

A REVIEW OF CONTESTED PERSPECTIVES ON CLIMATE CHANGE FINANCE

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Executive Summary

There is an overwhelming consensus that climate change is a reality that requires urgent attention through mitigation and adaptation strategies. A slow rise in aggregate funding and investment towards projects which incorporate adaptation with respect to the consequences of climate change or mitigation of the known causes of climate change has occurred globally. This illustrates the increased intention of the public and private sectors to find appropriate interventions which work towards the lowering of carbon emissions or finding ways for the public to adapt their current behaviour to the eminent changes of climate. In this report, we present a critical review of literature on climate change financing. The review engages the meaning, sources and monitoring of the flow of climate finance. We also present discourses on issues related to the evaluation of the social impacts of climate finance on intended beneficiaries. These debates are contextualised in eThekweni Municipality's approach to climate change adaption and mitigation. We note that there are many concerns regarding climate change finance that require further attention. These issues range from whether or not climate finance should form part of official development assistance (ODA), how funds should be distributed and who should climate change initiatives benefit. These issues could hamper the implementation of many useful strategies and much needed finance could end up funding projects that are not for public benefit. Furthermore, there is a conspicuous absence of appropriate and standard criteria for projects to meet in order to qualify as a climate change initiative. The lack of explicit requirements for projects to provide co-benefits to communities remains an unsettling problem and allows for substantial room for funding of unsuitable and in some cases, non-existent climate change projects. Much work still needs to be done to setup the identification criteria and measurement frameworks to help with issues of transparency, accountability and tracking of climate finance. This is especially needed in developing countries in order to curtail the misuse of climate funds in all tiers of government. There is also an urgent need to create a system that will govern, prescribe and monitor the use of climate funds for the betterment of the eco-systems, non – human species and humans.

Introduction

As the world becomes increasingly concerned about climate change and associated impacts on human and environmental health, climate change mitigation and adaptation strategies have become a priority for various stakeholders. To the detriment of the global South, much of the cost and consequences of unfolding climate change are expected to differentially affect populations, eco-systems, built environments and nature in the South. Meanwhile, current approaches to climate change mitigation and adaptation are premised on considerable financial investment which is mostly expected to flow from the global North to developing countries based in the global South. In this report, we present a critical review of literature on climate change financing. The review engages the meaning, sources and monitoring of the flow of climate finance. We also present discourses on issues related to the evaluation of the social impacts of climate finance on intended projects and ultimately its beneficiaries. These debates are contextualised in eThekweni Municipality's approach to climate change adaptation and mitigation.

1. Problematising Climate Change Finance

The United Nations Framework Convention on Climate Change (UNFCCC) of 1994 was the first formal agreement that acknowledged that climate change is a concern for humankind. To address challenges associated with climate change, the UNFCCC notes that it is quintessential for all parties to work collectively to gather and share information, policies and strategies on greenhouse gas emissions (GHG) in order to simultaneously mitigate and adapt to changing climatic conditions (Lattanzio, 2014). Realising the objectives of climate change mitigation and adaptation is premised on urgent financial commitment. However, the meaning of climate finance is fraught with conceptual ambiguity (Westphal *et al.*, 2015; Bracking, 2015b). This is evident in multiple definitions of climate finance that abound in the literature. The conceptual ambiguity presents a number of challenges and numerous questions in relation to transparency, accuracy and how climate finance is allocated, measured and verified (UNFCCC, 2014a).

In their working paper on climate finance, Westphal *et al.*, (2015:5) observe that there is no agreement on whether measurement of climate finance should be “based on gross or net flows”. While gross flows refers to “the total amount of private finance, offset finance, and non-concessional lending from multilateral development banks (MDBs),” net flows is “the grant equivalent transfers from developed countries and the net benefit to the developing countries for non-concessional public and private flows” (ibid). A lack of this distinction implies that stakeholders cannot accurately determine what actually constitute climate finance.

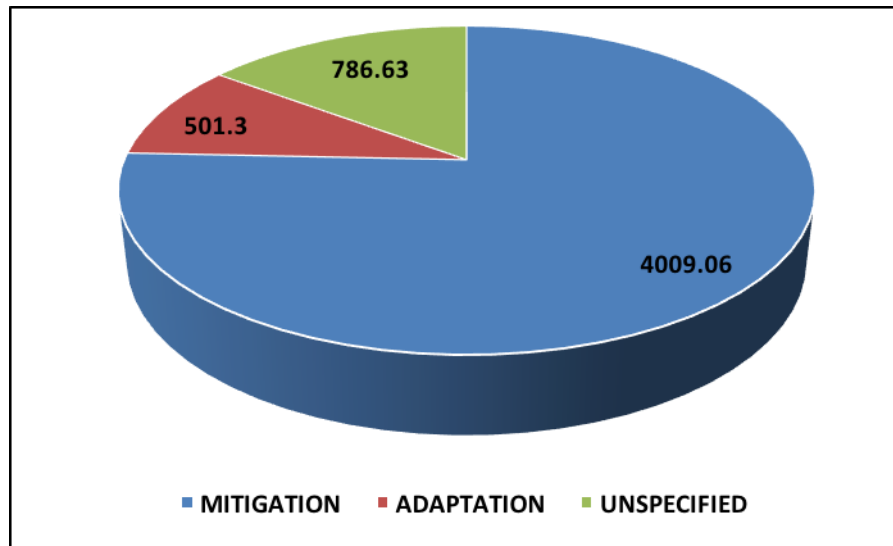
Another concern regarding climate finance relates to the view of what constitutes “private climate finance” (which accounts for 50-60% of total international climate funding); a view point which is often blurred (Clapp *et al.*, 2012). For instance, what is presently considered as private finance are often made up of funds from routine investment decisions by private companies and policies that have been placed on the energy markets. Such funds, although they might have indirect bearing on climate change, are not explicitly dedicated to climate change. Bracking (2015a:2343) cites an example of a clean development mechanism fund in South Africa that “was provided to the Tongaat Hulett Fuel Switching Project, to reduce unpleasant smells, when this too is covered by section 35 of the Air Quality Act 2004”. What this implies is that the current model of climate finance encourages commercial profitability without empirical evidence to demonstrate additional mitigating/adaptation benefits beyond what these companies are already mandated to implement by existing environmental laws. The implication of this is that anything that can be packaged as ‘green’ stands the chance of being funded. This amorphous circumstance and non-fixity of a definition of climate finance in the public sector is mirrored by the lack of international standards governing Green Bonds in the private sector (Bracking, 2015a).

As a way to embrace various sources of funding, and also perhaps inadvertently to further perpetuate conceptual ambiguity, the United Nations Framework Convention on Climate Change (2014a) broadly defines climate finance as “local, national or transnational financing, which may be drawn from public, private and alternative sources of financing”. Rather than address the problem of conceptual ambiguity, there remain challenges associated with the choice of this definition as evident in the non-endorsement of the definition by parties to the UNFCCC (Westphal *et al.*, 2015). While a broader definition has an aspirational intent and potential ability to attract sources of finance whose owners anticipate a multiplier effect from the association with climate finance, or more generally the ‘green economy’, it also confounds attempts to fix the definition sufficiently to enable litigable actions when finance spent in respect of the objectives of climate change mitigation and adaptation fail to objectively perform that function. The requirement of ‘evidenced-based’ expenditures under the category are potentially confounded by fungible switching between amorphous spending activities and objectives.

Besides the lack of clarity and agreement on the climate finance concept, there is also an imbalance in project funding between climate mitigation and climate adaptation initiatives. What is also striking is the fact that climate finance globally funds many more mitigation strategies, mostly in renewable energy and the

accelerating move away from fossil fuels, than it does adaptation strategies by a varying but large proportion (Climate Policy Initiative, 2015). This is contrary to an emerging view that climate finance should be shared equally between mitigation and adaptation which was written into the founding documentation of the Green Climate Fund, a central institution of global efforts to avert the consequences of the unfolding climate crisis (Bracking, 2015b; Buchner *et al*, 2011). The figure below outlines the skewed nature of investment in climate adaptation and mitigation. The dedication of a disproportionately high proportion of climate finance towards mitigation implies that very little is left to fund climate change adaptation projects. This lack of funding in adaptation can and does worsen the socio-economic conditions of the poor and vulnerable who often bear the brunt of climate change.

