

An analysis of energy disclosures in the mining sector

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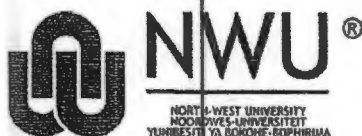
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ABSTRACT

TITLE: An analysis of energy disclosures in the mining sector

The study analyses the extent of corporate social reporting in the South African mining industry through quantitative content analysis of the annual integrated reports. The mining sector sustainability in South Africa is important to stakeholders and communities the mines operate in. Sustainable reporting helps with building confidence among investors, sending a clear message that the mines are serious about the environment, climate change and the communities they are doing business in. The Global Reporting Initiatives (GRI) G4 enhance standards and guidelines and were introduced in South Africa in 2015. All mines listed on the JSE reported their audited integrated results on sustainable reporting in 2016 based on the GRI G4 enhanced guidelines. The study explores the extent of energy reporting of ten of the South African mines in South Africa. Mining in South Africa uses 26% of the total energy generated by Eskom. Non-financial reporting, in the form of the new GRI G4 standards and guidelines, forms the primary objective of this research on energy reporting. Compliance with the globally accepted GRI G4 sustainability framework was analysed and evaluated. The study found that the overall compliance for the five elements is 74% for energy disclosures for all the mines studied. GRI G4 E3 D are the lowest element reported on with a score of 20%. The mines in South Africa do not generate energy to sell. In future, the mines will have to produce or seek alternative energy sources to be sustainable such as solar power or hydro-electric power generation. The compliance for the mines is based on 15 different regulatory frameworks. The mines should find a common international regulatory framework to report on as best practice as thus reporting mechanism is not sustainable in the future.

KEYWORDS: Global Reporting Initiative (GRI), Corporate Social Reporting (CSR), Mining industries, energy

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LIST OF ACRONYMS

CR	-	Corporate Responsibility
CRR	-	Corporate Responsibility Reporting
CSR	-	Corporate Social Responsibility
DoE		Department of Energy
GDP		Gross Domestic Product
GRI	-	Global Reporting Initiative
IRS	-	Integrated Reporting Committee
ISO		International Standards Organization
JSE	-	Johannesburg Stock Exchange
MPRDA		Minerals and Petroleum Development Act
OECD		Organization for Economic Co-operation and Development
PwC		PricewaterhouseCoopers
PGM	-	Platinum Group Minerals
SAIIA		South African Institute of International Affairs
SD	-	Sustainable Development
SR	-	Sustainability Reporting
SRI		Socially Responsible Index
TBL	-	Triple Bottom Line
UN	-	United Nations
UNEP	-	United Nations Environment Program
WCED	-	World Commission on Environment and Development
MINCOSA	-	Minerals Council of South Africa (formerly: Chamber of Mines)

CHAPTER 1: NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

South Africa is one of the top mineral producers in the world with the mining industry contributing significantly to the country's employment numbers and gross domestic product (GDP) (De Villiers & Alexander, 2014:199). Mining activities are often accompanied by adverse environmental and social effects which includes the depletion of non-renewable resources, land use and health and safety concerns (2014:200). The newly approved Mining Charter, published on the 27 September 2018 is proof that all stakeholders can work together to the benefit of mining in South Africa.

Over the past decade, due to competition for international investors, the mining industry has incorporated sustainable development into projects and governance, resulting in the use of annual sustainable reporting to demonstrate annual performances (Mudd, 2012:2). Since 1 March 2010, all companies listed on the Johannesburg Stock Exchange (JSE) have to report on sustainability as this had become a listing requirement (Hindley, 2013:1). Energy as part of sustainable reporting will be conceptualised, to explain the mines' behaviour towards sustainable reporting (Mudd, 2012:3). The approach to sustainable reporting is discussed by examining the data reported on energy as a function of overall sustainable reporting. By reporting the trends on energy consumption, the sustainability of the mines can be examined (2012:4).

While sustainability reporting focusses on social, economic and environmental aspects, this study concentrates on the mining industry in order to contextualise reporting within an energy-intensive industry (one that both utilises and impacts energy resources on an industrial scale) (KPMG, 2017; Mudd, 2012:2; Dennis, Connole & Kraut, 2015:87). The study presents a review of energy reporting by the mines (DoE, 2016:37; Mudd, 2012:2). All reports issued after 31 December 2015 must follow the GRI G4 enhanced reporting guidelines (GRI, 2016:44). The

enhanced material assessment issues under GRI G4 highlights the type of indicators to be disclosed and analysed by reporters and stakeholders (GRI, 2016:45).

Large corporations such as mining organisations, increasingly face pressures not only to perform financially but also are obliged to do so while showing environmental and social consciousness (Pandit & Rubenfield, 2016:54). Investors and other stakeholders want to know how organisations are reporting their triple bottom line responsibilities (Meintjies & Grobler, 2013:169; Iodsa, 2016:11; Pandit & Rubenfield, 2016:54; Hindley, 2013:1).

To achieve a sustainable level of profitability is an absolute requirement for mines in South Africa to survive, but is not the only reason for their survival (Toppinen *et al.*, 2012:191). The mines have a purpose and obligation to national and international society to operate in a respectful, responsible and beneficial manner. Society, in turn, has the right and power to define their expectations for those who operate within its boundaries (Toppinen *et al.*, 2012:192).

The scale of social and environmental footprint in any sector shapes the financial materiality of opportunities and risk in any sector (GRI, 2016:45). The investment analysis of mining traditionally reports on commodity price exposure and the cost of operating the mining assets (GRI, 2016:7). For investors to understand asset quality in the mining sector, mine management must address various sustainability issues. Mining investors focus on the following four materiality issues:

- 1) Environmental management;
- 2) Management of local stakeholders;
- 3) Occupational health; and
- 4) Safety and labour relations (Deloitte, 2017:4).

This study will focus on energy disclosure as a component of environmental management. By reporting and measuring energy that has a direct environmental and climate change effect, action can be taken to mitigate negative effects as well as bring about cost savings in energy related expenditure (De Lange, 2017).

According to the Global Reporting Initiative (GRI) framework (GRI, 2016:3) materiality is the threshold at which aspects of energy and other sustainability topics

become sufficiently important and need to be reported on. The materiality principle, as defined by the GRI G4 guidelines, requires that the report should cover aspects that reflect the organisation's significant economic, environmental and social impacts or items that substantively influence the assessments and decisions of stakeholders (GRI, 2016:3).

Figure 1.1 below indicates the importance of a mining company's materiality (GRI, 2016:27). By ranking the most important factors that influence mining in South Africa in the medium to long term, the second highest materiality item for mining is climate change. By measuring energy, the mines address the factors that contribute to climate change (Deloitte, 2017:4).



Figure 1.1: Importance of materiality disclosure in South African mines strategic group map (Source: GRI, 2016:27).

The GRI is an international independent standard organisation based in the Netherlands, founded in 1997 with the support of the United Nations Environment Programme (UNEP) (Guthrie *et al.*, 2013:4). The World Summit on Sustainable Development (WSSD) was held in Johannesburg in 2002 and the Johannesburg Plan of Implementation arising from that endorsed sustainability reporting and encouraged businesses to use the GRI's Sustainable Reporting Framework, which

includes the GRI Sustainable Reporting guidelines (Guthrie *et al.*, 2013:8; JSE, 2016:1).

The Johannesburg Stock Exchange Limited (JSE) was the first company in an emerging market to develop a sustainable index for its top 160 listed companies. This index is called JSE Socially Responsible Index (SRI) and was launched in May 2004. The SRI Index was terminated in December 2015 and replaced by the FTSE/JSE Responsible Investment Index Series also known as the FTSE 4 Good Index (JSE, 2016:1; Deloitte, 2016:4).

Research conducted by Alonso-Almeida *et al.* (2014:322) suggest that the energy sector and energy users should adopt the GRI framework in an effort to be more sustainable. Alonso-Almeida *et al.* (2014:322) indicated that it is important for companies to maintain a trust relationship (Lodhia *et al.*, 2014:43) with all stakeholders.

Energy consumption is increasing daily, and the consumption of all forms of energy is an issue that challenges the sustainable development of energy (Daizy & Das, 2013:8; Alonso-Almeida, 2014:326; Wonhas & Carter-Brown, 2017:1). It will be a difficult challenge to address the issues related to increased energy consumption (Daizy & Das, 2013:8). Rising energy cost, increased public scrutiny and enhanced social awareness of climate change are factors which can influence mining companies to examine and reduce their energy usage (Levesque *et al.*, 2014:233).

1.2 PROBLEM STATEMENT

The GRI reporting system is not without criticism; according to Goel (cited by Alonso-Almeida *et al.*, 2014:321; Blind & Pyka, 2014:1087; Murtonen, 2015:693), the GRI guidelines and standards continuously change to address shortcomings in annual reports and to introduce new reporting concepts in accordance with best practice standards on global markets (GRI, 2016:4; Alonso-Almeida *et al.*, 2014:321).

Corporate social reporting is the reporting of social and environmental information in annual reports and on websites (De Villiers & Alexander, 2014:198). By using the GRI G4 framework as a guideline, the disclosures of energy is analysed. Although

mining provides economic benefits, its social and environmental effects is of concern regarding energy consumption (De Villiers & Alexander, 2014:198; Wonhas & Carter-Brown, 2017:1). As sustainable challenges are growing, these social and environmental effects can be expected to instil a negative attitude from diverse groups (De Villiers & Alexander, 2014:198).

The primary constraints for mines in South Africa vary from social, environmental and economic challenges to energy resources locally and internationally (Mudd, 2012:2; Alonso-Almeida *et al.*, 2014:326). The availability of data on mine production such as energy used per ton of production can be easily combined with information gained from financial performance reporting (Mudd, 2012:2).

According to the Department of Energy (DoE, 2016:7), South Africa's basic energy resource is generated from coal; internationally, coal is the most widely used fuel for generating energy. Coal makes up 36% of the world's energy production, and 77% of South Africa's energy is generated from coal (DoE, 2016:37).

Energy sources can be harvested by methods such as solar energy or energy must be generated (Eskom, 2017:1). Energy generation requires fresh water which could be problematic because water is becoming a scarce commodity (Eskom, 2017:1). In addition to the problem of consumption of a scarce resource, namely water, the generation of energy creates a range of pollutants.

It is evident from the increase in legislation being promulgated globally and locally to enforce corporate social responsibility (CSR) reporting that the issue is receiving significant support. The Government and the United Nations regarded it as crucial concern. After a period of extensive discussions and developments in the field of CSR, it is relevant to comment on the extent that companies adhere to this and are supposed to react to changes in energy (Daizy & Das, 2013:15).

This study will, therefore, investigate the extent to which mines in South Africa report on energy disclosures according to the GRI G4 guideline (GRI, 2016:5). Climate change has the second greatest impact on the continued existence of a mine after the impact of local communities (Deloitte, 2016:5). Energy is only a sub-component

of climate change which is not part of the overall impact that the mines in South Africa faces.

1.2.1 Research question

To what extent do selected mining companies listed on the Johannesburg Stock Exchange (JSE) adhere to the proposed guidelines regarding energy disclosure proposed in the GRI's G4 sustainability guidelines? The material aspects on energy have clear guidelines to follow on reporting energy in the GRI G4 Guidelines. This standard can be used by any company of any size, type, sector or geographic location that wants to report on its impact related to energy (GRI, 2016:5).

1.3 RESEARCH OBJECTIVES

1.3.1 Main objective

The main objective of this research study is to investigate to what extent the selected mining companies in South Africa report on energy according to the GRI G4 guidelines.

1.3.2 Secondary objectives in literature

A literature review will be conducted to conceptualise corporate social reporting, integrated reporting, and energy sustainable disclosures from GRI G4 guidelines. The sources consulted include:

- Similar studies reported in scientific journals and on the internet;
- Reports on integrated reporting for mining organisations; and
- Other studies and books providing a broader background of the topic.

These studies are available on academic databases such as the North-West University's library services and Google Scholar students have access to. The Corporate Social Integrated Reports (CSR) of the mines are available to the public

on the official websites of the mines and the JSE. This study seeks to understand patterns or trends in annual reporting according to GRI G4 guidelines.

1.3.3 Empirical objectives

An empirical study will be performed to illustrate the extent to which mines listed on the JSE adhere to the proposed guidelines of the GRI G4 regarding energy consumption after 2015. Empirical research can be defined as research based on experimentation, factual, real, and verifiable and observation (evidence) of data or content (Oxford Dictionary, 2017; Weihong, 2015:1911; Murtonen, 2015:693).

The annual reports of ten mining companies for 2016 will be utilised as a sample to contextualise energy disclosures as required by the GRI guidelines. The annual audited financial reports will be downloaded from the company's websites and analysed.

1.4 RESEARCH DESIGN

1.4.1 Population

The population consists of all the mining companies listed on the JSE. These mining companies own and operate mines in South Africa and total use approximately 26% of energy generated by Eskom (DoE, 2016:37).

1.4.2 Sample

The largest and most influential sustainable mining companies on the JSE were considered for sampling to have a representative sample of the population. The companies listed on the JSE are distributed into three groups or sectors. The financial sector, the resources sector and industrial sector. The mining sector, as part of the resource sector, contributed 8% to the South African GDP in 2017. The sample consisted of ten mining companies listed on the JSE resource sector. The reason for selecting the mining industry is the amount of energy used daily in the production of mining products and is an established sustainable industry in South

Africa. These companies are involved in the exploration, diversified production or extraction of the platinum group metals (PGM), gold production, iron ore and coal in South Africa. The South Africa mines contributed 40% of the world's gold production and almost 80% of the world's platinum production in 2017 as released by the Minerals Council of South Africa. (formerly known as the Chamber of Mines)..

The sample was selected from all the mining companies listed on the JSE. All the mining companies are listed on the JSE and have production operations in South Africa.

In this non-experimental study, non-probability quota sampling was used by analysing the Integrated Reports of ten mines listed on the JSE (Maher & El-Masri, 2017:20). The Integrated Reports served as a primary data source.

1.4.3 Research method

A quantitative analysis of the Integrated Reports of these mines will be conducted using content analysis as the method of research. This technique involves counting the frequencies and sequencing of particular words, phrases or concepts to identify keywords or themes (Welman *et al.*, 2005:221). This method is appropriate for this study because it produces highly reliable quantitative data and is usually easy to repeat or replicate (Welman *et al.*, 2005:221).

The data analysis will determine the extent of compliance. Since the data will consist of low frequencies, it is not expected that the calculations will be complex. No unusual or new statistical techniques will be used to analyse the data.

1.4.4 Measuring instrument

A checklist will be developed based on the GRI G4 reporting guidelines. The information disclosed in the annual reports will be compared to the set of questions asked in the GRI 4 guidelines on energy. The GRI EN4 3-7 consists of five sections with 19 sub-sections. These sections and sub-sections will form the basis of the checklist.

