National Accounts

Environmental Economic Accounts

Environmental Economic Accounts Compendium

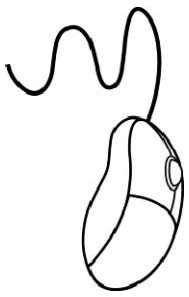
Report No.: 04-05-20
March 2014

Statistics South Africa

The South Africa I know, the home I understand

20 YEARS OF FREEDOM
south africa 1994 - 2014

Please scroll down



Environmental Economic Accounts Compendium

Pali Lehohla
Statistician-General

Report number: 04-05-20
Statistics South Africa
March 2014

Environmental Economic Accounts Compendium

Published by Statistics South Africa, Private Bag X44, Pretoria 0001

Environmental Economic Accounts Compendium / Statistics South Africa. Pretoria: Statistics South Africa, 2014
Report No. 04-05-20
Title continuous in English only
ISBN: 978-0-621-42500-0

A complete set of Stats SA publications is available at Stats SA Library and the following libraries:
National Library of South Africa, Pretoria Division
National Library of South Africa, Cape Town Division
Library of Parliament, Cape Town
Bloemfontein Public Library
Natal Society Library, Pietermaritzburg
Johannesburg Public Library
Eastern Cape Library Services, King William's Town
Central Regional Library, Polokwane
Central Reference Library, Nelspruit
Central Reference Collection, Kimberley
Central Reference Library, Mmabatho

This report is available on the Stats SA website: www.statssa.gov.za

Copies are available from: Printing and Distribution, Statistics South Africa

Tel: 012 310 8044/310 8161
Fax: 012 321 7381
012 310 2973
Email: distribution@statssa.gov.za

Contents

Abbreviations and acronyms

cm	Centimetres
DEA	Department of Environmental Affairs
DoE	Department of Energy
Eskom	Electricity Supply Commission
GDP	Gross domestic product
km	Kilometres
m	Metres
MDGs	Millennium Development Goals
PGMs	Platinum group metals
SAEO	South Africa Environment Outlook
SANBI	South African National Biodiversity Institute
SEEA	System for Integrated Environmental and Economic Accounting
Stats SA	Statistics South Africa
TAC	Total allowable catch
UNSD	United Nations Statistics Division
WRC	Water Research Commission

Figures, maps and tables

Background

The System for Integrated Environmental and Economic Accounting (SEEA) is an international standard that is continually expanded by the United Nations Statistics Division (UNSD). Some of the key focuses are expansion, implementation and experimental ecosystem services accounts. Statistics South Africa is harmonising its discussion documents into one report that includes the various sectors, namely energy, fisheries and minerals. Indicators derived from the environmental economic accounts tables are featured. The complete tables that include physical stocks and flows, as well as monetary tables for minerals are published as a separate work book to allow users to manipulate and analyse the information to suit their requirements.

The development of environmental economic accounts is changing from supply to demand driven. There is a growing demand for environmental economic accounts in South Africa. The Department of Environmental Affairs (DEA) perused the Energy and Fishery Accounts for South Africa to update specific sections in the South Africa Environment Outlook (SAEO) 2012. Statistics South Africa (Stats SA) and the South African National Biodiversity Institute (SANBI) have formed a partnership to develop ecosystem accounts. These are in an experimental phase with the focus on rivers. As these ecosystem accounts are further developed, key elements will become part of this report in future. Together with the Water Research Commission (WRC), Stats SA is exploring avenues to develop a framework, methodology and data sources to start water accounts for South Africa.

The first environmental economic account was published in September 2002 and its focus was on Water. The document focused on one of the nineteen Water Management Areas of South Africa – the Upper Vaal. The focus was internal to Stats SA and an external consultant was appointed to compile the account. The environmental economic accounts are a continuously expanding programme. Currently there are annual updates of the minerals, energy and fisheries tables. Water accounts provide the biggest challenge in terms of the availability of regularly updated data.

Chapter 1 – Energy

1.1 Overview

The following chapter provides examples of indicators that can be derived from the energy accounts, based on the energy balances from the Department of Energy (DoE).

The South African economy depends heavily on energy resources provided from coal. Coal dominates primarily because it is abundant and relatively cheap by international standards. South Africa's coal mining comprises 47% underground mining and 53% opencast mining operations. Many of the deposits can be exploited at extremely favourable costs, and as a result a large coal mining industry has developed. South Africa has large coal and uranium reserves. In 2011, South African mines produced 252 756 845 tons of coal. In 2011 there were 119 years left to depletion, given current rates of extraction and proven resources at 30 156 000 000 tons. South Africa exports 29% of produced coal to most of Europe and the Far East, through the Richards Bay coal terminal, making South Africa the sixth largest coal exporting country in the world.

Oil and gas explorations are limited in South Africa. Small oil and gas fields are situated off the south coast of Mossel Bay. Due to limited oil fields in the country, the bulk of crude oil is imported from the Middle East and Africa (Saudi Arabia, Iran, Kuwait, Yemen, Qatar, Iraq, Nigeria, Egypt and Angola). The small gas fields in South Africa supply Mossgas, a project started in 1987 to exploit offshore gas deposits.

Other energy resources in South Africa include biomass (such as wood and dung), natural gas, hydropower, nuclear power, solar power, wave power and wind power. Limited reserves of hydropower exist. South Africa has a huge potential for developing solar power, especially in the Northern Cape, with considerable potential for wind power existing in the coastal regions.

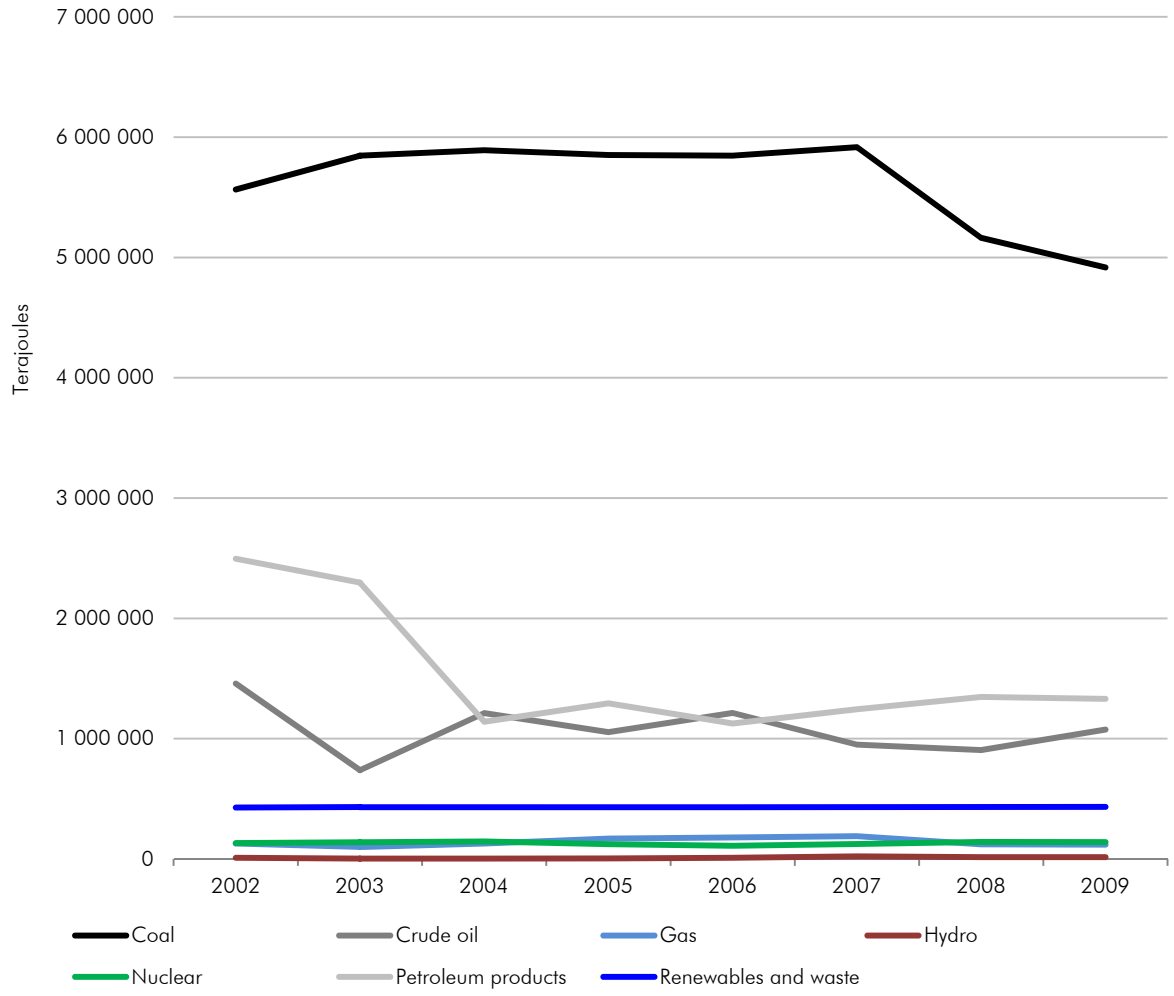
Energy is a key driver of South Africa's economy and the energy intensity as a measure of gross domestic product (GDP) is above average. It is largely as a result of the economy's structure, with dominating large-scale, energy intensive primary mineral beneficiation and mining industries. Coal, as the major indigenous energy resource, is relied on for the generation of most of the country's electricity and a significant proportion of its liquid fuels. Diversification of the primary energy mix, the bulk of which comprises coal, is especially challenging.[1,2]

The key findings for energy are focused on distribution of primary energy supply by source and energy use by sector over an eight year period from 2002 to 2009. The sources of primary energy are coal, crude oil, gas, hydro, nuclear, petroleum products, and renewables and waste. Sectors that use energy are agriculture and fishing, commerce, construction, domestic, electricity, gas and steam production, manufacturing, mining and quarrying, and transport, storage and communication.

1.1.1 Primary energy supply by source, 2002 to 2009

Figure 1.1.1 and Table 1.1.1 show energy supplied by the various sources between 2002 and 2009. Coal, crude oil and petroleum products supplied the most primary energy in the total mix between the various sources.

Figure 1.1.1: Primary energy supply by sources, 2002–2009



Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*.[3]

Table 1.1.1: Primary energy supply by source, 2002–2009

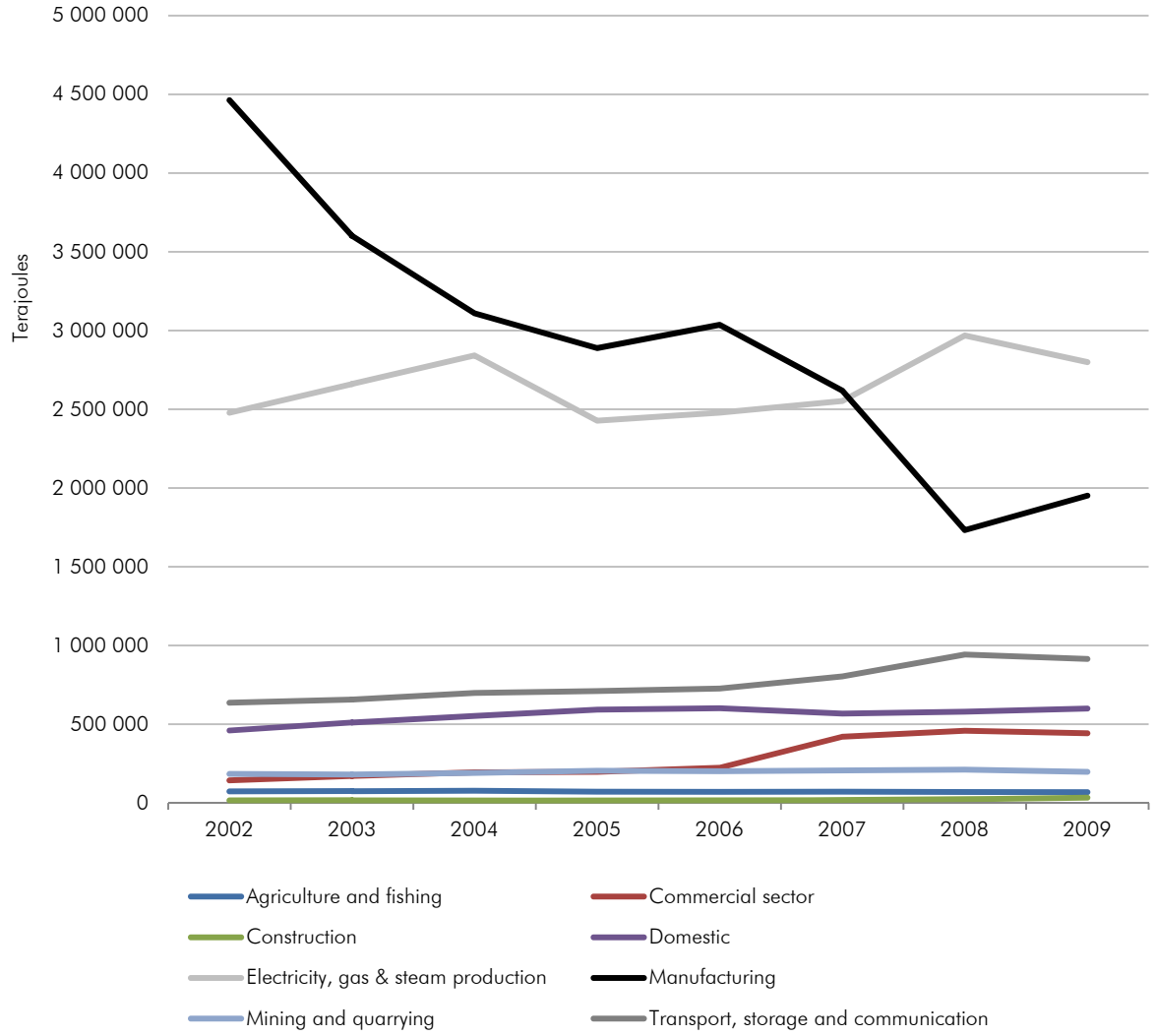
	2002	2003	2004	2005	2006	2007	2008	2009
Energy source				Terajoules				
Coal	5 564 663	5 845 989	5 892 359	5 851 419	5 845 839	5 917 588	5 162 613	4 916 727
Crude oil	1 458 054	737 474	1 212 633	1 054 539	1 214 122	950 040	905 344	1 074 807
Gas	127 137	99 062	127 842	169 888	177 998	189 162	121 430	118 904
Hydro	8 485	2 890	2 890	4 199	9 895	21 041	14 514	15 097
Nuclear	130 811	138 142	145 801	123 193	109 375	123 458	141 862	139 702
Petroleum products	2 495 973	2 297 299	1 140 938	1 293 215	1 126 267	1 244 781	1 346 547	1 331 161
Renewables & waste	426 467	430 427	430 427	430 427	430 427	430 427	432 267	432 267
Total supply	10 211 590	9 551 282	8 952 891	8 926 879	8 913 923	8 876 497	8 124 576	8 028 664
Energy source				% Change from previous period				
Coal		5,1%	0,8%	-0,7%	-0,1%	1,2%	-12,8%	-4,8%
Crude oil		-49,4%	64,4%	-13,0%	15,1%	-21,8%	-4,7%	18,7%
Gas		-22,1%	29,1%	32,9%	4,8%	6,3%	-35,8%	-2,1%
Hydro		-65,9%	0,0%	45,3%	135,6%	112,6%	-31,0%	4,0%
Nuclear		5,6%	5,5%	-15,5%	-11,2%	12,9%	14,9%	-1,5%
Petroleum products		-8,0%	-50,3%	13,3%	-12,9%	10,5%	8,2%	-1,1%
Renewables & waste		0,9%	0,0%	0,0%	0,0%	0,0%	0,4%	0,0%
Total		-6,5%	-6,3%	-0,3%	-0,1%	-0,4%	-8,5%	-1,2%

Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. [3]

1.1.2 Energy use by sector, 2002 to 2009

Total energy used by the various sectors is shown in Figure 1.1.2 and Table 1.1.2 for the period 2002 to 2009. The sectors that used the most energy are manufacturing, and electricity, gas and steam production.

Figure 1.1.2: Energy use by sector, 2002–2009



Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. [3]

Table 1.1.2: Energy use by sectors, 2002–2009

	2002	2003	2004	2005	2006	2007	2008	2009
Energy sector				Terajoules				
Agriculture & fishing	72 904	74 998	77 988	71 534	70 385	71 441	70 241	69 242
Commercial	143 597	171 599	194 992	197 644	224 133	420 637	459 064	442 575
Construction	15 816	16 939	15 982	16 535	15 665	17 302	25 344	34 098
Domestic	459 920	510 980	552 888	592 930	601 305	567 418	580 124	599 330
Electricity, gas & steam production	2 478 424	2 660 454	2 841 850	2 427 551	2 478 506	2 552 294	2 968 423	2 799 490
Manufacturing	4 462 893	3 602 037	3 109 626	2 888 487	3 036 673	2 619 092	1 732 371	1 952 219
Mining & quarrying	183 795	180 699	190 274	204 592	201 982	206 350	211 374	198 055
Transport, storage & communication	636 332	656 520	698 552	710 943	726 596	803 918	942 397	914 885
Total sector use	8 453 681	7 874 226	7 682 151	7 110 216	7 355 244	7 258 452	6 989 337	7 009 893
Energy sector				% Change from previous period				
Agriculture & fishing		2,9%	4,0%	-8,3%	-1,6%	1,5%	-1,7%	-1,4%
Commercial		19,5%	13,6%	1,4%	13,4%	87,7%	9,1%	-3,6%
Construction		7,1%	-5,7%	3,5%	-5,3%	10,5%	46,5%	34,5%
Domestic		11,1%	8,2%	7,2%	1,4%	-5,6%	2,2%	3,3%
Electricity, gas & steam production		7,3%	6,8%	-14,6%	2,1%	3,0%	16,3%	-5,7%
Manufacturing		-19,3%	-13,7%	-7,1%	5,1%	-13,8%	-33,9%	12,7%
Mining & quarrying		-1,7%	5,3%	7,5%	-1,3%	2,2%	2,4%	7,8%
Transport, storage & communication		3,2%	6,4%	1,8%	2,2%	10,6%	17,2%	-2,9%
Total		-6,9%	-2,4%	-7,4%	3,4%	-1,3%	-3,7%	0,3%

Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. [3]

Chapter 2 – Fisheries

2.1 Overview

South Africa's coastline spans 3 200 kilometres (km), linking the east and west coasts of Africa. Its shores are rich in biodiversity, with some 10 000 species of marine plants and animals recorded. The productive waters of the West Coast support a variety of commercially exploited marine life that includes hake, anchovy, sardine, horse mackerel, tuna, snoek, rock lobster and abalone. On the East Coast one finds squid, linefish and a whole range of intertidal resources that provide an important source of food and livelihoods for coastal communities. Marine life that is not harvested, such as whales, dolphins and seabirds, is increasingly recognised as a valuable resource for nature-based tourism.

The South African fishing industry is well managed and South Africa is one of the world's leading countries in the implementation of an ecosystem approach for fisheries management. The coastline provides substantial opportunities for economic and social development. However, it is a resource threatened by inappropriate development, pollution, poaching and over-use. There are two components to the fishing sector: wild capture and aquaculture. Programmes are developed to reduce the degradation of the marine environment through policies that promote conservation and sustainable use of marine-living resources. It also aims to restore and maintain productive capacity and biodiversity of the marine environment and protect human health.

The projected increase in demand for high-end fisheries products provides an opportunity for substantial increases in aquaculture production. South Africa's commercial fishery employs about 27 000 people. Total annual fish production from marine fisheries exceeds 600 000 tons. With South Africa's environmental potential for aquaculture and the state of development of its industry, production could grow from 3 543 tons to more than 90 000 tons over the next 10 to 20 years. According to the South Africa Yearbook 2011/12, the fishing industry has an annual turnover of about R80 billion and contributes 0,5% to the GDP of the country.

As of July 2010, the commercial harvesting of abalone was opened to allow fishing communities to derive a livelihood from the sea. This came with multifaceted conditions to ensure that social, economic and security plans and structures were in place to support communities, especially along the entire south-western and west coast of South Africa.