Figure 1: Total Contributions by Mitigation, Adaptation or Unspecified (\$ USD millions)



Source: UNFCCC (2014b)

Added to the foregoing is a mismatch in areas of priority between academic research and policy makers on climate change. While academics may prioritise mitigation/adaptation strategies over economic development, policy makers may focus on development first and mitigation/adaption afterwards (Rennkamp, 2013). This can cause friction within the working relationship between the academia and policy makers. This is a matter of concern that requires urgent intervention since a multi-sectorial and multi-institutional approach is critical to effectively deal with issues of climate change.

Authors have stressed that in order to effectively manage the issue of climate change, there has to be strong coordination between national, provincial and local governments and between NGOs, academia and communities (Holgate, 2007). However, the financialisation of the climate change policy and practice agenda have resulted in what can best be described as an 'elite capture' of climate change decision making apparatus. Financialising climate change is fraught with multiple challenges most of which are systemic. According to Bracking (2014), a financialised approach to addressing climate change is woefully insufficient. Bracking (2014:43) argues that "at best, financialised policy produces a spectacle or illusion of care, a globalised narrative which is embedded and generated within traditional supranational institutions and new institutional architecture such as the Green Climate Fund". Essentially, the global carbon market has become subject to elite capture with little evidence that this is providing the intended benefits for the environment, the poor and vulnerable. The financialisation of climate change is underpinned by market-based philosophy with a neo-liberal orientation despite evidence to the contrary that the market lacks commitment to addressing climate change (Bond, 2015). Added to this is the lack of critical insights into scenarios about possible future crises in the financialised international climate market, likely to be similar to those that have punctuated the international economic system. The dearth of insights in this regard implies that the international climate finance market is not prepared to cope with possible future crises.

In addition to the foregoing is a lack of critical discussion and empirical evidence to support the notion that the current global financialised system of providing climate finance for mitigation and adaptation is leading to a cleaner ecosystem (Bracking, 2015c). Despite this, the international community continues to pursue this trajectory with singular mindedness which gives the impression that it is the only path to achieving a cleaner global future. The financialisation of climate change without commitment to changing current patterns of GHG and proactive commitments to climate change mitigation is simply a farce masquerading as the only alternative to solving climate change. In fact, the current trajectory might be obstructing the kind of proactive steps both in terms of investment in cleaner energy alternatives and GHG abatements required for a secure cleaner global future (Bracking, 2015a). Many eminent scientists and international bodies are pointing to the insufficiency of current global agreements in the face of worse than expected warming figures over the last two decades (UNEP, 2011), with the consensus that even the recently signed Paris Agreement is insufficient to keep the planet below its targeted 2 degrees of warming as compared to pre-industrial levels (Anderson, 2015).

The international climate finance system is also characterised by limited growth in the funding that is required to meet mitigation and adaptation targets for a sustainable future. The foregoing presents a compelling basis to argue for the reconceptualisation of the Green Economy. Bracking (2015c:40) advocates a different paradigm that is underpinned by “a practice of democratic government which can act on science and peoples’ needs at a national and international level.... to assist communities to live differently; and ask which demands a peoples’ based political movement to make it happen”. Wainwright and Mann (2013) recently termed what is required a ‘climate x’, the formation of a new global climate Leviathan, or political order, made necessary, but by no means inevitable, by the demands of managing climate change. Meanwhile, from political economy, Casteel and Christophers (2015) also respond to the challenge of scale in relation to the problem of climate change, by suggesting that a massive capital switch of credit money into green infrastructure is required, and provide cautious sources of optimism that this might be possible.

These authors, and many others, share the premise that humans are facing a global challenge of mighty proportions that requires socio-economic and political, as much as energy system and natural science, responses. This approach is contrary to current dominant financialised paradigms in which developed countries and dirty companies can continue on their destructive path of GHG emissions as long as they invest in the carbon market for offsetting certified emissions reductions (CERs). Effectively, financialisation of climate change allows industrialised countries and large corporations to continue emitting GHG comparatively guilt-free since they can afford carbon credits.

This critique notwithstanding, interesting changes to policy and response in the cities of the Global South are occurring, despite rather than because of the global scale of negotiations. These are best described as an emerging system of correlation, a locally situated ‘dispositif’ in the Foucauldian tradition (see Braun, 2014: 50-51; citing Foucault, 1980: 194). As Braun recently summarised,

“In the face of climate change, what we see is that the administration of life – biopolitics – is itself changing, not only combining diverse elements into new heterogeneous formations, but also taking hold of new knowledge, technologies, and practices that either did not previously exist or had not previously been appropriated as a means of administration” (2014: 51. Emphasis in original)

The range of climate change adaptation and poverty reduction projects analysed in this paper illustrate this active remaking space of entraining, morphing and creating of new governance practices and understandings in eThekweni.

2. Sources of Climate Change Finance

The dominant paradigm in current approaches to climate mitigation and adaptation is one that is underpinned by considerable financial commitments. The paradigm is hinged on the notion that significant financial investment is required to offset GHG emission and help communities adapt to the imperatives of climate change. Climate finance is intended to assist developing countries reduce their GHG emissions and adapt to changing climatic conditions (UNFCCC, 2014a). Climate finance is realised through mechanisms like the Green Climate Fund (GCF). The GCF is an agreement within the UNFCCC to assist developing countries' adaptation and mitigation of climate change (Bracking, 2015c). Instruments for governing the GCF were initially planned by the Conference of Parties 17 (COP17) in Durban and then passed through a number of years of refining and iteration to date.

A study by the World Bank (2011) estimates that the predicted cost of climate adaptation is/will be between \$70 billion to \$100 billion USD per year between 2010 and 2050. However, the actual cost to the poor is still to be determined. To actualise climate change financing, developed countries would need to agree in financing the bulk of climate change initiatives. Under the GCF agreement, parties to the UNFCCC committed to contributing \$100 billion USD per annum by 2020 (Westphal *et al.*, 2015). Although developed countries committed significant funds to climate finance in the "fast-start finance period," there is no consensus on whether the targeted \$100 billion USD is in addition to existing contributions or should be new finance (Westphal *et al.*, 2015). In addition to this, there is no agreement on the proportions of national budgets that developed countries should commit to climate finance. Against this backdrop, how much a country commits to climate finance is often a subjective decision of contributing countries. Added to this is that fiscal policies in advanced economies such as the implementation of austerity measures in light of continuing and growing economic uncertainties will affect their ability to meet the set target.

The UNFCCC (2014) Biennial Assessment report indicates that global climate finance ranges from \$340 million to \$650 million USD per annum. Finance flows from developed to developing countries ranging from \$40 to \$175 million USD per annum. Below is a table illustrating these flows. However, a concern surrounding

climate finance is the lack of agreement as to how to fit it into existing development finance assistance classifications, and/or whether it should fit in at all. Whether other sources besides public funding should also contribute to the fund is also unclear.

Table 1. Estimated volume of mitigation and adaptation finance (\$USD million and in percent 2009-2010)

Source	Total (USD m)	Adaptation (%)	Mitigation (%)	Adaptation (USD m)	Mitigation (USD m)
Bilateral	22,767	16	84	3,641	19,127
Multilateral	14,361	3	97	475	13,886
Funds	2,492	3	97	65	2,428
Offsets* ¹	2,250	0	100	0	2,250
Philanthropy* ²	450	47	53	210	240
Private finance	54,600	0	100	0	54,600
Total	96,920	5%	95%	4,390	92,531

Source: Source: Climate Policy Initiative (CPI)

*Mid-point of estimates where ranges exist.

