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CARBON OFFSETS PAPER

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Acronyms and abbreviations

AAU	Assigned Amount Unit
ARR	Afforestation, Reforestation and Revegetation
ACR	American Carbon Registry
AFOLU	Agriculture, Forestry and Other Land-Use
ARB	Air Resource Board
AUD	Australian Dollar
CAD	Canadian Dollar
CAR	Climate Action Reserve
CCBS	Climate, Community and Biodiversity Standard
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CFI	Carbon Farming Initiative
CO2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DEA	Department of Environmental Affairs
DNI	Daily Normal Irradiance
DoE	Department of Energy
€	Euro
ETS	Emissions trading system/scheme
EU	European Union
EU ETS	European Union Emissions Trading System
GHG	Greenhouse gas
GS	Gold Standard
HFCs	Hydrofluorocarbons
IRP	Integrated Resource Plan
IPP	Independent Power Producer
JI	Joint Implementation
LTMS	Long-Term Mitigation Scenarios
LULUCF	Land Use, Land-Use Change and Forestry
$MtCO_2$	Metric tonnes of carbon dioxide equivalent
MRV	Measurement, reporting and verification
NCCRP	National Climate Change Response Policy
REDD	Reducing Emissions from Deforestation and Forest Degradation
RSA	Republic of South Africa
RGGI	Regional Green House Gas Initiative
SWH	Solar Water Heater
UNFCCC	United Nations Framework Convention on Climate Change
US$	American Dollar
VCS	Verified (Voluntary) Carbon Standard
VERs	Voluntary Emission Reductions
ZAR	South African Rand

Executive summary

1. South Africa voluntarily committed at the 2009 UN Conference of Parties (COP) on Climate Change held in Copenhagen in Denmark, to reduce greenhouse gas emissions from projected "business-as-usual scenarios" by 34 per cent in 2020 and 42 per cent in 2025, subject to certain conditions. In 2011, South Africa adopted the National Climate-Change Response Policy which comprises a comprehensive package of measures to deal with both mitigation (reducing greenhouse gas emissions) and adaptation (ensuring climate-change resilience through pubic investments).
2. The United Nations Intergovernmental Panel on Climate Change (IPCC) re-confirmed in its Fifth Assessment Report in September 2013 the high likelihood (95-100%) that global climate change is largely the result of increases in anthropogenic GHG emissions (due to human activity), and hence the need to reduce the growth in GHG emissions. The more recent April 2014 part of the report outlined a package of mitigation instruments, including decarbonisation of electricity generation, reducing emissions from transport building and industry, and addressing agriculture forestry and land use emissions pathway. The IPCC also noted in its adaptation findings concerns about the impact of climate change on food production, livelihoods and hunger that could slow or possibly even reverse progress on poverty reduction and development gains over the last 20 years.
3. The 2012 National Development Plan which offers a long-term perspective to eliminate poverty and reduce inequality by 2030, notes the importance of creating a framework for the transition to an environmentally sustainable low-carbon economy.
4. Following the publication of the Carbon Tax Policy Paper in May 2013, the Minister of Finance confirmed in the 2014 Budget that: "… a package of measures is needed to address climate change and to reduce emissions. This will include the proposed carbon tax, environmental regulations, renewable energy projects and other targeted support programmes. To allow for an alignment with the desired emission reduction outcomes (DEROs) being developed by the Department of Environmental Affairs the implementation of the carbon tax is postponed by a year to 2016". The 2014 Budget Review notes that: "…the proposed carbon tax and incentives, such as the energy-efficient tax incentive, will provide price signals to encourage the economy onto a path of low-carbon growth over the long-term."
5. The carbon tax formula (see Table below) as announced in the 2013 Budget allows for a basic tax-free threshold for emissions above a minimum 60%. Other elements of the formula include additional transitional allowances, including the carbon offsets, which can increase the tax free threshold by up to 90%.
6. The agriculture, forestry, land use and waste sectors will be excluded during the first five-year period, largely due to administrative difficulties in measuring and verifying emissions from these sectors. The intention is to include them in the carbon tax regime after the first five-year period. The proposed tax-free percentage thresholds and the offsets for the different sectors will remain fixed during the first phase (2016–20). The percentage tax-free thresholds will be reduced thereafter and may be replaced with absolute emissions thresholds. Both the tax-free percentage thresholds and their subsequent replacement with absolute emissions thresholds should be aligned with other initiatives.

Proposed emissions tax-free thresholds

Sector	Basic tax-free threshold (%)	Maximum additional allowance for trade exposure (%)	Additional allowance for process emissions (%)	Total (%)	Maximum offset (%)
Electricity	60	–	–	60	10
Petroleum (coal to liquid; gas to liquid)	60	10	–	70	10
Petroleum – oil refinery	60	10	–	70	10
Iron and steel	60	10	10	80	5
Cement	60	10	10	80	5
Glass and ceramics	60	10	10	80	5
Chemicals	60	10	10	80	5
Pulp and paper	60	10	–	70	10
Sugar	60	10	–	70	10
Agriculture, forestry and land use	60	–	40	100	0
Waste	60	–	40	100	0
Fugitive emissions from coal mining	60	10	10	80	5
Other	60	10	–	70	10

7. The 2014 Budget Review noted that along with the carbon tax, it is proposed that a carbon offsets scheme is introduced to complement the policy package to address climate change and protect households and businesses. The Budget Review noted that a Carbon Offsets paper will outline how firms will be able to reduce their carbon tax liability by up to 10% of their actual emissions. Using carbon offsets as a flexibility mechanism to reduce carbon tax liability mirrors current trends globally, where a number of countries are employing economic instruments to reduce their greenhouse gas (GHG) emissions.

8. The National Treasury publishes the Carbon Offsets paper for public comment, to give effect to the 2014 Budget announcement.

9. A carbon offset is an (external) investment that allows a firm to access GHG mitigation options in a manner that is cheaper than investment in its own operations. Carbon offsets typically involve investment in specific projects or activities that reduce, avoid, or sequester emissions. These projects are developed and evaluated under specific methodologies and standards, allowing carbon credits to be issued. Carbon offsets are also guided by principles that need to be fulfilled for a project to be awarded carbon credits under a specific standard.

10. Carbon offsets will enable firms to cost-effectively lower their carbon tax liability. They will also incentivise investment in least-cost mitigation options in the country, driving investment in GHG-mitigation projects that deliver carbon emissions reduction at a cost lower than the carbon tax. Such projects can generate considerable sustainable development benefits in South Africa, including channelling capital to rural development projects, creating employment, restoring landscapes, reducing land degradation, protecting biodiversity, and encouraging energy efficiency and low carbon growth.

Carbon offset projects: eligibility criteria

11. For the effective implementation of a carbon offsets mechanism that contributes towards the climate change response policy objectives and facilitates a transition to low-carbon economy, the following eligibility criteria for carbon offset projects are proposed:

- Only South African-based credits will be eligible for use within the carbon offsets scheme, to encourage the development of locally based projects and GHG-mitigation in South Africa.
- Projects that generate carbon offset credits must occur outside the scope of activities that are subject to the carbon tax. This is to prevent double counting of the carbon reduction benefit should an offset project be implemented on an activity that is liable to the carbon tax.
- In keeping with desired carbon offset principles a list of eligible projects will be introduced as a starting point to provide certainty and stimulate investment decisions and project development in the carbon offsets market. However, this standardised approach will be sufficiently flexible in accepting additional methodologies, so as not to limit the variety of projects that can be added once the offset programme has been launched. The list will therefore be expanded as the programme matures to allow new project types to be included should they meet the required criteria.
- Lists of both eligible and ineligible projects should be introduced, based on the value added to the low-carbon transition. An eligible projects list would include project areas that, in addition to carbon mitigation, also have sustainable development benefits and contribute to meeting South Africa's developmental priorities. An ineligible projects list would include projects that would be implemented within the scope of taxable activities following the introduction of the carbon tax. Projects that have little co-benefits and low value, such as the mitigation of industrial gasses, should also be excluded.
- Projects registered or implemented prior to the introduction of the carbon tax regime will have to fulfil specified conditions to be accepted to the scheme.

Carbon offset standards: eligibility and development

12. A number of carbon offset standards have been developed under both voluntary and compliance carbon offset schemes. Standards have also been emerging for particular geographic regions, which are generally being driven by either national or local governments and are tailored to specific domestic situations and climate change mitigation objectives.

13. Projects in South Africa have been developed under four different carbon offset standards, namely the Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), Gold Standard (GS) and Climate, Community and Biodiversity Standard (CCBS). To facilitate the introduction of the carbon offsets scheme, it is proposed that carbon offsets developed under these standards are considered for eligibility, providing that they comply with specified criteria:

    - Firstly, they comply with all the eligibility criteria for carbon-offset projects.
    - Secondly, they obtain a certificate stating the CO_2e reduction achieved, and they enable the Designated National Authority (DNA) to screen them for eligibility under the carbon tax regime (as is currently being done under the CDM).

14. The development of a South African-specific carbon offsets standard could be considered in the medium term to facilitate cost-effective development of domestic carbon offsets. The appropriate technical infrastructure to facilitate the carbon offsets development process would require an administrator of the programme, accredited independent third party verifiers, a carbon offsets registry and possibly a carbon trading platform.

Carbon offset potential in South Africa

15. There are currently 111 registered carbon offset projects in South Africa, developed either under the CDM of the Kyoto Protocol or under one of the voluntary carbon offset market standards (i.e. VCS, GS and CCBS).

16. Independent studies suggest that the potential overall national demand for offsets could be up to 30 million tonnes of CO_2e per annum.

17. A number of studies, employing a range of methodologies, have been carried out to estimate the potential carbon offset supply.

18. One approach was to examine the CDM project portfolio in South Africa. This methodology shows that the emission reductions quantity that could potentially be realised from CDM type projects, between 2013 and 2032, is between 15.5 million tonnes of CO_2e per annum (Promethium Carbon, 2012) and 17.2 million tonnes CO_2e (tCO_2e) per annum (Camco Clean Energy, 2012).

19. If the development opportunities in the Land Use, Land Use Change and Forestry (LULUCF) sector are included (these are not tradable in terms of the existing CER markets and thus not part of the CDM supply analysis), the number of potential carbon offsets could be considerably higher. LULUCF alone has a potential to supply 26 million tonnes of CO_2e per annum in South Africa (Promethium Carbon, 2012). The National Carbon Sinks Assessment study, which is expected to be completed in the first half of 2014 by the DEA, is anticipated to provide more accurate estimates for different types of carbon sequestration projects in agriculture, land rehabilitation, spekboom planting, soil, etc. It is expected that by 2020, around 8 million tonnes of CO_2e reduction per year could be achieved through carbon sequestration projects, increasing to 16 million tonnes by 2030.

20. A review of carbon offsets literature in another study estimates that carbon sequestration and emissions reduction in South Africa has the potential to supply at least 54.8 million tonnes of

CO_2e per annum (C4 EcoSolutions, 2013).

21. Drawing upon independent reviews of carbon offsets supply and demand analysis in South Africa, the potential for carbon offset credits supply seems to be sufficient to satisfy the demand expected be generated by the carbon tax.

