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REPORT ON

Sustainability

2017 SUSTAINABILITY REPORT FOR THE CLAY BRICK ASSOCIATION OF SOUTHERN AFRICA

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Promoting Inclusive Sustainable Practices in the South African Clay Brick Sector

This project is co-funded by the European Union

The Sustainability Report for the Clay Brick Association of Southern Africa (CBA) has been developed by Promethium Carbon. The project was funded by the Swiss Agency for Development and Corporation and implemented by Swisscontact in close partnership with the CBA.

PROMETHIUM CARBON

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EECB ENERGY EFFICIENT CLAY BRICK

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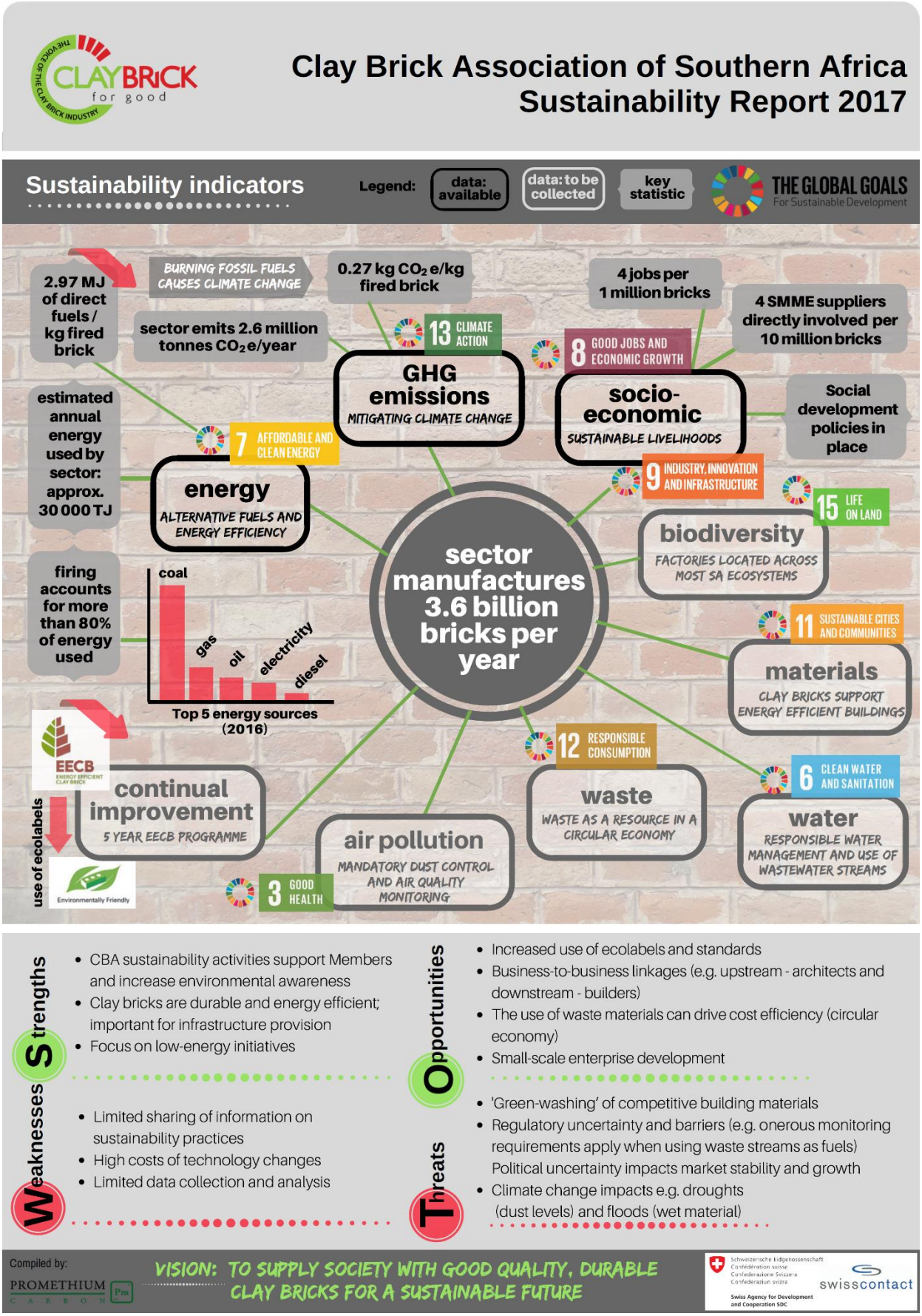
Infographic



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1. Sector Overview

Clay bricks fulfil an important role in developing South Africa's economy. They provide a durable and affordable means of building high quality housing and structures for the nation.

The formal clay brick sector is made up of around 100 small, medium and large brick manufacturers. These companies provide valuable employment opportunities across the country, with total direct employment of over 12 000 jobs. Many of the formal brick manufacturers are family-owned businesses that have been operational for more than one generation. The sector produces approximately 3.6 billion bricks per year, making it an integral part of South Africa's industrial economy.

1.1 Sector Status

CBA Members are located across the country, with the greatest number situated in Gauteng (Figure 1). A small portion (1%) of the Members are located outside of South Africa's borders however the country contributes more than 70% of the overall manufacturing capacity of the region.

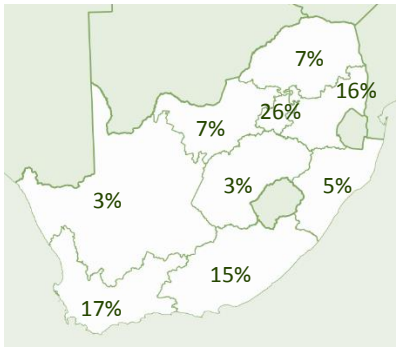


Figure 1: Geographical distribution of clay brick manufacturing sites. Source: Social Life Cycle Assessment for Clay Bricks *(2015)*

Approximately three quarters (76%) of the clay brick operations in South Africa are located in rural areas. From a socio-economic perspective this is significant as the clay brick industry provides much needed employment opportunities in these areas. The mining of clay and manufacturing of bricks have a number of impacts on the environment. These impacts typically relate to the use of resources. Raw materials for clay brick production in South Africa include various forms of clay, including kaolin and shale. These materials are generally sourced from a clay quarry, pit or mine located in close proximity to the brick yard. Coal is the primary source of fuel for brick manufacturing, although natural gas is also used in a number of operations.

The majority of manufacturers in South Africa use clamp kilns (Figure 2) to fire clay bricks. The other types of fixed kilns include tunnel; transverse arch; Hoffman; vertical shaft brick kiln and zigzag kilns. The clay brick industry manufactures different brick products, ranging from face bricks, plaster bricks to pavers.

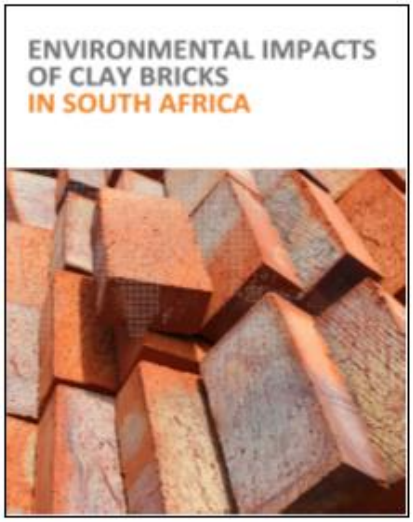
Figure 2: Typical clamp kiln formation (Source: www.fastonline.org)

The industry's main environmental impacts occur during mining, clay preparation and the firing steps. Impacts from the other manufacturing processes play an almost negligible part.

This report outlines the sustainability activities being undertaken to address these impacts and highlight areas for improvement.

1.2 Key CBA Sustainability Activities

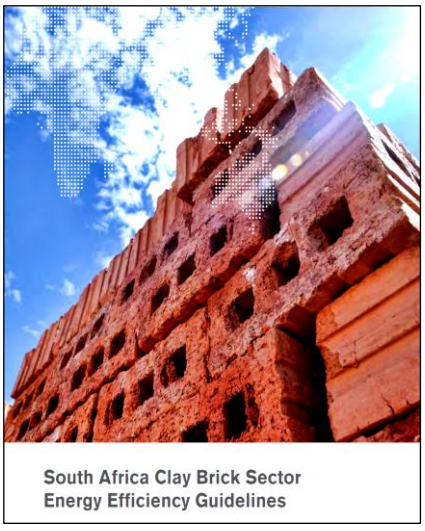
Over the last five years, the CBA has commissioned a number of key studies to explore the sector's socio-environmental impacts as well as measures and strategies that may assist Members respond to the related risks and opportunities.



The *Life Cycle Assessment of Clay Brick Walling in South Africa* is a comprehensive analysis of the environmental impacts of clay brick production and utilisation in South Africa. The study was commissioned by the CBA, co-funded by the National Research Foundation and conducted by the University of Pretoria. Initiated in 2013 and finalised in 2017, the study utilised production data from 84% of the CBA Members and was conducted in accordance with the ISO 14040 and 14044 standards.

The *Life Cycle Assessment* quantifies the environmental impacts of clay bricks by analysing the emissions produced and resources consumed during their production, use and end-of-life phase. The potential damages to human health, ecosystem quality, climate change and consumption of non-renewable resources were assessed.

Developed as complementary resource to the technical life cycle analysis, a *Social Life Cycle Assessment for Clay Bricks* (updated in 2015) was also commissioned which assesses the socio-economic impacts of clay bricks and determines the trade-offs between the socio-economic and environmental impacts of products, industries and building practices. The study focuses on the cradle-to-gate portion of the life cycle of the clay brick and considers various socio-economic indicators. The report highlights areas where CBA Members may address or improve social and socio-economic performance.



The *Energy Efficiency Thermal Tool and Study* were also commissioned by the CBA and Swisscontact to assist brick companies better understand heat energy flows in drier and kiln installations, with the aim of identifying losses and possible best practices to mitigate those losses. Drying and firing represent key opportunities for energy reduction in the clay brick sector. Rising energy prices and regulatory requirements to address climate change make energy efficiency is an imperative for industry. The CBA and the Energy Efficient Clay Bricks (EECB) Programme[1] developed an *Energy Efficiency Guideline* as a reference tool for operators in the industry. By reducing energy use and demand it is possible to reduce energy bills, make the energy system more sustainable, and have a positive impact on greenhouse gas emissions.

There have been a number of recent legislative and regulatory developments in the country pertaining to climate change. Over the past five years the Department of Energy, the Department of Environmental Affairs and National Treasury have published a suite of draft regulations and bills on climate change and energy

[1] Implemented by Swisscontact and funded by the Swiss Agency for Development and Cooperation.

reporting, which may impact on the clay brick sector. The CBA responded to these developments by drafting a formal *Position Paper* to outline the Association's position on the current pieces of draft legislation. This *Position Paper* focuses on mitigation related regulations as well as the adaptation benefits of clay bricks.

The *Position Paper* outlines the CBA's support of efforts to mitigate national and global emissions by activities undertaken in the clay brick sector, and recognises that mitigation measures will assist South Africa become a climate resilient society. The *Position Paper* also communicates the positive contributions that the formal clay brick sector makes towards the country's adaptation needs, where the thermal efficiency of clay bricks assists improve the living conditions of low cost housing developments and the durability of clay bricks improve the resilience of low income communities to climate impacts.

The association urges that due consideration be applied in the methods to achieve national climate change goals, to ensure that such methods do not place the clay brick sector at a financial or competitive disadvantage. Emission reduction and energy efficiency projects are highly capital intensive within the formal clay brick sector. Therefore technical and financial support will assist the formal clay brick sector in reducing energy consumption and associated emissions.

To address these energy and climate concerns, the CBA is developing a *Clay Brick Sector Climate Change Strategy*. The purpose of this strategy is to assist individual clay brick manufacturers respond to climate change and energy regulations within South Africa. It will guide manufacturers on climate change mitigation and adaptation risks and opportunities, which will inform the collective approach required by the clay brick sector to engage on climate change issues with government, investors, suppliers, customers and local communities. The strategy will be updated periodically taking into account any regulatory changes, so that it remains relevant, effective and implementable for clay brick manufacturers.

In addition to these resources on sustainability in the industry, the CBA and partners have developed a published various other reference documents for the benefit of the sector, available at www.claybrick.org.za.

1.3 Policies and Regulations

In addition to the above pro-active actions undertaken by the CBA, the Association also functions within a stringent local regulatory environment which influences how manufacturers address the environment, social and economic aspects of sustainability. The CBA encourages its members to comply with all relevant regulations as compliance ensures the long term sustainability of CBA members.

Environment	Social	Economic
National Environmental Management Act 107 of 1998	Basic Conditions of Employment Act 75 of 1997	Broad Based Black Economic Empowerment Act 53 of 2003
National Water Act 36 of 1998	Compensation for Occupational Injuries and Diseases Act 130 of 1993	Broad Based Black Economic Empowerment Amendment Act 46 of 2013
National Environmental Management: Biodiversity Act 10 of 2004	Labour Relations Act 66 of 1995	Employment Equity Act 55 of 1998
National Environmental Management: Air Quality Act 39 of 2004	Mine Health and Safety Act 29 of 1996	Mineral and Petroleum Resources Development Act 28 of 2002
National Environmental Management: Waste Act 59 of 2008	Skills Development Act 97 of 1998	The Mining Charter
National Energy Act 34 of 2008		

Figure 3: South African legislation relevant to the clay brick sector

2. The Context for Sustainable Development

> ***'…Development which meets the needs of the present without compromising the ability of future generations to meet their own needs.'***
> *Brundtland Report, World Commission on Environment & Development of 1983*

Sustainable development relates to the triple bottom line. Environmental sustainability is therefore a facet of sustainable development, and is concerned with avoiding or limiting negative impacts on the environment based on ideal-seeking behaviours and actions. Practices which deplete natural resources faster than they can be replenished are unsustainable. The medium-term results of environmental degradation may affect businesses' ability to operate. The long-term result is an inability to sustain human life.

