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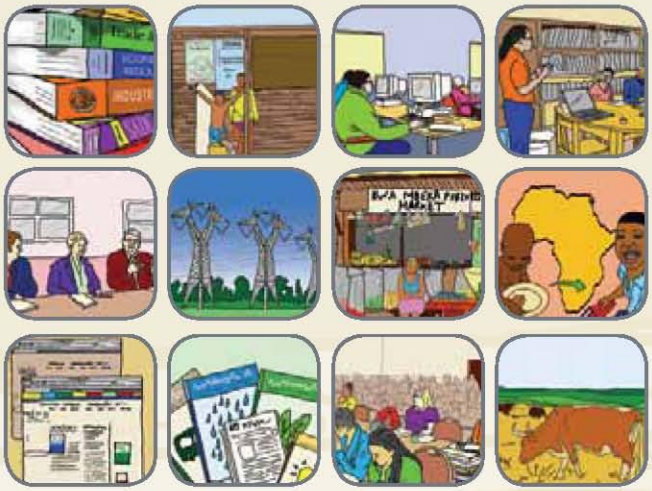

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Green Economy Policy Framework and Employment Opportunity: A South African Case Study

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Acronyms

COSATU	Congress of South African Trade Unions
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
DoE	Department of Energy
DST	Department of Science and Technology
EDD	Economic Development Department
GDP	Gross Domestic Product
GW	gigawatt
IDC	Industrial Development Corporation
ILO	International Labour Organization
IPAP	Industrial Policy Action Plan
MW	megawatt
NDP	National Development Plan – Vision for 2030
NEDLAC	National Economic Development and Labour Council
NGP	New Growth Path
NPC	National Planning Commission
NSSD	National Strategy for Sustainable Development and Action Plan
NT	National Treasury
O&M	Operation and Maintenance
R&D	research and development
SWH	solar water heater
the dti	Department of Trade and Industry
TIPS	Trade and Industrial Policy Strategies
UNFCCC	United Nations Framework Convention on Climate Change
USD	United State Dollar
ZAR	South African Rand

Abstract

In 2012, South Africa remains faced with the triple developmental challenge of unemployment, poverty and inequality. In addition, the country's current economic growth model is heavily resource and energy-intensive, aggravating pressures on the environment and the threat of climate change. The transition to a green economy, stemming from the concept of sustainable development, has been internationally recognised as a ground-breaking way forward, combining economic development, social welfare and environmental protection.

South Africa is in a unique position to exploit the emergence of green economic development in the world. The country's renewable resources abundance (solar and wind predominantly) and biodiversity positions it to play a leading role in the Southern African region and in Africa. In addition, if supported by an enabling environment, green sectors have the potential to foster South African growth and employment, as well as the shift to sustainable development.

Building on this opportunity, this paper, constructed as a national case study, investigates the current state of play in terms of green jobs in South Africa and analyses potential changes that a shift to a green economy could generate on the labour market. It reviews the policy and regulatory framework for a green economy in South Africa, including the role of the institutional structure and social dialogue. It then examines the current and potential employment of a green economy in South Africa, considering possible sectoral trade-offs and employment losses. The change in employment conditions that could be triggered by the greening of the economy is also considered.

1. Introduction

In 2012, South Africa remains faced with the triple developmental challenge of unemployment, poverty and inequality. In addition, the country's current economic growth model is heavily resource and energy-intensive, aggravating pressures on the environment and the threat of climate change. South Africa is thus the world's 13th largest greenhouse gases emitter while only ranking 29th and 70th in terms of gross domestic product (GDP) and GDP per capita.

The transition to a green economy, stemming from the concept of sustainable development, has been internationally recognised as a ground-breaking way forward, combining economic development, social welfare and environmental protection. The Brundtland Report defined in 1987 sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNWCED, 1987). Building on this definition, a green economy is "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2011). Practically speaking, in a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

South Africa is in a unique position to exploit the emergence of green economic development in the world. The country's renewable resources abundance (solar and wind predominantly) and biodiversity positions it to play a leading role in the Southern African region and in Africa. In addition, if supported by an enabling environment, green sectors have the potential to foster South African growth and employment, as well as the shift to sustainable development.

Building on this opportunity, this paper, constructed as a national case study, investigates the current state of play in terms of green jobs in South Africa and analyses potential changes that a shift to a green economy could generate on the labour market. The paper proceeds as follows. Section 2 reviews the policy and regulatory framework for a green economy in South Africa, including the role of the institutional structure and social dialogue. Section 3 examines the current and potential employment of a green economy in South Africa, considering possible sectoral trade-offs and employment losses. The change in employment conditions that could be triggered by the greening of the economy is also analysed. Section 4 concludes.