1. Introduction

22. The Minister of Finance confirmed in the 2014 Budget that a carbon tax will be introduced in South Africa in 2016. This tax will be introduced on a phased-in basis, to allow for a relatively smooth transition to a low-carbon economy. The carbon tax will cover Scope 1 emissions – emissions that result directly from fuel combustion and gasification, and from non-energy industrial processes. It is intended to send the necessary policy and price signals to investors and consumers to ensure that future investments are more climate-resilient. This will minimise the need for retrofitting, as well as the risk of embarking on redundant large-scale major capital projects and investments.

23. The carbon tax design incorporates a number of relief measures to protect the vulnerable in society and the competitive position of the local industry. This is in important in light of the fact that there is (as yet) a lack of an agreement on an international harmonised carbon price, and also to ensure a relatively smooth transition to a low carbon economy. The proposed carbon tax design comprises the following key elements:

- A percentage-based threshold on actual emissions (a 60%basic tax-free threshold), below which the tax will not be payable during the first five years.
- Allowances for sectors where the potential for emissions reduction is limited due to either technical or structural reasons, such as process emissions. Initial indications suggest that this will include the cement, iron and steel, aluminium and glass sectors.
- Graduated relief for trade-exposed sectors.
- Z Factor adjustment of the basic tax-free threshold to reward early mitigation efforts.
- The overall maximum tax-free threshold (including the offsets and possible adjustments to the basic 60% tax-free threshold) is limited to 90%, except for those sectors that have been completely excluded during the first five-year period.
- Carbon offsets that firms can use to reduce their carbon tax liability.

24. The use of carbon offsets to reduce the carbon tax liability for South African entities would mirror current trends in a number of jurisdictions that employ economic instruments to reduce greenhouse gas (GHG) emissions, including the EU, U.S. state of California, Canadian province Alberta and Australia.

25. South African entities are currently able to develop and sell or purchase carbon offsets from international carbon offset markets that were developed under international standards, such as the Kyoto Protocol's Clean Development Mechanism (CDM). It is expected that the creation of a domestic carbon offsets market, building on the capacity and experience with international carbon-offset standards, could provide further flexibility to the offset market in South Africa and enhance demand and supply of least-cost South African carbon offsets.

26. This paper complements the Carbon Tax Policy Paper published in May 2013. It provides further details about the proposed carbon offset mechanism to accompany the carbon tax. Analysis produced by four independent studies, carried out by Camco Clean Energy (Camco

Clean Energy, 2012), Promethium Carbon (Promethium Carbon, 2012 and 2014) and C4 EcoSolutions (C4 EcoSolutions, 2013), has been used and built upon.

2. Background

2.1. Defining a carbon offset

27. A carbon offset is a measurable avoidance, reduction or sequestration of carbon dioxide (CO_2) or other GHG emissions. Carbon offsets are sometimes described as project-based because they typically involve specific projects or activities that reduce, avoid or sequester emissions (Ramseur, 2007). Through investment in carbon-offset projects, entities will be able to fund GHG-reduction measures implemented by other entities to reduce their own carbon tax liability, often in a manner that is cheaper than what could be achieved through investment in a firm's own operations.

28. Offset projects can involve different GHGs and are therefore quantified and described with a standard form of measure: metric tons of CO_2-equivalents (tonne CO_2e) (Ramseur, 2007).Carbon offset projects are developed and evaluated under specific methodologies and standards which enable carbon credits to be issued. Depending on the type of methodology used for the development of carbon credits, they can either be sold in the voluntary or compliance carbon markets.

29. Carbon offset projects can be categorised according to either the technology employed or type of GHG reduction, or the specific methodology selected to develop the project. The four most common categories of offset projects are: biological sequestration, renewable energy, energy efficiency, and reduction of non-CO_2 GHG emissions (Ramseur, 2007).

30. Carbon offset methodology defines the parameters and operations required for calculating emission reductions or removals delivered by a carbon offset project during its lifetime. Project developers can use pre-existing methodologies or develop new ones (ODI, 2010). Carbon offset methodologies have to be approved by an entity assigned with the administration of a specific standard. This ensures that all carbon offset projects in the world developed under the same methodology conform to the same rules.

31. Carbon offset project development has to follow a specific methodology and be issued under a specific standard. While the type of carbon offset project would influence the cost of the project development, the selling price of carbon offsets is generally determined by the market.

2.2. Carbon offset principles

32. Carbon offsets are guided by a variety of principles, which will need to be fulfilled for a project to be awarded a tradable credit under a specific standard. The principles of 'real, additional and permanent' are pivotal to ensuring the credibility of carbon offset projects. Incorporating and monitoring sustainable development aspects of offset projects throughout their lifetime should also be given due attention. Box 1 below provides an overview of the main principles considered.

Box 1: Carbon offsetting principles

- **Additionality**– GHG emissions reduction that the carbon offset project delivers are additional if they would not have occurred under a 'business- as-usual' scenario.
- **Permanence** – GHG emissions reduction delivered by the project are permanent and unlikely to be reversed. Additional guarantees can be built in so that potential reversals will be compensated.
- **Real** – Delivered GHG emission offsets originate within tangible physical projects with proof that they have occurred or will occur at a specific point in time.
- **Measurability** – Delivered GHG emission reductions are quantifiable by accepted methodologies.
- **Monitoring & Verification** – Delivery of the GHG emissions reduction should be monitored by an independent third-party verifier with the appropriate local and sector expertise. Accreditation requirements for potential validators/verifiers should be strict so as to ensure they have sufficient expertise and competencies to fulfil their tasks.
- **Leakage** – The carbon-offset project should guarantee that the reduction of GHG emissions delivered does not cause leakage (that is additional or higher emissions outside the project boundary).
- **Double counting** – It should be guaranteed that the project GHG emissions reduction occurs outside the scope of taxable activities to prevent double counting of emissions. Projects should be registered within a specific registry to avoid use of the same offset twice.
- **Synchronisation** (Timing of emissions reduction) – Time periods for emissions offset flows should be matched to the emissions flow or emissions vintage. Rigorous and conservative accounting must be used to calculate baselines and establish boundaries.
- **Enforceability** – Offsets delivered by the project should be backed by legal instruments that recognise the validity of the offsets created, provide for transparency of the MRV system and ensure exclusive ownership.
- **Co-benefits** – In addition to reducing GHG emissions and mitigating the effects of climate change, offset projects should have the potential to deliver additional social and economic benefits. Within the South African context offsets can contribute towards charting the pathway to a low-carbon economy and creation of green jobs and investment in non-fossil fuel-based energy generation.

Sources: SEI, 2008; Ecosystems Market Place and Bloomberg New Energy Finance, 2011

2.3. Carbon offset standards

33. Carbon-offset markets currently exist both under compliance and voluntary carbon offset schemes. Compliance markets are created and regulated by mandatory regional, national and international carbon reduction regimes, such as the Kyoto Protocol, the European Union's Emissions Trading Scheme, California's ETS, Canadian province of Alberta or the Australian carbon pricing package. Voluntary offset markets function outside of the compliance markets and enable companies and individuals to purchase carbon offsets on a voluntary basis. Any offset scheme linked to carbon taxation in South Africa will qualify as a compliance market.

34. A number of carbon offset standards have been developed to suit particular needs of different types of markets and therefore require specific sets of carbon offset principles and may also require co-benefits (see Box 1). Projects under four different carbon offset standards have been developed in South Africa. They include the Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), Gold Standard (GS) and Climate, Community and Biodiversity Standard (CCBS) (for a more thorough overview of global carbon offset standards see Appendix

A).

35. The CDM produces offsets under the Kyoto Protocol in developing countries, which can then be sold to Annex 1 countries of the Protocol. Its affiliation with the Kyoto Protocol gives it widespread acceptance and credibility. It has been the main standard used in global markets, due to the ability of non-Annex 1 (developing) countries to sell their CDM certified credits to Annex 1 countries, which in turn use CDM credits to help meet their targets under the Kyoto Protocol. This has led to CDM becoming known as a mandatory carbon standard, due to its acceptance in the world's regulated carbon markets.

36. VCS is a recognised GHG accounting programme that can be used by projects to verify and issue carbon credits in the voluntary market. It is the largest voluntary carbon offset standard, as it closely follows the CDM methodologies and is therefore recognised and accepted.

37. GS is a standard mainly designed for renewable energy and energy efficiency projects. For a project to be certified under the GS, the project must also contain co-benefits - that is, positively impact on the local community hosting the project and the environment, through emissions reduction from using renewables or embarking on energy efficiency projects.

38. The Climate, Community and Biodiversity Alliance (CCBA) has developed voluntary standards to help identify land management activities that minimise climate change, support sustainable development and conserve biodiversity(Ecosystems Marketplace and Bloomberg New Energy Finance, 2012).

39. In addition to the emergence of voluntary carbon offset markets, there has been an emergence of standards for development of projects in a particular geographic region. These regional standards are generally being driven by either national or local governments and are tailored to their unique domestic situations and climate change mitigation objectives. Most notable are schemes developed in Brazil, China, Australia, Costa Rica, Thailand, the UK, Switzerland, Japan, South Korea and California. Regional standards are frequently established to close the loop between domestic supply and demand, and thus to encourage local carbon financing and channelling funds to locally developed projects. They often incorporate sustainable development objectives, which are tailored to the host country's context, as well as supporting other domestic priorities, strategies and targets. This approach has been taken in the United States (California and RGGI offset scheme), Australia's Carbon Farming Initiative, Japan's J-VER, Brazil's Mata Viva and China's Panda Standard.

40. While these embedded standards are mostly voluntary, they are increasingly being incorporated into the design of mandatory offset programmes, as is evident in California, Mexico, South Korea and Australia. This points to the increased acceptance of what has traditionally been seen as 'voluntary' carbon standards that are being incorporated into regulatory regimes alongside the CDM, and the growing confidence among regulators concerning the role that traditional voluntary standards can play in meeting domestic climate-change mitigation goals (Camco Clean Energy, 2012).

2.4. Carbon offsets and international carbon pricing policies

41. Understanding internationally recognised carbon offset standards can provide valuable

information to devise or adopt a standard that would be suitable for the South African context. (For a more thorough overview of regional carbon offset standards see Appendix B).

42. For instance, the recently introduced cap-and-trade GHG emissions scheme in the U.S. State of California also allows entities within the scope of the scheme to use offset emission credits to meet up to eight per cent of their triennial compliance obligation (Air Resources Board, 2012).

43. Equally, participants in the EU ETS are allowed to use most categories of Joint Implementation (JI) and CDM credits towards fulfilling their obligations under the EU ETS (EU Commission, 2011). Furthermore, the EU supports the design of new sectoral crediting mechanisms for actions in developing countries, preferably within the United Nations Framework Convention on Climate Change (UNFCCC), which can be used as substitutes for the project-based JI & CDM.

44. The Regional Greenhouse Gas Initiative (RGGI), incorporating a number of north-east and mid-Atlantic states in the United States of America, is also an example of a market-based regulatory programme that enables its participants to purchase emission offsets. The programme contains a sliding scale provision for offsets. Regulated emitters may use offsets to satisfy 3.3% of their compliance obligations at the start of the programme. The offset ceiling rises to 5% and 10% of total emissions if the twelve-month rolling average allowance reaches $7 and $10 per ton (in 2005 dollars) respectively (RGGI, 2012).