Sustainable development features prominently on international business agendas. This is driven by a number of international frameworks driving sustainable development across the development spectrum.

2.1 The International Context

The Sustainable Development Goals

The concept of low-carbon development was established in the context of the UN Framework Convention on Climate Change (UNFCCC) in 1992. The 2030 Agenda was adopted by the United Nations Development Program (UNDP) in September 2015. This agenda sets out the Sustainable Development Goals (SDGs). The urgent need for a transformation towards a greener and more inclusive economic development path is reflected in almost every one of the 17 goals.

Figure 4: Sustainable Development Goals

The strategic nature of the Sustainable Development Goals provides a broad context for business focus related to sustainability activities and strategies. These goals provide concrete definitions of the broad environmental, social and economic understanding contained in the Brundtland definition of sustainability. As such these

goals could provide valuable impetus to the Clay Brick Association in terms of driving awareness around the various aspects of sustainability.

2.2 The National Context

South Africa is committed to the Sustainable Development Goals and has a number of policy frameworks in place informing sustainable development from a local perspective.

The National Strategy for Sustainable Development

South Africa has formalised its definition of sustainable development by including it in the National Environmental Management Act (No. 107 of 1998): "*Sustainable development means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations*."

In addition to this definition, South Africa has developed a national vision for sustainable development:

> ***'South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration.'***
>
> *Department of Environmental Affairs and Tourism. People, Planet, Prosperity: A National Framework for Sustainable Development in South Africa, 2008.*

Figure 5: Systems approach to sustainability as adopted in National Strategy for Sustainable Development and Action Plan, Department of Environmental Affairs.

The latest National Strategy for Sustainable Development sets out key areas that require attention in order to ensure a shift towards a more sustainable path. This strategy identifies goals, priorities, objectives, interventions and indicators, which are reflected in long term national strategic plans, such as the National Development Plan.

The National Strategy for Sustainable Development identifies five priority areas for sustainable development as per South Africa's sustainable development vision. These priority areas reflect emerging global issues and the need to transition towards a sustainable and climate resilient economy[2]:

- Enhancing systems for integrated planning and implementation
- Sustaining our ecosystems and using natural resources efficiently
- Towards a green economy
- Building sustainable communities
- Responding effectively to climate change

[2] Department of Environmental Affairs. National Strategy for Sustainable Development and Action Plan (NSSD 1) 2011-2014. 2011.

The National Development Plan

The National Development Plan provides a long-term perspective on South Africa's transition to a sustainable and inclusive economy. The National Development Plan aims to eliminate poverty and reduce inequality by 2030. The plan sets a clear vision with regards to ensuring sustainability in its vision for 2030 which is to build "an environmentally sustainable, climate-change resilient, low-carbon economy and just society".

The following are identified as steps in achieving this vision:

- Sustaining South Africa's ecosystems and using natural resources efficiently;
- Building sustainable communities;
- Responding effectively to climate change;
- Mitigation and adaptation;
- Managing a just transition; and
- Enhancing governance systems and capacity.

The National Development Plan takes a pro-active approach in acknowledging the impact of climate change and the need for innovative solutions as part of South Africa's developmental journey. There is also a major focus on the social context through ensuring rural accessibility and ensuring equality in transition.

According to the National Development Plan, South Africa is faced by nine main challenges. These include:

- Too few people work;
- The standard of education for most black learners is of poor quality;
- Infrastructure is poorly located, under-maintained and insufficient to foster higher growth;
- Spatial patterns exclude the poor from the fruits of development;
- The economy is overly and unsustainably resource intensive;
- A widespread disease burden is compounded by a failing public health system;
- Public services are uneven and often of poor quality;
- Corruption is widespread; and
- South Africa remains a divided society.

These challenges pose risks to economic stability and the capacity of the manufacturing sectors to withstand economic uncertainty. The clay brick industry is well positioned to contribute to South Africa's growth and prosperity due to the sector's contribution to infrastructure development, the locations of most of the Members' facilities in rural areas and the employment creation of the sector.

3. Sustainable Development Key Performance Indicators

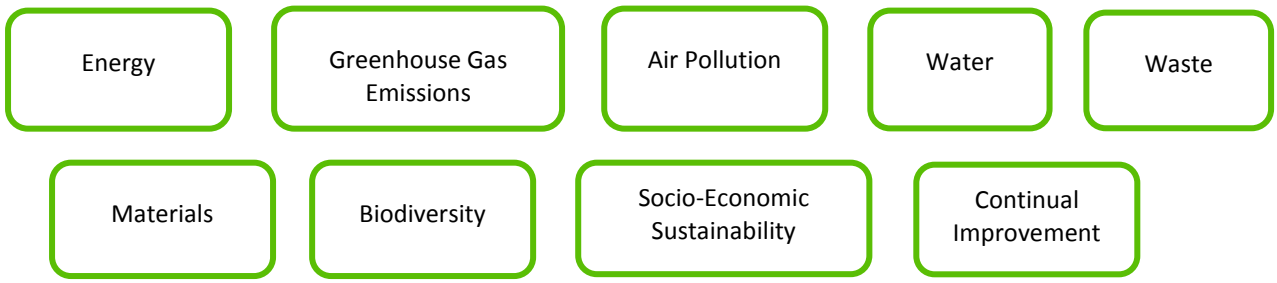
Business leaders are increasingly realising that the success of their companies is affected by the world in which they operate. The King IV Report, as a current example, recognises that companies operate in the triple bottom line: the economy, society and the environment. The manner in which organisations undertake business operations impacts these three elements which has given rise to the concept of the **triple bottom line** – the principle that business must be manged for positive outcomes with respect to profit, social impact and environmental impact.

Companies are therefore moving beyond the boundaries of traditional transactional performance to more innovative business models. "Purpose-centred" business models feature progressively in the latest management theories related to organisational success and longevity, which speaks directly to the definition of sustainable development: economic development that is conducted without depletion of natural resources.

The CBA and Members support the principles of the triple bottom line. This report marks the first initiative to report the CBA Member's sustainability initiatives in the context of the triple bottom line. The report is based on information provided by Members – in the form of data and case studies. The data is evaluated against a set of key performance indicators.

A key performance indicator is measurable value that shows how effectively an entity is achieving key objectives. Data for the proposed key performance indicators has been collected in a number of formal surveys and assessments. These include the *Life Cycle Assessment of Clay Brick Walling in South Africa*; a *Social Life Cycle Assessment for Clay Bricks* as well as the CBA's Member Surveys compiled in 2015 and 2017 respectively. This report uses data from these sources where available and also proposes new key performance indicators. Data for the proposed indicators may be collected and analysed in subsequent industry surveys and assessments.

Nine sustainability categories have been identified for reporting sustainability activities in the industry:



Understanding and tracking the proposed key performance indicators will, over time, provide the CBA and Members with a comprehensive overview of the performance of sustainability activities in the industry.

3.1 Energy

The use of energy has the power to both develop and to degrade. While increased energy use in industries may be associated with increased levels of production, the production and consumption of energy sources impact on human health and the environment. As a result, energy use is carefully monitored and managed in the local clay brick sector to ensure that it is utilised in a sustainable manner.

The majority of energy consumed during the life cycle of a typical clay brick in South Africa occurs during the use-phase, which is related to the use of electricity to control the temperature of buildings[3]. CBA Members therefore increasingly pursue efforts to increase the thermal efficiencies of their products, in order to meet users' needs in a manner that reduces environmental impacts.

The CBA and EECB have also developed a suite of comprehensive tools and awareness materials to assist Members understand the impact of energy use and associated emissions on the environment. The resources include the *Energy Efficiency Guidelines* and *Finance Guide,* as well as the *Thermal Performance Study* and Tool. A Life Cycle Assessment was also conducted by the University of Pretoria and co-funded by the National Research Foundation. The assessment provides findings on the environmental impacts of manufacturing clay bricks, in particular the energy efficiency of the technologies employed in South Africa.

Tracking key performance indicators

The primary energy performance indicator for the brick sector is the energy consumption of direct fuels and metered electricity. The energy used in the firing process accounts for more than 80% of energy used to manufacture bricks. Bricks are fired at temperatures of between 950°C and 1 200°C, depending on the clay by making use of a kiln. The most widely used firing fuel is coal, followed in significantly lesser degrees by gas, heavy and light fuel oils, diesel and electricity.

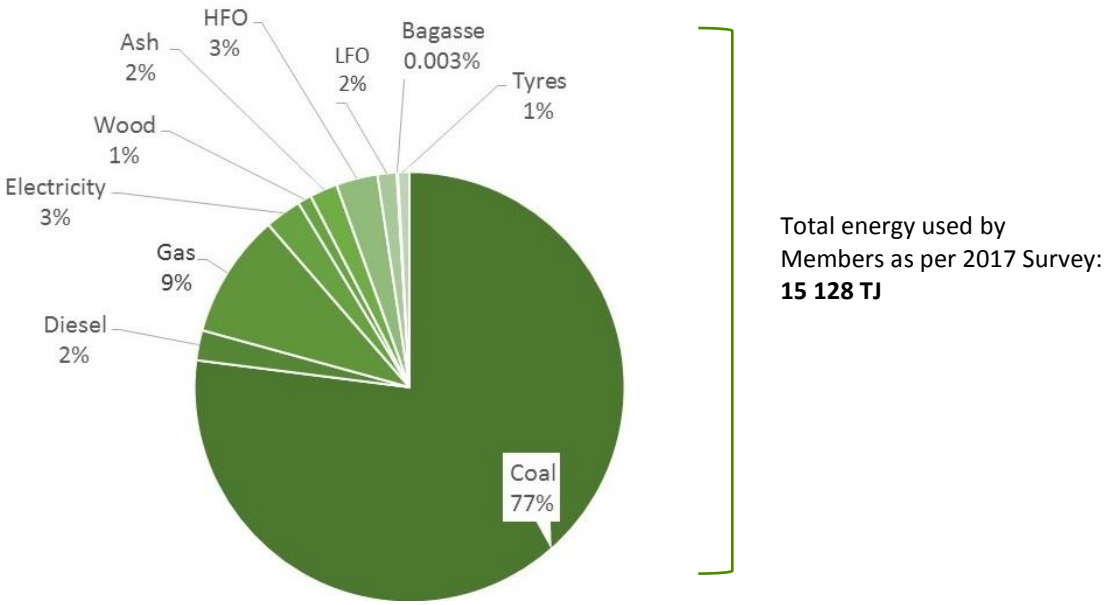


Figure 6: Energy sources (CBA Survey, 2017)

Where LFO = light fuel oil and HFO = heavy fuel oil

[3] The CBA Life Cycle Assessments finds that nearly 95% of energy is consumed during the lifecycle of 220mm walls; over 80% in 280mm cavity walls and nearly 70% in 280mm insulated cavity walls.

A secondary energy indicator is the level of consumption of energy from alternative sources (such as renewable energy sources and waste streams). This indicator provides information on the use of innovative or sustainable energy practices in the sector. The data for the third energy indicator, proportion of CBA members who have an energy management system in place, may be collected in future surveys.

Table 1: Performance of sustainability measures in the energy category

Category	Sustainability Principle	Objective	Key Performance Indicator	2013 Life Cycle Assessment	CBA Survey Results	
					2015	2017
1. Energy	1a. Energy efficiency	To reduce specific energy consumption per kilogram of output	Specific energy consumption of direct fuels and metered electricity, per brick equivalent (MJ/kg)	3.40 MJ/kg	3.09 MJ/kg[4]	2.97 MJ/kg
	1b. Alternative energy sources	To monitor renewable energy use and the use of alternative energy sources e.g. waste streams such as pulp and paper; solid waste etc.	The provision of information on the use of alternative energy sources (% of total fuel)		13%	4%
					Amongst Members who reported	
	1c. Energy management system	To efficiently and effectively manage the consumption of energy	The proportion (%) of Members who have an energy management system in place		No data collected	

The table above demonstrates that CBA Members are increasingly applying innovative measures to reduce energy consumption and to supplement the grid electricity supply with cleaner sources. As a result, the energy intensity of the South African brick sector has been found to be generally aligned with international counterparts.

Reducing energy demand has multiple benefits including reduced costs (energy can account for between 40% and 60% of typical production costs); increased sustainability of energy systems and positive impacts on particulate and greenhouse gas emissions. The EECB Programme has driven various energy efficiency projects in the industry, encouraging brick-makers to take up energy efficiency measures as well as initiatives that create market awareness regarding the environmental credentials of clay bricks as building products.

[4] Figure excludes Zimbabwean operations. If these facilities are included, the figures is 3.07MJ/kg.

Looking ahead and recommendations

Activities that facilitate the responsible use of energy and the development of clean energy sources support goal seven of the Sustainable Development Goals. These activities have the potential to positively impact society and the environment at both local level and international levels.