2. The green economy framework in South Africa

2.1. Policy mandate

Since 1994, South Africa has achieved far-reaching political, economic and social changes, and has shown an increasing commitment to sustainable development. Along with its involvement in international negotiations, it has developed its own national framework for a shift to a green economy. South Africa recognises sustainable development as a human right in the Bill of Rights of its 1996 Constitution (Republic of South Africa, 1996) and also committed to achieving the Millennium Development Goals, which include environmental sustainability as a target (United Nations, 2000).

The country is a Party to both the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC) and has made commitments under the Cancun Agreement for its greenhouse gas emissions to "peak, plateau and decline", with reductions in emissions compared to a "business as usual" scenario of 34% in 2020 and 42% in 2025. South Africa is also Party to many international conventions and agreements on biodiversity (such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Biological Diversity, the International Convention for the Regulation of

Whaling and the Ramsar Convention on Wetlands of International Importance) and pollution issues (such as the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal, the Stockholm Convention on Persistent Organic Pollutants and the Montreal Protocol for the Protection of the Ozone Layer).

2.2. Institutional structure

In many ways, South Africa's institutional arrangements with respect to the green economy reflect the challenges faced internationally of complex interconnections between a maze of institutions.

The National Strategy for Sustainable Development and Action Plan (NSSD) is the responsibility of the Department of Environmental Affairs (DEA), but the National Planning Commission (NPC), a department of sustainable development in all but name, resides in the Presidency (it however has advisory powers only).

The Economic Development Department (EDD) includes the green economy under its formulation of a New Growth Path (NGP) for the country, but EDD only has direct control over the two main state-run development finance institutions: the Development Bank of Southern Africa (DBSA) and the Industrial Development Corporation (IDC).

Support for green industry falls under the Department of Trade and Industry (the dti), but the dti has to rely on other departments to implement measures aimed at green industries. Environmental fiscal reform (green taxes and subsidies which supports both green industries and the greening of the economy as a whole) is under the mandate of the National Treasury (NT). The DEA is responsible for the protection and restoration of ecosystems and the setting of environmental standards (e.g. for pollution or emissions). The Department of Energy (DoE) is in charge of issues relating to fossil fuels and renewable energy. The Department of Water Affairs (which falls under the same ministry as the DEA) is responsible for issues relating to water, and technology policy and research and development (R&D) are under the Department of Science and Technology (DST).

Other departments (including for mining, agriculture, forestry, fisheries, transport, housing and local government) all contribute to green economy activities and thereby to green jobs at the sectoral level.

2.3. Social dialogue and tripartism

Organised sectoral social dialogue, between and within government, business and labour/civil society, can greatly facilitate the shift to a green economy. It can generate positive outcomes and mitigate any adverse effects of structural change. South Africa is one of the countries that have institutionalised social dialogue.

As a member state of the International Labour Organization (ILO), South Africa, through the National Economic Development and Labour Council (NEDLAC), developed the Decent Work Country Programme to complement efforts by government to address its developmental objectives and achieve decent work imperatives (ILO and NEDLAC, 2010).

The green economy agenda, which was first formalised in the country's response to the global financial crisis (prior initiatives had only addressed part of the green economy agenda), was also enacted through NEDLAC-mediated collective action by government, business and labour.

At the policy level, government's response to the green economy has also been characterised by greater public-private partnership (for example in the procurement of renewable energy and energy efficiency) than has been the norm in traditionally state-monopolised 'brown' industries, like electricity generation. Public procurement programmes and subsidies at the national, provincial and local levels have however not yet been fully leveraged in favour of green and decent employment.

All constituents, through NEDLAC, have recognised the importance of, and are willing to participate in, managing the transition to a green economy. They however defend different priorities.

Despite broadly supporting green economy initiatives and recognising the links between environmental and economic sustainability, the main concern for business lies in the potential cost and effort involved in complying with new regulations and taxes.

South African unions, through the Congress of South African Trade Unions (COSATU), along other stakeholders, recognises "the opportunities in industries that combat the negative effects of climate change and believes that South Africa should develop strong capacity in these green technologies and industries" (Republic of South Africa, 2009). It is also determined to not let the lack of action on climate change exacerbate poverty for the most vulnerable groups in society (workers or the wider African population) and has taken the lead in raising awareness on these issues at the national and international level. In July 2011, COSATU and the International Labour Foundation for Sustainable Development (also known as Sustainlabour) organised a meeting inviting other unions to discuss climate change, green economy and its effects on employment. At the 17th Conference of the Parties to the UNFCCC, COSATU took part in the fight against climate change by pressurising governments to take ambitious decisions at the meeting, mobilising with wider civil society and developing a coordinated response from the African continent.

The position of the most powerful member union in COSATU, the National Union of Mineworkers, has been to focus on jobs in the coal sector, arguing that coal will continue to have a role as a national source of primary energy, even within a green economy transition. While it supports renewable energy, it is strongly opposed to nuclear energy (although some members stress the potential for jobs deriving from uranium mining and processing).

