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A Critical Review of South Africa's Carbon Tax Policy Paper: Recommendations for the Implementation of an Offset Mechanism

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Abstract

The South African government has emphasised the need for 'developing country' solutions to climate change that simultaneously pursue GHG reductions and socioeconomic development. To encourage the transition to a low-carbon economy the National Treasury has proposed a carbon tax and offset mechanism to be introduced in 2015. The practical delivery of the offset scheme remains uncertain. This paper investigates which features and governance structure would be desirable for such a mechanism in South Africa. Primary research is conducted into the South African voluntary carbon registry; Credible Carbon. The questions asked by this paper are: Should firms be allowed to offset emissions? What is the ideal way to implement offsets in South Africa? This paper concludes that Credible Carbon provides a good model for carbon trading that can be scaled up to meet demand under the new regulations. However, government needs to ensure that projects continue to deliver acceptable social benefits and that carbon auditors are well-trained and accountable.

1. Introduction

The Carbon Tax Policy Paper released by the National Treasury in May 2013 outlines a set of new rules for pollution control in South Africa to be introduced from 1 January 2015. The Policy Paper proposes a carbon tax of R120 per ton of carbon dioxide equivalent (tCO_2e) to be levied on emissions in excess of the designated tax-free thresholds. Overtime the tax rate will gradually be increased and tax-free thresholds lowered. The Policy Paper notes that, "a carbon tax can be complemented or replaced by an Emissions Trading Scheme at a later stage" (National Treasury, 2013: 9). In the meantime, the policy outlines an offset mechanism which will allow firms to lower their tax liability by purchasing carbon credits to offset 5-10% of their total emissions.

South Africa's new rules follow a global trend of using market-based instruments such as carbon taxes and carbon trading to mitigate dangerous climate change. Carbon trading takes two main forms, 'offsetting' and 'cap-and-trade', with the straightforward goal of allowing companies and governments to reduce their emissions cheaply. Carbon offsetting entails the purchase of carbon reductions or credits. Firms and governments may purchase offsets because of a legal requirement to do so, or may voluntarily wish to reduce their carbon footprint. In South Africa, carbon trading currently operates as a voluntary market where firms purchase carbon offsets primarily for public relations or corporate social responsibility reasons. The market is small but growing, covering less than 0.1% of South Africa's total emissions in 2011 (Peters-Stanley & Hamilton, 2012).

The South African government's perspective on climate change is to reduce greenhouse gas (GHG) emissions while recognising that the priority for a developing country is to address poverty and socioeconomic development (National Treasury, 2013). The offset mechanism aims to provide firms with greater flexibility in meeting their targets, while broader benefits of sustainable development and poverty alleviation are visualised. It is argued that offsetting will increase investment into least cost mitigation options by incentivising firms to buy carbon offsets from projects that deliver emission reductions at a R/CO_2e cost lower than the carbon tax. Moreover local offset projects have the potential to deliver social benefits to communities such as rural development and employment (National Treasury, 2013).

The aim of this paper of is twofold; firstly to provide a critical analysis of the Treasury's decision to establish an offset mechanism, and secondly to suggest an appropriate delivery vehicle for the offset mechanism. This paper is structured as a series of questions and recommendations. The first question asks whether or not the purchase of carbon offsets should be allowed. In answering this question the economic argument for carbon trading is put forward, tempered by real world concerns and international experience. The establishment of an offset mechanism is motivated by efficiency gains and increased flexibility for firms. The following questions then relate to how the offset mechanism should be implemented. It is recommended that the mechanism is delivered by independent carbon registries that act as stock exchanges and already have the technical know-how and systems of governance and oversight in place. A case study analysis is conducted to assess a potential model for carbon trading.

The case study is the South African voluntary carbon registry Credible Carbon and a selection of projects that sell offsets through Credible Carbon. Information is obtained from an interview with Anton Cartwright (founding member of

Credible Carbon and carbon market expert) on 22 July 2013, visiting the project site of the Hout Bay Recycling Co-op, and project verification reports. The advantage of such a case study is that it provides unique and detailed insight into the 'real' workings of carbon trading. This paper argues that the National Treasury should recognise local registries such as Credible Carbon which focus on offset projects with social benefits as appropriate delivery vehicles for the proposed offset mechanism. However, external systems of oversight may be required to ensure that projects continue to deliver adequate social benefits and that carbon auditors are capable and objective.

2. Should firms be allowed to offset emissions?

a. Theory of carbon trading

Carbon trading is grounded in the economic theory of pollution control which seeks to find the most efficient way to reduce emissions. In an economy, if the cost of pollution to the polluter is lower than the cost of pollution to society as a whole, and carbon cannot be traded, there is a negative externality in that more pollution is produced than is socially optimal (Sloman, 2006). The theory assumes that we know the marginal benefit and marginal cost of pollution to society and thus could theoretically calculate the level of emissions that maximises the welfare of society. In a cap-and-trade system a 'cap' or limit is set on carbon emissions at this quantity. This cap is represented in Figure 1 as a vertical line at the optimal level e*. With a cap system the firm is commanded to reduce its emissions to the point e*. With a carbon tax, e* is achieved by attaching a fixed price to pollution indicated by the horizontal line. The optimal level of abatement e* is achieved because the firm will not abate more if the marginal cost of abatement exceeds the tax rate. The tax revenue is illustrated by the shaded area.

