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WWF

TECHNICAL REPORT

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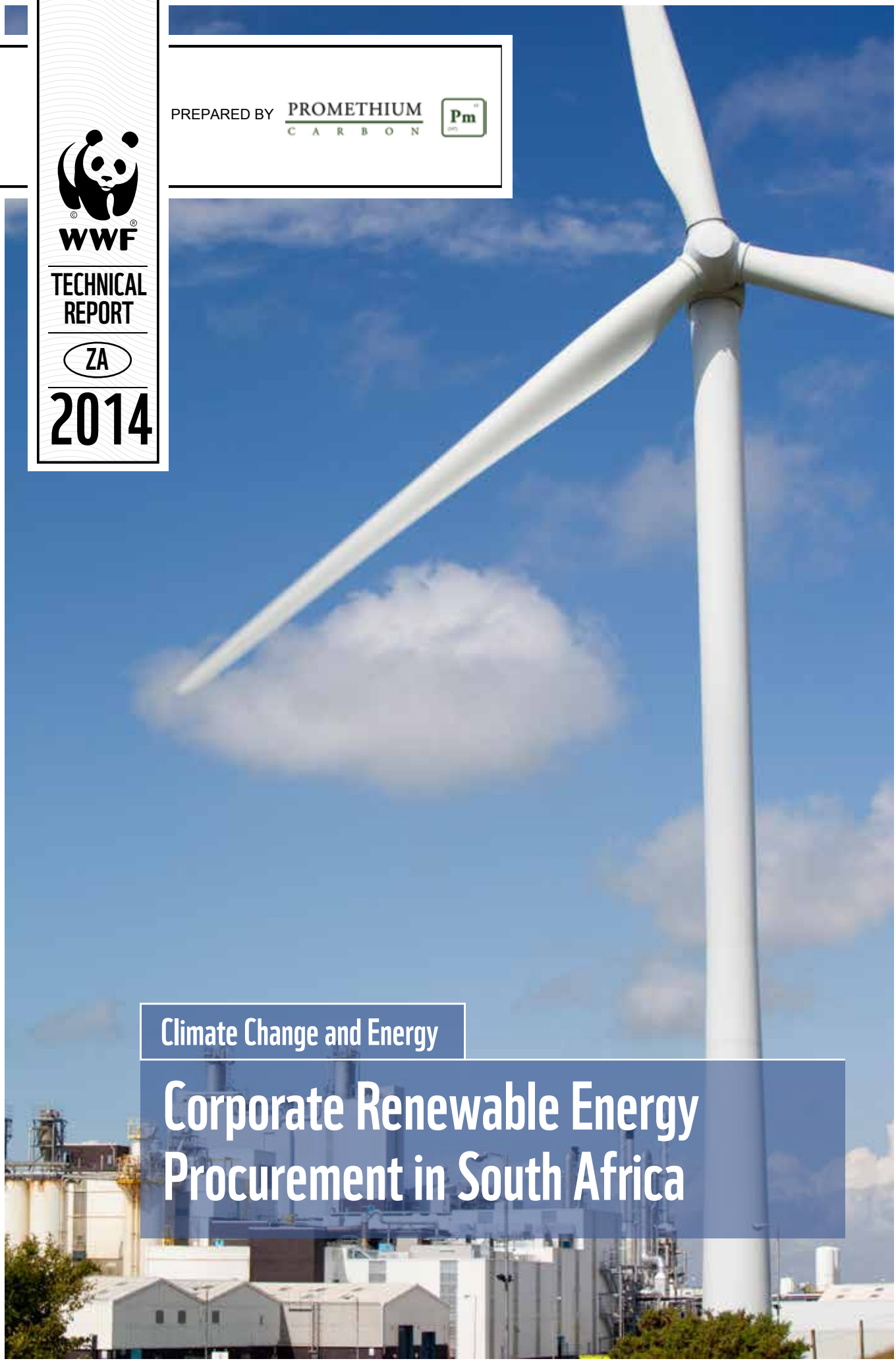

Climate Change and Energy

Corporate Renewable Energy Procurement in South Africa

ABOUT WWF

WWF is one of the world's largest and most respected independent conservation organisations, with almost 6 million supporters and a global network active in over 100 countries. WWF's mission is to stop the degradation of the Earth's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

ABOUT PROMETHIUM CARBON

Promethium Carbon is a dedicated carbon and climate change advisory firm. The company enjoys the position of being a trusted advisor to major international corporations operating out of South Africa, also assisting governments and government institutions in planning for the coming global carbon constrained environment. Promethium Carbon are knowledge leaders in the carbon and climate change industry, and received awards in London and Abu Dhabi in recognition of their work. The company's achievements also include a large number of registered carbon credit projects, and its clients consistently perform amongst the Leadership Index of the CDP (Carbon Disclosure).

CREDITS

Authors: Promethium Carbon
Editor: Lee Cahill
Designer: Michelle Heyns, Apula

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DISCLAIMER

EXECUTIVE SUMMARY

This 2013 study of renewable energy procurement in South African corporations found that there has been significant progress in this regard in recent years.

The study was commissioned in order to understand what drives the procurement of renewable energy in corporate South Africa, and the purpose of this report is to share the lessons learnt by the first movers in this field with the rest of the corporate community. Such lessons will be of value to companies that may be embarking on the process of evaluating and procuring renewable energy solutions. The voluntary procurement of renewable energy reviewed in the study does not include projects that form part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

This survey was sent to 101 stakeholders, and responses were received from over 30 of these, representing all sectors of the economy. Interviews were also carried out with certain stakeholders. The responses covered 42 projects, representing a approximately 230 MW of installed capacity and a potential renewable energy investment of approximately R4 billion. Companies responding to the survey reported twelve renewable energy technologies used in projects included in the survey. Responses indicated that solar PV, biomass-to-electricity and wind energy are the most commonly implemented technologies.

In the survey, companies were asked to identify the top two drivers that motivated renewable energy purchases. Respondents were asked to choose between five primary drivers which were then evaluated based on response rates. Financial and strategic issues were found to be the primary drivers (37% and 32% respectively).

Respondents were then asked to choose the top two secondary drivers. These drivers included the anticipated electricity price increases in South Africa, the impact of these on financial returns, and the constraints of long-term supply contracts for coal and liquid fuel. Respondents reported that all renewable energy projects resulting from financial or economic drivers were projects to replace electricity from the national grid. Many of these were based on executive decisions to strategically position their companies in such a way as to ensure that they were able to complete future projects.

In contrast, government incentives, rebates, taxes and access to carbon finance together accounted for the motivation of only one quarter (25%) of respondents secondary drivers under the financial or economic primary driver. The implication of this is that the 'stick' of high energy costs is a much stronger motivator than the 'carrot' of green finance. Policy developments that allow the full cost accounting of energy options could therefore have a major impact on renewable energy project implementation rates.

Capacity building and R&D also emerges as an important motivator (17% of respondents). The implication of this is that companies are anticipating an increase in the importance of renewable energy in their businesses. They perceive that early investment in renewable energy projects is necessary in order to build the capacity that will be required to successfully operate their businesses in the near future.

Renewable energy solutions also still face significant barriers to implementation. The most significant barriers identified in the survey are the high cost of the technology and the restrictions of the regulatory environment, closely followed by no access to capital or capital allocation restrictions.

All of the reported projects were implemented on a pilot scale. Pilot-scale projects allow a company to build capacity and 'learn by doing' in order to prepare for further investment in renewable energy technologies. Respondents also indicated that the procurement of renewable energy addresses sustainability objectives and demonstrates leadership in their markets.

Case studies of three respondents – MTN, Growthpoint Properties and EnviroServ - concluded that, in order to achieve the financial returns required by shareholders, companies are reliant on access to funding for part of the capital cost of implementing renewable energy solutions. To date, this funding has been obtained through the Eskom Demand Side Management (DSM) programme or international donors. This information has implications for the current review of Eskom's

Standard Product and Standard Offer rebate programme, under which such funding was dispensed, since that programme is not currently running.

South African corporations realise the strategic importance of renewable energy procurement. They understand that, by investing in small-scale renewable energy solutions now, they are building capacity and creating a better understanding of the benefits of renewable energy for their operations. By undertaking a project across its entire lifecycle, companies are able to gain a better understanding of the total cost of ownership, and the business case for renewable energy therefore becomes more robust.

The common message emanating from the survey and from stakeholder interviews is that renewable energy projects are becoming more financially viable. The emphasis on regulatory barriers, however, indicates that future policy development is required in order to address current policy and regulatory restraints. From these findings, the report concludes that the factors that will drive further success in corporate renewable energy procurement will be lower capital costs, access to funding, and a clearer policy and regulatory environment.

[1] Based on assumption of allocating capacity to response range (e.g. 1 to 5MW range assumed to be 2.5MW) and using R18 million per MW.

CONTENTS

1. INTRODUCTION

This study was conducted within the context of the following problem statement, which it aims to evaluate:

Does increasing voluntary corporate demand for renewable energy indicate as-yet unknown drivers for renewable energy procurement amongst corporations in South Africa?

The corporate sector is the largest consumer of electricity in South Africa, with manufacturing using 27% of the country's electricity, mining using 10%, and the commercial sector using 9.5%. The use of renewable energy in the corporate environment should therefore be of interest to all stakeholders in the renewable energy arena.

The South African government uses its Integrated Resource Plan (IRP) and Integrated Energy Plan (IEP) as the primary tools for determining future action with regard to electricity supply. The IRP and IEP are integrated planning tools that optimise for the lowest cost when it comes to energy supply. Government planning centres around energy demand forecasts and a range of viable supply technologies within a pre-determined set of constraints. In practice, the constraints have a significant impact on outputs.

