



South Africa's science and research are world-class.

Pocket Guide to South Africa 2008/09

SCIENCE AND TECHNOLOGY

The Department of Science and Technology seeks to realise the full potential of science and technology (S&T) in social and economic development, through the development of human resources (HR), research and innovation.

The department primarily focuses on implementing the National Research and Development Strategy (NRDS), which provides for an integrated approach to HR development, knowledge generation, investment in infrastructure and improving the strategic management of the public S&T system.

Expenditure is expected to continue to increase rapidly, to R4,1 billion in 2009/10, representing an average annual increase of 20%. Most of this expenditure comprises transfers to public entities for S&T initiatives.

Strategies and programmes

According to the Research and Development (R&D) Strategy, 1% of gross domestic product would be invested by both public and private sectors by 2008/09. By May 2008, the country's national spending on R&D totalled 0,9% and government was well on its way to achieve its target.

The department continues to develop strategies in new areas of knowledge and technology. Strategies for indigenous knowledge, nanotechnology, astronomy and intellectual property, derived from publicly funded research, have been developed.

The innovation towards a knowledge-based economy plan aims to drive South Africa's transformation towards a knowledge-based economy in which the production and dissemination of knowledge lead to economic benefits and enrich all fields of human endeavour.

To this extent, success will be measured by the degree to which S&T plays a driving role in enhancing productivity, economic growth and socio-economic development.

The plan addresses an array of social, economic, political, environmental, scientific and technological benefits and is designed to stimulate multidisciplinary thinking and challenge South Africa's researchers to answer existing questions, create new disciplines and develop new technologies.



Biotechnology innovation centres (Brics)

The National Biotechnology Strategy (NBS), which was launched in 2001, sets the agenda for the development of South Africa's biotechnology industry.

Initiatives include establishing Brics, such as BioPAD, Cape Biotech, LIFElab and the Plant Biotechnology Innovation Centre. Brics were created to act as instruments for the implementation of the NBS.

The Brics' focus areas cover a wide spectrum of the subdisciplines in biotechnology. These include human and animal health, biopharmaceuticals, industrial bioprocessing, mining biotechnology, bio-informatics and plant biotechnology. One of the challenges facing the South African biotechnology sector is the public's lack of understanding and knowledge of biotechnology applications and benefits.

A programme initiated as a result of this challenge is the Public Understanding of Biotechnology Programme, which provides the South African public with factual information, enabling members of the public to participate meaningfully in debates about biotechnology and make informed decisions.

Astronomy

Through the Astronomy Geographical Advantage Programme, South Africa continues to promote high-technology investment in space science to ensure that local researchers and students are able to participate in international astronomy.

A key result was the launch of the Southern African Large Telescope (Salt) in November 2005, in Sutherland in the Northern Cape. Salt is a multimillion rand project involving Germany, Poland, the United States of America, New Zealand and the United Kingdom. Salt is the largest single optical telescope in the southern hemisphere.

South Africa has been shortlisted, along with Australia, as one of the sites for the world-class radio telescope, the Square Kilometre Array. A final decision in this regard is expected in 2011.

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In January 2009, President Kgalema Motlanthe signed the South African National Space Agency Bill. The agency will promote the peaceful use of outer space; foster research in astronomy, Earth observation, communications, navigation and space physics; foster international co-operation in space-related activities; and advance scientific, engineering and technological competencies through human-capital development and outreach programmes.

The agency must facilitate the development of space missions, develop technology platforms and acquire, assimilate and disseminate space satellite data for any organ of state. It will also implement the National Space Strategy, which was approved by Cabinet in December 2008, to stimulate the capability to place South Africa among the leading nations in the innovative use of space S&T.

Advanced Manufacturing Technology Strategy (AMTS)

The AMTS guides efforts in the manufacturing sector, including the aerospace industry. It strives to:

- develop technology platforms that increase current and create new competitive advantages
- establish partnerships and human-capital development.

In October 2008, the Minister of Science and Technology, Mr Mosibudi Mangena, unveiled a world-class, locally developed electric car in Paris, France. Appropriately named Joule, the ultra sleek zero emission car made its global debut at the Paris motor show.



The car was named after British scientist, James Prescott Joule, one of the outstanding physicists of his day, best known for his research in electricity and thermodynamics.

Joule is a six-seater, multipurpose vehicle designed by Optimal Energy, in association with South African-born automotive designer, Keith Helfet. Optimal Energy was capitalised with a R50-million investment from the Innovation Fund (IF), an instrument of the Department of Science and Technology. Shareholders in Optimal Energy comprise executive management, the IF and the Industrial Development Corporation.



The aim is to enhance the knowledge base and the knowledge intensity of South Africa's manufacturing sector. In the Department of Science and Technology's Ten-Year Innovation Plan, the development of space S&T has been identified as one of the five priority areas.

