in various ways, trade may also have effects on the CDM. The CDM has the potential to influence trade as engagement may result in changed trade patterns as countries strive to meet the Kyoto Protocol targets whilst addressing climate change. From the very definition of the CDM, it emerges that, ideally, it is a GHG reduction investment that not only allows for sustainable development in the host country but also allows for trade in CERs between developing and developed countries. The transactions between the host country and the developed country in the CDM resemble global trade. CERs buyers or developed countries avoid reducing emissions in their own country, which would require higher costs and rather opt to buy permits (CERs) from CDM host countries, which is a more cost-effective approach. This is a classic example of comparative advantage. With this in mind, the CDM presents developing countries with an opportunity to attract much more trade from developed countries given their CDM potential.

Furthermore, as UNCTAD points out, international trade (through CDM projects) presents a good platform for enhancing green economy transition both nationally and at the international level. A country's enhanced access to green technologies is facilitated through trade and the transfer of new environmentally sound technologies and processes can be achieved through openness to trade and investment. In order to bring the potential of global climate change mitigation to fruition through the CDM, the ability of developing countries to diffuse and maintain low-carbon technologies is important. A report by the World Trade Organization (WTO) and UNEP points out that the key factors in achieving sustainability and GHG emissions reductions are financing, technology transfer and cooperation between developing and industrialized countries, aspects covered fairly under the CDM arrangement.

Another perspective of the CDM trade relationship is the investment aspect, as CDM projects may bring FDI flows. This is because multinational companies (MNCs) perceive new CDM-related business opportunities, including CERs, as providing a competitive advantage. In addition to direct financial benefit, there is the potential of a trickledown effect in the host country in terms of technical knowledge and additional investment. These potential benefits of the CDM to the host country raise expectations and make it a widely welcomed concept among the developing countries. This has led such countries to go further and put in place CDM-related motivations for FDI flow, such as efficient institutional arrangements to promote and process CDM projects, CDM awareness and training programmes. Although these are not independent determinants of CDM-related FDI flow, they play a great role in attracting CDM investments.

Very importantly, trade may have effects on the CDM. Trade policies designed to address climate change may affect how the CDM is actualized. Examples of such policies are emission trading schemes, promotion of clean technologies and renewable energy. Additionally, host countries are free to introduce domestic CDM laws, policies and instruments that help facilitate the implementation of CDM projects. Such policies may include regulations on foreign investment in CDM projects, the types of projects that may be implemented and taxes on CERs. These may have a positive effect on the CDM if, for example, a host country has put in place definite measures to promote

clean and low-carbon technologies. Negative effects on the CDM may be as a result of complicated host country requirements on investments and sustainable development criteria. Stringent requirements by host governments for sustainable development may discourage investors and drive them to countries with less stringent CDM project regulations.

Green Economy Pathway

The importance of the green economy concept for African economies was well expressed by delegates to the Seventh African Development Forum in October 2010. They called on African governments to 'prioritize and promote green economy as a vehicle for addressing the challenges of climate change effects on ecosystem sustainability and harnessing the opportunities provided by its vast and diverse ecosystems and natural resources'. As this research tries to untangle the intricacies of the CDM and green economy in general, as well as the CDM and Kenya's green economy in particular, it emerges that the concept of sustainable development has been discussed by many researchers. Drawing from UNEP the pathway to a green economy can be analyzed through action on three fronts: capitalizing on natural capital, green industrialization and creating enabling policies and institutions. Each of these pathways will be discussed in the following sections.

Capitalizing on natural capital

Africa's natural resources (capital) are central to social and economic development. Among such natural capital assets are the renewable and non-renewable resources accounting for an estimated 24% of total non-human wealth in SSA. This demonstrates huge potential in the gains that could be achieved by expanding investments to enhance natural capital. Bearing in mind that the CDM encompasses renewable energy projects, energy efficiency projects and forestry projects, exploiting the CDM potential in biodiversity-based industries is important. This presents significant benefits to a country and presents opportunities for 'leapfrogging' towards a green and low-carbon economy. Hence, we expect new investment opportunities that result in the maintenance and rehabilitation of valuable African ecosystems.

Embarking on green industrialization

According to the World Bank the need for the use of clean energies so as to achieve greater industrial efficiency is imperative. Although the financial and technological challenges for advancing to a green economy are substantial, the presence of massive clean energy potential in Kenya offers a great opportunity for industrial development supported by clean technologies. Remaining locked up in carbon-intensive sectors may undermine future competitiveness, particularly in Africa. To this end, the solution lies in promoting green and low carbon development. In this light, the CDM is seen as a vital mechanism in moving to a low-carbon world. Maximizing on renewable energy technologies, a fragment of the CDM, enhances energy and resource efficiency and also helps reduce the carbon intensity, that is, the amount of carbon dioxide emitted for each unit of economic output.