In support of the local context, the Department of Energy has published *Draft Regulations Regarding Registration, Reporting on Energy Management and Submission of Energy Management Plans*[5] and a draft National Energy Efficiency Strategy. The aim of the draft regulations is to monitor and manage energy consumption from large energy consumers in South Africa. The draft regulations require that brick-makers who consume over 180 TJ of energy per year must report their energy data to the Department of Energy, on an annual basis, via the Energy Efficiency Monitoring System web portal[6]. In addition, brick-makers who consume over 400 TJ of energy per year must report their energy data and submit energy management plans (in accordance with SANS 50010). The consumption thresholds are illustrated in Figure 7.

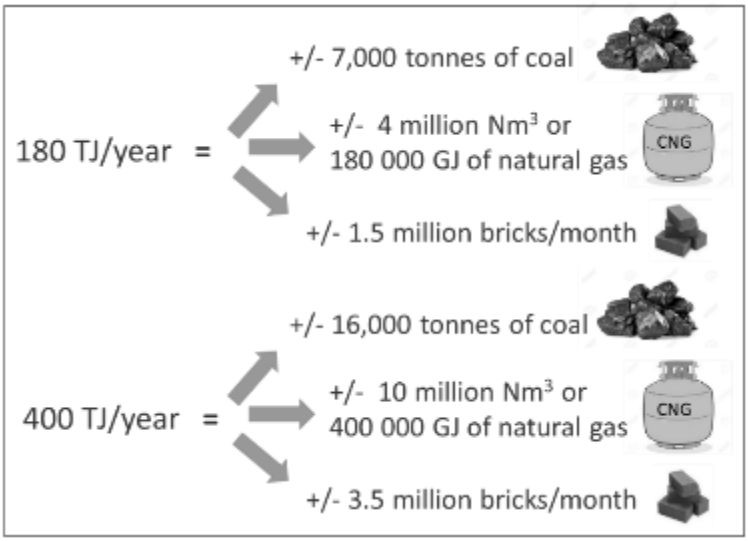


Figure 7: Reporting thresholds in terms of the draft energy reporting regulations

The draft National Energy Efficiency Strategy is likely to impact on the construction industry as targets have been set for public, residential and commercial sectors. The use of clay brick walling therefore has the possibility to assist the public, residential and commercial sectors meet the set targets. The CBA will continue to collect, analyse and share energy related data through the periodic industry surveys and reports.

Sector energy efficiency measures will be further supported by the *Energy Efficiency Guidelines* (developed by the CBA). The Guidelines identify 75 best practice opportunities and include indications relating to the cost of deployment, the savings expected and the simple payback periods likely to be achieved. The guidelines further present the Energy Management Systems approach to energy efficiency, including discussion on ISO 50001 and the training available to industry. The CBA, in conjunction with the EECB, will be looking to demonstrate a number of these best practices, the findings of which will be disseminated once finalised.

[5] http://www.gov.za/documents/national-energy-act-regulations-registration-reporting-energy-management-and-submission

[6] www.eems.co.za

Case study

BURNER REPLACEMENT AT ALGOA BRICK

Algoa Brick manufactures a full range of quality clay bricks, and has supplied to the Nelson Mandela Bay and Eastern Cape region for over 70 years. Following a targeted energy systems optimisation assessment (facilitated by the EECB as part of the National Cleaner Production Centre programme), Algoa Brick replaced old and inefficient burners at its Port Elizabeth facility in early 2017.

"Significant advances have been made in kiln burner equipment. Despite the cost, new technology can deliver good returns"

The burner replacement has resulted in a 12% increase in the quantity of bricks packaged for sale. While a portion of this growth is a result of increased throughput of just under 5%, much can be attributed to the reduction of waste by 6%. The waste reduction is attributed to more effective combustion of the burner fuel, which serves to optimise the energy obtained from the fuel and minimise negative effects such as flame impingement. Despite the increased throughput, overall energy consumption dropped by just below 3% (estimated annual reduction of 1,220,283 kWh from baseline) which can be attributed to the 7% reduction in unit energy usage. Overall energy consumption would be even lower if the throughput had not increased.

While energy costs have increased as a result of the use of a more expensive fuel, the significant waste reduction is a material, financial co-benefit. The simple payback of the replacement is under five months based on the sale of the additional output, or alternatively under six months, should Algoa Brick choose to reduce post-implementation throughput to the baseline levels.

Algoa Brick will also apply for a 12L tax incentive, to reduce the company's relevant taxable income by nearly R1.2 million (R0.95 / kWh) which could provide an after tax benefit of R324,594 (28%) less the cost of the 12L application which is expected to be in the region of R150,000 in total.

HABLA ZIG-ZAG KILNS PROVIDE OPPORTUNITIES FOR ENERGY EFFICIENCIES

The Habla Zig-Zag kiln has wide and continuous open firing channels which prolong the typical brick firing process. Fire is pulled through stationary bricks set in a zig-zag pattern which allows for optimal combustion and maximum energy (heat) extraction from fuel sources.

The benefits of the Habla Zig-Zag kiln include high thermal efficiencies and a reduction in fuel consumption. Compared to clamp kilns, the Habla Zig-Zag kiln can result in fuel savings of 80%, reduce CO_2 emissions at an equivalent level. The kiln also performs well in terms of production rates (25 to 40 thousand bricks per day); produces bricks of a high quality and results in less than 2% fired brick waste.

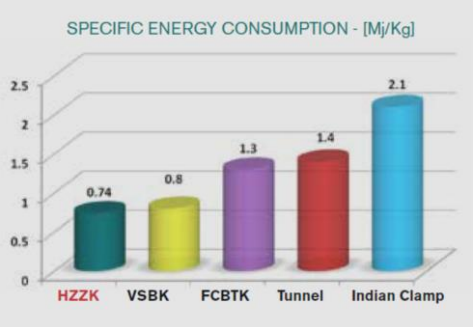


Figure 8: Energy Consumption Comparison of Various Kiln Types (where HZZK = Habla Zig-Zag Kiln; VSBK = Vertical Brick Shaft Kiln; FCBTK =Fixed Chimney Bull's Trench Kiln). Source: www.hablakilns.com

The operational and environmental benefits of the Habla Zig-Zag kiln make it an ideal technology to replace outdated, inefficient brick firing kilns. Case studies indicate that the payback period could be less than two years.

3.2 Greenhouse Gas Emissions

The release of greenhouse gas emissions into the atmosphere is currently the main driver of global climate change. The clay brick sector emits roughly 2.6 million tCO_2e per year. This accounts for roughly 0.5% towards South Africa's total national greenhouse gas inventory of around 500 tCO_2e per year. There are three areas which give rise to carbon and greenhouse gas emissions within the production process: direct combustion emissions relating to burning of fuels such as coal, onsite, in the manufacturing of clay bricks and indirect emissions in the generation or off-site electricity and upstream transport activities.

The bulk of greenhouse gas emissions associated with the life cycle of clay bricks arise in the use-phase. This is related to the use of electricity to control building temperatures, which is typically outside of the brick manufacturers' scopes of control. CBA Members however actively support efforts to reduce levels of emissions associated with the manufacturing of clay bricks.

The CBA has compiled a number of resources to support both manufacturers and users to make informed decisions that reduce their carbon and greenhouse gas impacts (www.claybrick.org). In particular, the Thermal Tool assists brick manufacturers to better understand where heat energy is flowing in their plants, with the aim of restricting these losses. It also points to specific measures that can be adopted to reduce losses. The Life Cycle Assessment for clay brick products (conducted by the University of Pretoria) further assists architects to accurately calculate the lifetime environmental impact of using clay brick in a building, compared against other construction materials. Access to accurate data makes it easier to design "green" buildings that are naturally energy efficient.

Tracking key performance indicators

The carbon dioxide (CO_2) equivalent emissions per kilogram of fired brick is a key indicator for the industry. The use of fuel in the brick-making process accounts for most greenhouse gas emissions. Coal is used both during the clay preparation stage (where it is mixed into the clay) and as a fuel source.

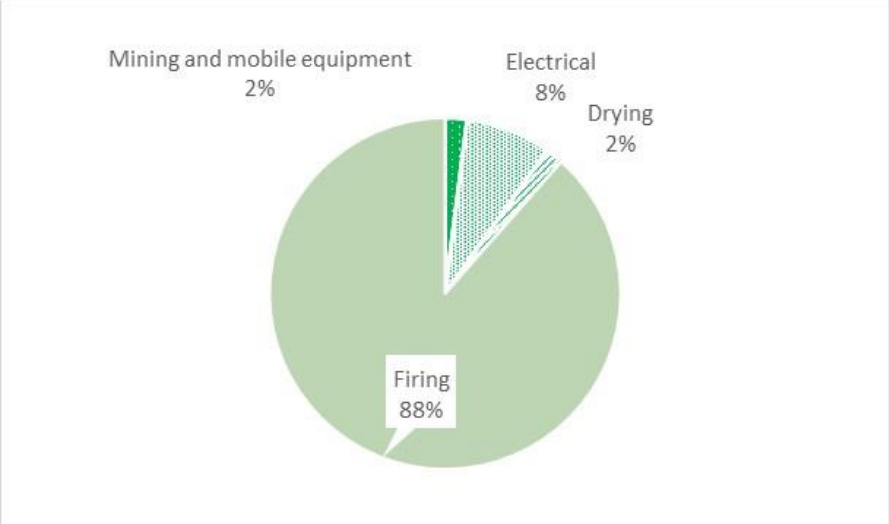


Figure 9: Greenhouse gas emissions per process (CBA Survey, 2017)

Emissions associated with upstream transport, particularly transport of clay, are another key performance indicator. As aggregated data sets are not currently available for this indicator, it is recommended that this information be collected in the following CBA surveys.

Table 2: Performance of sustainability measures in the greenhouse gas emissions category

Category	Sustainability Principle	Objective	Key Performance Indicator	2013 Life Cycle Assessment	CBA Survey Results	
					2015	2017
2. Greenhouse gas emissions	2a. greenhouse gas emissions in production	To reduce carbon or carbon equivalent emissions generated during the manufacture of bricks	Carbon dioxide equivalent emissions per kilogram of fired brick	0.27 $kgCO_2$/kg fired brick	0.33 $kgCO_2$/kg fired brick	0.31 $kgCO_2$/kg fired brick
	2b. Upstream transport	To collect information on upstream transport (coal, fuels, bought-in clay)	The provision of relevant transport fuel data (litres)	No aggregate data		

Looking ahead and recommendations

Reducing the use of fossil fuels in the clay brick industry will reduce the emission of greenhouse gases into the atmosphere. Greenhouse gas mitigation activities support goal thirteen of the Sustainable Development Goals, which further supports the goal of the Paris Agreement – to limit global temperature increases well below the 2°C mark.

Emissions (and air quality) are expected to be improved in the sector through the implementation of kiln and process technologies that are proven to be more energy efficient (and in particular reduce the use of fossil fuels). The CBA plans to periodically update the clay brick Life Cycle Analysis to assess the sector's progress in addressing environmental hot spots. Members will be further encouraged to track carbon and greenhouse gas indicators that are aligned with an energy management system and carbon reporting requirements.

The Department of Environmental Affairs has recently released a suite of draft regulations and related measures as part of its commitment to address climate change in South Africa. In particular, the recently finalised National Greenhouse Gas Emission Reporting Regulations require that brick manufacturers must register eligible facilities on the National Atmospheric Emissions Inventory System[7] and report their direct greenhouse gas emissions accordingly. Liable facilities are those located in South Africa, where over 4 million bricks are produced per month.

The CBA will continue to proactively engage with the South African government to improve the accuracy of the regulations where these may potentially impact the clay brick sector.

[7] Further details available at: http://www.saaqis.org.za/Emissions4.aspx

Case study

"Corobrik was the first South African company to be issued Certified Emissions Reductions by the United Nations' CDM for the fuel switch programme at its Lawley Factory"

EMISSION REDUCTIONS AT COROBRIK'S FACILITIES

With 15 factories around South Africa, Corobrik is the country's largest clay brick manufacturer. Corobrik is committed to reducing its environmental impacts and has converted a number of its kilns from coal to natural gas. These initiatives assist reduce the company's greenhouse gas emission intensity from previous levels because for each gigajoule of energy, natural gas releases just 48kgs of CO_2 compared to 97kgs of CO_2 emitted from coal.

Six of Corobrik's major factories currently use natural gas as a primary fuel for firing of its kilns. The fuel switches at the Driefontein and Lawley factories have been successfully registered under the Clean Development Mechanism (CDM). This registration entitles them to generate and trade in certified emission reduction certificates. The Driefontein project is capable of generating an annual average of around 38,000 metric tonnes CO_2 equivalent, and Lawley is capable of producing about 19,000 metric tonnes CO_2 equivalent per year.

Corobrik is investigating additional emission reduction initiatives and has plans to implement an annual emissions assessment which will also monitor atmospheric impacts.

LANGKLOOF BRICKS' TYRE-WASTE TO ENERGY INITIATIVE

Established in 1969, Langkloof Bricks is situated between Jeffrey's Bay and Humansdorp in the Eastern Cape. The brickyard has been in operation since 1969. The company was motivated by high energy costs to explore cheaper and more viable fuel options for firing and drying its bricks. Langkloof Bricks subsequently established a tyre-waste to energy facility at its operations in late 1999.