The South African Institute for Aquatic Biodiversity is the custodian of the National Fish Collection of South Africa.



The Fish Collection Database consists of about 80 000 fish specimens (containing at least 650 000 individual fish specimens) from southern Africa and surrounding oceans, and from elsewhere in the world. It is the world's largest collection of southern African fish.

About 7 500 species in about 400 families are represented in the collection, depending on which classification is used.

Nanotechnology

South Africa's National Nanotechnology Strategy recognises the needs of local industry and focuses on the essential building blocks of nanoscience, namely synthesis, characterisation and fabrication.

The strategy is aimed at increasing the number of nanotechnology characterisation centres in South Africa. In 2007, National Treasury allocated R450 million to implement the strategy. Known as "the technology of the very small" (i.e. about 1/80 000 of the diameter of a human hair), nanotechnology comprises a wide range of technologies, techniques and multidisciplinary research efforts, for application in a range of cross-cutting industries and activities.

In May 2008, the Department of Science and Technology, in partnership with the Government of France and the Sci-Bono Discovery Centre, held the La Lillette Nanotechnology Exhibition in Newtown, Johannesburg. It later moved to the Vuwani science centre in Limpopo.



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The South African Government is offering generous tax incentives to encourage the private sector to invest in research and development (R&D) activities in the country, in terms of Section 11(d) of the Income Tax Act, 1962.



The incentives consist of a deduction of 150% in respect of expenditure on eligible scientific or technological R&D undertaken by enterprises or individuals within South Africa; and an accelerated depreciation of assets used for purposes of scientific and technological R&D over three years at the rate of 50:30:20, starting from the year of assessment in which the asset is brought into use.

These include, among other things, aerospace, manufacturing and automotive industries; energy conversion, storage and distribution; the hydrogen economy; chemicals; electronics and information processing; as well as biotechnology and medicines.

The South African industry and researchers have been key players in nanotechnology and the practical application of nanoscience for a number of years; for example, Sasol's chemical processing by catalysis.

Indigenous Knowledge System (IKS)

The Department of Science and Technology established the National Indigenous Knowledge Systems Office (Niko) to, among other things, increase public awareness, understanding, knowledge and appreciation of the IKS. Niko has created an appropriate platform through the Interdepartmental Committee on IKS to co-ordinate and promote the work of different departments.

In 2008, the Department of Science and Technology announced several initiatives to promote and protect IKS in the country.

These included the design of a degree in IKS being reviewed by the South African Qualifications Authority and the establish-

National Science Week is an annual week-long event aimed at encouraging the youth to pursue careers in science and technology, and highlighting the importance of science in everyday life.





ment of a pilot centre at the University of Zululand to be used for recording, codification and dissemination of IKS.

Also to be set up are research chairs on IKS, which would be based at Higher Education (HE) institutions in the country to help increase the human capital required to conduct research and develop appropriate skills in indigenous knowledge.

Supporting innovators Technology for Human Resources for Industry Programme (Thrip)

The programme aims to increase participation by small, medium and micro-enterprises (SMMEs), Black Economic Empowerment entities, and black and female researchers and students, as well as to expand the share of the Thrip budget allocation to historically disadvantaged individuals and universities of technology.

Thrip supports, on average, 2 400 tertiary students each year.

Innovation Fund (IF)

The IF was created to promote technological innovation, increase networking and cross-sectoral collaboration, increase competitiveness, improve quality of life, ensure environmental sustainability and harness information technology (IT).

Tshumisano

The Tshumisano Technology Station Programme is advancing technology transfer and skills development to enhance equitable economic development. In this regard, the HE sector has a vital role in supporting SMMEs to become engines of growth. The Tshumisano Trust is collaborating with universities of technology in particular to promote the development of industries in manufacturing, chemicals and textiles, and is supporting innovation within SMMEs and student skills' development.

Technology stations include the:

- Tshwane University of Technology (TUT): Electronics and Electrical Engineering, complemented by IT
- Central University of Technology: Metals Value-Adding and Product Development

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- TUT: Chemistry and Chemical Engineering
 - Mangosuthu Technikon: Chemistry and Chemical Engineering
 - Vaal University of Technology: Materials and Processing Technologies
 - Nelson Mandela Metropolitan University: Automotive Components
 - Nelson Mandela Metropolitan University: Downstream Chemicals
 - Cape Peninsula University of Technology: Clothing and Textile
 - University of Johannesburg: Metal-Casting Technology
 - Durban Institute of Technology: Reinforced and Moulded Plastics
 - Cape Peninsula University of Technology: Agrifood Processing Technologies.
 - University of Limpopo: Limpopo Agrifood Technology Station.
- It was estimated that in 2007/08, the trust assisted 570 SMMEs.