Creating enabling policies and institutions

The role of the state in the transition to a green economy cannot be understated. Strengthening regulatory reform is a tool that governments can use to assist in the transition to a green economy. A green and low carbon economy transition demands functional institutions in all spheres of government state, provincial and local- as well as having all key stakeholders participating, including civil society. The CDM system assigns the DNA in the host country a vital role in assessing the appropriateness of a CDM project. It is the DNA's role to check the suitability of the CDM projects and whether they fulfil the sustainable development requirements of the host country. Research has revealed that DNAs have limited technical capacity to oversee the sector.

The CDM verification processes are found to be highly variable between countries and most only carry out very basic checks according to a broad sustainability matrix and few countries actually check projects in the field or carry out monitoring and evaluation exercises. As Monceau and Brohe observe, most DNAs are found wanting when it comes to promoting sustainable development benefits from CDM projects. This is further asserted by Wolfgang et al., who point out that most host countries do not have clear criteria, rather a general list of non-binding guidelines. Some researchers such as Brunt and Knechtel argue that the impact assessment of the sustainable development contribution of CDM projects adds to project costs, which host countries may not have. However, Olhoff et al. are of the view that while the sustainable development assessment does involve some costs, the benefits of well-designed projects are more. Improving capacity, efficiency and transparency of the DNA, therefore, is timely and of great consequence in terms of achieving the expected sustainable development goals. While the impetus for transforming to a green economy may be overwhelming, certain underlying factors such as financial challenges, lack of adequate technology as well as a lack of political will, hinder its achievement. As UNECN points out: 'If green investments and growth are to become effective and promoted on a wide scale, barriers to them must be identified and tackled.' Davidson et al. argue that although there are potential benefits for developing countries through the CDM, key restricting factors, both external and internal to the host country, lie in the way of realizing these benefits. Further, owing to the high costs associated with the transaction of CDM projects, as well as the complicated processes, the CDM market in Africa and other developing countries is limited. Given this scenario, more projects in the voluntary carbon market exist as these are not subjected to the guidelines and rules of the CDM. However, to date, the CDM continues to expand and is the largest offset mechanism.

How do CDM Projects Contribute to Green Economy?

As previously mentioned in this article, sustainable development is pegged on three dimensions: economic development, social development and environmental protection. These broad areas of sustainable development are operationalized by the DNA to reflect major national developmental objectives. Since the CDM is a project-based mechanism and although a specific project may only contribute marginally towards national sustainable development, positive contribution indicates overall sustainability of a development path for a given economy. Assessing the contribution of CDM projects towards sustainable development and poverty eradication should only be done on a specific project basis.

According to Sirohi, poverty remains a welfare concept that denotes the lack of (economic) resources to sustain the basic demands of life. Considering the green economy's role in the achievement of the Millennium Development Goals (MDGs), CDM projects would therefore have to provide employment (to increase income) either directly or on a multiplier effect on a continuing basis outside the CDM project boundary. This requires that the broad sustainable development dimensions should make sense at a project level in order to determine whether specific CDM projects contribute to sustainable development. On the project level, this means operationalizing the broad national sustainable development criteria by the host country by creating indicators representing project-level activities. These indicators are then used to validate CDM projects individually. To assess a specific CDM project at the time of validation, the project's sustainable development attributes in the PDD are checked against project-level indicators that resonate with the pillars of sustainable development. However, to assess the actual contribution of a CDM project to sustainable development in the host country requires ascertaining the actual contribution through surveys with project participants. This is because the expected contribution of the CDM project may differ from the actual contribution over time.

It is undeniable that if implemented optimally, the CDM concept could bring sustainable development benefits to developing countries in addition to being instrumental in achieving the goals of the Kyoto Protocol. However, a major concern and probably the single most important factor for the successful implementation and actualization of CDM projects in developing countries such as Kenya is CDM project financing. As previously mentioned in this article, the premise underlying the CDM was for Annex 1 Parties (developed countries) or private entities from developed countries to invest and finance emission reduction projects in developing countries in return for CERs from those projects. However, according to Willis et al., Annex 1 Parties normally purchase CERs from such projects on delivery, an element that evades equity to CDM projects. This implies that local project developers must find funds elsewhere. 'Only few transactions follow an investment model whereby a buyer invests either in equity or debt and gets emission reductions as part of the returns.'

In light of the challenges developing countries face, the Nairobi Framework brought together UN agencies and regional organizations to support equitable access to the CDM. These partners and others began funding technical support and capacity-building programmes for the CDM, particularly in Africa. In this endeavour, several funding options are available to African countries for the sole purpose of funding CDM projects. Kollikho notes that in Kenya, the Kenya electricity generating company (KenGen) has made tremendous efforts since 2005 in developing its projects through CDM funding and elucidates major constraints that have hampered progress with some of the funds in Kenya. Requirements by certain government funds for KenGen to incur the costs of the whole documentation processes before they could consider the projects in their portfolio translate to rigorous costs for KenGen and, thus, pursuing projects with such funds would not be viable. Kieskamp further points out that in some cases it is difficult for countries and companies to provide the much needed capital, particularly for CDM projects that involve new and unfamiliar technologies.