3. Carbon offset objectives

45. It is proposed that carbon offsets can be used by firms to reduce their carbon tax liability by up to 5% or 10% of their actual emissions, depending on the specific characteristics and dynamics of various industrial sectors. Carbon offsets will enable entities to cost-effectively lower their carbon tax liability. They will also incentivise investment in least-cost mitigation options in the country, driving investment in GHG-mitigation projects that deliver carbon emission reduction at a cost (R/CO_2e) lower than the carbon tax.

46. Investment in low-carbon projects will not only cost-effectively reduce carbon emissions and contribute towards national mitigation targets, but will also encourage a greater uptake of cleaner energy technologies and energy-efficiency measures and promote research and development into low-carbon solutions (Promethium Carbon, 2012). Carbon offset projects can also potentially generate considerable sustainable development benefits within South Africa, including channelling capital to projects that facilitate rural development, create employment, restore landscapes, reduce land degradation, protect biodiversity, and encourage energy efficiency and low carbon growth (Camco Clean Energy, 2012).

47. There are, however, numerous methodological issues that must be addressed to ensure an effective implementation of the offset mechanism that will contribute to the transition to a low-carbon economy. The remainder of this section outlines methodological principles that will be adopted to ensure effective implementation of the carbon-offsets mechanism.

3.1. Carbon offset project eligibility

3.1.1. Project eligibility with respect to geographical location

48. The geographical location from which liable entities can source carbon credits needs to be specified. Some countries that have introduced a carbon offset scheme to complement their carbon pricing policy accept carbon credits that are sourced from outside the geographical scope covered by the carbon price (e.g. EU ETS, RGGI). However, other countries are increasingly limiting the acceptance of offsets into their regimes from designated sectoral scopes and geographic regions (e.g. Australia and California).

49. To encourage the development of locally based projects, it is deemed appropriate that only South African-based project credits be eligible for use within the South African carbon offset scheme. While this geographical limitation might have implications on the availability of credits in the initial stages, it is envisaged that the demand for locally based offsets will provide a significant impetus for project development South Africa. This approach is also closely aligned with the overall motivation for the development of the offsets mechanism, namely to support the reduction of absolute emissions within South Africa, to assist in the implementation of the National Climate Change Response Policy (NCCRP), as well as to encourage broader sustainable development and job creation in the country.

50. Depending on the outcome of the UNFCCC climate change negotiations and the nature of an

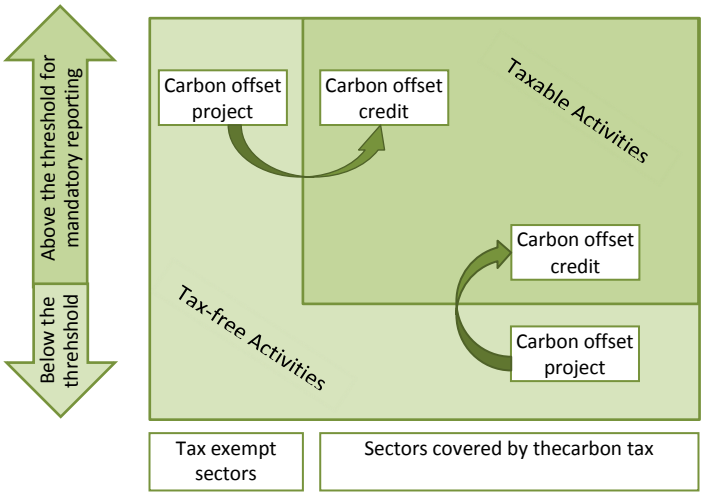
international climate change agreement that might be reached in the near future, the required geographical eligibility of carbon offset projects could be reviewed during subsequent phases of the carbon tax regime.

3.1.2. Offsets eligibility with reference to carbon tax coverage

51. Activities that could be eligible to generate offset credits can be implemented either inside or outside the carbon tax net. However, an offset project that is implemented on an activity that is liable to the carbon tax could result in double counting of the carbon reduction benefit. If such a project is implemented on a non-taxable activity, no such double counting should occur. There are two options of carbon offsets eligibility with respect to carbon tax coverage.

52. The first option is that only carbon offset projects originating outside the scope of taxable activities are accepted to ensure that no double-counting of tax benefits occurs. Emission reduction projects that are implemented outside the taxable emissions can be used as an offset (see Figure 1). Entities falling under the threshold of mandatory reporting requirements and entities within the Waste and AFOLU sectors are not liable to pay carbon tax during the first phase of the carbon tax regime and will therefore be able to generate carbon offset credits.

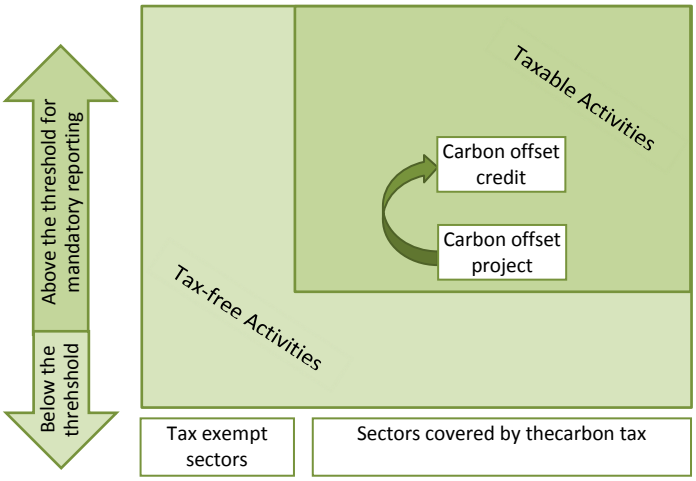
Figure 1: Carbon offsets originating outside the tax net



53. The second option would be that carbon offset projects originating within the scope of taxable activities would be eligible, i.e. both the buyer and seller of carbon offset credits would be inside the tax net and thus liable to the carbon tax (see Figure 2).Entities liable for the carbon tax would be permitted to implement emission reduction projects in other sectors liable to the carbon tax and reduce their own carbon tax liability. For instance, an entity within the cement sector would be able to invest in carbon reduction projects in an entity in the iron and steel sector to lower its carbon tax liability. In this scenario, double-counting of tax benefits would occur as the same carbon reduction could be used to lower the carbon tax liability of entities in

both sectors.

Figure 2: Offsets by companies inside the tax net



54. The difference between these two options is similar to the differences in the application of Flexible Mechanisms under the Kyoto Protocol. Under the CDM, carbon offsets come from outside the taxable activities (outside the scope of capped emissions, i.e. from the non-Annex I countries), while under the Joint Implementation (JI) carbon offsets come from inside the taxable emissions (i.e. from the Annex I countries). Option 1 described above resembles the Kyoto Flexibility Mechanisms principles established under the CDM. The CDM allows offset projects to be developed in non-Annex I countries, which do not have domestic emission reduction targets, and to be used by Annex I countries to meet their domestic emission reduction targets. The principles under option 2, on the other hand, resemble the principles of the Joint Implementation (JI) mechanism of the Kyoto Protocol. Under the JI, Annex I countries are permitted to invest in emission-reduction projects in any other Annex I country to meet their domestic emission reduction targets. Many lessons on the handling of this issue can be learnt from the Kyoto Protocol's CDM and JI.

55. Carbon tax is designed to encourage emission-reduction activities in covered sectors, through placing a price on carbon. This price on carbon acts as a signal that incentivises behavioural change and makes emission-reduction projects more attractive. If a company covered under the tax receives income from an emission-reduction project that reduces company overall emissions, then a double incentive is effectively provided. While this arrangement would enable a greater number of offset opportunities, it could also create double-counting problems as there are incentives for mitigation in the form of both carbon tax liability reduction and revenue from carbon offset credits. Therefore, under the South African carbon tax context, only entities not liable for the carbon tax will be permitted to implement emission-reduction projects and sell carbon offset credits to entities liable to the carbon tax. Option 1 has therefore been selected as a design feature for the initial period of the carbon-offset scheme.

56. The Mitigation Potential Analysis (DEA, 2013), conducted to examine technical mitigation potential in the economy, shows significant mitigation potential at a negative cost and further

mitigation potential at a cost lower than the effective carbon tax rate. Implementation of these projects can therefore be considered as business–as-usual for entities covered by the carbon tax to reduce their tax liability.

57. Carbon offsets originating within taxable activities shall be explicitly excluded.

3.1.3. Project methodologies

58. Determination of additionality is an important element of all carbon offsetting standards. There are two main approaches to determine additionality: a standardised approach through a list of approved projects types and a project-based approach through case-by-case evaluation.

- Standardised approach–this is an approach in which an accrediting or registering organisation would establish a list of approved project types before the start of the programme and work on expanding the list on an ongoing basis. Specific project methodologies could also be developed before the start of the programme or specific methodologies under established standards could be identified as permitted. Additional methodologies could be added after the start of the programme.
- Project-based additionality –this is an approach in which there is no set of "pre-approved" project types that are eligible. Carbon offset methodologies would be developed by project proponents and reviewed and approved on a case-by-case basis by the offsets programme administrator.

59. A project-by-project approach to determine additionality is associated with simpler procedures and lower transaction costs for project developers. It is also the easiest to administer by regulatory authorities.

60. However using a multi-tiered additionality test that includes a financial additionality test, can involve considerable cost and cause delays in the approval process. Project-based additionality assessment also has the potential for a high degree of subjectivity due to often limited project information. Performance standards aim to address some of the weaknesses of project-based additionality tests in that they do not rely on examining each individual project, but typically use aggregated data on project or technology characteristics to establish a threshold that must be met or exceeded for a project to be deemed additional (e.g. a performance indicator such as an emissions rate or a market indicator such as a penetration rate).

61. A standardised approach is therefore considered a more cost-effective approach for project developers. It will provide added certainty to project developers, which can stimulate investment decisions and project development that will facilitate market development. Allowing the offset program administrator to adopt specific offset methodologies before the start of the programmewill enhance the credibility of offset projects.

62. However a standardised approach that is not sufficiently flexible to accept additional methodologies could limit the variety of projects that can be added once the offset programme has been launched. Introducing a list of projects that can be developed as a starting point for the programme will provide sufficient certainty. The list will then be expanded as the programme matures, to allow new project types to be included should they satisfy the

required criteria. In addition to an ongoing expansion of the list, project developers should be allowed to propose new methodologies that fulfil specific criteria. This approach will streamline the role of the administrating entity, provide certainty to project developers and incentivise uptake of projects.

3.2. Eligible project types

63. The National Climate Change Response White Paper (DEA, 2011) called for an assessment of South African climate change mitigation potential. Analysis of GHG-mitigation potential in various areas could be used to determine priority areas, where development of carbon offset projects should be incentivised. The Mitigation Potential Analysis (DEA, 2013) shows the level of GHG emission reductions that could be realised relative to the projected emission baseline in a given year, considering best available options, science, evidence and a full assessment of the costs and benefits for key sectors of the economy. The South African National Carbon Sinks Assessment, to be published by the DEA by mid-2014, will identify suitable land-based climate change mitigation activities.