"Waste should be looked at differently – not as waste but as something with value"

The company is one of the official Eastern Cape partners of the Recycling and Economic Development Initiative of South Africa (Redisa). Langkloof Bricks receives between 25 000 and 40 000 tyres from Redisa per month at no cost and receives infrastructure development grant funding for every tonne processed. The waste-tyres are burnt at temperatures over 1 200°C to heat in excess of 90 000m^3 of air per hour to dry the clay bricks. Thereafter, the bricks are fired with coal in the Vertical Shaft Brick Kilns using a counter current, up-draft, continuous firing process. This reduces energy consumption and CO_2 emissions by up to 50%, compared to the more commonly-used clamp kilns.

The tyre-waste to energy project is an opportunity for Langkloof Bricks to minimise the company's impact on the environment, by reducing and transforming waste into a resource. Waste tyres continue to be a tremendous burden on the environment, and can instead be utilised as a heat source to dry bricks. In addition, the project contributes towards energy efficiency, air quality and climate change.

3.3 Air Pollution

Air pollution is a risk to both health and environmental sustainability. The inhalation of toxic pollutants results in respiratory illnesses as well as some cancers, heart and lung diseases. The environmental effects include acid rain that can damage forests and crops; acidify soil and water bodies or result in conditions that lead to the largescale death of aquatic animals.

Quarrying and brick preparation activities are the areas where most air pollutants arise in the clay brick industry. The typical air pollutants include particulate matter (visible dust and smoke); nitrogen oxides (produced during high temperature combustion) and sulphur dioxides. South Africa enforces ambient air pollution limits for all criteria pollutants as set out in the National Ambient Air Quality Standards. Industries are controlled through the National Environmental Management: Air Quality Act (No. 39 of 2004). Companies who undertake listed activities are required to compile comprehensive emission inventories for the entire site where the activity is present.

Clamp kilns, the most widely utilised clay brick production technique in South Africa, are categorised as listed activities. Clay brick manufacturers who employ this technology are required to obtain and operate according to the conditions of their Atmospheric Emission Licences, issued by the Department of Environmental Affairs.

Tracking key performance indicators

Dust fallout is proposed as one of the key indicators for air quality in the clay brick sector, which typically occurs during the brick preparation phase. The levels of air pollution (particularly sulphurous oxides) that result from the brick making process are also key performance indications which must be below the limits specified in the Air Quality Act.

The CBA Members air pollution data has not yet been collected or analysed on an aggregate basis. It is recommended that future CBA Brick Makers Surveys collect the following data for reporting in the second Sustainability Report.

Table 3: Sustainability measures in the air pollution category

Category	Sustainability Principle	Objective	Key Performance Indicator
3. Air pollution	3a. Dust fallout in production	To ensure dust fall generated during quarrying is below the legal limit	Concentration of dust levels in $mg/m^2/day/30$ day average
	3a. Air pollution in production	To ensure that air pollution during the manufacture of bricks is below the legal limit	Concentration of SOx levels in $\mu g/m^3$

Looking ahead and recommendations

Measures that reduce air pollution support goal three of the Sustainable Development Goals. CBA Members are required to report their atmospheric emissions on the National Atmospheric Emissions Inventory System[8] managed by the Department of Environmental Affairs.

[8] Further details available at: http://www.saaqis.org.za/Emissions4.aspx

Case study

RESEARCH: ATMOSPHERIC EMISSIONS FROM CLAMP KILNS

The University of Pretoria, in collaboration with the CBA, initiated a study to build a small-scale clamp kiln model that could fire bricks while accurately monitoring gaseous pollutant and particulate matter emissions. The results provide a benchmark for CBA Members to implement process improvements that increase air quality and reduce emissions.

The scope of the study included an investigation into the emissions of particulate matter, nitrogen oxides and sulphur dioxides. Thirteen successful firings were completed, each of about 25 000 to 35 000 bricks, lasting for 8-14 days. To ensure a realistic range of variables, the raw bricks, packing pattern and the firing technique were provided by eleven separate CBA Members.

Preliminary results

Sulphur dioxides accounted for the majority of air pollutants arising from the model kiln, illustrated in the following table.

Final average emission figures	g/brick	kg/tonne of bricks
Sulfur dioxide SO2	1.07	0.33
Nitrogen oxides NOx	0.14	0.04
Particulates PM10	0.96	0.29

The sulphur dioxide emissions are directly proportional to the fuel used, implying that CBA member can implement immediate improvements. Low sulphur fuels can be used, preventing formation of sulphur dioxides when the fuel is burnt. Such fuels however come at a significantly higher cost.

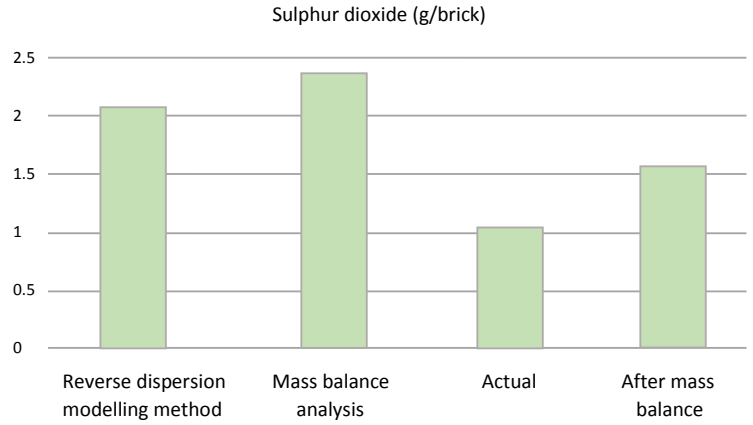


Figure 10: Sulphur dioxide results (CBA Technical Note #19)

The particulate matter emissions resulting from the study were found to be significantly lower than the standard factor obtained from previous literature sources. The nitrogen oxide emissions were also found to be moderately lower.

Based on this research, the study concludes that particulate emissions (dust) from vehicle movements on the brick yard and access roads may be responsible for more ambient pollution than previously thought. Further reports will be published as more results become available and the findings are analysed in greater detail. The model kiln facility remains available to CBA Members for tests on packing, firing and ignition techniques that may improve air and brick quality.

3.4 Water

Water resources in South Africa are under increasing pressure due to the impacts of drought and predicted population growth. Water is particularly critical in relation to regional water basins. Understanding where water sources originate is an important step in understanding the impacts that a clay brick manufacturer's water use may have on local communities.

Water used in the clay brick sector is sourced from both mains and non-mains supplies. CBA Members can impact water resources through the withdrawal and consumption of water, as these actions can affect the environment by lowering the water table, reducing the volume of water available for use, or otherwise altering the ability of an ecosystem to perform its functions. Such changes have wider impacts on the quality of life in the areas in which clay bricks manufacturers operate, including economic and social consequences.

Water continues to feature in the World Economic Forum's *Global Risk Report*[9]. For 2017, the water crises is the third ranked risk factor in terms of impact. Water stress is linked to extreme societal stress, particularly where the economic impact of water scarcity negatively influences a country's GDP. In addition, the World Bank forecasts that water availability in cities could decline by as much as two thirds by 2050, as a result of climate change and competition from energy generation and agriculture. These issues could greatly impact the South African water context in terms of availability, accessibility and affordability. The World Wildlife Fund's (WWF) set of actions that support water sustainability in South Africa represent a practical guide for water stewardship (Figure 11).

Figure 11: Actions to support water sustainability (WWF for Nature-South Africa, 2017)

Both South Africa's National Water Act and the National Environmental Management Act govern the use of and access to water supplies in the country. Certain activities require water use licences, to which CBA Members are required to comply. These licensing requirements could feed into the tracking of performance indicators.

Tracking key performance indicators

Water is a key resource for the clay brick sector as well as the communities in which CBA Members operate. Both mains and non-mains water are proposed as the key water performance indicators for the clay brick sector as water is utilised in the clay extraction and brick manufacturing processes. The aim of monitoring these metrics to maximise opportunities for diversification to non-mains water supplies (including water harvesting) as well as reducing reliance and use of potable water supplies in the manufacturing process. It is recommended that data on these key performance indicators be collected and analysed on an aggregate basis.

[9] World Economic Forum. 2017. *Global Risks Report: 2017*.

Table 4: Sustainability measures in the water category

Category	Sustainability Principle	Objective	Key Performance Indicator
4. Water	4a. Municipal water efficiency	To reduce the use of municipal water during the manufacturing process	Litres of mains water used per tonne of product manufactured
	4b. Other water supplies	To monitor use of water supplies other than from municipal sources (e.g. borehole; wastewater supplies; rainwater harvesting)	Litres of non mains water used per tonne of product manufactured

Looking ahead and recommendations

Water use and management are key considerations for the clay brick industry in light of growing demand for resources and increasing water scarcity. CBA Members are encouraged to adopt the WWF's proposed actions to support water sustainability (Figure 11) and goal seven of the Sustainable Development Goals.

The development of a water lifecycle assessment or footprint and subsequent strategy are also recommended, where these actions which could summarise key concerns and opportunities related to water use and management within the sector.

Case study

RAINWATER HARVESTING RECOGNISED AT CLAYTILE

Claytile is part of the Heavy Clay Products Group which is the largest independent producer of clay building bricks in the Western Cape. In December 2016, Claytile was awarded an EcoStandard EcoProduct certificate for its building brick. Claytile scored a 4-Star rating in terms of the assessment criteria, which considers resources, manufacturing, recyclability and product packaging and distribution.

Claytile scored 77% in the assessment of its manufacturing processes, which includes the use of rainwater from a bulk recycling plant. The rainwater is utilised in the production of clay bricks which mitigates the need to use water from the municipal mains or other sources such as boreholes, which may be shared by surrounding communities. Claytile also receives approximately 250 000 litres a week of effluent water from an old refinery. This water is used in the wetting of the clay before extrusion. The small quantity of residual oil acts as a lubricant which reduces the electricity consumption at the extruder. The co-benefits of this adaptation initiative include recognition, for example through the EcoStandard certification, that Claytile is committed to high environmental standards.

CBA ECOLABEL

Ecolabel platforms support companies in making informative, Self-declared Environmental Claims. The CBA makes use of an eco-label which supports positive environmental action and create awareness regarding environmental initiatives. The value of this ecolabel may be augmented through adherence to the criteria outlined in ISO 14021.

Figure 12: CBA eco-label

3.5 Waste

Clay bricks are highly durable and could have a life expectancy of hundreds of years. Bricks can also be reused, which minimises waste and distributes their environmental impacts over an extended life span. The incorporation of waste products and recycled materials into the brick making process reduces energy, water use and emissions, and also assists in saving scarce landfill space.

The brick industry in South Africa is committed to minimising waste and to managing any remaining waste responsibly. As a result, the volume of waste per tonne of production is very low compared to international counterparts, equating to 0.75% in 2014.

The majority of raw materials used in the manufacture of bricks, even after processing, can be crushed and reused either within the same process or as a raw material for other products. The *Social Life Cycle Assessment for Clay Bricks* (2015) commissioned by the CBA finds that of the members surveys, recycling and reuse activities are employed wherever possible.

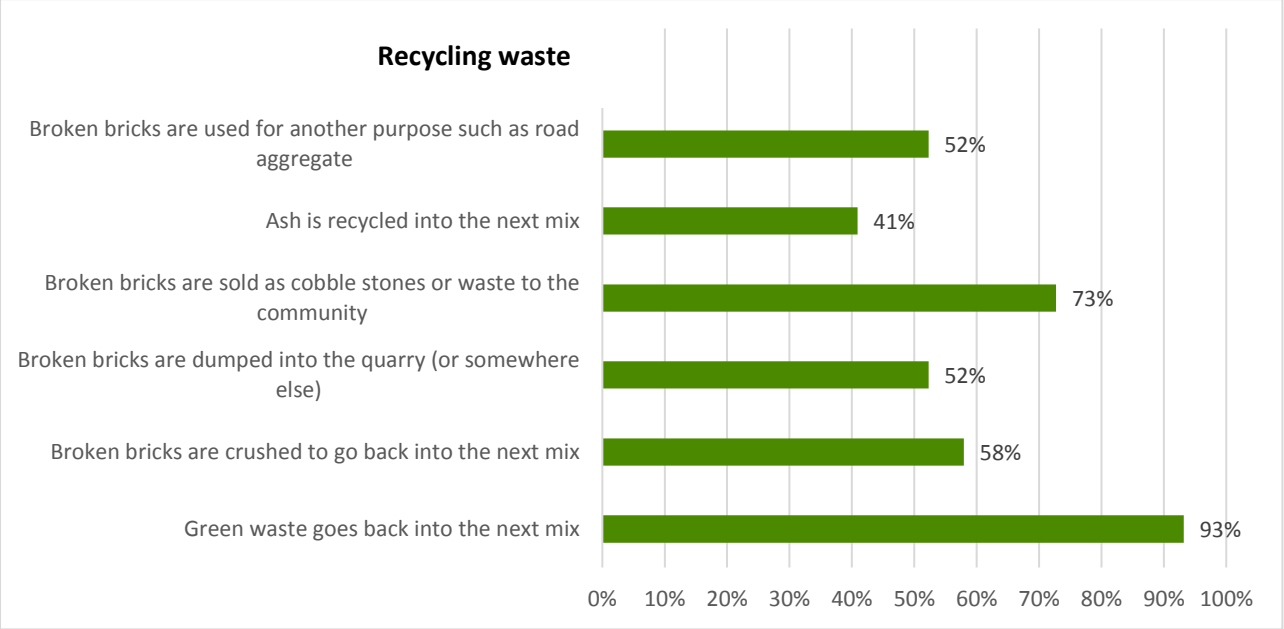


Figure 13: Recycling waste in the clay brick industry. Source: Social Life Cycle Assessment for Clay Bricks *(2015)*

Tracking key performance indicators

The key performance indicators for waste in the brick industry relate to the quantities of different waste categories per tonne of manufactured clay bricks as well as the quantities disposed of at general and hazardous landfill sites. It is recommended that aggregated data for these indicators be collected and analysed in subsequent CBA surveys.