Nonetheless, the Kyoto Protocol rules allow for unilateral projects; that is, projects implemented by investors in the host country. This is why, according to UNFCCC, emission reduction purchase agreements (ERPAs) is the most common kind of arrangement. This is an arrangement whereby a project developer commits to implement an emission reduction project and an Annex 1 entity commits to buying the credit generated by the project at specified prices. Currently, KenGen has signed three ERPAs with the World Bank for three of its projects. According to Michira, the energy sector in Kenya has become a magnet for private investors keen on funding CDM projects, consequently profiting from the lucrative electricity generation business owing to increased demand versus strained supply. All the facts presented here have a bearing on CDM and the green economy transition in Kenya. Having deliberated at length some of the key issues the article is focusing on, in the next section we will present the findings from the researchers' empirical work.

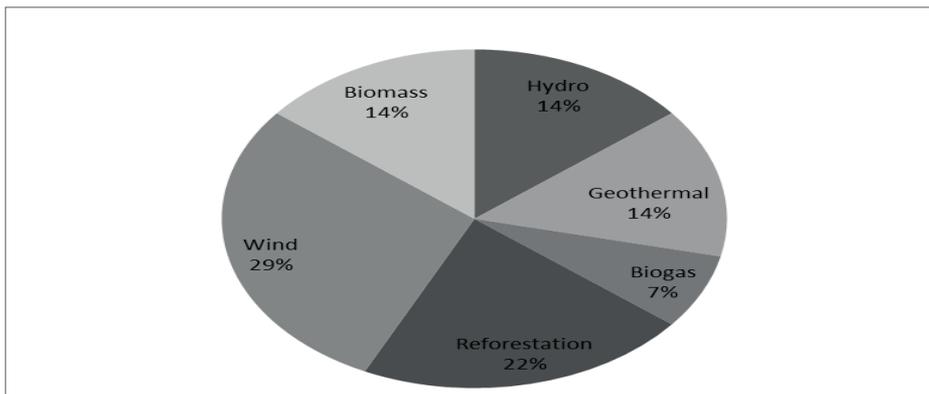
Key Findings

The analysis of the question raised under the methodology section deserves a keen assessment of the PDDs available publicly from the UNFCCC website. The PDDs used in this study represent statements made on registration of the CDM projects and are therefore the expectations of the CDM projects at the time the project is being validated. Table 1, previously discussed under the methodology section of this article, presents detailed indicators per each sustainable development criteria. These indicators were used for the analysis of issues in this article. Three indicators per criteria were used to assess each of the projects. This was found to be sufficient since one indicator could adequately cover various benefits claimed in the PDDs. For example, the stimulation of the local economy, including job creation and poverty alleviation, could cover two or more statements made in the PDDs.

CDM projects in Kenya by CDM project category

The Kenyan scenario captures the diversity of CDM project types, which include biogas, reforestation, biomass, wind, geothermal and hydro projects, as detailed in Figure 1. Wind projects take the largest share (29%) of CDM projects followed by reforestation projects at 22%. In contrast, Alexeew et al., from an assessment of CDM projects in India, found that majority of CDM projects were biomass followed by wind projects. The large share of wind projects in Kenya could be because wind energy is easily converted to electricity and, thus, the development of wind projects in the country would reduce the country's overreliance on its hydro resources, which are greatly affected by variance in weather. According to Castro and Michaelowa, in comparison with other project types, reforestation projects do not require high levels of funding and thus have a relatively shorter planning stage and implementation. In addition, they are all small-scale projects and benefit from the simplified procedures for small-scale projects. This explains why they take a relatively large share of CDM projects in Kenya

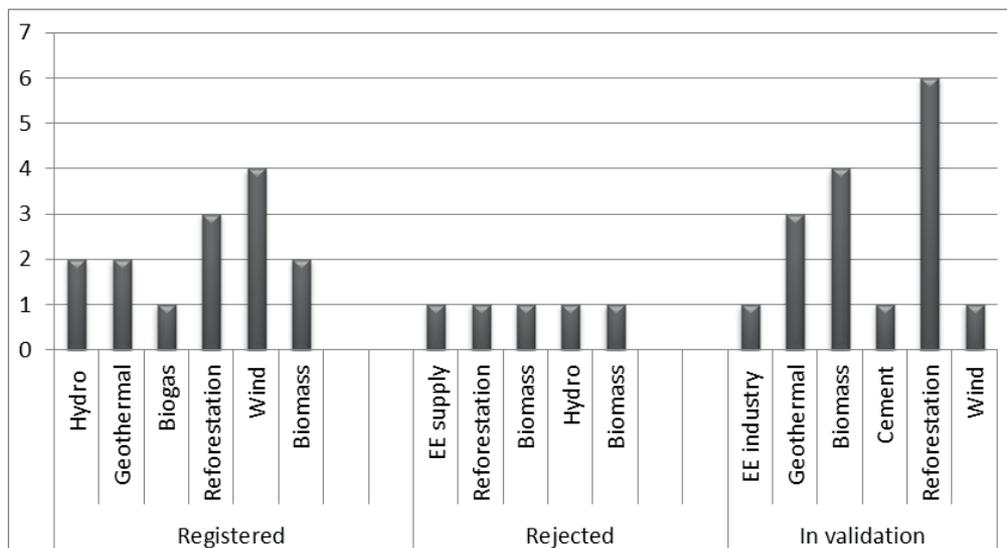
Figure 1: Number of CDM projects in Kenya per category (n = 14)