64. Drawing on the NCCRP, project types should be included based on their positive impact towards the transition to a low-carbon economy and climate change response. This should include project areas that, in addition to carbon mitigation, also have sustainable development benefits and contribute to meeting South Africa's developmental priorities. A similar approach has been adopted in carbon offset schemes in both California and Australia, where credits are only allowed from carbon offset projects in certain sectors that are not covered under their respective carbon regulatory schemes.

65. On this basis, an analysis of mitigation potential shows that development and adoption of eligible project methodologies could focus on the following areas:

- Energy and Energy Efficiency
    - Energy efficiency in the residential and commercial sector
    - Energy efficiency in buildings
    - Small scale renewable energy
    - Community-based and municipal energy efficiency and renewable energy
    - Fuel-switching projects
    - Electricity transmission and distribution efficiency
- Transport
    - Public transport
    - Transport energy efficiency
- Agriculture, forestry and other land uses (AFOLU)
    - Restoration of sub-tropical thicket, forests and woodlands

  - Restoration and management of grassland
  - Small scale afforestation
  - Biomass energy
  - Anaerobic biogas digesters
  - Reduced tillage
- Waste
  - Municipal waste projects

66. Appendix C contains further information about potential carbon-offsets project areas.

3.3. Ineligible project types

67. There are specific carbon offset project types that should be excluded from the scheme. These would include projects that would be developed inside the carbon tax net. Potential double counting of financial benefits from GHG mitigation in this instance could increase distortions in the carbon credit marketplace, with the entity generating the credits being able to potentially sell the credits to other entities for lower prices than projects in sectors that are not covered by the tax. Projects benefiting from other government incentives should also be excluded. Projects that could potentially result in a double incentive will therefore not be allowed. These would include:

- Energy efficiency projects implemented on activities that are owned or controlled by companies that are covered by the carbon tax.
- Projects that benefit from the Energy Efficiency Tax Incentive.
- Cogeneration of renewable energy projects implemented on activities that are owned or controlled by companies that are covered by the carbon tax.
- Fuel-switch projects implemented on activities that are owned or controlled by companies that are covered by the carbon tax.
- Renewable energy projects developed under the Renewable Energy Independent Power Producer Programme (REIPPP).

68. Projects that relate to the mitigation of industrial gasses will be excluded from the carbon offset mechanism. Industrial gas-related credits have been disallowed in the EU ETS from 2013, due to low value credits with little co-benefits flooding the market. These will include industrial gas-destruction projects, such as the HFC-23 and Nitrous Oxide destruction projects.

3.4. Implementation date

69. To facilitate a smooth implementation of the carbon offset scheme, it is proposed that carbon offset credits that were issued prior to the implementation of the carbon tax and have not yet been retired will be eligible for use under the carbon tax.

70. To ensure a close alignment of the objectives of the carbon tax regime and the carbon offset scheme, all the offset projects that were registered prior to the introduction of the carbon tax will have to be retrospectively evaluated against the eligibility criteria indicated in this paper before their eligibility under the carbon tax regime is approved.

71. Carbon offset credits issued prior to the implementation of the carbon tax regime will have to be transferred from an international registry to an envisaged South African registry, without the possibility of a repeated transfer out of the registry. Such credits will only be accepted for the scheme if they are transferred to a South African registry within 12 months of implementation of the carbon tax, scheduled for 1 January 2016. Following this sunset date, credits issues prior to the implementation date of the carbon tax will not be accepted.

72. Carbon offset projects that are currently at an early stage of development, but will be registered before the implementation of the carbon tax, will have to transfer the credits that are issued to them to a South African registry within 6 months of credit issuance to ensure their eligibility under the carbon tax regime. Following this sunset provision, credits issued to projects that have been registered prior to the implementation date of the carbon tax will not be accepted.

4. Carbon offset potential in South Africa

4.1. Current carbon offset projects in South Africa

73. There are currently a number of carbon-offset projects in South Africa that have been developed either under the CDM of the Kyoto Protocol or one of the voluntary carbon-offset market standards. Table 1 provides an overview of carbon-offset projects that are currently registered in South Africa (in addition, there is a large number of projects at earlier stages of their lifecycle).

Table 1: Carbon offset projects registered in South Africa

Carbon-Offset Standard	Number of Projects in South Africa (as of Feb 2013)
Clean Development Mechanism (CDM)	80 projects have been registered (12 issued with CERs) and 58 are at different stages of the project cycle
Voluntary Carbon Standard (VCS)	6
Gold Standard (GS)	22
Climate, Community and Biodiversity Standard (CCBS)	3
Total Registered Projects	**111**

4.2. Potential carbon offsets demand in South Africa

74. Under the proposed carbon tax, offsets can be used by firms to reduce their carbon tax liability up to a specific percentage. Considering the relative underdevelopment of the carbon-offset market in South Africa, it is challenging to estimate the demand for carbon-offset credits. Four independent studies have developed estimates of the demand for carbon offsets with a carbon tax scenario.

75. To calculate a potential demand for carbon offsets, Camco Clean Energy used South Africa's Second National Communication under the United Nations Framework Convention on Climate Change (DEA, 2011b), which states that South Africa emitted approximately 463,235,220 metric tonnes of CO_2e in 2000. Excluding agriculture and waste, sectors that will not be covered by the proposed carbon tax, approximately 387,267,830 metric tonnes of CO_2e per annum represents emissions associated with energy supply and consumption and industrial processes, which will be covered by the proposed carbon tax (DEA, 2011b).The analyses of an overall national potential demand for carbon offsets within South Africa, incentivised by the proposed carbon tax, could be between 25 and 30 million tonnes of CO_2e per annum (or 25 to 30 million carbon credits) (Camco Clean Energy, 2012). This calculation is based on the assumption that all entities covered under the tax would choose to purchase the maximum number of offsets they are allowed under the carbon tax.

76. Similarly, to calculate a potential demand for carbon offsets, Promethium Carbon in its 2012 study uses data from the Long Term Mitigation Scenarios report published by the Department of Environmental Affairs (DEA, 2007), which states that South Africa will have an estimated level of GHG emissions of564 million tonnes of CO_2e in 2012. It assumes that half of the total emissions of the country is covered by the carbon tax and that all the offsets allowed are used, bringing the offsets to around 10% of the covered emissions. Under this scenario, the annual demand for offsets would be in the order of 30 million tonnes per year (Promethium Carbon, 2012).

77. Finally, to give a more accurate estimation of carbon-offsets demand, another study (Promethium Carbon, 2014) combines the IPCC emission factors with energy demand projections, from the Integrated Energy Plan for South Africa developed by the Department of Energy, to calculate national GHG emissions. Additionally, it complements this data with process emissions projections obtained from South Africa's Greenhouse Gas (GHG) Mitigation Potential Analysis (2013) carried out for the DEA. Following the estimation of total emissions, the portion of total emissions that fall within the tax net has been estimated to project low-end demand as well as high-end demand within different sectors. On the low end, the demand increases from about5million tonnes per year to around 8million tonnes per year, and on the high end, the demand increases from 18 million tonnes per year to around 20million tonnes per year.

4.3. Carbon offsets supply estimation based on the CDM projects portfolio

78. In order to estimate the amount of offsets to be used under the carbon-offset scheme, one could examine CDM projects that are already undergoing the registration process. Examining the CDM project portfolio in South Africa might provide insight into potential supply. One study estimates that the average emission reductions that could potentially be realised between 2013 and 2032 from the CDM projects registered as of November 2012 is 17.2 million tCO_2e per year (Camco Clean Energy, 2012) as shown in Table 2 below.

Table 2: CDM Credits expected to be issued in South Africa per project type

Sector	Certified Emission Reductions (CERs)
Biogas	103 672
Biomass	881 144
Energy Efficiency	398 098
Fuel Switch	1 662 205
Hydro Power	169 693
Methane Recovery and Utilisation	1 694 461
N2O decomposition	2 164 037
Waste gas/heat recovery	1 945 559
Wind	7 561 841

Sector	Certified Emission Reductions (CERs)
Solar PV	473 624
Solar CSP	230 537
Total	**17 284 871**

Source: Camco Clean Energy, 2012 (Estimates as of November 2012, based on IGES, 2012; UNEP Risoe, 2012)

79. Also taking the registered CDM projects as a basis (as of September 2012), another study shows that the CERs currently in the pipeline are in the order of 15.5 million tonnes of CO_2e per year(Promethium Carbon, 2012) as shown in Table 3 below.

Table 3: CDM Credits expected to be issued in South Africa per sector

Sector	Certified Emission Reductions (CERs)
Agriculture	32 660
Manufacturing industries	75 441
Energy demand	505 473
Mining/mineral production	572 525
Waste handling and disposal	1 335 579
Metal production	1 440 260
Chemical industries	3 065 914
Subtotal	**7 027 852**
Energy industries (renewable - / non-renewable sources)	8 522 177
Total	**15 550 029**

Source: Promethium Carbon, 2012 (Estimates as of June 2012, based on UNFCCC.)

80. Employing a different methodology of estimation, by extrapolating from the CDM projects data, a potential to generate 41 million tonnes of CO_2e per year in the country as a whole has been estimated as shown in Table 4(Promethium Carbon, 2012).

Table 4: Carbon offset potential in South Africa per sector

Sector	Comments	Potential roll-out multiplication factor	Potential offsets that can be generated (tCO_2e/year)
Agriculture	Only one project implemented. Significant potential is predicted as there is a large agricultural industry in South Africa and several project types that could be implemented.	**100**	**3 200 000**
Manufacturing industries	Three projects are listed in this sector. As this is also a large sector in the economy, the roll-out potential is good.	**20**	**1 500 000**
Energy demand	Energy demand projects account for less than 0,005% of the country's energy demand. If these projects are scaled up by a factor of 20 it will still represent only a 0,1% energy saving in SA.	**20**	**10 000 000**
Mining/mineral production	The 6 projects listed are implemented by two mining companies. Given the size of the mining industry in SA it is possible to roll out these projects by a factor of 10.	**10**	**5 700 000**
Waste handling and disposal	Although there is huge potential for methane extraction from landfill sites, the challenges of implementing these projects within the current regulatory framework have prevented these projects from being developed on a large scale.	**5**	**6 700 000**
Metal production	The 11 projects listed as implemented represent a small portion of the total number of metal production furnaces operating in South Africa. It should be possible to roll these projects out by a factor 5.	**5**	**7 200 000**
Chemical industries	The projects implemented in this sector have all been nitrous oxide destruction projects. No further opportunity in this regard.	-	-
Estimated Total		-	**34 300 000**

Source: Promethium Carbon estimates (Potential roll-out multiplication factor reflects the relationship between current carbon offset projects in specific areas and a potential supply in those areas)

4.4. Carbon offsets supply estimation based on carbon sequestration projects

81. The Analysis of the CDM portfolio, however, excludes the development opportunities in the Land Use, Land Use Change and Forestry (LULUCF) sector as they are not tradable in terms of the existing CER markets. This signals considerable underdevelopment of the potential carbon offsets within the LULUCF in comparison to other sectors.