The latest version of the IRP 2010-2030 was released in November 2013. This allows for between 15% and 20% of the energy budget to be allocated to renewable options such as wind, solar PV and solar CSP. It does not, however, include options for biogas or landfill gas. These renewable energy supply options will be implemented through legislated, government-driven programmes, which may include, for example, elevated tariffs paid for renewable energy generated in terms of the Renewable Energy Independent Power Producer Programme (REIPPP). No provision has been made in either the IEP or the IRP for voluntary procurement of renewable energy by the private sector.

In contrast to the underlying allocations in the IRP, many corporations in South Africa are investing in renewable energy through government-funded Power Purchase Agreements (PPAs).
Trends in investment in renewable energy in the private sector also contradict perceived barriers.
The following barriers were identified during discussions with potential survey participants during the preparation of the survey structure and questions:

- **Intermittency:** The supply from renewable energy technologies is intermittent and difficult to forecast.
- **Cost:** Most technologies have proven to be expensive once total project costs rather than just the technology costs are calculated.
- **Maturity:** The technology required for renewable energy supply is not mature and therefore carries high technical, operational and commercial risks.
- **Reliability:** Due to the limited number of installations to date, corporations are hesitant to absorb unknown reliability factors into high-cost capital projects.
- **Backup:** Most solutions have been introduced by companies that have a limited footprint in South Africa, and which do not have established backup and maintenance structures in the country.

The overall aim of this research is to use a survey and case study approach to establish the extent of voluntary renewable energy demand in South Africa, and to identify the top drivers for this demand. It also seeks to understand the sectoral allocation of renewable energy purchases and why they occur in certain sectors while not in others.
The information will be used by WWF to refine its advocacy strategy relating to low-carbon frameworks and renewable energy.

[2] South Africa's Integrated Energy Plan - 2013

A two-tier approach was adopted for this study:

1. Tier One questions were aimed at identifying the primary drivers for renewable energy procurement. These took into account both internal factors, such as financial performance, business strategy, marketing and sustainability, as well as external factors such as regulatory issues.

2. Tier Two questions were aimed at identifying secondary drivers as a sub-set of the primary drivers. These took into account, for example, executive decisions, development strategies, research and development issues, growth targets and the competitive environment.

Three case studies were also developed to identify and highlight the primary and secondary drivers for renewable energy investment by specific companies.

2. SURVEY METHODOLOGY

2.1 TARGET AUDIENCE

The development of a renewable energy project in the private sector requires the collaboration of a number of stakeholders and, as such, the survey on which this study is based aimed to include all of these stakeholders.

The key stakeholder in all cases is the corporate entity. This is the company that intends to purchase power from the project. Current regulations make it very difficult to purchase power from third-party suppliers, especially if the power is generated off-site and needs to be channelled through the public transmission and distribution network. As a result, most companies are installing renewable energy solutions for their own use on their own premises.

Technology suppliers represent a stakeholder group that has insight into both the successes and challenges faced in the private sector renewable energy procurement process. Renewable energy solutions are relatively new in South Africa, and technology suppliers often have to take the time to inform private clients of the efficacy of the solution they are offering.

Project developers and financiers are another group of stakeholders, especially as the financial structuring of a renewable energy project determines its long-term financial success.

Technology suppliers, project developers and financiers were asked to respond only on corporate sector projects that fell outside of the framework of the REIPPP and other government-supported programmes. The responses from these stakeholders were therefore limited to the voluntary purchase of renewable energy by private companies.

The survey covered both successful and unsuccessful projects and the associated entities. Including unsuccessful projects ensured that the evaluation of responses could be more balanced

2.2 STRUCTURE OF THE SURVEY

The survey identified the selected technology, determined the status of the project, and presented a range options for primary and secondary drivers.

The renewable energy technology options given were:

Table 1: List of possible renewable energy technologies

Biomass-to-electricity or biomass-to-heat	Biogas-to-electricity or biogas-to-heat
Wave power	Hydro electricity
Landfill gas	Solar CSP
Solar PV	Tidal power
Wind	Waste (combustible solids)-to-electricity or heat

The project status options were:

- Feasibility (Proceeding): The project had been financially and technically evaluated, and was proceeding to implementation.
- Implemented: The project had been complete.
- Feasibility (Not proceeding): The project was not proceeding to implementation.

Respondents were asked to identify the main drivers for each project, and had to select two primary drivers from a list of five. Each primary driver had secondary options associated with it (see Table 2 for a summary of the taxonomy of primary and secondary drivers).

These drivers were:

- **Strategic**. In some cases the primary driver is strategic, and the board regards renewable energy as integral to the company's business strategy. Strategic considerations include such issues as securing access to energy in the future and addressing shareholders' expectations.

  A sub-set of secondary strategic drivers were developed to obtain an understanding of whether the procurement decision was merely enforced by an executive decision, whether it was to ensure long-term security of energy supply, or whether the company had identified a strategic opportunity for future capacity building.

- **Financial and Economic**. In some cases, projects are implemented for financial or economic reasons and show positive returns on investment as measured against the company's investment criteria. Returns may or may not include financial incentives such as government subsidies or other forms of finance.

  A sub-set of secondary financial drivers were itemised to determine whether financial goals were immediate, long-term or strategic.

- **Marketing and Branding**. Many companies are beginning to realise that there is an increasing demand for green products amongst consumers. The adoption of renewable energy is seen as a differentiator in the market, and competitive pressure may have prompted the investment in renewable energy or formed part of a larger brand-driven initiative.

  The sub-set of secondary marketing drivers focused on determining whether corporations were facing internal or external pressures to undertake renewable energy projects.

- **Regulatory.** The regulatory drivers were divided into command-and-control measures and market-based mechanisms. Provision was also made to distinguish between current regulation and anticipated regulation.

  Regulation that enforces a reduction in purchased grid electricity such as the Power Conservation Project planned by Eskom a couple of years ago would be an example of a command-and-control regulation. Carbon tax, on the other hand, is an example of a market based regulation.

- **Sustainability**: Companies are beginning to invest in communities and sustainable technologies either because they believe it is the right thing to do or because they have conducted comprehensive climate risk assessments and realise that adaptation measures are required. This option was aimed at identifying whether companies were investing in renewable energy due to social investment or climate change adaptation agendas, or both.

Companies could choose from a range of sustainability drivers including:

- Social and community benefit
- Adaptation and/or long-term environmental benefits;
- Scientific reasons
- Enhanced impact of CSI spend
- Environmental efficiency

Table 2: Taxonomy of Survey Questions

Status	Driver	Motivation
Feasibility (Proceeding/ Implemented)	Strategic	• Board/CEO decision • Shareholder/owner objectives • Security of access to energy • Security of long-term energy pricing • R&D/capacity-building/learning by doing • Strategic positioning
	Financial/Economic	• Project IRR • Immediate cost-saving • Anticipated future costs of electricity • Government incentives/rebates/taxes • Anticipated future savings • Oil/gas price hedging • Access to carbon finance
	Marketing/Branding	• Competitive pressure • Market positioning • Market differentiation • Customer pressure • Part of larger brand initiative • Employee retention
	Regulatory	• Current regulation (command-and-control) • Anticipated regulation (command-and-control) • Current regulation (market-based) • Anticipated regulation (market-based) • Carbon tax related
	Sustainability	• Social and community benefit • Adaptation/long-term environmental benefits • Scientific basis • Enhanced impact of CSI spend • Environmental efficiency
Feasibility (Not Proceeding)		• Regulatory barriers • Prohibitive costs • No proven track record • Not strategically aligned • No access to or allocation of capital • Unable to achieve necessary economies of scale • Unclear or unstable policy environment

3. ANALYSIS OF RESPONDENTS

The survey targeted a range of stakeholders, which were selected based on media presence and customer databases. Project developers were also contacted as they have knowledge of the projects that are currently in development in the country.

Requests to complete the survey were sent to 101 companies in all sectors of the South African economy.

Figure 1 shows that the largest portion of respondents (70%) were corporate entities, with project developers/financiers (15%) and technology suppliers (15%) making up the balance of responses. Most of the corporate respondents (60%) were large power users, with a smaller portion being medium businesses (40%) in terms of demand at single facilities or sites.