1.4.5 Analysis of the reports

The information in the annual audited reports was quantitatively analysed. To ensure availability and visibility of data only mining companies listed on the JSE were used. Only audited reports listed on the company's website were used. Links that lead away from the social and environmental reports were not followed. Only links that address the audited reports on social and environmental issues identified were followed.

1.4.6 Statistical analysis

The statistical analysis was performed by the statistical consultation service of the North-West University.

1.5 CHAPTER DIVISION

The study comprises four chapters as follows:

Chapter 1: Introduction

Chapter 1 sets out the background of sustainable practices and disclosures and the importance of energy disclosures. The study presents the problem statement, research question and objectives and sets out methods used to address the problem.

Chapter 2: Literature review on Corporate Social Reporting

In Chapter 2, a literature study will be presented regarding the relevant topics on social responsibility initiatives, integrated reporting indexes and GRI G4 guidelines. The annual trends and growth in corporate social reporting, South African mining companies and their environmental reporting will be discussed in chapter 2.

Chapter 3: Research design and method

In chapter 3 the research design and methods use in this study will be discussed in detail. The requirements, GRI G4 Framework guidelines and protocols are discussed in this chapter. A checklist is drawn up out of the GRI G4 guidelines on energy to compare companies with.

Chapter 4: Summary, conclusions and recommendations

In chapter 4 the results of the content analysis of the abovementioned checklist is discussed. A conclusion is reached on the extent on which these companies report their annual corporate social reporting on energy.

1.6 CHAPTER SUMMARY

Chapter 1 sets out the background to the study, the problem statement, objectives and the research method used. In chapter 2, a thorough literature study will be presented regarding the relevant topics on social responsibility initiatives, integrated reporting indexes and the GRI framework.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The literature review examines the concepts of sustainability, social and environmental reporting and the move towards integrated reporting. The study discusses the GRI guidelines on energy reporting and investigates recent developments in energy reporting according to the GRI guidelines. The new GRI G4 enhances reporting guidelines to provide more information for stakeholders and investors that can be used to compare financial reporting and sustainable reporting (KPMG, 2016c:41). The new enhanced material aspects changes were demanded by investors to ensure transparency in financial audits reports (GRI, 2016, KPMG, 2016a:410). The new GRI G4 guidelines follows the expanded auditor reporting standards that were issued by the International Auditing and Assurance Standards Board in January 2015 for those companies that follow the International Standards on Auditing (ISAs) (GRI, 2016; KPMG, 2016c:41).

2.2 DEFINITION AND TRENDS IN SUSTAINABILITY

According to the Oxford Dictionary 'sustainable' means to be maintained at a certain rate or level, or conserving an ecological balance by avoiding depletion of natural resources and be able to uphold or defend (Oxford Dictionary, 2017; Pollet *et al.*, 2015:16689). Daizy and Das (2013:10) describe sustainability development as a concept that balances the need for economic growth with environmental protection and social equality (Lodhia *et al.*, 2014:43; Govindan *et al.*, 2014:215). Mines are producing minerals and metal on an enormous scale worldwide. However, the nature of mining production is widely considered to be unsustainable. Mines are depleting a natural capital in producing a certain product like gold (Mudd, 2012:4; Pollet *et al.*, 2015:16687). Sustainability is also defined as ensuring the ability of current generations to meet their needs and wants without affecting the ability of future generations to meet their needs (Mudd, 2012:2; Gomes *et al.*, 2014:85).

The basic principles of reporting must be relatively straightforward, but universally applicable (GRI, 2016:5; GRI, 2017:2). The report should cover the most prominent issues relevant to the company's stakeholders (GRI, 2016:6; GRI, 2017:2). Sustainable reporting has become part of the critical aspects of an organisation's sustainable accounting reporting process (Lodhia *et al.*, 2014:43). Sustainable accounting reports have become sophisticated as standalone reports on companies' websites (Lodhia *et al.*, 2014:43; Raufflet *et al.*, 2014:258).

According to the KPMG Corporate Responsibility reporting survey in 2015, corporate social reporting continues to grow worldwide, although slower than previous years as reporting levels get closer to 100 percent (KPMG, 2016c:51). Seventy three percent of N100 companies across the 45 countries surveyed, report on corporate responsibility compared to 71% in 2013. The social reporting rate for the G250 companies remains above 90% as can be seen in Figure 2.1 below (KPMG, 2015a:1; KPMG, 2015b:4; KPMG, 2016a:4; Boiral & Henri, 2017:284; Lodhia *et al.*, 2014:44). Although there are several global reporting initiatives for example the Organization for Economic Co-operation and Development (OECD Guidelines for Multinational Enterprises), United Nations Global Compact (the Communications on Progress) and the International Standard Organization for Standardization (ISO 2600, International Standard for Social responsibility), South African Mining companies make use of the GRI standards of reporting (KPMG, 2016b:51). The most recent version of Sustainability Reporting Guidelines, G4, requires companies to enhance their stakeholder and materiality reporting standards within their reports to define material issues, or Material Aspects (KPMG, 2016c:51).

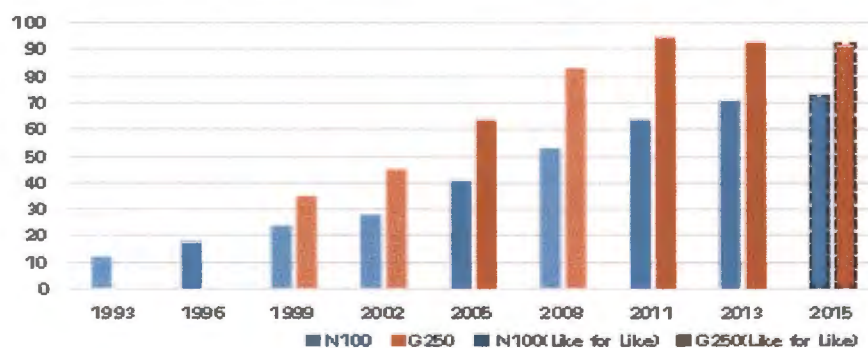


Figure 2.1: Growth in CSR Reporting Worldwide since 1993 (Source: KPMG 2015a:1).

Since GRI guidelines are voluntary, this has played a vital role in ensuring that companies' reports are the same across industries and regions (KPMG, 2015a:2; KPMG, 2015b:4; KPMG, 2016c:4). KPMG analysed the quality of reporting in 2015 versus 2013 and found the following trends (KPMG, 2015a:2; KPMG, 2013:4; KPMG, 2016c:6):

- The quality of CSR reporting has improved slightly in Asia Pacific but declined slightly elsewhere;
- Companies are getting better at reporting the environmental and social trends and risks that affect their business; and
- More companies are reporting that climate change affects their businesses.

Four emerging economies have the highest CR reporting rates in the world: 1) India, 2) Indonesia, 3) Malaysia, and 4) South Africa (KPMG, 2016c:2; KPMG, 2013:2). The GRI remains the most popular reporting guideline worldwide but is declining among the world's largest companies. Figure 2.3 compares the specific sustainable reporting instruments with the rest of the first world countries as measured in 2016 (KPMG, 2016c:21).

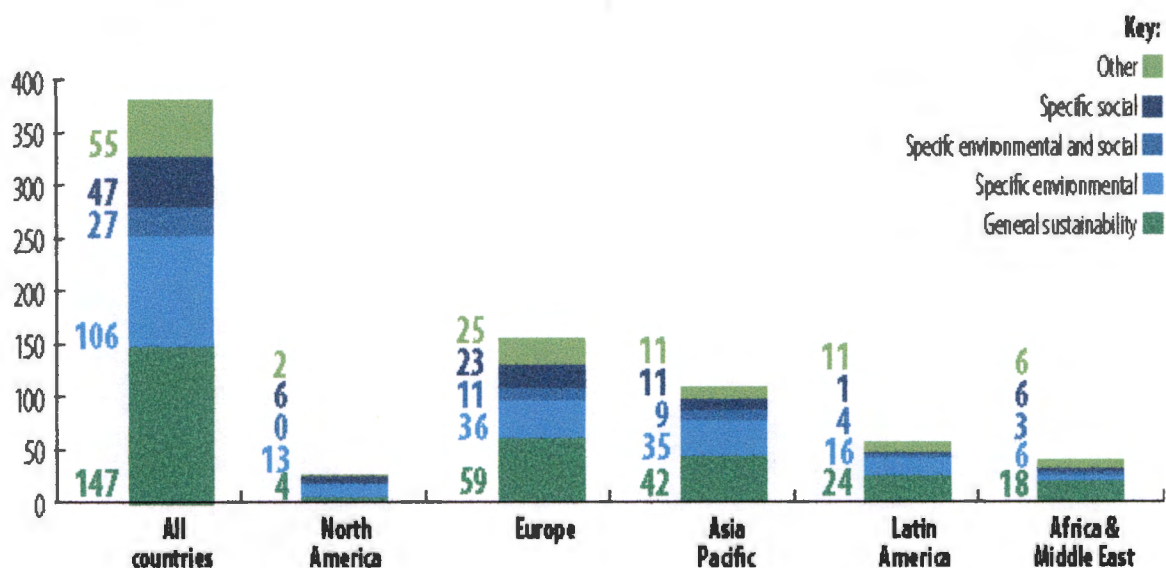


Figure 2.2: General sustainability reporting instruments focused on reporting specific environmental and social factors, 2016 (Source: KPMG 2016c:21).

With the establishment of the International Council on Mining and Metals (ICMM) in 2001, the Mining, Minerals and Sustainable Development (MMSD) project in 2002

acted as an international driver for mines to position itself within the sustainable agenda and processes (Onn *et al.*, 2015:116; Vintro *et al.*, 2014:155).

The mining industry realised that to maintain their social licence to operate; they must maintain good public reputation and cultivate strong community relationships (Ford *et al.*, 2014:206; Gomes *et al.*, 2013:84).

2.3 THE SOUTH AFRICAN MINING INDUSTRY

The cause for participation in sustainable development has initially started due to external pressures, in response to criticism and objections from governments and organised communities worldwide (Gomes *et al.*, 2013:84). With falling commodity prices and continued pressure on profit margins, South African mining companies are under increasing pressure from investors. Mining companies are also facing one of the most difficult operating environments they have ever experienced. These experiences are due to the changing regulatory environment with increased tax pressures, as well as resource nationalism, geopolitical issues and labour disturbances (KPMG, 2016c:30; Pollet *et al.*, 2015:16686). Economists view regulation as a necessary response to the absence of environmental impact markets (Ford *et al.*, 2014:206). Organisations need to demonstrate that they can manage their portfolios in uncertain markets while at the same time delivering on promises to shareholders (KPMG, 2016c:30; Lodhia *et al.*, 2014:43). Furthermore, mining companies are being assessed not only by financial performance but also on how they manage environmental and social issues. Companies need to remain adaptable and flexible to changing market conditions to be successful in this environment (KPMG, 2016c:30; Marimon *et al.*, 2012:133; Lodhia *et al.*, 2014:43).

According to the DoE (2016:7), South Africa is a highly energy intensive economy (DoE, 2016:7; Pollet *et al.*, 2015:166700). The industrial sector consists of mining, iron and steel, chemicals, non-ferrous metals, non-metallic minerals, pulp and paper, food and tobacco and other manufacturing, and uses 41% of the total energy demanded in South Africa. The energy use of the mines is in line with production growth of mines in South Africa (Nguyen *et al.*, 2014:639). According to research conducted by the DoE (2016:37), the main drivers for change in energy demands as South Africa moves to a low carbon economy are the increased focus on climate

change and emissions, increase in energy prices and the adoption of less energy-intensive technologies and practices (DoE, 2016:37; Pollet *et al.*, 2015:166700, Levesque *et al.*, 2014:252). According to Gomes *et al.* (2013:84), the mining industry faces some of the toughest business challenges of all industries when it comes to sustainable development in economic and business sectors since minerals are turned into multiple everyday products that are consumed by all populations for sustainable development.

According to De Lange (2017), a study conducted in 2006 and 2007 predicted that all gold mines in South Africa would be shut down by 2014. Due to the rapid depreciation of the rand, the gold price increased significantly (De Lange, 2017; CoM, 2017:3). The study referred to by De Lange was conducted by the Minerals Council of South Africa (MINCOSA) through the Monitor Group in 2007, and predicted a massive change in mining operations (De Lange, 2017; CoM, 2017:3). The study recommended continuous mining, control of water and power prices, although these denominators were outside the control of the mines (De Lange, 2017). The price of electricity has risen by 300% over the past five years (De Lange, 2017). This is a massive increase when one considers that electricity cost on average for a mine amounts to 6% of a mine's total expenditure (De Lange, 2017; CoM, 2017:3). The cost of mining a ton of ore has now risen by 11.7%, while the productivity per employee has dropped by 2.9% (De Lange, 2017; CoM, 2017:3; Pollet *et al.*, 2015:16687). Mining uses 26% of the total energy demanded (DoE, 2016:37; Pollet *et al.*, 2015:16689).

The idea that businesses exist only to maximise profits are changing (CoM, 2017:1). Corporate social investments are a key component of corporate strategies. With the negative sentiment surrounding, the mining companies still contributed significantly to the South African economy. In 2017 the South African mining companies has contributed:

- R312 billion to GDP;
- R93 billion to fixed investments;
- R16 billion in taxes and R5.8 billion in royalties;
- Employed 465 000 employees who supported 4.5 million dependents; and

- Created 1.4 million indirect jobs and spent R663.4 billion on goods and services (MINCOSA, 2017:1).

In this regard, mining companies reported audit results are:

- Clear about materiality and data;
- Show how the company is performing against the energy requirements as set out by the GRI guidelines; and
- Communicate data clearly and explain how reductions help the business grow and increase profits (GRI, 2016, KPMG, 2015b:2; KPMG, 2016c:6).

2.4 Role-players of energy disclosures in the mining industry

2.4.1 Integrated reporting

According to Fonseca *et al.* (2014:70), the adverse socio-environmental impacts of mines are stimulating the emergence of anti-mining campaigns, civil society protests and reports throughout the world. In reaction to the criticism mining companies started to promote sustainable initiatives and reporting their annual results as standalone reports (Fonseca *et al.*, 2014:71, Jones *et al.*, 2016:223). Lodhia *et al.* (2014:43) emphasise that the management and reporting aspects of sustainability differentiates the accounting literature from other areas of research into sustainability. Sustainability accounting and reporting should involve effective performance about social and environmental matters (Lodhia *et al.*, 2014:43). Lodhia *et al.* (2014:43) describe that sustainable reporting are in line with traditional accounting practices. According to Fasan and Mio (2017:288), traditional financial reporting and sustainable reporting are not enough to provide information for investors to make informed decisions. Companies according to Fasan and Mio (2016:288) need to focus on non-financial information and its important connections with financial performance. Integrated performance includes information on the company's strategy, corporate governance and performance and guides the information in a way that reflects the commercial, social and environmental context of its operations in (Fasan & Mio, 2016:288, Jones *et al.*, 2015:223). Integrated reporting according to Frias-Aceituno *et al.* (2012) (cited by Fasan & Mio, 2016:288) is a hybrid reporting fenoma that includes financial reporting and sustainable

reporting. This hybrid practise provides a true and fair view of a company's value and thereby accounting sustainability.

