SOUTH AFRICA
YEARBOOK
2024/25

Education, Science and Innovation

The Constitution of the Republic of South Africa of 1996, declares basic education as an inalienable basic human right for all South Africans. In 2015, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted the global education agenda, Education 2030, which is part of the 17 UN Sustainable Development Goals (SDGs) that make up the Agenda 2030 for sustainable development. SDG 4 calls for an "inclusive, quality and equitable education and lifelong opportunities for all".

The National Development Plan (NDP) states that by 2030, South Africans should have access to education and training of the highest quality, leading to significantly improved learning outcomes. The education system will play a greater role in building an inclusive society, providing equal opportunities and helping all South Africans to realise their full potential. Education is governed by two national departments, namely the Department of Basic Education (DBE), which is responsible for primary and secondary schools, and the Department of Higher Education and Training (DHET), which is responsible for tertiary education and vocational training.

Department of Basic Education (DBE)

The mandate of the DBE is to monitor the standards of the provision, delivery and performance of education annually or at other specified intervals across South Africa, with the objective of assessing compliance with the provisions of the Constitution and national education policy.

The department derives its mandate from the:

- National Education Policy Act, 1996 (Act 27 of 1996), which inscribes into law the policies and legislative and monitoring responsibilities of the Minister of Basic Education, and formal relations between national and provincial authorities;
- South African Schools Act, 1996 (Act 84 of 1996), which promotes access to education, supports quality and democratic governance in the schooling system, and makes schooling compulsory for children aged seven to 15 to ensure that all learners have access to quality education without discrimination; and
- Employment of Educators Act, 1998 (Act 76 of 1998), which regulates the professional, moral and ethical responsibilities of educators, and the competency requirements for teachers.

Over the medium term, the department aimed to continue focusing on: accelerating the delivery of and improving school infrastructure; providing educational opportunities to learners with severe to profound intellectual disabilities; enhancing teaching and learning by ensuring access to high-quality learner and teacher support materials; increasing the supply of quality teachers and preparing teachers to teach new subjects that will prepare learners for a changing world; improving the quality and reach of early childhood development (ECD) services; and providing nutritious meals for learners through the national school nutrition programme.

Transfers and subsidies, mostly for conditional grants to provinces, account for 85.3% (R86.8 billion) of the department's allocation over the MTEF period, increasing at an average annual rate of 5,9%, from R25.3 billion in 2023/24 to R30 billion in 2026/27.

Cabinet-approved reductions of R2.8 billion over the medium term are effected on various programmes, including the school infrastructure backlogs grant (R1.2 billion), the education infrastructure grant (R611 million), the Funza Lushaka bursary scheme (R397.9 million) and workbooks (R97 million). Total expenditure is set to increase at an average annual rate of 5,3%, from R30 billion in 2023/24 to R35.1 billion in 2026/27.

Improving school infrastructure

The department is committed to ensuring that all schools have safe and appropriate infrastructure. This is delivered through the education infrastructure grant and the school infrastructure backlogs grant, which account for 95,8% (R47.6 billion) of spending over the MTEF period in the Planning, Information and Assessment programme.

The education infrastructure grant's allocation of R42.3 billion over the period ahead will be transferred to provinces as supplementary funding to accelerate the construction, maintenance, upgrading and rehabilitation of new and existing infrastructure in the basic education sector. The school infrastructure backlogs grant addresses infrastructure backlogs at schools that do not meet the norms and standards for basic school infrastructure.

This grant is allocated R5.3 billion over the MTEF period, which will be used to replace a targeted 100 inappropriate and unsafe schools with newly built schools, and to provide water to 350 schools, sanitation to 320 schools and 220 additional classrooms to address overcrowding.

Cabinet-approved reductions of R1.2 billion to the school infrastructure backlogs grant and R611 million to the education infrastructure grant will result in projects that are still in the planning phase being delayed so that those currently being implemented can be completed.

Supporting learners with intellectual disabilities

The Learners with Profound Intellectual Disabilities Grant aims to improve the provision of quality education to learners with severe to profound intellectual disabilities. The grant is expected to provide access to quality publicly funded education to more than 13 000 such learners over the MTEF period through an allocation of R874.7 million in the Curriculum Policy, Support and Monitoring programme.

Providing high quality learning materials

Recognising that quality learning materials enhance the effectiveness of teaching and learning, the department plans to print and deliver grades R to 9 life skills, languages and mathematics workbooks to all public schools that request them. An estimated 60 million workbooks will be provided to about 9 million learners in each year of the MTEF period.

To fund this, R3.9 billion is allocated over the period ahead in the Curriculum and Quality Enhancement subprogramme in the Curriculum Policy, Support and Monitoring programme. Despite Cabinet-approved reductions of R97 million to the programme's budget over the MTEF period, the department still expects to print and distribute all workbooks requested by schools by maximising cost-saving measures, particularly on printing.

Increasing employment of quality teachers

The Funza Lushaka bursary scheme provides bursaries to prospective teachers to address critical educator shortages in priority subject areas such as inclusive education, mathematics, coding, robotics, and science and technology. Despite Cabinet-approved reductions to the programme's funding, which amount to R397.9 million over the MTEF period, the department plans to increase the number of bursaries awarded from 9 700 in 2024/25 to 10 300 in 2026/27.

This will be done by funding more students completing the one-year postgraduate certificate in education and increasing the number of bursaries awarded to institutions with lower fee structures. The bursary scheme is allocated R4 billion over the MTEF period in the Teachers, Education Human Resources and Institutional Development programme.

Improving Early Childhood Development (ECD) services

The provision of ECD services in provinces is supported by the early childhood development grant. The grant is allocated R5.6 billion over the MTEF period to provide subsidies for children accessing ECD services, infrastructure support to ECD providers and pre-registration support packages; and to pilot the construction of low-cost ECD centres. An additional R197 million in 2024/25 is earmarked for piloting a nutrition support programme that targets low-cost ECD centres.

Providing nutritious meals for learners

The department plans to continue providing nutritious meals to more than 10 million learners on each school day at 19 950 schools each year over the period ahead, in line with the National Development Plan's priority of eliminating poverty and supporting food security. The programme is funded by the national school nutrition programme grant, which is allocated R30.9 billion over the MTEF period in the Educational Enrichment Services programme.

School attendance

According to the Statistics South Africa's General Household Survey of 2023, there were approximately 15,4 million learners at school in 2023. Participation in education institutions was virtually universal (97,3%) by the age of 15 years (the last compulsory school age). Approximately two-thirds (63,6%) of learners were still in school by the age of 18, which usually represents the age at which learners exit Grade 12. A notable percentage of learners, however, remained in primary and secondary schools long after they should have exited those institutions.

Less than one-fifth (18,3%) of twenty-year-olds were, for instance, still attending school. While the percentage of learners who have achieved Grade 12 has been increasing, the survey shows that the percentage of individuals who attended post-school education has remained relatively low for youth aged 19 to 22 years of age. Although almost two-thirds (66,1%) of learners attended no-fee schools (up from 21,4% in 2007), the percentage varies from 87,3% in Limpopo to 51,0% in the Western Cape.

Learners who dropped out of school before the age of 18 years cited reasons such as poor performance (29,1%) and a lack of money (19,5%) as the main reasons. Although 7,2% named family commitments as the main reason, it was more common for females (14,1%) than for males (0,1%). The percentage of individuals aged 20 years and older who did not have any education decreased from 11,4% in 2002 to 3,1% in 2023, while those with at least a Grade 12 qualification increased from 30,5% to 50,8% over the same period.

Intergenerational functional illiteracy (where individuals have not attained Grade 7) has also decreased markedly. Although 34,4% of South Africans over the age of 60 years were still functionally illiterate, this figure dropped to only 3,2% for those aged 20-39 years of age.

Entities

South African Council for Educators (SACE)

The SACE is mandated by the South African Council for Educators Act, 2000 (Act 31 of 2000), to enhance the status of the teaching profession by providing for the professional registration of all educators, promoting the continuing professional development of educators, and maintaining ethical and professional standards in the teaching profession.

Expenditure and revenue are expected to decrease at an average annual rate of 0,9%, from R121.3 million in 2023/24 to R118.1 million in 2026/27. The decrease in revenue is mainly due to the expected decrease in the number of educators registered and reinstated.

The council expects to generate 81,2% (R285.3 million) of its revenue over the MTEF period through membership and registration fees, and the remainder through interest on investments, reprints of certificates and transfers from the department for continuing professional teacher development programmes.