82. The National Carbon Sinks Assessment study, which is expected to be completed in the first half of 2014 by the DEA, is anticipated to provide more accurate estimates for different types of carbon sequestration projects in agriculture, land rehabilitation, spekboom planting, soil, etc. It is expected that by 2020 around 8 million tonnes of CO_2e reduction per year and by 2030 around 16 million tonnes of CO_2e reduction per year could be achieved by carbon sequestration.

83. Another study estimating sequestration potential from the roll-out of current LULUCF projects identifies a sequestration potential of up to 26 million tonnes of CO_2e per year in South Africa to supply carbon tax offsets (Promethium Carbon, 2012).

84. Finally, drawing on the extensive review of carbon-offsetting literature, another case study estimates that carbon sequestration and emissions reduction in South Africa has the potential to supply at least 54.8 million tCO_2eper year (C4 EcoSolutions, 2013).

Table 5: Estimated carbon sequestration/emission reduction potential of various carbon offset types in South Africa

Project Type	Emissions offset (tCO_2e per year)	Sequestration (tCO_2e ha-1 per year)	Capacity (extent (ha))
AFOLU Offsets			
Savanna	1 400 000 – 16 000 000	0.7 – 8	2 000 000
Thicket	840 000 – 18 000000	0.7 – 15	1 400 000
Grassland	560 000 – 4 000 000	0.7 – 5	1 200 000
Karoo	14000 – 42000	0.4 – 1.2	35 000
Land management	2 000000 – 17 500000	0.4 – 3.5	5 000 000
Afforestation	~3000000	~10	300 000
Deep ocean	Nearly unlimited		
Energy Offsets			
Chemical capture	1000000 – 5 000000		
Wind energy	12 000000 – 90 000000		
Solar photovoltaic	>5000		
Energy efficiency	>30000000		
Concentrated solar	4 000 000 – 100 000 000		

Project Type	Emissions offset (tCO_2e per year)	Sequestration (tCO_2e ha-1 per year)	Capacity (extent (ha))
power			
Total	**54 819000**		

Source: C4 EcoSolutions, 2013 (see Appendix C for further information)

4.5. Carbon offset supply modelling based on various eligibility criteria

85. In an attempt to develop a more refined modelling methodology to estimate carbon-offsets supply another study (Promethium Carbon, 2014) used the technical mitigation potential and marginal abatement costs data collected for the South African GHG Mitigation Potential Analysis (Camco Clean Energy, 2013), carried out for the Department of Environmental Affairs, to model the supply of offset credits from projects outside the tax net. In order to limit the pool of technically possible projects, the study made assumptions regarding lower and upper bounds on mitigation costs. As an upper bound, it was assumed that projects liable as offsets will not be implemented when Marginal Abatement Costs (MAC) are higher than 150 ZAR per tCO_2e, as the income from carbon offsets (120 ZAR per tCO_2e), is not expected to make these projects viable. As a lower bound, the MAC below 0 ZAR per tCO_2e have been excluded, as anything with negative MAC can be considered as business-as-usual interventions, in which case additionality cannot be proven.

86. On this basis, the carbon-offset supply potential based on various eligibility criteria for offset projects has been estimated by the study. The total potential supply, based on different sources, could on average range from around 20million tonnes per year in 2015 to around 29 million tonnes per year in 2030. The analysis shows that the largest potential offset contributors could be projects outside of the carbon tax net (on average between 4.5 and 8.6 million tonnes per year by 2030). It further estimates that development of projects on the positive list, based on an example of the residential sector, could add between 5 and 11.5 million tonnes per year by 2030. If the REIPP programme was eligible for the scheme, it could be expected to contribute between 4.4 and 4.9 million tonnes per year. Finally, if projects registered as carbon credit projects before the implementation of the carbon tax regime were allowed, it is expected that on average 4 million tonnes per year would be available from 2015 onwards as an additional source for carbon offsets.

4.6. Carbon offset supply and demand analysis

87. Drawing on these independent reviews of carbon-offset supply and demand analysis in South Africa, it can be concluded that there seems to be a sufficient supply potential of carbon offsets to satisfy the potential demand generated by the carbon tax. While it is expected that the demand for offsets generated by the carbon tax could be between 5 and 30 million tonnes of CO_2e per annum, a potential supply of over 50 million tonnes of CO_2e per annum has been estimated.

5. Carbon offset standards

5.1. Initial carbon offset standard acceptance arrangements

88. In order to facilitate the introduction of the carbon-offset scheme, it is proposed that carbon credits developed under certain internationally recognised carbon-offset standards be permitted during the first phase of the carbon tax regime. They could include the Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), Gold Standard (GS) and Climate, Community and Biodiversity Alliance (CCBA) standard. It is proposed that carbon-offset credits developed under these standards be accepted as projects under all four carbon-offset standards already developed in South Africa. However, in order to ensure credibility of these carbon offsets for the purposes of the carbon tax regime, it will be required that prior to their acceptance they fulfil the above-specified eligibility criteria as well as administrative requirements noted below.

89. In order for the carbon-offsets projects developed under the specified, internationally recognised carbon-offset standards to become eligible under the carbon tax regime, it is proposed that the projects obtain a certificate stating the CO_2e reduction achieved[1]. It is further proposed that the certificate be issued by the Designated National Authority (DNA) that was established through South Africa's signing of the Kyoto Protocol, and has a specific mandate to oversee the development of CDM projects within South Africa.

90. In the case of the CDM, the DNA already conducts pre-screening and tracking of projects for eligibility in the CDM, although issuance of the Certified Emissions Reductions (CERs) is done by the CDM Executive Board. The DNA has developed the capacity to assess CDM projects for eligibility and its institutional capacity will be utilised to issue certificates to be used under the carbon tax regime. It is proposed that the DNA expands its functions to include issuance certificates stating the CO_2e reduction achieved for the purposes of the domestic carbon tax regime following the issuance of CERs by the CDM Executive Board.

91. For additional carbon-offset standards (e.g. the Gold Standard or VCS) to be eligible under the carbon tax, it is proposed that the taxpayer be required to obtain a certificate stating the CO_2e reduction achieved from the DNA. To attain eligibility, carbon-offset standards would thus have to enable the DNA to validate projects for eligibility under the carbon tax regime in a similar vein to the CDM. Thus, the international carbon-offsets standard bodies will have to establish a working relationship with the DNA to ensure that the development of the carbon-offset projects would be aligned with DNA's requirements.

[1] In order to ensure the credibility of carbon offsets developed under the carbon tax regime, it will be important that the administrative robustness,such as that of the 12L Energy Efficiency Tax Incentive, be developed. Under the 12L, it is proposed that taxpayers are entitled to claim an allowance for all forms of energy efficiency savings resulting from activities in the production of income. Energy efficiency savings will be determined by measuring energy use against an initial baseline, as set by a measurement and verification professional. The energy efficiency savings certificate is the key prerequisite for the energy efficiency savings allowance. The certificate must contain the predetermined energy use baseline, the annual energy efficiency savings (stated in kWh equivalent), and the revised baseline. All this information must be authenticated and issued by the South African National Energy Development Institute (SANEDI).

92. Furthermore, it is proposed that particulars of carbon-offset credits, which will be used under a carbon tax regime, be entered in a South African carbon-offsets registry that will be developed to maintain reliable records of carbon offsets (further information on the registry is below). This will ensure that the credits surrendered for compliance are retired, and thus cannot be traded and double counted either locally or internationally. The DNA would be best placed to oversee data entries in such a registry for accepted carbon-offset standards.

5.2. The South African domestic carbon offset scheme

93. To enable an effective functioning of the carbon-offset scheme in the long term, and to facilitate a sufficient supply of carbon credits to the market, a domestic carbon-offset standard could be developed in the medium term.

5.2.1. Technical infrastructure required for the operation of a domestic carbon offset scheme

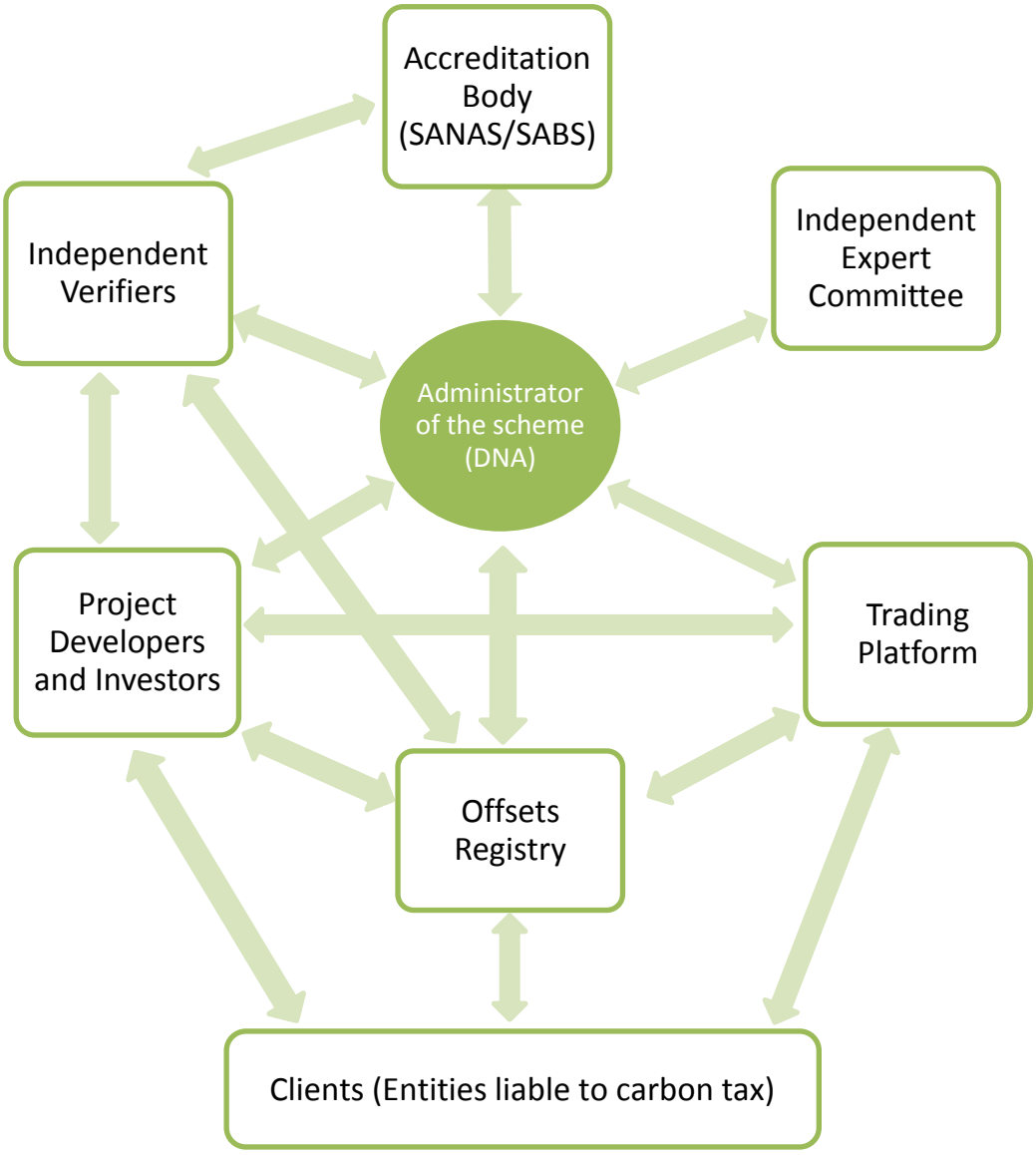
94. There are numerous requirements associated with the development of a domestic carbon-offset scheme. The establishment of specific technical infrastructure for verification and approval of credits to ensure that carbon offsets fulfil all the criteria and are credible to be accepted by the market is required. In order to develop a standard that is suitable for the South African context it is important to evaluate key features of existing standards. Lessons can be learned from established international carbon-offset trading schemes (e.g. the CDM or VCS) as well as places that use carbon-offset schemes to complement their carbon pricing instruments (e.g. California) (see Appendices A and B for further details).