The fishing sector comprises large-scale operators as well as small-scale, artisanal or recreational fishermen and women. The Small-Scale Fisheries Policy aims to support investment in community entities to take joint responsibility for sustainable management of the fishery resources and to address the depletion of critical fish stocks.

This document focuses on hake, West Coast rock lobster, abalone, Cape horse mackerel and South Coast rock lobster as the main marine resources that contribute to the economy.[2,4]

2.2 Hake

The location of hake (*Merluccius paradoxus and M. capensis*) fishing waters is in the South East Atlantic within the South African 200 nautical mile Economic Exclusion Zone. The fishing gear that is used is bottom trawl and the season is year-round. Products include whole, headed and gutted, fillets, steaks, portions, minced, chilled, coated, frozen block, marinated, loins, pickled, ready meal, and smoked.[4,5]

Trawl fisheries targeting hake provide over half of the value of all fisheries in South Africa. The main export markets are Europe, Australia and the United States of America. The offshore trawl fishery mostly targets deepwater *M. paradoxus* on the shelf edge from the Namibian border southwards. Shallow water *M. capensis* is the target of the inshore trawl fishery, which operates mostly on the Agulhas Bank off the South Coast. The two species overlap in their depth distribution, and both are found around the entire South African coast. Growth in both species is slow, and fish can reach 115 centimetres (cm) in size. Hake are piscivorous as adults, feeding at night, whereas they aggregate near the sea bottom during the day, when they are targeted by trawlers.

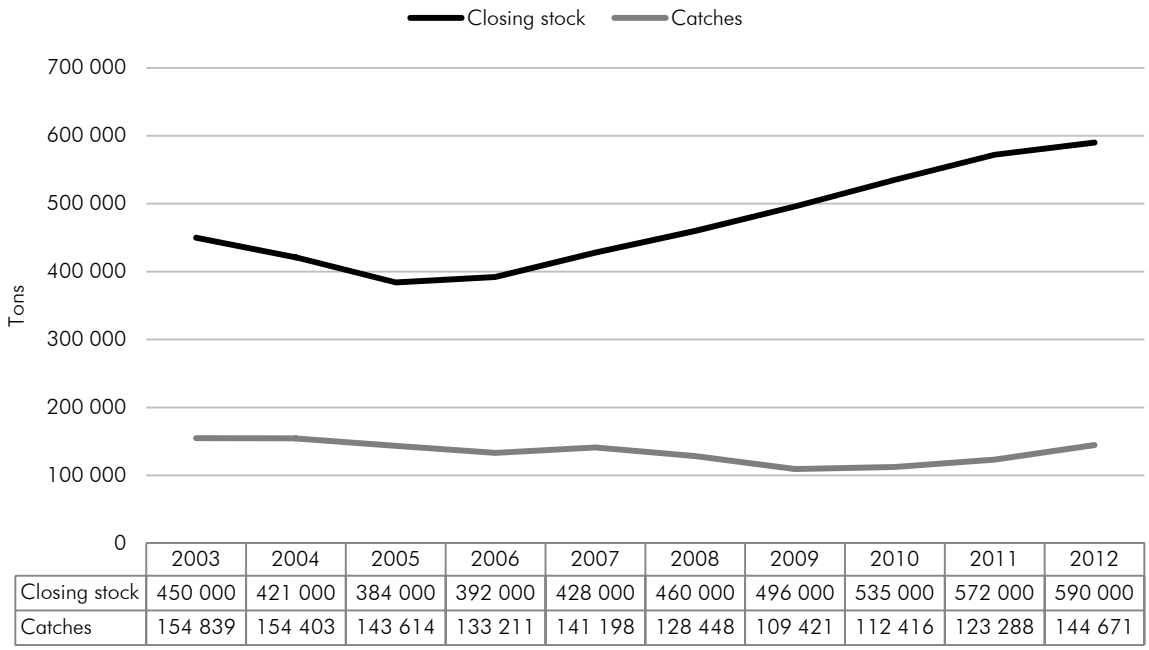
The South African hake fishery has become more inclusive and consultative recently. All fishing right holders have signed Codes of Conduct, committing them to compliance procedures and accepting the concept of sustainable harvesting. An Operational Management Plan is in place to allow the recovery of *M. paradoxus* stocks to sustainable levels within 20 years.[6]

The key findings for the hake commercial fishing industry are focused on total catches and closing stock over a ten year period from 2003 to 2012.

2.2.1 Hake closing stock and total catches, 2003 to 2012

The closing stock for hake increased from 450 000 tons in 2003 to 590 000 tons in 2012. This is an increase of 31,1% over the ten year period. Total catches for hake decreased from 154 839 tons in 2003 to 144 671 tons in 2012. This is a decrease of 6,5% over the ten year period.

Figure 2.2.1: Hake closing stock and total catches, 2003–2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock	450 000	421 000	384 000	392 000	428 000	460 000	496 000	535 000	572 000	590 000
Catches	154 839	154 403	143 614	133 211	141 198	128 448	109 421	112 416	123 288	144 671

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 2.2.1: Hake closing stock and total catches, 2003–2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
					Tons					
Closing stock	450 000	421 000	384 000	392 000	428 000	460 000	496 000	535 000	572 000	590 000
Catches	154 839	154 403	143 614	133 211	141 198	128 448	109 421	112 416	123 288	144 671
					% Change from previous period					
Closing stock		-6,4%	-8,8%	2,1%	9,2%	7,5%	7,8%	7,9%	6,9%	3,1%
Catches		-0,3%	-7,0%	-7,2%	6,0%	-9,02%	-14,8%	2,7%	9,7%	17,3%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

2.3 West Coast rock lobster

The West Coast rock lobster (*Jasus lalandii)* is a species of spiny lobster found off the coast of southern Africa. It occurs in the shallow waters from Cape Cross in Namibia to Algoa Bay in South Africa, where it can usually be found in rocky outcrops in the sea. West Coast rock lobsters are slow-growing, long-lived animals listed on the National Environmental Management Biodiversity Act of 2004 as a threatened and protected species, which means that it is a species of high conservation value or national importance that requires national protection. There is concern over the 2012 total allowable catch (TAC) that was not set according to recovery targets and scientific recommendations, raising concerns about the future management of this stock. Products are frozen whole (tailed) and fresh (live).

West Coast rock lobster is caught via a number of methods, mainly using traps or ring-nets. Hand collection is used by recreational fishers. These methods are very selective, and thus the bycatch levels are low or non-existent. These methods are minimally destructive to benthic habitats or benthic species (characteristics of the sea bottom and the plants and animals that live there), but depletion of lobsters will have had adverse effects on the benthos as West Coast rock lobster has important effects as a predator.

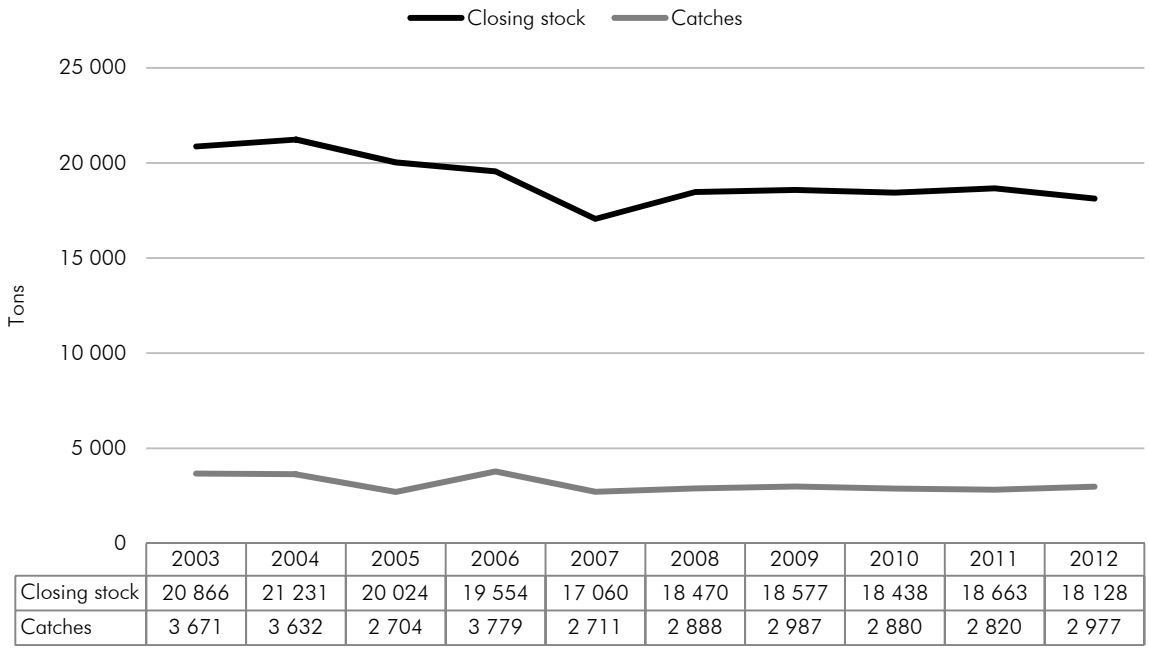
The commercial fishery for West Coast rock lobster is controlled by TAC, which is subdivided across geographical areas. However, there is a considerable amount of poaching from the stock, which adds to the uncertainty of the stock assessment. Other issues of concern are whale entanglements in the gear as well as gear loss, which results in ghost fishing. This concern has been decreased because the netting for the traps is made of biodegradable materials. Ecosystem based management has been put in place for this fishery.[4]

The key findings for West Coast rock lobster include commercial, recreational, and subsistence catches, as well as poaching estimates. The focus is on total catches and closing stock over a ten year period from 2003 to 2012.

2.3.1 West Coast rock lobster closing stock and total catches, 2003 to 2012

The closing stock for West Coast rock lobster declined from 20 866 tons in 2003 to 18 128 tons in 2012. This is a decline of 13,1% over the ten-year period. Total catches for West Coast rock lobster decreased from 3 671 tons in 2003 to 2 977 tons in 2012. This is a decrease of 18,9% over the ten year period.

Figure 2.3.1: West Coast rock lobster closing stock and total catches, 2003–2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock	20 866	21 231	20 024	19 554	17 060	18 470	18 577	18 438	18 663	18 128
Catches	3 671	3 632	2 704	3 779	2 711	2 888	2 987	2 880	2 820	2 977

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 2.3.1: West Coast rock lobster closing stock and total catches, 2003–2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
					Tons					
Closing stock	20 866	21 231	20 024	19 554	17 060	18 470	18 577	18 438	18 663	18 128
Catches	3 671	3 632	2 704	3 779	2 711	2 888	2 987	2 880	2 820	2 977
					% Change from previous period					
Closing stock		1,7%	-5,7%	-2,3%	-12,8%	8,3%	0,6%	-0,7%	1,2%	-2,9%
Catches		-1,1%	-25,6%	39,8%	-28,3%	6,5%	3,4%	-3,6%	-2,1%	5,6%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

2.4 Abalone

Abalone (*Haliotis midae*), locally called 'perlemoen', is a large marine snail that is a highly prized seafood delicacy in the Far East. Abalone are slow-growing, reaching sexual maturity at around seven years of age, and take approximately 8 to 9 years to reach the minimum legal size of 11,4 cm shell breadth. Abalone reach a maximum size of 18 cm shell breadth, and are believed to live to an average age of greater than 30 years. They occur in shallow waters of below 20 metres (m) in depth, with the highest densities in waters of below 5 m in depth.

Abalone are widely distributed around the South African coastline, from St Helena Bay on the West Coast to just north of Port St Johns along the East Coast. Historically, the resource was most abundant in the region between Cape Columbine and Quoin Point, where it supported a commercial fishery for almost 60 years. Along the East Coast, the resource was considered to be discontinuous and sparsely distributed and as a result no commercial fishery for abalone was implemented there. However, harvesting of abalone along the East Coast was allowed for a number of years through the allocation of experimental permits and subsistence exemptions. The recreational sector also targeted abalone for many years, but due to the decline in the resource, this component of the fishery was suspended in 2003/2004.

Once a lucrative commercial fishery, earning up to approximately R100 million annually at the turn of the century, rampant illegal harvesting and continued declines in the abundance of the resource resulted in a total closure of the fishery in February 2008. The resource has also been heavily impacted by an ecosystem shift that was brought about by the migration of West Coast rock lobster into two of the main, most productive abalone fishing areas.

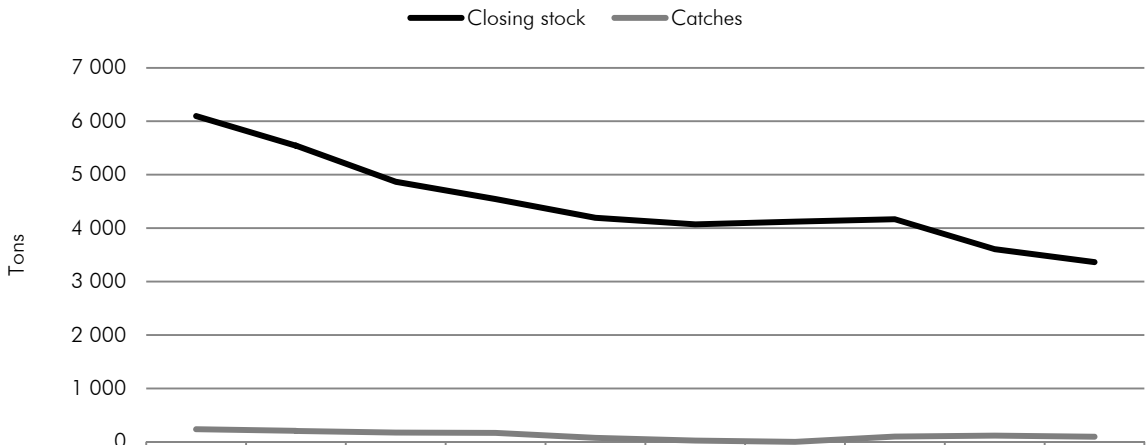
The commercial fishery subsequently re-opened in July 2010. Controlled experimental fisheries for abalone are currently being undertaken in False Bay and the Eastern Cape – areas that are not presently part of the commercial fishery. The purpose of these experiments is to determine the spatial distribution and abundance of the resource and whether these areas may be viable for sustainable fisheries in the future.[4]

The key findings for abalone include commercial and experimental sustainable estimates. The focus is on total catches and closing stock over a ten year period from 2003 to 2012.

2.4.1 Abalone closing stock and total catches, 2003 to 2012

The closing stock for abalone decreased from 6 096 tons in 2003 to 3 364 tons in 2012. This is a decline of 44,8% over the ten year period. Total catches for abalone declined from 234 tons in 2003 to 95 tons in 2012. This is a decline of 59,4% over the ten year period.

Figure 2.4.1: Abalone closing stock and total catches, 2003–2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock	6 096	5 543	4 866	4 544	4 194	4 071	4 122	4 168	3 606	3 364
Catches	234	204	175	169	75	24	0	99	116	95

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 2.4.1: Abalone closing stock and total catches, 2003–2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
					Tons					
Closing stock	6 096	5 543	4 866	4 544	4 194	4 071	4 122	4 168	3 606	3 364
Catches	234	204	175	169	75	24	0	99	116	95
					% Change from previous period					
Closing stock		-9,1%	-12,2%	-6,6%	-7,7%	-2,9%	1,3%	1,1%	-13,5%	-6,7%
Catches		-12,8%	-14,2%	-3,4%	-55,6%	-68,0%	-100,0%	-	17,2%	-18,1%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

2.5 Cape horse mackerel

Cape horse mackerel (*Trachurus capensis*) is a semi-pelagic shoaling fish that occurs on the continental shelf off Southern Africa from southern Angola to the Wild Coast.

Horse mackerel as a group are recognised by a distinct dark spot on the gill cover and a row of spiny scales (scutes) along the lateral line. It is, however, not easy to distinguish between the three species that occur in Southern Africa. Cape horse mackerel generally reach 40 to 50 cm in length and become sexually mature at around three years of age when they are roughly 20 cm long. They feed primarily on small crustaceans, which they filter from the water using their modified gillrakers. Historically, large surface schools of adult Cape horse mackerel occurred on the West Coast and supported a purse-seine fishery that made substantial catches. These large schools have since disappeared from the South African West Coast, but still occur off Namibia where horse mackerel are the most abundantly harvested fish. Adult horse mackerel currently occur more abundantly on the South Coast than the West Coast of South Africa.

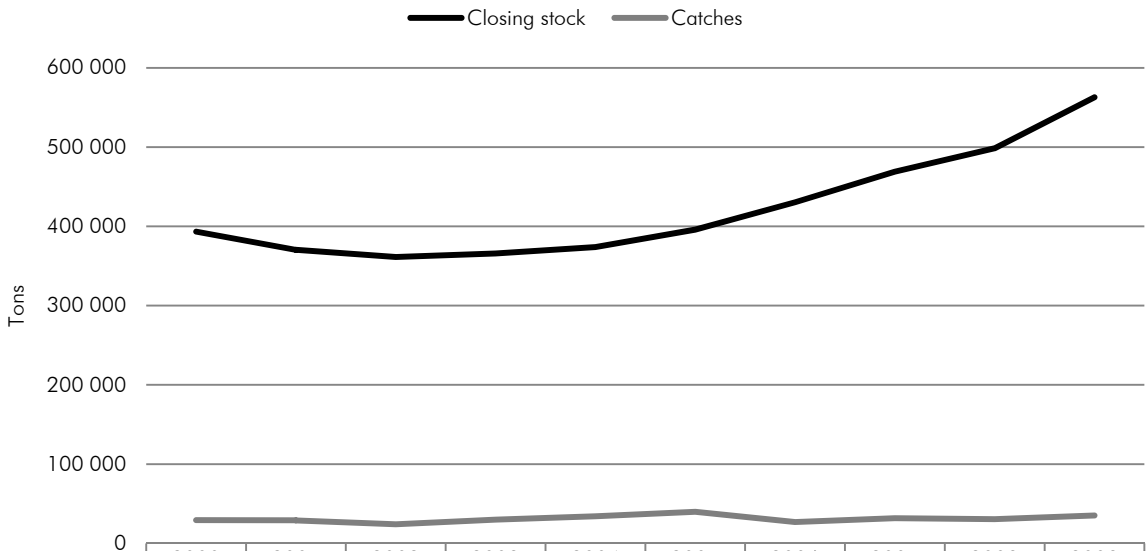
Adult Cape horse mackerel are taken as a bycatch by the demersal trawl fleet and as a targeted catch by the midwater trawl fleet, mainly on the South Coast. In addition, the pelagic purse-seine fleet on the West Coast takes juveniles as a bycatch. Cape horse mackerel yield a low value product and are a source of cheap protein.[4]

The key findings for Cape horse mackerel focus on bycatches by the demersal trawl fleet and as targeted catches by the midwater trawl fleet. The focus is on total catches and closing stock over a ten year period from 2000 to 2009.

2.5.1 Cape horse mackerel closing stock and total catches, 2000 to 2009

The closing stock for Cape horse mackerel increased from 393 262 tons in 2000 to 562 850 tons in 2009. This is a growth of 43,1% over the ten year period. Total catches for Cape horse mackerel increased from 29 142 tons in 2000 to 35 211 tons in 2009. This is an increase of 20,8% over the ten year period.

Figure 2.5.1: Cape horse mackerel closing stock and total catches, 2000–2009



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Closing stock	393 262	370 396	361 278	365 857	373 826	395 888	430 444	468 947	498 490	562 850
Catches	29 142	28 959	24 109	29 884	34 135	39 912	27 014	31 744	30 501	35 211

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 2.5.1: Cape horse mackerel closing stock and total catches, 2000–2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
					Tons					
Closing stock	393 262	370 396	361 278	365 857	373 826	395 888	430 444	468 947	498 490	562 850
Catches	29 142	28 959	24 109	29 884	34 135	39 912	27 014	31 744	30 501	35 211
					% Change from previous period					
Closing stock		-5,8%	-2,5%	1,3%	2,2%	5,9%	8,7%	8,9%	6,3%	12,9%
Catches		-0,6%	-16,7%	24,0%	14,2%	16,9%	-32,3%	17,5%	-3,9%	15,4%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

2.6 South Coast rock lobster

South Coast rock lobster (*Palinurus gilchristi*) is endemic to the southern coast of South Africa, where they occur on rocky substrata at depths of 50 to 200 m.