Umalusi Council for Quality Assurance in General and Further Education and Training (FET)

The Umalusi Council for Quality Assurance in General and FET derives its mandate from the General and FET Quality Assurance Act (2001) and the National Qualifications Framework Act (2008). As an external and independent quality assurance body, the council is mandated to set and maintain standards in general and FET by developing and managing the general and FET qualifications sub-framework.

To fulfil this mandate, the council's expenditure is expected to increase at an average annual rate of 5.3%, from R197.4 million in 2023/24 to R230.4 million in 2026/27. The council is set to derive 80.4% (R686.4 million) of its revenue over the period ahead through departmental transfers, which increase at an average annual rate of 3.8%, from R162.9 million in 2023/24 to R182.4 million in 2026/27.

Role players

Provincial Departments of Education

The role of the DBE is to translate government's education and training policies and the provisions of the Constitution into a national education policy and legislative framework. The DBE works closely with provincial education departments to ensure that provincial budgets and strategies are in line with and support national policies.

The national department shares a concurrent role with the provincial education departments for basic schooling and ECD, but it is the responsibility of each provincial education department to finance and manage its schools directly.

District offices are the provincial education departments' main interface with schools. Not only are they central to the process of gathering information and diagnosing problems in schools, but they also perform a vital support and intervention function. This includes organising training for personnel, dealing with funding, resourcing bottlenecks and solving labour-relations disputes. District offices are key to ensuring that school principals remain accountable to provincial education departments and that accountability lines within the school, to the principal and school governing body, are maintained.

Council of Education Ministers

The council, comprising of the Ministers of Basic Education, and Higher Education and Training, as well as the nine provincial members of the executive councils for education, meets regularly to discuss the promotion of the national education policy, share information and views on all aspects of education in South Africa and coordinate action on matters of mutual interest.

Heads of Education Departments Committee

The committee comprises the Director-General (DG) of the DBE, deputy DGs of the national department and the heads of provincial departments of education. The purpose of the committee is to facilitate the development of a national education system, share information and views on national education, coordinate administrative action on matters of mutual interest and advise the DBE on a range of specified matters related to the proper functioning of the national education system.

National Education Evaluation and Development Unit (NEEDU)

The NEEDU facilitates school improvement through systematic evaluation. This unit evaluates how district offices, provincial departments and the national department monitor and support schools, school governing bodies and teachers. This entails identifying critical factors that inhibit or advance the attainment of sector goals and school improvement, and making focused recommendations for addressing problem areas that undermine school improvement and the attainment of sector goals.

Education Labour Relations Council (ELRC)

The ELRC serves the public education sector nationally. It is a statutory council, initially established by the Education Labour Relations Act, 1993 (Act 146 of 1993), but draws authority from the Education Labour Relations Act, 1995 (Act 66 of 1995).

The establishment of the ELRC in 1994 at its founding meeting in Pretoria was a significant milestone for labour relations and education in South Africa. The main purpose of the council is to maintain labour peace within public education through processes of dispute prevention and resolution. These include collective bargaining between the educator unions and the DBE as the employer. The ELRC also conducts various workshops to increase the level of awareness and understanding of sound labour-relations procedures.

The ELRC has over the years succeeded in signing collective agreements that directly benefit educators in classrooms. The council serves educators in the public education sector, specifically those employed in terms of the Employment of Educators Act 76 of 1998. The council also serves the learners of this country by effectively resolving disputes in public education that involve the child as victim or witness and therefore complies with Section 28 of the Constitution of South Africa of 1996, which provides that the child's rights are of paramount importance in every matter concerning a child.

Educator unions

Educators are organised into six educator unions:

- National Professional Teachers' Organisation of South Africa;
- National Teachers' Union;
- South African Teachers' Union;
- Professional Educators' Union;
- Cape Professional Teachers' Association; and
- South African Democratic Teachers' Union.

There is an existing labour relations framework agreement between the DBE and unions. It encompasses both traditional areas of negotiation and issues of professional concern, including pedagogy and quality improvement strategies. An agreement was reached on the Framework for the Establishment of an Occupation-Specific Dispensation (OSD) for educators in public education. The OSD provides for dual career paths, where educators and specialists in classrooms can progress to levels where they earn salaries that are equal to, or higher than, those of managers without moving into management/supervisory posts.

It also provides for a new category of posts for teaching and learning specialists and senior learning and teaching specialists, as well as the creation of a cadre of education managers at school and office level.

Higher Education, Science and Innovation

The Department of Higher Education and Training (DHET) and the Department of Science, Technology and Innovation (DSTI) report to the Ministry of Higher Education, Science and Innovation but exist as separate votes.

Higher education and training

The NDP envisages that by 2030, South Africans should have greater access to Post-School Education and Training (PSET) opportunities through a system that is responsive to their needs. The DHET's vision is to have an integrated, coordinated and articulated PSET system for improved economic participation and the social development of youth and adults. The 2014 White Paper for Post-School Education and Training points out that the PSET system is an important institutional mechanism that must be responsive to the needs of society.

The system should be inclusive and cut across state boundaries, ethnic, gender, disability, class and socio-economic status, and national and religious identities,

to achieve a united human race based on human dignity. This is supported by Priority 2 (education, skills and health) of government's 2019-2024 Medium-Term Strategic Framework (MTSF).

The mandate of the DHET is to develop a skilled and capable workforce while broadening the skills base of the country to support an inclusive growth path. The department derives its mandate from the:

- Higher Education Act, 1997 (Act 101 of 1997), which provides for a unified national system of higher education;
- Skills Development Act (1998), which enables the creation of the National Skills Authority, sector education and training authorities (SETAs), the establishment of the Quality Council for Trades and Occupations, and the regulation of apprenticeships, learnerships and other matters relating to skills development;
- National Student Financial Aid Scheme Act of 1999, which provides for the granting of loans and bursaries to eligible students attending public higher education and training institutions, and the subsequent administration of such loans and bursaries;
- Skills Development Levies Act of 1999, which provides for the imposition of skills development levies;
- Continuing Education and Training Act of 2006, which provides for the regulation of continuing education and training, the establishment of governance structures for and the funding of public Technical and Vocational Education and Training (TVET) colleges and Community Education and Training (CET) colleges, the registration of private colleges, and the promotion of quality in continuing education and training; and
- National Qualifications Framework Act of 2008, which provides for the National Qualifications Framework (NQF), the South African Qualifications Authority (SAQA) and quality councils for the issuing and quality assurance of qualifications required by the sub-frameworks of the national qualifications framework.

As part of implementing its mandate, the Department oversees universities, TVET colleges, CET colleges, SETAs, quality councils and private education providers. Its goals include expanding access to higher education and training opportunities, and improving the quality of the provisioning, responsiveness and efficiency of the post-school education and training system. It aims to give effect to these goals over the medium term by focusing on upgrading ailing infrastructure at higher education institutions, and providing bursaries and loans to students from poor and working-class backgrounds.

The Department's expenditure is expected to increase at an average annual rate of 4,8%, from R130.5 billion in 2023/24 to R150.2 billion in 2026/27, driven mainly by transfers and subsidies to departmental agencies and accounts and higher education institutions. These account for an estimated 90,6% (R389.8 billion) of total spending over the period ahead.

Spending on compensation of employees accounts for an estimated 8,6% (R37.3 billion) of the total budget over the same period, mainly in the Technical and Vocational Education and Training programme for TVET college lecturers (R26.6 billion) and the Community Education and Training programme for CET college lecturers (R8.6 billion). Cabinet-approved reductions amounting to R27 billion over the medium term are mainly on transfer payments to the university infrastructure and efficiency grant and TVET infrastructure and efficiency grant, university subsidies, and the National Student Financial Aid Scheme.

Of these reductions, an estimated R4.9 billion over the MTEF period is on university subsidies. Although these subsidies are set to be reduced over the period ahead, the main funding source for universities is set to increase at an average annual rate of 3,7%, from R44 billion in 2023/24 to R49 billion in 2026/27.

Universities will need to implement cost-containment measures – including revisiting contracts, and reducing travel and subsistence costs – to accommodate the reduction. This takes into account the expected increase in university enrolments from 1.1 million in 2023 to 1.2 million in 2027.

Upgrading ailing infrastructure at higher education institutions

Although reductions of R6 billion to infrastructure grants over the MTEF period are expected to lead to delays in the start of new capital projects, they will also ensure closer alignment with the sector's capacity to spend infrastructure allocations as these grants have been underspent in recent years.