Table 5: Performance of sustainability measures in the waste category

Category	Sustainability Principle	Objective	Key Performance Indicator
5. Waste	5a. General waste minimization	To reduce the quantity of general waste per tonne of production disposed of to landfill by Members	Kilograms of general waste sent to landfill (after recovery operations at waste transfer stations), per tonne of product manufactured
	5b. Hazardous waste minimization	To monitor hazardous waste generated by Members (e.g. fuel oils; asbestos etc.)	The provision of information on the quantity of waste generated (kilograms), per tonne of production

Looking ahead

Tracking the amount of waste that is generated and disposed of during the manufacturing process allows Members to identify areas for improvement which can improve the consumption of resources, such as energy and water which are required to re-process waste bricks in the manufacturing cycle.

The CBA and Members further recognise that there are opportunities to reduce the volumes of waste generated outside of their scopes of responsibility, which will minimise disposal to landfill while simultaneously providing brick makers with alternative (and often low-carbon) fuel sources. Such activities support commitment to the 'triple bottom line' by benefiting brick makers, the environment and the communities in which landfills are situated. These measures further support goal twelve of the Sustainable Development Goals.

The CBA and Members are encouraged to engage with the Department of Environmental Affairs on the finalisation of the *Proposed Regulations to Exclude Waste Streams from the Definition of Waste*, in order to reduce the regulator barriers (for example, increased monitoring requirements) that may arise from utilising waste streams in the brick making process.

Case study

"Implementing a circular economy approach facilitates waste recycling while also realising water and cost-savings"

CONDEMNED JUICE WASTE REPLACES WATER AT ALGOA BRICK

Algoa Brick's facility in Port Elizabeth utilises condemned juice waste in the company's manufacturing processes. The juice waste consists of expired or reject juice, for example where the packaging has been damaged.

Algoa Brick accepts 20 000 - 40 000 litres per week, depending on the availability of the waste juice. The recycling facility consists of two 10 000 litre tanks, as well as an offloading facility equipped with pumps. The juice cartons and containers are put through a special press which minimises wastage by ensuring that the waste juice is funnelled into a single container. All the waste packaging is recycled. The waste juice is added to clay in the mixing and extrusion process which provides an equivalent litre savings in municipal water.

The repurposing of waste juice at the Algoa Brick facility is a prime example of a circular economy activity: it mitigates the use of natural water and the release of methane that would occur as a result of disposal to landfill, and the sugar content delivers a little extra energy as well as an enhanced aesthetic look during firing.

3.6 Materials

In addition to energy and water, the typical raw materials utilised in the industry are shale and different types of clay (for example kaolin). Clay is widely utilised and as a natural resource requires efficient and responsible use. The sourcing and extraction of materials for the manufacture of bricks is carefully managed by CBA Members, as required by the Department of Minerals and Resources. Negative environmental impacts, particularly during extraction, are required to be minimised and positive outcomes enhanced.

A significant benefit of the longevity of clay bricks is that they are highly adaptable and can last for decades with relatively low maintenance requirements. The durability of bricks further mitigates future carbon emissions and resources associated with the refurbishment and replacement of less durable materials.

Tracking key performance indicators

The proposed key performance indicators in the materials category have been identified as the proportion of production capacity sourced from organisations with valid mining rights and licences (used as an indicator of responsible sourcing); the proportion of raw materials derived from sources other than clay extraction (an indicator of sustainable resource use) and the quantity of packaging used by Members. It is recommended that the data sets relating to these indicators be collected and analysed on an aggregate basis going forward.

Table 6: Performance of sustainability measures in the materials category

Category	Sustainability Principle	Objective	Key Performance Indicator
6. Materials	6a. Materials	To monitor the proportion of materials derived from sources other than clay extraction or conventional fuel supply, in the manufacture of brick	The provision of information on the proportion of materials derived from sources other than clay extraction or conventional fuel supply, in the manufacture of brick
	6b. Packaging	To ensure that resource efficiencies are optimised	The provision of information on types of packaging used and reductions thereof

Looking ahead

Choices in materials affect company bottom lines, the environment and the communities in which the Members operate. The CBA and Members are therefore actively pursuing sustainable practices related to the sourcing and use of materials, which supports goal eleven of the Sustainable Development Goals.

Members continue to be committed to responsible sourcing and sustainable use of materials. Most brick manufacturing facilities are located near clay mining sites, limiting transport distances, costs and emissions. Where possible, recycled materials are incorporated into the processing phase, thereby reducing the energy, water and emissions associated with using virgin materials. However, the regulatory restrictions pertaining to the use of waste as fuel sources currently restricts such practices. Coal, incorporated into the clay and as a combustion fuel, therefore remains one of the key materials which results in greenhouse gas emissions. Efforts to reduce coal and other fossil fuel use are ongoing and Members are encouraged to engage with the Department of Environmental Affairs on the finalisation of the *Proposed Regulations to Exclude Waste Streams from the Definition of Waste*, in order to reduce the regulator barriers associated with using waste in the brick making process.

Case study

DEMATERIALISATION AT PIKA BRICK

Pika Brick is a privately owned clay brick manufacturer in the Freestate, operating in the vicinity of Bloemfontein. The company has traditionally fired their bricks utilising clamp kilns, but have recently converted to a zig-zag kiln firing technology.

Figure 14: Perforated clay brick

This change to a more efficient firing technology has offered the opportunity to also implement a further dematerialisation measure, leading to even higher levels of energy reduction and further lowering of the company's environmental impacts.

Dematerialisation is defined by United Nations Environmental Programme as "the reduction of total material and energy throughput of any product and service, and thus the limitation of its environmental impact. This includes reduction of raw materials at the production stage, of energy and material inputs at the use stage, and of waste at the disposal stage."

The dematerialisation activity at Pika Bricks is the change from solid brick production to a perforated product. Perforating a clay brick is the act of extruding the three dimensional clay body so that there are voided areas or holes within the clay body.

The benefits of this change include the reduction of material required to produce a clay brick, where the perforation ratio of 20% results in an immediate 20% reduction in materials. An additional benefit is the subsequent reduction in energy required to fire the clay brick. The drying of product is one of the foremost challenges faced by brick makers, and any introduction of perforations which means lower mass, less water and an increase in surface area, leading to a direct reduction in time and energy required for the drying of product.

The lower mass of product being fired requires a proportionate reduction in firing energy, and also usually has the added advantage of a more "even" burn due to each brick having a higher surface area and improved oxygen availability. Each brick also has a reduced "mass" that needs to be cored. Firing times are usually reduced as an additional benefit.

A reduction in fired brick mass also allows for larger loads to be transported adding to the competitiveness of a cored product versus a solid product, which also results in mitigating the greenhouse gas emissions that result from transport activities.

The dematerialisation activity is projected to result in an annualised savings of R680 000, which is possible at an entry level perforation of 16% taking only clay material and internal fuel quantity savings into account. This against an initial investment of R68 000 and a maintenance cost of R12 000 per annum. Put another way, the Rand saving is equivalent to R78.60 per thousand bricks produced.

Additional environmental benefits exist from a reduction in clay and coal mined and transported. The reduction of 1 794 tonnes CO_2 emitted is an additional environmental benefit as well as a possible additional saving of R215 000 per year in terms of the carbon tax (R120 per tonne).

3.7 Biodiversity

Biodiversity is the foundation of ecosystem services, to which human well-being is intimately linked. Clay extraction sites need to be managed responsibly for the wellbeing of the communities and environments that are directly and indirectly impacted by the activities of the clay brick industry. The CBA survey (2017) on brick production in the SADC region notes that deforestation is a concern due to the extensive use of charcoal or wood in some cases. Ecosystem-based adaption is an increasingly important conservation tool that uses biodiversity and ecosystem processes to assist people in adapting to climate change impacts. Ecosystem-based adaption presents opportunities for sustainable development in the clay brick industry as it aims to reduce the impacts of the industry's activities. Examples of ecosystem-based adaption include:

- Maintaining and managing rivers and wetlands;
- Maintaining natural green spaces such as parks, gardens or ecological corridors;
- Promoting indigenous and drought resistant plant species;
- Reducing local air pollution through absorptive surfaces such as vegetation.

The Department of Environmental Affairs has developed a Strategic Framework and Overarching Implementation Plan for Ecosystem-Based Adaptation in South Africa (2016 – 2021) for inclusion in South Africa's Adaptation Strategy. Further to this Guidelines for Identification and Implementation of Ecosystem-Based Adaptation Projects in South Africa are currently under development which aim to refine the Ecosystem-Based Adaptation Strategy by clarifying a set of principles and criteria for successful projects.

Tracking key performance indicators

The proposed indicator in this section is the proportion of Members that have site specific environmental management and rehabilitation plans. CBA Members who own or operate clay extraction facilities are required by the Department of Environmental Affairs to have site specific environmental management and rehabilitation plans. While some clay brick manufacturers have related Environmental Management Plans for the manufacturing site as well, this information has not been collected on an aggregate level. It is recommended that the data sets recording these levels be collected in future CBA surveys.

Table 7: Sustainability measures in the biodiversity category

Category	Sustainability Principle	Objective	Key Performance Indicator
7. Biodiversity	7a. Site Stewardship and Biodiversity	To provide information on site specific action plans that are in place at relevant sites	The % of Members that have site specific environmental management and rehabilitation plans

Looking ahead and recommendations

The South African National Biodiversity Institute, in partnership with the Council for Scientific and Industrial Research, is expected to release the country's updated *National Biodiversity Assessment* in 2018[10]. CBA Members are encouraged to study this update, which will provide an assessment on the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across clay brick companies and the sector as a whole. Activities that promote biodiversity will further support goal fifteen of the Sustainable Development Goals.

[10] https://www.sanbi.org/nba#top

Case study

COROBRIK'S QUARRY REHABILITATION PROGRAMME

"Quarries are typically developed as farmlands in rural areas"

Corobrik's quarrying operations are governed by environmental management plans, approved by the Department of Mineral Resources.

The plans provide for the rehabilitation of quarries that reach their end of life, which includes restoring the land to its natural state such as nature reserves or recreational and residential areas. Corobrik recognises that improving biodiversity can assist communities become more resilient and sustainable, which can also serve to increase demands for the company's products.

ISO 14001: 2015 SUPPORTS ORGANISATIONS INTEGRATE BIODIVERSITY CONSIDERATIONS INTO BUSINESS ACTIVITIES

"Protecting the environment is a strategic business imperative that organisations ignore at their peril"

Recently revised in 2015, ISO 14001 assists companies understand the effects their activities have on the environment, and *vice versa,* which ultimately enables businesses to reduce their negative environmental impacts. In particular, ISO 14001 considers biodiversity conservation as an integral part of sustainable development.

The Plan-Do-Check-Act continual improvement framework (Figure 15) is central to the ISO 14001 management cycle. The ISO framework provides for a holistic, strategic approach to the organisation's environmental policy, plans and actions – allowing companies to develop strategies within the specific context of their businesses.

Figure 15: ISO 14001 Management Cycle

ISO 14001 focusses on the environmental aspects that are under a company's direct control or which it can directly influence. The following principles are recommended for clay brick manufacturers who wish to use ISO 14001 to integrate biodiversity conservation into their environmental management systems by developing:

- An environmental policy statement that recognises the strong role of biodiversity conservation in sustainable development and the positive branding value;
- Biodiversity objectives and targets that take into account opportunities to advance conservation;
- A biodiversity management programme and emergency response plan;
- A biodiversity "champion" position to drive corporate biodiversity policy and strategy;
- Training programmes based on identify biodiversity training needs;
- Internal and external communication campaigns that highlight environmental impacts/actions;
- Procedures to monitor and measure the company's impacts on the environment.

In addition to the benefits of improved environmental biodiversity, achieving ISO 14001 certification delivers commercial value to organisations through reduced resource utilisation and associated greenhouse gas emissions, and streamlined waste management. The implementation of ISO 14001 systems also provides insights into business risk and competitive advantage, making it commercially advantageous as well as helping conserve and improve the environment.

3.8 Socio-Economic Sustainability

South Africa's socio-economic profile remains highly unequal two decades after the first democratic elections. The CBA's *Social Life Cycle Assessment for Clay Bricks* finds that Members remain committed to South Africa's development in a way that balances the needs of society, the environment and increased levels of economic production. The health and safety of employees is of high priority for the CBA Members, who are committed to fair and ethical labour practices.

The sector is made up of a variety of small and large brick manufacturers, providing valuable employment opportunities across the country. According to the industry survey referenced in the *Social Life Cycle Assessment for Clay Bricks,* formal clay brick manufacturing sites provide employment to approximately 12 028 permanent employees, of which 88% belong to the semi-skilled and unskilled occupational categories. In addition, employment is provided to approximately 946 temporary employees. As such, the industry plays an important role in rural areas in improving the economic position of households.