In an economy with multiple firms, firms can trade carbon within the cap-and-trade system. The overarching cap is set by the government at the socially efficient level creating the scarcity required for a market. Participants within the cap-and-trade system then buy or receive the right to pollute in the form of permits or allowances based on the emissions reduction target. These permits can then be traded among participants with different marginal abatement costs in order to achieve the target at the least economic cost (Stern, 2007). The theory assumes a perfectly competitive market system in which firms take prices as given and there are no impediments to the free trade of permits.

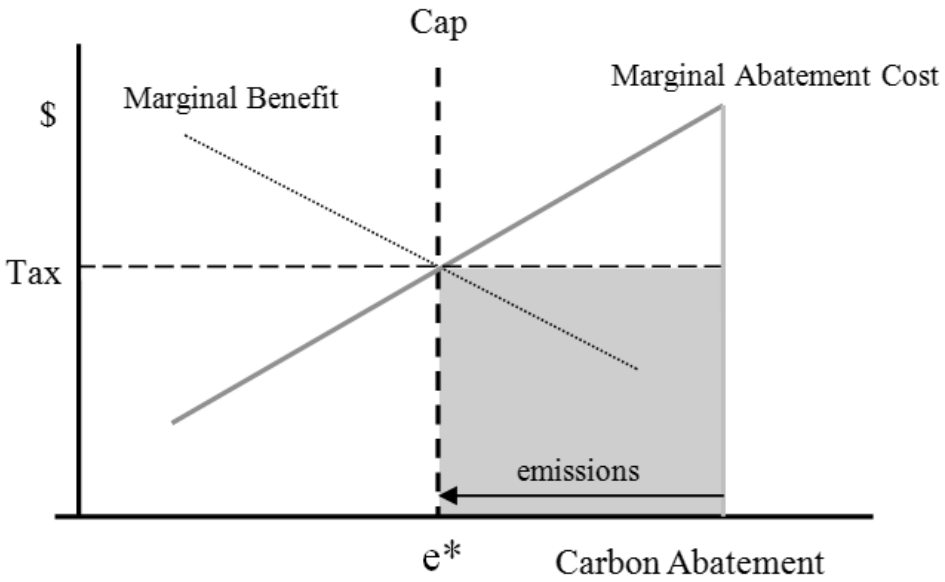


Figure 1: Carbon Tax vs. Cap-and-Trade

Whereas permits confer the right to emit, carbon credits can be purchased by firms to 'offset' emitting activity. Exchanging carbon offsets requires creating a tradable commodity. This is achieved through individual projects which reduce GHG emissions through various means. To be credible, these reductions must be verifiable, measurable and additional to a business-as-usual scenario. The economic cost of reducing carbon can be lowered if offset projects face lower abatement costs than firms. Moreover if one ton of carbon has the same global warming potential regardless of where it is emitted, firms should be allowed to buy carbon credits from offset producers located anywhere in the world. As stated in the Stern Review, "as long as these credits represent real emissions reductions, there is little reason to restrict their use, as cost-efficiency demands that emissions reductions are made wherever it is cheapest" (Stern, 2007).

According to economic theory, carbon trading and a carbon tax will yield the same environmental results and carbon prices in the long run. The difference is that a carbon tax provides price certainty over the short to medium term while giving no absolute limit on emissions. Whereas an emissions trading scheme provides certainty with regards to level of emissions, but not the price (Stern, 2007). The Carbon Tax Policy Paper combines the two instruments by setting a stable price for emissions and allowing firms to offset 5-10% of emissions based on their mitigation potential.

b. Limitations and market failure

The real world is more complex and many of the simplifying assumptions mentioned in the above section do not hold. As a consequence carbon trading functions less smoothly in reality. In the offset market, trading in an invisible compound creates a problem of asymmetric information between buyers and sellers, and high transaction costs such as verifying and monitoring offset projects are required to convince buyers that reductions are credible. The theory assumes a market structure where individual firms have no market power. However in reality actors are unequal and power is concentrated amongst large firms and multi-nationals, e.g. the energy sector (Spash, 2010). Powerful vested interest groups also wield influence over the institutional structure of the system and the way in which permits are allocated (Spash, 2010). Overall market distortions mean that the equilibrium price and quantity of carbon is unlikely to represent a true optimum. However, so long as the costs of market failure do not outweigh the benefits of achieving emissions reductions at a lower cost a case can be made in favour of cap-and-trade schemes.

The decision to implement a carbon tax instead of a cap-and-trade system in South Africa was greatly influenced by real world considerations. The oligopolistic market structure of the energy sector would have hampered efficient carbon trading. Further, government regulation of electricity prices and ownership of Eskom would need to be carefully factored into the design of an emissions trading scheme (Goldblatt, 2010). The costs of setting up a cap-and-trade system were estimated to be far higher than implementing a tax. Carbon trading is administratively complex and there is a need for a transparent and effective institutional framework which would be difficult and costly to establish in South Africa (National Treasury, 2013). The carbon tax will also provide government with a secure revenue stream which can be used to address the distributional impacts of carbon pricing (Goldblatt, 2010).

With both carbon taxes and cap-and-trade schemes there is the upfront difficulty of determining the appropriate price or emissions cap. A lack of data, complex feedback mechanisms and difficulties in quantifying the full benefits of reductions pose substantial challenges to calculating the socially optimal level of emissions (Spash, 2010). The Carbon Tax Policy document states that a tax of R120 per tCO_2e is a modest price that balances the need to transition away from carbon against the burden of higher carbon prices on households and commercial competitiveness.