The Department plans to ensure that institutions have appropriate infrastructure to accommodate students accessing higher education. The university infrastructure and efficiency grant is allocated R4.5 billion over the medium term, decreasing at an average annual rate of 24,3%, from R2.2 billion in 2024/25 to R1.2 billion in 2026/27.

The TVET infrastructure and efficiency grant is allocated R539.4 million over the same period, decreasing at an average annual rate of 41,7%, from R491.9 million in 2023/24 to R97.6 million in 2026/27. Despite these decreases, these allocations will enable infrastructure repairs and maintenance in priority areas such as bulk services, sanitation, teaching and learning facilities, and student accommodation. Allocations amounting to R989.4 million will be used to construct basic skills centres, teaching and learning facilities, workshops and ICT laboratories at CET colleges.

Providing bursaries and loans to students from poor and working-class backgrounds

The department will endeavour to ensure that all students who are offered a place to study at a university or TVET college based on academic merit will be afforded that opportunity. The National Student Financial Aid Scheme (NSFAS) provides bursaries that cover tuition at these institutions and living expenses to students from families earning below R350 000 per year.

Despite reductions of R16 billion over the MTEF period, transfers to NSFAS to provide a projected 2.9 million students with loans and bursaries are expected to increase at an average annual rate of 3,6%, from R45.6 billion in

2023/24 to R50.8 billion in 2026/27. The reductions will, however, affect the number of bursaries the scheme is able to award over the medium term.

Historically Disadvantaged Institutions Development Programme

The programme is fully described in the draft HDI-DP Framework that has been fully consulted with historically disadvantaged institutions in the university sector. The HDI-DP Framework seeks to address challenges that threaten the viability and sustainability of historically disadvantaged institutions and will draw on the Historically Disadvantaged Institutions Development Grant as a resource.

It will also draw on a range of other institutional, departmental and partner resources.

The framework sets the following strategic priority areas for development focus:

- Strengthen institutional management and governance systems;
- Improve institutional infrastructure and facilities;
- Enhance effective staff recruitment, development and retention;
- Strengthen the academic enterprise; and
- Leverage locality and community.

The notion of universities as anchor institutions will be a key feature of the programme. Once it is presented and approved, the DHET plans to roll out its full implementation in the next five years.

Funding for the missing middle

Addressing the dearth of funding for the missing middle students was a priority for the 2020/21 financial year. In working towards a financial aid system that is inclusive of missing middle students, it would be necessary to explore the possibility of a loan scheme for the higher education sector, within the funding constraints, and working with private sector partners and other government departments, taking into account work already done. Ensuring the sustainability and effective administration of the NSFAS would also be key to the success of the financial aid system.

Student accommodation

Plans are underway to develop and finalise a multi-faceted and comprehensive strategy for student housing. The strategy will include a range of possibilities for increasing the availability of student housing on and off university and TVET campuses.

This will include accelerating the Student Housing Infrastructure Programme, which is already underway, through which university- and college-owned housing will be developed, leveraging private sector investments and development potential, as well as developing a policy framework on the accreditation of private student accommodation.

The norms and standards for student housing for the PSET system are also expected to be developed and implemented.

Establishing universities

Over the next five years, the system is expected to expand to provide additional spaces in higher education. In order to enhance the planned expansion in terms of the current enrolment plans of institutions, two new institutions will be established – a university for crime detection in Hammanskraal and a university for science and innovation in Ekurhuleni.

The Higher Education Act of 1997 allows for new institutions to be established as either higher education colleges or university colleges. This decision will be dependent on the outcome of a feasibility study, followed by a development plan for each new institution. Once funding is secured, the new institutions can be established as either a university college or a higher education college. Over a period of time, a university college may be established as a fully-fledged university once it has met requirements to be established as such.

Expanding access to TVET colleges and improving their performance

Expanding access to skills programmes that address the labour market's need for intermediate skills that include practical components is one of the DHET's key mandates. Over the medium term, the department will work towards improving the quality of the PSET system by establishing more entrepreneurship hubs to enable TVET college students to realise their potential and become actively engaged in the economy, either through employment in the labour market or self-employment.

While the enrolment projections in TVET colleges are held constant over the next five years in order to eliminate funding gaps, the DHET is committed to expanding provision in the TVET college system through the development of comprehensive proposals involving a diversity of stakeholders and modalities of delivery, and to growing the number of students who can access vocational education and training. However, growth in the TVET college core programmes must take cognisance of the number of opportunities available to students for work-integrated learning.

Among these proposals will be the provision of open learning opportunities, primarily in the form of e-learning, as a key strategy towards reaching out and expanding access to students in remote locations, as well as to those already in employment. Furthermore, it is becoming evident that highly responsive and quality short skills programmes will grow in demand as organisations seek to reskill and upskill employees to meet rapidly changing workplace practices and standards.

Colleges will, therefore, partner with a diversity of stakeholders to deliver fit-for-purpose training in order to meet these localised needs. Programme diversification will constitute the cornerstone of expansion of the TVET system. The DHET will work collaboratively with the DSTI to leverage the innovation service points already in existence nationally, for the enhancement of skills development in TVET colleges.

Initial engagements will focus on augmenting and modernising current provision in TVET colleges through innovation and creativity to prepare students for the world of real work in a 21st century context. To facilitate this, teaching and learning support plans will be implemented in TVET colleges.

Establishing and operationalising Centres of Specialisation

Establishment and operationalising centres of specialisation in TVET colleges is a critical project for which the DHET continues to engage employers to work with young people as apprentices. The project aims to provide fully qualified artisans for a range of sectors in the economy, including high-technology manufacturing, the creative industries, computer software and aerospace engineering.

The department has also expanded its Centres of Specialisation from 26 to 34 centres at 20 TVET colleges with a further investment of R68 million, and 16 colleges now have 35 trade test centres. These trade test centres have trade tested more than 600 artisans, of which more than 500 have qualified as artisans.

Developing artisans

Over the medium term, the DHET aims to improve the public skills development system by managing the performance of service-level agreements with Sector Education and Training Authorities (SETAs) more effectively, and by providing funding to trade and quality assurance institutions for occupational qualifications. These institutions play a pivotal role in increasing the number of qualified artisans by rolling out skills programmes, learnerships, internships and apprenticeships, and by establishing partnerships with TVET colleges, universities and the labour market to provide opportunities for workplace experience. Through the SETAs, over the medium term, 93 000 new artisans are expected to be registered for training and 75 000 artisan learners are expected to qualify. For this purpose, R347.8 million over the medium term is allocated.

Through the Economic Reconstruction and Recovery Plan, the DHET has targeted 30 000 artisans per annum over the medium-term period to address the shortage of artisanal skills in the country. Income generated through the skills development levy, which is collected from employers by the South African Revenue Service (SARS) and transferred to SETAs and the NSF as a direct charge against the National Revenue Fund, contributes significantly to key performance areas of the public skills development system, including artisan development.

Strengthening governance of the CET sector

The DHET recognises that improving the CET sector is key for development as it has the potential to provide students with access to a comprehensive range of programmes that lead to part and full qualifications and employment opportunities, including entrepreneurial opportunities. To ensure that the sector rises to its potential, the DHET will continue to prioritise the development and training of lecturers in CET colleges and learning centres by enabling them to upgrade their qualifications, with a particular focus on mathematics and science. The DHET has also strengthened its recruitment policies so that only qualified lecturers are employed in the sector.

Establishing the Imbali Education Precinct

The Imbali Education Precinct will be made up of an interconnected network of education and support institutions that will work together in a locality for the mutual benefit of all involved – to create seamless, enhanced, quality education pathways from early childhood education to higher education for the community it serves.

Some progress has been made in implementing the Imbali Education Precinct Development Plan, mostly on the Indumiso Campus of the Durban University of Technology (DUT) through the allocation of existing resources, including significant infrastructure developments, and the development of a range of new teacher education programmes for TVET and CET college lecturers. However, there has been slow progress for a range of reasons, including changed leadership at DUT and a lack of on-the-ground champions.

A project team and project office will be established to take the work forward over the next five years. The idea and model of the development of education precincts will be tested in terms of the Imbali Project. It is envisaged that, over the next 10-year period, at least three such precincts will be developed across the country.

This approach will support the District Development Model. The South African Institute for Vocational and Continuing Education and Training Colleges must evolve into institutions that are highly responsive to the mid-level skills demands in the labour market. This requires expert and accurate planning in identifying much-needed skills sets, identifying appropriate modalities of skills training and delivery, efficient turnaround times in the development and delivery of occupational curricula, and vastly expanding the opportunities for work-based experience and learning through stakeholder engagements and partnerships.