The wider employment impact of the clay brick industry accounts for about 210 000 jobs in the formal sector, based on employment along the full value chain (Figure 16). In addition, approximately 3.5 billion bricks are produced annually for development within South Africa, making the clay brick sector an integral part of the country's industrial segment.

Figure 16: Employment over clay brick life cycle

Socio-economic sustainability within the clay brick sector relates to a range of issues. These include aspects within the workplace as well as considering the broader context of the sector's practices, its impacts and contribution to economic development. The *Social Life Cycle Assessment for Clay Bricks* identified the following impact areas with regards to the socio-economic context of the clay brick sector:

- Human rights;
- Working conditions;
- Health and safety;
- Cultural heritage;
- Governance; and
- Socio-economic repercussions.

These impact areas provide a holistic overview of the socio-economic aspects that need to be considered by the clay brick sector. The above impact areas must however be considered in from the different perspectives of the association, members and facilities. This will guide and inform the selection of indicators which could build a sound basis for socio-economic reporting, illustrated in Figure 17.

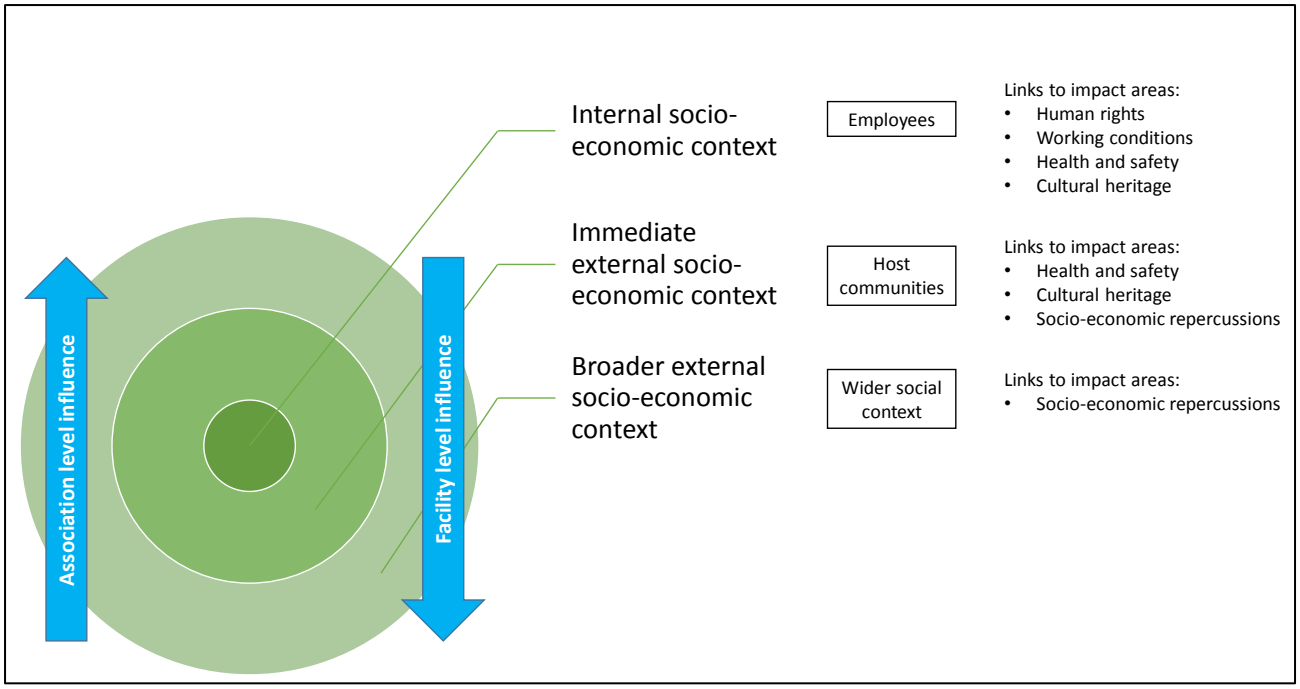


Figure 17: Socio-economic indicator context

The prioritisation of indicators may differ between the CBA and Members at facility levels. For example, the CBA has a broader role in terms of sector sustainability, individual members /facilities will have an immediate role in terms of operational sustainability.

Tracking key performance indicators

In addition to the number of people employed, the health and safety of Members' employees are key performance indicators of sustainable socio-economic practices within the industry.

The Department of Labour is primarily responsible for health and safety matters in South Africa. The Department requires the development of site specific Social and Labour Plans, prior to the initiation of any mining activities. The Department uses this plan, and other supporting documents, to assess whether the potential mine is viable and meets the regulatory requirements.

The clay brick sector is also subject to the health and safety requirements of Members' operating licences, which may be regulated by the Department of Minerals and Resources; the Department of Water and Sanitation, as well as the Department of Environmental Affairs. Departmental audits follow the relevant codes of practice, which in the case of the Department of Minerals and Resources, are based on ISO 14001 criteria.

The *Social Life Cycle Assessment* identified six impact areas, each with sub-categories. These cover a range of socio-economic indicators and provide an overview of the data available and current reporting trends. However for the purposes of this report, a select number of these sub-categories and indicators were selected, representing the impact areas. This was done in order to develop a workable format for socio-economic sustainability reporting going forward and to build a baseline around key issues which are material to the clay brick sector. It is recommended that data on these impacts be collected in future surveys.

Table 8: Performance of sustainability measures in the socio-economic sustainability category

Category	Sustainability Principle	Objective	Key Performance Indicator	CBA Survey Results
				2015
8. Socio-Economic Sustain-ability	8a. Socio-economic Repercussions	Contribution to economic development	Contribution of the product to economic progress in terms of number of jobs and SMMEs supplied per 1 000 bricks	- Number of jobs per 1 000 bricks: 0.004 - Number of SMME suppliers per 1 000 bricks: 0.0004
	8b. Employment	To facilitate employee development	Average hours of training that the organisation's employees have undertaken during the reporting period	No data collected
	8c. Employment equity	To facilitate equal employment opportunities across race and gender	Presence of formal policies on equal opportunities	Policies are in place at most of the sites, but incidence needs to increase

Looking ahead and recommendations

Sustainability reporting should not be solely centred on compliance. Sustainability relates to a much broader context which includes employees, host communities and a broader social network. In this regard broader social impacts are important to indicate the value the CBA is adding in terms of South Africa's development objectives and those that support goals eight and nine of the Sustainable Development Goals.

As such, CBA Members will continue efforts to actively participate in South Africa's socio-economic development. The following recommendations are proposed:

- The Governance category outlined in the *Social Life Cycle Assessment* includes a number of categories related to commercial sustainability such as transparency, feedback mechanisms and fair competition. It is suggested that these be considered in future sustainability reports.
- Improving access to material / immaterial resources (defined in Table 10) can be used to measure broader environmental impact. These indicators also provide a platform to pool initiatives from a sector perspective which could decrease costs and leverage combined sustainability efforts.

Table 9: Material and immaterial resources[11]

Access to material resources	Access to immaterial resources
Material resources refer to natural material resources such as water, land, mineral and biological resources, as well as infrastructure such as roads, sanitation facilities, schools. Organisations should engage with local communities over sustainable methods for sharing resources and should have plans for preventing, mitigating and controlling environmental damage. This includes management's attention to the sustainable use of natural resources, pollution prevention and waste recycling.	Immaterial resources include community services, intellectual property rights, freedom of expression and access to information. Access to immaterial resources can be improved by building community relations and promoting community services such as health care, education and lending programmes, or by sharing information and knowledge and transferring technology and skills to the community.

[11] Benoît Norris, C. (Ed). 2013. *The Methodological Sheets for Sub-Categories in Social Life Cycle Assessment (S-LCA)*. Paris: UNEP.

- Improving employment ratios both in terms of race and gender as well salaries. These illustrate regulatory compliance and could be used to determine areas for improvement and transformation.
- Improving health and safety indicators, similar to employment related indicators, are required for regulatory compliance. These indicators also provide valuable information in terms of sustainability of operations.

Case study

BROAD-BASED BLACK ECONOMIC EMPOWERMENT AT APOLLO

"The objective of B-BBEE is to correct inequalities that were placed on the population in the past"

Formed in 1995, Apollo Brick has operations in Gauteng and the Western Cape. The Gauteng operation is a level 6 contributor to B-BBEE and its Atlantis facility is a level 5 contributor.

As part of Apollo's commitment to upliftment within the regions it operates, the company endeavours to exceed the targets outlined in the company's Social and Labour Plan. Apollo works cooperatively with local municipality, labour movements and statutory bodies.

An example of one of Apollo's recent success stories is the development of a B-BBEE entrepreneurial project that has grown into a Pty Ltd company. The company approached a cooperative in Tembisa Township, its local community, to start up a plastics plant. Apollo uses plastics to cover bricks that are stacked on pallets and dried on an open-air hack line. Initial financial feasibility studies revealed that the business model with six cooperative members, the required number to form a cooperative, was financially unsustainable. Apollo subsequently broached the Ekurhuleni Municipality for assistance which provided, free of charge, a suitable premises and electricity. Five years on the cooperative has grown into a fully-fledged, sustainable company, Selese Plastics (Pty) Ltd, which is an associate of the CBA and which now supplies several other brick yards with the required plastics.

SOCIAL RESPONSIBILITY AT MAKANA BRICK GRAHAMSTOWN

"Socially responsible organisations play an increasingly vital role in the democratisation of our society"

As one of the largest clay brick suppliers in the Eastern Cape, Makana Brick is also a pillar of its local community. The company's voluntary development initiatives demonstrate commitment to making a sustainable contribution to South Africa's development and economic growth.

The social responsibility initiatives undertaken by Makana Brick are extensive and include engagement and development of eight previously unemployed people to assist in the clearing of gutters, storm water drains and communal pavements in the city of Grahamstown. The initiative ran for approximately a year. Makana Brick supplied the team with equipment and a dedicated vehicle. Cleared organic refuse was composted and subsequently used to rehabilitate mining areas.

Makana Brick also provides financial support to various foundations and initiatives such as the Ubunye Foundation (community development); St Mary's Development Community Centre (addresses the development needs of children and their families); the LIV Village (supports vulnerable, parentless children); Child Welfare Centre; donations to various schools and internships as well as a community garden on the company's premises.

The benefits of these social responsibility initiatives include an enhanced corporate image, improved employee morale and stabilising the social and economic environment.

3.9 Continual Improvement

The CBA and Members are actively involved in activities that consider innovative and practical ways of consistently increasing effectiveness and efficiencies to meet the industry's goals. The CBA has developed a Sustainability and Energy Efficiency Pledge, which requires Members to demonstrate that sound management principles are applied to energy usage; conducts energy audits; contribute to Life Cycle Assessments and sustainability initiatives and comply with the national energy reporting regulations. An example of the Pledge is provided in the case study section of this chapter.

Tracking key performance indicators

The widespread implementation of certified management systems (such as the ISO 50001 Energy Management System as well as others) is testament to the CBA Members' commitments to continual improvement. So too is the proportion of Members that report sustainability data, as well as the level of new investments in plant and machinery. It is recommended that data for these indicators be collected in future surveys.

Table 10: Sustainability measures in the continual improvement category

Category	Sustainability Principle	Objective	Key Performance Indicator
9. Continual improvement	9a. Data Collection	For sustainability data to be representative of all Members	The % of Members that submit a sustainability data return
	9b. Environmental Management	To maintain the high level of production capacity	The % of production capacity covered by an environmental management system
	9c. Quality Management	To monitor the % production capacity covered by a quality management system	The % of production capacity covered by a quality management system

Looking ahead

CBA Members recognise the need for continual improvement and are committed to pursuing activities that benefit the triple bottom line: economic growth, society and the environment, and that support the related Sustainable Development Goals.

The collation and analysis of data from regular information gathering exercises (such as the periodic Brick Markers Survey and future CBA Sustainability Reports) will enable Members to identify gaps as well as opportunities for growth or refinement. Opportunities for training and development will also be pursued, lending to development multiple levels including individuals, companies and in the wider industry.

Improvements will also continue to be driven by legislative changes, where the CBA will actively engage with the relevant ministries should legislation impact its Members.

Case study

Company Logo

<Company Name>
Sustainability & Energy Efficiency Pledge

<Company> hereby pledges to embrace the Clay Brick Association Sustainability initiative for Clay Brick, demonstrated in this pledge to committing to adopting a strategy of Energy Efficiency and a reduction in Energy Usage.

<Company> therefore pledges to commit to the following energy related efforts;

- **Be able to demonstrate that sound management principles are applied to Energy usage by**
  - Have a clear Energy Management Policy in place.
  - Energy usage is monitored, measured and reported throughout the various organisational levels.
  - Energy reduction targets are set and plans are in place in order to reach these targets.
  - Review company targets, plans and policy on an annual basis.
  - Adopt the South African Energy Efficiency Guidelines as an Energy Management tool.
  - Endeavor to reduce energy intensity (MJ/Kg) by XX%.
  - Be able to show the reduction in energy intensity over time.

- **Conducts Energy Audits**
  - Contract an accredited CEM or similar organisation to conduct an energy audit at least every 5 years.