95. An appropriate technical infrastructure to facilitate carbon-offset projects development process is necessary to ensure that a system of checks and balances is in place. At a minimum the technical infrastructure would consist of:

- an administrator of the programme and possibly an independent expert committee;
- accredited independent third-party verifiers;
- accreditation body for third-party verifiers;
- a carbon-offset registry; and possibly
- a carbon trading platform.

96. Figure 3 below provides a schematic overview of technical infrastructure required for the operation of a domestic carbon-offset scheme.

Figure 3: Technical infrastructure required for the operation of a domestic carbon offset scheme



97. A credible administrator of the scheme, which could be the DNA, should be appointed to oversee the programme and to approve issuance of credits. An independent expert committee might need to be appointed to work with the administrator of the scheme on the development of methodologies. Accreditation procedures for carbon-offset verifiers must be established to generate carbon-offset projects verification reports for project developers. Finally, a carbon-offset registry must be established to maintain credible carbon-offset records and a custodian of the registry must be appointed.

5.2.2. Administration of the carbon offset scheme

98. An administrator of the scheme, which is proposed to be the DNA, will have extensive responsibilities. Among its roles would be to pre-screen projects for their eligibility, evaluate independent verification reports and issue carbon credits. Additionally, an administrator or an appointed independent expert committee would be responsible for development and evaluation of methodologies and, when appropriate, also an endorsement of international methodologies for use in South Africa.

99. Firstly, an administrating entity should have the capacity to register carbon-offset project developers, to pre-screen project ideas to ensure they comply with eligibility criteria prior to their implementation. Secondly, it should be able to evaluate offset project verification reports prior to credits being issued and subsequently approve issuance of the specified amount of carbon credits.

100. Additionally, with the expansion of the scheme, an administrating entity and its affiliate, which is proposed to be an independent experts committee described below, would be responsible for the design and approval of methodologies and project types to be included within the scheme. This approach would lead to creation of a 'positive list' of approved methodologies. The administrator would then be responsible for providing guidance on approved methodologies and regular updating of the positive list.

101. The DNA has developed the capacity to assess CDM projects for eligibility and its institutional capacity will be used to administer the domestic carbon-offset scheme. The DNA already fulfils a part of the first responsibility of the administrator as it conducts pre-screening and tracking of projects for eligibility in the CDM, which is considered as the most robust global carbon-offset standard.

102. To ensure sufficient capacity in this regard, expanding the DNA's technical capacity must be considered. The DNA must be further capacitated and provided with additional training, financial and human resources to carry out all proposed functions.

5.2.3. Independent expert committee

103. The second responsibility of the administrator, i.e. management and updating of the positive list and associated design and approval of methodologies, requires capacity in climate change mitigation and adaption, which is currently contained within the DEA. To ensure the credibility of new methodologies, an 'independent expert committee' could be appointed to work closely with the administrator on the assessment of new methodologies. The independent expert committee could be composed of experts from relevant departments (DEA, DoE, DoT, DAFF, NT, etc.) as well as scientific research institutions (e.g. SANAS, SABS, SANEDI, CSIR and relevant academic institutions) and be chaired by the DEA.

104. The independent expert committee would recommend adoption of new methodologies. It would publish proposed methodologies for public review and comment. Following the public comment period the administrator of the scheme would include the new methodology on the positive list.

105. Individual project developers would also be able to propose new methodologies to be reviewed by the independent expert committee and included on the list of eligible projects.

5.2.4. Accreditation and Standards Bodies

106. In addition to the DNA and DEA, other institutions with the relevant technical capacity in GHG monitoring, reporting and verification will need to be included in the development of the carbon -offset scheme. This mainly includes the South African National Accreditation System (SANAS), which is recognised as the single National Accreditation Body; the South African Bureau of Standards (SABS), which is responsible for the development of GHG and energy efficiency measurement and verification of methodologies; but also includes the South African Energy Development Institute (SANEDI), with experience on the issues of clean and sustainable energy.

107. Both the SABS and the SANAS could play an important role in the carbon-offset market. A series of international GHG reporting standards, the ISO 14064(1-3),ISO 14065 standards and ISO 14066[2], have been adopted by the SABS as part of the South African technical infrastructure (as SANS 14065) and can be utilised for verification of carbon-offset projects. Furthermore, SANAS has prioritised a work programme to accredit companies for GHG verification and is already accepting applications for accreditations for ISO 14065. Accredited ISO verifiers are able to carry out VCS verifications. This will enable carbon-offset credits to be verified and issued under VCS domestically.

5.2.5. Independent Verification Bodies

108. In order to create an effective system of checks and balances, it will be important to establish a network of accredited independent verifiers to conduct verification of carbon-offset projects. The majority of emission-offsetting standards require an accredited third-party verifier to submit a verification report on behalf of the project developer and such a model should also be adopted within the South African scheme.

109. The administrator must maintain a database of approved independent verifiers. This database should be linked to the SANAS-accredited verifiers' database as noted above. This will enhance the credibility of the carbon-offset scheme and ensure a close link between the administrator of the carbon-offset scheme and the network of accredited verifiers. Furthermore, the administrator could be empowered to compile Terms of Reference for the code of conduct of validators as well as reserve the right to request SANAS to disqualify a verifier that may be found to be acting in contravention of the proposed code of conduct.

[2]There is a package of ISO standards guiding GHG reporting and verification. ISO 14064-3:2006: Greenhouse gases Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions. ISO 14065:2007: Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition. ISO 14066:2011: Greenhouse gases - Competence requirements for greenhouse gas validation teams and verification teams.

5.2.6. Offset registry

110. To enable effective management of carbon-offset credits records, an offset registry must be established within the South African scheme. It will be crucial for the credibility of the carbon-offsetting scheme to ensure that the credits surrendered for compliance are retired, and thus cannot be traded and double counted either locally or internationally. A carbon-offset registry would consist of an electronic database in which the carbon credit is stored. The establishment of a registry can be satisfied by the development of an IT platform, which can be overseen either by the administrator of the carbon-offset scheme or an appointed entity. If the development of a new registry in South Africa is perceived as too demanding in the short term, then one of the established and credible international carbon-offset registries could be contracted as an interim measure to manage the data records for the scheme. Box 2 below outlines the importance and key features of a carbon registry.

Box 2: Registration and enforcement system features

A carbon offset registry is required to generate reliable records of carbon offsets. Carbon offset registries keep track of offsets and are vital in minimizing the risk of double-counting. Registries also clarify ownership of offsets by assigning a serial number for each verified offset. When an offset is sold, the serial number and "credit" for the reduction is transferred from the account of the seller to an account for the buyer. If the buyer "uses" the credit by claiming it as an offset against their own emissions, the registry retires the serial number so that the credit cannot be resold (SEI, 2011).

The retirement of carbon credits is regarded as fundamental to ensure the integrity of the carbon offset. As acarbon credit represents the right to GHG emission reduction, to ensure effective utilisationof this GHG reduction right and ensure that it is can only be used once, carbon offsets need to be retired. Retirement effectively removes carbon offsets from the market and avoids the issue of double counting. Key features of a registry would be as follows:

- A registry with publicly available information to uniquely identify offset projects.
- A serial number for each offset credit generated by each project.
- A system to transparently track ownership of offsets which makes it possible to track each offset to the project from which it originated.
- A system to easily check on the status of an offset (e.g. whether an offset has been retired).
- Contractual or legal standards that clearly identify the original "owner" of the emission reductions as well as further owners of this offset.
- Contractual or legal standards that spell out who bears the risk in case of project failure or partial project failure (e.g. who is responsible for replacing the offsets that should have been produced by the failed project).

Source: SEI, 2011

111. General examples from international registries show a specific set of information being stored. This set of informational entries will need to be reviewed to ensure that in addition to generic data, it contains data required by the South African scheme. Box 3 below shows a

minimum set of information that should be added to the registry. It is anticipated that international carbon-offsets standards will be used at the outset of the scheme. A South African registry must be established and its link with the South African Air Quality Information System (SAAQIS), which will be used for GHG reporting, needs to be explored to ensure appropriate monitoring of GHG data.

Box 3: South African-specific information to be included in the domestic registry to clearly indicate compliance with eligibility criteria

- Serial number for each offset credit generated by each project.
- Location of the offset project – to determine eligibility with respect to geographical location.
- Methodological basis – to ensure that the project is being developed along eligible carbon offsets project methodology, i.e. methodology on a positive list.
- Legal status of the implementing entity – to ensure eligibility based on carbon tax coverage.
- Registration date of the project – to ensure project eligibility with respect to the carbon tax scheme commencement date.

5.2.7. Trading platform

112. The ultimate sale of carbon credits from project developers to entities included within the scope of the SA carbon tax legislation outlined above, who purchase carbon credits to lower their carbon tax liability, will be crucial to establish balance between supply and demand in the market.

113. Over the medium term, a credible trading facility could be appointed to enhance liquidity in the carbon-offset market and enable third-party investment in carbon-offset projects. The establishment of a trading facility will allow for the market to determine the price for carbon credits within South Africa and facilitate the exchange of key information, minimising speculation and increasing confidence and market participation.

5.3. Carbon offset project life cycle

114. In order for a project developer to be awarded credits from an offset project, a specific process needs to be established and the roles and responsibilities of the different parties involved must be defined. Drawing on existing standards, a proposed set of steps to be followed is included in Box 4 and further elaborated upon below.

Box 4: Carbon offset project life cycle

- Application to become a recognised offsets developer (project proponent) with an offset registry account submitted to the administrator.
- Submission of carbon-offset project ideas to the administrator for pre-screening to ensure that eligibility criteria being met.
- Implementation of carbon-offset project by the project developer.
- Verification of an implemented project by a recognised third-party verifier and submission of offset project verification (audit) reports to the administrator for approval.
- Carbon-offset project approval and issuance of credits into the registry by the administrator.
- Sale of carbon-offset credits (pre-dated credit options might be exchanged at an earlier point, but only used and retired for carbon tax liability reduction once materialised).
- Issuance of the carbon-offset certificate based on carbon-offset serial numbers by the administrating entity.
- Use of carbon-offset credits specified in the certificate to reduce the carbon tax liability and retirement of carbon credits.