2.4.2 The King Reports

The King Report on Governance for South Africa 2010 (King III) defines integrated reporting as a holistic and integrated representation of the company's performance regarding both its finances and its sustainability (Meintjies & Grobler, 2014:162; IoD, 2016:10).

The third Report on Governance in South Africa (King III) became necessary because of the anticipated new Companies Act and changes in international governance trends (IoD, 2016:4; PWC, 2017a:1). This is a novel approach to corporate reporting which is rapidly gaining international recognition (Onn *et al.*, 2015:117; Raufflet *et al.*, 2014:257). South Africa is regarded as a leader in the globalised movement to integrated reporting, the King Code of Governance Principles for South Africa 2010 (version 3, or "King III") has been incorporated into the JSE listing requirements (IoD, 2016:4; PWC, 2017a:1). King III has established a heads up for companies identifying the future of their business in an ever changing social, economic and environmental landscape (IoD, 2016:4; PWC, 2017a:1). These stipulations require that listed companies issue an integrated report for the financial years starting on or after 1 March 2010 or explain why they are not doing so (IoD, 2016:7; PWC, 2017a:1; De Villiers *et al.*, 2014:53). This is a report to stakeholders on the strategy, performance and activities of the organisation in a manner that allows stakeholders to assess the ability of the organisation to create and sustain value over the short, medium and long term and therefore reports not only on the financial, but also on the social, economic and environmental issues (IoD, 2016:13; PWC, 2017a:1).

King III emphasises the importance of reporting annually on:

- How a company has both positively and negatively affected the economic life of the community in which it operated during the year under review; and
- How the company intends to enhance those positive aspects and eradicate or ameliorate the negative aspects on the economic life of the community in

which it will operate in the year ahead (IoD, 2016:5; PWC, 2017a:2; De Villiers *et al.*, 2014:53).

According to King III fifty-six countries in the Commonwealth, including South Africa and the twenty-seven states in the European Union, including United Kingdom, have opted for a code of principles and practices on a comply or explain basis; in addition to certain governance issues that are legislated (IoD, 2016:6; PWC, 2017a:2). If the boards of directors of a company believe that it is in the best interest of the company to adopt a practice different from that was recommended in the code, they can explain their rationale. The board of directors of a company is legally bound to act in good faith (IoD, 2016:15; PWC, 2017a:6).

The next generation South African Corporate Governance Code, King IV was issued in November 2016. The King IV has been revised to bring it up to date with international governance codes and best practices. The King IV contains both principles and recommended practices aimed at achieving good governance outcomes. The King IV involves the application of 16 core principles as opposed to the 75 principles in King III. The King IV principles and practices are linked to desired outcomes of corporate governance (IoD, 2018:25). The recommended practices should be implemented and applied in a way that is appropriate for the organisation (IoD, 2018:25). The King IV intends to broaden the acceptance of corporate governance by simplifying and defining governance objectives and interpretations. The King IV is mandatory for all companies listed on the JSE from November 2017 and voluntary for all other companies (IoD, 2018:25).

Spitzeck *et al.* (cited by Meintjies & Grobler, 2013:161) state that the increase in financial crises in businesses over the years has resulted in society and governments questioning the way in which companies are managed and how business decisions are made. According to Meintjies and Grobler (2013:169), managers should have moral and ethical responsibilities to all stakeholders to ensure the long-term sustainability of their business. The Cadbury Report of 1992 in the United Kingdom, the Sarbanes-Oxley Act of 2002 in the United States, and the King Code of Governance in South Africa are examples of efforts to point out the importance of corporate governance to reduce the frequency of global financial crises (IoD, 2016:6).

2.4.3 The Mining Charter

Thirty-two countries around the world have either adopted or included community development requirements into their mining laws, while nine countries are planning to do so (Dupuy, 2014:200). The novel approach of community development by law goes beyond in mitigating the negative effect of mining on local communities (Dupuy, 2014:200). According to Dupuy (2014:200), the idea of ensuring that mining companies invest in local communities ensures real positive social and economic gains for mining affected communities. The Mining Charter of 2002 (Act 28, 2002) addresses the inequitable distribution of mining benefits to local communities and the mine workforce in South Africa. The latest addition of the Mining Charter (Deloitte, 2017:28) aims to advance social and environmental, sustainable development commitments for long-term growth in the South African Mining industry (PWC, 2017b:28).

The new Mining Charter of 2018 was published in the Government gazette on 27 September 2018, after consensus was reached with all stakeholders. All stakeholders were not happy with the newly approved Mining Charter. The mining charter gives guidelines for ownership, employment equity, procurement selection and beneficiation rights to mines, employees', communities and Government (Magubane, 2018:1; Dlodla, 2018:1).

Section 28 (2) (c) of the MPRDA (SA, 2002) requires all mining companies to report their level of compliance with the Mining Charter annually. The mining rights holders have been given a maximum of three years to comply with the targets as set out in the Review Mining Charter. Mining rights holders who do not comply with the ownership, housing, living conditions and human resource development requirements will be in breach of the MPRDA and may lose their mining rights licence.

The increase in energy prices in South Africa and the ongoing changes in the Mining Charter can impact the lifespan of South African mines (De Lange, 2017; Levesque *et al.*, 2014:252). By analysing the GRI guidelines and standards of the mines in South Africa, an understanding can be obtained on how mines report on their CSR.

Information gained from analysing and reporting on issues that threaten the lifespan of South African mines can be used to establish operational plans to increase the lifespan of the mines. Mines can then proactively change their operations to save jobs as these factors are now measured (Pollet *et al.*, 2015:16689, Levesque *et al.*, 2014:233).

South African mining industry audited financial reports specify that their reports are compliant to the following frameworks, guidelines and requirements and have been applied, where relevant in compiling the entire reports for 2016 and include the following:

- International Integrated reporting Framework;
- Global Reporting initiative (GRI) G4 guidelines;
- King Report on Governance for South Africa 2010 (King IV);
- South African Companies Act, 71 of 2008 (the companies act);
- JSE Listing requirements;
- South African Code for Reporting of Exploration Results, Mineral resources and Mineral Reserves (SAMREC Code);
- Broad-Base Socio-economic Empowerment Charter for the South African Mining and Minerals Industry (Mining Charter, 2002) and related scorecards;
- International Council on Mining and metals (ICMM);
- United Nations Global Compact (UNGC);
- Greenhouse Gas (GHG) Protocol;
- Sustainable Accounting Standards Board's (SASB) standards;
- FTSE/JSE Responsible Investment Index;
- International Financing Reporting Standards (IFRS);
- South African Institute for Chartered Accountants (SAICA) Financial Reporting Guides; and
- US Securities and Exchange Commission regulations, including the industry guide 7 for the reporting of mineral reserves.

2.5 THE MINING INDUSTRY AND THE IMPORTANCE OF ENERGY DISCLOSURES

Research conducted by KPMG (2016c:51) indicated that environmental, social and corporate governance issues are increasingly affecting mining companies' ability to operate, generate profit and create value, as well as affecting the sustainability of the mining companies. The overall perception is that mining in South Africa only benefit a few, despite the proliferation of mining sustainability initiatives of the mines (Fonseca *et al.*, 2013:180). According to Gomes *et al.* (2014:85), the relationship of sustainable development in a business context started in the 1980s and has drastically changed the relationship of a company and its environment. Sustainable business creates profits for its stakeholders, protecting the environment and improves the lives it interacts in (Gomes *et al.*, 2014:85; Ford *et al.*, 2014:206). Raufflet *et al.* (2014:256) describe that CSR projects are normally the result of strategic thinking where companies identify threats and create opportunities from threats. According to Ford *et al.* (2014:205), pro-active environmental management strategies lead to a competitive advantage. This according to De Villiers *et al.* (2014:51), leads to strategies that managers adopt or mimic other successful businesses. Sustainable reporting, therefore, becomes a major part of a mine's reporting agenda (De Villiers *et al.*, 2014:51). According to Raufflet *et al.* (2014:258), CSR issues is sometimes complex with no clear-cut solutions. Some of the guiding principles of the MINCOSA in South Africa (2017:3) are to integrate sustainable development strategies within the corporate decision-making process, to implement effective and transparent audited results, communicate independently verified reporting results to stakeholders and to continuously improve environmental performances.

As part of their CSR campaign and future strategies, Anglo-American plans to improve energy consumption by 30% by 2030. In 2016 Anglo American total energy consumption dropped to 97 million GJ from 105 million GJ (Anglo-America, 2016:1). Figure 2.4 is an example of the future strategies of Anglo-American on saving energy.

CLIMATE-CHANGE AND ENERGY STRATEGY – A PREFERRED FUTURE

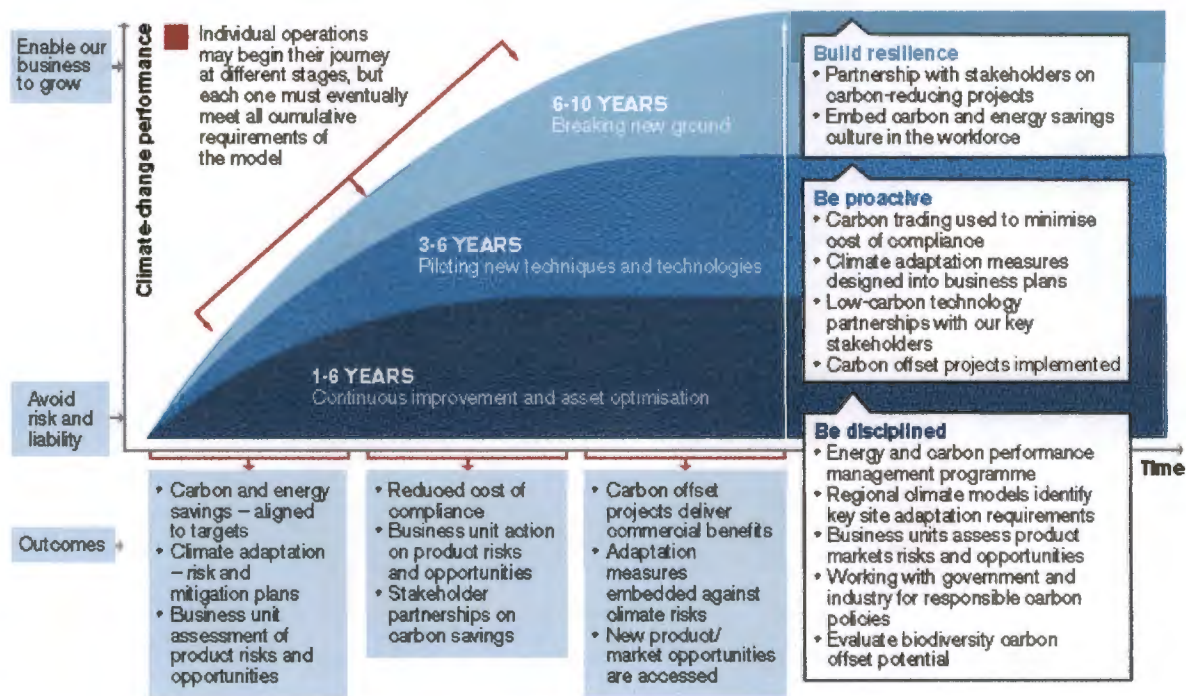


Figure 2.3: Anglo-American future strategy based on sustainable development (Source: Anglo-American, 2016:13).

The ever-growing interest in environmental, stakeholder and social challenges has increased the pressures on mines to balance their efforts in CSR to avoid conflicting stakeholder and government demands and to readdress their business and operation strategies (Toppinen *et al.*, 2012:202). Vidal and Kozak (2008, cited by Toppinen *et al.*, 2012:203) state that increasingly mines are expected to have a more active role socially and to counter emerging threats such as climate change and poverty, and promote sustainable mining (Toppinen *et al.*, 2012:203; Pollet *et al.*, 2015:16688).

Meintjies and Grobler (2013:162) state that organisations are inextricably linked to three interdependent sub-systems, namely environment, society, and the global economy Pollet *et al.*, 2015:14). These three systems, commonly referred to as planet, people and profit, should form part of any company's discussions on corporate sustainability (Meintjies & Grobler, 2013:169; IoD, 2016:11; Pollet *et al.*, 2015:16689).

Alonso-Almeida *et al.* (2014:318) cited both Prado-Lorenzo *et al.* (2009) and Lozano *et al.* (2011) who state that sustainable reports have been amended to be:

- A broadly applicable and reliable set of standards used to communicate with internal and external stakeholders;
- A framework to assess the company; and
- A source of public information (IoD, 2016:9; Alonso-Almeida *et al.*, 2014:318; & Messner, 2009:918).

Daizy and Das (2013:7) report that corporations have been criticised for their environmental misbehaviour for many centuries (Vintro *et al.*, 2014:155). According to Daizy and Das (2013:8), these poor corporate behaviours have necessitated the need for sustainable corporate practices in companies. Ballou *et al.* (2006 cited by Daizy and Das, 2013:7) state that sustainable development and CSR are a conjunction of corporate sustainability. According to Vintro *et al.* (2014:156), the mining industry can contribute to sustainable development by eliminating environmental and social impacts throughout a mine's life-cycle.

Internationally and nationally mines needed a legal licence to operate defined as the official operating permit (Raufflet *et al.*, 2014:257; MRPDA, 2002). This operating permit is also known as the social licence to operate (Raufflet *et al.*, 2014:257; MRPDA, 2002). The mines have to respond to local expectations to keep their social licence to operate while remaining accountable to all stakeholders (Raufflet *et al.*, 2014:257; Gomes *et al.*, 2014:85).

A risk study performed by Ernest and Young (E&Y) on the top ten mining risks for mines internationally, included social licence to operate as seven out of ten and the price of energy as nine out of ten (E&Y, 2017:10). The top risks are ranked one and the lower risk as ten.

According to Ernest and Young social licence to operate is a privilege for mines to operate that needs strong interaction with local communities and stakeholders. Environmental accidents and employee strikes suffered by some companies can result in corresponding damage for the whole mining industry.

Cost of energy and energy supply are important factors in the choice of energy sources for mining operations. Mining operations require a large quantity of electricity. Mining operations receiving electricity from a grid are often significant

customers in the electricity system of a country. Electricity consumption can have a material influence on the electricity networks and energy markets in which mines operate. In some countries mining companies are faced with rising tariffs for traditional sources of energy. The decision on energy resources have reputational and social implications for mines using increased energy and water usage (E&Y, 2017:10). Energy efficiency opportunities may be identified by improved data analytics (E&Y, 2017:10).