Even though organised labour has stressed the need for 'decent jobs' (and have rejected intermediaries such as labour brokers), it is mostly concerned by the protection of existing jobs and the creation of new jobs (i.e. employment *quantity*), rather than highlighting any particular issue with wages or working conditions (i.e. employment *quality*) within the area of green jobs. Overall, a strong focus on the job creation potential of green industries has been a key component of civil society advocacy for a green economy transition.

2.4. Overview of the legal and policy framework

The South African framework which guides the development of a green economy and, as a result, green jobs in the country essentially consists in nine key texts. Table 1 provides a chronological overview of these policies and measures, summarising their relevant goals, current (mid-2012) progress and the nature and level of civil society involvement in their establishment.

Table 1: Main green jobs-related policy and legal measures in South Africa

Policies and measures	Main goals	Progress (mid-2012)	Civil society involvement
Framework for Environmental Fiscal Reform (NT, 2006)	Provides principles and guidelines for fair and effective environmental taxes	Taxes and levies have been implemented on plastic bags, incandescent light bulbs, ecosystem restoration costs related to water use, liquid fuel, non-renewable electricity and new vehicle carbon dioxide emissions performance	A paper on carbon tax was published in 2010 for public consultation
Innovation Plan (DST, 2008)	Includes "safe, clean, affordable and reliable energy supply" and	Support for innovation in electric vehicles, fuel cells and carbon capture and storage, but	Limited

	climate change as priorities	cancellation of the country's largest clean energy R&D programme (the Pebble Bed Modular Reactor) and delay in the implementation of renewable energy demonstration projects (e.g. solar tower)	
Medium-Term Strategic Framework 2009-2014 (NPC, 2009)	Notes the need for sustainable livelihoods and sustainable resource management and relates these to various other policy areas including energy, water, housing, technology and competitiveness	Numerous policy responses implemented in line with the Medium-Term Strategic Framework, particularly the NSSD, the creation of an enabling environment for renewable energy, several water management projects and the National Climate Change Response.	Limited
Industrial Policy Action Plan (the dti, 2010, 2011 and 2012)	Specifically targets growth in green industries, focusing on solar water heaters (SWHs), but also includes other solar and wind energy, biofuels, electric vehicles and organic farming	Around 200 000 SWHs installed by mid-2012 and a procurement process started for around ZAR 120 billion worth of large-scale renewable electricity generation	Some consultation via NEDLAC
New Growth Path (EDD, 2010)	Targets the growth of a green economy, resulting in 400 000 new and additional jobs	Enabling regulation passed in other departments	Government, business and civil society signed the Green Economy Accord in 2011, which details (mostly already-existing) support measures
Integrated Resource Plan 2010-2030 (DoE, 2011)	Limits emissions from electricity generation to 275 Mt per year Expects renewable energy to make up 42% of all new electricity generation over the next 20 years	Procurement of renewable energy under the plan is on track, but procurement of nuclear energy has been delayed by at least a year	Large public participation, including inputs on modelling parameters and a first draft of the plan
National Climate Change Response (Republic of South Africa, 2011)	Endorses and quantifies South Africa's greenhouse gas emissions limits/commitments. Aims to grow green jobs while limiting job loss in unsustainable industries	South Africa had already made a (voluntary) emissions commitment and approved an emissions-limited energy plan (Integrated Resource Plan 2010-2030) prior to the publication of the policy	Significant public consultation, starting with the multi-stakeholder Long-Term Mitigation Scenarios process in 2007
National Strategy for Sustainable Development (DEA, 2011)	A large variety of indicators and goals spanning social, economic and environmental issues, but no budgets, timelines or responsibilities	Strategy published and annual publication of sustainability indicators (different from the ones in the strategy)	Public consultation on a draft NSSD since 2009.

National Development Plan (NPC, 2011b)	The NDP is very specific about goals and focuses on energy and carbon: • greenhouse emissions to peak in 2025 and introduce carbon budgeting • an economy-wide price for carbon and incentives for energy efficiency and managing waste better. • 5 million SWHs by 2030 • vehicle emission standards, zero-emission building by 2030 • simplify the regulatory regime for contracting about 20 000 MW of renewable energy by 2030	Greenhouse gas emissions may already be higher than levels committed to for stabilization in 2025. A carbon tax with exemptions is expected in 2013. SWH installations stand at just over 200 000 in 2012 (compared to the targeted 1 million by 2014/2015) Tax on carbon dioxide emissions of motor vehicles and new building energy efficiency regulations implemented Procurement has started on the first 3.7 GW of electricity supply from renewable energy out of a plan for 17.8 GW by 2030.	The NPC is guided by nominated Commissioners from outside of government (and business for the most part) and consulted publicly on the Development Plan based on an initial publication of a Diagnostic document.

