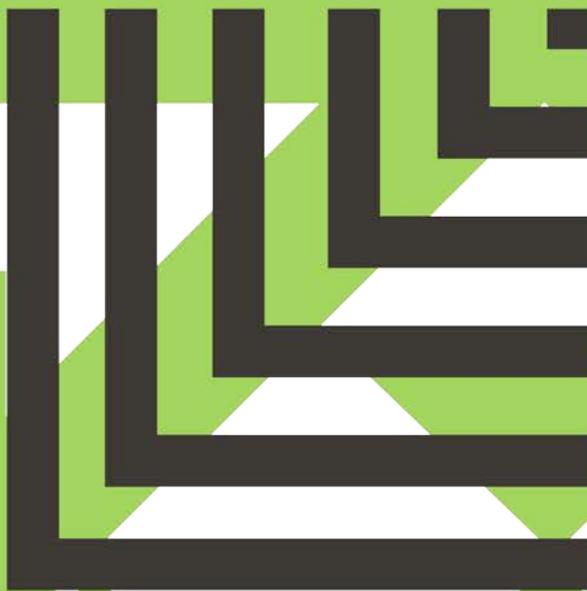# The Green Jobs Report

Green Skills Methodology Case Study

Prepared by Nico Kelder and Zoë Visser

Introduction

What is the status of this research?

In 2011, a collaboration between the Industrial Development Corporation (IDC), Development Bank of South Africa (DBSA) and Trade & Industrial Policy Strategies (TIPS) resulted in South Africa's first Green Jobs Report. The research was conducted over a two year period and resulted in a 170 page report that can be accessed on the IDC website. The report can be replicated and disseminated freely for non-profit purposes. This case study was developed by Nico Kelder of the IDC, and GreenSkills researcher Zoë Visser. Nico was the Senior Economist in charge of research input and quantitative modelling coordination on the project.

Purpose

What problem or question motivated the research?

In light of the adverse implications of the global economic crisis on employment levels, valuable research into the potential role of the green economy at national level is being gradually released in countries such as the United States, United Kingdom, South Korea and China. Multilateral institutions, national development agencies, government departments, academic institutions and private sector research units, among others, are increasingly undertaking research projects in this area. At the time that the research was undertaken, the employment potential of specific green industries or activities was mostly undefined, and where available, difficult to access. Furthermore, analysis is typically of a 'top-down' nature[1] and rarely country-specific.

The primary purpose of the Green Jobs Report is to provide a segmented view of the net direct job creation anticipated to emerge in the South African formal economy across a wide range of technologies/activities that may be classified as green, or which contribute to the greening of the economy. Supplemented by related information (both international and domestic) it is hoped that the report will assist a broad spectrum of stakeholders to embrace a green economic revolution, and contribute to the prioritisation debate, and respective strategic planning. Furthermore, by highlighting implementation challenges that are key to unlocking the potential of the green economy, the report also brings to the fore the importance of stakeholder interventions across the board. The success of such interventions would determine South Africa's ability to capture an earlier stage within a limited window of opportunity, and develop competitive advantage in specific green areas.

Design

What methodology was used?

This research was mainly based on desk-top research, supported by expert consultations. Careful coordination was required to produce the Green Jobs Report. A 17 person team – spread across 3 organisations – conducted research on a part-time basis. A great deal of coordination and guidance from team leaders was therefore required to ensure that the team was working synchronously. Additionally, a senior researcher checked all results across data sets to weed out any double counting/ inaccuracies.

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[1] By top down we mean that macro-economic variables and ratios are utilised to determine the potential for certain technologies.

Literature analysis: Existing studies and models pertaining to estimations of the job creation potential through a greening economy have been primarily compiled for developed nations in North America or in Europe. These studies and models are based largely on highly disaggregated sectoral data that is then used in an input-output model to simulate different scenarios and their impact on job creation. Since data at such a disaggregated level is not available in South Africa, the research team had to develop a methodology to estimate the employment creation potential of a progressively greening economy.

During the research and analysis process, the team consulted numerous publications, research papers, strategy documents and industry-specific information, both of a South African and international origin. Existing plans, such as the Integrated Resource Plan 2010 and the rollout plan for the Bus Rapid Transport System in Johannesburg and Cape Town, were analysed. Expenditure data was used (such as for the replacement of energy efficient motors in the latter plan). The modelling was based on the build programme of each technology/activity, utilising ratios such as jobs per megawatt, or jobs per Rand spent. These ratios were sourced from the research and then tested during the expert consultations to see the applicability in South Africa. Each researcher was responsible for one or more technology/activity. Timelines were established and discussions were held when researchers encountered difficulties in sourcing data.