Furthermore, it is unclear how climate financial assistance will be delivered to developing countries. Arguments on the nature of climate finance have coalesced into two diametrically opposed stances: whether climate finance should be in the form of grants or in the form of loans to developing countries. The dominant view among developing countries as well as civil society organisations (CSOs) is that climate finance should be in the form of grants. South Africa belongs to the G77+ China and the Africa group who believe that:

“developed country parties should provide substantial, new, additional, adequate, predictable and sustained public funding additional to and different from the official development assistance (ODA) to meet the agreed full costs and/or incremental costs incurred by developing country Parties to effectively implement their commitments under the Convention, taking into consideration that other sources of finance like the private sector and carbon market can play a supplementary role” (Africa Group, 2009:3).

Contrary to the above stance, existing funding approaches indicate that climate finance is not limited to donations from developed countries. Westphal *et al.*, (2015:5) note that funds such as “concessional and non-concessional loans, as well as capital contributions, guarantees, and insurance as climate finance” have all been construed by source countries as climate finance. This is contrary to the view that climate finance

¹ * The Adaptation Fund is covered under the ‘Funds’ category and not under carbon offset flows.

² **Philanthropy figure includes an estimated \$240 million USD from voluntary carbon markets (Over-the-Counter transactions).

should not be in the form of loans. The argument is that providing climate finance in the form of a loan could potentially worsen the dire financial constraints of developing countries that are negatively affected by the imperatives of climate change.

How climate change finance is classified also has serious implications on who receives it and how they may use it. Developing countries perceive climate finance as restitution between sovereign states. Therefore, recipient states should be allowed to use the funding in any manner they see fit. This is an area of serious contention. Disagreements on how climate finance should be spent do not only exist at the international level; they also exist at the national level (Persson & Remling, 2014). There are those who prefer that it be redistributed to the most vulnerable, while others contend that it be used to pursue investments that have high social benefits (Persson & Remling, 2014).

Disagreement on what constitutes climate finance has created debates as to whether climate finance should be provided through existing or new institutions. Developed countries prefer existing institutions that they have been leading to oversee climate finance, while developing countries prefer new institutions created specifically for managing climate finance. Developing countries are weary of existing international financial institutions as they have not been functioning in their favour and have failed to provide proper support for sustainable development and poverty alleviation (Ballesteros *et al.*, 2010). Evidence supports the notion that existing institutional models in climate finance advance the financial interests of established institutions/businesses. Bracking (2015c:35) notes this point alluding to the emergence (in respect of the GCF):

“of a ‘fund-of-funds’ institution; a largely mitigation based expenditure model; using private sector-oriented results and evaluation technologies that allow fictive and dirty energy subsidies to predominate; of offshore, equity fund managers promoted to decision-makers over portfolio expenditures, combined with multilateral entities as gatekeepers and compradors, who will likely use the same offshore intermediaries down the funding pipeline as would the private sector to begin with.”

The hegemonic interests at the international level leave little room for negotiations in relation to climate change mitigation and adaptation. In Bracking's (2015b) view, this hegemonic vested interest group

continues to be a key hindrance to the adoption of new energy alternatives since a new approach will challenge the status quo and thus disadvantage those that benefit from it. Against the backdrop of the foregoing concerns, it is important that whichever institution(s) are used for distribution be seen as legitimate and effective by all parties.

3. Climate Change Co-Benefits

Following from the ambiguous nature of climate finance terminology and how the funds should be used and managed, the absence of clarity as to what qualifies as a co-benefit in climate change finance remains another unresolved issue (Tompkins & Eakin, 2011; Aakre & Rubbelke, 2010). This ambiguity causes a great challenge in distinguishing which projects are suitable or appropriate to be listed as a 'climate change project' and thereby qualify for climate change adaptation or mitigation financial incentives. Co-benefits have been defined as "the additional and locally desirable developmental benefits of climate actions" (Zusman, 2008: 88). Co-benefits are normally expected to be socio-economic in nature. For example, poverty reduction co-benefits make a case for social value found in ecological changes and interventions. Climate change adaptation projects have the potential of contributing to a multitude of poverty reduction activities such as urban food security, income generation and job creation. These effects, however, have not been systematically evaluated, nor has a set of criteria been established as what activities can be categorised thus. "Poverty reduction co-benefit" is a concept being used to better understand the socio-economic changes in climate change projects particularly targeting disadvantaged and vulnerable peoples.

Co-benefits can be calculated as the costs avoided if alternative policies other than climate mitigation/adaptation policies were adopted such as the costs of avoiding premature deaths in extreme weather conditions (Bollen *et al.*, 2009). The extent to which co-benefits of climate mitigation policies offer economic incentives for countries usually depends on the two following factors:

1. The extent to which co-benefits are seen as important. Mitigation has been calculated to be beneficial until 2050 when the benefits of air pollution are large enough to compensate for the Gross Domestic Product (GDP) loss from adopting GHG mitigation policies. It was however not found to be as economically beneficial to choose climate mitigation policies after the year 2050 because the benefits decrease drastically and thereby countries may lose interest in climate change interventions (Bollen *et al.*, 2009).

2. It is important to consider the cost of achieving the same level of reduction of local air pollution through direct policies compared to the indirect policies that may be associated with co-benefits. Therefore direct policies can be considered as co-benefits if they are cheaper than indirect policies (Bollen *et al.*, 2009).

Besides precise classification of climate change finance, very little attention has been dedicated to who ought to benefit from such funding in the literature. The key question revolves around whether only projects with a public co-benefit should be funded. There is the egalitarian view which states that there should be equal funding opportunities for all eligible states/beneficiaries without taking into consideration their level of vulnerability. This approach has been criticised because it advocates for equal per capita funding for state/beneficiaries and projects even when there are socio-economic variations in population and among project beneficiaries (Ratajczak-Juszko & Feaver, 2011). An approach that emphasises equality may undermine equity of benefits if pre-existing conditions of vulnerability and levels of well-being are not taken into consideration. However, the view that advances the notion that funding should be proportional to the level of vulnerability (see Fussel *et al.*, 2012; Grasso, 2010; Stadelmann *et al.*, 2014) has also been criticised on the basis that it is difficult to measure vulnerability. It has been argued that indicators that have been suggested for measuring vulnerability are normative, misguided and are best suited for measuring symptoms rather than actual causes of vulnerability (Persson & Remling, 2014). Since there has been no agreement or clarity as to what type of projects the GCF should fund, there have been suggestions that the types of projects that have been seen as successful can be used as exemplars for other projects. Projects that have been successful share the following attributes (Friends of the Earth & Institute for Policy Studies, 2015):

1. Projects that were identified as successful responded to **community-identified needs** with climate action that was community driven i.e. initiated, developed, implemented and monitored by the community.
2. They have engaged with broad networks that have deep and local roots.
3. They have **built relationships of trust within the community** as well as between the community, government, civil society, financiers and academia and with community members in leadership roles and as project promoters.
4. They engaged with **local and domestic private sector actors**, as opposed to those that are international.