Source: Author

Overall it is clear that South Africa has a very large number of policies and strategies in place with respect to the green economy, many of which originated before the concept even came into widespread use (around 2009/2010). It is notable that the policies were often developed from the bottom up, i.e. a more holistic document was informed by one (or several) dealing with a more specialized aspect, for example, the NSSD and the National Development Plan (NDP) were both developed after the electricity, industrial policy and economic development plans which would be informed by it.

Sector- and time-specific policies complement the South African framework. Policies related to waste management, biodiversity, energy efficiency (standards in particular), solar water heating, water conservation and demand management, and public transport have been implemented in the recent years to support the shift to a green economy. Various government initiatives also exist at the provincial and local levels (for example provincial green economy or green industry strategies in Gauteng, Western Cape and KwaZulu-Natal). In addition, the Framework for South Africa's Response to the International Economic Crisis, published in February 2009 as a result of the combined effort of government, business and labour (facilitated by NEDLAC), was the first economic policy document to directly mention green jobs (Republic of South Africa, 2009). It has triggered substantial green investment, particularly in renewable energy (to the value of ZAR 120 billion) and transport (including rail in the order of ZAR 100 billion).

Last but not least, the South African government has implemented a comprehensive monitoring system, the 12 Outcomes Framework, developed by the Department of Performance Monitoring and Evaluation, a dedicated department created in 2010 in the Presidency. This framework, which identifies the goals to reach, the means to achieve them, and the tools to assess progress, determines 12 outcomes (system-wide results) covering all spheres of sustainable development (education, health, safety and security, employment, skills, infrastructure, rural development, human settlement, local government, environment, international relations, and public service) and reflecting the desired development impacts that the government seeks to achieve. Each outcome is clearly articulated with key activities and measurable outputs and sub-outputs. A large set of specific indicators (overlapping the development indicators published annually by the Presidency), associated with targets for 2014/2015, is used to measure the progress. The green economy is reflected throughout the framework, in addition to specific mentions in the employment and environment outcomes (DPME, 2010).

As a result, possibly the major challenge for green economy initiatives – as with many others in government – lies in coherence among multiple policies and coordination among the various departments and other government actors (like Eskom, the South African electricity public utility) responsible for its implementation. The policies implemented generally involved public consultation during the formulation, with significant levels of public involvement particularly with respect to climate change policy. In terms of implementation, while there has been an initial lag in the meeting of clean energy (energy efficiency and renewable energy) targets, these have started to be addressed since 2011. Procurement of renewable energy in particular is expected to result in investment worth ZAR 120 billion in the first round alone, rising in time to over ZAR 500 billion. Ecosystem-related public employment programmes have been successful for some years and are widely cited as best practice, even though their scale remains small compared to the economic and unemployment challenge.

3. Green economy and the South African labour market

3.1. Current and potential green employment

South Africa is characterized by high levels of unemployment. In March 2012, the official unemployment rate stood at 25%, while only 41% of the active population was actually employed (Statistics South Africa, 2012). Nearly one million jobs were lost in 2009 owing to the economic recession across all major sectors (both formal and informal) of the economy (Statistics South Africa, 2010). In addition, within the employed population, significant divergences in income and welfare between highly paid and skilled workers (of all races) and low-skill low-wage workers (mostly black/African) exist.

From a green economy perspective, the country does not report green jobs individually in any of its major surveys or statistics of employment, nor does it measure or report the size or growth of 'green industries'. This highlights a glaring need to continuously monitor the growth of the green economy and to report green industries and jobs as a specific category within Statistics South Africa surveys. However, based on a 2006 report to NEDLAC – the last available data – the environmental goods and services sector (more commonly referred to as "green industries" in government policy) was valued at between ZAR 14.5 billion and ZAR 23.2 billion in 2004, i.e. from 1.0-1.6% of GDP. Waste management accounted for 80% of the sector by value (Blueprint, 2006).

The NGP targets the creation of 300 000 additional direct jobs by 2020 in the green economy sector, including 80 000 in manufacturing. Construction, and operation and maintenance (O&M) of new environmentally-friendly infrastructure would account for the remainder. According to EDD, the potential for job creation rises to well over 400 000 by 2030. The expansion of the existing public employment schemes in the environmental sector as well as in production of biofuels could also trigger additional employment (EDD, 2010).

The second Industrial Policy Action Plan (IPAP) identifies "green and energy-saving industries" as a priority sector for job creation (the dti, 2010). The main focus of the first IPAP was on solar water heating, where 40% of the market was captured by importers in 2009 (the dti, 2010). The 2011 revision included more detailed targets in six sub-sectors: wind and solar energy; biomass energy; clean and multi-energy stoves; water and energy-efficient appliances and materials; efficient motors, variable-speed drives, energy metering and control and electricity storage; and waste and waste water treatment and (energy and material) recovery (the dti, 2011).