2.6 THE GLOBAL REPORTING INITIATIVE

The Global Reporting Initiative is an international, independent, standards organisation based in the Netherlands (De Klerk, 2016). According to De Klerk (2016), sustainable reporting gives companies a common language for disclosing and reporting on non-financial information with the goal of enhancing corporate transparency worldwide (De Klerk, 2016, Levesque *et al.*, 2014:232).

The new GRI standards meet the new global trends for best practice on sustainable reporting (De Klerk, 2016). The GRI enhances reporting on topics such as energy and water use, as well as labour practices. It is important to note that the new format allows individual topic updates based on market and sustainable needs, without requiring revisions to the full set of standards (De Klerk, 2016). The GRI reporting framework allows for a common ground of reporting by all major stakeholders (Sorenson, 2012:27; Levesque *et al.*, 2014:252).

According to Fonseca *et al.* (2014:71), the term sustainability or responsibility is often used to describe corporate social reporting. Fonseca *et al.* (2014:71) and the GRI (2016:2) describe sustainability as the practice of measuring, disclosing and being accountable to internal and external stakeholders for a company's performance towards sustainable development.

According to research conducted by Deloitte (2017:1), corporate reporting continues to evolve to meet the expectations of investors as the environment in which organisations do business in changes. The Paris Agreement on Climate in 2015 and the G20 have highlighted a need for better information regarding climate-related risk (Deloitte, 2017:1; Vintro *et al.*, 2014:156). In June 2012 the governments of Brazil,

Denmark, France and South Africa formed the GoF47, following the United Nations Conference on Sustainable Development (UNCSD), also known as the Rio+20. Paragraph 47 of the outcome document, known as *The Future we want* acknowledges and underlines the importance of corporate sustainable reporting (Guthrie *et al.*, 2013:3, GRI, 2016:44).

The focus of the document is on sustainable reporting by the private sector, whose contribution to the achievement of sustainable objectives is recognised in paragraph 46 of GoF47 (Guthrie *et al.*, 2013:8). The term corporate sustainable reporting is used in the Rio+20 outcome document to describe reporting by the private sector (Guthrie *et al.*, 2013:8). Paragraph 46 of the Rio+20 outcome document recognises that the active participation of the private sector can contribute to the sustainable development through the important tool of public-private partnerships (Guthrie *et al.*, 2013:7). Businesses have an important part to play in driving and investing in innovation and production processes to meet requirements of sustainable development and in reporting to decision-makers about the way in which their activities contribute to the global sustainable agenda (Guthrie *et al.*, 2013:7; Sorenson, 2012:23; Fonseca *et al.*, 2014:71).

The landmark agreements between 195 nations at the United Nations Climate change conference in Paris shows that the world's energy markets are changing. The global trend to reduce carbon emissions has a renewed focus on the generation of energy (Wonhas & Carter-Brown, 2017:1). The Global Reporting Initiative (GRI) promotes the use of sustainability reporting as a way for organisations to become more sustainable and contribute to sustainable development (GRI, 2016). The GRI's mission is to make sustainable reporting a standard practice.

According to the South African Institute of International Affairs (SAIIA, 2015), the CSR agenda has been part of the global movement debate for decades. CSR in the South African mining industry, according to SAIIA (2015), embodied some of the most socially destructive processes of the post-apartheid era. After 1994 the South African mining industry became a leader in implementing CSR initiatives and made the greatest financial contributions as a sector to the economy (SAIIA, 2015). South African mining industries have started listing on the London Stock Exchange.

Because of these international investments, mining industries have been incentivised to increase CSR to attract and retain international investors (SAIIA, 2015).

The different South African mining industries had to compete for international investors. Competition was necessary to improve the relevant company's image and reputation (SAIIA, 2015). Implementation has led to greater assistance in addressing the socio-economic challenges faced by mining communities after 1994 According to Govindan *et al.* (2014:216) the forces which involve implementation of a company's CSR performance activities are called drivers. Govindan *et al.* (2014:216) describe these drivers as values driven, performance and stakeholder driven. A values-driven approach from stakeholders is a self-motivated stakeholder approach and depends on external pressures or forces. As stated before all companies reporting on sustainable material issues after 31 December 2015, must follow the newly enhanced reporting materiality issues of the GRI G4 guidelines (KPMG, 2016c:45).

2.7 DISCUSSION OF MATERIALITY ASPECT ON ENERGY G4 EN 3-7

There are 30 environmental performance aspects in the following categories: material use (EN 1-2); energy (EN 3-7); water (EN 8-10); biodiversity (EN 11-15); emissions, effluents and waste (EN 16-25); products and services (EN 26-27); compliance (EN 28); transport (EN 29) and overall (EN 30) (Sorensen, 2012:21; GRI, 2016). According to Daizy and Das (2013:8), the consumption of energy is currently one of the most important issues of sustainable development. The consumption of all forms of energy are increasing daily (Daizy & Das, 2013:8).

Energy, as an element of GRI G4 guidelines, is a specific topic under Environmental performance category. The fourth generation of GRI guidelines, G4, was launched in May 2013. The G4 guidelines were revised to reflect important current and future trends in sustainable reporting. The G4 guidelines are user friendly and accessible. Companies can now report on sustainable impacts that matter and publish reports that are more strategic, focused, credible and easier to navigate (GRI, 2016).

The GRI G4 guidelines describe the method of reporting for each organisation as follows (GRI, 2016):

Disclosure G4 EN3 – Energy consumption within the organisation

The GRI G4 guidelines stipulate that an organisation compiling the information on fuel consumption must avoid double-accounting. Double-accounting occurs when self-generated energy is reported as fuel consumption. The energy from non-renewable and renewable sources used by the organisation must only be counted once (GRI, 2016).

Organisations must report renewable energy separately from non-renewable energy and only report energy consumed by units owned or controlled by the organisation. This energy consumption must be calculated and reported within the organisation in joules or the international standard of units (SI) of the organisation or country it operates in (GRI, 2016).

In some countries, electricity generated from coal is the only form of energy they consumed, while for other organisations steam or water are the only other energy sources available. Energy can be supplied from an external source or generated self by the organisation (GRI, 2016).

Disclosure G4 EN4 – Energy consumption outside the organisation

Energy consumption can occur outside an organisation in any of the upstream and downstream processes involved with its operations. The reporting organisation can identify energy sources consumed outside of the organisation within upstream and downstream business categories. Upstream categories can include purchase goods and service, capital goods, and waste generated in operations. Downstream categories can include use of and disposal of products sold, leased assets, franchises, and investments. For each of these categories, the organisation can calculate or estimate the amount of energy consumed (GRI, 2016).

Disclosure G4 EN5 – Energy intensity

Energy intensity ratios define energy consumption in the organisation-specific context metrics used. These ratios express energy required per unit of activity,

output or any other specific organisational metrics. The organisational context metric is often referred to as normalised environmental impact data (GRI, 2016).

Disclosure G4 EN6 – Reduction of energy consumption

The GRI G4 guidelines subscribe that an organisation can report on initiatives that were implemented and have the potential to assist with reduction in energy. These reductions in energy can include process redesign, upgrading of equipment, changes in behaviour and operational changes (GRI, 2016).

Disclosure G4 EN7 – Reduction in energy requirements of products and services

According to the GRI G4 guidelines organisations shall report on reductions in energy of products and services sold during the reporting year. Consumption patterns can include for example 10% less energy used per unit time in processes.

2.8 SUMMARY

A literature review was conducted on the impact of social, environmental and financial material aspects of sustainable reporting. Although companies use different terminology for corporate sustainable reporting, GRI G4 sets out the standards and requirements for companies to adhere to a common practice of reporting.

Energy is one of the GRI G4 guidelines described in detail to address the benefit of reporting energy. Energy generation is closely related to climate change. The competitions for funds by mines by using the GRI G4 guidelines and other integrated reporting, ensure sustainable financing for the mines.

Chapter 3 will discuss the findings on the material aspect energy in detail and the total adherence to compliance with the GRI G4 requirements as was derived from the mines' annual audited integrated reports.

CHAPTER 3: EMPIRICAL RESEARCH

3.1 INTRODUCTION

To investigate corporate social reporting on energy a sample of companies from the mining sector was selected for the study. In conducting this study, the data required was extracted from annual integrated reports. The annual integrated reports were accessed through the company's websites. Data for the year 2016 were used as this was the most recent data available for mining companies to report on the enhanced GRI G4 guidelines. The list includes the top 160 companies listed on the JSE. From those 160 companies, an initial list of the top 10 mining companies was used as a sample frame for this study. The corporate websites were retrieved online and downloaded for analysing. The data collected for this study involved the examination of the annual integrated reports of 2016 of ten mining companies listed on the JSE. Although mining may utilise other communication channels for demonstrating energy disclosures such as the internet, newspapers, media as well as internal reports, this study pays specific attention to the published annual integrated reports of 2016.

3.2 CONTENT ANALYSIS AS A RESEARCH METHOD

Content analysis is the research method used in this study to investigate the published annual integrated reports of the ten mines chosen. Content analysis enables the researcher to include large amounts of textual data and systematically quantify its properties, such as the frequencies of most used keywords and processes by locating the more valid structures of its available content (Stemler, 2001:2).

According to Demirok *et al.* (2015:2460) content analysis is a widely used qualitative research method. Stemler (2001:1) describes qualitative content analysis as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding and it often involves building and applying a concept dictionary or fixed vocabulary of terms on the basis of which words are extracted from the textual data for statistical computation. Content

analysis is thus an established method that also may be used to gain insight into the disclosure of energy related aspects as part of the reporting field. In the mining industry, a natural or human-made disaster may cause the website content to change. The website content can be altered after a natural or human-made disaster to hide any fraudulent activities. For this reason, all data was downloaded on the same day to ensure that a direct comparison of the data was possible. Zhao (2015:1) cited McMillan (2000:93) in emphasising the importance of timing in content analysis from websites.

Moldavska *et al.* (2017:745) describe content analysis as a method that consists of both qualitative and quantitative research design strategies. Content analysis in the form of quantitative measures present the data in the form of frequency, or how many times. Qualitative data analysis are in the form of categories which in turn enables the interpretation of the data in text form (Bengtsson, 2016:8). Content analysis was used because it fits the main purpose of the study well. Moldavska *et al.* (2017:747) describe content analysis as a focus on the reporting of results, rather than describing the analytical process. Table 3.1 compares the strengths and weaknesses of content analysis in more detail.

Table 3.1: Strengths and weaknesses of content analysis

Strengths / Uses of Method	Weaknesses / Limitations of Method
1. The study material for research is readily available on the internet to gain access to	1. The data selected must be recorded accurately. Thus the objectivity of the data may be obscured. The researcher must make decisions on how to interpret particular forms of data analysis
2. To collect data for a representative sample is easy and inexpensive	2 This method of interpretation may not explain the behaviour of the organisations and the people in quantifying relations to their behaviour.

3. The data available and collected are correct. The content data are easy to replicate and repeated	3. This method to retrieve data is time-consuming
4. The data, events, processes and issues can be presented objectively. The data analysis may not be immediately appealing to a reader, viewer or consumer of the data.	4. It is a descriptive method of data analysis. It does not explain certain disclosures properly
5. Content analysis is a data collection process. The researchers do not interact with people or processes that are being studied. The influence of people and processes cannot be interpreted in the final results of the study	5. A great deal of data is available that can be seen as quantity rather than quality of the disclosure.

Source: Adapted from Van Zyl (2015:26).

A superior advantage of content analysis is that it is relatively easy to gain access to the material. The audited annual integrated reports of all the mines analysed were available and accessible on their websites. It was therefore relatively easy and inexpensive to build a representative sample.

The themes for content analysis must be identified and be identical in nature for each theme for research analysis. Themes can be described as sub constructs which are usually identified by the researcher before, after, and during the data collection period (Welman *et al.*, 2005:223).

Erlingsson and Brysiewicz (2017:94) describe the process of synopsis of content analysis as follows: The initial step is to read and re-read the information on the websites to gain an understanding of what the information is about, get an idea of what the main points are what you need to analyse, then divide the information into smaller units. While dividing the information into smaller units, you need to ensure that the core meaning is retained. Tabel 3.2 describes this method in detail.

Table 3.2: Glossary of terms as used in the hands-on guide to doing content analysis

Condensation	Condensation is a process of shortening the text while still preserving the core meaning
Code	A code can be thought of as a label; a name that most exactly describes what this particular condensed meaning unit is about. Usually one or two words long
Category	A category is formed by grouping together those codes that are related to each other through their content or context. In other words, codes are organised into a category when they are describing difference aspects, similarities or differences, of the texts' content that belong together. When analysis has led to a plethora of codes, it can be helpful to first assimilate smaller groups of closely related codes in sub-categories. Sub-categories related to each other through their content can then be grouped into categories. A category answers questions about who, what, when, or where? Category names are factual and short.
Theme	A theme can be seen as expressing an underlying meaning, that is, latent content, found in two or more categories. Themes are expressing data on an interpretative (latent) level. A theme answers questions such as why, how, in what way, or by what means. A theme is intended to communicate with the reader on both an intellectual and emotional level. Theme names are very descriptive and include verbs, adverbs and adjectives.

(Source: Erlingsson & Brysiewicz, 2017:94).

The following techniques listed by Welman *et al.* (2005:223) are used in identifying themes:

- Word analysis (word repetitions, keywords in context and indigenous terms).
- Reading of larger units (for example comparing and contrasting material and searching for missing information).

- Intentional analysis of linguistic features (metaphors, transitions and connectors).
- The physical manipulation of texts (unmarked texts, pawing and cut and sort procedures).
- Secondary data analysis.

Word analysis and comparisons of topics on energy between the mines were the technique used in this study to identify themes (Bouten & Hoozee, 2015:375). According to Stemler (2002:2), content analysis is the most widely used common method in qualitative analysis and is simply doing a word-frequency count. Researchers must be aware that words can differ and thus there is no well-developed weighting procedure, causing a limitation on word counts (Stemler, 2002:2).

Analysis of the mines audited integrated reports for 2016 proceeded according to the following steps (Bouten & Hoozee, 2015:375):

- Consider the content. Is the content of the mines' audited reports consistent with aspect description on energy materiality matrix?
- What type of information should companies provide about material issues?

As an ethical consideration, the recipient must carefully interpret the information and must not add or restate the information as being different to what has been provided (Van Zyl, 2013:907).

3.3 POPULATION AND SAMPLE

The study uses annual reports of mining companies that were listed on the JSE for the period 2016. This represents the most current data after the GRI G4 enhanced guidelines were introduced. All the companies listed on the JSE for year 2016 were part of the population. The selection of the sample was based on a quota sampling method. Quota sampling is a non-probability sampling technique where the sample has the same proportions of individuals as the entire population concerning characteristics, traits and focussed phenomenon (Oxford Dictionary, 2018). However, the aim is to gather the annual reports from the same industry for year ending 2016; the sample had to be selected based on mining companies that

provided annual audited reports for the year ending 2016. If a mine were part of a larger group and annual Integrated Reports are provided for the whole group only, those consolidated, integrated reports were used for the study.