Figure 1: Stakeholder Survey Responses

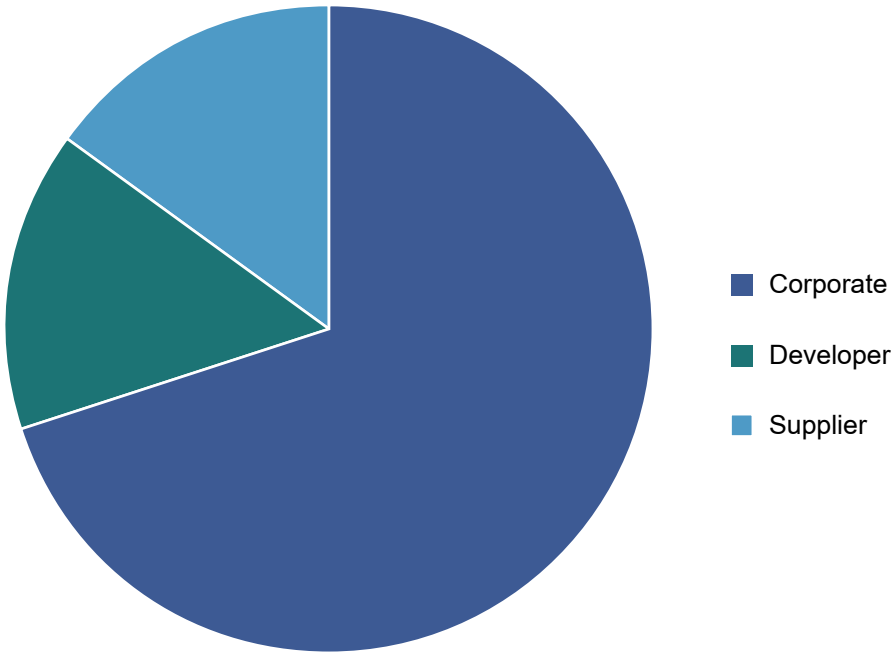
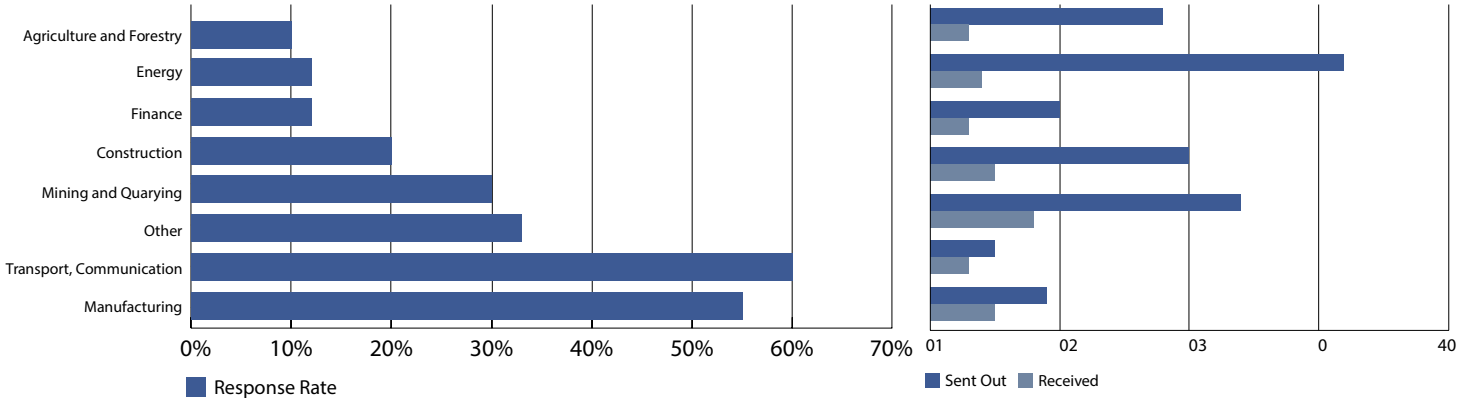


Figure 2 shows that the response rate from surveys sent to companies in the manufacturing sector was the highest (56%). This was followed by companies in the transport and communications sectors (40%), and by a grouping of diverse companies and industry bodies in a number of other sectors such as food and waste processing (33%). The lowest response rates were from the agriculture and forestry sectors (11%) and the energy sector (13%).

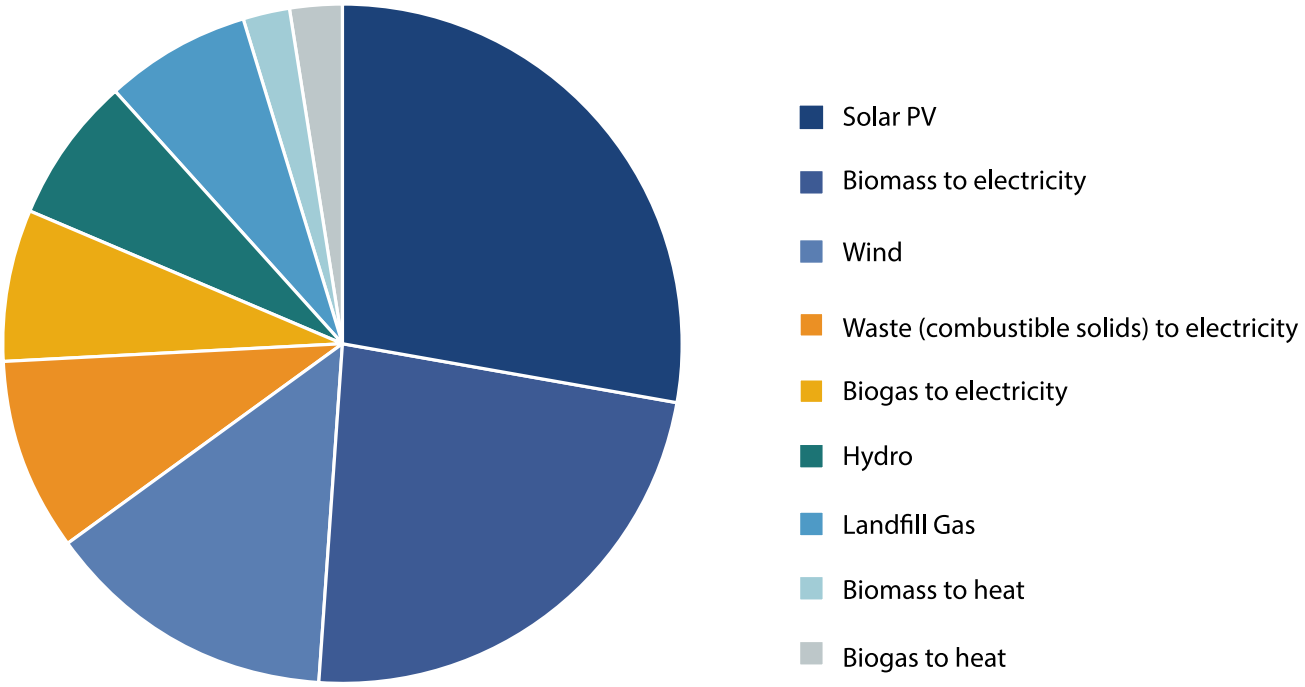
Figure 2: Sectoral analysis of responses received



Sector	Questionaires sent out	Responses received	Response Rate
Manufacturing	9	5	56%
Transport, communications	5	2	40%
Other	24	8	33%
Mining and quarrying	20	6	30%
Finance	10	2	20%
Construction	5	1	20%
Energy	32	4	13%
Agriculture & forestry	19	2	11%

All stakeholders were asked to identify the technologies they had implemented or were in the process of implementing. Figure 3 indicates that solar PV is the most popular technology of choice, accounting for 22% of the survey responses. Solar PV, together with biomass-to-electricity, waste heat-to-electricity and wind projects accounted for more than two-thirds of project responses.

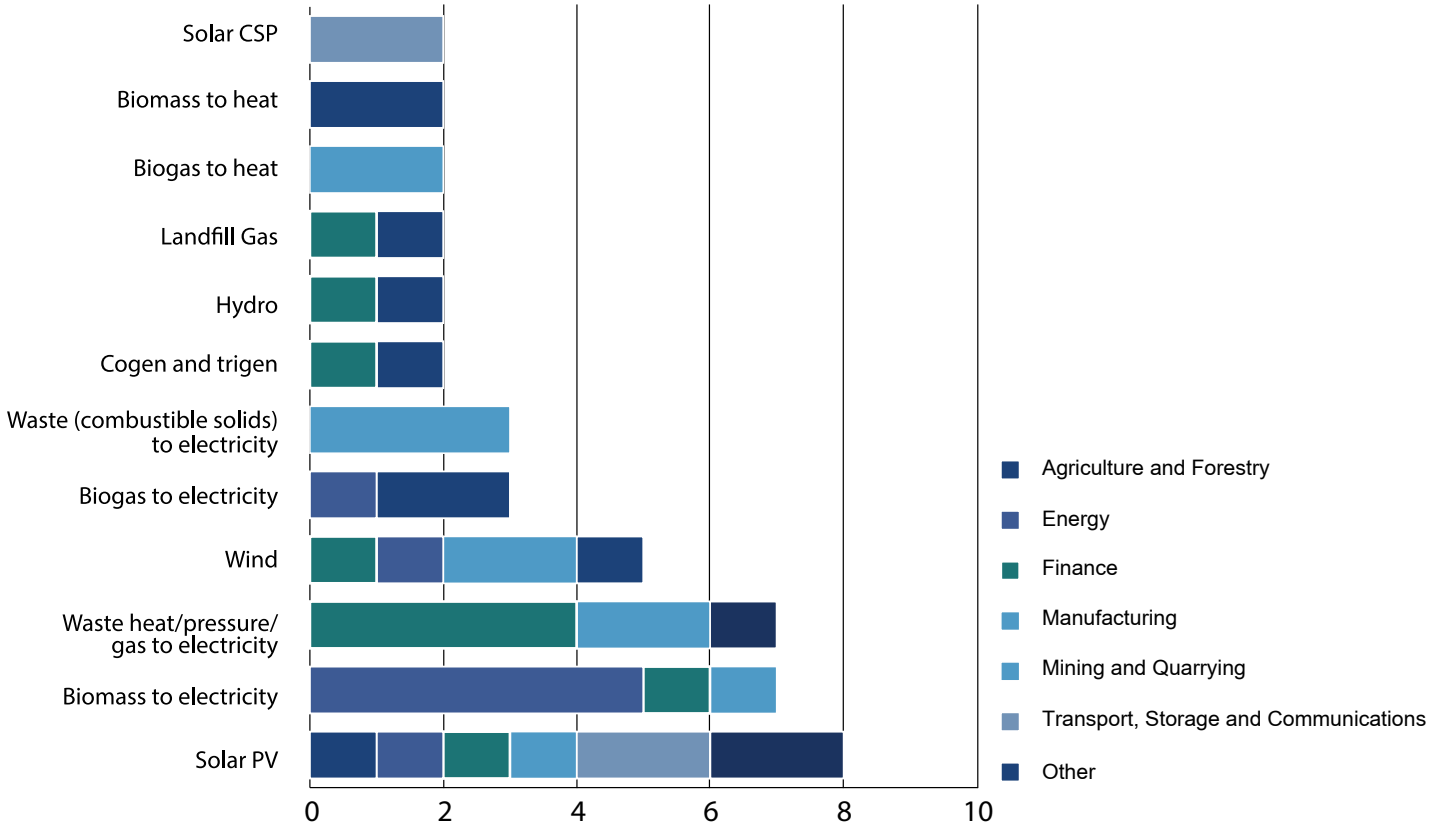
Figure 3: Technologies identified in the survey



Not all technologies were chosen by the respondents. Technologies such as tidal power, waste (combustible solids)-to-heat and wave power were not chosen by any respondents. These technologies have therefore been excluded from the analysis.