Source: Authors, based on UNEP Risoe CDM/II Pipeline Analysis and Database, 1 April 2013.

If one looks at Figure 1 in the aggregate, renewable energy projects including geothermal, biomass, hydro and wind projects make up most (71%) of the total projects in Kenya. Much has been documented about the 'unattractiveness' of renewable energy projects to investors as compared to other project types. Willis et al. observe that investors shy away from renewable projects since the equipment cost and overall transaction cost is significantly higher per emission reduction. Overall, the revenue from CERs is smaller for renewable energy projects than other types of potential CDM projects. This is evidenced by the UNEP Risoe pipeline (as of 2012) where more than half 69% of the CDM projects are renewable and they take only 34% of the total CERs. The majority of CERs are from a relatively small number of industrial chemical projects such as HFC23 and N₂O and this supply affects CER prices. Given the aforementioned, it is possible that renewable energy projects may face several difficulties in attracting project finance and the ISS concludes that due to these facts, energy efficiency projects are generally more in number than renewable energy projects in Africa

Figure 2: CDM projects according to stage of registration in Kenya

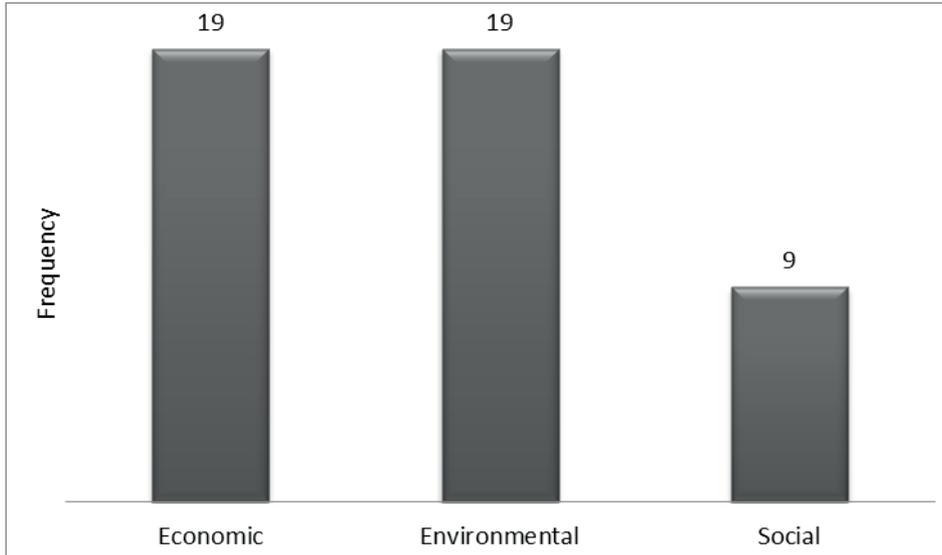


Source: Authors, based on UNEP Risoe CDM/II Pipeline Analysis and Database, 1 April 2013.

The findings of this research, however, contrast with the above conclusion. The majority (71%) of the registered CDM projects in Kenya, as of April 2013, are renewable energy projects. A plausible explanation for this is that owing to the rising electricity demand that has raced ahead of supply, electricity supply in Kenya is majorly unreliable, with power outages ever so often and therefore the need for alternative sources of power. The trend presented above that the majority of CDM projects in Kenya are renewable projects is further reflected in Figure 2 where consideration of both the ejected CDM projects and those in the validation phase reveals that renewable CDM projects are still higher in number.

Rejected CDM projects do not seem to follow any particular trend and, furthermore, rejection does not appear to be related to project type. In contrast, Castro and Michaelowa found that rejections are related to project category and type as most rejected projects are energy efficiency projects. In addition, they conclude that project size does not have an effect on the success or rejection of a project. Since this study could not ascertain the sizes of the rejected projects, comparison to previous studies could not be done. From the views of project participants though, some of the reasons for project rejection include withdrawal by the project participants and failure to meet the eligibility criteria put forward by the UNFCCC. Of those projects still in validation, reforestation projects are the highest. This could either be because of the simplified procedures for small-scale projects or because, as earlier mentioned, such reforestation projects do not require high-level funding as compared to other project types. Certain sectors are absent from the Kenyan CDM pipeline and these include those involving industrial gases, mining, transport and municipal waste management.