5. **They have built capacity using local institutions.** Local capacity needs to be built by creating new institutions that are run by the community, including supporting the communities with a range of skill and capacity building and training, including activities that support the development of the local workforce, enterprises, and supply chains.
6. **Local knowledge, tools and methods** was adapted and used.
7. **They did not impose external ideas on to the local community.** Outside ideas were not imposed on the communities, solutions were rather tailored to the context of the community to ensure that the end user needs were for broader development met.
8. They engaged with local governance and regulatory authorities prior to implementation of projects. They took local governance models into account and ensured buy-in and co-operation of local governing bodies and regulatory authorities prior to implementation.
9. Appropriate **policies were put in place**; they had long term benefits such as social and technical sustainability. Having appropriate enabling policies and regulatory frameworks in place are essential for long-term financial, social and technical sustainability. Such frameworks are critical to drawing in finance. Investing modestly in policy and institutional reform, supported by political will, may have significant multiplier effects. Policies are needed to remove market, institutional, financial, technology and social barriers that were inhibiting commercially viable investments. This will increase investment over time.
10. Solutions were tailored to the local context to ensure that they meet the users' needs for broader development.
11. The rights of the poor were recognised and respected especially rights to the control over resources such as land, water and forests.
12. Gender issues were taken into consideration.
13. Projects were aimed at supplying multiple co-benefits such as electricity, clean water, new skills and capital/financial wealth. Such benefits stayed with the community.
14. Decision making structures included the public. Processes were transparent throughout and had multi stake holder participation throughout.
15. Most of these projects were small in scale (less than \$50 million USD).
16. These projects were partially or wholly funded by grants and allowed for flexibility, experimentation and innovation.

The above successful project co-benefits are noble in ensuring that social justice and equity are heavily weighed out within a project.

Additional criteria that have been suggested for determining which projects should be funded are: effectiveness; robustness; investment sustainability; transparency; accountability; participation; multiplier effects and learning potential (Persson & Remling, 2014). Although regional co-benefits have been taken into account, there is no requirement for regional or global social benefits in funding applications (Persson & Remling, 2014). Applicants are only required to include information on potential beneficiaries, but they are not expected to estimate the number of beneficiaries or even their characteristics when applying for funding (Persson & Remling, 2014). This is unfortunate because a better understanding of potential beneficiaries would clarify whether there is public benefit or private benefit or both.

4. Transparency and Accountability in Climate Finance

Climate finance is characterised by a number of transparency and accountability issues including the absence of core performance indicators and results management frameworks (Lattanzio, 2014). Without performance indicators, it becomes difficult to measure if a climate change adaptation/mitigation project is performing/underperforming. Developing countries currently have no experience in tracking and monitoring climate change-related financial flows since this is the first time that they have been required to do so. This means that they will not have kept useful records for the eventual evaluation of climate change projects and it will take time for countries to develop the capacity to carry out such activities (Montmasson-Clair, 2013).

There is also a lack of clarity on what happens if projects do not achieve intended objectives (Ballesteros *et al.*, 2010). Presently, there are no clearly stated penalties for failure to meet project objectives. It is important to design monitoring or evaluative system to measure, report and verify (MRV) climate finance. However, there is no MRV support framework at the international level because definitions are still an issue of debate (Berliner *et al.*, 2013). It has been recommended that MRV should take place on three levels: international, national and project levels respectively. Berliner *et al.* (2013) suggest that rather than requiring countries to provide information on spending, they should be provided with support and reporting skills/tools to avoid burdening recipients with complicated reporting systems. MRV applies to both to those that are receiving and those contributing to climate finance. Contributors will be interested in whether their contributions are being used as intended while recipients will be interested in whether contributors are fulfilling their promises.

The determination to deliver clear and appropriate definitions for climate change financing and to balance out the weight of climate mitigation with adaptation projects will ultimately help to provide transparency and accountability to projects. This will increase the capacity of global funding to support the plight of climate disasters which occur in developing countries located in the global South. Lack of data on climate change projects has made it difficult to determine how much climate finance is funding projects termed 'climate change projects' in developing countries. An implication of this is that many projects that are funded may go unaccounted for. In addition, projects that may not necessarily be climate change projects may qualify for funding due to the lack of clarity on what qualifies as a climate change project. There is also a risk of double counting since there is no guidance as to how climate finance should be counted both nationally and globally. Bracking (2015a: 2343) illustrated the consequences of this non-fixity in the case study of the South African Clean Development Mechanism (CDM) projects that: "the ongoing lack of public data and company monitoring reports available at the DNA [Designated National Authority] also suggests that the status of CDM [clean development mechanism] approvals lacks transparent oversight". Bracking (2015c: 35) further argued of the GCF framework that "investment decisions remain ring-fenced in the private sector facility, or answerable only to overarching targets and goals in the investment framework and its (eventual) derivative investment contracts which will be required to be loosely referenced to the priority areas". Without the oversight of stakeholders on how climate finance related decisions are made and how these are implemented, the transparency of investments in climate change initiatives remains problematic.

To provide effective climate adaptation/mitigation strategies, it is pertinent to have a better understanding of the actual costs and benefits of these strategies. These are called the "economics of adaptation" (Doczi & Ross, 2014). The African Development Bank (AfDB) estimated that the average cost of African adaptation strategies is between \$20-30 billion USD in 2011 in addition to existing development needs. This may seem expensive, but long-term benefits are likely to outweigh short-term costs thus justifying such spending. It has also been noted that, it is difficult to estimate ecosystem conservation and relocation as well as social adaptation costs. Consequently, such costs may not be adequately represented in cost estimates (Doczi & Ross, 2014).

Risk reduction strategies need to be integrated into the development of climate finance strategies. Knowledge about impacts and vulnerability regarding climate change should translate into policy (Department of

Agriculture, Forestry & Fisheries, 2012). Having appropriate and enabling policies and regulatory frameworks in place are essential for long-term financial, social and technical sustainability of climate change mitigation and adaptation. Such frameworks are critical to accessing climate change finance. Investing modestly in policy and institutional reform, supported by political will, may have significant multiplier effects. Policies are needed to remove market, institutional, financial, technology and social barriers inhibiting commercially viable investments in climate change finance (Institute for Policy Studies, 2015).

5. Efforts by the South African government in Climate Change Mitigation and Adaptation

South Africa is amongst one of the largest GHG emitters in the world (Montmasson-Clair, 2013) despite being highly vulnerable to climate change. Recognising the urgent need to mitigate climate change, the South African government has taken proactive steps in reducing its carbon footprints. Current initiatives in place to curb GHG emissions include the Renewable Energy Independent Power Producer Procurement Programme and the Carbon Tax initiative. In addition to these, the country aims to upscale existing climate change mitigation projects including:

1. Working for Water (WfW) and Working on Fire estimated at \$1.2 billion USD per year.
2. Working on Wetlands estimated at \$0.12 billion USD per year.
3. Water Conservation and Demand Management estimated at \$5.3 billion USD per year.
4. Land restoration estimated at \$0.07 billion USD per year.

Source: UNFCCC (2015: 9)

In its intended nationally determined contribution (INDC) to COP21 held in Paris in 2015, South Africa committed to climate change mitigation and adaptation through the implementation of various policy options. The INDC emphasised the importance of transforming South Africa's pattern of energy generation, distribution and consumption in order to attain the objective of a low carbon future. This entails deriving the country's energy from both renewable and non-renewable sources as well as improving the efficiency of its energy infrastructure by replacing "an inefficient fleet of ageing coal-fired power plants with clean and high efficiency technology going forward" (UNFCCC, 2015:2). In the INDC, South Africa's commitment to climate change adaptation revolves around six goals (UNFCCC, 2015:3-6):

1. Develop a National Adaptation Plan, and begin operationalisation as part of implementing the National Climate Change Response Policy for the period from 2020 to 2025 and for the period 2025 to 2030.

2. Take into account climate considerations in national development, sub-national and sector policy frameworks for the period 2020 to 2030.
3. Build the necessary institutional capacity for climate change response planning and implementation for the period 2020 to 2030.
4. Develop an early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas for the period 2020 to 2030, and reporting in terms of the National Adaptation Plan with rolling five-year implementation periods.
5. Development of a vulnerability assessment and adaptation needs framework by 2020 to support a continuous presentation of adaptation needs.
6. Communication of past investments in adaptation for education and awareness as well as for international recognition.