Due to the availability of solar PV, this technology is most frequently chosen and has the highest penetration in most sectors. Biomass projects are concentrated mainly in the agricultural sector. Figure 4 summarises the technology chosen per sector in the survey.

Figure 4: Sectoral application of renewable technologies



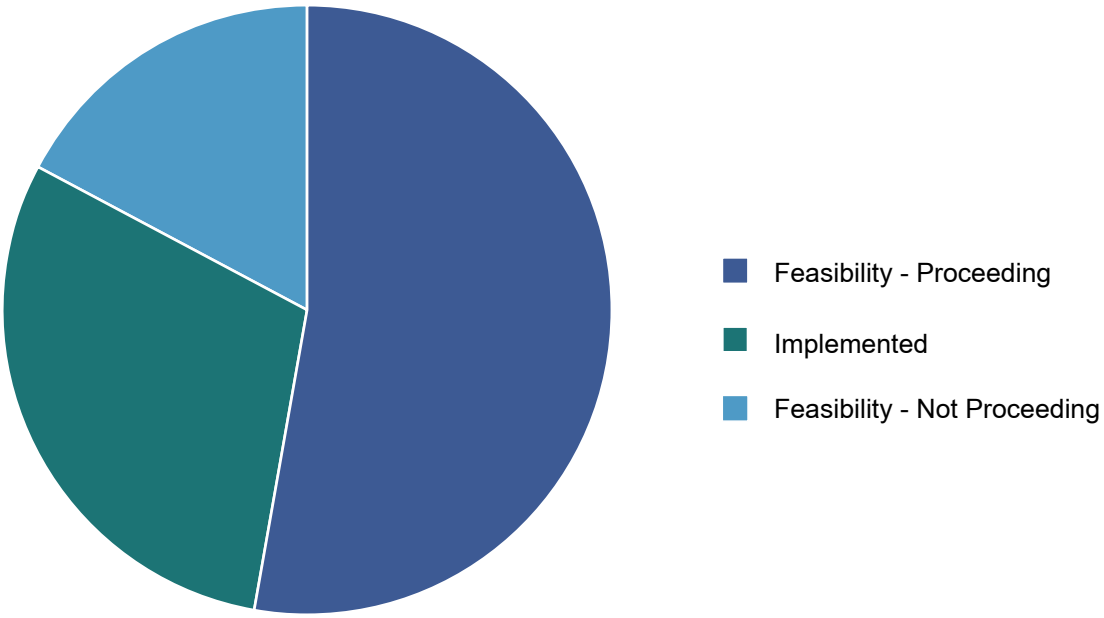
4. SURVEY RESULTS

Thirty-two responses were received to the 101 surveys sent out. Conservatively, this represents approximately 230 MW of installed capacity and a potential investment in renewable energy of R4 billion. Although the projects in the survey do not form part of the REIPPP and were undertaken voluntarily, their impact can be assessed in relation to the REIPPP allocation. The 230 MW in the survey equates to 15% of the capacity allocated during the third round of the South African IPP programme, and potentially 6% of the capacity allocated to renewable energy generation in the IRP 2010.

Analysis of the responses received is based on the status of the projects on two levels. At the first level, it is based on projects that are proceeding or have been implemented. This analysis offers insight into the drivers for successful project implementation. The second level of analysis relates to projects that are not proceeding. This offers insight into the barriers to project implementation.

Almost one third (30%) of the projects for which responses were received have been implemented, and more than a half (53%) are proceeding beyond feasibility stage . This leaves less than one fifth of projects that are not proceeding (17%). Whereas this analysis shows a positive picture for renewable energy project implementation, it must be borne in mind that the owners of many projects that are not proceeding may have chosen to not respond to the questionnaire.

Figure 5: Project status from responses



The results obtained indicate that fewer projects have been proven to be non-viable (15%) than projects that have proven to be viable (30%). The high number of projects that are still in the feasibility and implementation phase (59%) show that the renewable energy industry is still in its infancy, and that the rate of development with respect to the number of implemented projects can be expected to increase in the foreseeable future.

The generation capacities of the projects are relatively consistent for each technology.
Table 3 shows the average size of project for each technology.

Table 3: Average Project Size by Technology

Technology	Average Size
Biogas to electricity	<1MW
Biogas to heat	3-5MW
Biomass to electricity	>5MW
Biomass to heat	<1MW
Hydro	>5MW
Landfill Gas	<10MW
Solar PV	From <1MW to >5MW
Solar CSP	< 1MW
Waste (combustible solids) to electricity	<1MW
Wind	>5MW
Waste heat/pressure/gas to electricity	> 5 MW
Wind	> 5 MW

[3]Based on assumption of allocating capacity to response range (e.g. 1 to 5MW range assumed to be 2.5MW) and using R18 million per MW.

4.1 PRIMARY DRIVERS FOR RENEWABLE ENERGY PROCUREMENT

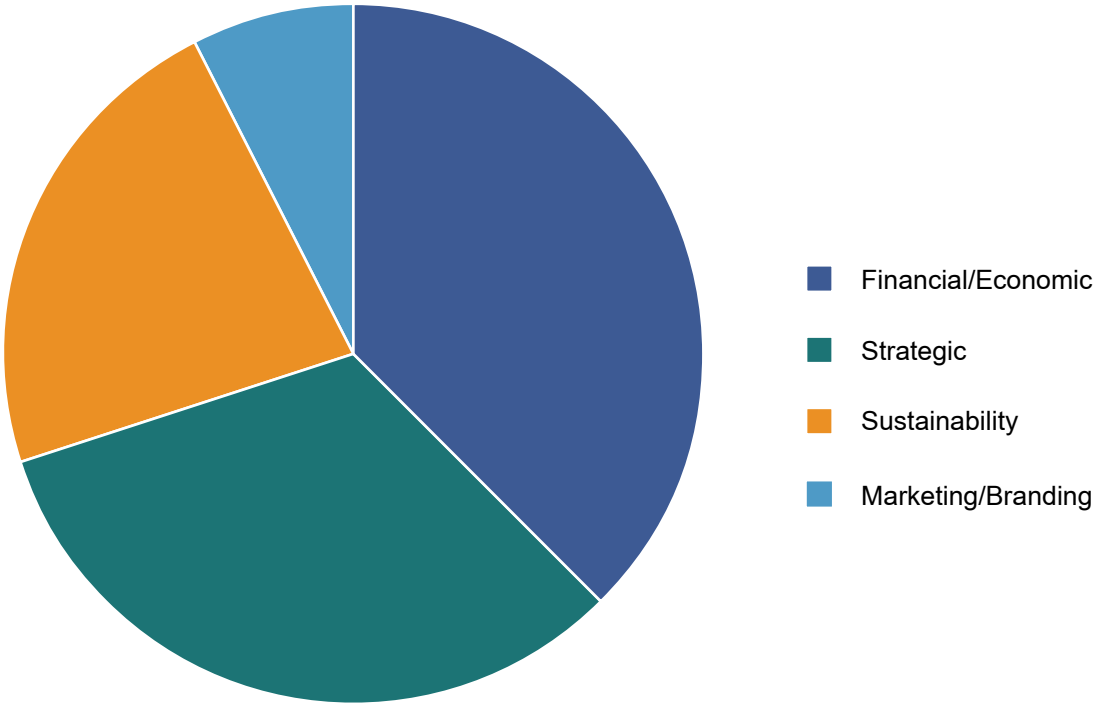
In the survey, respondents were asked to choose the top two primary drivers for each project.

Responses indicated that the most significant primary driver for investment in renewable energy in the corporate sector in South Africa is financial. Just over one third of respondents (37%) reported that projects which have either been implemented or are in the process of being implemented were justified on the basis of financial returns.

The highest-ranking non-financial project driver was identified as being the fact that renewable energy is considered to be of strategic importance to the company (32%). The fact that such projects are considered essential to the sustainability of the company was ranked second (23%). Only 8% of respondents reported that a renewable energy project was justified on the basis of the contribution it could make to the market position or branding of the company.

It is interesting to note that regulation (either current or anticipated) did not feature as a primary driver in renewable energy investment.