Figure 3: Sustainable development claims by criteria



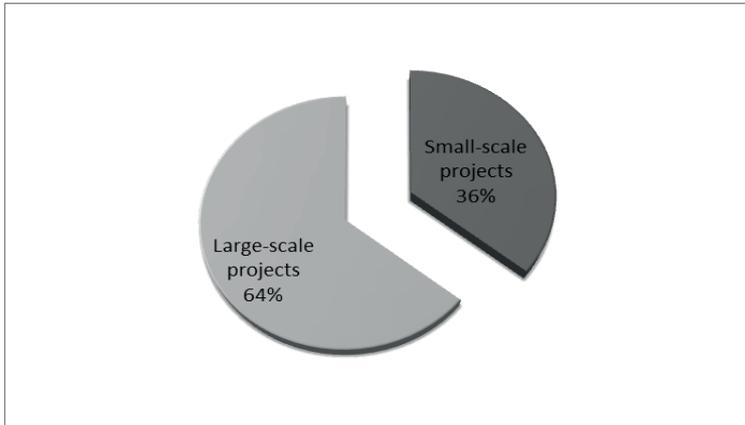
Source: Authors, based on PDDs registered in Kenya as of April 2013.

Sustainable development claims by criteria

Checking against the list of indicators in Table 1, the sustainable development claims of the 14 registered CDM projects in Kenya are shown in Figure 3. Generally, all of the sampled fourteen projects make claims to economic and environmental contribution while only a few projects make claims to any social contribution.

Claims of economic and environmental benefits, at 40,4%, far exceed those of social benefits at 19,1%. In comparison, UNFCCC, on an analysis of PDDs of 3 864 CDM projects registered and undergoing registration as of June 2012, found that claims of environmental benefits exceeded those of economic benefits, albeit by a small margin, and far exceed social benefits claims. TERI, from an analysis of 202 PDDs, found that economic benefits were mentioned by most of the projects, social benefits came in next and lastly environmental benefits. By contrast, however, Olsen and Fenhann found that social benefits were claimed more than economic and environmental benefits. Further analysis of the projects in Kenya reveals that claims to economic and environment contributions are the most prevalent, since most CDM projects list contribution to more than one indicator in the economic and environmental criteria.

Figure 4: Nature of CDM projects in Kenya (n = 14)



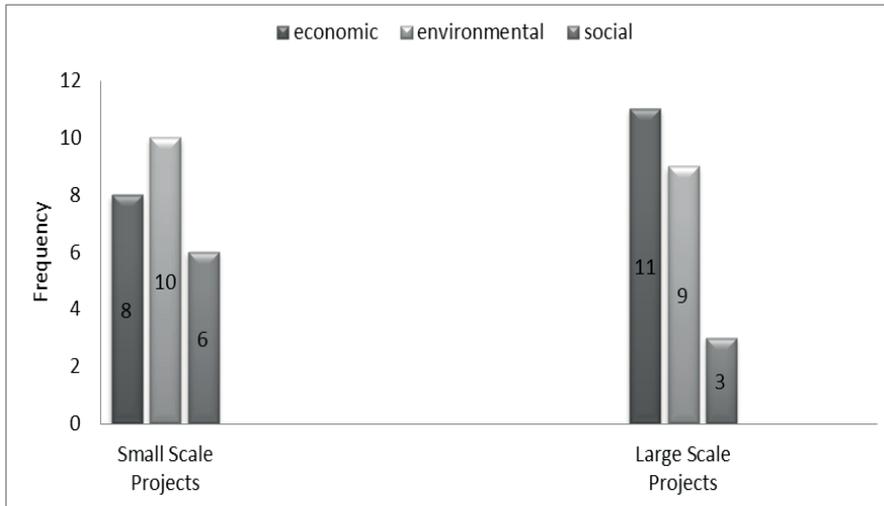
Source: Authors, based on PDDs registered in Kenya as of April 2013.

Nature of CDM projects

The nature of CDM projects here refers to whether they are small scale or large scale. This is of great importance since small-scale projects benefit from the simplified modalities and procedures for small-scale CDM project activities. A look at the composition would therefore inform the research on whether the simplified modalities and procedures act as an incentive for the growth in number of small CDM projects in Kenya. Figure 4 represents the results. Large-scale projects comprise a larger percentage (64%) of total projects as compared to 36% for small-scale projects in Kenya. The simplified modalities and procedures for small-scale CDM project activities can therefore be concluded to influence in some way the number of small-scale projects in Kenya albeit not by a large number. The project size and project type are linked to some extent as evidenced from the UNEP-Risoe database; the small-scale projects consist of reforestation, biomass and biogas projects, while the large-scale projects include hydro, wind and geothermal. It can be concluded that project scale does to some extent serve as an indicator for project type. A major factor that determines the scale of a CDM project is the transaction costs. As previously mentioned in this study, the transaction costs of large-scale projects, unlike small-scale projects, are just a small fraction of the total project cost and thus these types of project are more economically attractive for foreign investors when accruing CERs will lead to a profit. This could help explain the scenario in Kenya where large-scale CDM projects take a larger share than small scale projects. A further analysis of the sustainable development claims in the PDDs according to project size (Figure 5) was conducted. While social benefits are claimed the least by both project size categories in Figure 5, small-scale projects claimed more social benefits than large-scale projects. This seems to be in agreement with researchers such as Yap and Subbarao, who claim that small-scale CDM projects are most likely to contribute to sustainable development and especially social benefits for the poor. Large-scale projects seem to focus mainly on economic benefits as they are found to make more economic claims than small-scale projects.