Sampling procedures and sample size are important when one evaluates research projects (Maher & El-Masri, 2017:20). According to Maher and El-Masri (2017:20), any evidence of sampling problems raises serious concerns about validity of the study findings. Maher and El-Masri (2017:20) distinguish between non-probability and probability sampling. In non-probability sampling participants and organisations are chosen on the researcher's assumptions (Maher & El-Masri (2017:20). In probability sampling the sample of the population is known beforehand (Maher & El-Masri (2017:20).

The sample represents almost 80 mines owned and operated by ten mining companies. The final sample was extracted as follows by making use of probability sampling techniques. By simple random sampling, the core sample was elected as follows in Table 3.3.

Table 3.3: Quota sampling

Population	The population consists of all companies listed on the JSE
Groups	The companies were then cross checked to see if they are listed with the Department of Minerals
Obtain a quota sample	A study was conducted to ascertain which mines use the most energy between mining operations of gold, platinum and coal
Sample	Each mining company was then individually assessed for how many mines and which mines they operate and owned in South Africa

Source: Adapted from Maher and El-Masri (2017:20).

The final ten mines whose audited integrated reports were analysed in the study. The mines were selected based on their reports on energy in the mining industry.

- Anglo American
- Ashanti Gold
- BHP Billiton
- Gold Fields
- Impala PLC
- Sibanye Gold
- Lonmin
- Rand Gold Exp
- Harmony
- ARM Minerals

Coal mining was excluded from the list as these organisations do not use a lot of energy. BHP Billiton is listed on the JSE but operates its mines in partnerships with different mining companies (JSE, 2017).

3.4 MEASURING INSTRUMENT

The GRI G4 has developed a voluntary reporting framework to promote sustainable reporting and one of the criteria concerns energy consumption and disclosures. The measuring instrument will be implemented to measure the compliance with the standards on energy by GRI G4 indicators. The energy aspect of the GRI guidelines was used for this study since it is the framework that is used and recognised worldwide (Deloitte, 2016; GRI, 2016). The application of content analysis was carried out by converting the qualitative information in the annual reports into quantitative scores.

The disclosure index was developed by compiling the GRI G4 guidelines in the form of a checklist which can be found in Annexures 3 to 7 of the guidelines. For this study, the standards concerning energy were divided into five distinct aspects as set out by the GRI G4.

Table 3.4: Standard categories on energy

G4 EN3	<i>Energy consumption within the organisation</i>
The measure of how mines report direct and indirect energy consumption by primary energy source within the mine.	
G4 EN4	<i>Energy consumption outside the organisation</i>
The measure of energy consumption of the mines outside the mine.	
G4 EN5	<i>Energy intensity</i>
Energy consumed in the mine is part of the energy intensity usage ratio calculated by mines.	
G4 EN6	<i>Reduction of energy consumption</i>
This measures the energy consumed as a direct result of the conservation of energy and efficiency initiatives implemented to reduce energy consumption	
G4 EN7	<i>Reduction in energy requirements of products and services</i>
This is the one aspect that mines do not measure. According to the mining reports, this indicator is irrelevant in the production of minerals in the mining sector (Deloitte, 2016)	

Three variables were used for the findings. The three variables were full, partial and non-disclosure.

“Full” - “Full” is used when the standard was clearly defined. When the findings were “full”, the mentioned disclosure was either explicitly described or enough information was provided so that the information proposed to be disclosed could be inferred or calculated. The finding was also “yes” when it was clearly indicated that the information proposed to be disclosed was not applicable for a certain reason and was therefore not disclosed. If “full” a score of 2 was given to the point.

“Partial” - The finding was indicated as “partial” when the necessary information proposed by the standard was not part of the actual required standard of the company’s financial information. If “partial” a score of 1 was given to the point.

“None” - The finding was indicated as “none” when the necessary information as defined by the standard could not be found in the integrated report and

also when it was not stated that the information is not applicable if it were the case. If “none”, a score of 0 was given to the point.

Table 3.5: GRI G4 EN 3 Measuring Instrument

G4 EN 3		Companies									
Energy consumption within the organization		Anglo American	Anglo Gold Ashanti	BHP Billiton	Goldfields	Impala	Sibanye	Randgold	Lonmin	Harmony	ARM
A	Report total fuel consumption from non-renewable sources in joules or multiples, including fuel types used	2	2	2	2	2	2	2	2	2	2
B	Report total fuel consumption from renewable fuel sources in joules or multiples, including fuel types used	2	2	2	2	2	2	2	2	2	2
C	Report in joules, watt-hours or multiples, the total:	2	2	2	2	2	2	2	2	2	1
	Electricity consumption	2	2	2	2	2	2	2	2	2	2
	Heating consumption	0	0	0	0	0	2	2	0	0	0
	Cooling consumption	0	0	0	0	0	2	2	0	0	0
	Steam consumption	0	0	0	0	0	2	2	0	0	0
D	Report in joules, watt-hours or multiples, the total:	2	2	2	2	2	2	2	1	2	1
	Electricity sold	0	0	0	0	0	0	0	0	0	0
	Heating sold	0	0	0	0	0	2	2	0	0	0
	Cooling sold	0	0	0	0	0	2	2	0	0	0
	Steam sold	0	0	0	0	0	2	2	0	0	2
E	Report total energy consumption in joules or multiples	2	0	2	2	2	2	2	2	2	2
F	Report standards, methodologies, and assumptions used	2	0	2	2	2	2	2	2	2	2
G	Report the source of the conversion factors used	2	0	1	2	2	2	2	2	2	2

Table 3.6: GRI G4 EN 4 Measuring Instrument

G4 EN 4		Companies									
Energy consumption outside the organization		Anglo American	Anglo Gold Ashanti	BHP Billiton	Gold Fields	Impala	Sibanye	Randgold	Lonmin	Harmony	ARM
A	Report energy consumed outside of the organisation, in joules or multiples	2	0	2	2	2	2	2	2	2	2
B	Report standards, methodologies, and assumptions used	2	0	2	2	2	2	2	2	2	2
C	Report the source of the conversion factors used	1	0	0	0	0	2	2	2	2	1

Table 3.7: GRI G4 EN 5 Measuring Instrument

G4 EN 5		Companies									
Energy Intensity		Anglo American	AngloGold Ashanti	BHP Billiton	Gold Fields	Impala Platinum Holdings	Sibanye Gold	Randgold and Exploration	Lomax PLC	Harmony	African Rainbow Minerals
A	Report the energy intensity ratio	2	2	1	2	2	2	2	2	2	0
B	Report the organisation-specific metric (the ratio denominator) chosen to calculate the ratio	2	0	0	2	0	2	2	2	2	0
C	Report the types of energy included in the intensity ratio: fuel, electricity, heating, cooling, steam, or all	2	2	0	2	0	2	2	2	2	2
D	Report whether the ratio uses energy consumed within the organization, outside of it or both	2	0	0	2	0	2	2	2	2	2

Table 3.8: GRI G4 EN 6 Measuring Instrument

G4 EN 6		Companies									
Reduction of energy consumption		Anglo American	AngloGold Ashanti	BHP Billiton	Gold Fields	Impala Platinum Holdings	Sibanye Gold	Randgold and Exploration	Lomax PLC	Harmony	African Rainbow Minerals
A	Report the amount of reductions in energy consumption achieved as a direct result of conservation and efficiency initiatives, in joules or multiples	2	2	2	2	2	2	2	2	2	2
B	Report the types of energy included in the reductions: fuel, electricity, heating, cooling, and steam	2	2	2	2	2	2	2	2	2	2
C	Report the basis for calculating reductions in energy consumption such as base year or baseline, and the rationale for choosing it	2	0	2	2	0	2	2	2	2	2
D	Report standards, methodologies, and assumptions used	2	0	2	2	0	2	2	2	2	2

Table 3.9: GRI G4 EN 7 Measuring Instrument

G4 EN 7		Companies									
Reduction in energy requirements of products and services		Anglo American	AngloGold	BHP Billiton	Gold Fields	Impala	Sibanye	Randgold	Lomax	Harmony	ARM
A	Report the reductions in the energy requirements of sold products and services achieved during the reporting period, in joules or multiples	2	2	2	2	2	2	2	2	0	2
B	Report the basis for calculating reductions in energy consumption such as base year or baseline, and the rationale for choosing it	2	0	2	2	0	2	2	2	0	2
C	Report standards, methodologies, and assumptions used	2	0	0	2	0	2	1	2	0	1

3.5 RESULTS OF THE STUDY

3.5.1 Overall evaluation of the mines

The mining companies are assessed based on their reporting of energy as set out by the GRI G4 guidelines. Skouloudis *et al.* (2009:303) describe the following criteria to evaluate the sustainable reports. The reports are evaluated as follows:

- Content – breadth of discussion and identification of materials used and their impact
- Coverage – of the material aspect on energy and core descriptions
- Presentation – logical breakdown and analysis on energy data used
- Interpretation – the companies' energy usage are discussed regarding baseline year of measure, energy savings and future energy savings projects
- Implications – discussion of what the data means for the company's future plans and the priorities.

The following basic rating scale were used for assessment.

- "0" The report does not include any information relevant to the specific (energy) topic or no coverage.
- "1" The report provides generic or brief statements, without specific information on the mines approach to the topic.
- "2" The report includes valuable information on the topic, but there are still major gaps in coverage. The mines identify the assessed issue but fails to present it sufficiently.
- "3" The mines provided information that is adequate and clear.
- "4" Coverage of the specific issue can be characterised as full in the report.

Table 3.10: Overall energy evaluation disclosure rating for the mines

Company	Content	Coverage	Presentation	Interpretation	Implications	Total Score	Total percentage
Anglo American	4	4	2	3	3	16	80
Ashanti Gold	4	4	4	2	2	16	80
BHP Billiton	4	2	2	1	1	10	50
Gold Fields	4	4	4	4	3	19	95
Impala PLC	4	3	3	3	3	16	80
Sibanye Gold	4	4	3	3	3	17	85
Rand Gold Exp.	4	4	4	2	2	16	80
Lonmin	4	4	2	2	2	16	80
Harmony	4	3	3	3	3	16	80
ARM Minerals	4	4	4	4	3	19	95

3.5.2 Overall compliance to the standards regarding energy consumption and use (GRI G4 EN 3 – 7)

The energy standards consist of 5 overall standards and 22 sub-standards. G4 EN3 consists of 7 sub-standards, G4 EN4 consists of 3 sub-standards, G4 EN5 consists of 5 sub-standards, G4 EN6 consists of 4 sub-standards and G4 EN7 consists of 3 sub-standards.

The results are reported and discussed from an overall viewpoint on all standards for the mines and categories individually. Companies generally have two types of disclosure in the GRI reporting – general and specific.

General disclosure

The organisation has a choice of options to identify the required General Standards disclosures to be reported. They are divided into seven parts: strategy and analysis, organisational profile, identified material aspect and boundaries, stakeholder engagement, report profile, governance, ethics and integrity (GRI, 2016).

Specific standard disclosure

The GRI G4 specific standard disclosures are organised by categories and aspect and need to be reported only for the Material Aspects identified by the organisation for example disclosures on management approach and indicators (GRI, 2016).

3.5.3 Analysis of disclosure per standard indication

Overall all the mines focus reporting on saving of energy used from a baseline year and year-on-year savings of energy. The overall low scores as mentioned was purely because the energy produce or sold by heating, cooling and steam are not reported on in detail because of a lack of information available. If these reporting elements reported on are excluded from the calculation, the overall mining percentages increases to well above 95% overall for all categories.

A content analysis was done to identify the scope and differences in disclosure practises between the mines. The content analysis is done show that Gold Fields and ARM Minerals have the highest scores as these companies' disclosures are adequate and clear and adhere to the GRI G4 guidelines on energy reporting. The rest of the mines, excluding BHP Billiton, disclosures scores are adequate and clear with low scores on implications and interpretations. The disclosures provide generic or brief statements, without mentioning the mine's specific approach to the listed topic. Hence, there are gaps in the reporting information. BHP Billiton has a low disclosure score as they report energy disclosures as part of their greenhouse gas emissions and not as a separate aspect.

Results of the content analysis suggest that energy sustainable reporting disclosures do not vary substantially across the mining industry. A distinct pattern of how the results are disclosed could be observed. The findings suggest that there is not much difference regarding the nature and type of energy disclosure made across the mining industry. By reporting and ensuring that the mines' sustainable reports adheres to all the requirements as set out in chapter 2 page 19, corporate social responsibility becomes a successful business strategy. Most of the mines' reports approach sustainable development as part of their business strategy. Thus the similarities between results observed. All the mines report that their stakeholders and

investors are taking a holistic view in assessing performance that includes social, environmental and governance concerns.

3.5.4 Energy consumption within the organisation (EN3)

Objective:

In EN3 the direct energy consumption of the mines is reported, including energy produce within the organisation (e.g. the burning of gases). Direct energy use is energy consumed by the mines and its products and services rendered. Indirect energy is energy consumed by other organisations that are delivering a service to the mines.

Organisations are expected to select a consistent boundary to measure energy consumed and produced in the organisation. South African mines do not consume or produce heating, cooling or steam energy in their operations as stated in their annual integrated reports.

The selected reporting of GRI G4 EN3 are used to calculate direct and indirect energy consumption by primary energy source. This data is obtained by meter readings and cross checked with invoices. In places where no energy meters are available the data are obtained from invoices only.

GRI G4 EN3 standards consists of seven sub-standards, and the analysis is performed per individual sub-standard. In GRI G4 EN3 the direct energy consumption and energy produced of the reporting mines are reported. The total fuel consumption and production of the renewable and non-renewable sources are calculated based and reported on in joules or multiples of joules per energy used.