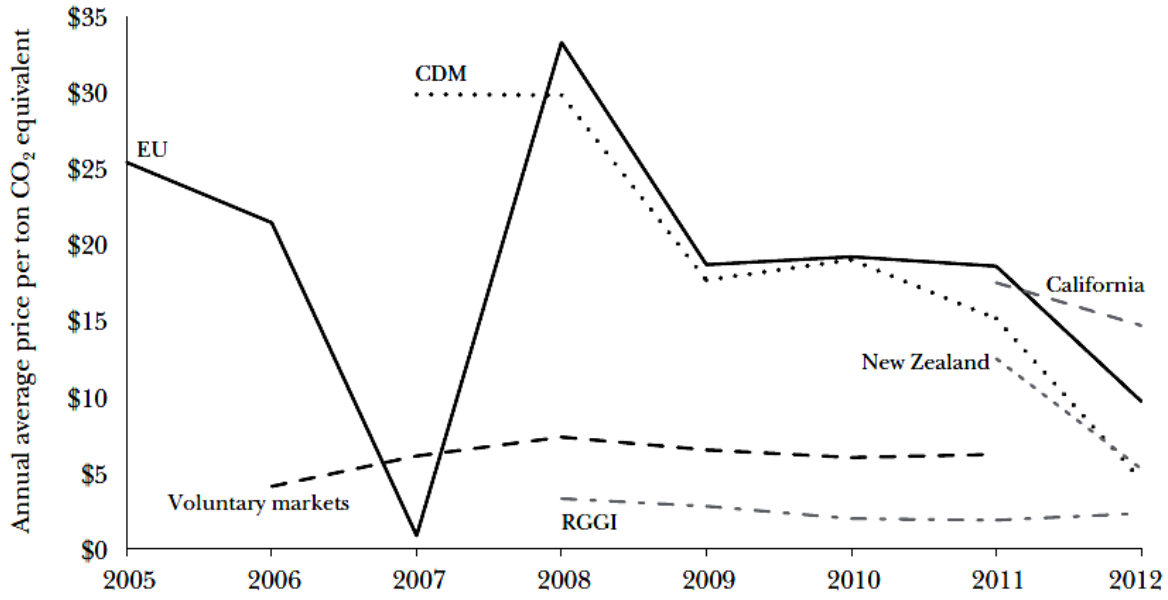
c. International experience with carbon trading

Carbon offset markets exist under both voluntary and compliance schemes. In compliance markets demand for offsets is created by a mandatory legal requirement. At the end of 2012 the main compliance markets were the EU's Emission Trading System; the Clean Development Mechanism; the Regional Greenhouse Gas Initiative (north-eastern American states) and New Zealand's Emissions Trading Scheme (Newell *et al.*, 2013). The EU's Emission Trading System is the world largest cap-and-trade scheme; it is company-based and covers roughly 40% of Europe's emissions. The Clean Development Mechanism is an offset market set up by the UN's Kyoto Protocol. The Clean Development Mechanism aims to help industrialized countries meet their Kyoto abatement targets by financing carbon reduction projects in developing countries. Voluntary markets enable companies and individuals to reduce their carbon footprint on a voluntary basis. The voluntary market is fragmented into numerous registries which market and sell credits. Examples of large standards bodies for voluntary carbon offsets are the Gold Standard and the Verified Carbon Standard. Collectively, carbon transaction volumes reached 10.3 billion tons of CO_2e in 2011, accounting for roughly 20% of global emissions (Kossoy & Guigon, 2012).

While the volumes of carbon traded have been growing, both within markets and due to the creation of new markets, prices have been extremely volatile as indicated by Figure 2. The major collapse in prices in 2007 represents Europe's largest carbon trading hurdle so far. The price drop arose due to a number of factors. In the pilot phase modest emissions reduction goals were set under time pressure and without reliable data. When data on aggregate emission levels was released in 2006 participants realised that the supply of permits exceeded demand and the rules of the system prevented participants from 'banking' these permits for future use. This over-allocation of allowances lead to a carbon price that was essentially zero (Newell *et al.*, 2013).

In all markets prices have been falling in response to the global economic downturn. In the European market, current low prices have been caused by an oversupply of credits due to an unprecedented amount of carbon offset projects and lack of demand due to insufficient reduction commitments from developed countries. This has been compounded by the global recession which has reduced demand for carbon credits via reduced emission levels (Seppänen *et al.*, 2013). Price volatility in the carbon market is harmful as it creates uncertainty and deters firms from making long-term investments in low-carbon technologies. A volatile carbon price also makes it difficult to determine whether or not individual carbon offset projects will be successful. Price floors and ceilings have been suggested to reduce the risk of price spikes. However these

mechanisms need to be credible to work, and price intervention runs the risk of creating unintended wealth transfers and compromising market clearing (Stern, 2007).



(*Source*: Newell *et al.*, 2013: 127)

Figure 2: CO_2 Allowance Prices (nominal)

The EU's Emission Trading System has been successful in that it has significantly reduced emissions while not hindering the competitiveness of EU firms (Laing *et al.*, 2013). Emissions savings attributable to the EU's Emissions Trading System are estimated to be in the range of 40 to 80 $MtCO_2$ per year which is bigger than the impact of most other individual energy-environmental policy instruments (Laing *et al.*, 2013). However, the scheme has been criticised for failing to encourage firms to initiate long-term investment in new, clean technology. Instead reductions have come from short-term fuel-switching and energy conservation, as well as purchasing carbon credits (Leiter *et al.*, 2011).