An IDC-DBSA-TIPS study estimated the employment potential in the formal sector of the green economy in South Africa to be approximately 98 000 new direct jobs in the short term (2011-2012), almost 255 000 in the medium term (2013-2017) and around 462 0000 "employment opportunities" or part-time jobs in the long term (2018-2025). Manufacturing and construction jobs each comprise only about 10% (46 000) of the

total number of jobs, while the bulk of jobs were associated with O&M services. In total, 26 industries were covered including sectors such as energy generation, energy and resource efficiency, emission and pollution mitigation, and natural resource management (Maia, *et al.*, 2011). In the long term, almost 50 % of this job creation potential stems from natural resource management, i.e. activities associated with biodiversity conservation and ecosystem restoration, as well as soil and land management. Payment for ecosystem services could also generate substantial employment opportunities. Energy generation comes second with more than 130 000 employment opportunities (28% of the total), growing rapidly from 13 500 (14%) in the short term. Job creation in energy and resource efficiency is expected to double from 31 500 in the short term to 68 000 in the long term, accounting for under 15% of the total. The potential of emission and pollution mitigation is more limited. The sector should still result in about 32 000 jobs in the long run. A dti study however suggests that the recycling sector has large scale (mostly informal) employment potential of more than 350 000 people (the dti, 2009). Table 2 below summarises current and potential employment in main South African green economy sectors by 2025.

Table 2: Current and potential employment in main green economy sub-sectors

Sectors	Current employment	Potential additional employment (by 2025)
Waste management (including recycling)	36 960-131 130 jobs (90% unskilled), including 40 000 in plastic recycling, 10 000 in scrap metal, 35 000 in metal beverage cans (the dti, 2009)	165 134-351 314 jobs (90% unskilled labour) (the dti, 2009) but only around 16 000 direct jobs (Maia, *et al*., 2011)
Biodiversity and natural resource management	73 392 biodiversity-specific personnel but 1 158 264 jobs in biodiversity-related sectors (Vass, *et al*., 2009; SANBI and The Lewis Foundation, 2010) 23 000 full-time equivalent/person-years employment to low-skilled workers in ecosystems restoration with the 'Working for Water' programme[1] (Peter, *et al*., 2010)	110 000 additional full-time equivalent per person-years employment with the 'Working for Water' programme (Maia, *et al*., 2011) As much as 350 000 person-year in soil and land management through payment for ecosystem services (Blignaut, *et al*., 2008)
Sustainable/public transport	Unknown	41 642 jobs in bus rapid transit in the long term (mostly in O&M after the decline of construction work) (Maia, *et al*., 2011) and 148 000 with the Gauteng mass rapid transit railway and bus system (Gautrain) (Naidoo, 2009)
Wind energy	Negligible	5 000 jobs in the long term (Maia, *et al*., 2011)
Solar energy	Very low	Minimum of 16 500 direct jobs (13 500 in photovoltaic and 3 000 in concentrated solar power) including 9 000 in manufacturing (Maia, *et al*., 2011)
Waste-to-energy	Unknown	37 000 direct jobs in the biomass industry, 10 000 in cogeneration and 7 000 in landfill gas, anaerobic digestion and pyrolysis/gasification (all essentially in O&M) (Maia, *et al*., 2011)

[1] 'Working for Water' is a South African government program that was founded in 1995 to clear alien invasive plants while providing social services and rural employment. Since its inception, the programme has cleared more than one million hectares of invasive alien plants providing annually jobs and training to approximately 20 000 people from among the most marginalized sectors of society.

Biofuels (bioethanol and biodiesel)	Unknown	More than 50 000 direct jobs, mostly from the growing of crops for raw material supply (Maia, *et al*., 2011)
Building and housing energy efficiency	Limited	6 500 direct jobs in building, construction and installation (Maia, *et al*., 2011)
Solar water heating	Approximately 700 people (including 200 in manufacturing and 400 in installation) (Maia, *et al.*, 2011)	17 620 new direct jobs, 16 278 of which in installation and 1 225 in manufacturing (Maia, *et al*., 2011)
Electric vehicles and lithium-ion batteries	Less than 100 people	10 000 in manufacturing (production of electric cars and buses, and of lithium-ion batteries) conditional to government support (Maia, *et al*., 2011)

Sources: Author, based on the dti, 2009 ; Maia, et al., 2011; Vass, et al., 2009; SANBI and The Lewis Foundation, 2010; Peter, et al., 2010; Blignaut, et al., 2008; and Naidoo, 2009.