The DHET will, in partnership with the German government, seek to strengthen the TVET system through:

- sectoral coordination and cooperation to implement governance and policy through the facilitation of cooperation agreements between the public and private sectors that build on existing initiatives and take forward new initiatives.
- private-sector engagement by assisting partner organisations to increase the level of private sector representation in decision-making bodies and to promote systematic stakeholder dialogue.
- the implementation of reformed vocational and technical skills development to support the provision of demand-oriented skills development to youth by promoting on-

the-job or work-based training approaches, the training of vocational teaching personnel, and strengthening the quality of artisan training in centres of specialisation.

Reviewing the National Skills Fund

The 2014 White Paper for Post-School Education and Training enunciates that the NSF will be responsible for skills development aligned to national development strategies and priorities, including building linkages within the skills system and providing funds for government strategies such as youth programmes, building small businesses and cooperatives, and rural development. It will also fund research and innovation that is not confined to a particular sector.

Coupled with the White Paper and other government strategic policy instruments, is the establishment of the new Ministry of Higher Education, Science and Innovation, which necessitates a review of policy and systems. On the other hand, the DSTI has introduced the White Paper on Science, Technology and Innovation, which is critical in ensuring that science, technology and innovation enable inclusive and sustainable South African development in a changing world.

With the rising unemployment rate, especially among the youth, and sluggish economic growth, prioritisation and focused skills development interventions that support national policies need urgent attention and resourcing. To this end, the Minister of Higher Education, Science and Innovation intends to undertake a review of the NSF – to evaluate the general operations of the NSF, including, but not limited to, its efficiency and relevance regarding the country's national priorities.

Legislation

Key policies and legislation relating to higher education and training in South Africa include the:

- Continuing Education and Training Act, 2006 (Act 16 of 2006), which provides for the regulation of continuing education and training, the establishment of governance structures for, and the funding of, public TVET colleges and CET colleges, the registration of private colleges, and the promotion of quality in continuing education and training;
- Higher Education Act, 1997 (Act 101 of 1997), which provides for a unified national system of higher education;
- NQF Act, 2008 (Act 67 of 2008), which provides for the NQF, the SAQA and quality councils for the issuing and quality assurance of qualifications required by the sub-frameworks of the NQF;
- NSFAS Act, 1999 (Act 56 of 1999), which provides for the granting of loans and bursaries to eligible students attending public higher education and training institutions, and the subsequent administration of such loans and bursaries;
- Skills Development Amendment Act, 2008 (Act 37 of 2008), which enables the creation of the National Skills Authority, SETAs, the establishment of the Quality Council for Trades and Occupations (QCTO), and the regulation of apprenticeships, learnerships and other matters relating to skills development; and
- Skills Development Levies Act, 1999 (Act 9 of 1999), which provides for the imposition of skills development levies.

Entities

Council on Higher Education (CHE)

The CHE is a statutory body established in terms of the Higher Education Act of 1997, as amended. The council's mandate is to advise the minister responsible for higher education on all matters pertaining to higher education; develop and manage the higher education qualifications sub-framework; develop and implement a suite of policies and criteria; and facilitate the implementation of the higher education qualifications sub-framework and the National Qualifications Framework (NQF) and protect their integrity.

Over the medium term, the council will continue to focus on becoming a recognised centre for information and policy analysis on higher education, and on conducting sector research and monitoring to advise the minister on all higher education matters. As these activities require skilled personnel, spending on the compensation of 52 employees accounts for a projected 40,6% (R115.4 million) of the council's total budget, decreasing at an average annual rate of 4%, from R45.6 million in 2022/23 to R40.2 million in 2025/26, due to one-off payments for back pay and allowances for the previous three years made in 2022/23.

The council expects to derive 91,5% (R263.1 million) of its revenue through transfers from the department. Revenue is projected to increase at an average annual rate of 4,7%, from R87.2 million in 2022/23 to R100.1 million in 2025/26.

National Skills Fund (NSF)

The NSF was established in terms of the Skills Development Act of 1998. It funds projects identified in the national skills development strategy as national priorities; projects related to the achievement of the purposes of the Act, as determined by the Director-General; and any activity undertaken by the Minister to achieve a national standard of good practice in skills development.

Over the medium term, the fund aims to: contribute to the development of skills for 5 100 small, medium and micro enterprises and cooperatives; fund 17 000 learners; facilitate the acquisition of various skills for 36 000 learners through community-based skills development initiatives; fund education and training for occupations in high demand for 120 000 learners; fund education and training programmes for 108 200 learners from rural areas; fund innovation and digital technology education and training programmes for 3 000 learners from rural areas; fund education and training programmes for 2 120 learners for worker education; and fund workplace experience for 1 780 learners.

The fund will pursue priority projects such as the development of infrastructure at TVET and community colleges; and research and innovation aimed at expanding, integrating and improving the effectiveness of the post-school education and training system. An estimated R12.4 billion over the MTEF period is allocated for these projects. The fund is set to derive 88% (R15 billion) of its revenue over the medium term through the skills development levy and 12% (R2.1 billion) from interest earned on investments held at the Public Investment Corporation.

The skills development levy is collected from employers by the SARS and transferred to the fund as a direct charge against the National Revenue Fund. Transfers from the

levy are projected to increase at an average annual rate of 7.1%, from R4.3 billion in 2022/23 to R5.3 billion in 2025/26. A sum of R1,7 billion was disbursed by the NSF towards its bursaries programme in 2021/22, benefitting students enrolled in undergraduate and postgraduate programmes in scarce and critical skills.

National Student Financial Aid Scheme (NSFAS)

The NSFAS was established in terms of the NSFAS Act of 1999. The scheme is responsible for providing bursaries and loans to students; developing criteria and conditions for the granting of loans and bursaries to eligible students in consultation with the Minister; raising funds; recovering loans from debtors; maintaining and analysing a database of funded students; undertaking research for the better use of financial resources; advising the minister on matters relating to student financial aid; and undertaking other functions assigned to it by the Act or by the minister.

The scheme aims to provide bursaries to 1.4 million university students and 1.7 million TVET students from poor and working-class backgrounds at 76 public higher education institutions at a projected cost of R159.8 billion over the MTEF period. It will also look to improve the bursary application process so that applicants can get immediate confirmation of funding and resolve issues with the disbursement of tuition and student allowances.

Transfers from the department constitute an estimated 94% (R154.2 billion) of the scheme's total revenue over the medium term. Allocations are set to increase at an average annual rate of 5.7%, from R46 billion in 2022/23 to R54.3 billion in 2025/26.

By mid-2023, NSFAS was funding 1.1 million students with a budget allocation of R47.6 billion in the 2023 academic year. In 2023, SASSA beneficiaries accounted for 49% of the funded students in 2023.

Quality Council for Trades and Occupations

The QCTO was established in terms of the Skills Development Act of 1998. The council's mandate is to develop and quality assure occupational qualifications and part qualifications (including trades and skills programmes), manage the occupational qualifications sub-framework, and advise the minister on all matters of policy concerning occupational standards and qualifications. Over the medium term, the QCTO aimed to continue focusing on overseeing the conversion of national accredited technical education diploma qualifications into occupational qualifications that have greater industry relevance, and developing and submitting new occupational qualifications to the South African Qualifications Authority (SAQA) for registration.

The occupational qualifications management programme will carry out these activities at a cost of R80.2 million over the next three years. Total expenditure is set to increase at an average annual rate of 7,2%, from R129.3 million in 2022/23 to R161.2 million in 2025/26. The QCTO derives 76,4% (R351.9 million) of its revenue over the MTEF period from SETA grant funding. Transfers from the department constitute an estimated 20,2% (R93.1 million) of total revenue, increasing at an average annual rate of 7,6%. Revenue is expected to increase in line with expenditure.

Sector Education and Training Authorities

The Skills Development Act of 1998 mandates SETAs to fund skills development; implement national, sector and workplace strategies to develop and improve skills in the South African workforce; and provide learnerships that lead to recognised occupational qualifications. Over the medium term, the authorities will focus on strengthening and delivering relevant priority skills to South Africa's labour market, with particular emphasis on partnering with TVET colleges, universities and the market.