- **Contribute to the Life Cycle Assessment (LCA) of Clay Brick and Clay Brick sustainability initiative**
  - To participate and provide accurate data in Clay Brick LCA update activities.
  - To participate and provide accurate data in the Clay Brick sustainability reporting.

Company Logo

<Company Name>

Sustainability & Energy Efficiency Pledge

Energy Reporting Compliance

- Ensure compliance by registering with the relevant authority for Energy Reporting where required.
- Submit timeous Energy Reporting reports to the relevant regulatory authority where required.
- Submit an Energy Management Plan to the relevant regulatory authority where required.

<Company> understands and agrees that by signing this pledge <Company> binds itself in the use of the EECB label for promotional purposes and promises to act both ethically and responsibly in portraying <Company> as being compliant with the requirements contained within this pledge and with a clear understanding of the spirit in which this pledge is written.

<Company> further agrees to renew its commitment to energy reduction and use of the EECB label by re-signing this pledge on a 3 yearly basis.

I, _____, hereby sign this pledge on behalf of <Company>, its management and employees on this _____ (day) of _____ (month, year).

_____ Witness 1 _____

Signature Signature

_____ Witness 2 _____

Title Signature

4. Performance Summary

The following tables are a summary of the key performance indicators and data detailing information that is available as well as recommendations regarding information that may be collected in subsequent surveys.

4.1 Performance tables

Table 11: Summary of available data on select sustainability measures

Category & related SDG	Sustainability Principle	Objective	Key Performance Indicator	2013 Life Cycle Assessment	CBA Survey Results	
					2015	2017
1. Energy 	1a. Energy efficiency	To reduce specific energy consumption per kilogram of output	Specific energy consumption of direct fuels and metered electricity, per brick equivalent (MJ/kg)	3.40 MJ/kg (full lifecycle)	3.09 MJ/kg	2.97 MJ/kg
	1b. Alternative energy sources	To monitor renewable energy use and the use of alternative energy sources e.g. waste streams such as pulp and paper; solid waste etc.	The provision of information on the use of alternative energy sources by Members (% of total fuel)		13%	4%
2. Green-house gas emissions 	2a. Greenhouse gas emissions in production	To reduce carbon or carbon equivalent emissions generated during the manufacture of bricks	Carbon dioxide equivalent emissions per kilogram of fired brick	0.27 $kgCO_2$/kg fired brick	0.33 $kgCO_2$/kg fired brick	0.31 $kgCO_2$/kg fired brick
8. Socio-Economic Sustain-ability* 	8a. Socio-economic Repercussions	Contribution to economic development	Contribution of the product to economic progress in terms of number of jobs and SMMEs supplied per 1 000 bricks		- Number of jobs per 1 000 bricks: 0.004 - Number of SMME suppliers per 1 000 bricks: 0.0004	
	8c. Employment equity	To facilitate equal employment opportunities across race and gender	Presence of formal policies on equal opportunities		Policies are in place at most of the sites, but incidence needs to increase	

** Results are from the Social Life Cycle Assessment updated in 2015*

The following table is a list of proposed key performance indicators, data for which has not yet been collected at an association level.

Table 12: Summary of data that is yet to be collected on an aggregate basis

Category	Sustainability Principle	Objective	Key Performance Indicator
1. Energy 	1c. Energy management system	To efficiently and effectively manage the consumption of energy	The proportion (%) of Members who have an energy management system in place
2. Greenhouse gas emissions 	2b. Upstream transport	To collect information on upstream transport utilisation by Members	The provision of relevant transport information (litres)
3. Air pollution 	3a. Dust fallout in production	To ensure dust fall generated during quarrying is below the legal limit	Option 1: Concentration of dust levels in mg/m^2/day/30 day average Option 2: % of facilities that are compliant with regulatory levels
	3a. Air pollution in production	To ensure that air pollution during the manufacture of bricks is below the legal limit	Option 1: Concentration of SOx levels in µg/m^3 Option 2: % of facilities that are compliant with regulatory levels
4. Water 	4a. Municipal water efficiency	To reduce the use of municipal water during the manufacturing process	Litres of mains water used per tonne of product manufactured
	4b. Other water supplies	To monitor use of water supplies other than from municipal sources (e.g. borehole; wastewater supplies; rainwater harvesting)	Litres of non mains water used per tonne of product manufactured
5. Waste 	5a. General waste minimization	To reduce the quantity of general waste per tonne of production disposed of to landfill by Members	Kilograms of general waste sent to landfill (after recovery operations at waste transfer stations), per tonne of product manufactured
	5b. Hazardous waste minimization	To monitor hazardous waste generated by Members (e.g. fuel oils; asbestos etc.)	The provision of information on the quantity of waste generated (kilograms), per tonne of product manufactured

6. Materials 	6a. Materials	To monitor the proportion of raw materials derived from sources other than clay extraction or conventional fuel supply, in the manufacture of bricks	The provision of information on the proportion of raw materials derived from sources other than clay extraction or conventional fuel supply, in the manufacture of bricks
	6c. Packaging	To ensure that resource efficiencies are optimised	The provision of information on types of packaging used and reductions thereof
7. Biodiversity 	7a. Site Stewardship and Biodiversity	To provide information on site specific action plans that are in place at relevant sites	The % of Members that have site specific environmental management and rehabilitation plans
8. Socio-Economic Sustain-ability 	8b. Employment	To facilitate employee development	Average hours of training that the organisation's employees have undertaken during the reporting period
9. Continual improvement 	9a. Data Collection	For sustainability data to be representative of all Members	The % of Members that submit a sustainability data return
	9b. Environmental Management	To maintain the high level of production capacity	The % of production capacity covered by an environmental management system
	9c. Quality Management	To monitor the % production capacity covered by a quality management system	The % of production capacity covered by a quality management system

4.2 Sustainability analysis

The following analysis (Figure 18) is high-level overview of the strengths, weaknesses, opportunities and threats facing the CBA in terms of sustainability. This analysis provides insight with regards to focus areas for the implementation of sustainability measures.

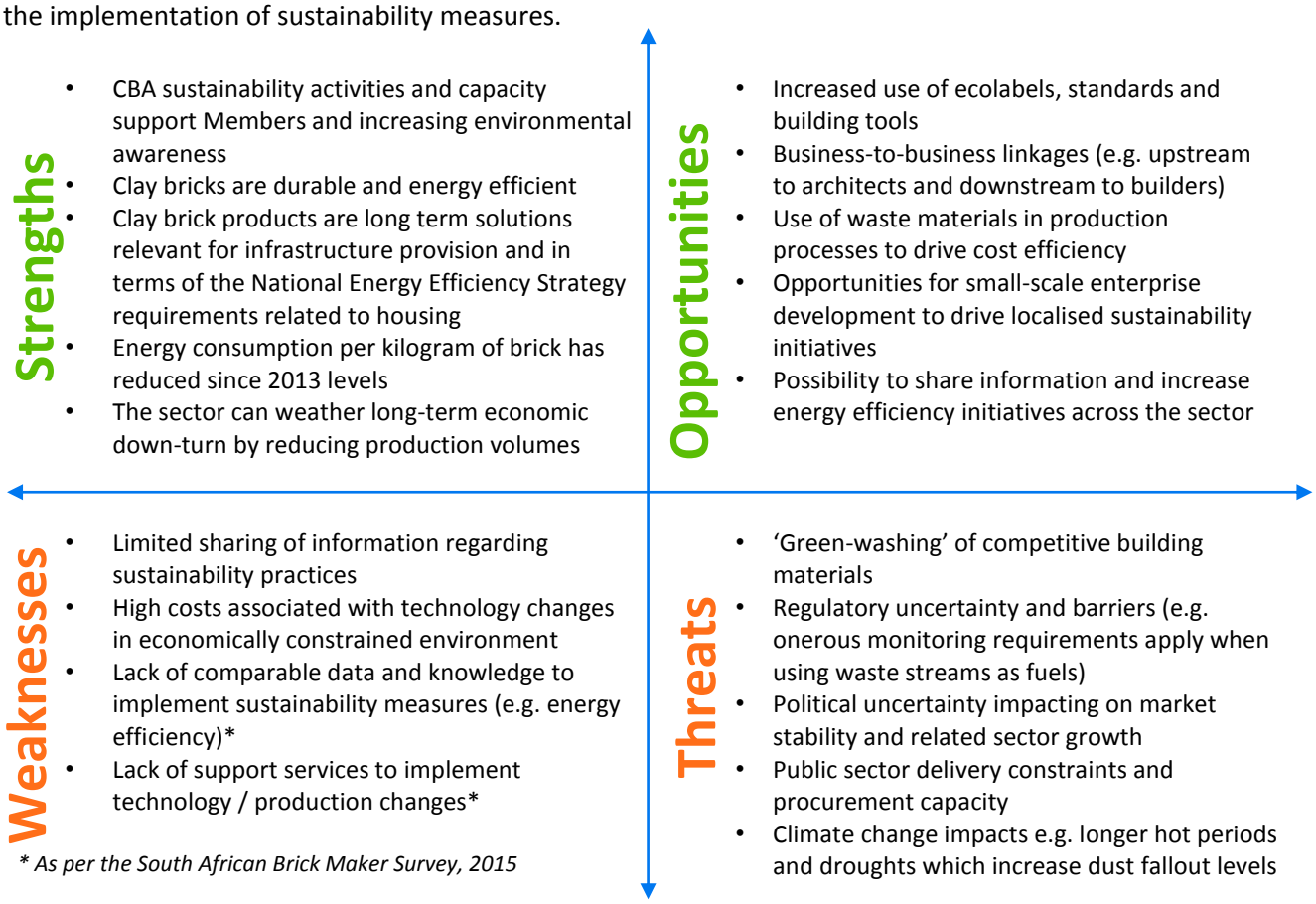


Figure 18: CBA sustainability analysis

The CBA has taken a proactive approach to sustainability which has filtered down to Members, resulting in significant strides towards energy efficiency and emission reductions since 2013. Uncertain regulatory and political environments coupled with national economic development challenges impact the production capabilities of the sector. This impacts the fiscal capacity of Members to implement sustainability practices or technology changes. In addition regulatory barriers (e.g. costs of continuous monitoring) make it difficult for continuation and expanded roll-out of initiatives where waste is used in clay brick production processes.

Clay brick products are recognised as durable and beneficial, positioning the clay brick sector as a key player in the sustainable infrastructure space. Again, the capacity of both government and private sector to deliver infrastructure or procure products impact the sector's growth. There are however opportunities within the development/infrastructure sector to optimise business-to-business linkages to advance the clay brick sector, and to engage with the authorities to 'delist' certain wastes from the waste regulations in order to reduce regulatory barriers associated with the use of waste streams in the brick making process.

Finally, the sharing of knowledge, information and learning across the clay brick sector is vital to encourage and expand on the current uptake of new or innovative sustainable activities. This distribution of information will allow for cost benefits to be shared through the contribution to technology or production learning curves. This will also enable greater support for technology change and implementation of sustainability activities.

5. Recommendations

The following recommendations are guided by the data and inputs contained in this Sustainability Report.

5.1 CBA strategies

CBA strategies could be developed for all, or some, of the following categories:

- Air Pollution
- Water
- Waste
- Materials
- Biodiversity
- Socio-Economic Sustainability

Water risks in particular are rising in predominance and severity, particularly in South Africa which is characterised as a water scarce country. The World Wide Fund (WWF) has published a set of water scenarios[12] for South Africa which summarise the country's water context and related. The WWF's scenarios for the future of water in South Africa indicate that the country is expected to face a water deficit of 17% by 2030. This shortage could worsen due to the increasing impacts of climate change. Monitoring water use is therefore important on both company and industry levels in order to understand possible impacts such as rising water prices or reduced capacity.

A water strategy could also drive awareness from a strategic level to an operational level, facilitating buy-in with regards to water conservation and optimisation initiatives. Aspects that could be considered in this regard include:

- Improving water efficiency within the sector
- Protecting water sources within the context of the clay brick sector
- Accounting for the value of water
- Partnering with stakeholders to address the competition for water as a resource.

Collective action plays a vital role in building a sustainable water future for all stakeholders. By collaborating to mitigate risks, seize opportunities, as well as preserve and maintain this valuable shared resource, the clay brick industry can contribute to creating a water secure future for South Africa.

5.2 Guidance on financing energy efficiency activities

CBA Members are encouraged to utilise the *Energy Efficiency Finance Guide* developed by the EECB Project and the CBA to assist brick manufacturers overcome the financial barriers associated with developing energy efficiency projects.

As a complementary resource to the *South Africa Clay Brick Sector Energy Efficiency Guidelines*, the Finance Guide provides an in-depth review of all financial options available to the clay brick sector e.g. loans; development finance; energy service companies and original equipment suppliers; cash grants; tax deductions; research and development finance and carbon credits. The benefits, requirements and relevant

[12] WWF for Nature-South Africa. 2017. *Scenarios for the future of water in South Africa*.

contact details for each type of finance are provided as well, which allows brick makers to match the most appropriate finance option with their proposed energy efficiency activities. The Finance Guidelines outlines a recommendations matrix for all 60 energy efficiency measures identified in the Energy Efficiency Guidelines.

In addition, the Finance Guide provides information on how to build a business case to substantiate finance applications, with a view to supporting brick manufacturers in their endeavours to source different finance streams.

The Finance Guide provides practical, relevant examples of finance applications through the assessment of 10 best practice business cases. Each business case includes a detailed review of the relevant sources of funding as well as information on the ease of accessing the financial option, the relevant qualification criteria and applicability to the project and company.