The South African government has realised that international and corporate financiers are critical to providing financial backing for climate change adaptation and mitigation projects. This recognition is evident in the National Climate Response Green (25th November 2010) and White (13th October 2011) papers which emphasised the need to allow various institutions to contribute to climate change finance (Department of Environmental Affairs, 2010, 2011). The Green Paper aims to establish the National Climate Change Fund that would source international and national finance for mitigation and adaptation as well as a Climate Finance Tracking Facility that would track public and private climate finance flows (Department of Environmental Affairs, 2010). The public sector will offer support through public procurement programmes while development finance institutions will incorporate climate change objectives in their planning and portfolios (Montmasson-Clair, 2013). In 2011, South Africa launched a South African Renewables initiative aimed at providing a channel for international public finance into the development of renewables capacity and the delivery of green energy. The collaboration included United Kingdom, Norway, German, Denmark and the European Investment Bank (Montmasson-Clair, 2013).

The climate change strategy is formulated with the leadership of the National Treasury (NT), the Economic Development Department (EDD) and the Department of Environmental Affairs (DEA). These departments are tasked to develop climate finance strategies and architecture for South Africa. Research by the Development Bank of Southern Africa (DBSA) which explored the best structure of the coordination mechanism for South Africa suggested that the structure be flexible to include a tracking facility that would

facilitate South Africa's climate change response (Montmasson-Clair, 2013). However, South Africa does not have a clear strategy for climate finance tracking and this is a matter of concern. Climate finance is not explicitly included in the priority outcome area of the Department of Performance, Monitoring and Evaluation (DPME). There is also no centralised management of donor funding. Provinces and government departments receive individual funding for climate change related projects and manage these at their respective tier of governance. Only funds obtained through the Global Environmental Facility (GEF) are managed centrally by the Department of Environmental Affairs.

South Africa has taken a very diverse approach to climate change inclusive of research, policies, strategies, action plans and legislation. However, the lack of knowledge has resulted in duplication of work and wasting of resources that have slowed implementation of climate change projects (Dlamini, 2009). There have been attempts to build a database to record all funding information for climate change funding. In 2008/2009, the National Climate Change Response Database (NCCRD) was established. Information on this database includes description, timelines, budgets, target group, and the funding organisation of climate finance. This attempt was unsuccessful because financiers are often reluctant to provide the required information (Montmasson-Clair, 2013).

6. Climate Change Mitigation and Adaptation in eThekweni Municipality, South Africa

Although poor countries are the most affected by the consequences of climate change, developed countries produce most of the GHG emissions that causes climate change. To adapt to changing climatic conditions, cities in developing countries have the opportunity to utilise an integrated approach to tackling pressing issues, such as an ecosystems-based adaptation model. The Community Ecosystem-Based Adaptation (CEBA) is a system where green collar workers are used to implement climate change projects and they benefit both financially and through the ecosystems services. Well-functioning ecosystems have been identified as the most effective buffering against the impacts of climate change (Taylor, *et al.*, 2014). EThekweni municipality is working in the holistic framework of CEBA, and creates various co-partnered projects which attempt to work with local communities in natural habitat restoration projects within their area (Roberts *et al.*, 2012). The municipality has had flexibility in designing some of these projects, some specific projects are taking a "learn-by-doing" tactic. This flexibility allows officials to partner with local organisations and people on an iterative design and incremental change process as they make interventions relevant to

local communities involved (Roberts *et al.*, 2012). In other words, the project team goes out, tests and adjusts through an ongoing improvement design to see what works best in the community. The CEBA have complementary socio-economic aspects of nature, communities and local citizenry, and together, the theories can help to provide guidance in evaluating complex projects. These approaches can also work together to clarify the concept of poverty reduction co-benefits, which essentially places a pro-poor perspective in the forefront within the integrated multi-dimensional approach. The benefits of this relationship can contribute towards what is called the “Green Economy” (eThekweni Municipality, 2011).

Like other cities in developing countries, eThekweni Municipality is highly vulnerable to climate change. The Municipality’s vulnerability is further exacerbated by environmental injustice stemming from apartheid laws, high levels of poverty and inequality as well as extensive reliance on the natural ecosystems for survival. The eThekweni Municipality has implemented numerous projects in the name of climate change adaptation/mitigation. In the process of trying to co-ordinate the work that is being implemented by different departments and structures within the Municipality, the climate change learning exchange was born (Nzimande & Botes, 2014). The learning exchange aimed to facilitate the exchange of ideas on challenges and successes of climate change initiatives. The municipality also works towards forming partnerships with non-governmental organisations (NGOs), academia and businesses in order to access data, human capacity, funding, and political leaders who could provide much needed political support (Nzimande & Botes, 2014).

Climate change may not have been a priority for eThekweni Municipality in the 1990s, but this has changed with the establishment of the Environmental Planning and Climate Protection Department (EPCPD). This office has made use of global climate change knowledge networks, academics and experiences in the design and implementation of its climate change projects (Taylor *et al.*, 2014). The energy office and the EPCPD have developed a climate adaptation and mitigation strategy as part of the plan by the EPCPD to collaborate with other departments interested in the climate change agenda. The eThekweni municipality has adopted a ‘no regrets’ stance on climate change adaptation. In this approach, the vulnerability risks from climate change are reduced even if the impacts of climate change do not become as severe as they may have been predicted (Taylor *et al.*, 2014). Under the latest municipal programme, greater emphasis has been placed on understanding the socio-economic effects or co-benefits from projects which promote the enhancement of biodiversity and ecosystems. It would thereby be timely to take stock of the measures or indicators of socio-economic changes within such initiatives, and specifically understand how climate adaptation programmes

have changed the behaviour of local communities and their respective members who are directly involved with interventions. The approach encourages diversity in climate change projects.

Over the years, eThekweni Municipality has implemented various climate change projects (see Table 2). Among the older projects (up to 2011), they include the Greening of Moses Mabhida stadium and its precinct for the 2010 soccer World Cup at the cost of 6.6 million ZAR. Other training stadia including the King Zwelithini, Princess Magogo and Sugar Ray Xulu stadia were also 'greened' at the cost of 4.3 million ZAR (eThekweni Municipality, 2011). Added to the foregoing was the implementation of the Smart City project for the COP17 at the cost of 5.8 million ZAR. The initial list of climate change projects are listed in Table 2³.

Table 2: Some Climate Change Mitigation/Adaptation Initiatives in eThekweni Municipality

Project title	Aim	Cost by year 2011 (in ZAR)
The Buffelsdraai Reforestation Project	The mitigation of the carbon footprint of the 2010 FIFA World Cup	13.00 million
The Inanda Mountain Reforestation Project	An offsetting and adaptation initiative to restore vital ecosystem goods and services	4.10 million
The Paradise Valley reforestation Project	An offsetting and adaptation initiative to restore vital ecosystem goods and services	3.30 million
The Durban Metropolitan Open Space System (D'MOSS) project	This project was aimed at protecting the municipal biodiversity resources and ecosystems services as supported by CEBA	3.99 million
eThekweni Municipality Systematic Conservation Plan	The improved resilience of D'MOSS to climate change by minimizing habitat and ecological biodiversity loss and reduce the lack of connectivity	100 000
Non-user Conservation Servitudes (NUCS)	The offer of tax relief to privately owned land that is being managed and conserved appropriately	None
Working for ecosystems	The control of invasive alien plants using an expanded public works model; the initial project is operating in four wards	3.50 million
Working on fire	Alien invasive plant and fire control in grassland areas that are not receiving management	5.00 million
Invasive alien plant (IAP) Control	The proper coordination and prioritisation regarding control and management of IAS in the city	9.00 million

Source: Adapted from eThekweni Municipality Report (2011)

³ For full list see Appendix 1.

The climate change projects in eThekweni Municipality have been funded from multiple sources including donations from Danish funding agency, Danida, the Rockefeller Foundation, the city of Bremen and carbon offset funding from the FIFA 2010 World Cup and COP17/CMP7. Funding dedicated to climate change became available only in 2010/11 (Taylor *et al.*, 2014).