The fishery operates between East London and Cape Point and up to 250 km off-shore along the outer edge of the Agulhas Bank. Fishing gear is restricted to longlines with traps. It is the second largest rock lobster fishery in South Africa, and is capital intensive, requiring specialised equipment and large ocean-going vessels. For this reason, it is restricted to the commercial sector.

Products (frozen tails, whole or live lobster) are exported to the United States of America, Europe and the Far East. Sales are affected by seasonal overseas market trends and competition from other lobster-producing countries. High prices on international markets and the rand to dollar exchange rate make the sector lucrative.

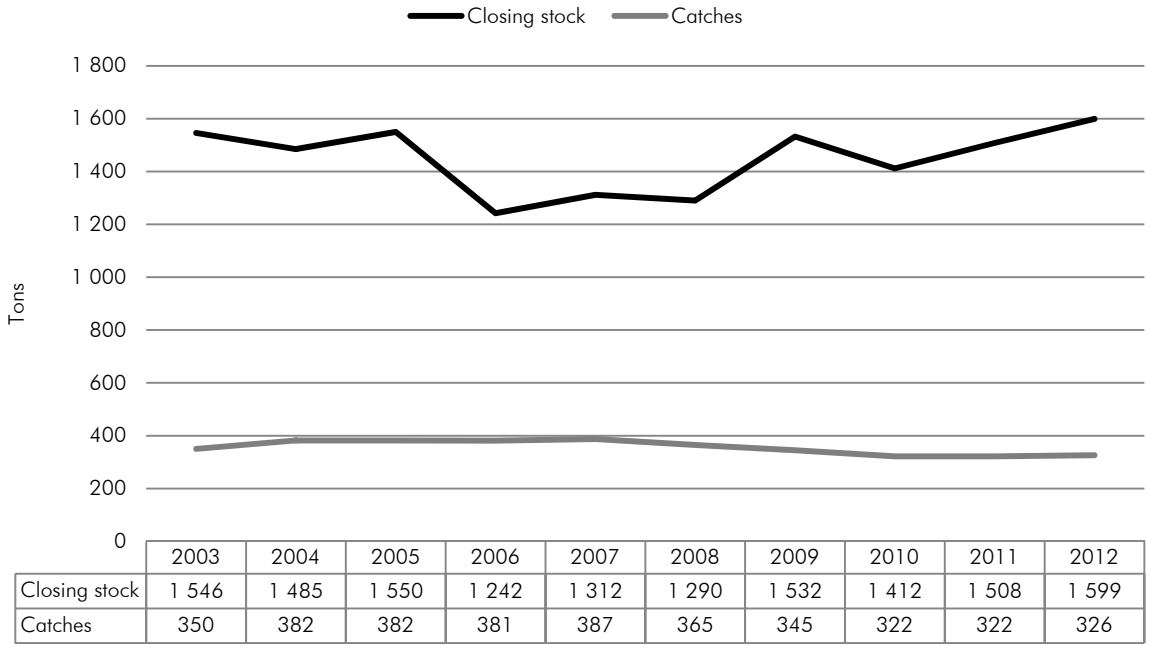
Longline trap-fishing is labour intensive and as such each boat requires approximately 30 officers and crew. The total sea-going complement of the fleet is about 300. The sector employs approximately 100 land-based factory (processing) and administrative staff.[4]

The key findings for South Coast rock lobster focus on specialised commercial harvesting requiring specialised equipment. The focus is on total catches and closing stock over a ten year period from 2003 to 2012.

2.6.1 South Coast rock lobster closing stock and total catches, 2003 to 2012

The closing stock for South Coast rock lobster increased from 1 546 tons in 2003 to 1 599 tons in 2012. This is a growth of 3,4% over the ten year period. Total catches for South Coast rock lobster declined from 350 tons in 2003 to 326 tons in 2012. This is a decline of 6,9% over the ten year period.

Figure 2.6.1: South Coast rock lobster closing stock and total catches, 2003–2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock	1 546	1 485	1 550	1 242	1 312	1 290	1 532	1 412	1 508	1 599
Catches	350	382	382	381	387	365	345	322	322	326

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 2.6.1: South Coast rock lobster closing stock and total catches, 2003–2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
					Tons					
Closing stock	1 546	1 485	1 550	1 242	1 312	1 290	1 532	1 412	1 508	1 599
Catches	350	382	382	381	387	365	345	322	322	326
					% Change from previous period					
Closing stock		-3,9%	4,4%	-19,9%	5,6%	-1,7%	18,8%	-7,8%	6,8%	6,0%
Catches		9,1%	0,0%	-0,3%	1,6%	-5,7%	-5,5%	-6,7%	0,0%	1,2%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Chapter 3 – Minerals

3.1 Overview

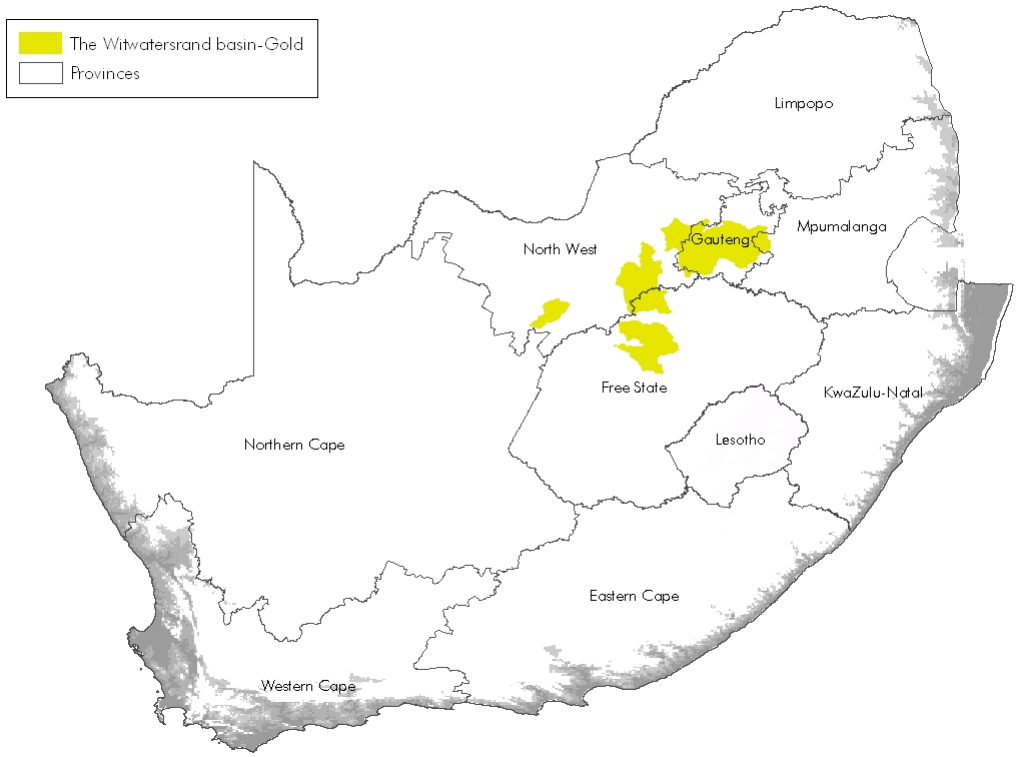
Mining and related industries provide critical inputs to the country's socio-economic development. The contribution of mining to GDP was 8,8% in 2011.[8] South Africa ranks among the top 10 countries with regard to production of minerals such as manganese, iron ore, gold, chrome and ferrochrome. The discovery of world-class diamond and gold deposits in the latter half of the 19th century laid the foundation for the emergence of South Africa from an agricultural to a modern industrial economy. The mining industry covers a wide spectrum of minerals in which South Africa has an exceptional mineral endowment. Mining plays a vital role as a foundation industry that stimulates key services, manufacturing and side-stream industries. Mining provides direct employment to about half a million economically active people.

South Africa's mineral wealth is found in well-known geological formations and settings, i.e. the Witwatersrand Basin (gold deposits), the Bushveld Complex (Platinum group metals (PGMs) deposits) and the Karoo Basin (coal deposits).

The Witwatersrand Basin

The geology and gold mines of the 'Ridge of White Waters' are world famous. Nearly half of all the gold ever mined has come from the extensive Witwatersrand conglomerate reefs that were discovered in 1886, not far from Johannesburg's city centre – seven major goldfields distributed in a crescent-like shape along the 350 km long basin, which produced more than 50 055 tons of gold. The Witwatersrand Basin yields 93% of the country's gold output.[2]

Map 3.1.1: The Witwatersrand Basin

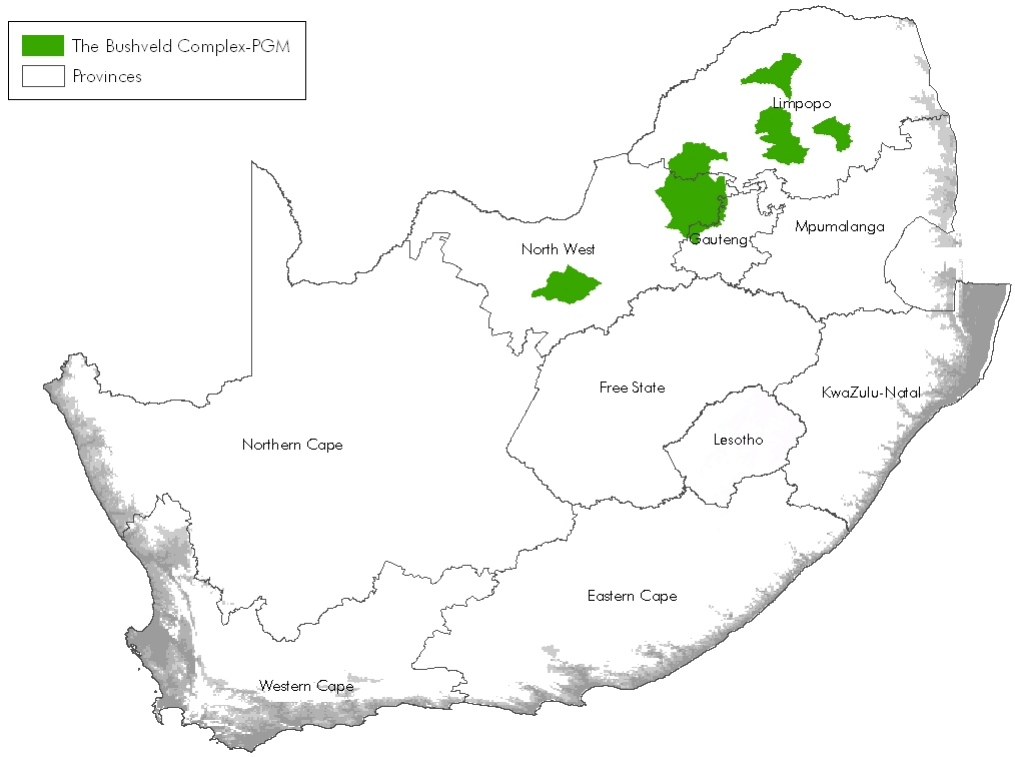


Source: Statistics South Africa.

The Bushveld Complex

The Bushveld Complex extends over an area of 65 000 square kilometres and reaches up to 8 km in thickness. It is by far the largest known layered igneous intrusion in the world and contains most of the world resources of chromium, PGMs and vanadium. The impressive igneous geology of the Bushveld complex can best be viewed in Mpumalanga, in the mountainous terrain around the Steelpoort Valley. The imposing Dwars River chromitite layers, platinum-bearing dunite pipes, the discovery site of the platinum-rich Merensky Reef, and the extensive magnetite-ilmenite layers and pipes near Magnet Heights and Kennedy's Vale are in this area. The Waterberg is an extraordinary location because it is a discovery of a new section of the Bushveld Complex that is called the geological wonder of the world. The Waterberg platinum deposit has grade thickness that exceeds many of the world's platinum mines.[9]

Map 3.1.2: The Bushveld Complex

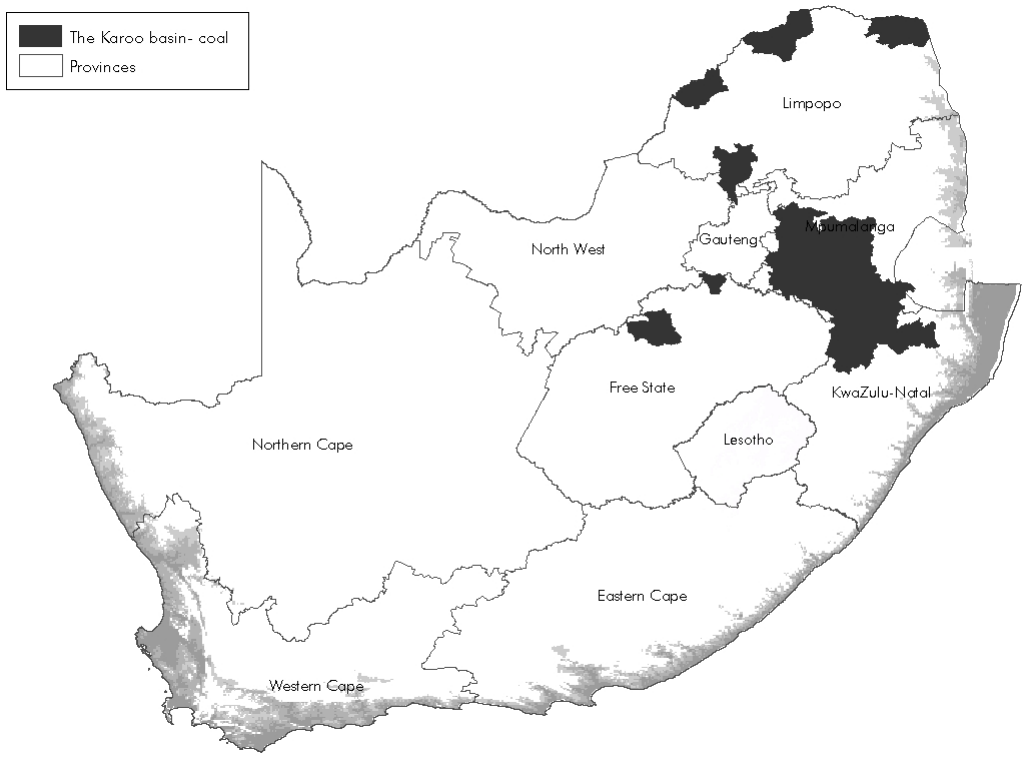


Source: Statistics South Africa.

The Karoo Basin

The Karoo Basin extends through Mpumalanga, KwaZulu-Natal, the Free State and Limpopo, hosting considerable bituminous coal and anthracite resources.[2] All of the known coal deposits in South Africa are hosted in sedimentary rocks of the Karoo Basin. The coals range in age from Early Permian (Ecca Group) through to Late Triassic (Molteno Formation) and are predominantly bituminous to anthracite in rank, which is a classification in terms of metamorphism under the influence of temperature and pressure. Based on variations in sedimentation, origin, formation, distribution and quality of the coal seams, coalfields are defined within the Karoo Basin. These variations are in turn attributed to specific conditions of deposition and the local tectonic history characteristic of each area.[10]

Map 3.1.3: The Karoo Basin

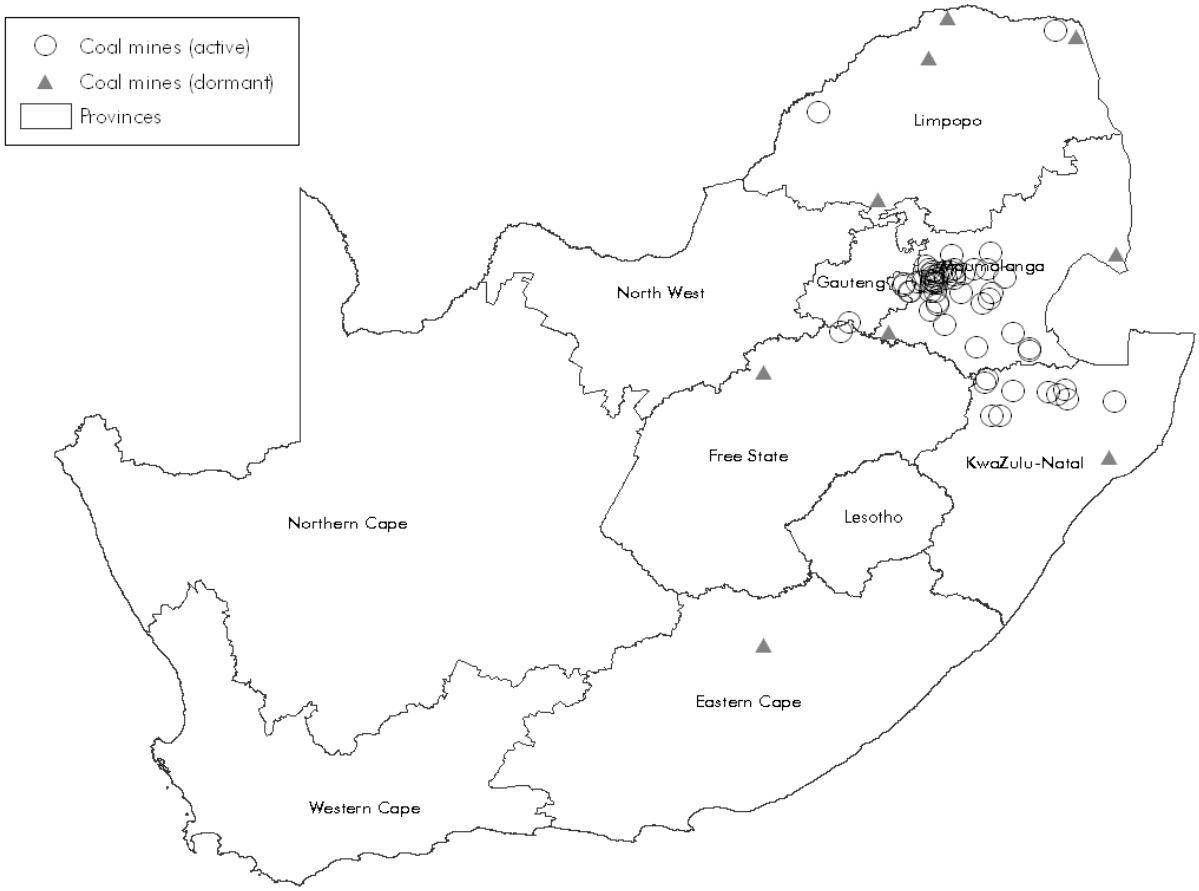


Source: Statistics South Africa.

3.2 Coal

South Africa's indigenous energy-resource base is dominated by coal. Internationally, coal is the most widely used primary fuel. Most of the country's primary energy needs are provided by coal. Many of the coal deposits can be exploited at extremely favourable costs and, as a result, a large coal-mining industry has developed. In addition to the extensive use of coal in the domestic economy, South Africa exports coal through the Richards Bay Coal Terminal, ranking South Africa as number six in coal exports worldwide. South Africa's coal mining is 47% underground mining and 53% opencast mining operations. The coal mining industry is highly concentrated in large mines. Coal production feeds electricity generation, petrochemical industries, general industries, the metallurgical industry, and merchants for local and export sales. By international standards, South Africa's coal deposits are relatively shallow with thick seams, which are easier to mine. The key role played by the country's coal reserves in the economy is illustrated by the fact that the Electricity Supply Commission (Eskom) ranks first in the world as a steam coal user and seventh as an electricity generator. Sasol is the largest coal-to-chemicals producer in the world.[2] The key findings for the coal mining industry are focused on production, years to depletion, volumes sold, value of sales, and resource reserves over a ten year period from 2002 to 2011.