The authorities will continue to establish partnerships with industry to scale up the placement of graduates, work-integrated learning, research, and the facilitation of industry exposure for TVET college lecturers in line with industry needs. These partnerships also allow authorities to garner labour market intelligence that informs sector skills plans and curriculum development, which improves the quality of programmes offered and the employability of graduates. These activities are expected to cost R61.5 billion over the medium term. Expenditure is set to increase at an average annual rate of 1,4%, from R20.8 billion in 2022/23 to R21.7 billion in 2025/26.The authorities derive the bulk of their revenue through the skills development levy, which is collected from employers by the SARS and transferred as a direct charge against the National Revenue Fund.

Revenue from the levy is set to constitute 89,2% (R54.7 billion) of total revenue over the medium term. It is projected to increase at an average annual rate of 4,9%, from R16.5 billion in 2022/23 to R19.1 billion in 2025/26. The remainder is expected to be generated through interest on investments. Through its SETAs combined, the department opened up 52 701 learnership opportunities to the value of R1.6 billion in the last financial year. It opened up 14 4 75 internships opportunities to the value of R758 million. It opened up 14 954 TVET placement opportunities to the value of R726 million and also committed to achieve a target of 20 000 placements of TVET graduates work placements.

The department's SETAs combined opened up 7 095 university students work placements to the value of R311 million and we also awarded 13 169 bursaries in various fields on skills in high demand to the value of R970 million. The department opened up 34 514 skills programmes opportunities for the unemployed to the value of R278 million. It also reskilled and upskilled 36 502 individuals in various sectors of the economy to the value of R494 million.

South African Qualifications Authority (SAQA)

The SAQA is a statutory body established in terms of the SAQA Act of 1995. It exists under the NQF Act of 2008, as amended, with the role of providing decisive and coherent leadership to coordinate, simplify, monitor and evaluate the implementation of an effectively articulated NQF.

The authority will focus on enhancing its ICT infrastructure over the medium term to automate the national learner records database and verify qualifications. It will also continue to refurbish, repair and maintain its headquarters while continuing its efforts to sell the building. As the authority is service delivery orientated, compensation of employees accounts for a projected 62,3% (R238.3 million) of total expenditure, increasing at an average annual rate of 1,2%,

from R78.8 million in 2022/23 to R81.7 million in 2025/26.

Transfers from the department account for an estimated 71,1% (R282.3 million) of total revenue over the MTEF period, while revenue generated from operations accounts for 27,6% (R107.8 million). Total revenue is expected to increase at an average annual rate of 6%, from R115.7 million in 2022/23 to R137.6 million in 2025/26.

South Africa's higher education landscape comprises the following institutions:

- Cape Peninsula University of Technology
- Central University of Technology, Free State
- Durban University of Technology
- Mangosuthu University of Technology
- National Institute for Higher Education, Northern Cape
- National Institute for Higher Education, Mpumalanga
- Nelson Mandela University
- North-West University
- Rhodes University
- Sefako Makgatho Health Sciences University
- Sol Plaatje University, Northern Cape
- Tshwane University of Technology
- University of Cape Town
- University of Fort Hare
- University of the Free State
- University of Johannesburg
- University of KwaZulu-Natal
- University of Limpopo
- University of Mpumalanga
- University of Pretoria
- University of South Africa
- University of Stellenbosch
- University of Venda
- University of the Western Cape
- University of the Witwatersrand
- University of Zululand
- Vaal University of Technology
- Walter Sisulu University, Eastern Cape.

Science, Technology and Innovation

The Department of Science, Technology and Innovation (DSTI) 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, and 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 providing funding for research infrastructure to strengthen South Africa's research and innovation capabilities, including implementing the national space strategy; developing human capital; and advancing innovation to improve South Africa's competitiveness in the global market through measures such as supporting emerging farmers.

The department's expenditure is expected to increase at an average annual rate of 3,4%, from R9.1 billion in 2022/23 to R10.1 billion in 2025/26. Transfers and subsidies account for an estimated 94% (R29.7 billion) of total expenditure over the MTEF period. The second largest cost driver is compensation of employees, spending on which increases from R357.7 million in 2022/23 to R403.8 million in 2025/26 at an average annual rate of 4,1%.

Strengthening research infrastructure and innovation capabilities

In recognising that the availability of adequate research infrastructure is vital for the development of a robust and competitive national system of innovation, the department will continue to fund projects that are in line with the South African research infrastructure roadmap. These include constructing large national infrastructure platforms and facilities; acquiring scientific equipment; and developing pilot plants, technology demonstrators and specialised facilities such as drug development and aerospace platforms.

In support of this, the department is allocated R3.9 billion over the period ahead in the Basic Science and Infrastructure subprogramme in the Research Development and Support programme. The department's work is also geared towards strengthening research capabilities. Key among these are the South African National Space Agency's (SANSA) space infrastructure hub project, a multi-year infrastructure development project that involves the development of space infrastructure such as satellite imagery to map geographical information, satellite-based augmentation systems and earth observation satellites; and the Square Kilometre Array (SKA), which is a global endeavour to construct the world's largest and most sensitive wavelength radio telescope.

These initiatives are supported by additional allocations over the MTEF period of R1.2 billion to the SANSA for the space infrastructure hub project and R1.3 billion to the South African Radio Astronomy Observatory for the expansion of the SKA in the Space Science subprogramme in the Technology Innovation programme.

Developing human capital

Human capital is key to the development of a national system of innovation that is globally competitive and responsive to South Africa's developmental needs. In recognition of this, the department provides support through granting postgraduate bursaries and scholarships; sponsoring internships; and funding emerging and established researchers, including for strategic instruments such as the South African research chairs initiative and centres of excellence projects.

To date, the department has awarded 257 research chairs, 240 of which are operational. Centres of excellence serve as hubs that draw a range of universities and science councils together to tackle challenges in areas such as health, food security, human development, energy and biodiversity. In support of these efforts, R8.7 billion is allocated over the MTEF period to the Human Capital and Science Promotions subprogramme in the Research, Development and Support programme.

Advancing innovation to improve South Africa's competitiveness in the global market

Over the medium term, the department planned to advance innovation and address key competitiveness challenges,

including market sustainability and facilitating access to new export markets. To achieve this, it intends to support 15 commercial outputs in designated areas such as healthcare and 85 technology demonstrations, prototypes, products and services each year over the period ahead.

These include locally developed fermentation-based skin care products and cotton baling machines for small-scale farmers. The department also planned to financially support black emerging farmers; train artisans in the space, energy and bioeconomy sectors; train graduates through experiential learning opportunities in the energy sector; and support learnership initiatives in publicly financed research and development institutions. Spending for these initiatives is expected to amount to R6.8 billion over the MTEF period in the Technology Innovation programme.

Legislation

Legislation governing the DSTI include the:

- Intellectual Property (IP) Rights from Publicly Financed Research and Development Act, 2008 (Act 51 of 2008), which provides for the more effective use of IP emanating from publicly financed R&D, through the establishment of the National Intellectual Property Management Office (NIPMO), the IP Fund, and offices of technology transfer at institutions;
- Technology Innovation Act, 2008 (Act 26 of 2008), which intends to promote the development and exploitation in the public interest of discoveries, inventions, innovations and improvements, and for that purpose establishes the Technology Innovation Agency (TIA);
- SANSA Act, 2008 (Act 36 of 2008), which establishes the SANSA to promote space science research, cooperation in space-related activities and the creation of an environment conducive for the development of space technologies by industry;
- Natural Scientific Professions Act, 2003 (Act 27 of 2003), establishes the South African Council for Natural Scientific Professions, and legislates the registration of professional natural scientists, natural scientists-in-training, natural science technologists and natural science technologists-in-training;
- National Research Foundation (NRF) Act, 1998 (Act 23 of 1998), which establishes the NRF to promote basic and applied research, as well as the extension and transfer of knowledge in the various fields of science and technology;
- National Advisory Council on Innovation (NACI) Act, 1997 (Act 55 of 1997), which establishes the NACI to advise the Minister responsible for science and innovation on the role and contribution of science, mathematics, innovation and technology in promoting and achieving national objectives;
- Africa Institute of South Africa (AISA) Act, 2001 (Act 68 of 2001), which establishes the AISA to promote knowledge and understanding of African affairs by encouraging leading social scientists;
- Human Sciences Research Council (HSRC) Act, 2008 (Act 17 of 2008), which provides for the HSRC, which carries out research that generates critical and independent knowledge relative to all aspects of human and social development;
- Scientific Research Council Act, 1988 (Act 46 of 1988), which refers to the activities of the Council for Scientific and Industrial Research (CSIR), one of the leading scientific and technological research, development and implementation organisations in Africa, which undertakes directed R&D for socio-economic growth in areas including the built environment, defence, the environmental sciences, as well as biological, chemical and laser technologies;
- Astronomy Geographic Advantage Act, 2007 (Act 21 of 2007), which provides for the preservation and protection of areas in South Africa that are uniquely suited to optical and radio astronomy, and for intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas;
- Geoscience Amendment Act, 2010 (Act 12 of 2010), which amends the Geoscience Act, 1993 (Act 100 of 1993), to mandate the Council for Geoscience to be the custodian of geotechnical information; to act as a national advisory authority in respect of geohazards related to infrastructure and development, and to undertake exploration and prospecting research in the mineral and petroleum sectors;
- The South African National Research Network (SANReN), which is responsible for the roll-out of a high-speed broadband network to all academic and research institutions in the country, was awarded a private electronic communications network licence exemption under the Electronic Communications Act, 2005 (Act 36 of 2005); and
- Science and Technology Laws Amendment Act, 2014 (Act 7 of 2014), which seeks to, among other things, streamline the process for the nomination and appointment of members of the boards or councils of such entities as well as the filling of vacancies on the boards.