National research facilities

The National Research Foundation (NRF) manages South Africa's national research facilities. It promotes and supports basic and applied research. The NRF oversees the following national research facilities:

- South African Astronomical Observatory
- Hartebeesthoek Radio Astronomy Observatory
- Hermanus Magnetic Observatory
- South African Institute for Aquatic Biodiversity
- South African Environmental Observation Network
- National Zoological Gardens
- iThemba Laboratory for Accelerator-Based Sciences (iThemba Labs).

Science councils

Council for Scientific and Industrial Research (CSIR)

The CSIR is one of the largest scientific and technology, R&D and implementation organisations in Africa. The organisation undertakes and applies directed research and innovation in S&T to improve the quality of life of South Africans.



Mintek

Mintek, South Africa's national mineral-research organisation, is one of the world's leading technology organisations specialising in mineral processing, extractive metallurgy and related areas.

Collaborating with industry and other R&D institutions, Mintek provides service testwork, process development, consulting and innovative products to clients worldwide.

Mintek is an autonomous statutory organisation and reports to the Minister of Minerals and Energy. About 30% of the annual budget of R350 million is funded by the State Science Vote, with the balance provided by contract R&D, sales of services and products, technology licensing agreements and joint-venture operating companies.

Human Sciences Research Council (HSRC)

The HSRC conducts research that generates critical and independent knowledge, relative to all aspects of human and social development. Alleviating poverty and developing and implementing policy are central to its research activities.

The HSRC's research also extends beyond South Africa through projects and collaborations in other African countries.

Medical Research Council (MRC)

The MRC conducts research through six national programmes, and collaborates with most of the world's top health-research agencies to improve the nation's health status and quality of life.

The MRC disseminates research information through the National Health Knowledge Network. The council has established the African Biotechnology Information Centre in co-operation with various universities.

The MRC's National HIV and AIDS Lead Programme coordinates the South African AIDS Vaccine Initiative.

Agricultural Research Council (ARC)

The ARC is committed to promoting agriculture, and related sectors, through research and technology development and transfer.

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In August 2008, the Department of Trade and Industry launched South Africa's first aerospace supplier village. Situated in Centurion, Pretoria, the village is expected to unlock the potential of South Africa's aerospace industry.



The primary objective of the Centurion Aerospace Village (CAV) is the development, construction and operation of an aerospace supplier park. In addition, the CAV addresses the upliftment of small and medium enterprises and black empowerment companies within the industry and repositions the aviation sector to ensure participation in the global aviation market.

Government's vision is that, by 2014, the South African aerospace industry should be sustainable, growing, empowered and internationally recognised.

The village will house a number of local industry companies, including Denel and Aerosud Holdings, as well as smaller companies in what will be a cluster-focused development.

Council of Geoscience (CGS)

The CGS supplies the country with geoscience data to establish a safe and cost-effective physical infrastructure.

South African Bureau of Standards (SABS)

The SABS produces, maintains and disseminates standards. It promotes standardisation in business and government, and administers compulsory standards on behalf of the State. It also certifies international quality standards.

Other important research bodies and areas

The National Institute for Tropical Diseases in Tzaneen, Limpopo, continually assesses various malaria-control programmes.

The South African National Antarctic Programme manages three bases, one at Vesleskarvet, Antarctica; a second on Marion Island in the south Indian Ocean; and a third on Gough Island, a British territory in the South Atlantic Ocean.

South Africa is the only African country with a presence in Antarctica, and which is also conducting research there in



physics, engineering, Earth sciences, and biological and oceanographic sciences.

The South African base, Sanae IV, is one of the few country bases built on hard rock, as opposed to the ice shelf. The Department of Science and Technology has finalised the Antarctic Research Strategy for South Africa.

Mine-safety research

The Safety in Mines Research Advisory Committee aims to advance mineworkers' safety. It has a permanent research-management office overseeing research in rock engineering, engineering and occupational health.

Energy research

The Chief Directorate: Energy of the Department of Minerals and Energy manages a policy-directed research programme.

This includes transport energy, renewable energy and energy for developing areas, coal, electricity, energy efficiency, energy economy and integrated energy-policy formulation.

Agricultural research

Agricultural research is conducted by the ARC, several universities and the private sector.

Water research

Water research in South Africa is co-ordinated and funded by the Water Research Commission in Pretoria.

The organisation's most active partners in water research are:

- universities and universities of technology
- professional consultants
- science councils
- water and waste utilities
- non-governmental organisations.

Coastal and marine research

The Chief Directorate: Marine and Coastal Management advises on the use of marine living resources and the conservation of marine



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ecosystems, by conducting and supporting relevant multidisciplinary scientific research and monitoring the marine environment.

Environmental research

The Chief Directorate: Environmental Management of the Department of Environmental Affairs and Tourism annually finances several research and monitoring programmes.

The programmes focus on, among other things, waste management and pollution, nature conservation, river management, the coastline and marine environment, and the atmosphere.