Map 3.2.1: Geographic locations of coal mines

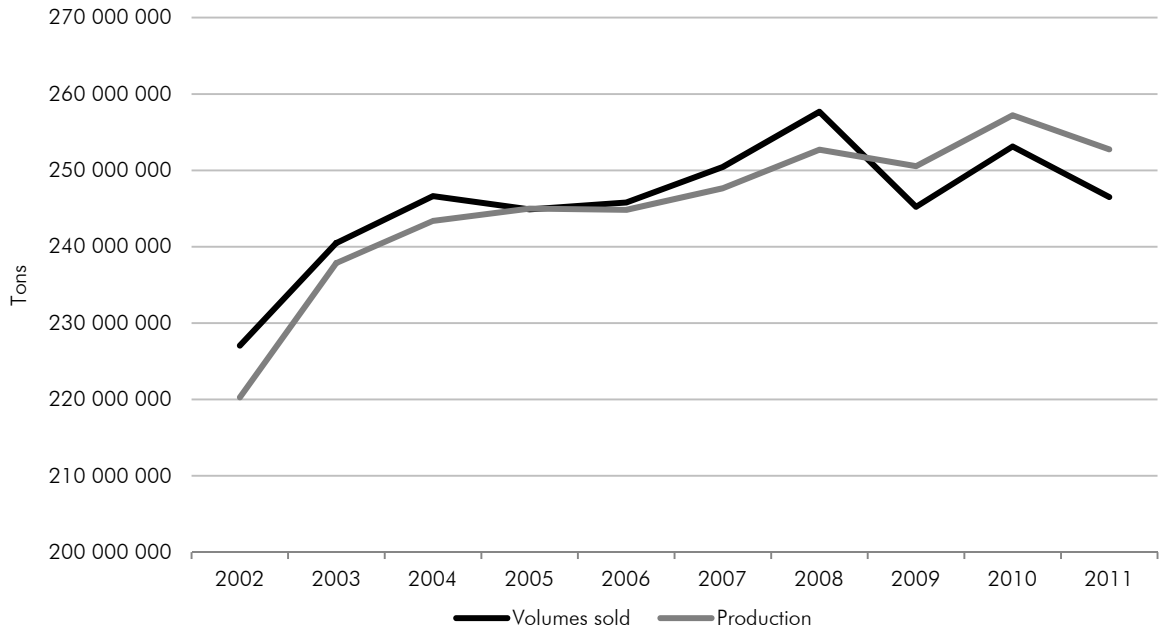


Source: Statistics South Africa.

3.2.1 Coal production and volumes sold, 2002 to 2011

Coal production increased from 220 269 559 tons in 2002 to 252 756 845 tons in 2011. This is a 14,7% increase in coal production (extraction) over ten years. The total volume of coal sold increased by 8,6% over ten years from 227 051 562 tons in 2002 to 246 512 359 tons in 2011.

Figure 3.2.1: Coal production and volumes sold, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.2.1: Coal production and volumes sold, 2002–2011

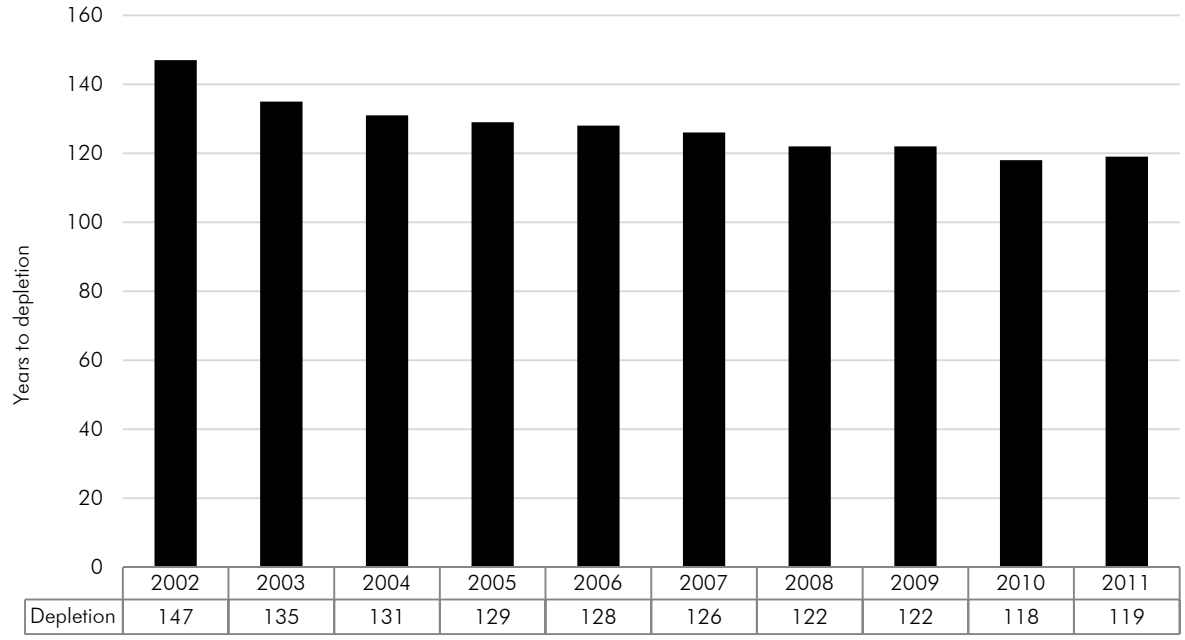
	2002	2003	2004	2005	2006
			Tons		
Production	220 269 559	237 872 103	243 371 530	244 988 246	244 832 433
Volumes sold	227 051 562	240 498 933	246 621 420	244 879 351	245 796 296
			% Change from previous period		
Production		8,0%	2,3%	0,7%	-0,1%
Volumes sold		5,9%	2,5%	-0,7%	0,4%
	2007	2008	2009	2010	2011
			Tons		
Production	247 666 358	252 699 108	250 538 125	257 205 807	252 756 845
Volumes sold	250 445 056	257 663 707	245 216 147	253 135 968	246 512 359
			% Change from previous period		
Production	1,2%	2,0%	-0,9%	2,7%	-1,7%
Volumes sold	1,9%	2,9%	-4,8%	3,2%	-2,6%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.2.2 Coal years to depletion, 2002 to 2011

The estimated number of years to depletion for proven coal reserves in 2011 was 119 years. In 2002 there were 147 years left to depletion decreasing to 119 years in 2011, which is a 19,0% decrease over the 10 years.

Figure 3.2.2: Coal years to depletion, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.2.2: Coal years to depletion, 2002–2011

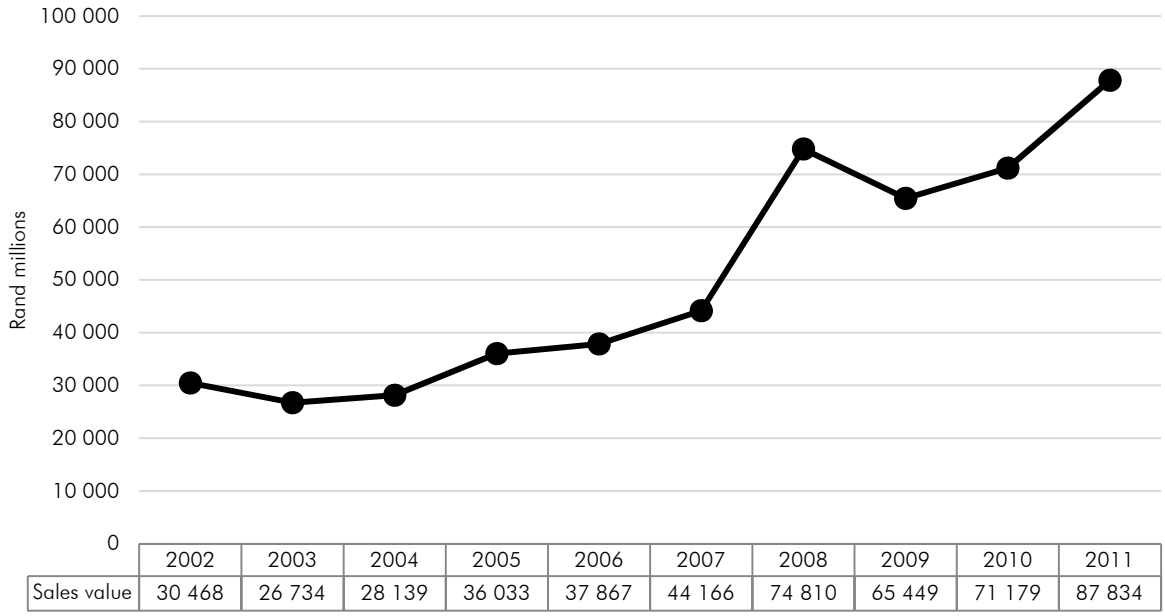
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Years to depletion									
147	135	131	129	128	126	122	122	118	119
% Change from previous period									
	-8,2%	-3,0%	-1,5%	-0,8%	-1,6%	-3,2%	0,0%	-3,3%	0,8%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.2.3 Coal sales, 2002 to 2011

The total value of coal sales for 2011 amounted to R87 834 million. This is a 23,4% increase from 2010 sales of R71 179 million.

Figure 3.2.3: Coal sales, 2002–2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales value	30 468	26 734	28 139	36 033	37 867	44 166	74 810	65 449	71 179	87 834

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.2.3: Coal sales, 2002–2011

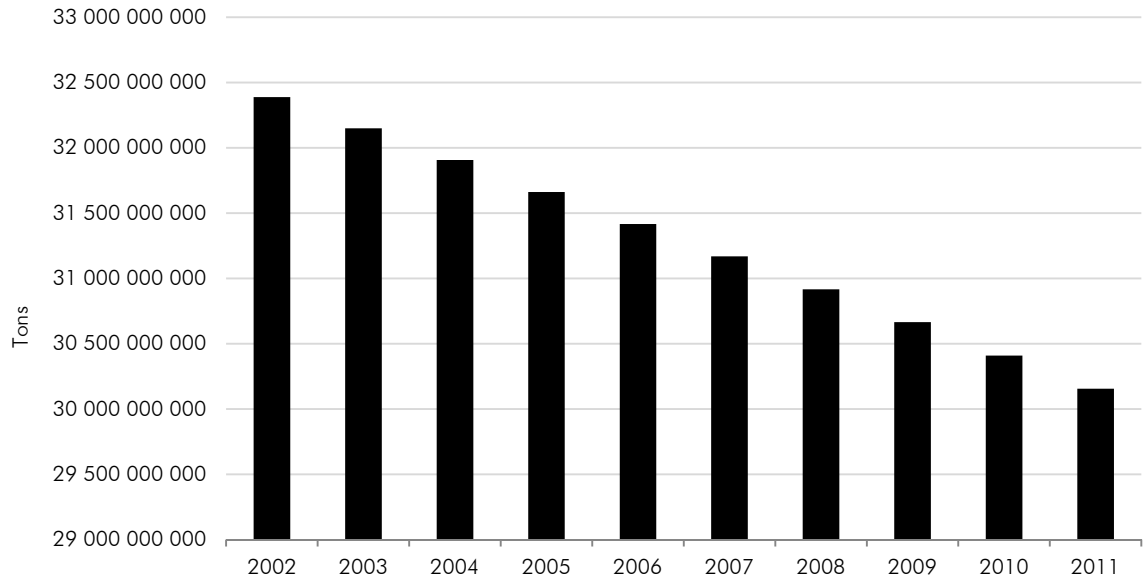
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rand millions									
30 468	26 734	28 139	36 033	37 867	44 166	74 810	65 449	71 179	87 834
% Change from previous period									
	-12,3%	5,3%	28,1%	5,1%	16,6%	69,4%	-12,5%	8,8%	23,4%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.2.4 Coal resource reserves, 2002 to 2011

Proven coal resource reserves were 30 156 000 000 tons in 2011. The decrease in proven coal reserves over the ten year period from 32 387 930 555 tons in 2002 to 30 156 000 000 tons in 2011 is 6,9%.

Figure 3.2.4: Coal resource reserves, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.2.4: Coal resource reserves, 2002–2011

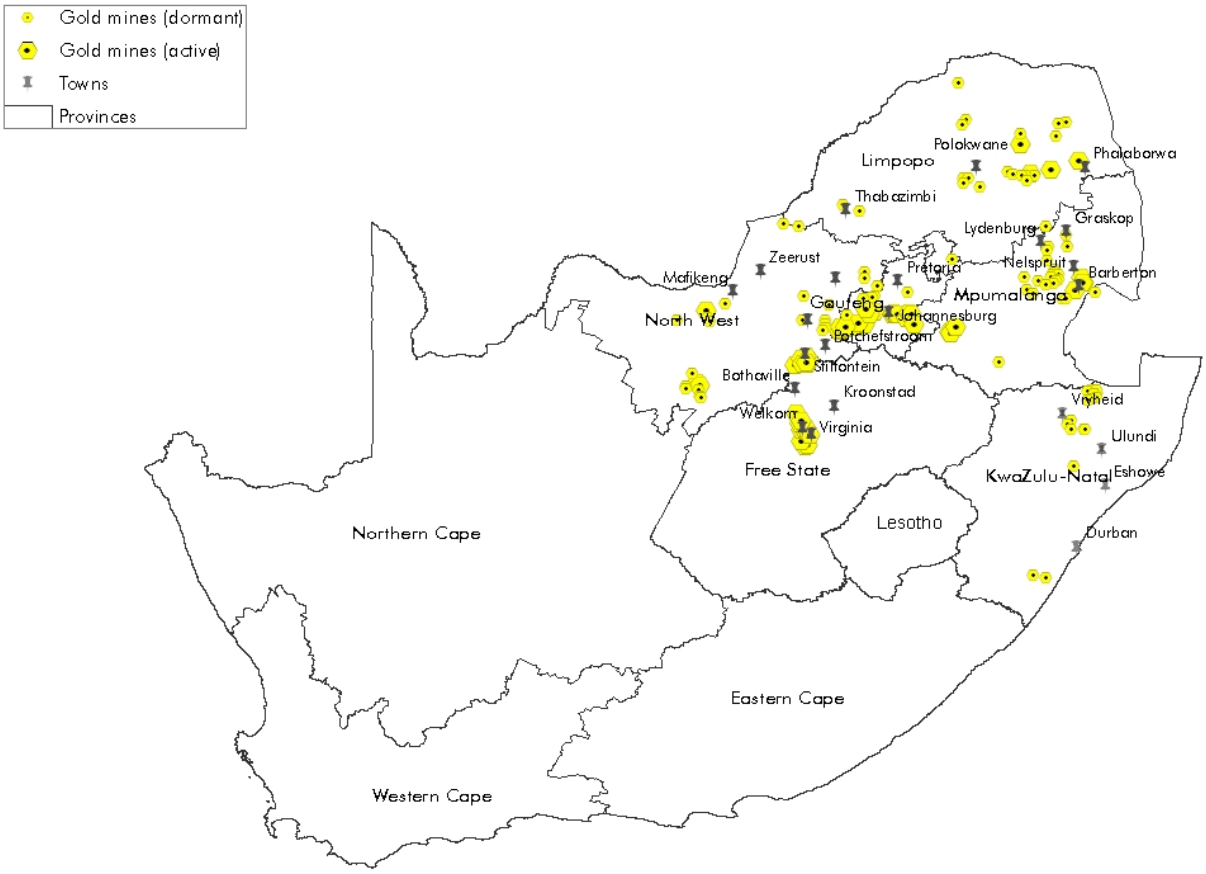
2002	2003	2004	2005	2006
Tons				
32 387 930 555	32 150 058 452	31 906 686 922	31 661 698 676	31 416 866 243
% Change from previous period				
	-0,7%	-0,8%	-0,8%	-0,8%
2007	**2008**	**2009**	**2010**	**2011**
Tons				
31 169 199 885	30 916 500 777	30 665 962 652	30 408 756 845	30 156 000 000
% Change from previous period				
-0,8%	-0,8%	-0,8%	-0,8%	-0,8%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.3 Gold

South Africa accounts for approximately 10% of the world's gold production. About 40% of the world's total gold reserves are found in the Witwatersrand Basin that stretches 400 km through Gauteng and Free State. Significant mining takes place in the greenstone belts in Mpumalanga and North West. South Africa's gold production decreased, resulting in the country dropping in production ranking from the second-largest to the fourth-largest producer in the world. The decrease in production is mainly as a result of the mining of lower-grade ore, influenced by higher rand gold prices, and temporary closure of shafts to maintain infrastructure. A contributing factor is new safety procedures to facilitate auditing. South Africa's gold-mining industry works at deeper levels and under more difficult conditions than any other mining industry in the world.[2] The key findings for the gold mining industry are focused on production, years to depletion, volumes sold, value of sales, and resource reserves over a ten year period from 2002 to 2011.

Map 3.3.1: Geographic locations of gold mines

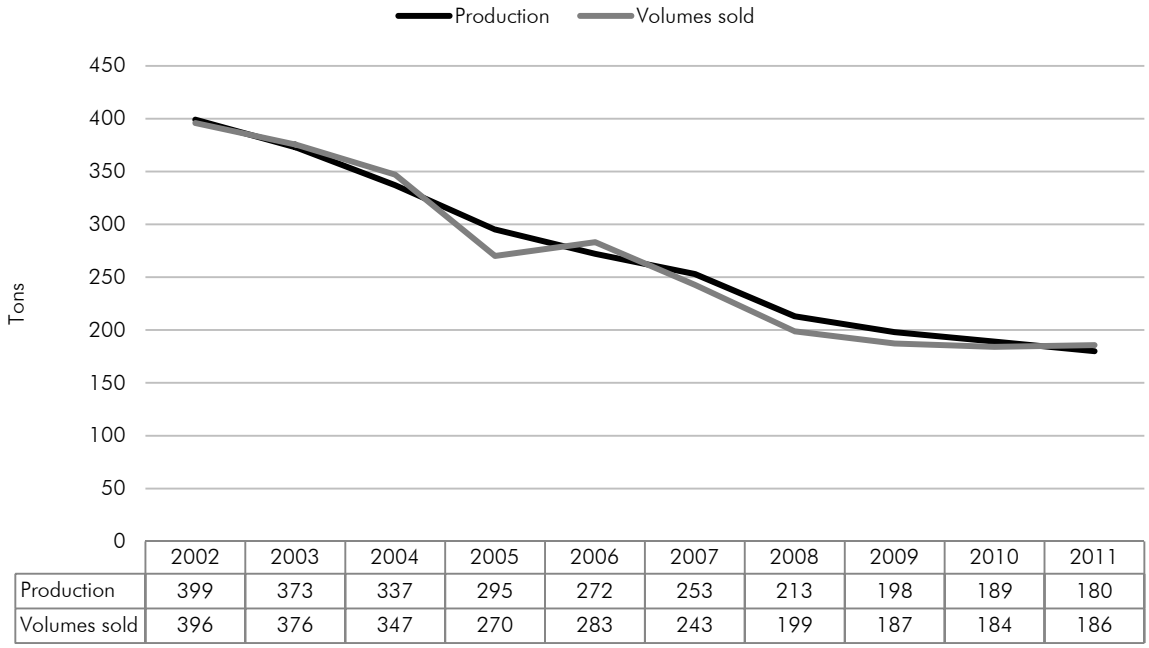


Source: Statistics South Africa.

3.3.1 Gold production and volumes sold, 2002 to 2011

Gold production decreased from 399 tons in 2002 to 180 tons in 2011. This is a 54,9% decrease in gold production over ten years. The total volume of gold sold decreased by 53,0% over ten years from 396 tons in 2002 to 186 tons in 2011.