3.2. Substitution of 'brown industries' by 'green industries'

Besides generating new employment, green industries have the potential to be effective alternatives to traditional sectors as they generally create more jobs per unit of investment, unit of capacity or unit of production than the 'brown' industries for which they are a substitute (UNEP, ILO, IOE and ITUC, 2008). This is particularly true for land-based industries (e.g. land restoration or conservation)[2]. In addition to supporting a structural change towards a more equitable and labour-intensive economy, green industries reduce the exposure of South Africa's economy to green protectionist measures (like the application of carbon pricing) that would significantly impact the country. They reduce the interdependence of mining and energy (e.g. coal for electricity and liquid fuels or electricity for smelters) and limit the country's trade exposure to global measures to protect the environment (particularly with regards to climate change).

At the sectoral level, mining and minerals beneficiation is the sector most at risk from a shift to a green economy. Employment in the sector has already suffered from a massive decline in recent years (from 830 000 in 1997 to about 548 000 in 2009) due to increased cost pressures and mechanisation, constraints to the expansion of production and export such as a lack of infrastructure (electricity and rail), declining reserves and production (especially for gold) and policy flux leading to an uncertain investment environment (new legislation and speculation around the nationalisation of mines) (NPC, 2011a).

A report for the ILO (Polidano, 1997) contends that 17 000 jobs in the South African coal sector are at risk from a climate action-related decrease in global demand for coal (rather than domestic policies) and its effect on South African coal exports. Considering that the sector currently employs around 74 000 people, this means a potential 23% of coal mining jobs would be at risk. In addition, the impact of carbon border taxes or equivalent greenhouse gas reduction instruments on South African exports could result in total export losses of as much as USD 9 billion (2004 constant USD) over the 2015-2020 period. These losses would be concentrated in energy-intensive industries, but could be almost entirely offset through global emissions trading including South Africa. The only sectors where export losses could not be mitigated in this way would be coal exports, followed by iron and steel (Jooste, *et al*., 2009).

On the other hand, the manufacturing of catalytic converters for automobiles, which is South Africa's largest green industry by value, accounted for exports of the order of ZAR 30 billion in 2008. Catalytic converters result in more than half of the global demand for platinum – an industry in which South Africa has an 80% global market share and which employs more than 180 000 people in the country, i.e. more than any other

[2] It is however critical to consider the overall impact of a sector on the economy. For example, biofuels are land-based and job-intensive but can destabilize the economy by affecting the price of staple foods such as maize.

mining sector and more than all other non-gold mining combined (Chamber of Mines of South Africa, 2011). The main threat to these jobs and the demand for platinum lies in an evolution of catalytic converter technology away from the use of platinum or of automotive technology away from the use of combustion engines to electric drivetrains. In an effort to hedge against this change, the South African government is supporting a significant research programme on the use of platinum in fuel cells, an energy storage technology that could power electric transport.

At the same time, the green economy presents new mining opportunities:

- renewable energy technologies in general use more iron ore than fossil fuelled technologies;
- light-weight materials for improved energy efficiency in vehicles and other technologies require specialist minerals like titanium;
- clean energy technologies from wind turbines to electric vehicles require the mining of so-called rare earth elements, for which South Africa was once (in the 1950s) the world's leading producer, but for which production has moved almost entirely to China;
- there are also opportunities with regards to fuels for low-carbon technologies like uranium or thorium (the latter is a by-product of rare earth extraction in South Africa).

While exact numbers are hard to approximate, it is possible, however counter-intuitive, that a green economy would result in a net *gain* in employment in the mining sector.

This trend should be compounded by the shift to cleaner sources of energy. According to a Greenpeace study (Rutovitz, 2010), an alternative energy development scenario for South Africa focused on renewable energy and energy efficiency (the Energy [R]evolution Scenario) would lead to 27% more employment in the energy sector in 2030 than a business-as-usual scenario. The South African energy sector would employ a total of 149 000 people in 2030 against 117 000 in the reference scenario. Renewable energy would be the main employer with 76 000 jobs (compared to 11 000 in the baseline scenario). 41 500 people would still work in the coal sector (including export), in decline from 64 000 in 2010, as opposed to an increase to 91 000 people in a business-as-usual path. Efforts in energy efficiency would result in greater employment in the sector. In 2030, 27 000 people (compared to 12 000 in the reference scenario) would work in the sector. A variant version of the [R]evolution scenario, further augmented by "enhanced manufacturing" including greater localisation, would add 33 700 additional jobs in 2030, including 25 000 associated with technology exports, to reach 182 700 jobs in total.

Agriculture should also be transformed by the greening of the economy. The IPAP identifies organic agriculture as an industry with the potential to create 20 000 jobs over a ten-year period and therefore counterbalance the loss of employment (due mostly to increased cost pressure and mechanisation) witnessed in the agricultural sector over the last decade (from 969 000 jobs in March 2001 to 650 000 jobs in March 2010) (DAFF, 2010). It also contains plans for growing organic cotton as a market differentiator in export markets, to stem the decline of the local industry, as well as the retention of 5 000 jobs in the Rooibos and Honeybush industries through improved marketing (the dti, 2010). Organic, near organic and low-tillage cultivation is significantly more labour-intensive than the currently dominant techniques of agricultural production and offers alternative employment opportunities in the sector. Payment for ecosystem services, along with addressing the issue of land degradation, also has the potential to generate lifeline incomes for rural areas through subsidies which pay for themselves through deferred environmental costs[3].