Small-scale projects, on the other hand, claim more environmental benefits. In comparison, Olsen and Fenhann found that small-scale projects tend to deliver more economic and social benefits while large-scale projects deliver more 'other benefits' and environmental benefits. In the aggregate, small-scale projects claim the most sustainable development benefits and this is in agreement with the general observation from literature.

Figure 5: Sustainability claims according to project size (n = 14)



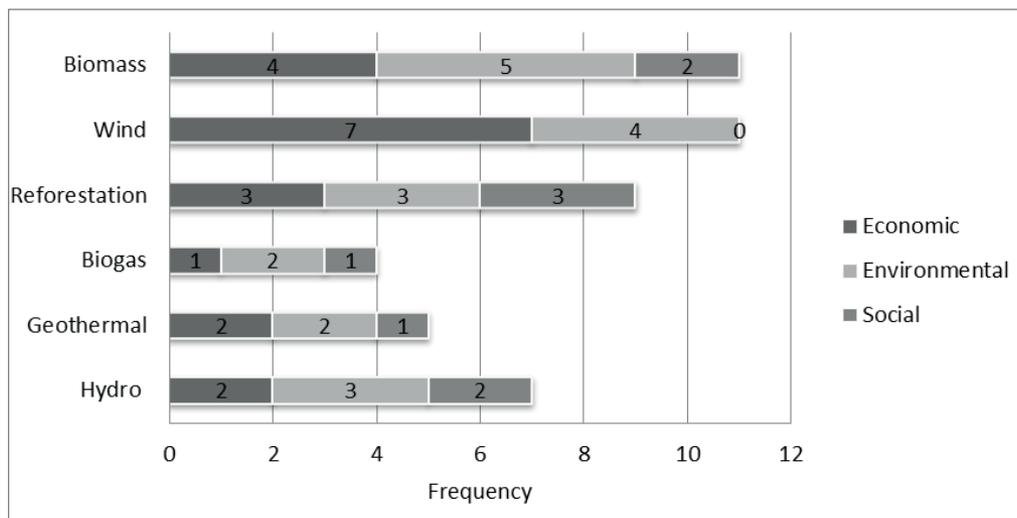
Source: Authors, based on PDDs registered in Kenya as of April 2013.

Sustainable development claims by project type

Biomass and wind projects make the most claims to sustainable development indicators. While wind projects make the most number of claims, they make no claim to social criterion benefits. All the other CDM project types make claim to all the three sustainable development criteria benefits (Figure 6). Renewable energy projects, which include biomass, wind, hydro, biogas and geothermal, is the category with the most sustainable development benefits. In comparison, Olsen and Fenhann found that wind and hydro projects make most claims to sustainable development contribution. Similarly, Alexeew et al. found that biomass, hydro and wind projects make on average higher contributions to sustainable development and make claim to all sustainable development dimensions. In contrast, Olsen and Fenhann found that CH₄ reduction, and especially cement projects, was the category with high sustainable development benefits and not renewable energy projects.

Wind projects claim the most economic benefits. This confirms the observation in the literature that large-scale projects such as wind projects are usually located in the best sites to take advantage of available resources and thus are more economically advantageous. Biomass projects claim the most environmental benefits. However, under the social criterion reforestation projects claim the most benefits and this observation further speaks to the earlier mentioned conclusion that small-scale projects claim more social criterion benefits.

Figure 6: Sustainable development claims by project type (n=14)