Entities

Academy of Science of South Africa (ASSAf)

The ASSAf was established in terms of the Academy of Science of South Africa 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 enhance South Africa's capacity to produce and publish research, provide evidence-based policy advice to government, and increase the quality and visibility of South African research publications. This entails undertaking various consensus studies in the categories of health, education, climate change, energy, the science-policy nexus, biosafety and biosecurity, poverty reduction, gender- responsive issues, young people and people with disabilities.

To complement this work, the academy aims to host 15 lectures on scientific topics, form 12 strategic partnerships with players in the science community and publish 6 journal titles on the Scientific Electronic Library Online open-access platform over the MTEF period. Expenditure is expected to increase at an average annual rate of 3%, from R35.5 million in 2022/23 to R38.8 million in 2025/26. Transfers from the department account for an estimated 95,4% (R106.6 million)

of total revenue over the period ahead, increasing from R33.8 million in 2022/23 to R37.1 million in 2025/26 at an average annual rate of 3,1%.

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 fosters industrial and scientific development in the national interest through multidisciplinary research and technological innovation to improve the ability of the state to efficiently deliver basic services in fields such as health, education, social security, energy and shelter to all South Africans, and, in doing so, reduce inequality.

Over the medium term, the council will focus on conducting high-quality and relevant research, pursuing technological innovation to foster industrial and scientific development, and building on industrial development opportunities in fields such as pharmaceutical innovation and agro-processing. To achieve this, the council aims to support 56 registered patents and publish 960 journal articles over the medium term. The CSIR also planned to implement a range of research, development and innovation programmes in areas such as health, energy, defence and security. Spending on these activities amounts to an estimated R8.4 billion over the MTEF period.

As the council's work requires highly specialised skills and is labour intensive, spending on compensation of employees accounts for 55.6% (R5.6 billion) of planned expenditure over the medium term, increasing at an average annual rate of 9,1%, from R1.7 billion in 2022/23 to R2.1 billion in 2025/26. Transfers from the department account for an estimated 22.2% (R2.3 billion) of the council's total revenue over the period ahead.

The remainder is set to be generated from services rendered, such as contract research and development, income from intellectual property, proceeds from technology transfers, and royalties. Total revenue over the period ahead is projected to be R10.8 billion.

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 geared towards the public sector.

The council's research outputs are widely disseminated to support policy development at all levels of government. Over the medium term, the HSRC 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 unemployment; and building the capacity of scholars and researchers.

Human capital is essential for the council to produce research outputs, for fundraising and to implement contract research projects. As such, spending on compensation of employees accounts for an estimated 47.3% (R932.9 million) of the council's total expenditure over the medium term, increasing at an average annual rate of 4,6%, from R283.6 million in 2022/23 to R324.7 million in 2025/26.

The HSRC was set to receive 50,4% (R1 billion) of its revenue through transfers from the department, increasing at an average annual rate of 8%, from R279.2 million in 2022/23 to R351.5 million in 2025/26. It plans to generate the remainder of its projected revenue through research contracts and grants from national and international agencies, government departments and private-sector foundations.

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 fund research, develop human resources and provide research facilities to enable knowledge creation, innovation and development in all fields of science and technology. It is also mandated to promote indigenous knowledge.

Over the MTEF period, the foundation aimed to focus on implementing its 10-year strategy, Vision 2030. This involves interventions to catalyse transformation in the science and technology system through measures such as creating grant funding instruments that focus on women and black researchers; scaling up the development of a research and innovation workforce for renewing, regenerating and replenishing the cohort of South African researchers; establishing a transformed knowledge workforce with a greater diversity of people and ideas to lead the knowledge enterprise; and advancing the international competitiveness of the scientific workforce.

An estimated R5.4 billion over the MTEF period is allocated for capital expenditure. Included in this amount is R1.3 billion in new funding for major infrastructure investments for the SKA, which includes the science processing and regional centres, the science operations centre building, the engineering operations centre building, and fencing for the MeerKAT national park. Expenditure is expected to increase at an average annual rate of 5.3%, from R4.3 billion in 2022/23 to R5 billion in 2025/26.

The foundation receives funding primarily through transfers from the department, which accounts for an estimated 88,6% (R14.4 billion) of projected revenue over the MTEF period. These are expected to increase at an average annual rate of 1.5%, from R4.3 billion in 2022/23 to R4.5 billion in 2025/26, due to the additional funding for infrastructure investments in the SKA. The remainder of the foundation's revenue is set to be derived through contract funding from other government departments and entities for specific projects and programmes, and income from sales and interest.

South African National Space Agency (SANSA)

The SANSA was established in terms of the SANSA Act of 2008. The agency became operational in 2010 and is broadly required 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.

Space services provide an indispensable tool for the formulation of government decisions and policies by helping to provide knowledge on and address challenges in industries such as agriculture, water, energy, health, safety and security. Over the medium term, the agency will continue to focus on activities that ensure that these services are integrated into service delivery. Key among these is the space infrastructure hub project, where the agency plans to develop spacecraft and ground segment infrastructure to support deep space operations, earth observation and space science operations.

The build phase to develop satellites is expected to begin in 2023/24 and operations in 2024/25. The agency is allocated an additional R775 million in 2023/24 and R434 million in 2024/25 for this purpose. The agency's expenditure is expected to decrease at an average annual rate of 16,5%, from R563.4 million in 2022/23 to R327.5 million in 2025/26, due to one-off allocations of R774 million in 2023/24 and R434 million in 2024/25 for the space infrastructure hub project.

As the agency relies on highly skilled professionals to fulfil its mandate, compensation of employees comprises an estimated 34.6% (R651.4 million) of total spending over the period ahead. Transfers from the department account for an estimated 75,2% (R1.9 billion) of the agency's revenue over the period ahead, decreasing at an average annual rate of 11,9% , from R343.8 million in 2022/23 to R235.4 million in 2025/26, as a result of the additional allocation for the space infrastructure hub project.

Technology Innovation Agency (TIA)

The TIA draws its mandate from the TIA Act of 2008, as amended. The agency serves as the key institutional intervention to bridge the innovation gap between research and development outcomes from higher education institutions, science councils, public entities and private companies to maximise the potential of technological innovation for stimulating the economy.

Over the medium term, the agency aimed to continue focusing on bridging the innovation gap between research and development; supporting technologies within the national system of innovation; scaling up all strategic programmes by increasing the pace at which applications and internal processes occur; creating a conducive environment for engaging with innovators, stakeholders and suppliers; adopting measures to support small, medium and micro-enterprises in the sector; and increasing the participation of marginalised segments of society.

To give effect to this focus, over the next three years, the agency aims to license 70 technological innovations, launch 101 products into the market and ensure that 24 technology innovations are operational and functional. Transfers, mainly for supporting small, medium and micro-enterprises with the commercialisation of innovative technologies, account for an estimated 72,7% (R1.4 billion) of the agency's planned expenditure over the period ahead. Expenditure is set to increase at an average annual rate of 0,2%, from R649.8 million in 2022/23 to R653.4 million in 2025/26.

As human resources are central to the agency's operations, spending on compensation of employees accounts for an estimated 19,2% (R367.5 million) of expenditure, increasing from R120.2 million in 2022/23 to R126.1 million in 2025/26 at an average annual rate of 1,6%. The agency receives most of its revenue through transfers from the department. These are set to increase at an average annual rate of 0,1%, from R634.8 million in 2022/23 to R632.5 million in 2025/26.