Figure 6: Primary drivers for renewable energy procurement – where respondents were asked which were the top two primary drivers



4.2 SECONDARY DRIVERS FOR RENEWABLE ENERGY PROCUREMENT

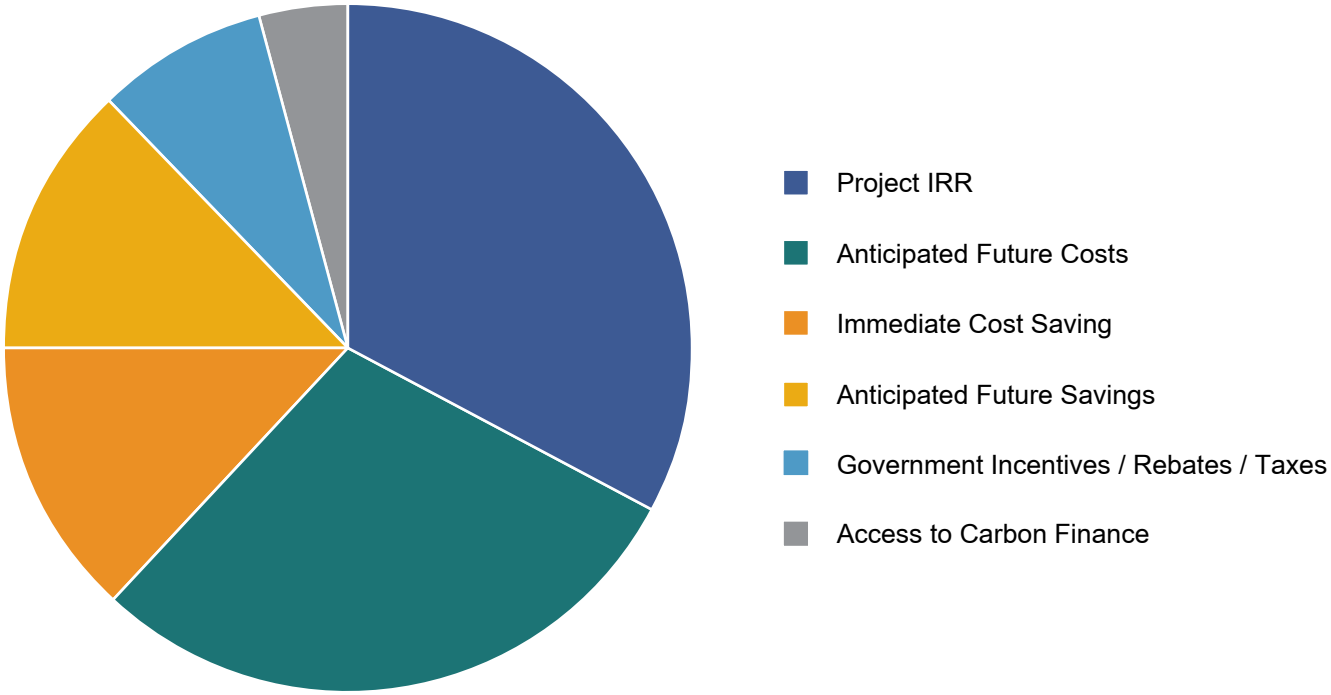
The survey was structured in such a way as to gain insight into the secondary drivers underlying each primary driver. Respondents were asked which top two underlying reasons contributed to a particular primary driver.

Secondary drivers for projects identified as having financial or economic reasons as the primary driver (37% of all projects) are shown in the graph below. One-third of the respondents (33%) reported that projects were justified on the basis of the internal rate of return (IRR) of the projects. Slightly fewer respondents (29%) reported that projects were implemented based on anticipated increases in energy costs. This indicates that companies are taking the threat of high energy costs in the future seriously enough to invest in the mitigation of this risk.

The balance of the respondents reported that projects were motivated by immediate cost savings (13%), anticipated future savings (13%), incentives (8%) and access to carbon finance (4%).

These results show that even though the return on capital invested (project IRR) is the most important secondary driver for projects, two thirds of respondents identified other secondary drivers. The selection of project evaluation metrics can therefore be very important in the promotion of renewable energy projects. Companies should incorporate additional evaluation metrics in project feasibility evaluations rather than just focusing on return on investment.

Figure 7: Secondary financial and economic drivers - where respondents were asked which were the top two secondary drivers where financial/economic reasons was the primary driver



Companies reported that all renewable energy projects implemented as a result of this secondary financial and economic driver were to replace electricity from the national grid. No projects to replace electricity generated in other ways, such as with coal or liquid fuels, were reported. This result may be due to rapid increases in electricity tariffs in recent years - with further steep increases expected in the future - as well as to long-term energy supply contracts for coal and liquid fuel.

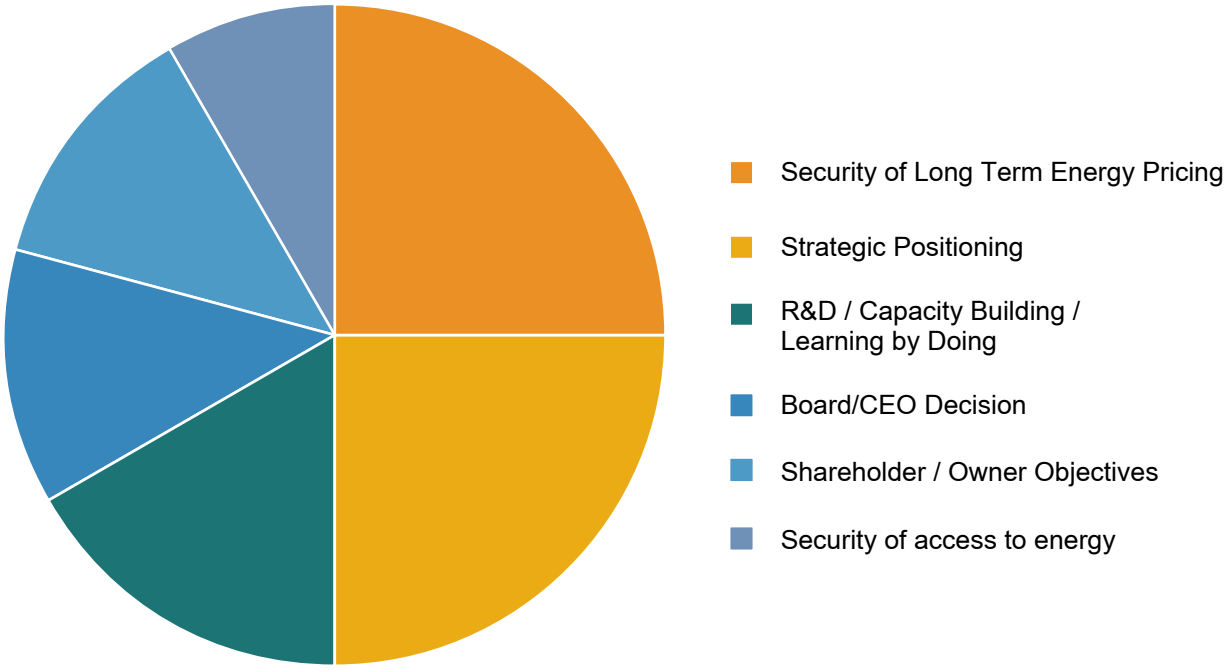
It is interesting to note that government incentives, rebates, taxes and access to carbon finance accounted for the motivation of only 8% of respondents. The implication of this is that the 'stick' of high energy costs is a much stronger motivator than the 'carrot' of green finance. Policy developments that can unlock the potential of green project finance for renewable energy projects could therefore have a major impact on project implementation rates.

Respondents who reported strategic reasons as one of their two major drivers (32%) gave security of long-term energy pricing (25%) and strategic positioning (25%) as the main motivators. The fact that certain companies reported long-term energy pricing as a driver in the strategic driver category implies that certain companies have not been able to quantify the economic impact of high energy prices in the future, but consider it a serious enough threat to commit capital investment to renewable energy projects.

Capacity building and R&D also emerges as an important motivator (17% of respondents). The implication of this is that companies are anticipating an increase in the importance of renewable energy in their businesses. They perceive that early investment in renewable energy projects is necessary in order to build the capacity that will be required to successfully operate their businesses in the near future.

Shareholder objectives motivated just over one quarter of respondents (13%) to implement projects in the strategic category. Security of access to energy as a strategic motivator accounted for less than one fifth (8%) of responses.

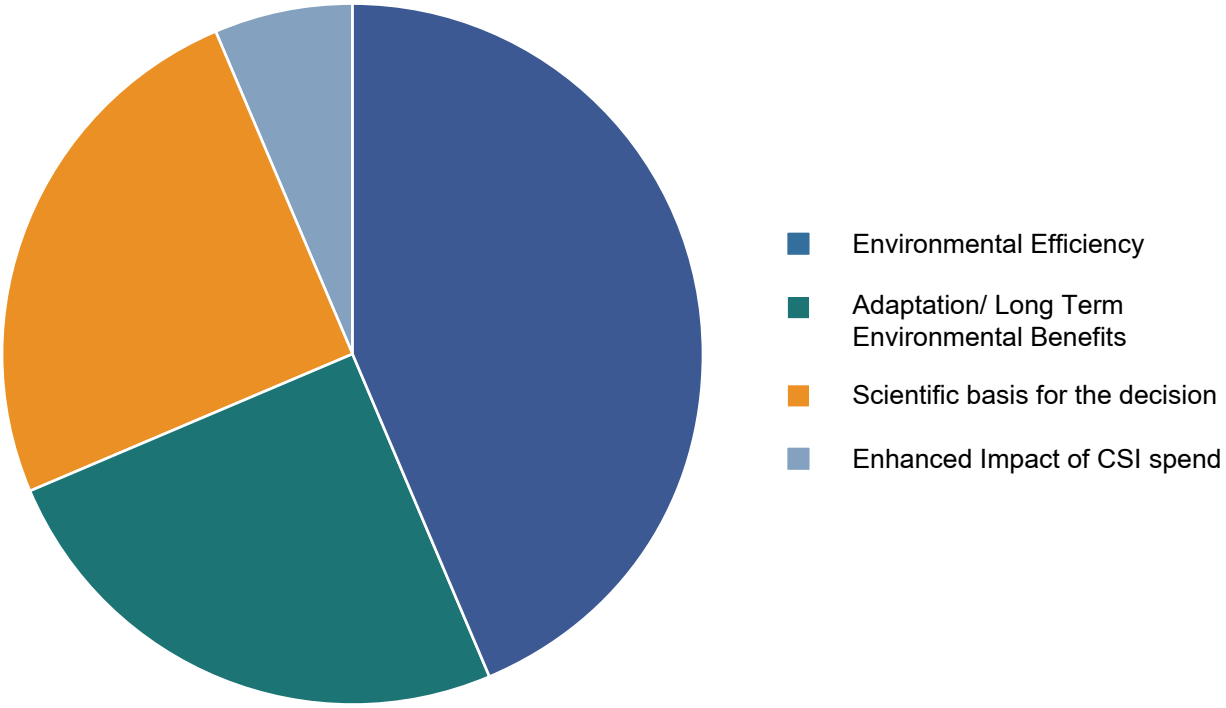
Figure 8: Secondary Strategic Drivers - where respondents were asked which were the top two secondary drivers where strategic reasons was the primary driver



Respondents that gave sustainability as one of their main drivers (23% of all projects) identified environmental efficiency (88%) as their secondary driver. This implies that these companies do take their responsibility towards the environment seriously. Companies that motivate projects on the basis of environmental efficiency have already progressed along the path towards the proactive management of natural capital in their business operations.