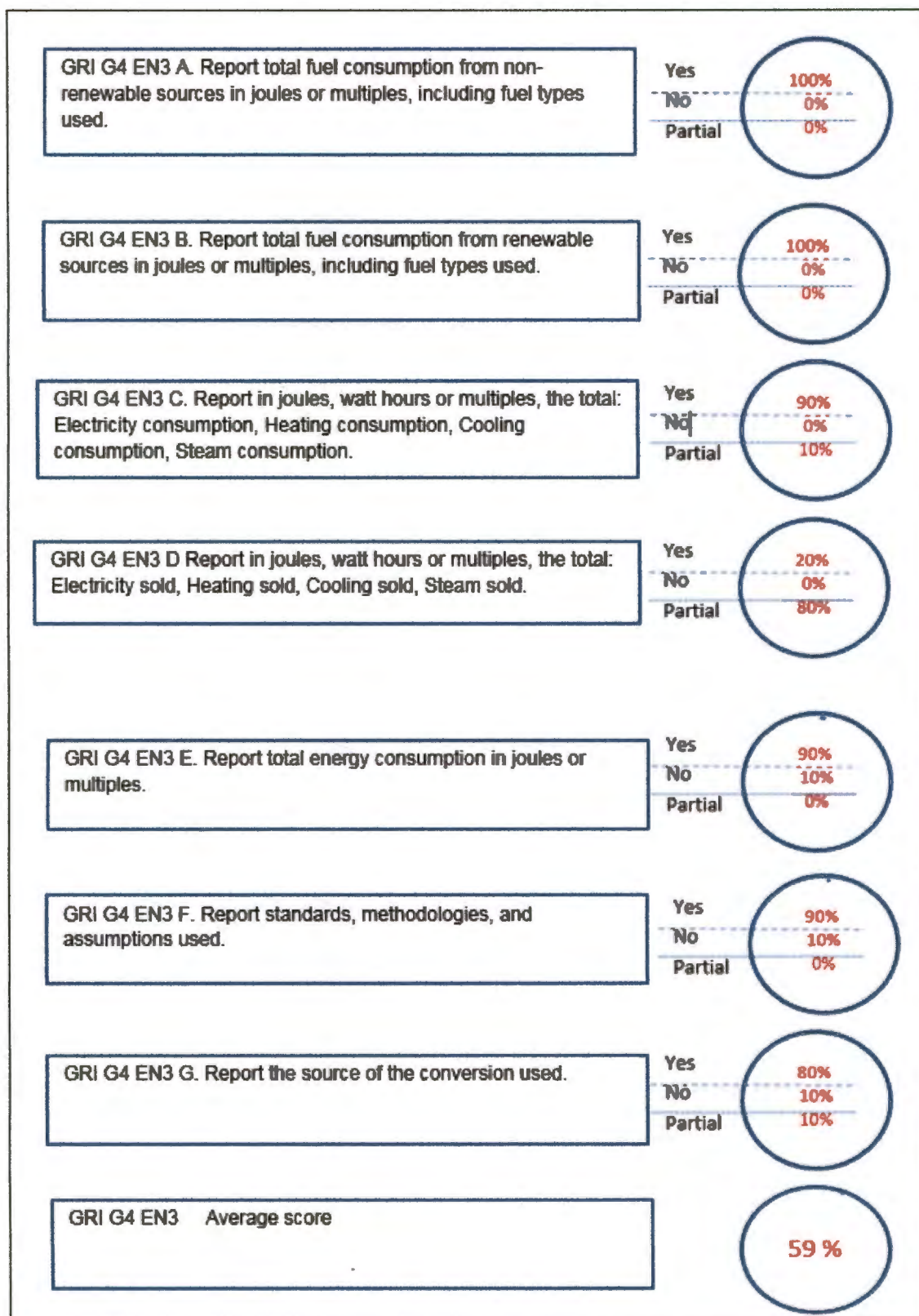


Figure 3.1: GRI G4 EN3 – Energy Consumption within the organisation

Figure 3.1 indicates the level of compliance to the GRI G4 EN3 seven sub-standards guidelines by the integrated report studied for each element.

- The level of compliance for EN3, element A that report total fuel consumption from non-renewable sources in joules or multiples, including fuel types used was 100%.
- The level of compliance for EN3, element B that report total fuel consumption from renewable fuel sources in joules or multiples, including fuel types used was 90% compliant.
- The level of compliance for EN3, element C that report in joules, watt-hours or multiples of energy consumed was 90%.
- The level of compliance for EN3, element D report in joules, watt-hours or multiples of energy sold was 20%.
- The level of compliance for EN3, element E that report total energy consumption in joules or multiples was 90%.
- The level of compliance for EN3, element F that report standards, methodologies, and assumptions used was 90%.
- The level of compliance for EN3, element G that report the source of the conversion factors used 80%.

Element D has the lowest score of 20%. This element mentions energy sources such as heating, cooling, steam and electricity sold. Since the companies do not sell energy in any form, they report less on this element.

The standard GRI G4 EN3 on consumption of energy within the organisation complies with a 59% average compliance ratio. All the mines consume energy and do not sell energy as stated in their integrated reports. The element ratio GRI G4 EN3 D electricity, heating, cooling and steam sold are not reported on in detail. This element ratio is the lowest in scores obtained from statistical analyses purely because the mines do not consume these elements.

3.5.5 Energy consumption outside the organisation (EN4)

Objective:

Standard EN4 provides information on energy consumption needed to produce energy bought externally, such as electricity. Only energy consumed outside of the organisation that was expected to be material was reported on in the integrated reports for GRI G4 EN 4 A-C. Where available, the mines use energy data available to calculate the relevant emissions factors to produce goods and services.

The mines calculate the energy consumed outside the mines concerning the type of fuels used to produce, transport and distribution off goods, services and fuels by service providers.

GRI G4 EN 4 consist of three sub-standards.

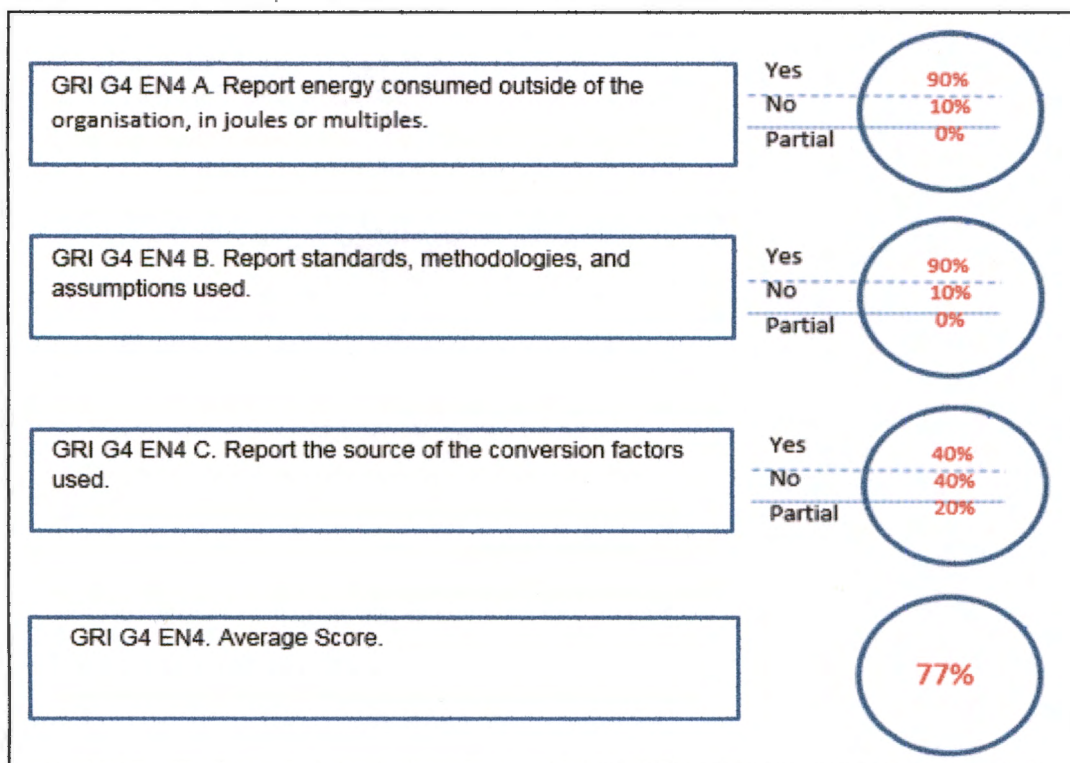


Figure 3.2: GRI G4 EN4 – Energy consumption outside the organisation

- The level of compliance for EN4, Element A that reports on energy consumed outside of the organisation was 90% compliant.

- The level of compliance for EN4, Element B reports on standards, methodologies and assumptions was 90% compliant.
- The level of compliance for EN4, Element C that reports the source of the conversion factors used was 40% total compliance and 20% partial compliance.

The calculation refers to energy use outside of the mines. These were calculated based on goods and services rendered by outside companies to the mines. These include purchases of goods, services, fuel and energy related services supplied, thus the low compliance figures on consumption of energy outside the mines on GRI G4 EN4 C.

The element GRI G4 EN4 that refers to energy consumption outside the organisation complies with a 77% average compliance ratio. Four out of ten of the mines do not report the source of the conversion factors used. No reasons are available in the reports on the reason for not reporting.

3.5.6 Energy intensity (EN5)

Objective:

Standard EN5 measures energy saved by mines due to conservation and energy efficiency improvements implemented by the mines. The mines use an ounce of gold produced as a specific metric to calculate energy intensity as a saleable product. Third party auditors externally assure this metric.

GRI G4 EN5 consist of four sub-standards.

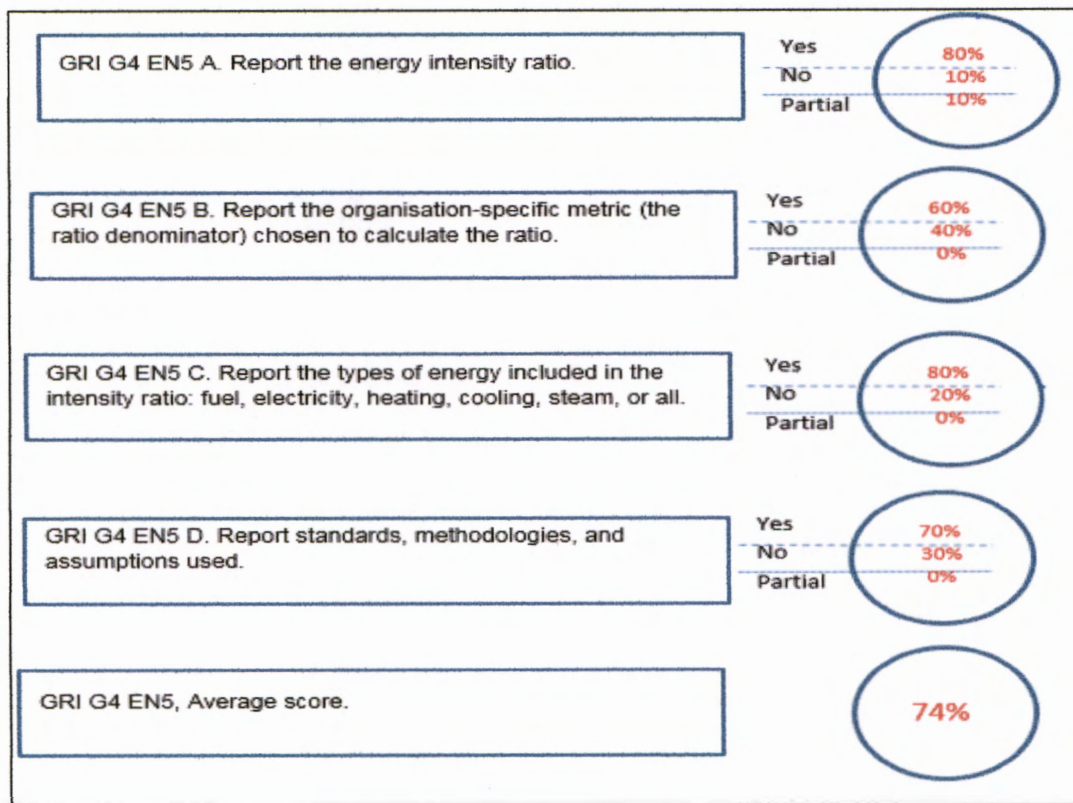


Figure 3.3: GRI G4 EN5 – Energy intensity

- The level of compliance for EN5, Element A that reports the energy intensity ratio calculated for the products produce were 80% compliant.
- The level of compliance for EN5, Element B that report the specific metric used to calculate the energy intensity was 60% compliant.
- The level of compliance for EN5, Element C that reports the types of energy intensity used were 80% compliant. This compliance is only used to calculate energy used, and not on heating, cooling, steam or fuel used.
- The level of compliance for EN5, Element D that reports whether the ratio uses energy consumed within the organisation, outside of it or both, were 70%.

The basis for calculating energy intensity included energy fuels and electricity and energy consumed within the mines. Energy intensity ratios define energy consumption as energy required per unit of activity or energy output. Energy intensity ratios helps to contextualise an organisation's energy efficiency. This includes unit of

products produce per energy ratio, production volumes, number of full time employees and sales.

The element GRI G4 EN5 energy intensity complies with a 74% average compliance ratio. Three out of the ten mines do not report on energy intensity. No reasons are available in the financial and social reports for not disclosing energy intensity.

3.5.7 Reduction of energy consumption (EN6)

Objective

Standard EN6 addresses the development and research of energy-efficient products and services delivered by the mines. The basis for calculating reductions in energy consumption in mines is directly related to energy initiatives implemented to save energy costs. This initiative includes many factors such as mining depth, ore quality and stripping ratios.

GRI G4 EN6 consist of four sub-standards.