Role player

South African Council for Natural Scientific Professions (SACNASP)

The SACNASP's mandate is to provide a credible professional registration and regulatory body that allows natural scientists to establish, direct, sustain and ensure a high level of professionalism and ethical conscience in the natural scientific professions sector. Their conduct should be internationally acceptable and in the broad interest of the community as outlined in the SACNASP Code of Conduct.

Policy Mandate and Programmes

Technology Innovation

The programme aims to enable research and development (R&D) in space science and technology, energy security and the bioeconomy, and in the emerging and converging areas of nanotechnology, robotics, photonics and indigenous knowledge systems (IKS), to promote the realisation of commercial products, processes and services. It also promotes the protection and utilisation of IP, technology transfer and technology commercialisation through the implementation of enabling policies and interventions along the entire innovation value chain.

Its subprogrammes include the:

- **Space Science,** which supports the creation of an environment conducive to the implementation of the national space strategy and South African earth observation strategy, and that addresses the development of innovative applications and human capital to respond to national priorities and support socio-economic development.
- **Hydrogen and Energy**, which provides policy leadership in research, development and innovation initiatives in the energy sector. This subprogramme plays a key role in developing a sustainable and globally competitive South African energy knowledge base and industry.
- **Bio-innovation**, which leads the implementation of the national bioeconomy strategy.
- **Innovation Priorities and Instruments**, which supports and strengthens the innovation policy package aimed at creating and sustaining an enabling environment for innovation, technology and development, and the commercialisation of publicly funded R&D initiatives.
- **NIPMO** – the implementing agency established to provide for the more effective use of IP emanating from publicly financed R&D.

International Cooperation and Resources

The programme strategically develops, promotes and manages international partnerships that strengthen the National System of Innovation. It enables an exchange of knowledge, capacity and resources between South Africa and its international partners, with a focus on building capacity to support science, technology and innovation in Africa.

It also supports South African foreign policy through science diplomacy. Its subprogrammes include:

- Multilateral Cooperation and Africa, which advances and facilitates South Africa's participation in bilateral science, technology and innovation cooperation initiatives with other African partners; in African multilateral programmes, especially those of the Southern African Development Community and African Union; and in broader multilateral science, technology and innovation, and innovation partnerships, with a strategic focus on South-South cooperation.
- International Resources, which works to increase the flow of international funding into South African science, technology and innovation initiatives, as well as African regional and continental programmes, through concerted efforts to promote foreign investment and the fostering of strategic relations with partners such as the EU, as well as foundations and philanthropic organisations and the multinational private sector.
- Overseas Bilateral Cooperation, which promotes and facilitates South Africa's cooperation in bilateral science, technology and innovation agreements with partners in Europe, the Americas, Asia and Australasia, especially for human capital development and collaborative research and innovation; and secures support for joint cooperation with other African partners.

South Africa is regarded by many countries and private sector partners as a preferred and privileged partner for international cooperation. On average, approximately 15% of annual R&D funding in South Africa comes from international investors.

Research, Development and Support

The programme provides an enabling environment for research and knowledge production that promotes the strategic development of basic sciences and priority science areas through the promotion of science human capital development, and the provision of research infrastructure and relevant research support, in pursuit of South Africa's transition to a knowledge economy.

Its subprogrammes include:

- **Human Capital and Science Promotions**, which formulates and implements policies and strategies that address the availability of human capital for science, technology and innovation; provide fundamental support for research activities; and contribute to the development of a society that is knowledgeable about science, critically engaged and scientifically literate.
- **Science Missions**, which promotes the development of research, the production of scientific knowledge, and the development of human capital in fields of science in which South Africa enjoys a geographic advantage.
- **Basic Science and Infrastructure**, which facilitates the strategic implementation of research and innovation equipment and facilities to promote knowledge production in areas of national priority, and sustain innovation led by research and development.
- **Astronomy**, which supports the development of astronomical sciences around a new multiwavelength astronomy strategy, and provides strategic guidance and support to relevant astronomy institutions in the implementation of strategic astronomy programmes.

Socio-Economic Innovation Partnerships

The programme enhances government's growth and development priority areas through targeted science and technology-based innovation interventions, and the development of strategic partnerships with other government departments, industry, research institutions and communities. Its subprogrammes include:

- **Sector Innovation and Green Economy**, which provides policy, strategy and direction for research and the development-led growth of strategic sectors of the economy; and supports the transition to a green economy.
- **Innovation for Inclusive Development**, which supports the development of science and technology-based innovations for tackling poverty, including the creation of sustainable jobs and human settlements, and the enhanced delivery of basic services.
- **Science and Technology Investment**, which leads and supports the development of indicators and instruments for monitoring investments in science and technology, the performance of the National System of Innovation, and ways of strengthening policy.
- **Technology Localisation, Beneficiation and Advanced Manufacturing**, which funds technology and innovation development programmes to advance strategic, sustainable economic growth for the medium and long term; sector development priorities; and service delivery.

National research facilities

The national research facilities managed by the NRF are clustered on the basis of their areas of specialisation aligned to the science missions of the National Research and Development Strategy.

South African Astronomical Observatory (SAAO)

The SAAO is the national centre for optical and infrared astronomy in South Africa. Its prime function is to conduct fundamental research in astronomy and astrophysics by providing a world-class facility and by promoting astronomy and astrophysics in southern Africa. The SAAO contributes to South Africa's future development by creating and disseminating scientific knowledge, providing research infrastructure and providing an interface between science and society. It is also responsible for managing the operations of the South African largest Telescope.

Hartebeesthoek Radio Astronomy Observatory (HartRAO)

The HartRAO is a national facility of the NRF. Its radio astronomy research focuses on stellar evolution, pulsars and masers; and its space geodesy research uses space-based techniques to study the Earth. The facility is also used by university students for carrying out research. It also undertakes science awareness programmes for schools and the general public.

South African Institute for Aquatic Biodiversity (SAIAB)

A national facility of the NRF, the SAIAB is famous for its association with the discovery of the enigmatic coelacanth and is internationally recognised for ichthyological research, dynamic research staff and an active postgraduate school. The SAIAB provides unique skills and infrastructure support in marine, estuarine and freshwater ecosystems research, molecular research, collections and bioinformatics.

South African Environmental Observation Network (SAEON)

The SAEON is a business unit of the NRF and serves as a national platform for detecting, translating and predicting environmental change through scientifically designed observation systems and research. The SAEON also captures and makes long-term datasets freely accessible, and runs an education outreach programme. The SAEON has six nodes dispersed geographically across the country.

National Zoological Gardens (NZG)

The NZG is a rapidly transforming facility reporting to the NRF. It owns an impressive animal collection, conservation centres, the Centre for Conservation Science and the NZG Academy. The NZG is well placed as an education and awareness platform for visitors comprising educators, learners, students, special interest groups and the general public.

iThemba LABS

iThemba LABS is the continent's largest facility for particle and nuclear research as well as one of only a handful of facilities in the world producing radionuclides for commercial, research and medical applications. In addition, its facilities include a full radiotherapy clinic for the treatment of certain cancers using both proton and neutron therapy.

The facility has secured government support to finance its strategic flagship project, the South Africa Isotope Facility (SAIF), an initiative that seeks to secure future sustainability of the facility by procuring a dedicated 70 Mega Electron-volt cyclotron accelerator to boost the production rate of a range of accelerator-based radioisotopes.

The strategic vision of the facility is to configure its radioisotope production division and establish the SAIF in a flagship project geared to triple the current radioisotope income.

The move is set to establish the facility as a formidable international entity with a secure market niche in the accelerator-based radiopharmaceutical sector. An annual average of more than 155 000 patients worldwide benefit from cancer diagnostic radioisotopes produced using the separated sector cyclotron particle at iThemba LABS.

Infrastructure projects

Square Kilometre Array (SKA)

The multi-billion-rand SKA, which is hosted in South Africa and Australia, aims to eventually extend into eight African countries and will be the world's biggest telescope. It is also one of the biggest-ever scientific projects and multinational collaborations in the name of science. The SKA organisation is progressing well, and South Africa continues to play an active role in the project. It was one of seven countries (with Australia, China, Italy, the Netherlands, Portugal and the United Kingdom (UK) that signed a treaty establishing the SKA Observatory in March 2019.