Half of the respondents in the sustainability category identified long-term environmental benefits (25%) and scientific information (25%) as secondary drivers. As is the case with environmental efficiency, these companies are displaying a high level of maturity in the management of their natural capital.

Figure 9: Secondary Sustainability Drivers - where respondents were asked which were the top two secondary drivers where sustainability reasons was the primary driver



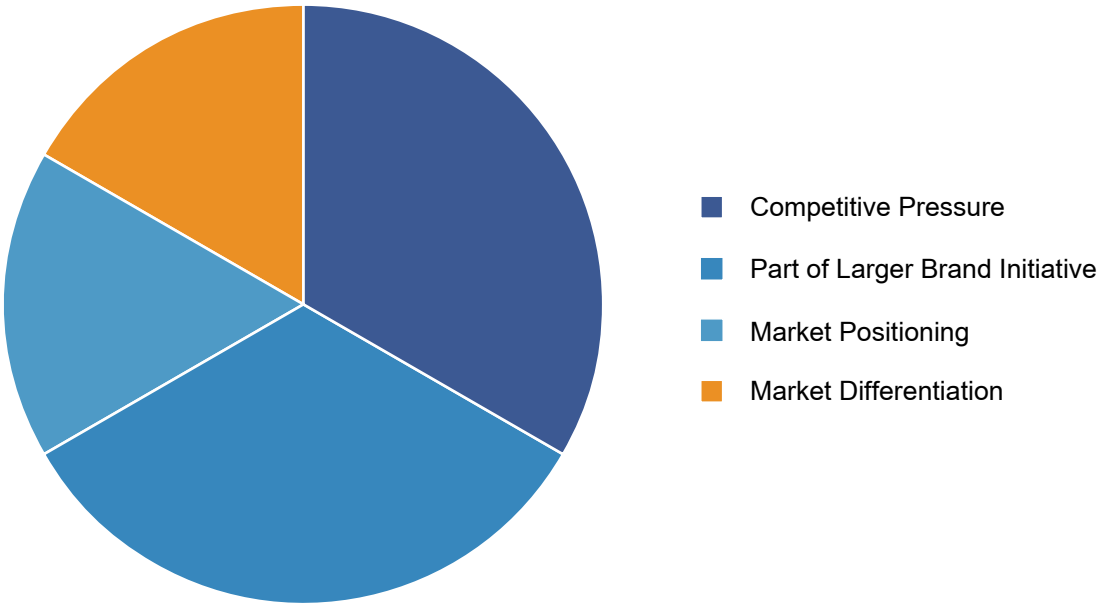
While 6% of projects were identified as having been done for enhanced impact of Corporate Social Investment (CSI) spend, no projects were identified as having been done for social and community benefit. Further research is needed to understand these results as this may be an area in which future advocacy and development effort could yield positive results.

Respondents that identified marketing and branding as their primary driver accounted for less than one-tenth of the results. Companies which indicated that marketing and branding was a motivator all listed it as the second option. This indicates that it is less important than other secondary drivers under the strategic primary driver category.

The motivation for implementing renewable energy initiatives as part of a marketing and branding exercise nevertheless indicates that companies are giving public visibility to their renewable energy efforts. This is significant as energy supply would not normally be highlighted in a company's communications strategy.

The survey indicated that the top two secondary drivers under the marketing and branding primary driver category applied to two-thirds of the projects. Competitive pressure is an external pressure applied by developments in the market place, while brand initiatives are internal developments aimed at aligning the marketing efforts of a company over a wider range. Secondary drivers with reference to market positioning (17%) and market differentiation (17%) accounted for the balance of the responses.

Figure 10: Secondary marketing and branding drivers - where respondents were asked which were the top two secondary drivers where marketing/branding reasons was the primary driver

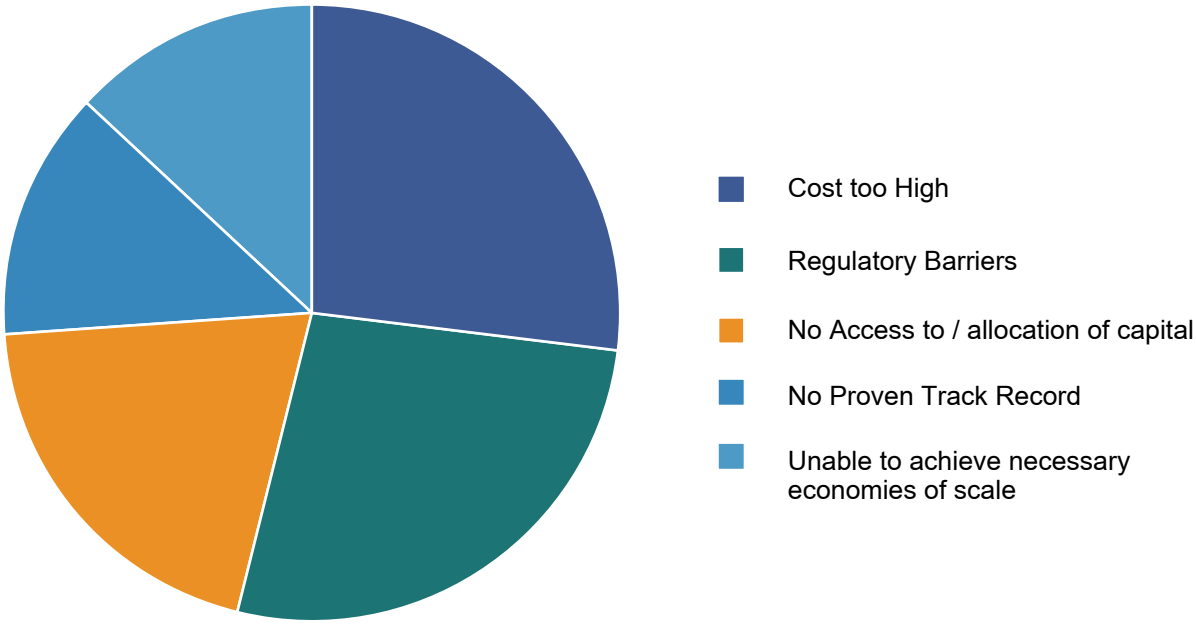


4.3 BARRIERS TO PROJECT IMPLEMENTATION

The purpose of the survey was not only to identify the drivers that lead to the implementation of renewable energy projects, but also to identify the barriers that may hinder implementation. There is a certain degree of commonality between project drivers and project barriers. Some of these issues were highlighted in the responses received.

The top two barriers identified were regulatory and cost barriers. Half of responders (54%) reported one of these two barriers that projects were not implemented due to. Other important barriers were high implementation and technology costs (27%), access to capital (13%), and lack of economies of scale (13%). Lack of a track record for the technology was cited by 13% of respondents.

