



CSIR 2019/20 Annual Report Presentation to the Portfolio Committee on Higher Education, Science and Innovation

75 YEARS OF TOUCHING LIVES
THROUGH INNOVATION

Friday, 13 November 2020



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



CSIR

Touching lives through innovation

Overview of the 2019/20 financial year



- **First year of the implementation of CSIR industrialisation strategy**
- **Implemented the new operational model and migrated from operating units to clusters**
- **Finalised placements for SET staff and large portion of support base**
- **Established a dedicated portfolio for business development and commercialisation**
- **Rebranded to appropriately position the organisation with the public and private sector**
- **Initiated a number of strategic partnerships with the private sector**
- **Private sector income for the year amounted to R175 million**
- **Initiated 11 exchange programmes with industry**
- **Filed four priority patent applications and 17 invention disclosures**
- **Supported 116 SMMEs**
- **Obtained 12th consecutive clean audit outcome from the Auditor General**

Contents



- **CSIR mandate and strategic focus**
- **Key performance indicators**
- **Financial sustainability and good governance**
- **Human capital highlights**
- **Research, development and innovation highlights**



CSIR MANDATE AND STRATEGIC FOCUS





CSIR MANDATE

“The objects of the CSIR are, through **directed** and **particularly multi-disciplinary research** and **technological innovation**, to foster, in the **national interest** and in fields which in its opinion should receive preference, **industrial** and **scientific development**, either by itself or in **co-operation with principals** from the **private** or **public sectors**, and thereby to contribute to the **improvement of the quality of life** of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act.”

(Scientific Research Council Act 46 of 1988, amended by Act 27 of 2014)





VISION

We are accelerators of socio-economic prosperity in South Africa through leading innovation



MISSION

Collaboratively innovating and localising technologies while providing knowledge solutions for the inclusive and sustainable advancement of industry and society

Our values



Excellence

We excel at R&D and industrial **innovation** solutions that address South Africa's challenges. We are unashamedly **passionate** about the **impact** we make and pursue **excellence** in every facet of CSIR life.

People-centred

We **care** about people – our impact through innovation aims to **improve lives**. We respect each other's **diversity**, and uphold the **dignity** of every person, regardless of **culture or belief system**. We treat our **stakeholders** the way we like to be treated.

Integrity

We value integrity – in ourselves and in others. We are **honest** and **fair** in how we work and how we engage the world around us. We respect the trust that our colleagues and our stakeholders place in us and commit to ethical decision-making, delivery and governance.

Collaboration

We are keen to learn from one another and **collaborate** across the organisation and with external partners, to ensure our work has the best chance to **innovate** a better future for South Africans.

Our core values are EPIC!

The CSIR pursues Excellence, celebrates People, personifies Integrity, and welcomes Collaboration.

The CSIR strategic intent



Growth

Refers to inclusive and dual growth for the country and the CSIR. The CSIR will use its capabilities in e.g skilled human capital and infrastructure to assist in growing the economy; but will also grow in the same, and other competencies to become a world-class organisation.



Sustainability

Focuses on CSIR-developed technologies that lead to the advancement and sustainability of SA enterprises and the financial sustainability of the organisation in a resource-constrained environment



Impact

Focuses on the commercialisation of our technologies and innovations for industrial development, as well as technology and knowledge transfer that enable a capable state



Relevance

Addresses the CSIR's role in leading innovation to contribute to industrial development and our ability to deliver on our mandate



Strategic objectives



Conduct research, development and innovation of transformative technologies and accelerate their diffusion



Collaboratively improve the competitiveness of high-impact industries to support South Africa's re-industrialisation



Drive socioeconomic transformation through RD&I that supports the development of a capable state



Build and transform human capital and infrastructure



Diversify income and maintain financial sustainability and good governance



Technology – Sector Clusters

Positioned to drive SA's industrialisation



Industry advancement clusters

Advanced Agri & Food

Innovate to strengthen primary production, agro-processing and advance rural economies

Future Production Chemicals

Establish state-of-the-art (bio)-chemistry to drive local pharmaceutical and the broader chemical industries

NextGen Health

Develop technologies to drive improved health outcomes and patient-centric healthcare delivery