Figure 3.3.1: Gold production and volumes sold, 2002–2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Production	399	373	337	295	272	253	213	198	189	180
Volumes sold	396	376	347	270	283	243	199	187	184	186

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.3.1: Gold production and volumes sold, 2002–2011

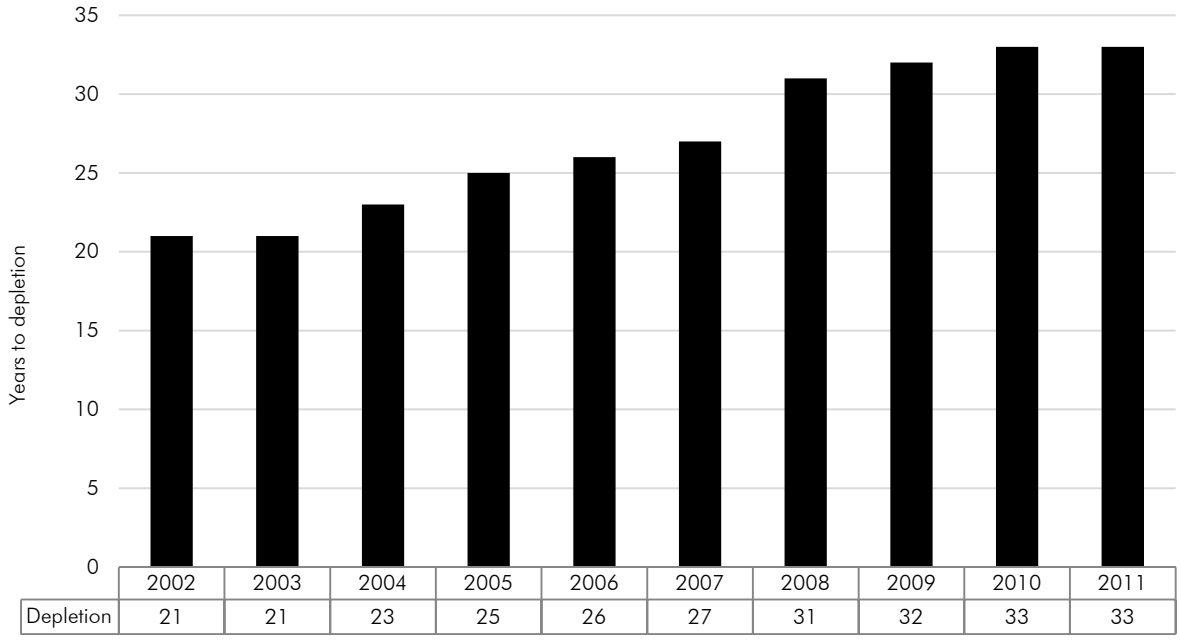
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
					Tons					
Production	399	373	337	295	272	253	213	198	189	180
Volumes sold	396	376	347	270	283	243	199	187	184	186
					% Change from previous period					
Production		-6,5%	-9,7%	-12,5%	-7,8%	-7,0%	-15,8%	-7,0%	-4,5%	-4,8%
Volumes sold		-5,1%	-7,6%	-22,2%	4,8%	-14,3%	-18,1%	-5,8%	-1,7%	0,9%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.3.2 Gold years to depletion, 2002 to 2011

The estimated number of years to depletion for proven gold reserves in 2011 was 33 years. In 2002 there were 21 years left to depletion and this increased to 33 years in 2011, which is a 57,1% increase over the 10 years.

Figure 3.3.2: Gold years to depletion, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.3.2: Gold years to depletion, 2002–2011

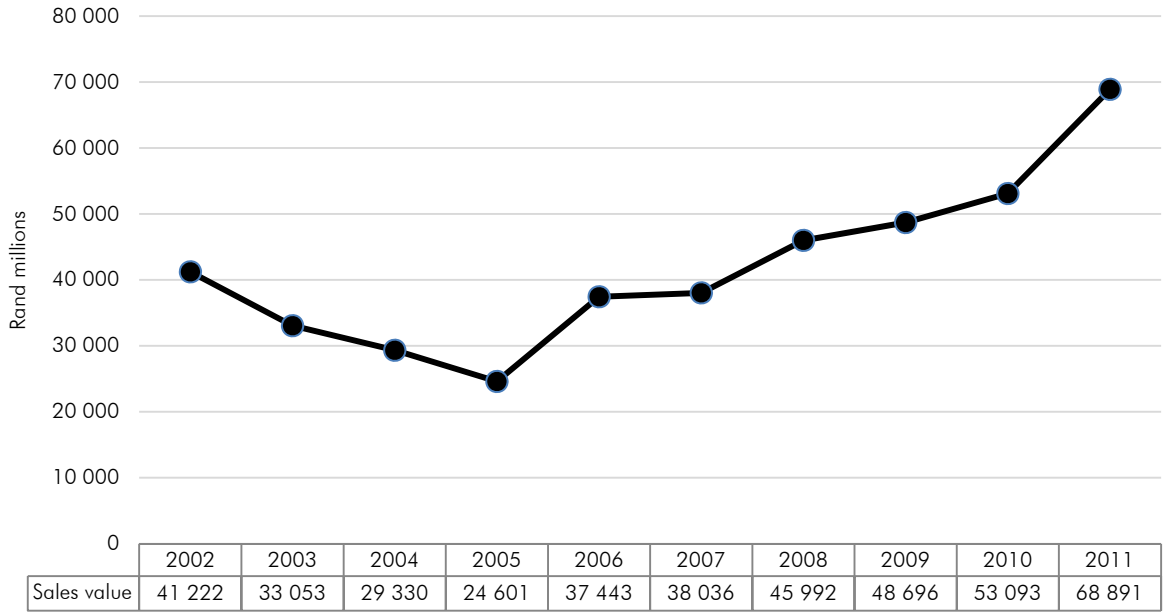
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Years to depletion									
21	21	23	25	26	27	31	32	33	33
% Change from previous period									
	0,0%	9,5%	8,7%	4,0%	3,8%	14,8%	3,2%	3,1%	0,0%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.3.3 Gold sales, 2002 to 2011

The total value of gold sales for 2011 amounted to R68 891 million. This is a 29,8% increase from 2010 sales that amounted to R53 093 million.

Figure 3.3.3: Gold sales, 2002–2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales value	41 222	33 053	29 330	24 601	37 443	38 036	45 992	48 696	53 093	68 891

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.3.3: Gold sales, 2002–2011

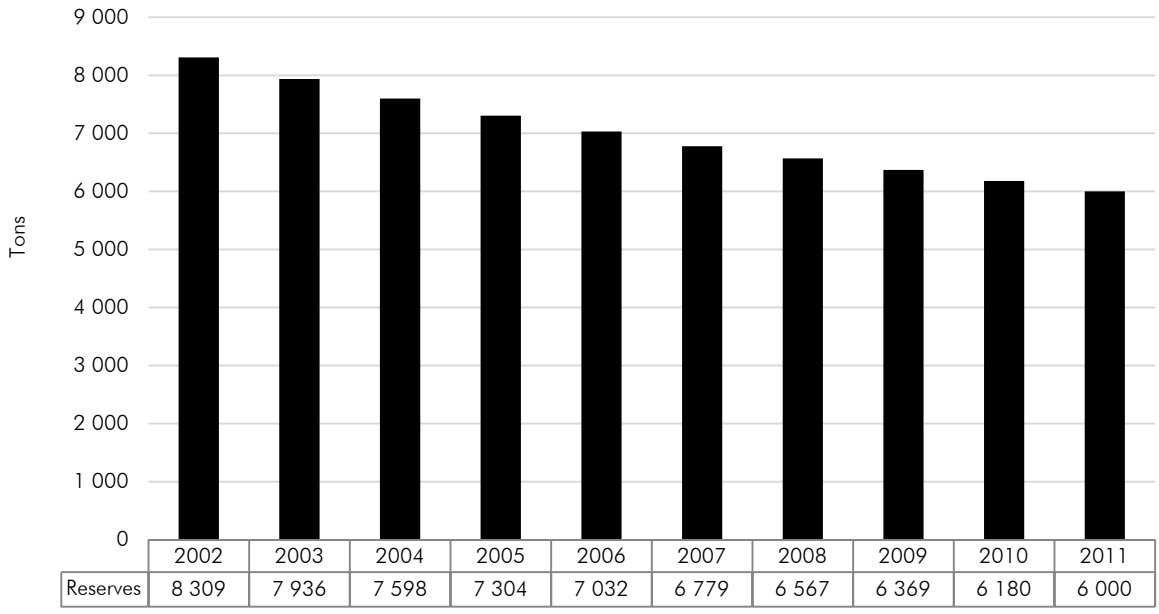
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rand millions									
41 222	33 053	29 330	24 601	37 443	38 036	45 992	48 696	53 093	68 891
% Change from previous period									
	-19,8%	-11,3%	-16,1%	52,2%	1,6%	20,9%	5,9%	9,0%	29,8%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.3.4 Gold resource reserves: 2002 to 2011

Proven gold resource reserves were 6 000 tons in 2011. The decrease in proven gold reserves over the ten year period from 8 309 tons in 2002 to 6 000 tons in 2011 is 27,8%.

Figure 3.3.4: Gold resource reserves, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.3.4: Gold resource reserves, 2002–2011

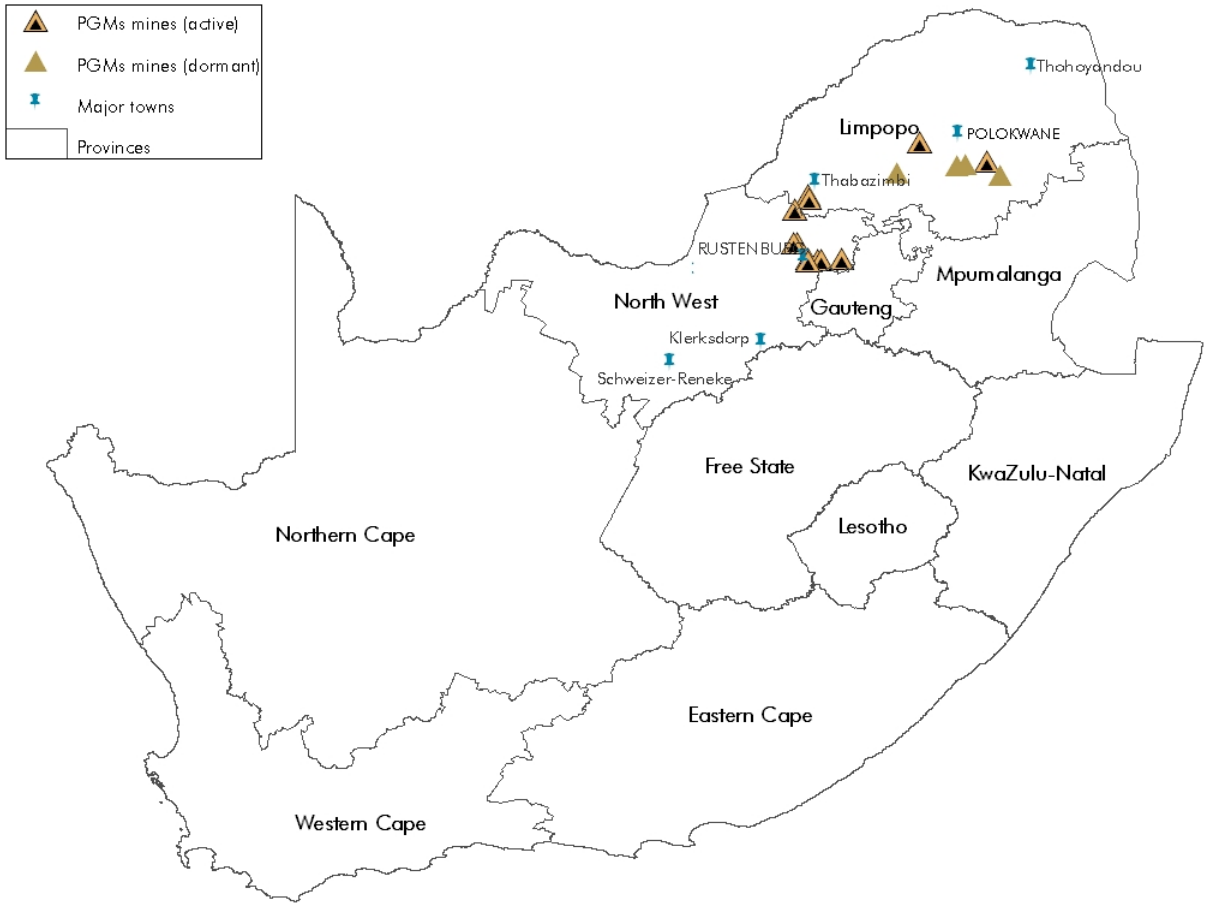
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Tons									
8 309	7 936	7 598	7 304	7 032	6 779	6 567	6 369	6 180	6 000
% Change from previous period									
	-4,5%	-4,3%	-3,9%	-3,7%	-3,6%	-3,1%	-3,0%	-3,0%	-2,9%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.4 Platinum Group Metals

South Africa is the world's largest producer of platinum, with major producers being Anglo American Platinum (Amplats), Anooraq, Impala Platinum (Implats), Northam Platinum, Aquarius Platinum and Lonmin. PGMs constitute six components, namely platinum, palladium, rhodium, ruthenium, iridium and osmium. They are divided according to their densities into a heavier category (platinum, iridium and osmium) and a lighter group (palladium, rhodium and ruthenium).[2] The total demand globally for platinum was 7,36 million ounces *versus* a total refined platinum supply of 7,4 million ounces (including recycling) in 2011. The automotive industry is one of the largest users of platinum, demanding 3,2 million ounces in 2011. Jewellery accounted for 1,9 million ounces of platinum in 2011. The vast majority of primary PGMs production is from South Africa.[10] The platinum metals have outstanding catalytic properties. They are highly resistant to wear and tarnish, making platinum, in particular, well suited for fine jewellery. Other distinctive properties include resistance to chemical attack, excellent high-temperature characteristics, and stable electrical properties. All these properties have been exploited for industrial applications.[11] The key findings for the PGMs mining industry are focused on production, years to depletion, volumes sold, value of sales, and resource reserves.

Map 3.4.1: Geographic locations of PGMs mines

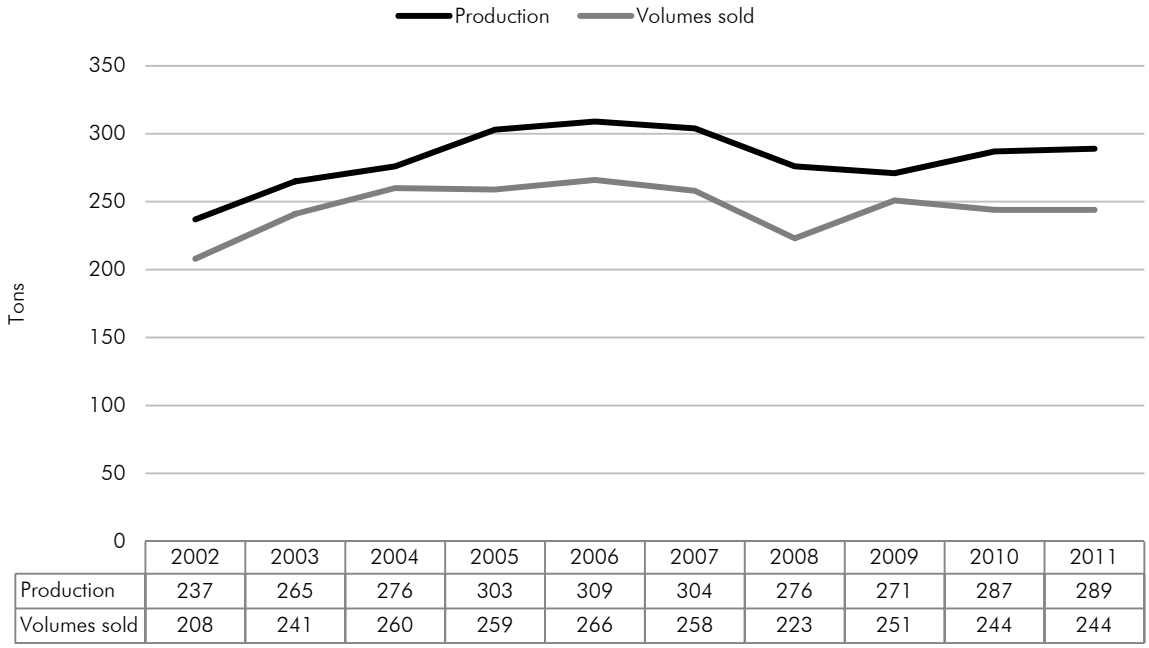


Source: Statistics South Africa.

3.4.1 PGMs production and volumes sold, 2002 to 2011

PGMs production increased from 237 tons in 2002 to 289 tons in 2011. This is a 21,9% increase in PGMs production over ten years. The total volume of PGMs sold increased by 17,3% over ten years from 208 tons in 2002 to 244 tons in 2011.

Figure 3.4.1: PGMs production and volumes sold, 2002–2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Production	237	265	276	303	309	304	276	271	287	289
Volumes sold	208	241	260	259	266	258	223	251	244	244

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.4.1: PGMs production and volumes sold, 2002–2011

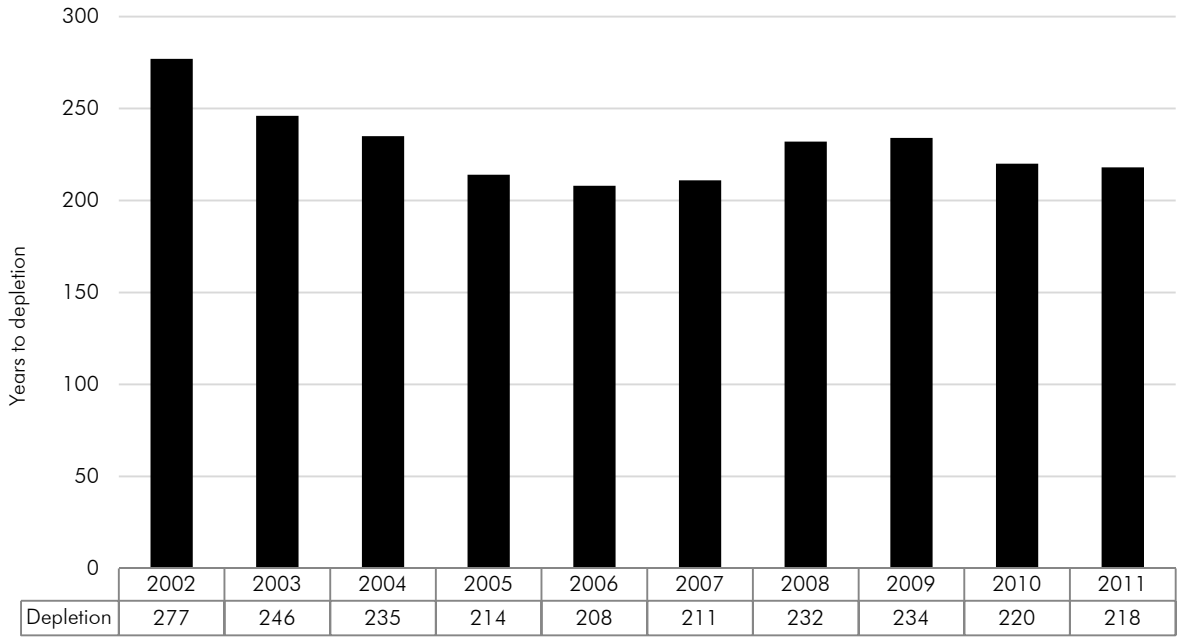
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
					Tons					
Production	237	265	276	303	309	304	276	271	287	289
Volumes sold	208	241	260	259	266	258	223	251	244	244
					% Change from previous period					
Production		11,8%	4,2%	9,8%	2,0%	-1,6%	-9,2%	-1,8%	5,9%	0,7%
Volumes sold		15,9%	7,9%	-0,4%	2,7%	-3,0%	-13,6%	12,6%	-2,8%	0,0%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.4.2 PGMs years to depletion, 2002 to 2011

The estimated number of years to depletion for proven PGMs reserves in 2011 was 218 years. In 2002 there were 277 years left to depletion decreasing to 218 years in 2011, which is a 21,3% decrease over the 10 years.