Source: Authors, based on PDDs registered in Kenya as of April 2013

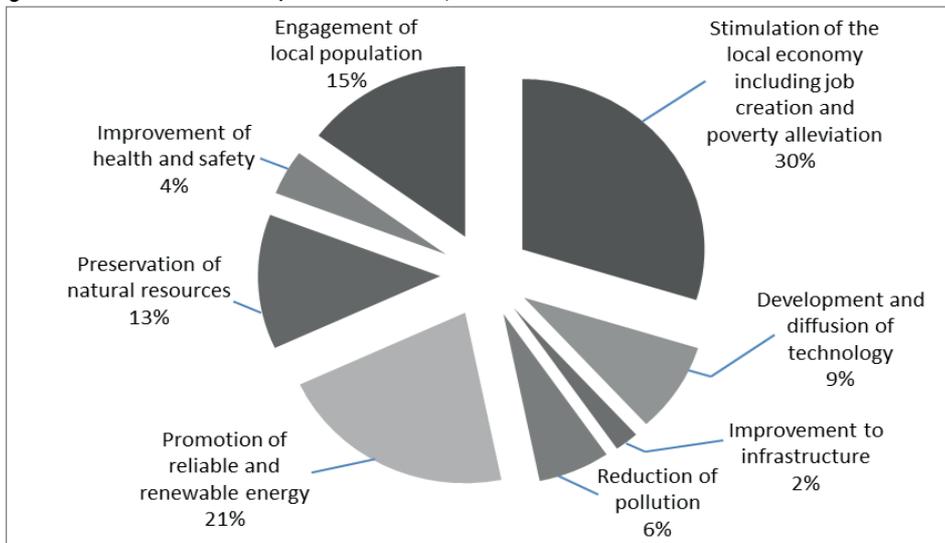
Sustainable development claims by indicator

In their PDDs, all CDM projects cited local economy stimulation, job creation and poverty alleviation as an indicator and this covered 30% of the indicators mentioned. The high percentage may point towards the relative emphasis on the different aspects of sustainable development that project developers make (Figure 7). Promotion of reliable and renewable energy (21%) came in next as the second most cited claim. This observation cements the conclusion by UNFCCC that similar projects tend to claim similar sustainable development contributions. This is keeping in mind that most of the CDM projects in Kenya are renewable energy projects.

Engagement of the local population was third at 15%. In comparison, the UNFCCC found that stimulation of the local economy, including job creation and poverty alleviation (29%), was the most claimed benefit, reduction of pollution (22%) was next and promotion of renewable energy (19%) was third. Although the indicators used by different researchers differ, Olsen and Fenhann found that the most claimed benefit is employment generation followed by economic growth contribution and, lastly, improved air quality. The TERI found that improved local quality of life and employment generation were the indicators that were most mentioned.

Reduction of pollution was among the least cited claims, with only 6% of the projects claiming this benefit. Moreover, only 9% of the projects claimed development and diffusion of technology. Olsen and Fenhann (2008) and the TERI note that technology transfer is not a mandatory requirement for CDM projects and this may explain why only very few projects cite it as a benefit. In comparison, infrastructure creation was claimed by 59.4% of the 202 CDM project sample used by the TERI. However, in the aggregate, indicators under the environment and economic criteria were cited equally and this was because most CDM projects cited more than one indicator. Social indicators were the least cited.

Figure 7: Sustainable development claims by Indicator (n=14)



Source: Authors, based on PDDs registered in Kenya as of April 2013

Sustainable development claims by project category

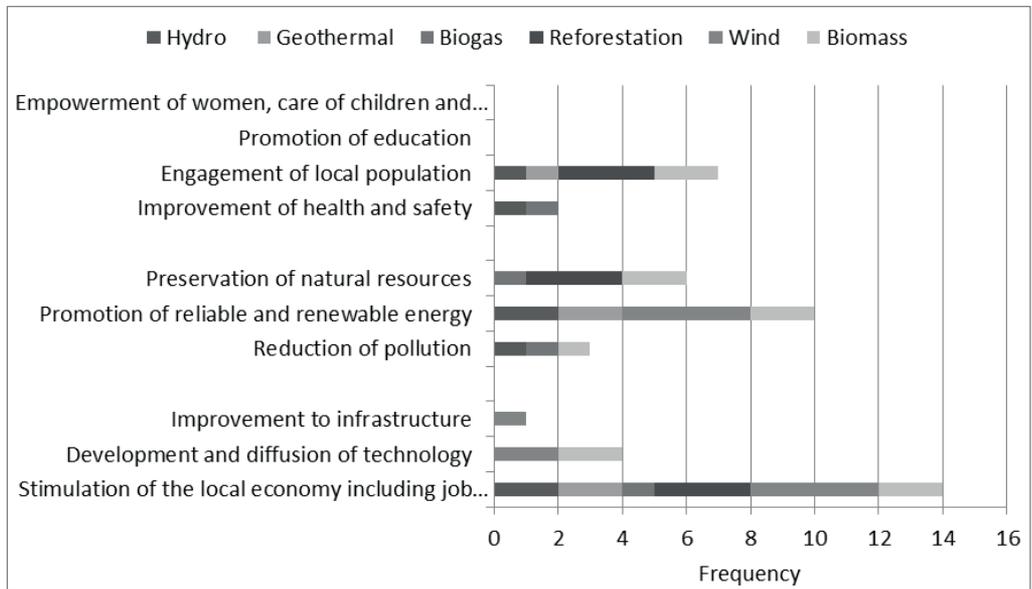
Figure 8 shows the sustainable development indicators mentioned by different CDM project types. The most outstanding benefit claimed by all types of project, as previously mentioned in this article, is stimulation of the local economy through job creation and poverty alleviation. Although the percentages differ, the UNFCCC, and Olsen and Fenhann found similar results. This trend reveals that project developers place more emphasis on economic contribution of the projects than other criteria. This indicator is mentioned most by wind projects and, in comparison, the UNFCCC found that HFC projects make most claims to this indicator followed by wind projects.