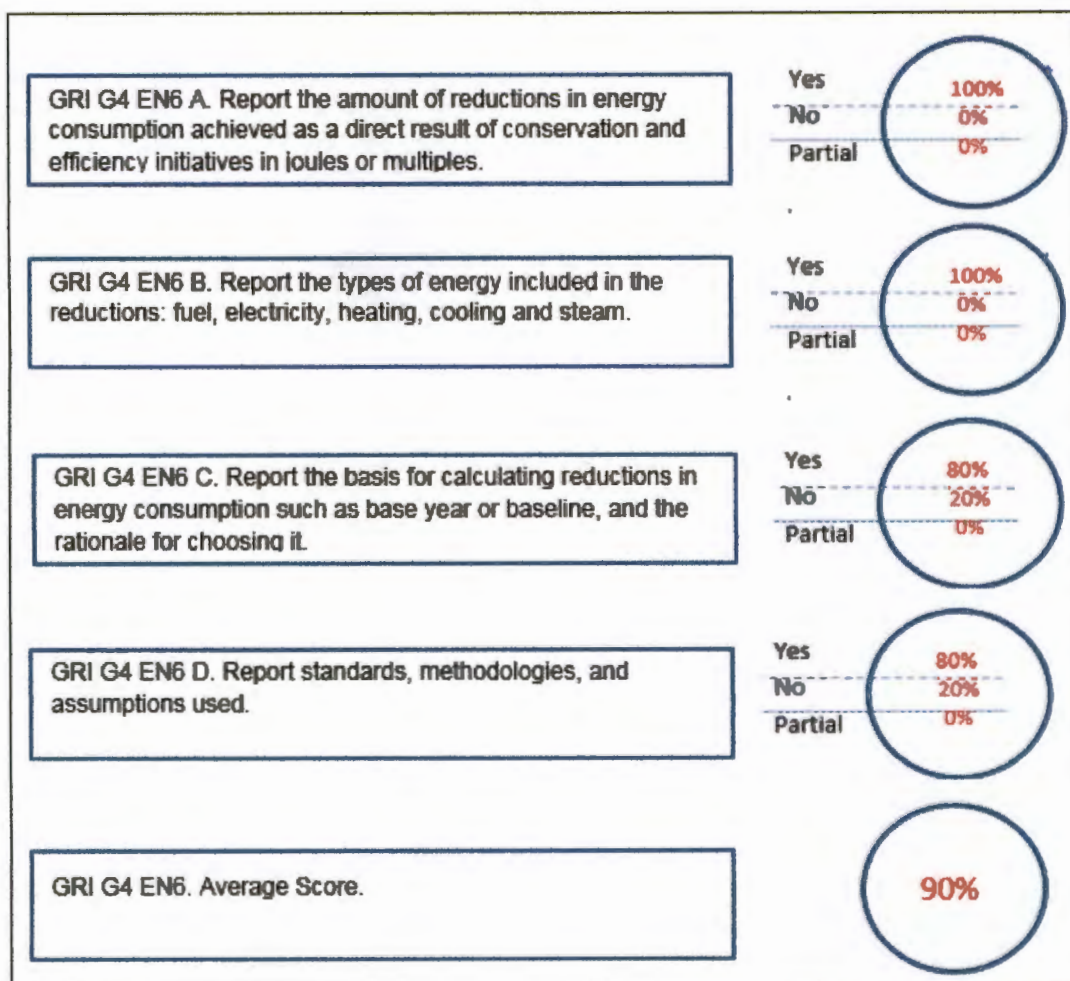


Figure 3.4: GRI G4 EN6 – Reduction of energy consumption

- The level of compliance for EN6, Element A reports the amount of reductions in energy consumption achieved as a direct result of conservation and efficiency initiatives in joules or multiples were 100% compliant.
- The level of compliance for EN6, Elements B reports the types of energy included in the reductions were 80% compliant.
- The level of compliance for EN6, Elements C reports the basis for calculating reductions in energy consumption such as a base year or baseline, and the rationale for it were 80% compliant.
- The level of compliance for EN6, Elements D reports standards, methodologies and assumptions used in their calculations to reduce energy were 80% compliant.

The reductions in energy use are a direct result of conservation and efficiency measures taken to improve energy usage.

The element ratio GRI G4 EN6 on reduction of energy consumption is the best reported element at 90%. This element reports on the saving of energy per ton product produce annually by each mine. Two mines reported partially on the method used to calculate standards, methodologies and assumptions used.

3.5.8 Reduction energy requirements of products and services (EN 7)

Objective:

Finally, standard EN7 reports the indirect energy consumption of the mine's activities. Indirect energy consumption includes the designing of energy-efficient products and services. The mines do not comply with this element fully. They are of the opinion that the mines produce gold. The mines are of the opinion that element ratio G4 EN 5 and 6 are more relevant regarding the savings achieved related to products and services.

GRI G4 EN7 consist of four sub-standards.

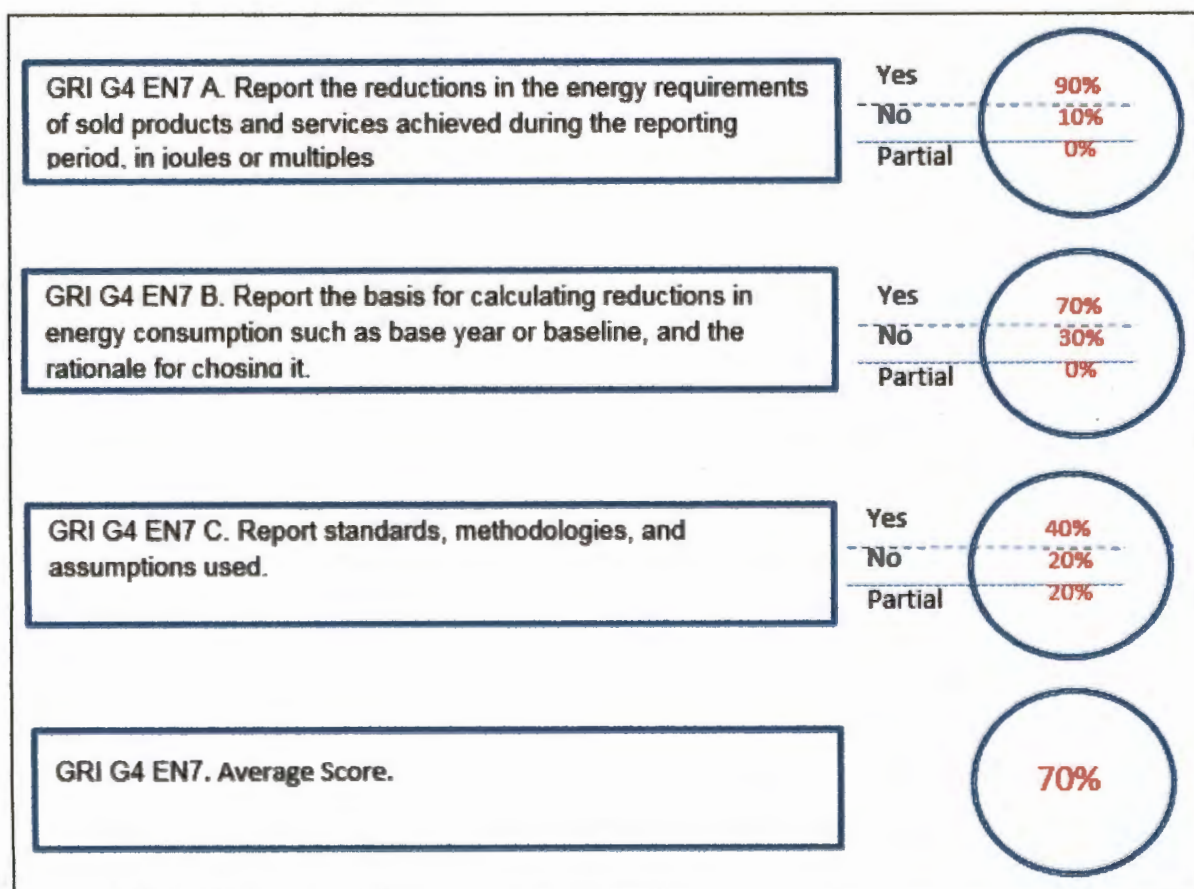


Figure 3.5: GRI G4 EN7 – Reduction in energy requirements of products and services

- The level of compliance for EN7, Element A that requires reporting the reductions in energy used for products and services sold in energy from a base year or baseline were 90% compliant.
- The level of compliance for EN7, Element B that requires the basis for calculating the reductions in energy from a base year or baseline were 90% compliant.
- The level of compliance for EN7, Element C that reports the standards, methodologies and assumptions used was 40% total compliance and 20% partial compliance.

The element ratio GRI G4 EN7 on reduction in energy requirements of products and services was on average 70% compliance. Only one mine did not report on the element at all, and three mines reported partially on the element. The element requires mines to calculate the reductions in energy of products and services sold during the reporting year. Consumption patterns can include for example 10% less energy used per unit time in processes.

The mining companies used in the study in South Africa are among the largest energy intensive consumers of energy. The details of energy reporting by the companies are very high as they all adhere to the different reporting structures as was mentioned in chapter 2 page 19. This provides several benefits for the mining companies. First, considering that the sample companies are from energy intensive industries, this situation are beneficial for the companies regarding attracting investors and informing stakeholders of their sustainable strategies for next few years. Such a high level of sustainable disclosures of the sample companies might be an indication of the overall disclosures of companies in South Africa. Second, the findings indicate that South Africa and the JSE listing requirements for all companies listed on the JSE would rather report more than what is required to attract international investors and to satisfy all relevant stakeholders.

Overall the study yielded three main contributions to sustainable reporting requirements. First, because mining companies are listed nationally and internationally (dual listing) the companies adhere to all sustainable regulatory reporting requirements. By large the mining companies studied in this report were

very responsive to institutional sustainable reporting and the changes that were developed. Secondly, although the study focusses on energy as a sustainable reporting requirement, all the companies in this study reported on the total requirements of the GRI G4 enhances reporting guidelines. Thirdly, corporate social responsibility has now become a successful business strategy in emergency economies.

3.6 SUMMARY

Chapter 3 describes the empirical research used to obtain data for mines' audited financial results. The mines' overall compliance and consistency in reporting data using the GRI G4 guidelines made it easier to calculate their compliance.

The different audited integrated reports show a consistent trend in reporting the element ratios on energy. The sample chosen is representative of the mines in South Africa and data measured are consistent and valid.

The word count was consistent, thus made it easier to calculate the elements as describe by the GRI G4 framework. The word counting procedure was consistent in achieving the results obtained and different people might or might not have achieved the same results as obtained by this study. The researcher tried to be consistent in word counts as used by other researchers on similar topics.

The sustainable reports on social, environmental and economic sustainability alongside annual financial reports provided enough data to conclude the study. The data can be used easily in combination with production and other statistics.

The different issues faced by the mines regarding energy price increases and community development are extra burdens for their finances. By reporting on the energy elements, mines can measure and take remedial action to reduce production per ton of product produced.

Chapter 4 will explain the shortcomings, limitations and recommendations.

CHAPTER 4: LIMITATIONS, CHALLENGES AND RECOMMENDATIONS

4.1 INTRODUCTION

This research focused on analysing the extent of compliance by mines listed on the JSE to proposed energy disclosures using the GRI G4 as part of sustainable reporting. The research was conducted using content analysis to determine the degree of compliance by the ten mines listed on the JSE, all of whom are significant users of energy. Their compliance was assessed according to standards from GRI G4 EN 3 to G4 EN 7, based on their integrated reports.

All mines disclose in detail the energy usage and savings from a baseline year. GRI G4 EN7 was mostly not reported on. GRI EN4, GRI EN3 to GRI EN6 are disclosed in detail. The sub-elements (GRI EN4 sub-element EN3 A and D) were not fully disclosed. None of the mines disclosed steam, cooling and heating as energy source sold or consumed. Only Gold Fields disclose why they are not reporting on these energy sources. They stipulate that they do not consume or sold any of the energy sources.

Heating, cooling and steam consumed

These four elements are grouped. In some countries, electricity is the only form of energy consumed, while for other organisations steam or water is the only energy sources available. Energy can be supplied from an external source or generated self by the organisation (GRI, 2016).

Heating, cooling, steam, electricity sold

In South Africa mines only use electricity. They do not generate electricity, thus the low scoring of energy sold within the organisation. The mines that reported on the electricity sold referred to stand-alone diesel generators that are used for electricity during power outages.

The element GRI G4 EN3 on consumption of energy within the organisation complies with a 59% compliance ratio. All the mines consume energy and do not sold energy. The element ratio EN3 D electricity, heating, cooling and steam sold are not reported on in detail or at all. All the mines reported that they do not generate energy and only consume energy.

The element EN4 energy consumption outside the organisation complies with 77% compliance ratio. Four out of ten of the mines do not report the source of the conversion factors used. No reasons were available in the reports for not reporting on the method of calculating the conversion factors.

The element GRI G4 EN5 energy intensity complies with 74% compliance ratio. Three out of the ten mines do not report on energy intensity. No reasons are available in the financial and social reports for not disclosing energy intensity. Energy intensity as describe by GRI can help in measuring the products produce per ton. This can lead to reducing greenhouse gas emissions, provide technical innovation in reducing greenhouse emissions which in turn helps with the global solution in managing climate change. Climate change risk further influenced the design and operation of current as well as acquisition of future assets regarding energy efficiency and the use of alternative energy sources.

The element ratio EN6 on reduction of energy consumption is the best reported element at 90%. This element reports on the saving of energy per ton product produce annually by each mine. Two mines reported partially on the method used to calculate standards, methodologies and assumptions used.

The element ratio EN7 on reduction in energy requirements of products and services was 70% compliance. Only one mine did not report on the element at all, and three mines reported partially on the element. The element requires mines to calculate the reductions in energy of products and services sold during the reporting year. Consumption patterns can include for example 10% less energy used per unit time in processes.

4.2 LIMITATIONS AND CHALLENGES

Analysis of the integrated reports was based on a sample of mines registered with the Department of Minerals and listed on the JSE. The results obtained from these analyses must only be used for these mines and should not be generalised to other mines not listed in the original sample.

One limitation of this study is that it considers only a single year of integrated reports, namely the 2016 final audited reports for the listed mines and is restricted to annual reports of the mining companies. The second limitation relates to the sample size and a specific CSR disclosure. Owing to the small sample size and focus on energy related disclosures only, it was not possible for us to run any comprehensive statistical test to examine if there are any significant differences in the nature and extent of CSR disclosures between the mining industries. The findings observed in this study may vary over a longer period as the requirements for GRI reporting changed in 2015. The period of reporting analysed for this study could have been in the transition period for mines to the new integrated reporting standards.

The official transition period ended on 31 December 2015, and after that, the GRI G4 reporting guidelines were used for all reports (Weber *et al.*, 2016:61). Under the G3.1 Reporting Guidelines, CSR reporters could choose to include any number of predefined disclosures about the company's strategy and analyses (Weber *et al.*, 2016:61). Although the GRI recommends the use of external assurance, it is not a prerequisite (GRI, 2016). When a sustainability report is assured externally, the external assurance report should form part of the CSR report (Weber *et al.*, 2016:63).

The mines integrated reports, on their web pages, showed the GRI G4 standards measured and where and on which page in the audited financial reports the results for a specific standard could be found. The words used to describe indirect and direct energy for the integrated results differed slightly from mine to mine but were consistent with the GRI descriptive standards.

The overall findings should be interpreted with caution. Firstly, the sample size is small, and operations of the industry limited to South Africa. Future studies may include all mining companies in South Africa, including coal mining and low energy intensive mining companies. Secondly, the measure of energy reporting only focusses on the GRI G4 enhanced guidelines that became available after December 2015. Finally, the study did not focus on the physical resources and human capabilities (resource-based theory), which can influence the study results even further.

4.3 RECOMMENDATIONS

The findings of the ten mines show that GRI reporting of audited financial reporting is growing as can be seen by the research conducted by KPMG. The summarised sustainable reports on the web page of the mines show that they are measuring the GRI standards and that mines are making progress in improving climate change by saving energy. Regulatory requirements for the final audited reporting for mines in South Africa should be standardised.

It is further recommended that there be a clear and substantiated relation between energy requirements and climate change for the mines. Energy as the second highest element of concern for mining should be correlated with energy consumption to show energy saving.

Although no similar reports were found of South African mines as consumers of energy, a similarity for energy reporting by the ten mining companies can be found in this study. All ten mines in the sample have the same reporting structure on GRI G4 standards, as they all face the same challenges in South Africa.

GRI G4 reporting can be considered an internal organisational learning tool. Top-down vertical integration of company operational strategy is required to achieve sustainability.