6.1. Challenges for the eThekweni Municipality in Relation to Climate Change Mitigation and Adaptation

There have been many challenges faced by municipalities such as eThekweni in relation to climate change mitigation and adaptation. One of the challenges has been the fact that it has been difficult to distinguish the impacts of climate change interventions from other attempts at improving urban management and social and economic development. For a project to be considered climate change related, it “has to in some deliberate and demonstrable way be a departure from decision making and operational practices that do not consider and account for long-term human-induced instabilities in the climate system” (Taylor *et al.*, 2014:17). However, some projects in eThekweni Municipality that are presented above as climate change projects may not necessarily meet this criterion.

Taylor *et al.* (2014) note that there has been a lack of support from political leadership for climate change mitigation and adaptation projects. Taylor *et al.* (2014: 31) further argue that “there is, no formal party position on issues like climate mitigation or climate adaptation. Even the recent four-yearly ANC party conference, where new policy positions were aired, totally ignored climate change as a development concern”. This lack of political will have implications in terms of the amount of the city’s budget that is dedicated to climate change projects. Despite the lack of support from political leadership, climate change mitigation and adaptation has received considerable support from some middle management including eThekweni Mayor and officials with scientific backgrounds. However, Taylor *et al.* (2014) highlight the existence of a blurry line between the workings of the political leadership and the state (municipality) that resulted in the climate change agenda becoming affected by power struggles between political leadership and middle management.

A third challenge is the lack of internal skills at the municipal level. This has created extensive reliance on consultants for the design, implementation, monitoring and evaluation of climate change projects (Taylor *et al.*, 2014). The extensive financial resources committed to consultancy possess additional financial constraints to the already limited funds available for climate change initiatives in eThekweni. One way to

reduce these might be to gradually increase the capacity of departments within the municipality, such as Public Works, to manage 'green jobs' directly either in an existing programme or division – waste services or parks – or programme – such as the extended public works programme.

7. Conclusion

There is agreement that climate change is a reality that requires urgent attention through mitigation and adaptation strategies. However, there are clearly many concerns regarding climate change financing that require further attention. Issues range from whether or not climate finance should form part of ODA, how funds should be distributed and who climate change initiatives should benefit. These issues could hamper the implementation of many useful strategies and much-needed finance could end up funding projects that are not for public benefit since there is this absence of criteria that projects need to meet in order to qualify as a climate change initiative. The lack of explicit requirements for projects to provide co-benefits to communities remains an unsettling problem. Much still needs to be done to setup identifying criteria and measurement frameworks to help with issues of transparency, accountability and tracking of climate finance. This is especially needed in developing countries in order to curtail the misuse of climate funds in all tiers of government. There is also an urgent need to create a system that will govern, prescribe and monitor the use of climate funds for the betterment of the eco-systems and the human race as a whole. Furthermore, there is a need to develop and implement some form of penalty for non-compliance with the terms of climate change finance. In addition, there is an urgent need to explore other approaches to climate change adaptation and mitigation beyond the current financialised paradigm.

It was mentioned above that the divide between what is 'adaptation' and what is 'mitigation' remains somewhat blurred. A recent theoretical contribution by Braun may assist here in that he sees both as part of an over-arching 'eco-cybernetic' type of management adopted by cities both internally and in relation to the global system, in the face of climate change (2014:50). The relationship between the 'city' and the 'globe' provides for complex feedback loops, such that for cities (he is writing more about the global North, but we think it equally might apply to eThekweni):

“what differentiates mitigation and adaptation is simply where in these complex feedback loops ‘government’ is applied and on what it seeks to produce effects” (Braun, 2014:50 emphasis in original).

In this new changing biopolitics mitigation seeks change to the upward contributory causation, while adaptation seeks change to the downward, consequential causation:

“One seeks either to realise effects on the first part of this global loop (the effects of urban life on global climate such as through fuel consumption meters) or to produce effects on the second part (the effects of climate change on urban life, such as through the design of ‘critical’ infrastructure)” (Braun, 2014: 50. Emphasis in original).

In eThekweni Municipality, global knowledge and practice are widespread, while work from eThekweni contributes to the formation of global best practice, thus problematising any hierarchical organisation of scale in climate-related activities. In consequence, any future classification of climate finance will need to be cognisant that the *dispositif* of climate action in the everyday life of projects, programmes and activities in eThekweni confounds any easy definition of mitigation being pursued by the private sector with leveraged funds, as compared with adaptation for the public good using public revenues in councils. Both are intermingled and entrained together.

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Appendix 1

eThekwini Municipality Climate Change projects (2011)

Project title	Description	Cost by year 2011
1. The Buffelsdraai Reforestation Project	To mitigate the carbon footprint of the 2010 FIFA World Cup.	R13.00 million
2. The Inanda Mountain Reforestation Project	An offsetting and adaptation initiative to restore vital ecosystem goods and services.	R4.10 million
3. The Paradise Valley reforestation Project	An offsetting and adaptation initiative to restore vital ecosystem goods and services.	R3.30 million
4. The Durban Metropolitan Open Space System (D'MOSS) project	This project was aimed at protecting the municipal biodiversity resources and ecosystems services as supported by CEBA.	R3.99 million
5. EThekwini Municipality Systematic Conservation Plan	Aim: to improve the resilience of D'MOSS to climate change by minimizing habitat and ecological biodiversity loss and reduce the lack of connectivity.	R100,000
6. Non-user Conservation Servitudes (NUCS)	Offers tax relief to privately owned land that is being managed and conserved appropriately.	None
7. Working for ecosystems	To control invasive alien plants using an expanded public works model, this project is operating in 4 wards.	R3.50 million
8. Working on Fire	Alien invasive plant and fire control in grassland areas that are not receiving management.	R5.00 million
9. Invasive alien plant (IAP) Control	To ensure good coordination and prioritization regarding control and management of IAS in the city.	R9.00 million
10. Sihlanzimvelo Project	An integrated, systematic and sustainable approach to the maintenance of the 800 km of watercourses in eThekwini Municipality. The purpose is to ensure that all watercourses are restored to, and maintained at an appropriate environmental standard, thus safeguarding local communities.	R15.00 million per year for 3 years
11. Design Flood line Planning	Storm water pipe and culvert designs are being adjusted to accommodate the predicted increase in rainfall and stream flow intensities. Flood lines are being revised to accommodate this increase in order to ensure that new developments in or adjacent to rivers are not negatively impacted.	R 830,000 operational budget for 2011/12, this work is ongoing as budget allows
12. Sea Level Rise Assessment	A number of sea level rise scenarios (30, 60 and 100 cm) were developed using both downscaled global climate and semi-empirical models. These were used with wave run-up and shoreline regression models to determine possible future shoreline positions. Along portions of the coast the	R 500,000 to date (2011)

	slip failure zones associated with steep dune systems were also mapped.	
13. Durban Central Beachfront Dune Rehabilitation	This project involves the augmentation and protection of existing dunes, where possible, through the extension of frontal dune zones and erection of sacrificial fencing and timber board walks and the planting of indigenous dune plants.	R 6.00 million capital expenditure and R 1.50 million per annum operating expenditure
14. Sliding Scale of Tariffs	A basic amount of water (9 kl) is provided free of charge to make water available to poor families in an economically sustainable way (i.e. via cross subsidisation).	No direct costs to the municipality excluding staff time
15. Non-Revenue Water Reduction: Water Pressure Management Programme	This programme involves the installation of new pressure management devices, the optimisation of the settings on existing valves and the optimisation of existing pressure reducing valves using time or flow control.	± R 20.00 million per annum
16. Community Adaptation Plans (CAPs)	1) Aimed at understanding how climate change impacts exacerbate daily challenges and risks faced by vulnerable communities. 2) An assessment of climate change impacts upon maize, including an investigation into the productivity of alternative staple crops under climate change conditions and their social acceptability. 3) Research into water harvesting options and the undertaking of a local level project focusing on water harvesting, water-wise landscaping and the improvement of a community garden were initiated at a school in Luganda.	R 2.50 million
17. Luganda School Water Harvesting and Micro Agricultural Water Management Technology	The project involves harvesting roof (clean) water from classroom roofs and surface (grey) water from school grounds into two separate storage tank systems.	R 350,000
18. Durban Green Corridor	To rehabilitate and manage the open spaces of the uMngeni River catchment and to promote adventure sports, nature-based recreation and eco-tourism in a corridor linking the Drakensberg Mountains to Durban, thus forming the basis in the development of a greener economy.	R 4,5 million (in addition to R 3 million from external partners) to date
19. Wind Resource Map	The eThekweni Energy Office has developed a municipal map highlighting wind power generation potential. The study identified 10 sites for further investigation for the development of 20 mW wind farms.	R 200,000
20. Municipal Adaptation Plans Cost-Benefit Analysis	To further prioritise interventions in terms of implementation, an innovative cost-benefit	R 1.45 million

