Official Guide to SOUTH AFRICA

2021/22

SCIENCE AND INNOVATION

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The Department of Science and Innovation (DSI) derives its mandate from the *1996 White Paper on Science and Technology*, which introduced the concept of the national system of innovation, a set of interacting organisations and policies through which South Africa creates, acquires, diffuses and puts into practice new knowledge to help achieve individual and collective goals.

A coordinated and efficient national system of innovation will help the country achieve its national development priorities by promoting change through innovation. This will enable all South Africans to enjoy the economic, socio-political and intellectual benefits of science, technology and innovation.

Over the medium term, the department planned to focus on developing human capital, ensuring the effective use of publicly funded intellectual property, implementing the national space strategy, and implementing the national integrated cyberinfrastructure system. The department will continue to work towards identifying, protecting, using and commercialising intellectual property and technology.

Over the medium-term period, this includes generating a targeted 365 knowledge products (including peer-reviewed scientific articles and applications for or the registration/granting of intellectual property rights); developing and approving 12 science, technology and innovation strategic policy directives; and developing and/or maintaining nine interventions to improve the delivery of government services or functions.

The **National Space Strategy** is intended to ensure, through activities such as Earth observation, navigation and meteorological monitoring, that South Africa captures a reasonable share of the global space market.

The **National Integrated Cyberinfrastructure System** is expected to enable the successful and sustainable implementation of national projects such as MeerKAT and the Square Kilometre Array (SKA). The MeerKAT telescope, for example, is expected to add 20 antennae to its current array of 64 at a projected cost of R800 million over the period ahead.

The department continues to modernise existing sectors such as mining through support for research and development (R&D), both to ensure a safer working environment for miners and to increase the lifespan of mining in the country. In addition, we are also playing a vital role in beneficiation of the mineral's economy.

Through the S**outh African Mining Extraction Research, Development and Innovation** (SAMERDI) strategy, the department has invested money towards the modernisation of the African mining industry. In partnership with Anglo American Platinum, Bambili Energy and ENGIE in October, 2021, the department has initiated a feasibility study on the Hydrogen Valley and identified nine (9) catalytic projects across the mobility, industrial and building sectors in the first phase of the hydrogen economy programme.

By implementing the **South African Hydrogen Valley** corridor, which covers the Johannesburg Hub, the Mogalakwena/Limpopo and the Durban/Richards Bay

areas, the project has the potential to create 14 000 to 30 000 direct and indirect jobs per year by 2030. The launch of the world's biggest hydrogen truck by Anglo American Platinum at the Mogalakwena Mine in Limpopo on 6 May 2022, was an indication of the potential that South Africa has become a significant global player in the Hydrogen Economy.

In line with the DSI's commitment to supporting existing industries to meet South Africa's climate mitigation targets, the department was expected to further develop technologies to reduce emissions from coal-fired boilers in the cement, energy, steel, and paper and pulp industries through the CoalCO2-X project.

Hydrogen Society Roadmap (HSRM)

To support innovation in South Africa's energy markets, the DSI launched the HSRM in February 2022 to unlock the potential of new sources of clean energy to facilitate a just transition from a carbon-intensive to a carbon neutral economy.

The South African hydrogen economy journey started in 2007 when Cabinet approved the national hydrogen and fuel cells research, development and innovation Hydrogen South Africa Strategy (HySA Strategy). The DSI is implementing the HySA Strategy through the 15-year HySA Programme.

The HySA Programme, on its 13th year of implementation in 2022, has made significant contribution towards the creation of a Hydrogen Economy in South Africa. This has been achieved through the creation of knowledge, technological expertise and human resources development.

During the 2019/20 financial year, the HySA Programme underwent its second five-year review, which recommended the development of an overarching HSRM.

In September 2020, the DSI initiated a process to develop the HSRM in collaboration with key relevant departments as well as the private sector and civil society through a consultative process, which culminated in a stakeholder collaboration workshop on 14 July 2021. This led to the Cabinet approval of the HSRM on 14 September 2021.

The implementation of this roadmap is expected to support inclusive growth and assist government to reduce unemployment, poverty and inequality.

In South Africa, hydrogen is extensively used in the chemical and fuel-refining sectors, but it is produced mainly from non-renewable sources such as coal and natural gas. With a sound foundation, hydrogen is well positioned to become a game changer in the country's aspirations to move towards a net-zero carbon economy.

World Science Forum (WSF)

South Africa was the first country in Africa to host the WSF, from 6 to 9 December 2022, in Cape Town. The WSF is a biennial international conference series on global science policy which brings together leading scientists, researchers, private sector players, civil society and global media to discuss the challenges facing science and societies in the 21st century.

Entities

Academy of Science of South Africa (ASSAf)

The ASSAf was established in terms of the ASSAf Act of 2001, as amended, to promote outstanding achievements in all fields of scientific inquiry, recognise excellence, and provide evidence-based scientific advice to government and other stakeholders.