Figure 11: Barriers to renewable energy procurement

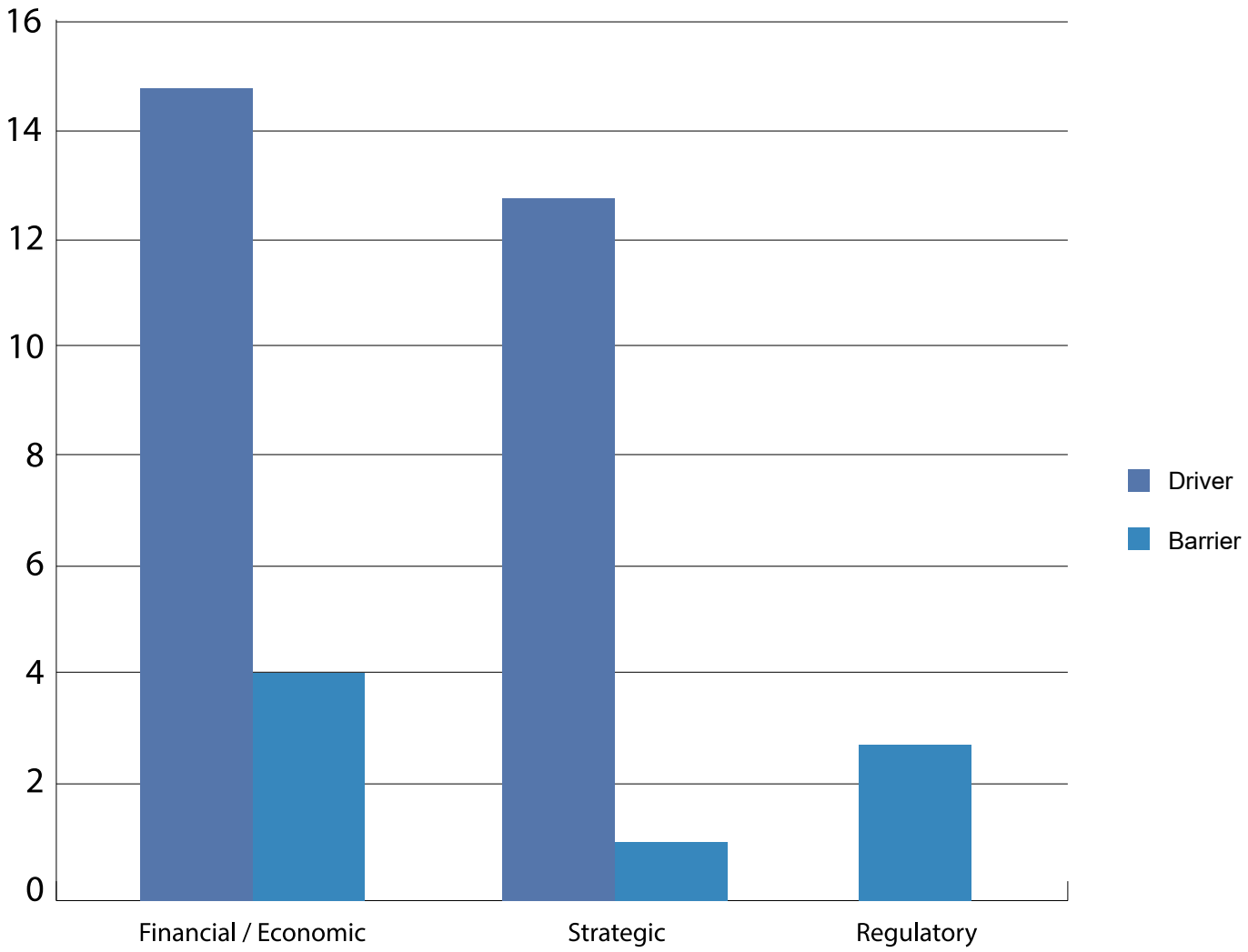


Financial, strategic and regulatory issues can be either drivers or barriers to project success. A high percentage of the respondents (50%) listed financial drivers for proceeding with projects, whereas a much smaller percentage (13%) listed it as a barrier. The implication of this is that more projects are proceeding based on the financial returns than projects that are not proceeding due to low returns. This result indicates that renewable energy technologies are becoming competitive with other technologies in terms of cost.

Strategic drivers are less important, with less than half of respondents (43%) proceeding with projects on strategic grounds. However, almost none of the respondents (3%) identified strategic issues as a barrier to project implementation.

None of the respondents listed regulatory issues as project drivers, while a small fraction (10%) listed them as a barrier. The majority of respondents (90%) did not identify regulatory issues as either a driver or a barrier.

Figure 12: Overall identification of drivers and barriers



5. CASE STUDIES

5.1 MTN SA

Solar CSP Fresnel Lens as an alternative to electricity and direct cooling

MTN SA (MTN) is a mobile telecommunications company that provides voice, data and telemetry solutions to its customers in South Africa. Whereas the generation of renewable energy is not a core focus of its value proposition, it is wholly dependent on the supply of energy in order to operate. Availability and reliability of energy supply are therefore essential to the company's operations.

MTN's unique energy needs are driven by the requirements of the Uptime Institute, a third-party organisation that governs requirements for data centres globally, and relate to both electricity supply and cooling. The largest demand for cooling comes from the need to ensure reliable temperature control in the buildings housing the switches and servers that support the mobile telephone network.

It is vital for MTN to ensure that cooling is always available for its data centres and, as such, backup cooling capacity is required on a permanent basis. In the case of a loss of power from its primary power supplier, the company must immediately be able to switch to the backup system. This may be appropriate in an emergency, but the continuous operation of the backup system results in lower overall system efficiency and higher operational costs.

MTN realised that the use of free energy from a renewable source could improve the efficiency of the company's systems, as it offsets the high requirement for purchased energy caused by low system efficiencies.

In 2012, MTN therefore procured a concentrated solar plant (CSP) as part of a solution to provide cooling for its 14th Avenue campus. The campus receives an average of 2 500 hours of sunshine per year, and average solar-radiation levels range between 4.5 and 6.5kWh/m2 per day. The CSP plant provides thermal energy to an absorption chiller which, in turn, provides cold water to the cooling circuit. The solar solution offsets a portion of the company's high running costs because the energy is from a free renewable source.

The survey identified that financial and strategic issues accounted for 69% of the primary drivers for the procurement of renewable energy. These are the same primary drivers that MTN identified in the case of this project.

The secondary financial drivers were project returns (IRR) and immediate cost savings. Internal rates of return were calculated on overall system efficiency, and were able to meet the required hurdle rates. The company was able to realise immediate cost savings at its campus by reducing dependence on municipal supply.

MTN identified its secondary strategic drivers as capacity building and security of long-term energy pricing. The purchase of the solar CSP plant built on previous purchases of successful renewable energy technology. The capacity to procure, implement and operate renewable energy technologies increases with every project that MTN concludes.

The success of MTN's renewable energy procurement does not mean that the company did not encounter some of the barriers identified in the survey. High costs and regulatory issues accounted for 54% of the key barriers to procuring renewable energy by corporations, and MTN did encounter a cost barrier during the design of its project.

High capital costs negatively affect the rate of return on a project, so MTN had to address the cost barrier in order to ensure that the financial IRR motivator could be achieved. The company overcame this by obtaining grant funding for a portion of the equipment costs. This funding was sourced from Germany through a grant made available for the purchase of solar CSP technology.

The success of this project has given MTN the confidence to diversify its energy mix by implementing a range of renewable

energy solutions throughout the group. The company has developed the internal capacity to design and evaluate renewable energy options, as well as to manage to the implementation of projects.

Companies that are considering renewable energy procurement should focus on the drivers for renewable energy procurement and not the barriers. The MTN case study shows that there is value in concluding a pilot renewable energy technology project in a single location. The value lies in the fact that internal capacity building plays an important role in the success of future projects. The benefits of renewable energy are not necessarily in the individual project but may be beneficial to other divisions or business units within an organisation.

The need or opportunity	Back up cooling and electricity supply for data centres	
Technology	CSP	
Primary drivers	Financial	Strategic
Secondary drivers	• Project IRR • Immediate cost saving	• Capacity building • Security of long term energy pricing
Barrier	High capital cost	
Solution to barrier	Grant funding from German government	
Additional benefits	Capacity in terms of RE design and implementation	

5.2 ENVIROSERV WASTE MANAGEMENT

Landfill Gas to Electricity

Enviroserv Waste Management (Enviroserv) is a solid waste management company providing services that include waste collection, waste treatment and disposal, on-site waste management and recycling, as well as the development and management of landfill operations.

According to the South African National Greenhouse Inventory of 2010, the estimated emissions from solid waste disposal in South Africa are 14.5 million tCO2e. This is comparable to the entire greenhouse gas emissions of a country such as Singapore.

The Chloorkop municipal solid waste landfill site is owned and managed by Enviroserv. Since 2007 this landfill has been flaring methane. This landfill gas (LFG) can be used as a renewable energy source in the generation of electricity from gas-powered generators. Enviroserv has therefore proceeded with the process of designing and building a renewable power generation facility at the Chloorkop landfill.

The Enviroserv Chloorkop LFG-to-electricity project was initially developed for the REIPPP. This programme was developed to enable the South African government to procure renewable energy from private renewable energy generators. The programme was, however, regulated to procure energy from sites with a capacity of above 5MW. This meant that Enviroserv could not participate in it due to the smaller size (3MW) of the project.

Currently LFG is extracted using a series of wells and a vacuum system. This system directs the collected gas to a central point where it is flared. The renewable energy project will divert the gas from the flare to a system of gas generators that will use the gas to generate electricity. This, in turn, will supply electricity to the municipal electricity grid.

Enviroserv faced direct regulatory barriers to project implementation and was unable to achieve the necessary economies of scale. The regulatory barriers were associated with the ability to trade the electricity generated. The economies of scale were constrained by gas volume estimates. As the project could not participate in the REIPPP, the next option was to sell the power generated at the site to a customer using the municipal and national electricity transmission infrastructure.

Regulations stipulate that a wheeling fee is payable to the network operator in the case of using the electricity network to deliver power to the customer. The barrier that Enviroserv faced was that the regulations were drafted to allow for this

transaction to be concluded between Eskom and the power generator, but did not clarify the conditions for the inclusion of a municipality in the agreement.

Enviroserv has played a leading role in drafting these agreements in accordance with regulations so that the project can sell power to a third party in a municipality in the Eastern Cape. This regulatory barrier has therefore been successfully addressed by the project team.

The second barrier to entry that the project faced was being unable to achieve the necessary economies of scale. A landfill gas-to-electricity project requires a minimum infrastructure regardless of the quantity of gas available. This infrastructure consists of piping, gas treatment and safety measures. The Chloorkop landfill site is currently anticipated to have an installed capacity of 3MW. Instead of purchasing fewer large engines the project required more small engines, which increased the total cost per MW installed.

The Enviroserv project overcame its barriers by concluding a private power supply agreement with a corporate offtake client. This electricity is sold at a premium to grid electricity because the client is prepared to pay more for green electricity.

The need or opportunity	Reduce greenhouse gas emissions solid waste disposal. Participation in REIPPP	
Technology	Landfill gas to electricity	
Structure	Private power supply agreement with lower cost and higher returns	
Barriers	Regulation	Economies of scale
Solution to barrier		• Purchase of several small engines rather than a few large engines
Additional benefits	Private power supply agreement with a corporate off take client	

5.3 GROWTHPOINT PROPERTIES

Embedded Solar PV for energy use

Growthpoint Properties (Growthpoint) is the largest listed property company on the Johannesburg Stock Exchange (JSE). It has assets to the value of R55.7 billion, comprising 393 properties in South Africa and 48 properties in Australia. With over 4 million square metres of gross lettable area (GLA), Growthpoint is perfectly placed to explore the viability of installing embedded solar PV solutions into the properties in its portfolio. The company believes that such initiatives will improve the service offering to its client base of tenants.

Growthpoint's mission is to be the leading property management company in South Africa. The adoption and installation of renewable energy in its portfolio shows leadership in the property management sector. The solar PV initiative also shows a commitment to environment-friendly technologies that will reduce overall carbon emissions.