The world's largest offsetting scheme - the Clean Development Mechanism - has received both praise and criticism. It has been touted as a means to achieve higher overall reductions without compromising equity concerns as it entails developed countries financing the transition to low-carbon economies in the developing world through the purchase of offsets (Gilbertson & Reyes, 2009). Developing countries are arguably able to create carbon credits at a lower cost as they have on average lower energy efficiencies, less advanced technologies, lower labour costs and weaker regulatory requirements (Kollmuss *et al.*, 2008).

To ensure that host countries benefit from offset projects the Mechanism requires projects to deliver sustainable development benefits in addition to carbon reductions. Past research indicates that while offsets do bring revenue into developing countries, broader development benefits to communities have been limited (Peters-Stanley & Hamilton, 2012). Moreover, offsets have primarily been purchased from India and China, who are the biggest emitters in the developing world. To address inequality concerns, as of 2013 only carbon credits from existing projects registered before 2013 or from LDCs will be accepted.

d. Recommendation: Offsets are needed to facilitate adjustment

The government's decision to implement a carbon tax instead of a full cap-and-trade system is the right choice given the high costs of setting up and enforcing a cap-and-trade scheme in South Africa. While a carbon tax will not guarantee that environmental targets are reached, it will provide the price stability needed to encourage firms to make long-term investment decisions and commit resources to research and innovation in emissions reduction. However, a carbon tax alone will not provide firms with much flexibility to abate emissions. In particular, energy-intensive industries are concerned about their ability to reduce emissions given that they have little control over the carbon intensity of electricity (Copeland, 2012). The establishment of an offset mechanism alongside the carbon tax is recommended to increase flexibility and lessen the impact of the tax on commercial competitiveness. Increased flexibility will also give businesses more reason to stay in South Africa and not relocate to areas that do not have carbon policies in place – a phenomenon known as carbon leakage. Moreover, a reliable offset mechanism will increase the economic efficiency with which emissions reductions are achieved if offset projects can reduce carbon at R/CO_2 cost lower than R120. The price of R120 provides an upper limit for the price of carbon offsets. This will reduce instability in the market that has been problematic in international trading schemes.

The question then becomes: what percentage of emissions should firms be allowed to offset? Economic theory suggests that allowing firms to offset 100% of their total taxable emissions allows for carbon abatement at the least cost if credits are priced below R120. The concern is that by allowing firms to simply offset, firms do not have an incentive to make long term changes and move away from fossil fuels. The validity of this claim depends on how long term the offset projects are. For example, offset projects that invest in renewable energies will contribute to a shift away from fossil fuels. The offset allowance should

then depend both on the firm's ability to abate and the nature of offset projects. Given the efficiency gains to be had from carbon trading, an offset allowance of between 5 and 10% appears modest, although the type and credibility of offset projects must be considered.

3. What is the ideal way to implement offsets in South Africa?

a. The ideal governance structure for carbon taxation / exchange

Government can elect to manage the sale of offsets itself by establishing a public carbon registry or it can allow companies to buy offsets from existing registries which currently operate without government oversight. The government is currently involved with carbon trading via the Clean Development Mechanism. South African offset projects seeking to register with the Clean Development Mechanism are overseen by the Department of Energy which has some capacity to aid the approval process (DoE, 2013). Offset projects are verified by accredited carbon auditors, the majority of which are international (DoE, 2013). Establishing a centralised, government controlled registry would require significant institutional capacity, political will and technical expertise. It is precisely a lack of these characteristics that has been held liable for the low uptake in offset projects in sub-Saharan Africa (Olsen & Fenhann, 2008).

Arguably, a better alternative would be for government to decentralise the sale of offsets by permitting firms to purchase carbon credits from independent and effective registries that already possess the technical knowhow and have systems of oversight and governance in place. The question then is whether to recognise well-established, international registries and/or smaller locally established registries such as Credible Carbon which is currently the only locally developed carbon registry in South Africa. Whereas international registries sell offsets that have been produced all over the world, Credible Carbon focuses on offset projects operating in South Africa which have high social benefits in addition to GHG reductions (Cartwright, 2013). The following section describes Credible Carbon's model of carbon trading, and thereafter questions its desirability and scalability.

b. The Credible Carbon model

Credible Carbon, established in 2008, is South Africa's only locally developed voluntary carbon registry. As a carbon registry it acts as a stock exchange allowing buyers and sellers to transact Verified Emissions Reductions (VERs). VER is the term given to a legitimate offset in the voluntary market that is equivalent in global warming potential to 1 ton of CO_2. Offsets are issued and can be sold only after they have been verified by an independent carbon auditor. Verification is required to attach value to the invisible compound and convince buyers that the GHG reductions are real and that carbon credits deliver their stated benefits to communities. In order to assure buyers that offsets are legitimate registries adopt a set of rigorous carbon standards. The standards of the Clean Development Mechanism which are notorious for their complexity, and high levels of detail and technical expertise, are required to quantify a project's GHG reductions. These stringent standards have resulted in high transaction costs that are debilitating for smaller projects (Chadwick, 2006). The standards adopted by Credible Carbon are less onerous in order to cut down on transaction costs and enable smaller projects to be successful. Credible Carbon's standards are simple and easy to understand so as to gain buyers' trust in the market and system (Cartwright, 2013).