Over the medium term, the academy aimed to achieve enhanced national capacity to produce and publish research, provide evidence-based policy advice to government, and increase the quality and visibility of South African research publications.

Council for Scientific and Industrial Research (CSIR)

The CSIR was established in 1945 and is governed in terms of the Scientific Research Council Act of 1988. The council's overarching and continuous focus area is to foster industrial and scientific development in the national interest.

This is achieved through conducting multidisciplinary research and providing technological innovation to improve the ability of the state to deliver basic services with the broader objective of reducing inequality.

Human Sciences Research Council (HSRC)

The HSRC was established in 1968 to undertake, promote and coordinate research in the human and social sciences. The council is mandated to initiate, undertake and foster strategic, basic and applied research in human sciences; and address developmental challenges by gathering, analysing and publishing relevant data, especially through projects linked to collaborative programmes oriented towards the public sector.

The council's research outputs are widely disseminated to support policy development at all levels of government. As such, over the medium term, the council aimed to continue focusing on producing research that serves the public; contributing to good governance and public service delivery; helping to address the challenges of poverty, inequality and inclusive development, and building the capacity of scholars and researchers.

National Research Foundation (NRF)

The NRF was established in terms of the NRF Act of 1998, as amended. In terms of this legislation, the foundation is mandated to support research through funding, the development of human resources, and the provision of research facilities to enable knowledge creation, innovation and development in all fields of science and technology. It is also mandated to promote indigenous knowledge.

The NRF supports approximately research-productive and internationally recognised researchers. The productivity and quality of the knowledge produced by researchers who are funded by the foundation has been significant over the past five years. In this regard, over the medium term, the NRF planned to continue

driving excellence underpinned by the strength of the South African science system with a strong emphasis on transformation, innovation and sustainability.

South African Council for Natural Scientific Professions (SACNASP)

The SACNASP is the legislated regulatory body for natural science practitioners in South Africa. The natural sciences encompass a wide range of scientific fields covering all of the basic sciences and many of their applied derivatives. Its mission is to establish, direct, sustain and ensure a high level of professionalism and ethical conscience amongst its scientists.

South African National Space Agency (SANSA)

The SANSA was established in terms of the South African National Space Agency Act of 2008, as amended, to promote the peaceful use of space, foster international cooperation in space-related activities, and facilitate the creation of an environment conducive to space technology and industrial development.

In addition to continuing its focus on these priorities, over the medium term, the agency aimed to focus on broadening the suite of products and services available in the space sector, and contributing to promoting socio-economic development across Africa.

SANSA contributes significantly to the national economy and job creation through various projects such as satellite development and testing for various space missions, big data platforms like data visualisation centres, the activation of a satellite-based augmentation system over southern Africa, and the development of the required human talent.

More than 30 government departments and entities use national geospatial data for planning, monitoring and decision-making. South Africa, through SANSA, has been selected as one of two International Civil Aviation Organization (ICAO) designated Regional Space Weather Centres.

South Africa launched the state-of-the-art SANSA 24/7 Regional Space Weather Centre in Hermanus in the Western Cape in November 2022. The space weather capability is a direct response to the country's good safety track record that led to the ICAO selecting SANSA as one of the two regional centres to provide space weather services, including solar storm forecasts and warnings to the global aviation sector.

The DSI has also launched three locally produced nanosatellites, as part of South Africa's new Maritime Domain Awareness Satellite constellation. The high-tech satellites will detect, identify and monitor vessels in near real-time in support of the South African maritime domain awareness strategy.

Square Kilometre Array

The South African and Australian governments are co-signatories to co-host the SKA Observatory array telescopes and associated infrastructures over the period 2021-2030. Through the SKA Observatory, South Africa will be producing a whole new generation of science and scientists, many of whom are being trained

in the country. South African companies and the South African Radio Astronomy Observatory will benefit immensely from the rolling out of this infrastructure which includes the building of the SKA Exploratorium in Carnarvon in the Northern Cape.

The initiative is expected to boost science awareness and outreach, stimulate science tourism in the region and create employment. In particular, the DSI will also focus on ensuring the production of more-black and women scientists and specialists on this front. The MeerKAT telescope, built by South Africans, does great scientific work and will continue to do so until it is fully integrated into the SKA in the next five to seven years.

Technology Innovation Agency (TIA)

The TIA Act of 2008, as amended, mandates the agency to serve as a key institutional intervention to bridge the innovation gap between R&D outcomes from higher education institutions, science councils, public entities, and private companies.

This with the purpose of intensifying the effect of technological innovation in the economy. Over the medium term, the agency aimed to continue focusing on bridging the innovation gap between R&D goals, and supporting technologies within the national system of innovation.