Figure 3.4.2: PGMs years to depletion, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.4.2: PGMs years to depletion, 2002–2011

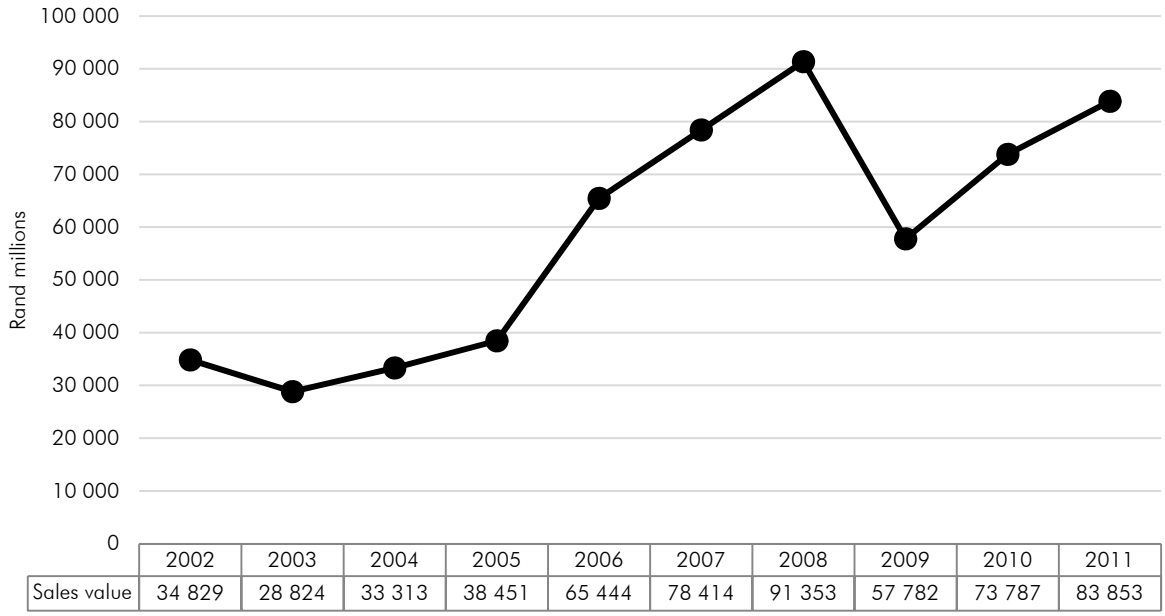
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Years to depletion									
277	246	235	214	208	211	232	234	220	218
% Change from previous period									
	-11,2%	-4,5%	-8,9%	-2,8%	1,4%	10,0%	0,9%	-6,0%	-0,9%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.4.3 PGMs sales, 2002 to 2011

The total value of PGMs sales for 2011 amounted to R83 853 million. This is a 13,6% increase from 2010 sales that amounted to R73 787 million.

Figure 3.4.3: PGMs sales, 2002–2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales value	34 829	28 824	33 313	38 451	65 444	78 414	91 353	57 782	73 787	83 853

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.4.3: PGMs sales, 2002–2011

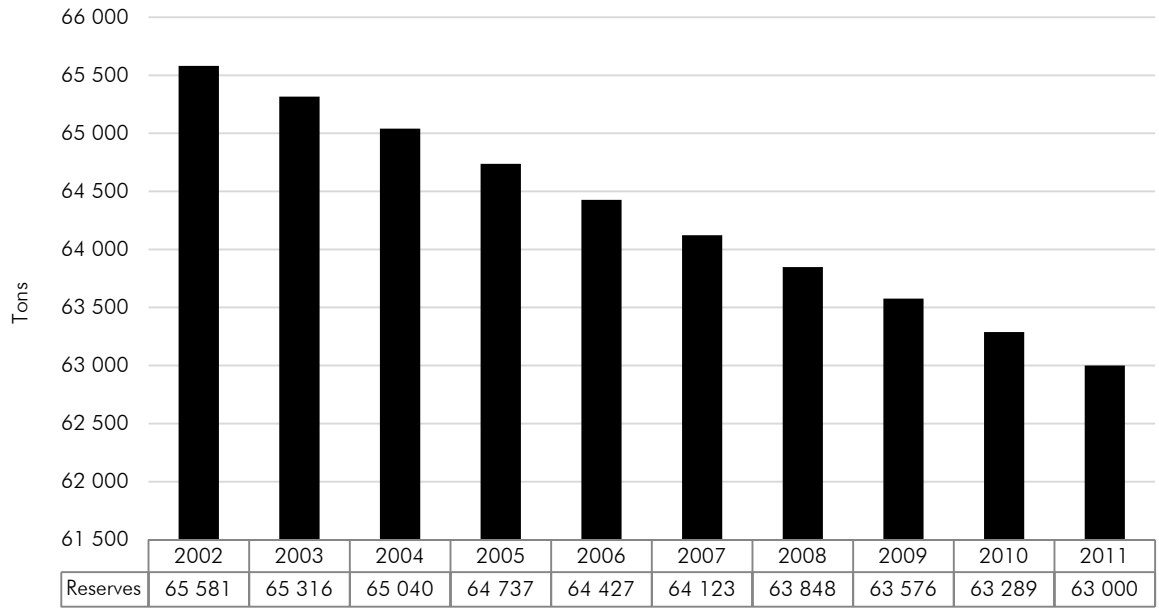
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rand millions									
34 829	28 824	33 313	38 451	65 444	78 414	91 353	57 782	73 787	83 853
% change from previous period									
	-17,2%	15,6%	15,4%	70,2%	19,8%	16,5%	-36,7%	27,7%	13,6%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

3.4.4 PGMs resource reserves, 2002 to 2011

Proven PGMs resource reserves were 63 000 tons in 2011. The decrease in proven PGMs reserves over the ten year period from 65 581 tons in 2002 to 63 000 tons in 2011 is 3,9%.

Figure 3.4.4: PGMs resource reserves, 2002–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 3.4.4: PGMs resource reserves, 2002–2011

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Tons									
65 581	65 316	65 040	64 737	64 427	64 123	63 848	63 576	63 289	63 000
% Change from previous period									
	-0,4%	-0,4%	-0,5%	-0,5%	-0,5%	-0,4%	-0,4%	-0,5%	-0,5%

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Chapter 4 – Indicators

4.1 Overview

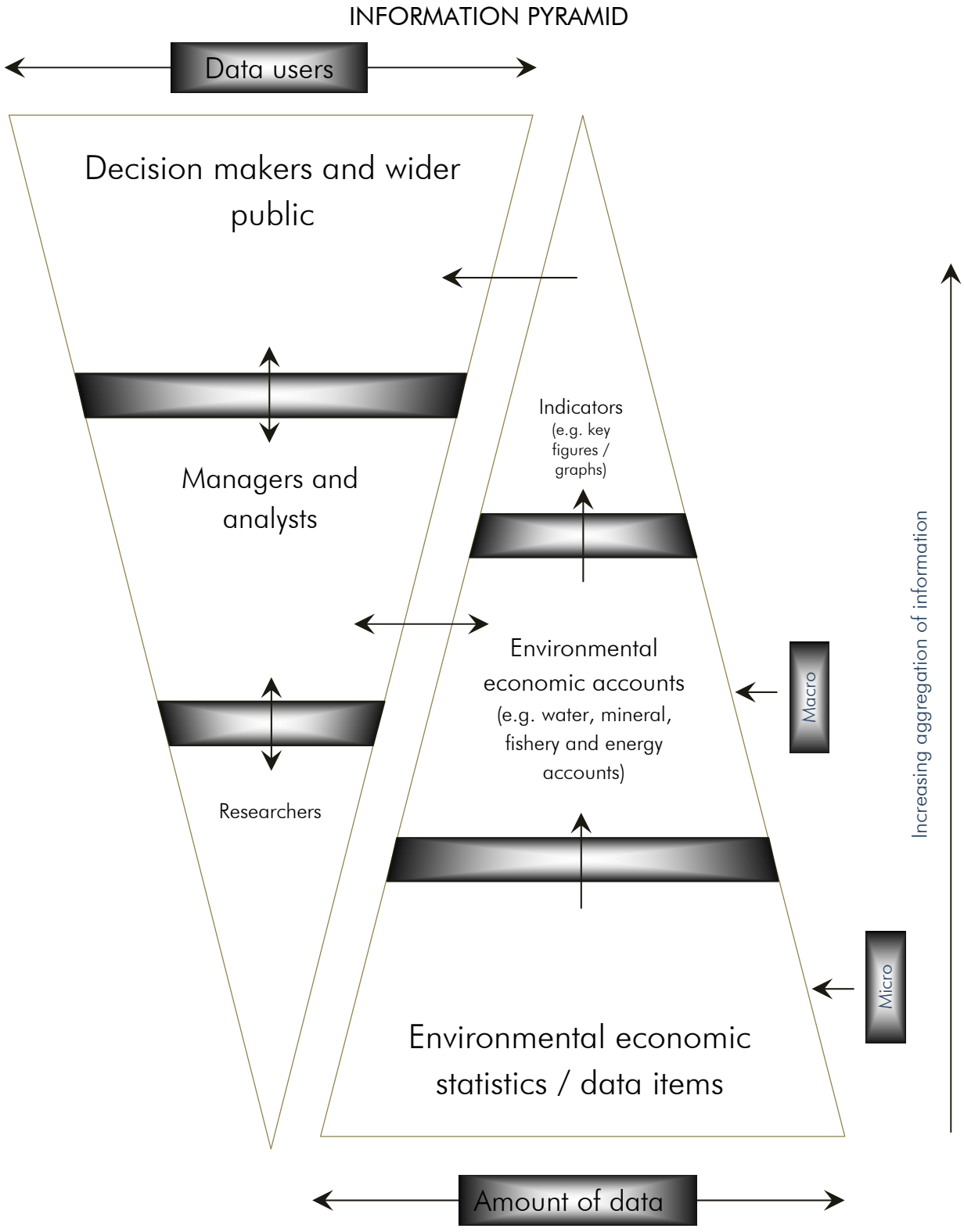
Environmental objectives cannot be pursued without an awareness of the consequential socio-economic effects. The understanding of these linkages is achieved by integrating environmental and socio-economic information. Robust measurement frameworks are required to show the bigger picture, identify gaps and draw connections with other socio-economic statistics. On the information side, data items flow into standard tables and supplementary tables of the SEEA. From these tables headline indicators and indicators on specific subjects or industries are developed. Data users are managers, analysts and researchers who provide advice and research findings to decision makers and the wider public (Figure 4.1).

The SEEA is an internationally adopted framework with analytical potential that lends itself to the development of indicators calling on a wide range of data, which can provide insight and guidance to policy makers in both the economic and environmental sectors. While the SEEA does not attempt to define a given set of indicators of sustainable development, compiling such sets is now common in many countries and international organisations. Often the SEEA framework can provide relevant information and provide the background for a set of indicators that is more consistent than independently selected indicators, and which provides better linkages between indicators of environmental pressures and responses. Similar to the main national accounts, the SEEA accounts provide a score-keeping function from which key indicators can be derived and used in the analysis of policy options. The accounts provide a sound basis for the calculation of measures, which may already be included in sets of sustainable development indicators, but they may also be used to develop new indicators, such as environmentally-adjusted macro-aggregates which would not otherwise be available. The UNSD has on-going development with regard to SEEA Parts 2 and 3. Part 2 of the SEEA deals with applications and extensions to the central framework. As countries are encouraged by the UNSD to implement the SEEA, it is a valuable and practical framework.

The indicators included in this document are mainly derived from the environmental economic accounts tables that are developed for environmental economic accounts. However, other environmental indicators that link to the economy or society will be identified to give a broader picture of the linkages and effects between the natural environment and the human and economic environment.

The indicators for energy, fisheries and minerals are derived from the environmental economic accounts tables. The indicators relating to access to improved water sources and sanitation facilities are from South Africa's Millennium Development Goals (MDGs). The intention is to link the environment to the economy and society to show robust information on the impacts created by human and economic activities.

Figure 4.1: Information Pyramid



Sources: United Nations, 2012. *International Recommendations for Water Statistics*. United Nations, New York, 2012. Australian Bureau of Statistics, 2012. A systems approach to supporting environmental sustainability, Canberra, Australia.

4.1.1 Energy intensity for the manufacturing, commercial, domestic, and transport, storage and communication sectors, 2002 to 2009

Description

Energy intensity and consumption for the manufacturing, commercial, domestic, and transport, storage and communication sectors

Linkages

The energy intensity indicator could be linked to the MDGs since energy is an essential element to many plans to achieve sustainable development. In order to ensure environmental sustainability, energy security needs effective management. There is also a link to the economy and specifically the GDP, since the SEEA-Energy consider the depletion of energy resources such as coal, oil, and gas as a cost to the nation. A major link exists also with the mineral deposits in which coal is the main resource that is extracted to fuel electricity generation. It is possible to determine how much energy is consumed during a certain extraction period of a given mineral resource.

Selection criteria

The indicator met the following criteria:

- Data available and accessible in the long term;
- Data collection process has minimal environmental impact;
- Data available at no cost;
- Provides information to measure important issues;
- Relates to goals, targets and objectives; and
- Relevant to policy and management needs in South Africa.

Measurement

Units	Spatial scale	Frequency
Terajoules	National	Annually

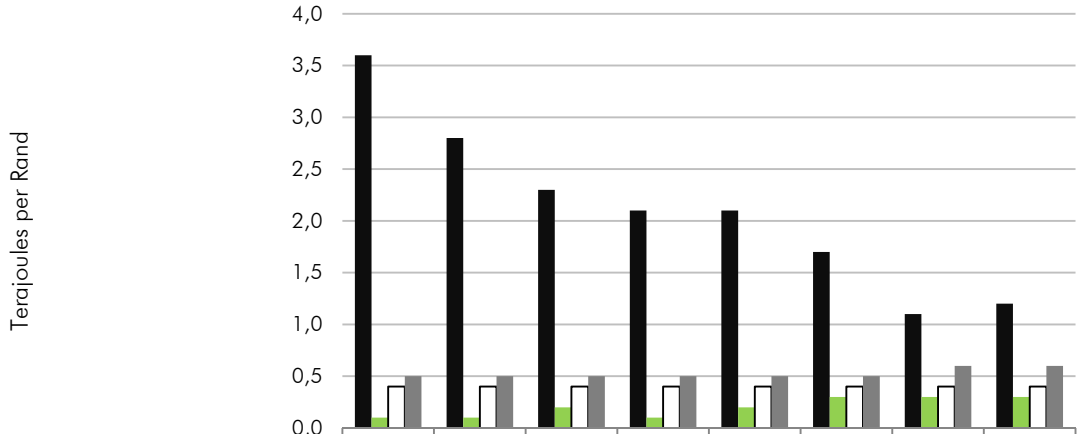
Manufacturing was the largest consumer of energy from 2002 to 2009. In 2002 the manufacturing industry used 4 462 893 terajoules or 78,2% of energy supplied (manufacturing, commercial sector, domestic sector and transport, storage and communication) at an energy intensity of 3,6. The energy used dropped to 1 952 219 terajoules or 49,9% of energy supplied in 2009 with an energy intensity of 1,2. The iron and steel industry is the biggest energy user within the manufacturing sector. Table 4.1.1 shows the amount of energy in terajoules used by the manufacturing sector, and the total value added to the GDP at constant prices from 2002 to 2009. High energy intensities indicate a high price or cost of converting energy into GDP. Low energy intensity indicates a lower price or cost of converting energy into GDP.

The commercial sector's energy consumption is relatively low and this is reflected in the energy intensity amongst the four largest energy use industries, i.e. manufacturing, commerce, domestic, and transport, storage and communication. Although the commercial sector experienced an increase in energy use from 2007 to 2008, compared with other industries the intensity of energy use still remained low, starting at 0,1 in 2002 and gradually increasing to 0,3 in 2009.

The domestic sector's energy intensity at 0,4 in 2002 remained stable through to 2009.

The transport, storage and communication sector is one of the top industries with regard to energy consumption, but its energy intensity is low in relation to the economy. According to Table 4.1.1, during 2002 the sector's energy intensity was 0,5, remaining stable to 2007, and slightly increasing to 0,6 in 2008 and 2009.

Figure 4.1.1: Energy Intensity for the manufacturing, commercial, domestic, and transport, storage and communication sectors, 2002–2009



	2002	2003	2004	2005	2006	2007	2008	2009
Manufacturing	3,6	2,8	2,3	2,1	2,1	1,7	1,1	1,2
Commercial sector	0,1	0,1	0,2	0,1	0,2	0,3	0,3	0,3
Domestic sector	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Transport, storage and communication	0,5	0,5	0,5	0,5	0,5	0,5	0,6	0,6

Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. Statistics South Africa, Pretoria.[3]

Table 4.1.1: Energy Intensity for the manufacturing, commercial, domestic, and transport, storage and communication sectors, 2002–2009

	2002	2003	2004	2005	2006	2007	2008	2009
				Energy use by sector (Terajoules)				
Manufacturing	4 462 893	3 602 037	3 109 626	2 888 487	3 036 673	2 619 092	1 732 371	1 952 219
Commercial	143 597	171 599	194 992	197 644	224 133	420 637	459 064	442 575
Domestic	459 920	510 980	552 888	592 930	601 305	567 418	580 124	599 330
Transport, storage and communication	636 332	656 520	698 552	710 943	726 596	803 918	942 397	914 885
Total sector use	5 702 742	4 941 136	4 556 058	4 390 004	4 588 707	4 411 065	3 713 956	3 909 008
				GDP value added at basic prices (Rand millions, constant prices)*				
	1 236 270	1 273 129	1 330 390	1 401 066	1 478 492	1 561 076	1 619 802	1 598 057
				Energy Intensity				
Manufacturing	3,6	2,8	2,3	2,1	2,1	1,7	1,1	1,2
Commercial	0,1	0,1	0,2	0,1	0,2	0,3	0,3	0,3
Domestic	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Transport, storage and communication	0,5	0,5	0,5	0,5	0,5	0,5	0,6	0,6

Source: Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. Statistics South Africa, Pretoria.[3]
* GDP values as of November 2013.

Data sources and references

- Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. Statistics South Africa, Pretoria.
- Department of Energy, 2011. *Energy Balances*, 2009.
- Government Communications Information System. *South Africa Yearbook 2010/11, Energy*.
- Statistics South Africa, 2013. *Gross Domestic Product, P0441*.
- SEEA-Energy 2012. Draft prepared for discussion at the 18th meeting of the London Group of Experts on Environmental Accounting, Ottawa, Canada-2-4 October, 2012.

4.1.2 Hake: Sustainability of hake (*Merluccius paradoxus and M. capensis*) stocks, 1991 to 2012

Description

Catch levels and closing stock for hake (*Merluccius paradoxus* and *M. capensis*) and TAC for fish and fish farming.

Linkages

This indicator is linked to biodiversity themes and the United Nations Convention on the Law of the Sea of 10 December 1982, as well as the Commission for Sustainable Development indicator 'Maximum sustained yield for fisheries'.

Selection criteria

The indicator met the following criteria:

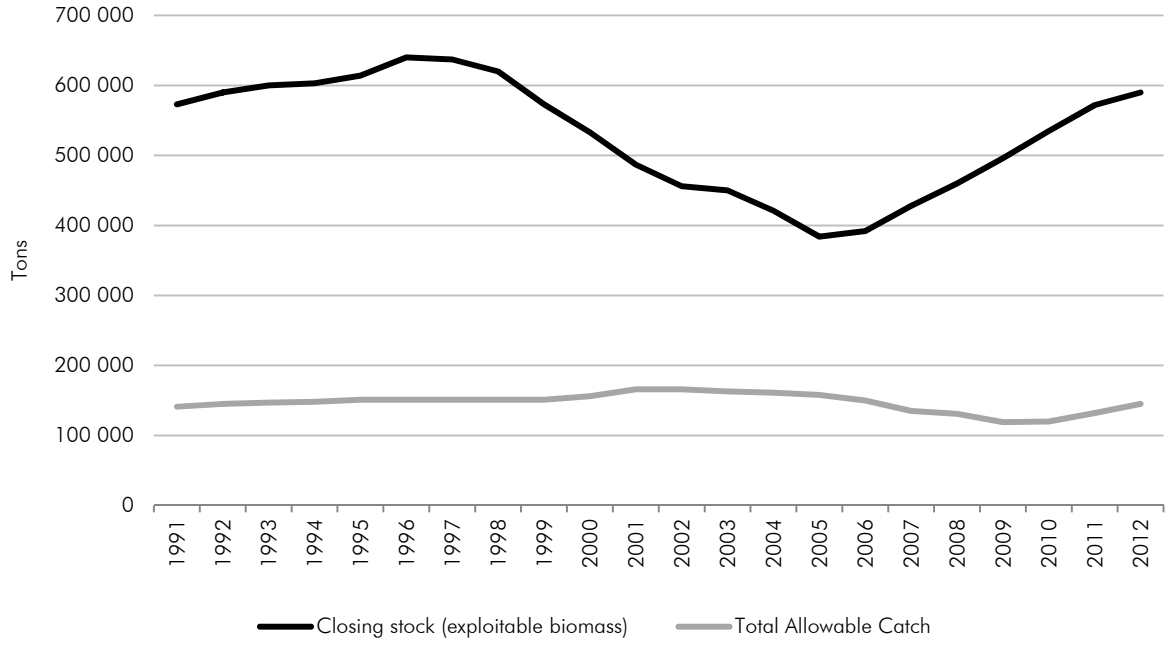
- Good quality data, available at minimal cost;
- Provides information to measure important issues;
- Information presented to be easily understood;
- Relates to goals, targets and objectives;
- Provides timely information to allow for responses;
- Relevant to policy and management needs in South Africa;
- Accurate, reliable, and scientifically sound data;
- Data available and accessible in the long term;
- Data of correct spatial and temporal extent, and time series; and
- Data collection process has minimal environmental impact.