Future Production Manufacturing

Strengthen manufacturing value chain to enhance Industry Competitiveness

Future Production Mining

Support the growth and revitalisation of the mining industry

Defence & Security

Build resilient defence and security capabilities to strengthen national security technology capacity

SMART Places

Effect smarter resource use, sustainable economic growth and smart infrastructure and service developments

SMART Mobility

Enable South Africa to have an efficient, effective and integrated logistics sector

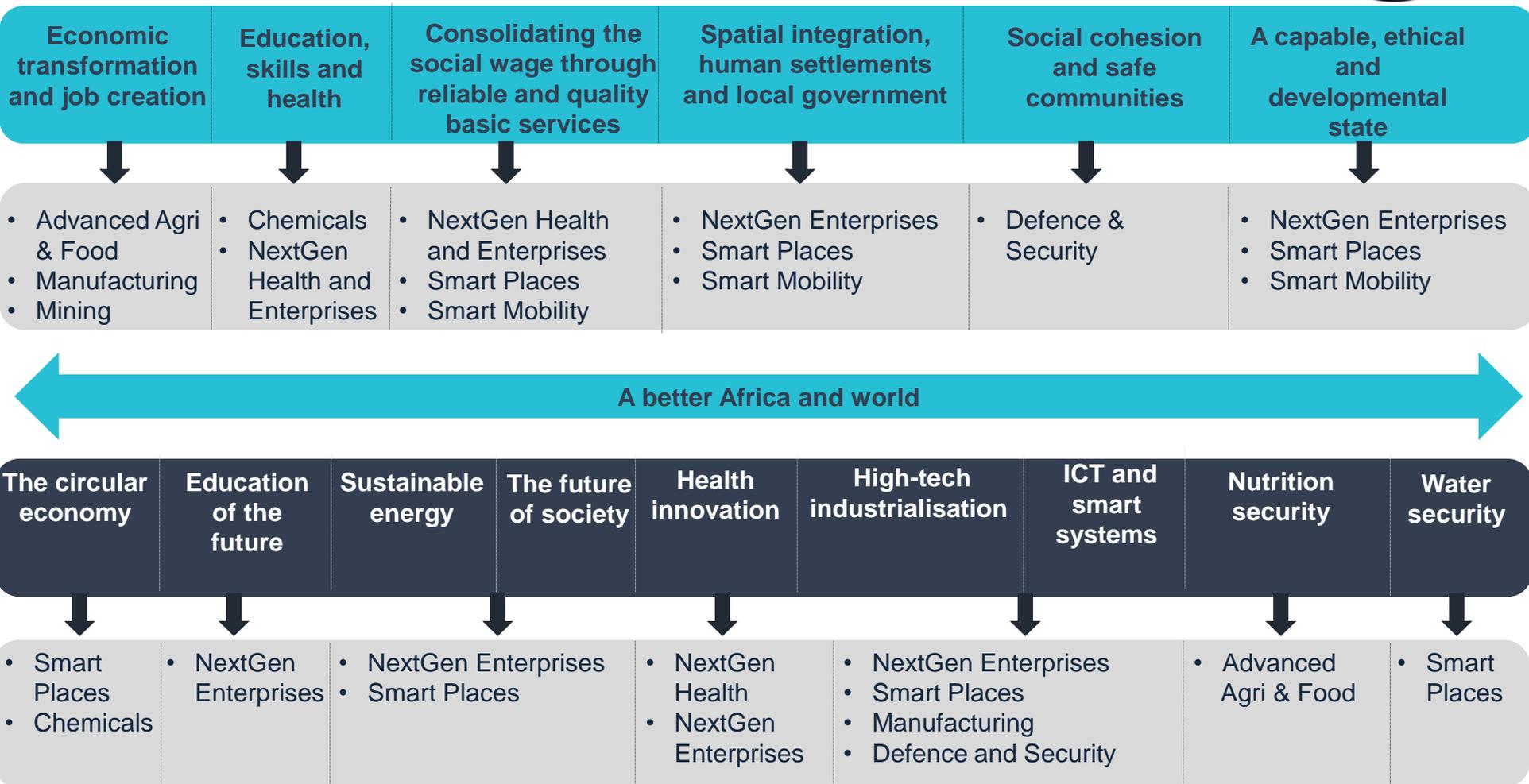
NextGen Enterprises & Institutions

Support the digitalisation of government, public institutions and private sectors

Industry and society enabling clusters

The clusters are technology industry convergences that represent the CSIR's strategic focus. They have been selected based on national priorities, potential for socioeconomic impact and the fourth industrial revolution.