South Africa is also working on getting the SKA Observatory treaty ratified by Parliament. The SKA Observatory is an intergovernmental organisation tasked with the construction and operations of the SKA radio telescope. The quality of astronomy infrastructure will facilitate world-class research. With thousands of linked radio wave receptors in Australia and in southern Africa, the SKA radio telescope will constantly scan space and feed the data to astronomers around the world.

The amounts of data being collected and transmitted by the SKA in a single day would take nearly two million years to play back on an iPod. This means the project requires supercomputing power and Big Data management and analytics capabilities on an unprecedented scale. The SKA is working with the world's most significant ICT powerhouses on the project. One aspect of the project will see the Netherlands Institute for Radio Astronomy and the International Business Machines Corporation collaborating to research extremely fast, but low-power exascale computer systems, data transport and storage processes, and streaming analytics that will be required to read, store and analyse all the raw data that will be collected daily.

The SKA project will also have unprecedented data-connectivity needs. Meeting the advanced technological and engineering needs of this project will result in significant local skills development, revolutionise science and technology research and enable innovative new businesses and employment in the science, technology and engineering fields. Aside from the benefits to African science, Big Data Management and analytics capabilities could be the biggest spin-off from the SKA project. The innovations, skills development and commercial potential emerging as a result of the project are huge. The potential is not just academic; the taxpayer-funded IP is developed to a point where it is ready to become commercialised and benefit the economy.

Human capital development is already taking place as a result of the SKA project, with bursaries and scholarships being granted to allow students to learn the necessary cutting-edge science, technology, mathematics and engineering skills to support the project. Because the SKA is a long-term project, over decades its effect will increase. The Centre for High Performance Computing (CHPC) is a member of the international SKA Science Data Processing Consortium. With funding from the DSTI, it is also supporting eight African SKA partner countries through an initiative where they have installed a new supercomputer to provide 1 000 teraflops (one petaflop) of computing power to researchers.

The facility was upgraded to meet the growing demand for use by university and industrial researchers. The SKA remains a major platform for cutting-edge innovation in domains such as supercomputing and the high-speed transmission and processing of massive data sets. Going forward, there will be a strong drive to leverage the SKA as a spearhead for other programmes – including next generation high performance computing challenges and Big Data challenges.

Two engineering consortia have been hard at work at their sites in Murchison, Western Australia, and the Northern Cape, South Africa, respectively, designing all the essential infrastructure required for the construction of this complex global project to get under way. This includes access roads, power, water and sanitation, buildings, antenna foundations, and the communication, security and site monitoring equipment required to support the SKA telescope.

The South African consortium, Infrastructure South Africa, was led by the South African Radio Astronomy Observatory, which designed, built and operates the 64-dish SKA precursor telescope, the MeerKAT. Following the successful review of the key infrastructure components of the SKA – considered a major engineering victory – the project will now move on to the bridging phase.

National Integrated Cyberinfrastructure System (NICIS)

The NICIS promotes scientific and industrial development through the provision of high-performance computing capability, high-speed network capacity and a national research data infrastructure integrated hierarchically into globally connected systems and into local systems, providing seamless access for the research and education communities of South Africa. It is a national initiative of the DSTI and is implemented by the CSIR.

The CHPC is one of three pillars of the NICIS. It provides massive parallel processing capabilities and services to researchers in industry and academia. The other main pillars are the South African National Research Network, which provides high-speed connectivity and advanced networking services, and the Data Intensive Research Initiative of South Africa, which implements services that enable sound data management practices and support efficient data-driven scientific and engineering discoveries.

The NICIS is the national or Tier 1 platform to provide e-infrastructure, tools and services to enable sustainable e-research, human capital and research capacity and skills development; and effective delivery of e-learning.

South African Research Infrastructure Roadmap (SARIR)

Through a joint agreement between South Africa and the EU, the SARIR Framework was developed as the basis for prioritising the development of national research infrastructure needs. The SARIR is a high-level strategic and systemic intervention to provide research infrastructure across the entire public research system, building on existing capabilities and strengths, and drawing on future needs.

This roadmap will provide guidance to the DSTI on the strategic development, acquisition and deployment of research infrastructure as a necessary enabler for research, development and innovation. The SARIR is intended to provide a strategic, rational, medium to long-term framework for planning, implementing, monitoring and evaluating the provision of research infrastructure necessary for a competitive and sustainable national system of innovation.

It also provides a basis for discussion concerning financing future infrastructure for research in South Africa, and for participating in joint international research infrastructure. The roadmap was developed through a bottom-up process driven from within the national research community, moderated at a technical level by an expert steering committee and aligned with national research priorities through strategic moderation by the DSTI. The implementation of the SARIR will continue over the MTSF period, with all 13 research infrastructures approved in the first phase of the roadmap being implemented.

Information and Communications Technology

The DSTI is leading the implementation of the national ICT Research, Development and Innovation Strategy. The strategy's main purpose is to create an enabling environment for innovation and manufacturing facilities and resources in South Africa. The CHPC, SANReN and the Very Large Databases are the three pillars of cyberinfrastructure that the DSTI supports. Hosted by the UCT and managed by the CSIR's Meraka Institute, the CHPC was the first of its kind in South Africa and is making scientific supercomputing a reality for the country.

A major project for SANReN is the national backbone network, which aimed to connect all major metros in the country with a 10 gigabyte per second link. SANReN, linking 215 research sites, consists of 1 500 kilometres (km) of dark fibre and 5 000 km of managed bandwidth. This network is complimented by significant international broadband capacity on the West Africa Cable System and the east coast SEACOM system, ensuring that the DSTI's projects support competitive research and innovation as it prepares the national innovation system for the future. SANReN connects more than 200 sites from Thohoyandou to Cape Town, including all the main campuses of all South African universities and most public research institutions, as well as global projects such as the SKA and the MeerKAT.

Indigenous Knowledge Systems (IKS)

The IKS Policy serves as a guide for the recognition, understanding, integration and promotion of South Africa's wealth of indigenous knowledge resources. One of the areas of action identified by the policy is the protection of indigenous knowledge and the holders of such knowledge against exploitation. This includes ensuring that communities receive fair and sustained recognition and, where appropriate, financial remuneration for the use of this knowledge. The indigenous knowledge of many communities embodies a deeply spiritualised and ancient

relationship with the Earth's systems and cycles. Traditional songs and languages, clothing, architecture, foods, motifs, daily rituals and mythological epics contain local survival information. Moreover, the diversity of indigenous cultures provides unique insights into how to live harmoniously within nature.

By sharing indigenous stories of vulnerability and adaptation, people learn how communities share ideas on how ancestral wisdom is being incorporated into climatic adaptation strategies. By cherishing the value of indigenous knowledge, people can discover how best to adapt to a changing climate.

The DSTI has three IKS priorities:

- The development of a regulatory environment for the protection of IKS.
- The development of the National Recordal System for the collection, recording, documenting, storage and management and dissemination of IKS in communities in the nine provinces of the country. Until orally transmitted and rapidly disappearing indigenous knowledge is recorded, it will be difficult to protect. The National Recordal System is the largest fingerprint initiative of the region to document and record indigenous knowledge.
- Applied research, specifically bio-prospecting activities. An example would be the Moritela Tshwene Tea Project near Zeerust in the North West.

A major achievement was to put in place an information infrastructure that would hold IKS in oral format. In addition, two UK-South Africa bilateral research chairs have been awarded for research into food security – one co-hosted by the universities of the Western Cape and Pretoria, and the other based at the NMU. The DSTI has also established indigenous knowledge studies centres of excellence at some of the country's universities. The centres will play a defining role in generating highly qualified human resource capacity in IKS.

Natural Resource Development

To reinvigorate the South African mining sector and to harness the vast amounts of existing and potential opportunities for industrial and manufacturing growth, it is crucial for the country to create the technologies and mining methods to push mining deeper in a commercially viable manner. South Africa needs a competitive mining industry. This will only be possible if science and innovation play the quintessential role of changing the cost and exploitation horizons of the sector.

None of the existing mining stakeholders (publicly funded research institutions, private sector companies, universities, unions or government) have the scale to impact the situation alone in the long run. To achieve this, a critical mass of science and knowledge to push the frontiers of mining will require a national effort consisting of deep partnerships and collaborations across institutions and industries.

Women in Science Awards

Every year since 2003, the DSTI has held the South African Women in Science Awards (SAWiSA) to recognise the achievements of prominent women scientists and encourage the participation of women in research. The awards are held in August as part of National Women's Month celebrations, which take place to honour the women who marched to the Union Buildings in 1956 to protest the apartheid system's pass laws.