Measurement

Units	Spatial scale	Frequency
Tons	National	Annually

Figure 4.1.2 shows the correlation between the closing stock (exploitable biomass) and the set TAC level. From 1990 the TAC level was gradually set at higher levels each year until 2002 (166 000 tons). At first the closing stock (exploitable biomass) continued to recover (1990 to 1998). In 1999 the closing stock (exploitable biomass) began to decline and maintained this decreasing trend until reaching 384 000 tons in 2005. In 2009 the closing stock (exploitable biomass) surpassed the TAC level indicating a path of sustainability. There is about a 3-year lag time before there are positive responses in the closing stock (exploitable biomass) due to the dropping of the TAC levels.

Figure 4.1.2: Hake: Closing stock and total allowable catch, 1991–2012



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 4.1.2: Hake: Closing stock and total allowable catch, 1991–2012

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Closing stock (exploitable biomass) (Tons)										
573 000	590 000	600 000	603 000	614 000	640 000	637 000	620 000	573 000	533 000	487 000
Total allowable catch (Tons)										
141 000	145 000	147 000	148 000	151 000	151 000	151 000	151 000	151 000	156 000	166 000

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock (exploitable biomass) (Tons)										
456 000	450 000	421 000	384 000	392 000	428 000	460 000	496 000	535 000	572 000	590 000
Total allowable catch (Tons)										
166 000	163 000	161 000	158 000	150 000	135 000	131 000	119 000	120 000	132 000	145 000

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Data sources and references

- Statistics South Africa. Environmental Economic Accounts Tables.
- Department of Agriculture, Forestry and Fisheries (DAFF), Marine Resource Assessment and Management (MARAM), and the University of Cape Town, Department of Mathematics and Applied Mathematics.
- Marine Stewardship Council (MSC), 2009. *MSC Fishery Fact Sheet: South Africa hake trawl fishery, 2009*. Website: www.msc.org

4.1.3 West Coast rock lobster: Sustainability of West Coast rock lobster (*Jasus lalandii*) stocks, 1991 to 2012

Description

Closing stock for West Coast rock lobster (*J lalandii)* and TAC for fish and fish farming.

Linkages

This indicator is linked to biodiversity themes and the United Nations Convention on the Law of the Sea of 10 December 1982, as well as the Commission for Sustainable Development indicator 'Maximum sustained yield for fisheries'.

Selection criteria

The indicator met the following criteria:

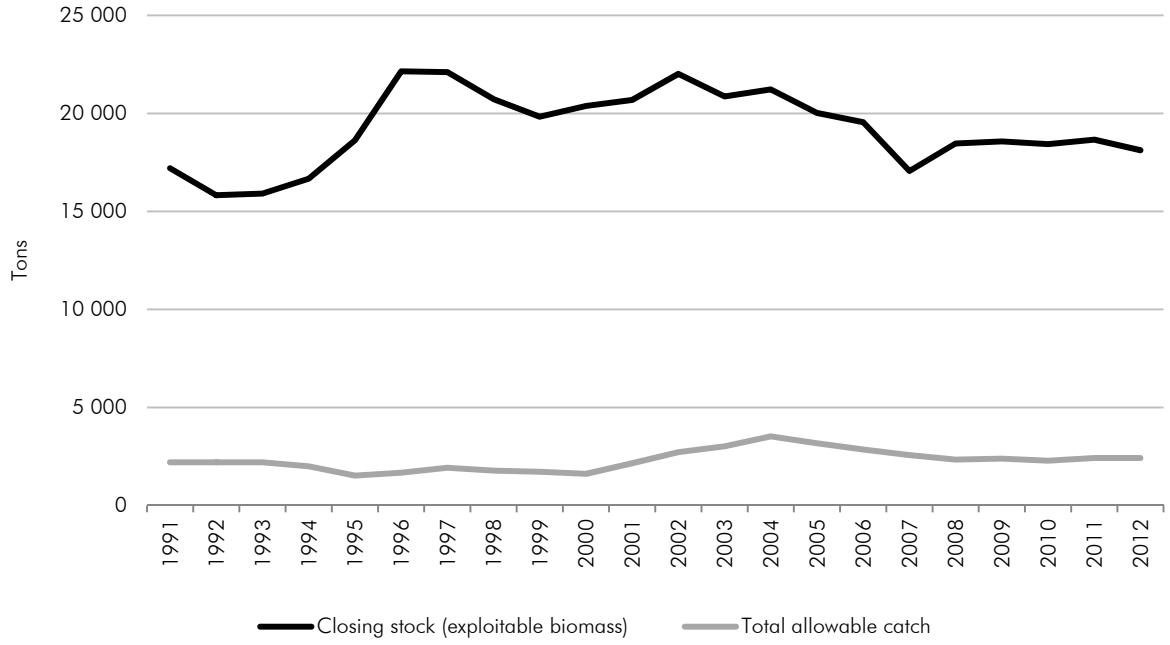
- Good quality data, available at minimal cost;
- Provides information to measure important issues;
- Information presented to be easily understood;
- Relates to goals, targets and objectives;
- Provides timely information to allow for responses;
- Relevant to policy and management needs in South Africa;
- Accurate, reliable, and scientifically sound data;
- Data available and accessible in the long term;
- Data of correct spatial and temporal extent, and time series; and
- Data collection process has minimal environmental impact.

Measurement

Units	Spatial scale	Frequency
Tons	National	Annually

Figure 4.1.3 shows the correlation between the closing stock (exploitable biomass) and the set TAC level. From 1991 the TAC level was gradually set at higher levels each year until 2004 (when it peaked at 3 527 tons). The closing stock (exploitable biomass) followed a recovery trend from 1992 to 2002. In 2004 the closing stock (exploitable biomass) began to decline, maintaining this decreasing trend until reaching 18 470 in 2008, and showed some fluctuations till it reached a recent low of 18 128 tons in 2012.

Figure 4.1.3: West Coast rock lobster: Closing stock and total allowable catch, 1991–2012



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 4.1.3: West Coast rock lobster: Closing stock and total allowable catch, 1991–2012

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Closing stock (exploitable biomass) (Tons)										
17 203	15 826	15 913	16 670	18 634	22 153	22 112	20 725	19 831	20 382	20 688
Total allowable catch (Tons)										
2 200	2 200	2 200	2 000	1 520	1 675	1 920	1 780	1 720	1 614	2 151

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Closing stock (exploitable biomass) (Tons)										
22 016	20 866	21 231	20 024	19 554	17 060	18 470	18 577	18 438	18 663	18 128
Total allowable catch (Tons)										
2 713	3 016	3 527	3 174	2 857	2 571	2 340	2 393	2 286	2 426	2 426

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Data sources and references

- Statistics South Africa. Environmental Economic Accounts Tables.
- Department of Agriculture, Forestry and Fisheries (DAFF), Marine Resource Assessment and Management (MARAM), and the University of Cape Town, Department of Mathematics and Applied Mathematics.
- Department of Agriculture, Forestry and Fisheries (DAFF), 2013. *West Coast Rock Lobster: Description of sector*. Department of Agriculture, Forestry and Fisheries, Pretoria.

4.1.4 Coal: Employment rate compared with production, and total earnings in the coal mining sector, 1994 to 2011

Description

Production/extraction of coal, number of workers employed and total earnings in the coal mining sector.

Linkages

This indicator is linked to South Africa's labour force and the employment rate in the country as well as compensation of employees for the mineral industry.

Selection criteria

The indicator met the following criteria:

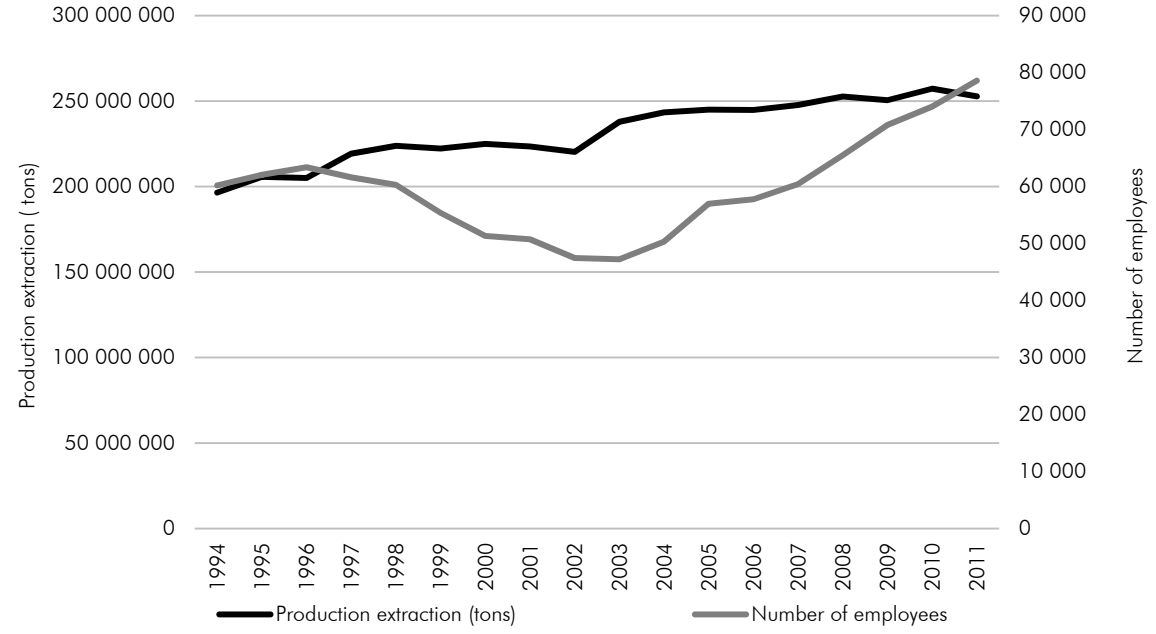
- Good quality data, available at minimal cost;
- Provides information to measure important issues;
- Relates to goals, targets and objectives;
- Relevant to policy and management needs in South Africa;
- Data available and accessible in the long term; and
- Data of correct spatial and temporal extent, and time series.

Measurement

Units	Spatial scale	Frequency
Number of employees Production extraction (thousand tons) Total earnings (Rand millions)	National	Annually

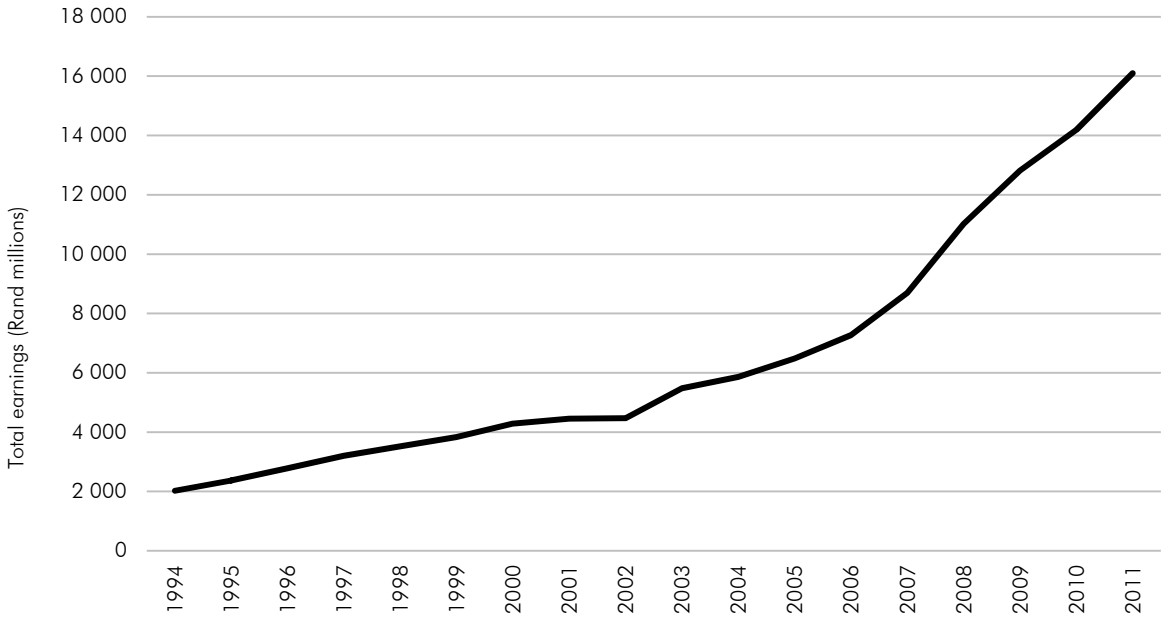
Table 4.1.4 and Figure 4.1.4a show the production/extraction of coal and the number of employees in the coal mining industry from 1994 to 2011. Figure 4.1.4b shows the total earnings (compensation of employees) from 1994 to 2011. Over the period of 18 years, coal production/extraction increased by 28,7% from 196 454 485 to 252 756 845 tons. Employment in the coal mining industry increased from 60 187 employees in 1994 to 78 580 in 2011. Total earnings increased from R2 021 million in 1994 to R16 095 million in 2011.

Figure 4.1.4a: Production/extraction of coal and employment in the coal mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Figure 4.1.4b: Total earnings (compensation of employees) in the coal mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 4.1.4: Production/extraction of coal, employment and total earnings (compensation of employees) in the coal mining industry, 1994–2011

1994	1995	1996	1997	1998	1999	2000	2001	2002
Production extraction (Tons)								
196 454 485	205 639 117	204 995 941	219 266 848	223 783 750	222 270 783	224 906 677	223 494 679	220 269 559
Number of employees								
60 187	62 064	63 397	61 607	60 309	55 378	51 346	50 740	47 469
Total earnings (Rand millions)								
2 021	2 371	2 782	3 204	3 523	3 831	4 287	4 451	4 468
2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Production extraction (Tons)								
237 872 103	243 371 530	244 988 246	244 832 433	247 666 358	252 699 108	250 538 125	257 205 807	252 756 845
Number of employees								
47 239	50 327	56 971	57 778	60 439	65 484	70 791	74 025	78 580
Total earnings (Rand millions)								
5 481	5 864	6 482	7 270	8 692	11 021	12 815	14 187	16 095

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Data sources and references

- Statistics South Africa. Environmental Economic Accounts Tables.
- Department of Mineral Resources, 2011/2012. *South African Minerals Industry*.
- Government Communication Information System, 2013. *South Africa Yearbook 2011/12*.

4.1.5 Gold: Employment rate compared with production, and total earnings in the gold mining sector, 1994 to 2011

Description

Production/extraction of gold, number of workers employed and the total earnings in the gold mining sector

Linkages

This indicator is linked to South Africa's labour force and the employment rate in the country as well as compensation of employees for the mineral industry.

Selection criteria

The indicator met the following criteria:

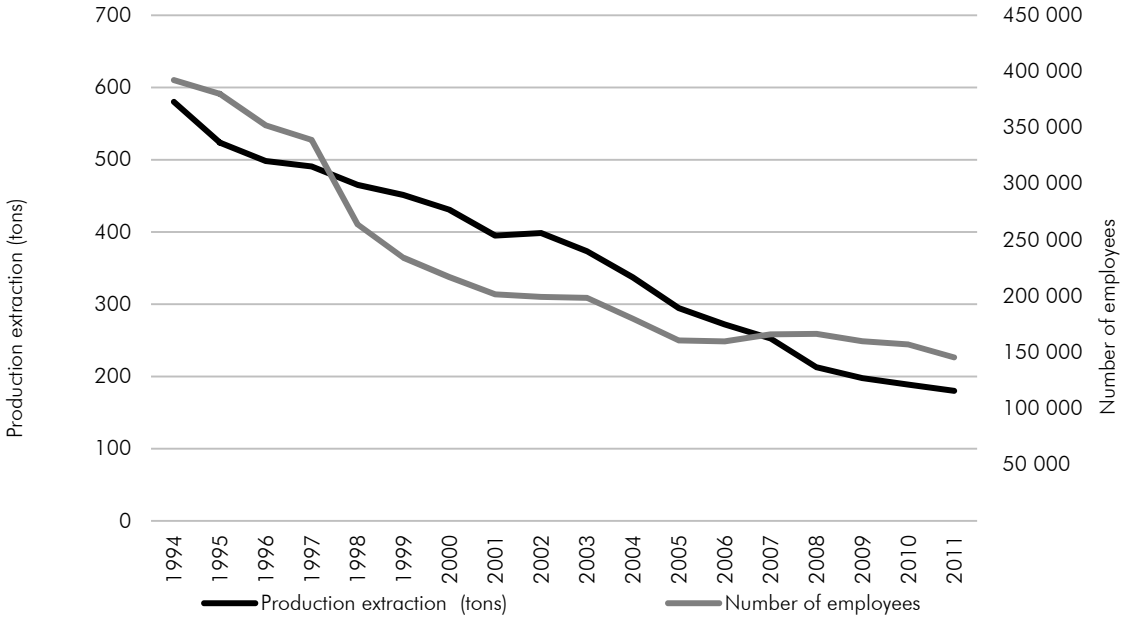
- Good quality data, available at minimal cost;
- Provides information to measure important issues;
- Relate to goals, targets and objectives;
- Relevant to policy and management needs in South Africa;
- Data available and accessible in the long term; and
- Data of correct spatial and temporal extent, and time series.