Expert and stakeholder consultation: The research required substantial interaction with local and foreign experts, as well as industry players involved in the specific activities or currently utilising/developing the various existing/potential technologies. Engagement with government officials and state-owned enterprises also provided valuable guidance as to the strategic direction of the analysis. Interviews were mostly one-on-one, with a large degree of flexibility. Discretion from researchers was required as not all experts were willing to provide information freely.

Green segment/technology coverage: A scoping exercise was undertaken to identify the 'green technology universe' – defined as all technologies or activities that could be deemed green, and including processes and technologies that were still in conceptual stage. The segments/technologies within this universe that were deemed to be of significant interest from a South African perspective were subsequently selected. Certain important segments/technologies were excluded (such as natural gas and road-to-rail switching) due to an inability to access the necessary information for purposes of the report. Their stage of development and anticipated potential application locally were further determinants in selecting the segments/technologies that would be investigated further. The coverage was eventually narrowed down to 26 green segments/technologies that could result in employment opportunities as the greening of the South African economy unfolds. These were grouped under the following four distinct broad types of activity: i) energy generation; ii) energy and resource efficiency; iii) emissions and pollution mitigation; and iv) natural resource management.

Employment focus and categorisation of activities: Only direct jobs in the formal economy were estimated (i.e. multiplier effects are not taken into account in this work), and these were calculated on a net basis to take into account anticipated job losses at a segmented level. The employment potential was categorised according to the following types of activity: i) building, construction and installation; ii) operations and maintenance; and iii) manufacturing. The focus on manufacturing was due to the IDC's focus on industrial development.

Timeframes, employment potential calculation: The time horizon spans 15 years, grouped as follows: the short term (i.e. the years 2011 and 2012); the medium term (i.e. the subsequent five-year period up to and including the year 2017); and the long term (i.e. the subsequent eight-year period up to and including the year 2025). It should be noted that the employment analysis was undertaken in 2010 and early in 2011.

Some points on the calculation of employment potential are as follows:

- The estimation of the employment potential was based on the anticipated number of jobs per year, on a non-cumulative basis. The lifespan of the facilities/equipment was, where necessary, taken into account in the employment calculations.

- Employment estimates for operations and maintenance activities, in turn, captured the number of people needed to operate the plants already constructed and commissioned, implying that the workers employed in year one would still be employed in year two and so on. Thus, as the number of plants increases, so the quantum of employment associated with operations and maintenance requirements will also increase.

- The jobs were calculated on a full-time equivalent basis. For instance, if a crew of ten people is able to build a plant in three months, it would have to build four plants per year in order to be considered fully employed. However, should the crew build only one plant, the employment creation would be reflected as 2.5 jobs.

- The employment potential was determined for each year by creating an assumed build programme for each green segment/technology, where possible, and then averaged for each time frame. The principal reason for utilising an average for each time period (i.e. short, medium or long term) was that some of the green segments/technologies exhibited significant annual fluctuations in employment, especially regarding construction activities and manufacturing potential. Consequently, undue focus on the employment levels attained in any specific year could result in a distorted or inaccurate perception of the sustainable potential.

- Although all the estimates are based on the methodology described above, the various segments/technologies exhibited differing degrees and quality of information available, whether locally or internationally. For certain technologies, it was possible to construct annual tables indicating the roll-out over time, while in other cases it was only possible to estimate averages for the period.

- Ratios were utilised with respect to specific green segments/technologies, with such ratios being either financial- or output related. For example, ratios of employment per megawatt installed were used in the case of solar photovoltaic (PV), while a ratio reflecting the number of workers per rand spent was utilised for air pollution control equipment. Accordingly, the profile of megawatts installed or the amounts spent formed the bases for the employment calculations, respectively.

- Other technologies used the estimated number of workers that would be required per fixed activity (e.g. the number of people per plant was utilised in order to determine the employment potential in the biomass combustion subsection of waste-to-energy). In turn, the calculation of the employment potential in the Bus Rapid Transit subsection of transport efficiency involved using employment numbers observed in the actual roll-out of Johannesburg's Bus Rapid Transit system.