Four questions guide Credible Carbon's verification process:

1. Is the project real?
2. Is the described technology in place and functioning in accordance with its design specification?
3. Are the estimates of greenhouse gas emissions reduction reasonable in terms of accepted international standards and unbiased towards buyer or seller?
4. Is there a discernible impact on poverty?

Credible Carbon's competitors are larger, internationally established voluntary registries such as Gold Standard and the Verified Carbon Standard. These bodies typically have more rigorous carbon standards and are suitable for large scale projects that produce enough carbon credits to afford the higher transaction costs. However large scale projects typically tend to have less social development benefits (Corbera *et al.*, 2009). As voluntary buyers in the South African market tend to be interested in the social benefits of projects as well as the GHG reductions there was a gap in the market for a registry that was more affordable for smaller carbon projects with high social benefits (Cartwright, 22 June 2013: personal communication). Credible Carbon has also attracted larger offset projects. For example, Reliance Compost opted to move from the international registry TUV Nord to Credible Carbon due to exorbitant money

and time costs associated with TUV Nord's carbon standards. In terms of the price of carbon, Credible Carbon is competitive with international registries. Credible Carbon's prices in 2012 ranged from R43 per tCO_2 to R250 per tCO_2 depending on the size of the transaction and nature of the project. In comparison, the weighted average price in the global voluntary market was US$5.9 per tCO_2 (R59) (Peters-Stanley & Yin, 2013).

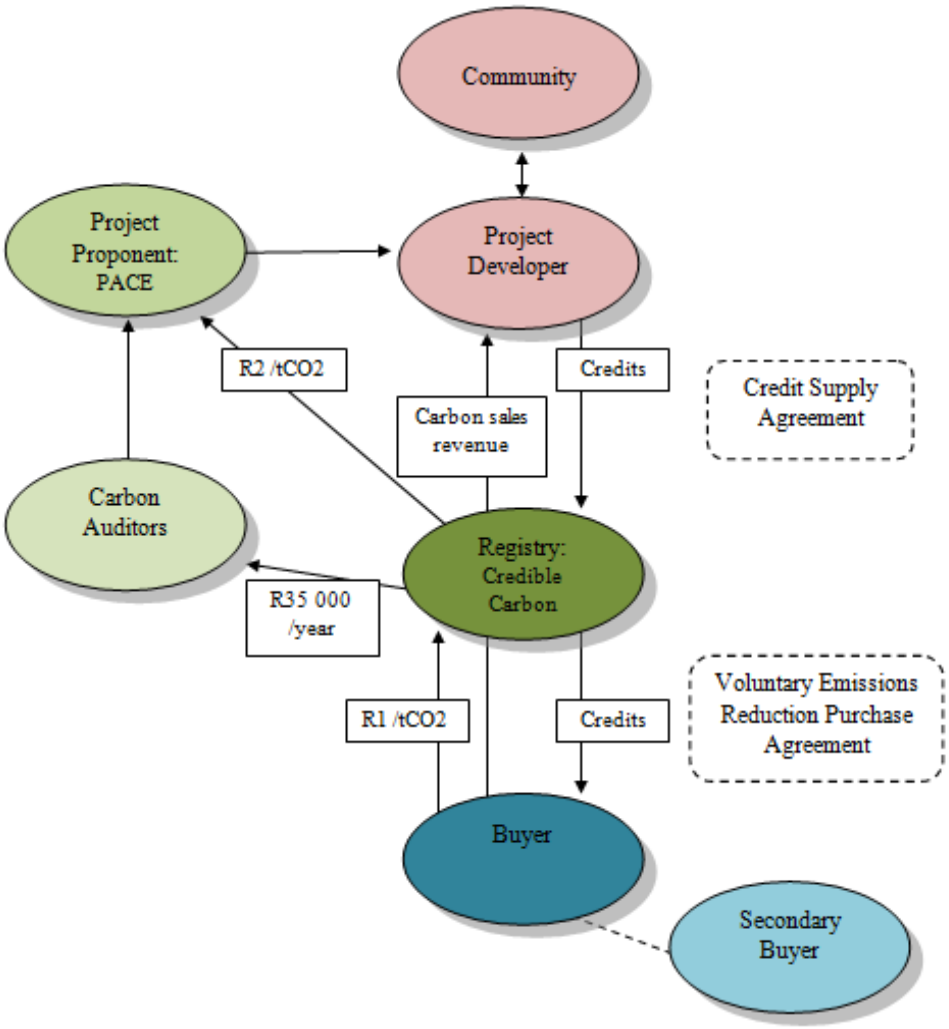
As indicated by the fourth guiding question, projects registered with Credible Carbon should have a discernible impact on poverty. Credible Carbon aims to direct revenue towards projects that have social benefits on the grounds that mitigating climate change involves both poverty reduction and GHG reduction. Carbon trading is seen as the technical vehicle to provide social progress (Cartwright, 22 June 2013: personal communication). Credible Carbon does not operate for profit and requires that 70% of the carbon revenue after audit fees must be returned to the project community. Credible Carbon has experienced growth in volumes traded from 8 000 tCO_2 in 2010 to over 42 000 tCO_2 in 2012 (Cartwright, 2013).