Measurement

Units	Spatial scale	Frequency
Number of employees Production extraction (tons) Total earnings (Rand millions)	National	Annually

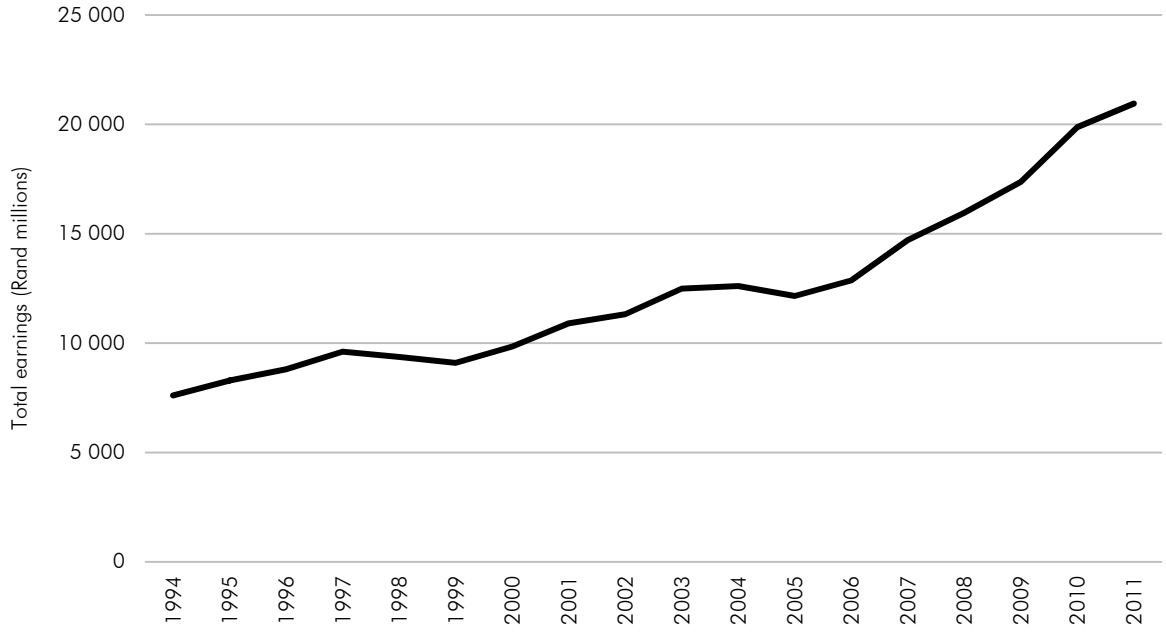
Table 4.1.5, Figure 4.1.5a and Figure 4.1.5b show the production/extraction of gold, the number of employees in the gold mining industry and total earnings from 1994 to 2011. Gold production/extraction shows a gradual decrease over the period from 1994 to 2011. In 1994 gold production was 580 tons and it decreased to 180 tons in 2011. Employment in the gold mining industry also decreased, from 392 327 employees in 1994 to 145 561 employees in 2011. It seems that there is a cause and effect between gold production/extraction and the number of employees. Total earnings increased from R7 612 million in 1994 to R20 948 million in 2011.

Figure 4.1.5a: Production/extraction of gold and employment in the gold mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Figure 4.1.5b: Total earnings (compensation of employees) in the gold mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 4.1.5: Production/extraction of gold, employment and total earnings (compensation of employees) in the gold mining industry, 1994–2011

1994	1995	1996	1997	1998	1999	2000	2001	2002
Production extraction (tons)								
580	524	498	491	465	451	431	395	399
Number of employees								
392 327	380 086	352 039	339 078	263 869	234 206	216 982	201 673	199 378
Total earnings (Rand millions)								
7 612	8 292	8 808	9 613	9 372	9 100	9 846	10 904	11 324
2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Production extraction (tons)								
373	337	295	272	253	213	198	189	180
Number of employees								
198 465	179 964	160 634	159 782	166 063	166 424	159 925	157 019	145 561
Total earnings (Rand millions)								
12 496	12 610	12 153	12 865	14 710	15 960	17 371	19 878	20 948

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Data sources and references

- Statistics South Africa. Environmental Economic Accounts Tables.
- Department of Mineral Resources, 2011/2012. South African Minerals Industry.
- Government Communication Information System, 2013. South Africa Yearbook, 2011/12.

4.1.6 PGMs: Employment rate compared with PGMs production, and total earnings in the platinum mining sector, 1994 to 2011

Description

Production/extraction of platinum, number of workers employed and the total earnings in the platinum mining sector.

Linkages

This indicator is linked to the South Africa's labour force and the employment rate in the country as well as compensation of employees for the mineral industry.

Selection criteria

The indicator met the following criteria:

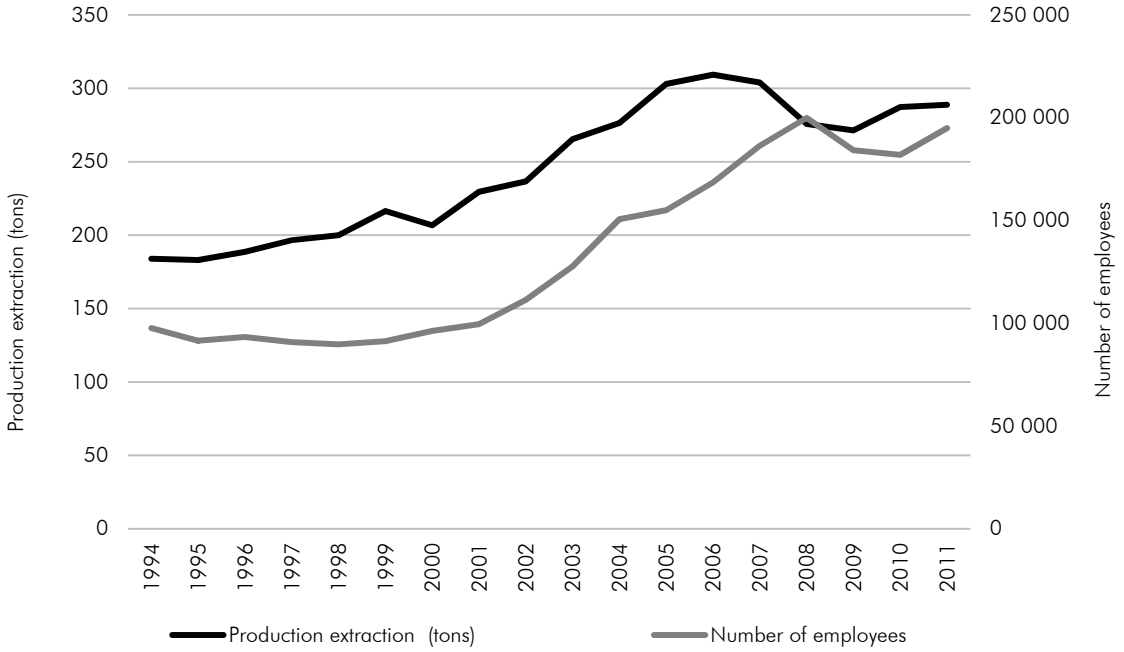
- Good quality data, available at minimal cost;
- Provides information to measure important issues;
- Relates to goals, targets and objectives;
- Relevant to policy and management needs in South Africa;
- Data available and accessible in the long term; and
- Data of correct spatial and temporal extent, and time series.

Measurement

Units	Spatial scale	Frequency
Number of employees Production extraction (tons) Total earnings (Rand millions)	National	Annually

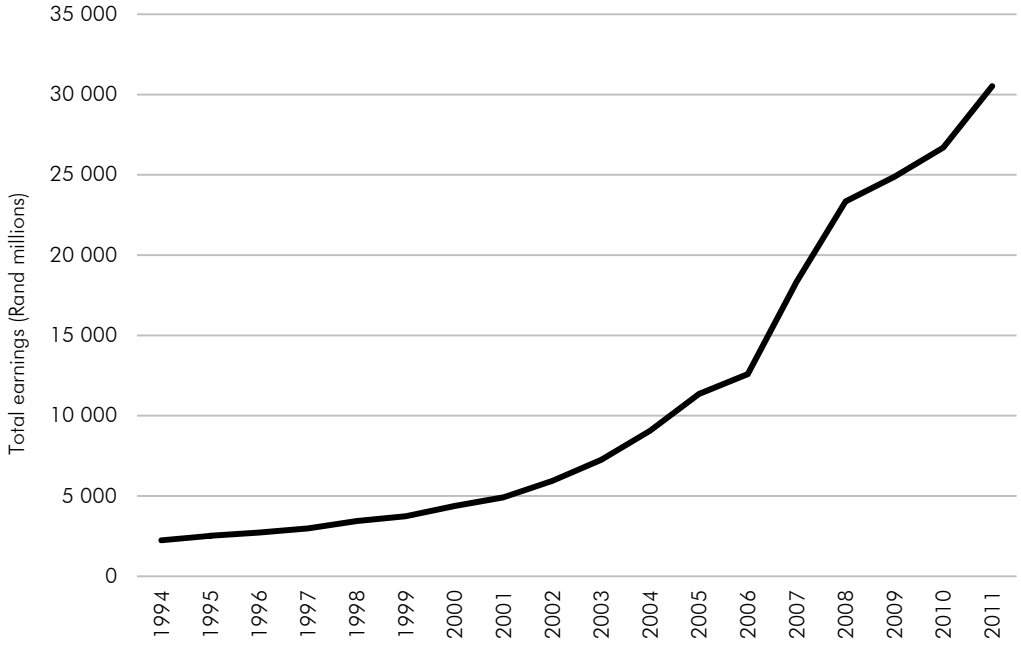
Table 4.1.6, Figure 4.1.6a and Figure 4.1.6b show the production/extraction of platinum, the number of employees in the platinum mining industry and total earnings from 1994 to 2011. Over the 18 year period, platinum production/extraction increased by 57,0% from 184 tons in 1994 to 289 tons in 2011. Similarly, employment increased by 99,7% from 97 643 employees in 1994 to 194 979 employees in 2011. Total earnings increased from R2 241 million in 1994 to R30 523 million in 2011.

Figure 4.1.6a: Production/extraction of PGMs and employment in the PGMs mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Figure 4.1.6b: Total earnings (compensation of employees) in the PGMs mining industry, 1994–2011



Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Table 4.1.6: Production/extraction of PGMs, employment and total earnings (compensation of employees) in the PGMs mining industry, 1994–2011

1994	1995	1996	1997	1998	1999	2000	2001	2002
Production extraction (tons)								
184	183	189	197	200	216	207	230	237
Number of employees (thousands)								
97 643	91 528	93 304	90 876	89 781	91 269	96 273	99 575	111 419
Total earnings (Rand millions)								
2 241	2 522	2 725	2 979	3 444	3 741	4 373	4 915	5 937
2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Production extraction (tons)								
265	276	303	309	304	276	271	287	289
Number of employees (thousands)								
127 672	150 630	155 034	168 530	186 411	199 948	184 163	181 969	194 979
Total earnings (Rand millions)								
7 243	9 064	11 358	12 585	18 341	23 344	24 879	26 688	30 523

Source: Statistics South Africa. Environmental Economic Accounts Tables.[7]

Data sources and references

- Statistics South Africa. Environmental Economic Accounts Tables.
- Department of Mineral Resources, 2011/2012. *South African Minerals Industry*.
- Government Communication Information System, 2013. *South Africa Yearbook, 2011/12*.

4.1.7 Proportion of population with access to an improved drinking water source

Description

The percentage of South Africa's population that has access to an improved drinking water source.

Linkages

This indicator is linked to the MDG 7: Ensure Environmental Sustainability. Target 7C: Halve by 2015, the proportion of people without sustainable access to safe drinking water.

Selection criteria

The indicator met the following criteria:

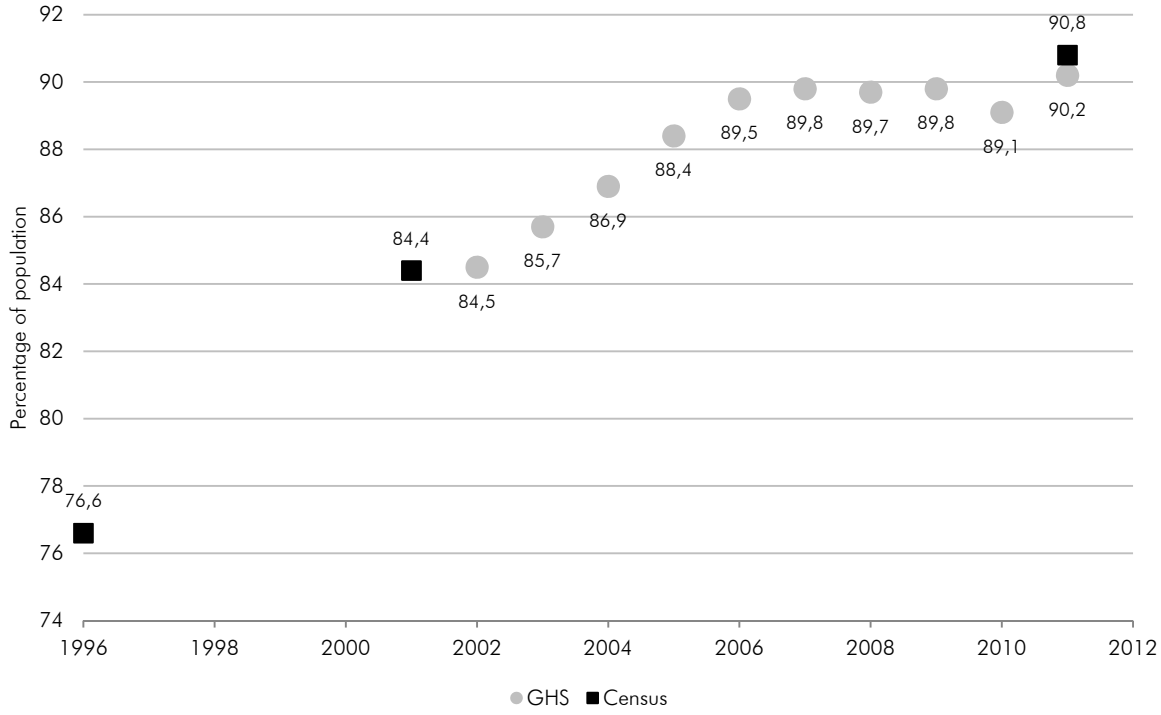
- Good quality data;
- Provides information to measure important issues;
- Relates to goals, targets and objectives;
- Relevant to policy and management needs in South Africa;
- Data available and accessible in the long term; and
- Data of correct spatial and temporal extent, and time series.

Measurement

Units	Spatial scale	Frequency
Percentage of population	National	GHS – annually Census – 1996, 2001, 2011

The target that South Africa set itself for 2014 is achieving improved access to safe drinking water services to all its citizens. Progress is measured using the Department of Water Affairs' Water Services National Information System, which tracks households having access to water infrastructure. Stats SA uses the General Household Survey (GHS) survey data to plot the trend showing the target and whether this will be met. The target falls short of 100% in 2013, which is an indication that it is unlikely to be met by 2014. Census 2011 reported that 90,8% of the population was using an improved drinking water source.

Figure 4.1.7: Proportion of population using an improved drinking water source



Source: Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*. Statistics South Africa, Pretoria.[12]

Table 4.1.7 Proportion of population using an improved drinking water source

1996	1997	1998	1999	2000	2001	2002	2003
GHS							
-	-	-	-	-	-	84,5%	85,7%
Census							
76,6%	-	-	-	-	84,4%	-	-
2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
GHS							
86,9%	88,4%	89,5%	89,8%	89,7%	89,8%	89,1%	90,2%
Census							
-	-	-	-	-	-	-	90,8%

Source: Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*. Statistics South Africa, Pretoria.[12]

Data sources and references

- Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*.

4.1.8 Proportion of population with access to an improved sanitation facility

Description

The percentage of South Africa's population that has access to an improved sanitation facility.

Linkages

This indicator is linked to the MDG 7: Ensure Environmental Sustainability. Target 7C: Halve by 2015, the proportion of people without sustainable access to sanitation facilities.

Selection criteria

The indicator met the following criteria:

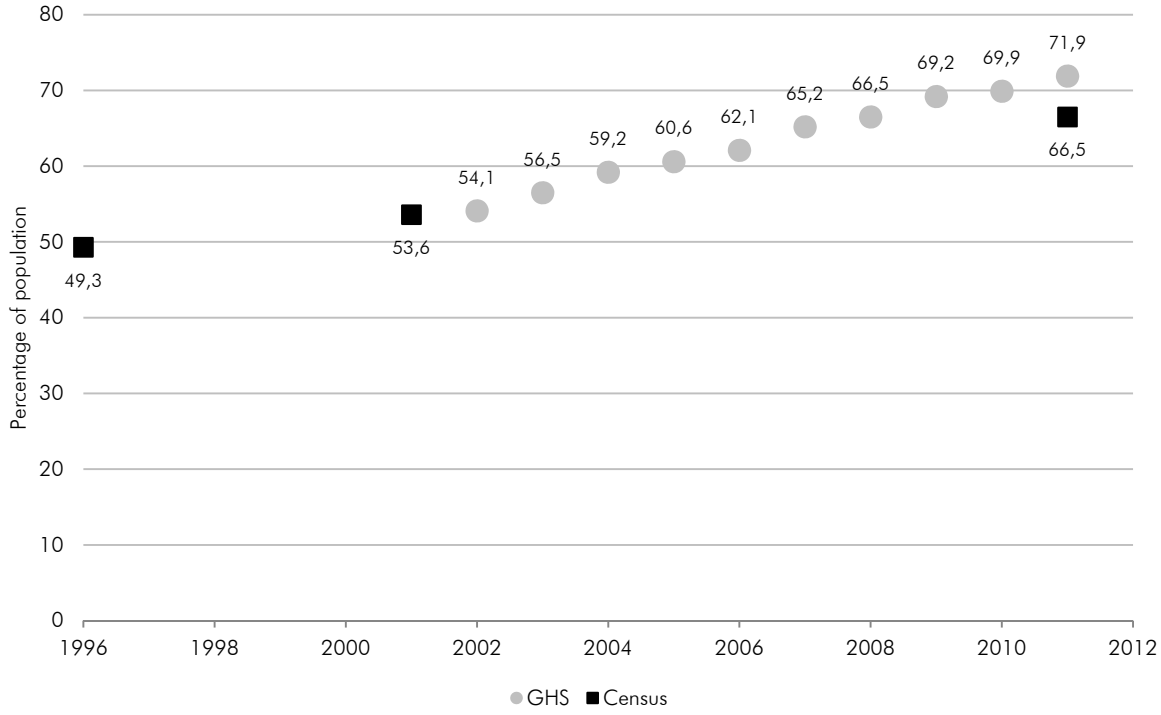
- Good quality data;
- Provides information to measure important issues;
- Relates to goals, targets and objectives;
- Relevant to policy and management needs in South Africa;
- Data available and accessible in the long term; and
- Data of correct spatial and temporal extent, and time series.

Measurement

Units	Spatial scale	Frequency
Percentage of population	National	GHS – annually Census – 1996, 2001, 2011

South Africa has a target of 100% access to sanitation facilities by 2014. The data, when compared with water, show that between 1996 and 2001 the rate of sanitation delivery was half that of water. Between 2001 and 2011 the data show that the sanitation rate of delivery was twice that of water. South Africa's rural areas are problem areas in the limited services provided by municipalities with regard to access to water and sanitation, mainly because of a lack of technical skills.

Figure 4.1.8: Proportion of population using an improved sanitation facility



Source: Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*. Statistics South Africa, Pretoria.[12]

Table 4.1.8 Proportion of population using an improved sanitation facility

1996	1997	1998	1999	2000	2001	2002	2003
GHS							
-	-	-	-	-	-	54,1	56,5
Census							
49,3	-	-	-	-	53,6	-	-
2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
GHS							
59,2	60,6	62,1	65,2	66,5	69,2	69,9	71,9
Census							
-	-	-	-	-	-	-	66,5

Source: Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*. Statistics South Africa, Pretoria.[12]

Data sources and references

- Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*.

References

1 Department of Energy, 2009. *Digest of South African Energy Statistics*. Department of Energy, Pretoria.

2 Government Communication Information System, 2012. *South Africa Yearbook 2011/12*. Government Communication Information System, Pretoria.

3 Statistics South Africa, 2011. D0405.1.1 *Energy Accounts for South Africa 2002 to 2009*. Statistics South Africa, Pretoria.

4 Department of Agriculture, Forestry and Fisheries, 2012. *Status of the South African Marine Fishery Resources, 2012*. Department of Agriculture, Forestry and Fisheries, Cape Town.

5 Marine Stewardship Council. Website: www.msc.org

6 Statistics South Africa, 2012. D0405.0 *Fishery Accounts for South Africa: 1990-2011*. Statistics South Africa, Pretoria.

7 Statistics South Africa. Environmental Economic Accounts Tables.

8 Statistics South Africa, 2013. P0441, *Gross Domestic Production, 3rd Quarter*. Statistics South Africa, Pretoria.

9 Platinum group metals. Website: www.platinumgroupmetals.net/projects/waterberg

10 Keaton Energy. Website: www.keatonenergy.co.za/assets/investors-and-media/files/CPR_2_Geology_01apr08.pdf

11 Reference Hunt, L.B., Lever, F.M., 1969. Platinum Metals: A Survey of Productive Resources to Industrial Uses. *Platinum Metals Review* 13 (4): 126-138.

12 Statistics South Africa, 2013. *Millennium Development Goals, Country Report 2013*. Statistics, South Africa, Pretoria.