	analysis is being undertaken whereby the number of people benefiting from an intervention is used to assess priority instead of the usual financial metrics.	
21. Integrated Assessment Tool for Climate Change Adaptation	This project involved a detailed analysis of multiple sector impacts (using downscaled temperature and rainfall projections) and the development of a standalone software platform for the spatial display and interrogation of sector impact modules.	R 4.21 million
22. Low Carbon Durban Research Project	The Low Carbon Durban Research Project utilised the expertise of prominent scientists from the Academy of Science of South Africa and other international scientists to develop a Low Carbon Durban Report to assist Durban's transition to a low carbon city.	R 2.10 million
23. Disaster Operation Centre	The Municipal Disaster Management Centre was activated on 1st June 2010. This centre coordinates risk management and disaster response throughout the municipality. Coordination capability has been enhanced by the installation of 240 CCTV cameras, as well as a mobile camera.	R 42.00 million
24. Establishment of eThekweni Municipality's Energy Office	Using DANIDA funding, eThekweni Municipality embarked on a concerted energy efficiency drive, which resulted in the establishment of the Energy Office in 2008 and the finalisation of the eThekweni Energy Strategy in February 2009. In January 2010, the eThekweni Council adopted eThekweni Energy Strategy, which clearly articulated the mandate and responsibility of the Energy Office. As a result the Energy Office now initiates key strategic energy interventions in the Residential Sector, Local Authority and Public Sector, Industry, Commerce and Agribusiness Sector and the Transport sector.	R 2.40 million to establish the office; R 5.57 million per annum
25. Establishment of eThekweni Municipality's Climate Protection Branch	The work undertaken by the branch that was established in 2007 has contributed towards Durban being considered a global leader in climate change adaptation through the implementation of novel and innovative work streams focused on community, municipal and ecosystem-based adaptation.	Approximately R1.00 million per annum

<p>26. EThekwini Metro Connect</p>	<p>MetroConnect is a layer 2 VPN municipal next generation fibre network spanning eThekwini Municipality. It provides e-government services to both its internal stakeholders and to Durban's residents, making Durban a true digital city.</p>	<p>None stated</p>
<p>27. Durban Botanic Gardens: A Climate Change and Biodiversity Awareness Centre of Excellence</p>	<p>A number of awareness raising initiatives have been developed at the Durban Botanic Gardens. These informative and interactive displays address issues related to climate change, including the value of biodiversity, water conservation, food security and renewable energy. Projects include: The Renewable Energy Project (budget =R 300,000) where two large solar panel arrays have been installed and connected to the Visitors Complex power supply.</p>	<p>None Stated</p>
<p>28. Integrated Rapid Public Transport Network (IRPTN)</p>	<p>The development an extensive and inclusive public transport network plan which will ultimately allow residents easy access and mobility throughout the municipal area. A part of this network is already in place – the People Mover system of buses covers the entire central business district and is a cost-effective and reliable way of travelling within the city centre.</p>	<p>Not yet finalised, but billions of Rands during first phase</p>
<p>29. Electric Bicycles Pilot</p>	<p>Three electric bicycles were purchased by eThekwini Municipality in 2010 in order to establish if they were a suitable a mode of transport for any of the various transport requirements of the municipality. The three bicycles were rotated amongst a variety of staff and departments. Reports and interviews were completed with users to determine potential applications of electric bikes within the municipality.</p>	<p>R 18,000</p>
<p>30. Non-motorised Transport Green Circuit and Key Building Connections: Phase 1</p>	<p>This project involves the provision of cycling infrastructure and lanes to connect natural environmental resources and key city infrastructure in the Durban central business district. This includes the widening of the bridge across the uMngeni Estuary on the M4 route.</p>	<p>R 23.00 million</p>
<p>31. Priority Zone Facilities Management</p>	<p>The project is a pilot programme aimed at developing a Proficient Integrated Urban Realm Management Model that could be replicated across the municipality in key strategic or economic nodes. The vision of this architectural and urban management product is to create a holistically healthy urban environment for all</p>	<p>R 34.00 million to date</p>

	residents of Durban. This includes a city that is efficient and responsive, that attracts property investments and tourism, and that creates opportunities for its residents whilst always meeting their needs.	
32. Green Roof Pilot Project	The green roof pilot project commenced in 2008 and is ongoing. The roof is vegetated with locally indigenous species to attract biodiversity. The temperature reduction and storm water attenuation benefits of the roof are being monitored and this knowledge is being used to promote the usage of green roof technologies throughout Durban through the development of a green-roof guideline document.	R 1.60 million to date
33. EThekwini Water & Sanitation (EWS) Customer Service Centre	In the new EWS building, ground water from below the parking basement floor, rainwater from the roof and condensate from the air conditioning units is collected in rainwater tanks and used for toilet flushing and to water plants.	R 24.00 million
34. South Durban Basin (SDB) Biodiversity and Greening Programme and Recycling Pilot Project	A general improvement of the SDB included the upgrading of green areas around the school using indigenous plants, the development of a permaculture garden, use of rainwater harvesting tanks, education and awareness and a reduction in the amount of recyclable waste that goes to landfill sites through recycling initiatives.	R 200,000
35. COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project	Installation of a 500 kW concentrated solar photovoltaic dual axis tracking system in eThekwini Municipality. This is the largest Solar CPV installation in South Africa and is being implemented as a showcase for COP17/CMP7. The project also has a focus on skills transfer to municipal staff and public awareness-raising during the COP17/CMP7 event.	R30.00 million capital investment
36. Wonderbag™ Residential Cooking Efficiency Programme	The Wonderbag™ is a heat-retention/insulation cooker. EThekwini Municipality is currently piloting 3,500 Wonderbags™ in the Chesterville area, prior to implementation throughout the city. The Wonderbag™ saves approximately 0.5 tonnes of carbon per year if used 2 or 3 times per week. This heat-retention cooker is South Africa's first programmatic CDM project and is being registered by the UNFCCC.	R 190,000