Research and science bodies

South African Bureau of Standards (SABS)

The SABS was established as a statutory body in terms of the Standards Act of 2008 and is part of South Africa's standardisation, quality assurance, accreditation and metrology technical infrastructure institutions.

The bureau is mandated to develop, promote and maintain South African national standards; render conformity assessment services; and promote the quality of commodities, products and services. Its overarching objective is to protect the integrity of the South African market, protect consumers, create a competitive advantage, and facilitate access by South Africans to local and international markets.

Over the medium term, the bureau aimed to focus on revitalising testing operations and facilities in key targeted sectors. The bureau also plans to roll out a local content verification programme for key sectors designated for local procurement.

National Intellectual Property Management Office (NIPMO)

The NIPMO is mandated to ensure that intellectual property from publicly financed R&D is identified, protected, utilised and commercialised for the benefit of the people of South Africa, whether it be for social, economic, military or any other benefit.

Agricultural Research Council (ARC)

The ARC was established by the Agricultural Research Act of 1990, which mandates the council to: conduct R&D, and effect the transfer of technology in the agriculture sector; contribute to a better quality of life; and facilitate and ensure natural resource conservation.

Mintek

Mintek's mandate, as set out in the Mineral Technology Act of 1989, is to maximise the value derived from South Africa's mineral resources through, among other things, R&D, technology transfer, and the creation of an enabling environment for the establishment and expansion of mineral industries.

To this end, Mintek develops appropriate, innovative technology for transfer to industry, and provides the industry with test work, consultancy, analytical and mineralogical services.

Council for Geoscience (CGS)

The CGS was established in terms of the Geoscience Act of 1993 to promote the search for and exploitation of any mineral in South Africa. It is mandated to generate, compile, curate and publish world-class geoscience knowledge products, provide geoscience-related services to the South African public and industry, and render advisory services related to geohazards and geo-environmental pollution.

Over the medium term, the council was expected to continue focusing on the geoscience national mapping programme, the data migration and digitisation programme, the procurement of key geoscientific equipment and infrastructure, and the improvement of high-quality research and analysis.

The high-quality geoscience data provided by geological mapping for exploration and mining is expected to increase exploration activities, resulting in economic growth. This information is also required to assess the environmental impact of mining activities and shale gas development.

South African Medical Research Council (SAMRC)

The SAMRC conducts and funds health research and medical innovation in terms of the amended SAMRC Act of 1991. The council is mandated to contribute to improved health and quality of life for the South African population by providing evidence-based recommendations to various policy-makers through health research, development, technology transfer and capacity development.

National Health Laboratory Service (NHLS)

The NHLS was established in terms of the National Health Laboratory Service Act of 2000. The entity operates more than 230 laboratories in nine provinces and is the sole provider of training for pathologists and medical scientists, provides comprehensive and affordable pathology services to more than 80% of the South

African population, and plays a significant role in the diagnosis and monitoring of HIV and TB.

The entity also houses the National Institute for Communicable Diseases (NICD), which is internationally renowned for its role in the surveillance and monitoring of communicable diseases. It provides expertise to southern African countries on outbreaks such as Ebola, listeriosis and, most recently, COVID-19.

South African National Energy Development Institute (SANEDI)

The SANEDI was established in terms of the National Energy Act of 2008, and is listed as a schedule 3A public entity in terms of the Public Finance Management Act of 1999). Its mandate is to direct, monitor and conduct applied energy R&D, and demonstrate and deploy specific measures to promote the uptake of green energy and energy efficiency in South Africa.

Water Research Commission (WRC)

The WRC was established in terms of the Water Research Act of 1971. It is mandated to conduct research in the water sector by determining needs and priorities for research; promoting coordination, cooperation and communication in the area of water research development; stimulating and funding water research; promoting the effective transfer of information and technology, and enhancing knowledge and building capacity in the water sector.

South African Environmental Observation Network (SAEON)

The SAEON is a research facility that establishes and maintains nodes (environmental observatories, field stations or sites) linked by an information management network to serve as research and education platforms for long-term studies of ecosystems that will provide for incremental advances in the understanding of ecosystems and the ability to detect, predict and react to environmental change.

South African Astronomical Observatory (SAAO)

Founded in 1820, the SAAO is the national centre for optical and infrared astronomy in South Africa. Its primary role is to conduct fundamental research in astronomy and astrophysics by providing a world-class facility to scientists.

The SAAO also promotes astronomy and astrophysics in southern Africa, by sharing research findings and discoveries, and participating in outreach activities to enthuse citizens about physics and astronomy. The SAAO is a facility of the NRF, which operates under the DSI.

Its headquarters are in the eponymous suburb of Observatory in Cape Town, and has a dedicated research and observation station with several working telescopes, including Southern African Large Telescope, outside the Karoo town of Sutherland in the Northern Cape.

To achieve the best possible observing conditions, all of the current astronomy

operations occur in Sutherland. Historical telescopes in Cape Town are still regularly used for outreach and public events.