Under the environmental criterion, the most claimed indicator is promotion of reliable and renewable energy. All project types except biogas and reforestation projects make claim to this indicator and this feeds into the theory that the need for alternative sources of energy in Kenya drives the need for renewable energy projects. Wind projects, on the other hand, claim improvement to infrastructure and technology transfer, indicators that are not claimed by other project types except biomass, which claims technology transfer. In comparison, the UNFCCC found that technology transfer was claimed by all project types, with higher percentages being claimed by geothermal and relatively high percentages by biomass and wind projects. Hydro and reforestation projects claimed lower percentages of technology transfer, while biogas and hydro projects are the only ones that claim both improvement of health and safety and reduction of pollution indicators.

The most claimed social indicator is engagement of the local population. Reforestation projects mention the formation of constituency community associations which are granted exclusive forest-user rights to all non-wood forest products and also offer income generation through tree seedlings. In comparison, the UNFCCC found that health and safety was claimed the most followed by engagement of local population. None of the project types make claims to empowerment of children and promotion of education. This is partly due to the gender specificity of the indicators towards women and children.

All projects claim all the indicators in each sustainable development criterion, except wind projects which do not cite any social benefits.

Figure 8: Sustainable development claims by indicator per project type (n = 14)



Source: Authors, based on PDDs registered in Kenya as of April 2013.

In contrast, Alexeew et al. found that wind projects contribute to a significant extent to all dimensions including social benefits. Of all the 14 CDM projects analysed, wind projects take the largest share (29%) and reforestation projects come second at 22%. Probable explanations for this could be that, firstly, wind energy is easily converted to electricity and the development of wind projects in the country would reduce the country's overreliance on its hydro resources, which are greatly affected by variance in weather. Secondly, all the reforestation projects are small scale and therefore benefit from the simplified procedures for small-scale projects.

The most claimed indicator by all the CDM projects is local economy stimulation, job creation and poverty alleviation and this represents 30% of the indicators mentioned. The high percentage may point towards the relative emphasis on the economic prong of sustainable development that CDM project developers make. Promotion of reliable and renewable energy (21%) came in next as the second most cited claim. This observation cements the conclusion by the UNFCCC that similar projects tend to claim similar sustainable development contributions. This is keeping in mind that most of the CDM projects in Kenya are renewable energy projects.

Under the environmental criterion, the most claimed indicator is promotion of reliable and renewable energy. All project types except biogas and reforestation projects make claim to this indicator and this feeds into the theory that the need for alternative sources of energy in Kenya drives the need for CDM projects that provide renewable energy.

Conclusion

As indicated in the introduction, the focus of the article was to evaluate the impact of the CDM on Kenya's green economy transition. In general, renewable energy projects including geothermal, biomass, hydro and wind projects make up most (71%) of the total projects in Kenya. This conclusion contradicts observations by previous researchers that renewable projects are less attractive to investors since the equipment costs and overall transaction costs are significantly higher per emission reduction. A plausible explanation for renewable CDM projects in Kenya being in the majority is that electricity supply in Kenya is majorly unreliable, thus creating the need for alternative sources of power. Of the CDM projects in Kenya, large-scale projects comprise 64%, while small-scale projects comprise only 36%. Two conclusions for this observation are made. Firstly, the transaction costs of large-scale projects, unlike small-scale projects, comprise just a small fraction of the total project cost and, thus, large-scale projects are more economically attractive for foreign investors where accruing CERs will lead to a profit. Secondly, the simplified procedures for small-scale projects play a big role in encouraging the development of small-scale CDM projects in Kenya. When the project size and project type are considered, the small-scale projects consist of reforestation, biomass and biogas projects, while the large-scale projects include hydro, wind and geothermal.

This study concludes that project scale does to a large extent serve as an indicator for project type in Kenya. Small-scale projects made a slightly higher number of sustainable development claims and especially social claims as compared to large-scale projects. Of all the projects, renewable energy projects made claim to the most sustainable development indicators. The most claimed indicator was local economy stimulation, job creation and poverty alleviation (30%) followed by promotion of reliable and renewable energy (21%) with engagement of the local population in third place at 15%. This study concludes that CDM project developers, particularly of large-scale projects, pay more attention to the economic dimension of sustainable development compared to the other two sustainable development dimensions. In addition, similar projects make claim to similar sustainable development contributions and, therefore, the fact that renewable energy projects are the largest project type explains why promotion of reliable and renewable energy is the second most cited claim. Reduction of pollution was among the least cited claim with only six per cent of the projects making this claim and only nine per cent of the projects claiming development and diffusion of technology.

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