<p>37. Community Renewable Energy Projects</p>	<p>In the Durban Market, a high energy lighting system was replaced with a low energy system resulting in a 38 kWh reduction in energy consumption. A solar PV unit and a wind turbine were installed at the Alice Street Bus Depot and Thusong Centres and provide 31 and 100 kWh, respectively, of renewable energy daily. At the Claremont Taxi Rank a solar PV unit was installed and provides 23 kWh of renewable energy daily for the operation of the taxi rank.</p>	<p>Durban Market (Clairwood), R400,000 Alice Street Bus Depot, R185,000 Thusong Centre, R685,000 Claremont Taxi Rank, R689,000</p>
<p>38. Low Cost Solar Water Heater (SWH) Programme</p>	<p>Eight thousand, three hundred and four 100 L capacity solar water heaters were installed on roofs of low cost houses within eThekweni Municipality from January to June 2011. The solar water heaters were provided to registered owners of low cost houses free of charge.</p>	<p>The programme was fully funded by an Eskom subsidy for low pressure SWH units (90% of cost) and Carbon Credits through the Clean Development Mechanism (10% of costs)</p>
<p>39. Shisa Solar Programme</p>	<p>The Shisa Solar programme aims to promote energy efficient solar water heaters (SWH) throughout Durban. The Neighbourhood Programme targets the middle to high income market segment. A key barrier to solar water heater uptake in South Africa is the price of individual SWH units. eThekweni Municipality has therefore developed a program that will allow participants to pay less for SWHs, through a “volume purchasing” system.</p>	<p>R 1.00 million</p>
<p>40. KwaDabeka Hostel Hot Water Pilot</p>	<p>Approximately 25% have geysers for hot water, while most residents at the KwaDabeka hostel use kettles and two plate stoves to heat water for bathing and washing, resulting in high monthly electricity usage in many hostels. In this pilot project an industrial sized solar water heater was installed on one floor of the KwaDabeka Hostel to determine the viability of a renewable energy solution to this problem.</p>	<p>R 190,000</p>
<p>41. Energy Efficiency Demand Side Management</p>	<p>The Division of Revenue Act (DoRA) Energy Efficiency Demand Side Management (EEDSM) fund from the National Treasury has been made available to municipalities over a three year period. In Durban during 2009-2010 the project focused almost exclusively on traffic light replacements. In 2010-2011 the project is</p>	<p>Total grant allocation over 3 years is R 68.00 million</p>

	focussing on both traffic lights and office building lights. In the 2011-2012 the bulk of the funding will be used for building retrofits, specifically in community residential units (hostels).	
42. 2010 eThekweni Municipal Green House Gas (GHG) Inventory	The purpose of this project is to build on the two prior GHG inventories and to catalogue the GHG emissions of both eThekweni Municipality and the entire community within Durban for 2010.	R 280,000
43. KwaZulu-Natal Sustainable Energy Forum (KSEF)	The KSEF meets the need for information dissemination, networking, oversight and accountability for the governance of this sector. The KSEF was established as an independent body, with seed funding from both eThekweni Municipality's Energy Office and the United Nations Industrial Development Organisation (UNIDO).	Approximately R 15,000 per month
44. Towards a Sustainable Pit Latrine Management Strategy Through LaDePa	Pit latrine sludge is difficult to handle and contains pathogens and detritus, making disposal to landfill the only existing option. Sludge, however, also contains nutrients and phosphates, a critical but scarce terrestrial resource, which is lost through landfill disposal. The challenge is to remove (economically) the detritus and pathogens from the sludge and produce a workable material that could be recycled for agricultural use.	R70.00 million over 3 years (including pit emptying)
45. Decentralised Wastewater Treatment System (DWATS) at Newlands-Mashu Agricultural Hub	DWATS consists of decentralised off-sewer wastewater treatment coupled to the promotion of urban horticulture via the recovered wastewater. The system was designed, constructed and operated in order to enable data collection, gain experience and to promote the ability to replicate this for future applications.	Construction of the plant cost R 2.30 million, while testing and research cost R 1.15 million for the infrastructure to facilitate field trials and testing of water
46. Durban Water Recycling	Treating domestic wastewater back to near potable standard for recycling back to industry, thereby reducing demand for potable water. The available water can then be used to better service city residents and support further development in the city. This was the first Public Private Partnership in the water sector in South Africa and is a unique recycling intervention.	Privately sourced funding
47. Durban Landfill Gas-to-Electricity Project	This project is currently producing 7.5 mWh of electricity (6.5 mWh at Bisasar and 1.0 mWh at Mariannahill). Both vertical and horizontal wells are drilled into the existing waste. Landfill gas is extracted and piped to the generation compound,	Capital: R 110.00 million; Operating costs: R 10.00 million per annum

	<p>where the raw gas is fed as a fuel into spark ignition engines.</p> <p>This drives generators that produce electricity that is fed into the local grid, thus reducing GHG emissions by some 20,000 tons per month.</p>	
48. Mariannahill Landfill Conservancy	<p>This project involves the rehabilitation of the footprint and buffer zone of the landfill on a continual basis using local environmental assets such as endemic and indigenous flora and fauna. Both the original soil profile and flora was rescued and restored by the Plant Rescue Unit (Prunit) during the rehabilitation process. These were used in other rehabilitation projects in the region, thereby minimising the loss of key biodiversity.</p>	Approximately R 550,000 per annum
49. Domestic Orange Bag Recycling Programme	<p>The National Environmental Management Waste Act (2008) and the Polokwane Declaration in 2000 prescribed a 50% reduction in waste to landfill by 2012, and zero waste to landfill by 2022. Hence, this innovative recycling project, where recycling at source eliminates contamination in the recycling process.</p>	R 9.00 million to date
50. Durban Climate Change Partnership (DCCP)	<p>The DCCP unites diverse sectors, including business, industry, government, civil society, academia, people with disabilities and the youth in addressing the climate change challenge. Seed funding was provided by eThekweni Municipality to facilitate the formation of this body, which will become independently funded and administered in the longer term.</p>	R 800,000 to date
51. Durban Industry Climate Change Partnership Project (DICCPP)	<p>The core focus of the DICCPP has been to provide support to eThekweni Municipality's Energy Office to promote implementation of the formally adopted Municipal Energy Strategy.</p> <p>The DICCPP has also conducted a number of climate change response workshops with various economic clusters during 2010 and has participated in a local climate change partnership forged between the National Business Initiative, Durban Chamber of Commerce and Industry, UNIDO and eThekweni Municipality.</p>	R 700,000
52. Sister City Programme	<p>All sister city partnerships are based on formal cooperation agreements that focus on a number of areas of cooperation, and have resulted in the following projects: The DWATS system at Frasers Informal Settlement is a Public Private Partnership between the Bremen Overseas</p>	None Stated

	Research and Development Association (BORDA), eThekwini Municipality and Hering.	
53. Greening Moses Mabhida Stadium	Greening the stadium has yielded significant cost savings to the municipality, and provided the strategic advantage of being able to offer a “green” event hosting venue. This includes a 30% reduction in possible energy consumption through energy efficient architectural design, technologies and fittings, saving around R 1 million per annum. There has also been a 74% reduction in possible water consumption, saving around R 0.70 million per annum. Carbon emissions from building the stadium are being offset through local reforestation and renewable energy interventions.	R 6.60 million
54. Greening of Training Stadia for the 2010 FIFA World Cup TM	A best-fit greening intervention was determined for each venue to achieve energy efficiency, water conservation, waste management and climate protection using funds provided by eThekwini Municipality and Danish International Development Agency (DANIDA). Water conservation is achieved through the use of rainwater harvesting, flow restraint valves, intelligent pitch irrigation, the hi-tech pitch at KwaMashu and dual-flush toilets and tap aerators. Energy efficiency is achieved through heat pumps, motion detection lighting, daylight timer switches and flood control lighting. Environmental Management Systems were developed for maximum operational efficiency.	R 4.30 million
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<p>56. COP17/CMP7 Event Greening Programme</p>	<p>This programme aims to reduce the ecological impact associated with hosting the COP17/ CMP7 event. The core focus areas are carbon-neutrality, resource- and energy efficiency, ecological footprinting, the production of event greening guidelines and an awareness campaign around responsible accommodation and tourism approaches. It has also provided a platform for the development of the Community-Ecosystem Based Adaptation (CEBA) concept. These interventions will have a legacy value at the local, national and international level.</p>	<p>R 5.80 million</p>
<p>57. Green Guideline Series</p>	<p>The Green Guideline series provides practical tools to guide individuals, businesses and institutions in living and working more sustainably in Durban. They are concise, practical and focused documents providing clear information about choosing appropriate “green interventions.” The series includes Energy Efficiency, Water Conservation, Sustainable Waste Management, Green Landscaping, Green Roof and Green Eventing.</p>	<p>R 516,000</p>

Source: eThekweni Municipality (2011)