5.3 Monitoring and reporting guidance

The statement: "you can't manage what you can't measure" is very apt for the tracking of sustainable development key performance indicators. Monitoring plays a critical part in determining progress towards sustainable practices and addressing key performance indicators both as an industry as well as on a member level. Continual monitoring allows the quick identification of sector challenges such as e.g. energy and water, as well as ensuring the CBA stays abreast of all necessary international and locally relevant trends in sustainable development. The monitoring process can be briefly summarised as follows in Figure 19:

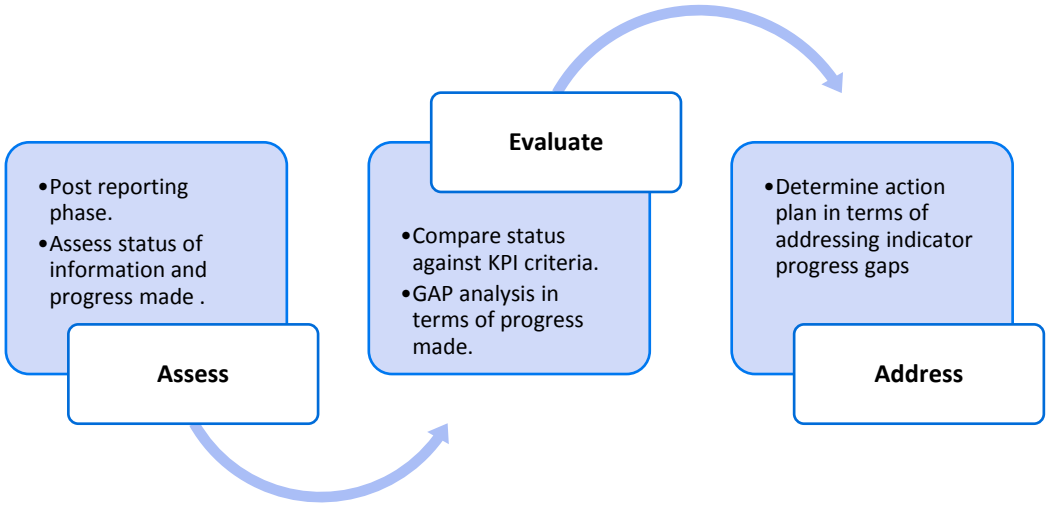


Figure 19: Monitoring process

General guidance for the setting up of monitoring and evaluation system suggests that such a system should be; practical, sector driven and consider national circumstances and priorities. As such the Clay Brick Association's monitoring, evaluation and reporting process should consider the diversity and complexity of the actions being implemented across its varied member base. It should therefore build on existing capacities and utilise existing processes and arrangements in its implementation.

The objective of monitoring is to assess progress and the status of information at the end of each sustainable report to determine progress in terms of the various key performance indicators. It is vital to, throughout the process, ensure that the right information and the right format of information is collected and collated.

Suggested monitoring and reporting criteria

As monitoring should be addressed throughout the reporting process, it is suggested that the following key criteria (as per international best practice), Table 13, should be monitored as part of the report compilation process:

Table 13: Suggested sustainability reporting monitoring criteria

MONITORING CRITERIA	DEFINITION	INDICATOR	DROP DOWN MENU
Stakeholder Inclusiveness	The report should provide a balanced view of various stakeholders and relevant data.	The report should identify all stakeholders / departments consulted.	Blank
		The report should list engagement sessions.	Blank
		The reports should list comments received and how comments were addressed.	Blank
Completeness	The report should include coverage of all required inputs as per the applicable guideline document.	The report covers and prioritizes all material information.	Blank
		The information in the report includes all significant impacts in the reporting period.	Blank
		The report does not omit relevant information that influences or informs stakeholder assessments or decisions or that reflects significant changes / tendencies since previous report submission.	Blank
Balance	The report should reflect both positive and negative aspects of reporting performance to enable a reasoned and balanced assessment of overall performance.	The report discloses both favourable and less favourable results and findings.	Blank
		The information in the report is presented in a format that allows readers to see both positive and negative trends in performance on a year to year basis.	Blank
		The emphasis on the various issues / aspects addressed in the report is proportionate to their materiality.	Blank
Comparability	The report, aligned to relevant requirements, should select, compile and report information consistently. The reported information should be packaged in such a way as to enable stakeholders to identify and analyse changes in performance over time.	The report and the information contained therein can be compared on a year-to-year basis.	Blank
		Performance reported on can be compared with appropriate benchmarks / other reports.	Blank
		Any significant variation between reporting periods in scope, length of reporting or information contained can be identified and explained.	Blank
Accuracy	Reported information should be accurate and detailed for readers to assess performance.	The report indicates that data has been measured. Data measurement techniques, data collection techniques and bases for calculations are described and detailed and can be replicated to achieve similar results.	Blank
		Estimations and assumptions are adequately disclosed and details are provided as to where data and additional data can be obtained.	Blank
		Qualitative statements in the report are valid on the basis of other reported information and other available information.	Blank

Timelines	**Reporting should occur on a regular schedule within the stipulated timeframes of international reporting.**	**Information in the reports has been disclosed while it is recent relative to the reporting period. If not, disclosure and motivation is provided.**	**Blank**
		The information in the report clearly indicates the time period to which it relates, when it will be updated and when it was last updated.	Blank
Reliability	Reporting processes should utilise recording, compilation, analysis and disclosing information and processes which can be subject to examination and adheres to the required quality measures put in place.	If applicable, the scope and extent of external assurance is identified and defined.	Blank
		The original source of information in the report can be identified.	Blank
		Reliable evidence to support assumptions or complex calculations can be identified and disclosed in the report.	Blank
		Representation is, available from original data or information owners attesting to its accuracy within acceptable margin of error.	Blank

Cross-cutting issues

There are three additional cross-cutting activities which will greatly inform and influence monitoring, evaluation and reporting within the Clay Brick Association.

Data Collection

Data collection is a key component of the report compilation process. In this regard the communication on data collection and the management of data are vital in structuring and planning the report content. A systemised process of collecting data is required.

Communication and engagement

Communication is a strategic component of the reporting process in order to provide guidance on the information required as well as incorporating inputs from the members or other relevant parties. Including comments and inputs from the stakeholders are critical to ensuring a holistic reporting perspective.

Documenting and archiving

Reporting and data collection require a defined and structured documenting and archiving system to deal effectively with the sustainability reporting process. Information must be accessible and must be available to include in reports and to inform reports and systematic trends. In this regard archiving is a key component of the total data collection process.

Reporting and monitoring process

The process for reporting and monitoring of the CBA's key performance indicators could follow the steps outlined in Figure 20.

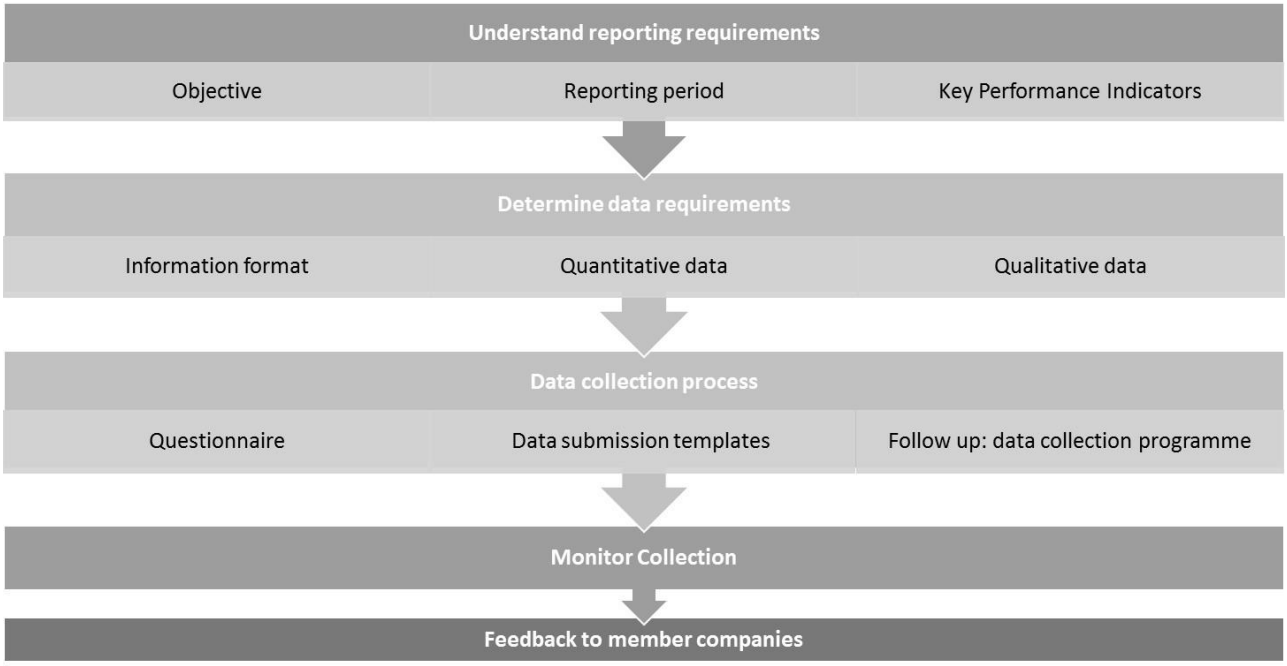


Figure 20: Reporting and monitoring process

Potential monitoring system

An example of a possible monitoring system that may be considered by the CBA is provided in Figure 21.

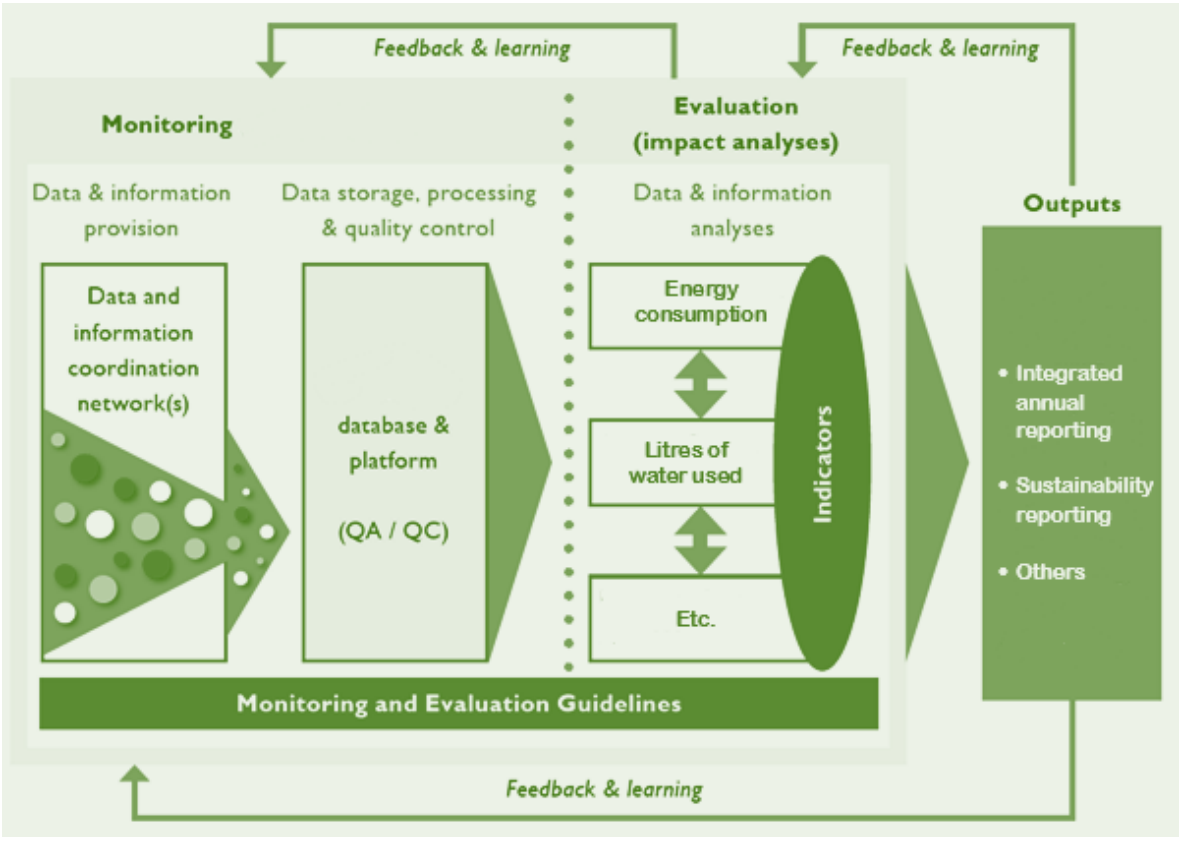


Figure 21: Example of a monitoring and evaluation system

6. Future Vision

CBA Members were invited to provide their endorsement of the following proposed vision statements, or recommend alternatives, at the CBA's Annual General Meeting on 13 May 2017.

> *"To supply society with good quality, durable clay bricks for a sustainable future."*

The majority of the questionnaire respondents (20 out of 21) indicated that they support the proposed vision statement.

Notes

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www.claybrick.org

Promoting Inclusive Sustainable Practices in the South African Clay Brick Sector

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CLAYBRICK for good

THE VOICE OF THE CLAY BRICK INDUSTRY

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