Credible Carbon currently has 10 projects from which buyers can purchase offsets. Three projects of different scale and type are referred to and investigated in this paper. The projects are:

- *Reliance Compost* – avoids methane production by composting green waste from the Cape Town metropolitan municipality. Size: 145 919 tCO_2 per annum
- *Umdoni Bio Fuel* – provides 4000 households in Umdoni Kwazulu-Natal with bioethanol gel (a by-product of the local sugarcane industry) to replace coal, wood, paraffin and dung fuel sources. Size: 800 tCO_2 per annum
- *The Hout Bay Recycling Co-op* – a small project in Imizamo Yethu township in Hout Bay that sorts and recycles waste to reduce the amount of waste entering landfills and minimize production of virgin materials. Size: 296 tCO_2 per annum

Figure 3 illustrates the stakeholders in the carbon business and how they interact with one another. PACE stands for The Promoting Access to Carbon Equity Centre. PACE is a South African based, not-for-profit organisation that plays the role of project advisor and coordinator, or 'project proponent', on behalf of Credible Carbon. PACE was established before Credible Carbon in 2004 to help South African projects seeking to register with the Clean Development Mechanism. PACE then led to the development of Credible Carbon, a separate legal entity, as a means to address the shortfalls of the Clean Development Mechanism. The following aims to describe the roles, responsibilities and

incentives of each stakeholder in greater detail, as well as the nature of negotiations and oversight between the parties.



(*Source*: Author, based on communications with Cartwright on 22 June, 2013)

Figure 3: Stakeholders and Transaction Flows

Project developer and community

The project developer initiates the offset project and assumes responsibility for the day-to-day managing of the project. The project developer may be an individual, community, NGO, firm or municipality. Reliance Compost is a for-profit company. The Hout Bay Recycling Co-op is a social enterprise that was started by the residents of Imizamo Yethu township and the NGO Thrive. The project initially required additional funding from Thrive but has since become independent of the NGO. Umdoni Bio Fuel started out as a means for the Umdoni Municipality to meet its Free Basic Alternative Energy obligations, and later established itself as an offset project. The community refers to the broader

beneficiaries of the project such as the project employees and surrounding inhabitants.

It is important for the project developer and the registry to clearly define who has ownership of the carbon. This is clarified in the Credit Supply Agreement before the project is registered. For example, if a project entails fitting RDP houses with solar water heaters, it must be clear whether or not it is the government, who paid for the heaters, or the private households, that now use the heaters, that will receive revenue from VER sales. The project developer has an incentive to maximise his revenue from carbon. This entails choosing a registry that will negotiate a high carbon price and deliver high net cash returns quickly, and maximising the project's stated carbon reductions. The role of the carbon auditor is thus crucial to ensure that projects accurately report volumes of carbon abated. Projects are required to keep careful records in order to ensure that their abatement can be correctly recognised.

Project proponent

The Promoting Access to Carbon Equity (PACE) Centre is the project proponent. PACE plays the role of project advisor and coordinates interactions between Credible Carbon, the project and the auditors. PACE is responsible for conducting the initial due diligence on potential projects and thus assumes the upfront time risks. PACE advises projects on how best to proceed, also helping to create the initial documents required to register the project. The carbon auditors are hired and paid by Credible Carbon but managed and overseen by PACE. PACE ensures that the carbon auditors stay within budget, and recommends deadlines for verification reports to prevent auditors from getting too caught up in the finer details. PACE does not operate for profit and receives R2 for each ton of CO_2 sold from Credible Carbon.

Carbon auditors

Independent carbon auditors are hired by Credible Carbon to produce yearly verification reports. Audits typically last four days and involve a site visit and beneficiary interviews. The auditor answers the four questions that guide the registry's standards and quantifies the project's annual emissions reductions. The auditor is required to confirm that estimates of emissions reductions are "plausible and unbiased". By requiring a good estimate rather than a precise number Credible Carbon is able to keep the cost of auditing down. Auditing is the largest transaction cost and Credible Carbon typically pays R35 000 for audits per project per year which is substantially less than other registries. Past

auditors used by Credible Carbon include the University of Cape Town's Energy Research Centre, SouthSouthNorth, Urban Earth, Carbon Calculated and The Green House, all of which are South African.

Verification is critical for the credibility of the registry and project which is required to attract buyers and higher prices. The registry must choose auditors that will be acceptable to the project developer and potential buyers. This requires auditors that are expert, efficient and do not have any conflict of interests. Ideally, auditors should value their reputation more than the fee they receive (Atkins, 2013). The verification report for Reliance Carbon found the project's estimates to be reasonable and slightly understated. For 2012 the auditors estimated reductions of 145 919 tons of CO_2e, and Reliance Compost estimated 142 376 tons of CO_2e (Hetherington & Palmer, 2013). The original PIN and 2011 verification report for Umdoni Bio Fuel estimated carbon reductions of roughly 5 535 tCO_2e. This estimate was based on the assumption that the bioethanol gel fuel dispensed to the households each month lasted for the full month, when in reality the fuel was used up within 7 days. Thereafter households reverted to paraffin, firewood or electricity. This error was only picked up in the third and most recent verification report and estimates were revised downwards by 85% to 800 tCO_2 per annum (Mckenzie & Botes, 2012). While the auditor's word is final, a misleading verification report that exaggerates carbon reductions can be harmful to the registry's reputation. This should incentivise the registry to ensure that reports are accurate and unbiased.