5.3.1. Becoming a carbon offsets developer

115. In order to become a recognised offsets developer (project proponent), application will have to be made to the administrator of the programme. Once the administrator has received an application, an offset registry account will be created, enabling the project developer to commence with the submission of project ideas to the administrator. Application for an offset registry account could possibly be carried out in conjunction with a first submission of a project idea.

5.3.2. Project pre-screening

116. Pre-screening of carbon-offset projects can take place during the planning and early implementation phase of the project. It confirms the sound planning of the project developer and the compliance with the eligibility criteria and chosen offset standard methodological underpinnings. The project would usually not have been implemented at this stage and pre-screening neither comments on the actual performance of a project nor certifies any emission reductions. Pre-screening is an ex-ante indication that the project, if implemented according to

an approved methodology and fulfilling specified eligibility criteria, might generate the expected amount of emission reductions and complies with rules and regulations. This is carried out by the project administrator.

5.3.3. Project verification

117. Monitoring and verification standards are required to ensure that offset projects perform as expected. Project verification is usually carried out by an independent verifier. Rigorous third-party verification of offset projects effectively creates the system of checks and balances between buyers and sellers in the offset market.

118. Verification is an ex-post confirmation that the project was implemented and is performing according to its specific design. Verification will confirm and quantify the amount of emission reductions. Verification will also confirm that the eligibility criteria and methodologies and monitoring standards have been implemented according to what was specified at the pre-screening phase. Ex post verification could be repeated as frequently as annually in order to have credits issued on a regular basis.

5.3.4. Issuance of carbon offset credits and certificate

119. The entity administrating the carbon-offset programme would be required to evaluate offset project verification reports to ensure that projects have been implemented as proposed. The administrating entity will then issue carbon-offset credits to the project developer and insert a record of the carbon credit into the registry.

120. Credits can then be traded so entities liable to the carbon tax will be able to obtain carbon-offset credits. Prior to the use of credits to lower their carbon tax liability, entities will have to obtain a certificate from the administrating entity of the carbon-offset programme.

6. Request for comments

121. The National Treasury, Department of Environmental Affairs and the Department of Energy invite public comment and input on this document, classified according to the following topics of relevance to implement an effective carbon offset scheme linked to the proposed carbon tax.

a) General design features of the carbon-offset scheme as outlined in this paper.

b) Carbon-offset potential under the proposed carbon tax in South Africa.

c) Eligibility criteria of carbon-offset projects under the carbon tax.

d) Interim arrangements to operationalise issuance of carbon-offset credits by using existing international carbon-offset standards.

e) General institutional arrangements to implement a domestic carbon-offset scheme.

f) The role, functions, capacity and location of the administrating entity of the scheme.

g) Development of a South African carbon offsets registry.

h) Development of a trading platform.

i) Other issues that might be of relevance.

122. Comments on this policy paper should be submitted to Peter Janoska at peter.janoska@treasury.gov.za by 30 June 2014.

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Appendix A – Overview of global carbon offset standards

Table 6: International carbon offset standards and their use in South Africa

Standard	Projects and Market share	Details
The Clean Development Mechanism (CDM) www.unfccc.int	7435 registered projects 80 projects in SA Dominant standard in the compliance market, but only 1% market share in voluntary market (in 2012)	The CDM is one of the flexibility mechanisms under the Kyoto Protocol. The CDM is widely accepted and the most recognised standard in the world. Under the CDM Annex 1 countries are eligible meet part of their caps using Certified Emission Reductions (CERs) from CDM emission reduction projects in developing countries.
Verified Carbon Standard (VCS) www.v-c-s.org	1140 registered projects 6 projects in SA 58% market share in voluntary market (in 2012)	The VCS aims to be a universal, base-quality standard with reduced administrative burden and costs. It is currently the largest voluntary carbon standard, which is widely recognised and accepted.
Gold Standard (GS) www.cdmgoldstandard.org	223 registered projects, 354 listed projects, 61 validated projects and 152 issued projects 22 projects in SA 12% market share in voluntary market (in 2012)	The GS is a standard for renewable energy and energy efficiency projects and the project developers are also required to demonstrate co-benefits. It is widely recognised and accepted, but its use is limited due to its limited scope of projects.
Climate, Community and Biodiversity Standard (CCBS) www.climate-standards.org	145 registered projects(in 2012) 3 projects in SA	CCBS comprises of a set of project-design criteria for evaluating land-based carbon mitigation projects and their community and biodiversity co-benefits. It has been linked to 47% of VCS forestry credits.
ISO Standards: **ISO-14064** **ISO-14065** **ISO-14066** www.iso.org	4% market share in voluntary market(in 2012)	ISO 14064-3:2006: Greenhouse gases Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions ISO 14065:2007: Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition ISO 14066:2011: Greenhouse gases - Competence requirements for greenhouse gas validation teams and verification teams

Source: Ecosystems Market Place and Bloomberg New Energy Finance, 2012; SEI, 2008; SEI, 2008

Appendix B – Carbon offsetting schemes that accompany specific carbon pricing policies

California - California's Global Warming Solutions Act (AB 32)

In July 2006, the State of California passed the Global Warming Solutions Act of 2006, which creates a timetable for capping state-wide emissions at 1990 levels below 2020, and then capping levels at 80% below 1990 levels by 2050. The central element of the Act is a cap and trade scheme, which started its operation on January 1, 2012, with an enforceable compliance obligation beginning with the 2013 GHG emissions. Beginning in 2013, the cap will decline approximately 3 percent each year. California is working closely with British Columbia, Ontario, Quebec and Manitoba through the Western Climate Initiative to develop harmonized cap and trade programs that will deliver cost-effective emission reductions.

As an additional GHG emissions mitigation mechanism to complement the cap and trade scheme, the Global Warming Solutions Act has made provisions for a carbon offsets programme (ARB, 2012). California's State Air Resources Board (ARB) is able to issue offset credits for greenhouse gas (GHG) emission reductions or sequestered carbon that will meet regulatory criteria. Offset credits may be used by an entity to meet up to eight per cent of its triennial compliance obligation under the cap-and-trade program. Each ARB offset credit is equal to 1 metric ton of carbon dioxide equivalent (MT CO_2e) and can only be quantified using an ARB approved compliance offset protocol. Sub article 13 of the cap-and-trade regulation details the legal requirements for compliance offset protocols, implementation and verification of offset projects, and issuance of ARB offset credits. Once an ARB offset credit is issued, it may be used for compliance up to applicable limits with the cap-and-trade program.

Early Action Offset Credits

The cap-and-trade regulation allows for the transition of eligible existing offset credits developed under selected voluntary offset protocols to ARB early action offset credits for use in the cap-and-trade program.

Offset Credit Criteria

The Regulation contains provisions that ensure the environmental integrity of issued ARB offset credits and ensures ARB's ability to conduct oversight and enforcement of all parties involved in the generation of ARB offset credits. ARB requires that in order to be used in the Cap-and-Trade Program. Specifically, offsets must:

- Represent a GHG emission reduction or GHG removal enhancement that is real, additional, quantifiable, permanent, verifiable, and enforceable;
- Be achieved using one of the standardized Compliance Offset Protocol that has been approved by ARB;
- Be achieved by an offset project that meets specific requirements;
- Be achieved by an offset project that is listed as prescribed;
- Be achieved by an offset project that meets the criteria for monitoring and reporting;
- Be achieved by an offset project that is verified by an ARB-accredited third party verification bodied and verifiers as prescribed; and

• Be issued by ARB.

Programme Methodological Specifics

Projects aspiring to be awarded ARB offset credits must represent a GHG emission reduction or GHG removal enhancement that is real, additional, quantifiable, permanent, verifiable, and enforceable. Projects aiming to generate ARB offset credits must comply with one of the four offset protocols adopted by ARB. These cover the following areas:

- Forest Projects
- Urban Forest Projects
- Livestock Projects
- Ozone Depleting Substances (ODS) Projects

Following project types are proposed:

- Rice Cultivation Projects
- Mine Methane Capture Projects

Compliance Offset Protocols must be approved by the Board after public notice and the opportunity for public comment. Any updates or modifications to existing COPs must also be approved by the Board. Staff will review and periodically revise COPs as needed. For example, if new scientific information is developed to support changes to emission factors used to help quantify the amount of emission reductions achieved by the project, staff could propose changes to the COP.
For the Board to approve a COP it must meet the following criteria, which are found in section 95972 of the Regulation:

- Robust Quantification: The COP must accurately determine the amount of GHG reductions or sequestration for the offset project type using the best available science.
- Data Collection and Monitoring: The COP must include the relevant data collection and monitoring procedures for the offset project type.
- Project Baselines: The COP must establish a project baseline for the relevant offset project type(s) that reflects a conservative estimate of business-as-usual performance or practices.
- Account for Leakage: The COP must account for activity-shifting and market-shifting leakage when quantifying the reductions or sequestration for the offset project type.
- Account for Uncertainty: The COP must conservatively account for uncertainty in setting the quantification methods and emission factors used for the offset project type.
- Account for and Ensure Permanence: The COP must ensure that GHG reductions or removal enhancements are permanent, and if there is a risk of impermanence, they must include a mechanism to ensure permanence. See Example 6.3.1.
- Establish Crediting Period: The COP must establish the length of the crediting period for the offset project type. There are minimum and maximum requirements for crediting period lengths.
- Standard Methods and Quantification: The COP must use standard criteria for determining the eligibility and additionality of offset projects of that type. In addition, the COP must quantify the GHG reductions or removal enhancements achieved by the offset project using standardized baseline assumptions, emission factors, and monitoring methods.
- Geographic Applicability: Each COP must establish where offset projects using the protocol can be located. Some COPs may have a limited geographic scope due to lack of available data for establishing accurate emission factors or quantifying GHG reductions or removal enhancements in a particular geographic area. The Cap-and-Trade Regulation establishes that offset projects must be located in the United States and its Territories, Canada, or Mexico. Although this criterion is established in the Regulation, individual COPs may specify

a more limited geographic area within that range. For example, the protocol for Compliance Offset Protocol Livestock Projects is only applicable in the United States.

Offset Credit Creation Process

The main elements of the offset credit creation process are:
- Registration;
- Listing of the offset project;
- Monitoring and reporting of GHG reductions or removal enhancements;
- Verification;
- Offset Project Registry determination and issuance of registry offset credits; and
- ARB determination and issuance of ARB offset credits and registration of ARB.

Regional Greenhouse Gas Initiative (RGGI)

Regional Greenhouse Gas Initiative (RGGI), incorporating a number of North East and Mid-Atlantic States the United States, is an additional example of market-based regulatory program that enables its participants to purchase emission offsets. RGGI went into effect on January 1, 2009, as the first mandatory cap-and-trade program to regulate GHG's in the US.