The South African Photovoltaic Industry Association believes that embedded solar PV power generation has the potential to provide 2GW of installed capacity by 2020. This is equivalent to over 4% of Eskom's total installed capacity in 2013. During the course of 2010, Growthpoint started evaluating renewable energy solutions for its portfolio. Its primary drivers for considering renewable energy were financial and strategic. The first project to be implemented was a pilot solar PV project in Umhlanga in KwaZulu-Natal. A small pilot was chosen so that Growthpoint could build capacity both internally and externally.

The high cost of solar PV installations was a barrier that had to be overcome. Eskom was brought in as a partner to overcome the cost barrier and to facilitate a better understanding of how solar PV could benefit the commercial building sector. Eskom funded the project through its 49 Million Campaign, and used the results to inform the company of the utility's Standard Offer Programme, launched in 2012. The secondary financial drivers for Growthpoint were the availability of rebates and immediate cost savings. The building was located within a municipal boundary, so the retail price of

electricity was high enough to realise immediate savings.

The immediate cost saving was achieved by offsetting the supply of power from the PV installation against the municipal tariff that the building's tenants were paying.

Growthpoint's strategic driver was supported by a combination of secondary drivers from strategy and marketing. The company has recognised the opportunity to be strategically positioned for a larger scale roll-out when retail electricity pricing increases and equipment costs decrease, making future projects financially viable. It will be able to use real data and lessons learnt from small installations to build robust business cases for future installations.

Growthpoint found tariff structures to be the main regulatory barrier to implementing solar PV projects in its buildings. This is in line with the survey, which found that regulatory barriers accounted for up to 27% of survey respondents' barriers to project implementation.

Growthpoint therefore continues to engage the regulatory authorities in order to evaluate tariff structures that will create a market in which electricity can be traded by private entities. This would enable the company to engage directly with tenants in order to procure renewable power from solar PV installations.

Growthpoint has not limited its scope to solar PV, and has evaluated biomass, biofuel, and hydropower. It continues to position itself strategically to ensure that it is ready to embrace further renewable energy solutions as and when they are available, reliable and correctly priced.

The need or opportunity	• Improved service offering to tenants • Demonstrate leadership in reducing carbon emissions • Strategic positioning for when retail electricity prices increase and equipment costs decrease	
Technology	Solar PV	
Primary drivers	Financial	Strategic
Secondary driver	• Availability of rebates • Immediate cost savings	• Strategy positioning • Marketing
Barriers	Tariff structures	
Solution to barrier	Engage regulatory authorities in order to evaluate tariff structures	
Additional benefits	Support for further work looking at other RE solutions	

5.4 CASE STUDY LESSONS

From the case studies, it is clear that the most common primary driver for renewable energy procurement is financial. The survey reinforced this notion with over 70% of respondents indicating as such. Case study interviews sought to understand the underlying reasons why the primary financial driver was chosen.

These indicated that access to grant funding was a catalyst for being able to proceed with the implementation of renewable energy projects. Grant funding was able to reduce the capital commitment required by the project owner and to increase financial returns. Companies are embarking on renewable energy installations on a pilot scale so that they can 'learn by doing' and build internal capacity. Internal capacity building allows companies to begin to fully understand the process required to complete a renewable energy project, as well as to obtain critical data on the performance of systems.

The real data obtained from pilot projects can be used for planning for larger scale installations in the future.

Although the companies in the case studies have been able to proceed with certain projects, the issue of regulations has still been raised as a barrier to implementation. The policies and regulations relating to the generation of renewable power and the ability to trade this power need to be drafted in a manner that encourages further generation of renewable energy. The companies canvassed during the case studies have displayed a level of maturity in utilising their financial and intellectual capital, and are cognisant of the social and natural capital implications to their businesses.

6. CONCLUSIONS

The voluntary procurement of renewable energy solutions is being pursued across a broad range of sectors including agriculture, forestry, fishing, finance, manufacturing, mining, electricity, gas and water. This indicates that these solutions can be tailored for specific needs and are not limited by the purchaser of the power.

The most popular forms of renewable energy are solar PV, biomass-to-electricityand wind power. These technologies are the most mature technologies and are suited to embedded generation. This mitigates a portion of the technology risk for companies procuring renewable energy for internal consumption.

Companies that are purchasing renewable energy technologies are doing so predominantly on a pilot scale. Pilot-scale projects allow a company to build capacity and 'learn by doing' in order to prepare for further investment in renewable energy technologies.

Financial and strategic drivers are the most important drivers for procuring renewable energy. Financial returns are being maximised by access to grant funding and increases in electricity tariffs. This is especially relevant to customers that are not large-scale bulk electricity purchasers. In future, the provision of grant funding should be linked to the return of performance data and made available in the public domain so that the larger corporate community can start making fact-based decisions regarding renewable energy purchases. For example, businesses could provide historical performance figures related to the utilisation and output of solar PV panels in exchange for grant funding.

Companies have realised the strategic importance of understanding the procurement of renewable energy. By investing in small-scale renewable energy solutions now, they are able to build internal capacity in order to fully understand the capabilities of this form of energy and the benefit that it can have for the future of their operations. Renewable energy solutions are not easy to implement, and there are costs inherent to the process that are not always evident during the feasibility process. By concluding an entire project lifecycle, companies obtain an understanding of the total cost of ownership, and the business case for renewable energy can become more robust.

There is, however, still a lot of uncertainty in the regulatory environment, with policies not being progressed to clear regulations. Generation is managed by the National Energy Regulator of South Africa (NERSA), but the trading and transmission environment is still not clearly defined and regulated. Further policy and regulatory clarity will allow companies to better understand the regulatory requirements of trading electricity.

The factors that will drive further success in corporate renewable energy procurement will be:

- Lower capital costs
- Access to funding
- A clearer policy and regulatory environment.

APPENDIX A: LIST OF RESPONDENTS

Although the survey solicited response from stakeholders involved in all aspects of renewable energy, the focus of the survey was on actual voluntary renewable energy projects in the corporate sector. To avoid duplication it was ensured that each project would only be evaluated once. Multiple inputs on a project resulted in a more complete data set for those projects.

Company	Name	Title	Sector
ABB	Chesney Bradshaw	Head of Sustainability	Electricity, gas and water
Anglo American	Anonymous		Mining and quarrying
Anglo American Platinum	Gerhard van den Berg	Group Energy Engineer	Mining and quarrying
Apollo Tyres SA	Bruce Sobey	Divisional Head: Projects	Manufacturing
ArcelorMittal South Africa	Edward Dennis Britz	Principal Specialist: Energy	Manufacturing
Barclays Africa Group Limited	Aveshen Moodley	Vice President of Sustainability	Finance
BBE Energy	Christiaan Nell	General Manager	Mining and quarrying
Belgotex Floorcoverings	Kevin Walsh	Chief Operations Officer	Manufacturing
BR ENERGY	Ian Curry	Managing Director	Electricity, gas and water
BWC	Ilya Goryashin	Head of Operations	Other (RE Developer)
Cell C	Harrish Kasseepursad	Senior Manager	Transport, storage and communications
Clarke Energy SA	Paul de Mattos	Managing Director	Electricity, gas and water
EnviroServ Waste Management	Mynhardt Cronje	General Manager: EnviroServ Waste- to-Energy	Other (Waste Management)
eThekwini Municipality	John Parkin	Deputy Head: Plant and Engineering	Other (Municipality)
Green Building Council of South Africa	Francois Retief	Technical Manager	Construction
IBL	Anonymous	Banker	Finance
Italtile	Naseema Elias	Group Environmental Officer	Retail Trade
Kestrel Renewable Energy	Alex Hofmeyr	National Sales Manager	Manufacturing
MTN	Willem Weber	Senior Manager for Technical Infrastructure	Transport, storage and communications
NuPlanet	Anton-Louis Olivier	Managing Director	Electricity, gas and water
Prestige Thermal Energy / Technotherm / Green Energy Industries Green Waste Energy Development	Richard Bingham	Group Director	Manufacturing
RCL Foods	Ettienne John Thiebaut	Group Sustainability Manager	Other (Food)
Richards Bay	Andrew Denton	General Manager	Mining and quarrying
Sappi	Tyrone Hawkes	Director	Agriculture, forestry and fishing
SAWEA	Marilize Stoltz	Office Administrator	Other (Industry Association)
Sibanye Gold - Beatrix Operations	Dirk van Greuning	Environmental Engineering Manager	Mining and quarrying
Solek	Anonymous	Project Developer: Renewable Energy Projects	Agriculture, forestry and fishing
Standard Bank	Geoff Sinclair	Head: Environmental Markets	Finance
Thermex Carbontech (Pty) Ltd	Brian Barnard	Managing Director	Other (Project Developer)
Tronox Namakwa Sands	Peter Haley	Senior Electrical Engineer	Mining and quarrying
Vodacom	Trisha Govender	Senior Specialist: Sustainability	Transport, storage and communications

APPENDIX B: INFORMATION ON COGENERATION, TRIGENERATION AND OTHER WASTE ENERGY RECOVERY PROJECTS

During the preparation of the survey we found that a number of companies are investing in alternative clean energy technologies that are not renewable energy. These technologies include the recovery of waste gas and heat from industrial processes as well as cogeneration and trigeneration plants. Such technologies share certain characteristics with renewable energy in that they can supply energy without combusting additional fossil fuels and that the energy is lost if it is not captured at the time it is released.

Two companies responded that they have installed waste gas to electricity plants and one company installed a trigeneration plant. The waste gas to electricity plants were both larger than 5 MW and were motivated by anticipated increases in electricity prices. The trigeneration plant was between 1 MW and 5 MW in size and was also motivated by anticipated increases in electricity prices.

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