In conclusion, looking at main current and potential employment, it is clear that not only the green economy is likely to create more new work opportunities (formal and informal) than the work that it would replace (in the 'brown economy'), but it is also expected and intended to play a role in safeguarding existing jobs from the impacts of environmentally-related pressures, like rising commodity prices (especially for food and energy).

[3] According to the DEA State of Environment Report, "[s]oil degradation alone costs South Africa an average of nearly ZAR 2 billion annually in dam sedimentation and increased water treatment costs" (DEAT, 2006).

3.3. Changes in employment quality

Working conditions are governed in South Africa by the provisions of a number of key pieces of legislation, mainly the Basic Conditions of Employment Act[4]. To the extent that they are effectively enforced, these laws determine a baseline for conditions of employment in the country. Key characteristics of general labour conditions are listed in Table 3.

Table 3: General conditions of employment in South Africa

Minimum wage	Ranges from ZAR 2 218 in the agriculture and fisheries sector to ZAR 3 926 in transport, storage and communication, i.e. under the living level measure of ZAR 4 105 per month.
Hours of work	Median ordinary hours of employment of 45 hours per week, i.e. right up against the ceiling established by the Basic Conditions of Employment Act.
Leave	Identical to the provisions of the BCEA (21 consecutive days)
Security of employment	Notice period of 1-4 weeks depending on length of service, same as in the BCEA. Severance pay of 1-2 weeks per year of service.
Gendered conditions	Qualifying period for accessing maternity benefits of 12 months. A woman worker on maternity leave can only expect a third of her salary, no time for nursing, no contribution to child care arrangements later on and very little explicit guarantee of employment security.
Health	Medical insurance of some kind is found in 8% of agreements. Median sick leave entitlements of 10 days per year. Sexual and reproductive health issues are almost completely absent from collective agreements.
Family	Very little provision in collective agreement for attending to family responsibilities. Funeral benefits in 8% of agreement. Family responsibility leaves of three days, as described in the BCEA.
Responses to HIV/AIDS	Largely invisible in collective agreement.
Education and training	Little evidence to show support of education and training.

Sources: Author, based on Labour Research Service, 2011

A green economy does not, in and of itself, lead to better work conditions or quality of employment. For example, a large number of the jobs that would be created through ecosystem restoration (e.g. invasive alien clearing) or waste management may well be informal, providing a source of additional income, but little skills development and a short-term job rather than a career.

Within the formal sector, there is likely to be a net movement from primary to secondary and tertiary sectors, with the creation of almost 400 000 jobs in O&M. However, only about 160 000 of those are likely to match general conditions of employment, as the large number of jobs from ecosystem services (roughly 240 000) may very well be primarily temporary and informal (Maia, *et al.*, 2011). Besides, the potential human cost which could result from the implementation of green policies cannot be ignored. The shift to a green economy should be complemented with mechanisms to protect workers and their families, as well as the whole value chain, from the loss of income and/or employment. (Re)training, associated with the creation of alternative employment opportunities (through local economic development), is key to ensure a sustainable transition. The impact of new policies on safety, decent working conditions and sustainability of communities should also be considered (ILO, 2011).

[4] Other important texts and policies are the Constitution or Bill of Rights, the Labour Relations Act, the Employment Equity Act, the Occupational Health and Safety Act, the Compensation for Occupational Injuries and Diseases Act and the Unemployment Insurance Fund.

Construction and manufacturing, two transversal industries characterised by precarious and short-term work arrangement[5], present an opportunity to address some of the issues and problems that affect workers through structured social dialogue. These two sectors have room to improve the quality of jobs, provide equal access to opportunities and compensation and retrain workers displaced by the greening process (ILO, 2011).

The renewable energy sector, at the operational level[6], could participate in the shift to decent employment (BNDES, CGEE, FAO and UNECLAC, 2008), as findings in the bioethanol sector in Brazil, which indicate improvements in wages, social benefits, job formalisation and a fall in child labour, suggest. Initiatives like the roll-out of energy efficiency measures to low-income households can also augment the existing social protection provided by free basic services.