Other assumptions:

- *Multiple/competing demands for inputs:* Certain segments may share the same inputs to a greater degree than others. For example, there is no limitation on the solar availability for two competing technologies, such as PV and Concentrating Solar Power (CSP), although the land and water resources do play a limiting role. Hence, the solar resource was assigned to both segments without limitations, except for the realism of the roll-out. Skills availability was not factored in as an input.

- *Sustainability of production through internationalisation:* The size of the South African market, on its own, may be insufficient to maintain domestic manufacturing capability serving several green technologies. In this regard each technology was assessed to determine the potential for the exportation of components, or even complete systems, in order to enhance the sustainability of potential domestic manufacturing operations. Basically without exception, the target market for these exports was taken to be the rest of the African continent.

- *Feasibility and relative implementation costs:* The analysis does not attempt to determine the actual feasibility of implementing each of the green segments/technologies covered, nor the relative ease of implementation. Furthermore, it is important to note that the relative cost of the various technologies has not been assessed nor taken into consideration. This critical factor would obviously determine the

feasibility of implementation, and could be the subject matter of a supplementary research project. When considering the possible roll-out of the various technologies, the technical potential[2] of each respective technology has, however, been taken into consideration.

- *Policy and regulatory support:* Most importantly, it is assumed throughout the analysis that the introduction and/or expansion of each green segment/technology are accompanied by a reasonable degree of policy and regulatory support.

Layout of results: A standard layout was adopted for the broad sections (presented in separate chapters) and their respective subsections. A brief description of each broad technology is provided in each subsection, including certain technological variations where applicable, followed by an outline of its historical development and maturity stage. Maturity is important with regards to the large scale roll-out of the technology – more mature technologies can be rolled-out faster and at a larger scale, and roll-out will start sooner. Marine power is a relatively immature technology thus it has a slow roll-out towards the end of the period. The main advantages and disadvantages are highlighted, while the deemed introduction potential in South Africa and in the rest of the African continent is also assessed. A brief overview of the global use of each technology provides an indication of its international acceptance. Select global players are also identified in order to expose the extent of the possible competitive environment for South African counterparts, as well as the potential for future partnerships in rolling-out the technology in South Africa. The analysis of the potential job creation is provided, starting with an overview of the assumptions made. Lastly, key challenges and implications for policy-makers and other key stakeholders are highlighted.

Findings

What did the research find in relation to the research question?

The green economy is complex, extremely diverse, relatively new and fast evolving in many of its segments, particularly in an economy such as South Africa's. The country will essentially be dealing with the progressive and simultaneous introduction of technologies that are either being improved, developed or commercialised. The economic merit of many of these technologies may only be fully established in years to come, opening up opportunities for the establishment of infant industries over time.

The analysis reveals the potential of an unfolding green economy to lead to the creation of approximately 98 000 new direct jobs, on average, in the short term, almost 255 000 in the medium term and around 462 000 employment opportunities in the formal economy in the long term.

Analysing this potential for each of the four broad types of activity, it is clear that the jobs associated with **natural resource management** (i.e. activities pertaining to biodiversity conservation and ecosystem restoration, as well as soil and land management) predominate over the three consecutive timeframes due to South Africa's exceptional endowments of natural capital. The share of such activities in the estimated total employment potential rises from around 45% in the short term to almost 50% in the long term.

However, the contribution made by a progressively expanding green **energy generation** segment increases from 14% of the total in the short term, or just over 13 500 jobs, to more than 28% in the long term, by which time some 130 000 employment opportunities are, on average, expected to be associated with this type of activity.

New direct employment opportunities in **energy and resource efficiency** activities are expected to rise, on average, from around 31 500 (32% of the total) in the short term, to almost 68 000 or just under 15% of the total in the long term.

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[2] There are certain limitation to for example the construction of wind farms due to the number of cranes in the country.

Activities associated with **emissions and pollution mitigation**, in turn, are anticipated to result in approximately 8 400 new direct jobs, on average, in the short term, with this number expanding to just under 32 000 in the long term.

Reflections on the research

- Due to the cross cutting nature of the green economy, it is very difficult to isolate green jobs.
- The importance of adopting appropriate policies and regulations that will create an environment where the green segment/technology is rolled out in an effective, cost-efficient and sustainable manner cannot be over-emphasised. Without this, the employment potential outlined in this report would be highly compromised. Accordingly, some of the existing bottlenecks and other impediments are highlighted in the individual sections.

References

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