Offsets serve as a limited compliance flexibility mechanism for regulated facilities under the RGGI program. The quantitative limit on offsets was set at a level that approximates the amount of offsets equivalent to 50% of the projected avoided emissions that would need to be achieved to comply with the emissions cap. At the start of the program, a regulated facility was able to meet 3.3% of its compliance obligation during a compliance period through the use of offsets. If the emissions allowance price rises above a specified level, or price trigger, a regulated facility can use a higher percentage of offsets to meet its compliance obligation. The price trigger is evaluated based on long-term price signals. These signals are determined based on a 12-month rolling average price, following a 14-month market settling period, which commences at the start of each new compliance period.) If the price exceeds USD 7 (in 2005 dollars) (stage-one trigger), a regulated facility can use offsets to meet up to 5% of its compliance obligation; and if it exceeds USD 10 (stage-two trigger), it can use offsets to meet 10% of its compliance obligation. Both stage-one and stage-two price triggers are calculated based on formulas in RGGI Model Rule definitions of stage-one and stage-two "threshold price".

Project Types

Initially, only offsets from five project types are permitted (landfill methane capture and destruction, afforestation, SF6 reduction in the electricity sector, avoided agricultural methane emissions, and energy-efficient building projects). The RGGI program has developed methodologies for five offset project types:

1. Landfill methane capture and destruction;
2. Sulphur hexafluoride (SF_6) emission reduction in the electricity transmission and distribution sector;
3. Carbon sequestration through afforestation activities;
4. CO_2 emission reduction or avoidance from natural gas, oil or propane combustion due to end-use energy efficiency in the building sector; and

5. Avoided methane emissions from agricultural manure management operations.

Currently, eligible offset projects must be located within a RGGI participating state, or any other state or US jurisdiction where a cooperating regulatory agency has entered into a memorandum of understanding (MOU) with the appropriate regulatory agency in all 10 RGGI participating states to provide oversight support for the project. However, if the stage-two trigger comes into effect, the twelve-month rolling average allowance price reaches $10, the geographic project location boundary will be expanded to allow, under certain conditions, offsets from any mandatory carbon constraining program outside the US.

Alberta-Based Greenhouse Gas Reduction Program and Offset Credit System

Alberta's offset credit system is a compliance mechanism for entities regulated under the province's mandatory GHG emission intensity-based regulatory system. Large final emitters (any facility in the province that emits more than 100,000 metric tons of CO_2e of GHG's per year) are required to reduce their GHG intensity by 12% per year. Regulated facilities that are not able to meet their reduction obligation through direct facility improvements can meet the emissions intensity reduction target through three compliance mechanisms:

- purchase or use of Emissions Performance Credits
- contributions to the Climate Change and Emissions Management Fund at a price of CND 15 per metric ton of CO_2e; or
- purchase of Alberta-based offset credits

Offset Programme Administration

The Alberta provincial government has the overall program authority for the Alberta-based offset credit system. Third-party verifiers serve to verify baselines, annual compliance reports, and offset credits being registered on the Alberta Emissions Offset Registry. Third-party verifiers must be professional engineers or chartered accountants with appropriate experience. Third party verifiers must complete and submit a Statement of Qualification, which states that the review team has adequate areas of knowledge and expertise as part of the required verification documentation. The regional scope of the Alberta offset system is the Canadian province of Alberta. Alberta's offset system will be linked to or incorporated into Canada's GHG offset program or other programs as they come on line.

Programme Methodological Specifics

Projects are required to be real, demonstrable and quantifiable, and to not be required by law. Issues concerning additionality are addressed during the multi-stakeholder technical review process and during the public posting period. Project developers must demonstrate that the project activity results in emissions reductions that are beyond business as usual practices. No additional additionality screening tests are required. A bottom-up approach is used to develop baseline quantification protocols under the Alberta offset system. Offset project developers propose baseline quantification methodologies that are then reviewed and approved by Alberta Environment. Monitoring requirements are not specified in the quantification protocols.

Project Types

The Alberta offset system takes a top-down approach to approving eligible project types. Offset projects must meet the requirements for an offset project stated in section 7 of the Specified Gas Emitters Regulation. Projects must also be generated in accordance with a government approved protocol that articulates minimum requirements for specific offset reduction activities in the province.

Quantification protocols are available for the following projects types: acid gas injection, anaerobic wastewater treatment, beef feeding, beef-feed days, beef lifecycle, bio fuel, biogas, biomass, compost, dairy cattle, energy efficiency, energy efficiency for commercial and institutional buildings, engine fuel management and vent gas capture, enhanced oil recovery, streamlined enhanced oil recovery, instrument gas conversion to instrument air, landfill bioreactor, landfill gas, modal freight, nitrous oxide abatement from nitric acid production, nitrous oxide emissions reductions in agriculture, non-incineration of thermal waste, pork, road rehabilitation, run-of-the-river electricity systems, solar electricity systems, tillage, waste heat recovery, streamlined waste heat recovery and wind-powered electricity systems.

EU Emission Trading Scheme

The European Union Emissions Trading Scheme (EU ETS) became effective January 1, 2005, creating the world's largest market in greenhouse gas emissions to date. Participants in the EU ETS are also allowed to use credits generated from most categories of Joint Implementation (JI) and Clean Development Mechanisms (CDM) under the Kyoto Protocol towards fulfilling their obligations under the EU ETS.

The EU legislation currently excludes two types of JI/CDM credits (nuclear and temporary forest credits) while Member States 'may' allow the use of others and hereby currently take different approaches. Furthermore, from the third accounting phase, commencing in 2013, only CDM credits originating in Least Developed Countries will be accepted under the EU ETS.

Appendix C - Potential for carbon sequestration and emission reduction by types of projects

Table 7: Potential carbon offset areas

Carbon Offset Areas	Carbon Offset Project Technology	Carbon Offset Projects in the Area
Renewable Energy		
Wind energy	South Africa has extensive areas of land with considerable potential for development of wind energy.	
Solar energy	South Africa is considered to have excellent solar resources, where total accumulated annual solar irradiation is exceptionally high and annual variability relatively low. Solar PV modules are relatively widely employed in South Africa, particularly on a small scale in households and in rural areas. Although PV technology is relatively expensive, costs are decreasing as technology and efficiency is improved, and as public awareness and acceptance of the technology increases.	
Solar Thermal Heating	According to Eskom an estimated 30 % of domestic, commercial and industrial energy consumption is accounted for by water heating. Large-scale development of SWHs has considerable potential to reduce demand for electricity and reduce concomitant GHG emissions. Studies undertaken by the Energy Research Centre (ERC) in support of the development of a renewable energy policy roadmap indicate that policies which encourage increased roll-out of SWH's have considerable potential to reduce electricity use and create jobs in manufacture and installation of SWH components.	The Kuyasa CDM Project in Khayelitsha, Cape Town, is an example of the use of SWHs to generate carbon offsets, where over 2,300 low-cost homes were retrofitted with SWHs (in addition to energy-efficient lighting and improved insulation). The project was South Africa's first registered CDM project and the world's first registered Gold Standard project and wasanticipated to contribute annual reductions of 7,000 tCO_2e.
Hydro Energy	South Africa, as a water-scarce nation, has relatively limited potential for development of hydro-electric power generation (i.e. electricity generated by turbines driven by water flow). The provinces best suited to exploit small-scale hydro-electric power generation (power plants with a capacity of less than 10MW) are KwaZulu-Natal and the Eastern Cape.	There are no projects in South Africa, but the technology accounts for a significant number of registered CDM projects. There have been over 1,500 hydro-electric CDM projects, generating over 65 GW, developed in China.

Carbon Offset Areas	Carbon Offset Project Technology	Carbon Offset Projects in the Area
Biomass	Biomass is biological material from living organisms that is used either directly as an energy source of converted to other energy products such as biofuel. When biomass is used directly to produce fuel, plant biomass is used to generate electricity through steam turbines or produce heat directly through direct combustion.	Some CDM projects have been registered for South Africa including: i) fuel switches from coal to biomass e.g. Tugela pulp and papermill; ii) the use of biomass as fuel as opposed being sent to landfill and generation of methane e.g. Mondi, Richards Bay and Lowpal Timbers; iii) the distribution of efficient biomass cookstoves e.g. Improved Cooking Stoves Programme; and iv) biomass production e.g. Lomati Biomass Power generation.
Energy Efficiency and Fuel Switch		
Energy Efficiency	There is substantial scope in South Africa for the development of energy efficiency projects in different sectors. Eskom's Demand Side Management (DSM) programme has demonstrated the potential scale of energy savings possible in participation with industry. Industrial demand accounts for approximately 41 % of energy consumption, residential sector about 17 % and the commercial sector 4 %. There is large scope for the development of energy efficiency in existing households, commerce and industry throughout the country in applications such as heating, cooling and lighting.	The CDM energy efficiency (demand-side) projects already registered for South Africa include activities such as solar water heater installation, energy-efficient bulbs, ceiling insulation, reduced energy consumption in processing industries, efficient cookers and efficient refrigeration. These projects can all be referred to as demand-side energy efficiency. Possible supply-side energy efficiency projects include generation of own energy, increased efficiency of power plants and efficiency in the distribution of energy.
Fuel Switch	Fuel switching is the replacement of non-renewable energy sources with renewable energy sources.	Fuel switching projects that have been registered with the CDM include switches from coal to natural gas as an energy source in production process including kilns, turbines and mills e.g. Rosslyn Brewery, Lawley, Mondi, Tongaat Hulett and Sasol.
Transport	There is an extensive potential for improvement of carbon efficiency in transport.	South Africa does not have any CDM projects registered under the transport category, although some project ideas notes (PINs) have been approved by the DNA e.g. the Rea Vaya Bus Rapid Transit System of the transportation department of the City of Johannesburg (currently listed under the VCS as a pre-CDM registration project), Cape Town's Integrated Bus Rapid Transport System Project, and the Retrofit

Carbon Offset Areas	Carbon Offset Project Technology	Carbon Offset Projects in the Area
		Kinetic Energy Recovery System for reducing emissions in transportation fleets.
Agriculture, forestry and other land uses (AFOLU)	A land-based sequestration of carbon through restoration of ecosystems is an underdeveloped area of carbon offsetting. There are numerous mechanisms for increasing sequestration or reducing emission of GHGs in land-based projects within the CDM and various voluntary methodologies, for example through afforestation, reforestation and revegetation (ARR); improved management of forests, grasslands and agricultural areas; restoration of wetlands; improved management of fire regimes; and Reduced Emissions from Deforestation and Degradation (REDD). A significant benefit to land-based projects is their potential to generate additional co-benefits to the project area, for example protection of biodiversity, increased tourism potential, enhanced protection of watersheds, and creation of jobs and alternative sources of income.	The sale of carbon offsets can potentially restore millions of hectares of highly degraded land across South Africa. In 2004, the South African government initiated the Subtropical Thicket Restoration Programme (STRP) with the primary objective of creating jobs and funding large-scale restoration by selling carbon offsets generated through the increased sequestration of carbon by restored ecosystems (in this case, sub-tropical thicket vegetation). In 2006, the VCS/CCBSwas selected as the most appropriate validation process for the STRP, primarily because of uncertainties and low prices in the CDM marketplace for land-based/forestry projects, which led to low prices and low demands for CDM offsets in this sector.

Source: C4 EcoSolutions, 2013