Waste management, mainly recycling, could play a key role in poverty alleviation as the sector has the potential to provide an income for a large amount of unskilled people. Nevertheless, many of the waste management-related jobs do not match the basic requirements of decent work. Child labour, occupational health and safety, social protection and freedom of association (such as unions, local associations, cooperatives, etc.) remain critical issues. In addition to environment- and health-harmful practices, the recycling sector mostly offers low-end, informal jobs with small and unstable earnings, thus keeping many in poverty. From a sustainable development and poverty reduction perspective, the opportunity to upgrade jobs in the recycling sector has actually much more impact than additional employment (UNEP, 2011). The example of Brazil, where recycling workers have been organised into cooperatives and associations and work in formal employment with service contracts, demonstrates that upgrading is both possible. Their income is three to five times higher than that of individual waste pickers, lifting entire families out of poverty (ILO, 2011). A progressive formalisation as well as the upgrade of employment should be targeted by the industry.

Likewise, tourism, an extremely labour-intensive and a significant source of employment in South Africa, faces the same challenges. Despite allowing for the quick entry into the workforce for youth, women and migrant workers, the sector faces many problems when it comes to generate green and decent work opportunities. Working conditions (essentially low pay, difficult conditions but also clandestine jobs, child labour and the exploitation of women), the representation of workers and communication between workers and management are among the problems faced by the labour force employed in the sector (ILO, 2010a, and Bolwell and Weinz, 2008). Negative environment impacts can also result from tourism activities and exploitations. Tourism is therefore not a straightforward solution to sustainable development. In particular, local stakeholders must work towards improving working conditions in the sector. In South Africa, the Fair Trade in Tourism South Africa initiative works on promoting sustainable tourism in the country. They offer a certification program, along with supporting activities, which endorses establishment that meet stringent criteria. They promote, *inter alia*, fair wages and working conditions, fair operations, purchasing and distribution of benefits, ethical business practice and respect for human rights, culture and the environment[7].

Even with green policies, main precarious and unhealthy employment characteristics are likely to continue. In other words, despite some positive changes in the production processes and working conditions, specific efforts in terms of policies and programmes will be needed to ensure that these new green jobs are also decent.

[5] The construction sector is notably heavily dependent on a system of 'specialist subcontractors' who in turn make use of smaller subcontractors from either the formal or informal sectors, exposing workers to vulnerable and insecure employment as well as low wages, worse working conditions and less training (ILO, 2003).
[6] Construction and manufacturing of renewable energy technologies are likely to follow trends in those sectors.
[7] See http://www.fairtourismsa.org.za for more information.

4. Conclusion

The mandate for a green economy in South Africa derives from the country's constitution, which enshrines sustainable development in the Bill of Rights. However, the concept, along with the associated idea of 'green jobs', really only rose to prominence since the global financial crisis, when all stakeholders (government, business and labour/civil society) endorsed a shift to a greener economy as a means for both improving the resilience of the economy against external shocks and as a driver for more job-intensive growth. Since 2008, a green economy transition has been detailed through a number of policies and frameworks, most notably including those on economic development (the NGP), industrial development (the IPAP) and electricity supply (the Integrated Resource Plan for Electricity).

The green economy already provides employment for several hundred thousand South Africans, predominately in mining jobs related to catalytic converters (half the demand for platinum, which employs 180 000 people), as well as services jobs in recycling, biodiversity conservation and eco-tourism.

The growth of a green economy presents an opportunity for the creation of new employment, without sacrificing the quality of employment overall. Multiple studies support the NGP expectation of 300 000-400 000 new jobs to be created in green industries, while the only area where some decline in employment is expected is coal mining, driven by a decrease in demand for coal exports rather than changes in domestic demand. Coal miners should therefore be targeted and empowered specifically for transitioning into greener jobs. Also, securing long-term employment in specific sectors like platinum relies heavily on the ability of South Africa to keep up with, and lead, global development of technology.

It is possible, but not a given, that employment quality would improve with the development of a greener economy. Employment conditions in the construction and manufacturing sectors are not likely to either improve or deteriorate markedly as a result of a shift to greener industries. Moreover, while some services jobs, like those in waste collection or ecosystem restoration may not represent formal and/or full-time jobs, these are likely to provide lifeline incomes to those currently unemployed, rather than displacing existing 'decent' jobs. Employment quality would essentially depend on improved enforcement of existing and future regulations.

Ensuring the growth of the green economy and that South Africans benefit from higher quality jobs requires, as with all other industries, an increase in people with managerial and technical (engineering and artisan) skills. Skill shortage has been identified as a critical issue in green industries and the lack of coordination in training and development, as well as the absence of 'green skills' programmes is a challenge that needs to be addressed urgently (ILO, 2010b). Almost all sectors are affected, with hydropower, biogas, biomass and wind industries experiencing particularly acute shortages. Within the value chain, manufacturing and development are the most impacted activities due to the demand for engineers and highly qualified staff (ILO, 2011). The significant shortfall in professional, managerial and technical skills has the potential of acting as a "bottle-neck" for the growth of green industries (Vass, *et al.*, 2009, and SANBI and The Lewis Foundation, 2010 and HSRC, *et al.*, 2008) and should be the foundation of all green economy policies in South Africa and the rest of the world.

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