Future research can be conducted to establish the impact of sustainable reporting on mines and the effect of this reporting on the lifespan of mines.

Finally, it can be seen that South African mining companies want their economic, social and environmental reporting to be more transparent and visible to investors. The definition of sustainability has now changed to be experienced by communities and government as a trustworthy stakeholder, making a significant social impact in the community's mines operate in while achieving strategic and business objectives.

4.4 CONCLUSION

The objective of the study was to establish to what extent mines in South Africa report on the proposed new GRI G4 guidelines introduced in December 2015. The main and secondary questions underlying this research were found to be well established and reported in their annual integrated reports.

The research shows that the mines produce high quality and authentic, integrated audited reports that conform to the highest quality. The mines have a strong awareness of the concept of the GRI mechanism and how it can benefit the mines by measuring the energy concept as well other related activities.

The research study did not attempt to gain an understanding of how the mines perceived GRI reporting and if and how they are using the GRI reports for the benefit of the stakeholders involved. The mining companies in South Africa are under extreme pressure from the government to transform. By reporting regarding the GRI guidelines, sustainable reporting can be used as a communication tool for increasing transparency of the audited results and wider acceptance of the mines complex operations. There should be consistent review, monitoring and evaluation of CSR programmes according to the GRI G4 guidelines.

The study revealed compliance on the standards as set out by the GRI G4 standards and guidelines. Over 80% of the ten mines researched showed compliance to the GRI reporting standards. Only the first year after the new GRI G4 guidelines came into effect in 2015, was measured. This study showed an overall compliance to the new standards and that mines have adapted to the new reporting initiatives.

The Task Force on Climate-Related Financial Disclosures (TCFD, 2017) recommends that organisations disclose clear, comparable and consistent

information about risk and opportunities presented by energy usage. This will ensure that companies demonstrate better understanding of energy related disclosures.

Research conducted by the TCFD shows that investors demand better reporting on CSR and GRI G4 guidelines.

Many factors may affect the selection of the relevant disclosure indicators. The group strategic map of the mines (Figure 1.1) and its requirements to be sustainable reflect and respond to the scale of stakeholders' concerns.

By reporting on energy, the mines increase their transparency to markets more efficiently. The mines are at risk due to the continuous increase of energy prices. The GRI G4 on energy addresses the governance risk and opportunities of the core elements of integrated disclosure. The mines' strategy around energy focusses on the resilience of the mines, taking into consideration climate related changes.

The GRI G4 guidelines are continuously changing to adapt to the changing environment, so investors can be confident that energy disclosures by the mines are relevant.

The GRI framework is the most widely used social reporting standard used and is considered the most comprehensive reporting guideline. It aims for the evaluation of social and environmental reporting as used by different companies. By reporting on the recently updated GRI standards, the mines prove that they are addressing stakeholder needs. This helps stakeholders of the Mining Charter to evaluate the different international standards more closely. Using the GRI global guidelines is a way of reporting on the requirements of the Act (South Africa, 2002). This serves to promote the interests of progressive companies in their public claims to be socially responsible, transparent and accountable to all stakeholders.

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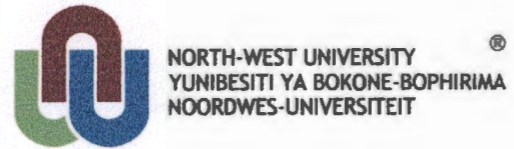
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Appendices

Appendix A: Ethical Clearance Letter



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25 April 2017

ETHICAL CLEARANCE

This letter serves to confirm that the research project of **MAASDORP IS** has undergone ethical review. The proposal was presented at a Faculty Research Meeting and accepted. The Faculty Research Meeting assigned the project number **EMSPBS16/06/03-01/21**. This acceptance deems the proposed research as being of minimal risk, granted that all requirements of anonymity, confidentiality and informed consent are met. This letter should form part of your dissertation manuscript submitted for examination purposes.

Yours sincerely

A handwritten signature in black ink, appearing to read 'CJ Botha'.

Prof CJ Botha

Manager: Research - NWU Potchefstroom Business School

Original details: Wilma Pretorius(12090298) C:\Documents and Settings\Administrator\My Documents\Briewe MBA\2017\

Appendix B: ORCID Registration



Connecting Research
and Researchers

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3,846,324 ORCID IDs and counting. [See more...](#)

Ivan Maasdorp

ORCID ID

 orcid.org/0000-0002-7324-1345

 [Print view](#)

▼ Education (1)

Sort

North-West University: Potchefstroom, North West, South Africa
2016-01-26 to present

MBA (Business School)

Source: Ivan Maasdorp

Created: 2017-06-16

▼ Employment (1)

Sort

Sasol Synfuels Pty Ltd: Secunda, Mpumalanga, South Africa
1989-09-16 to present

Chief Process Controller (Refineries)

Source: Ivan Maasdorp

Created: 2017-06-16

Appendix C: Gold Fields Element Energy

In accordance with core		Self-declared			
General standard disclosure in accordance with core					
Profile disclosure	Description	Cross reference	UNGC	ICMM	Further explanation and/or reason for omission
Energy					
G4-EN3	Direct and indirect energy consumption by primary energy source within the organisation	On 4, pg 76 – 80 Online: www.goldfields.co.za/leadership_main.php?Environment	7.8.9	8.9	Gold Fields does not self-electricity, heating, cooling or steam. As per the guidance under G4-EN3, organisations are expected to select a consistent boundary for energy consumption. When possible, the boundary should be consistent with the boundary used in Indicators G4-EN15 and G4-EN16. The standard used to select the boundary for reporting under G4-EN15 and G4-EN16 is ISO 14064 – Part 1. The boundary selected to report on G4-EN3 is in line with this boundary. The methodology used to calculate the direct and indirect energy consumption by primary energy source is by multiplying the measured amounts consumed with default energy content factors. Energy consumption is obtained by meter readings and cross checked with invoices. If no meter is installed, the data is obtained from invoices only. The energy content of fuels consumed on-site was calculated using conversion factors from Delta 2016 Version 1. Our Granny Smith operation purchases gas for the on-site gas-fired power station that is owned and operated by an independent power producer (IPP). Granny Smith also pays for electricity delivery. Our Darnley and Tlokweng operations have in-site gas-fired power stations, owned and operated over the fence by an IPP.
G4-EN4	Energy consumption outside the organisation.	This GRI Content Index CP 4, pg 76 – 80	8.9	8.9	Energy consumed outside of the organisation, in joules or multiples, is 5,943 (2015: 5,8007; 2014: 5,8527 J) As per the guidance under G4-EN3, organisations are expected to select a consistent boundary for energy consumption. When possible, the boundary should be consistent with the boundary used in Indicators G4-EN15 and G4-EN16. The standard used to select the boundary for reporting under G4-EN15 and G4-EN16 is ISO 14064 – Part 1. The boundary selected to report on G4-EN3 is in line with this boundary. Only energy consumption outside of the organisation which was expected to be material (based on emissions associated with this energy use) was calculated. The material categories where found to be “purchased goods and services” and “fuel and energy-related activities”. These two scope 3 categories made up 96% of the total scope 3 emissions. To calculate this energy consumption outside of the organisation, assumptions were made with respect to the type of fuels used to produce, transport and distribute goods, services and fuel. Where available, the energy data used to calculate the relevant emission factors to produce goods and services were used. The energy content associated with the production of fuels was calculated using emission factors from Delta 2016 Version 1 and converting these to energy factors using the United Kingdom Grid Emission Factor of 0.41206kgCO₂/MWh.

Gold Fields does not self electricity, heating, cooling or steam. As per the guidance under G4-EN3, organisations are expected to select a consistent boundary for energy consumption. When possible, the boundary should be consistent with the boundary used in Indicators G4-EN15 and G4-EN16. The standard used to select the boundary for reporting under G4-EN15 and G4-EN16 is ISO 14064 – Part 1. The boundary selected to report on G4-EN3 is in line with this boundary. The methodology used to calculate the direct and indirect energy consumption by primary energy source is by multiplying the measured amounts consumed with default energy content factors. Energy consumption is obtained by meter readings and cross checked with invoices. If no meter is installed, the data is obtained from invoices only. The energy content of fuels consumed on-site was calculated using conversion factors from Delta 2016 Version 1.

Our Granny Smith operation purchases gas for the on-site gas-fired power station that is owned and operated by an independent power producer (IPP). Granny Smith also pays for electricity delivery. Our Dameng and Tarkwa operations have in-site gas-fired power stations, owned and operated over the fence by an IPP.

Energy consumed outside of the organisation, in joules or multiples, is 5,943 (2016: 5,600TJ; 2014: 5,852TJ).

As per the guidance under G4-EN3, organisations are expected to select a consistent boundary for energy consumption. When possible, the boundary should be consistent with the boundary used in Indicators G4-EN15 and G4-EN16. The standard used to select the boundary for reporting under G4-EN15 and G4-EN16 is ISO 14064 – Part 1. The boundary selected to report on G4-EN3 is in line with this boundary.

Only energy consumption outside of the organisation which was expected to be material (based on emissions associated with this energy use) was calculated. The material categories were found to be "purchased goods and services" and "fuel and energy-related activities". These two scope 3 categories made up 96% of the total scope 3 emissions. To calculate this energy consumption outside of the organisation, assumptions were made with respect to the type of fuels used to produce, transport and distribute goods, services and fuels.

Where available, the energy data used to calculate the relevant emission factors to produce goods and services were used. The energy content associated with the production of fuels was calculated using emission factors from Delta 2016 Version 1 and converting these to energy factors using the United Kingdom Grid Emission Factor of 0.41236tCO₂/MWh.

Appendix D: Gold Fields Element Energy Continue

Profile disclosure	Description	Cross reference	UNGC	ICMM	Further explanation and/or reason for omission
Energy (continued)					
G4-EN5	Energy intensity.	Ch 4, pg 78 – 83	Q, 9	Q, 9	The organisation-specific metric is ounce of gold, as our saleable product, this metric is externally assured. Fuels and electricity have been included in the energy intensity ratio. Energy consumed within the organisation has been included in the ratio. Our Granny Smith operation purchases gas for the on-site gas-fired power station that is owned and operated by an independent power producer (IPP). Granny Smith also pays for electricity delivery. Our Damang and Tarkwa operations have in-site gas-fired power stations, owned and operated by an IPP. The energy losses from the on-site power generators are accounted for by applying an energy efficiency factor.
G4-EN6	Reduction of energy consumption.	Ch 4, pg 80 – 83	Q, 9	Q, 9	The reductions in energy consumption achieved as a direct result of conservation and efficiency initiatives is 321,063GJ (2015: 777,914GJ; 2014: 477,568GJ). The types of energy included in the reductions were fuel and electricity. The basis for calculating reductions in energy consumption was directly related to energy efficiency initiatives implemented. As the energy efficiency of gold mining is influenced by many factors, such as hauling distances, mine plan adjustments, mining depth, ore quality and shipping ratios, energy reductions should be linked back to actual initiatives implemented. The Greenhouse Gas Protocol and WRI Mitigation Goal Standard, an accounting and reporting standard for national and subnational greenhouse gas reduction goals, were the standards followed to calculate the impact of energy reduction projects.
G4-EN7	Reductions in energy requirements of products and services.	n/a	Q, 9	Q, 9	Indicator is not relevant to the product we produce – gold.

Appendix E: Statistical Analysis of GRI G4 EN 3

GRI G4 EN3		Yes	No	Partial
A	Report total fuel consumption from non-renewable sources in joules or multiples, including fuel types used			
B	Report total fuel consumption from renewable fuel sources in joules or multiples, including fuel types used.			
C	Report in joules, watt-hours or multiples, the total: Electricity consumption Heating consumption Cooling consumption Steam consumption			
D	Report in joules, watt-hours or multiples, the total: Electricity sold Heating sold Cooling sold Steam sold			
E	Report total energy consumption in joules or multiples			
F	Report standards, methodologies, and assumptions used.			
G	Report the source of the conversion factors used.			

Appendix F: Statistical Analysis of GRI G4 EN 4

GRI G4 EN4		Yes	No	Partial
A	Report energy consumed outside of the organisation, in joules or multiples.			
B	Report standards, methodologies, and assumptions used.			
C	Report the source of the conversion factors used.			

Appendix G: Statistical Analysis of GRI G4 EN 5

GRI G4 EN5		Yes	No	Partial
A	Report the energy intensity ratio.			
B	Report the organisation-specific metric (the ratio denominator) chosen to calculate the ratio.			
C	Report the types of energy included in the intensity ratio: fuel, electricity, heating, cooling, steam, or all.			
D	Report whether the ratio uses energy consumed within the organisation, outside of it or both.			

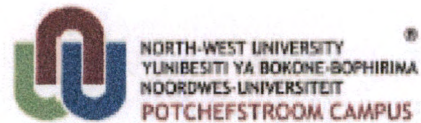
Appendix H: Statistical Analysis of GRI G4 EN 6

GRI G4 EN6		Yes	No	Partial
A	Report the reductions in the energy requirements of sold products and services achieved during the reporting period, in joules or multiples			
B	Report the basis for calculating reductions in energy consumption such as base year or baseline, and the rationale for choosing it			
C	Report standards, methodologies, and assumptions used.			

Appendix I: Statistical Analysis of GRI G4 EN 7

GRI G4 EN7		Yes	No	Partial
A	Report the reductions in the energy requirements of sold products and services achieved during the reporting period, in joules or multiples			
B	Report the basis for calculating reductions in energy consumption such as base year or baseline, and the rationale for choosing it			
C	Report standards, methodologies, and assumptions used.			

Appendix J: Statistical analysis certificate



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14 November 2017

Re: Thesis, Mr. IS Maasdorp, student number: 27937690

We hereby confirm that the Statistical Consultation Services of the North-West University analysed the data involved in the study of the above-mentioned student and assisted with the interpretation of the results. However, any opinion, findings or recommendations contained in this document are those of the author, and the Statistical Consultation Services of the NWU (Potchefstroom Campus) do not accept responsibility for the statistical correctness of the data reported.

Kind regards

A handwritten signature in black ink, appearing to read 'E Fourie', written in a cursive style.

Dr E Fourie
Statistical Consultation Services

Appendix K: Editing certificate



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Sunday, 14 October 2018

To whom it may concern

Re: Confirmation of language edit, typography and technical precision

The dissertation *An analysis of energy disclosures in the mining sector* by IS Maasdorp (27937690) was edited for language, typography and technical precision. The referencing and sources were checked as per NWU referencing guidelines (Harvard Style).

Final, last minute corrections remain the responsibility of the author.

Antoinette Bisschoff

BA Languages (UPE – now NMU); MBA (PU for CHE – now NWU); Translation and Linguistic Studies (NWU)

Officially approved language editor of the NWU since 1998
Member of SA Translators Institute (no. 100181)

Precision ... to the last letter

Appendix H: Turnitin Report



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