Registry

Credible Carbon acts at the market place putting sellers into contact with buyers. Credible Carbon markets its credits through its website, at conferences and by presenting to businesses interested in reducing their carbon footprint. Credible Carbon sells the Verified Emissions Reductions to buyers and receives payment. The revenue is first used to pay off the auditing fee of R35 000, thereafter Credible Carbon pays PACE R2 per ton of CO_2e sold and collects a registration fee of R1 per ton. The remaining sales revenue is given to the project. The Voluntary Emissions Reduction Purchase Agreement is the legal document that transfers ownership of VERs from the project to the buyer. Ownership of credits is transferred from the project to the buyer at the point of sale. Thereafter, the buyer and not the project can claim to have reduced emissions. The registry is responsible for negotiating a good price and guaranteeing that the VERs conform to the registry's standards. The price of offsets is influenced by various factors which are discussed in the following section on price determination.

Buyers

Corporate buyers account for the majority of transactions in the global voluntary market – 92% in 2011. The largest share of these buyers (54%) purchased offsets for corporate social responsibility, public relations and branding reasons. Other motivations include resale of offsets (22%) and anticipation of formal regulation (12%) (Peters-Stanley & Hamilton, 2012). Credible Carbon's largest buyers are financial services firms, fuel companies, conferences, tourism services and politicians who purchase offsets to boost their green image or achieve corporate sustainability goals (Cartwright, 22 June 2013: personal communication). Increasingly, South African firms may also feel pressure from EU-based firms that want information on the carbon footprint of exports (Peters-Stanley & Hamilton, 2012). Buying carbon credits from Credible Carbon is straightforward and accessible to anyone through their online purchasing system. Buyers can state how much carbon they would like to buy and from which projects. Buyers can then hold their offsets and later resell them, or retire them. If credits are retired they are removed from the system to prevent them from being used more than once. The movement of the VERs is tracked by the registry.

Information asymmetry between buyers and sellers is an inevitable challenge in a market that involves an intangible compound. The project developer has in-depth knowledge into the GHG reductions and social benefits of their project. In order for the credits to be legitimate and command a high price, it is important that this information is communicated to buyers who are typically cautious of projects they don't understand. In order to reduce information asymmetry Credible Carbon aims to make the entire process as transparent as possible. Project summaries, Project Idea Notes and verification reports are publically available on the website. The registry is easy to contact and buyers are encouraged to visit the project sites in order to close the information gap (Cartwright, 22 June 2013: personal communication)

c. The social outcomes delivered by Credible Carbon

Credible Carbon requires that projects have a discernible impact on poverty, but places no requirements on how carbon revenue is spent by a project. In the verification report, the auditors list and qualitatively assess the social benefits of a project. The Hout Bay Recycling Co-op benefits the community by providing an income opportunity in an impoverished area and by offering a waste removal service to the surrounding township which is not serviced by the municipality. The project keeps its carbon revenue in a staff trust and spending decisions are made collectively by the employees (Mason-Jones, 2013). The social outcomes

of the Umdoni Bio Fuel project include cost savings of around R50 – R70 per household per month as the gel fuel replaces some of the need to buy paraffin. This cost saving is significant relative to the prevailing levels of poverty in the Umdoni community. The gel stoves also reduce the risk of fire and improve indoor air quality (Wesselink & Moosa, 2011). The listed social benefits of Reliance Compost include job creation, staff training, donations made to external community projects and establishing Oranjezicht City Farm which celebrates local food, culture and community (Hetherington & Palmer, 2013). Reliance Compost states that its carbon revenue is earmarked for staff and community benefits. However, as Reliance Compost operates at a profit without the sale of credits, there is a concern that carbon revenue may simply replace funds that the firm would have allocated to social spending anyway (Cartwright, 22 June 2013: personal communication). Overall, it appears that projects registered with Credible Carbon deliver tangible and significant social benefits.

d. Price determination in the Credible Carbon model

The price that carbon is able to secure in the voluntary market is important for the viability of the market. In particular smaller scale projects require a higher carbon price in order to pay off the auditor's fee. It is therefore important to identify which factors influence the price of offsets.

Four key factors can be identified:

- Size of the sale
- Buyer's intentions
- Attractiveness of the project
- Carbon standards and quality of verification

Credible Carbon's current average price per ton of CO_2 is R90. Online purchases are subject to a set price of R120 per ton. This is a premium price for small transactions. Larger purchases by institutional buyers are typically negotiated less formally by a company representative and the registry. The registry is usually willing to lower its prices if the buyer offers to purchase a large volume of credits. If the buyer's intentions are to buy credits for public relations reasons, the attractiveness of a project in terms of its social benefits weighs heavily on the price. Institutional buyers are willing to pay a higher price for credits from more 'attractive' projects, such as the Hout Bay Recycling Co-op than for credits from more industrial projects, such as Reliance Compost (Cartwright, 22 June 2013: personal communication). The nature of carbon offsets requires rigorous carbon standards and verification to reassure buyers that reductions are

real. Hence projects with more convincing documentation and reputable auditing can command higher prices in the market (Peters-Stanley & Hamilton, 2012).

e. Will Credible Carbon cope with a statutory offset system?

The case study reveals that Credible Carbon's model of voluntary carbon trading is functioning well. Lower transaction costs mean that smaller projects with high social benefits can earn revenue from the sale of VERs. Voluntary buyers are typically interested in buying offsets for PR reasons thus community focused projects can receive a good price for their offsets. Independent carbon auditors, overseen by PACE, ensure that projects do not overstate their reductions. Both the auditors and the registry have an incentive to ensure that reductions are measured accurately in order to maintain a good reputation. Currently, Credible Carbon does not operate for profit and employees are paid at a rate far lower than market rates. The market is too small for the system to make a significant environmental impact. However, the registry is achieving its goal of using carbon trading as a means to direct revenue to 'good' projects that have a discernible impact on poverty.

While Credible Carbon currently functions in the voluntary market, it provides a 'rough and ready' system that could be moved into the compliance space with a statutory offset system. The advantage of the Treasury recognising offsets from local registries, such as Credible Carbon, is that it keeps revenue in South Africa. Firstly, the offset projects are located in South Africa and secondly, whereas both the Department of Energy and international registries make use of international carbon auditors, Credible Carbon hires auditors based in South Africa. Moreover, Credible Carbon supports projects that aim to deliver both socioeconomic benefits and GHG reductions. This is in agreement with government's overarching view that climate change policies should also promote development.

At an average price of R90 per ton of CO_2e Credible Carbon's offsets would be competitive with the tax of R120 per ton. If the Treasury were to allow firms to purchase offsets from Credible Carbon, the registry would likely face a dramatic increase in demand. A concern is whether or not the system can be scaled up to meet this demand. With increased demand certain projects could produce more VERs. For example, Umdoni Biofuel would be able to expand the scheme to include more households or provide more fuel to each household. Successful projects such as the Hout Bay Recycling Co-op could be replicated in other communities. Verification methods could be tailored to a certain type of project

and the established methodology simply repeated for the different project locations. Thus, in the long run costs are expected to fall as projects are expanded or replicated and technical skills are gained.

Another issue to consider is how a change in buyers' intentions might affect the system. In the voluntary market buyers are willing to pay for credits with a 'good story' but in the compliance market buyers generally want to purchase legitimate offsets at the lowest cost. Often projects which deliver offsets at a low cost are large and industrial with less social benefits (Corbera *et al.*, 2009). Less pressure from the demand side to establish projects with high social benefits should not be a problem if the registry remains committed to selling offsets from projects that make a discernible impact on poverty. However, a potential role for government could be to provide additional oversight to ensure that projects are indeed benefitting local communities under the statutory offset system.

4. Conclusion

An offset mechanism has the potential to increase economic efficiency and reduce the effect of the planned carbon tax on industry competitiveness. Using Credible Carbon as a case study, this paper argues that local, community focused registries are desirable and scalable, and should be recognised by the National Treasury as the appropriate delivery vehicle for the proposed mechanism. Increased demand for offsets from the new carbon tax policy has the potential to lower transaction costs in the long run, promote higher levels of technical expertise, and increase the environmental and socioeconomic impact of the system by enabling the establishment of more offset projects. However there remain a few concerns regarding the implementation of an offset mechanism that policymakers need to pay careful attention to.

The legitimacy of offsetting as a means to combat climate change is dependent on whether or not offset projects actually deliver their stated carbon reductions and whether these reductions are additional to a business-as-usual scenario. Independent and accredited carbon auditors are thus crucial to the proper functioning of the system. There is a concern that auditors could be biased towards approving projects if it brings them more work in the future and that auditors in South Africa may simply not have the technical knowledge and skills required to accurately calculate emissions reductions. Further questions that need to be asked are: Which bodies in South Africa are capable of measuring carbon reductions? How expert and unbiased are the auditors? Should government invest in training more carbon auditors? Should government be responsible for establishing a set of uniform standards and methodologies that auditors can apply?

A further difficulty is measuring the social impacts of offset projects. Concepts such as 'sustainable development' and 'community benefits' are subjective and mean different things to different people and governments. Currently, carbon auditors qualitatively list and assess the social benefits of offset projects registered with Credible Carbon. However, a more rigorous set of standards may be required if the scheme is to be implemented on a larger scale. A number of methods exist for quantifying social impacts. Household income is one of the most widely used measures of economic progress. However, human well-being is multi-dimensional and includes health, education, social connections and political freedoms. An alternative perspective is Sen's capabilities approach which focuses on means that increase an individual's capability to do or be something different, of which money is just one tool (Stiglitz *et al.*, 2009). The measurement of social benefits will also need to account for the distinction between *current well-being* and *sustainability*, that is, whether benefits will last over time.

An issue touched on earlier in this paper is that carbon offsetting may allow firms to lower their tax liability without undertaking any serious commitment to reduce the carbon intensity of their production methods or invest in clean technology. In order to promote a transition to a low-carbon economy, long-term changes to move away from fossil fuels are required. If offset projects result in real carbon reductions and are long-term in nature, offsetting should not be restricted (Stern, 2007). Hence, government and carbon registries should be alert to promoting projects that are sustainable in order to shift the economy away from a dependency on non-renewable energy forms. A final concern is whether or not the demand for offsets will be as robust as anticipated. Initially, firms may be able to reduce emissions quite easily and cheaply in-house. However, it is expected that as low cost abatement options are exhausted and as the tax rate is gradually increased and tax-free thresholds lowered, offsetting will become increasingly attractive to firms.

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