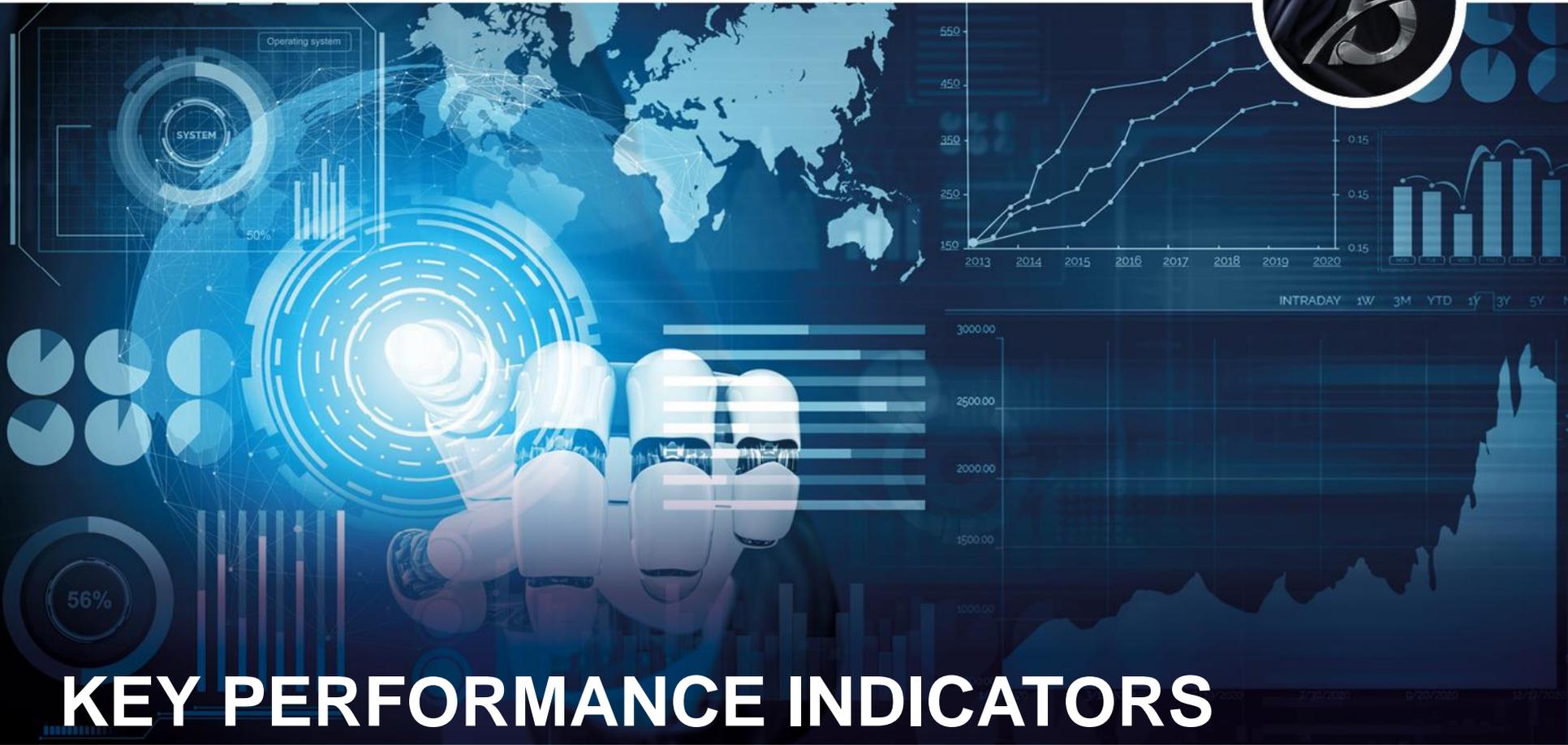
CSIR alignment to MTSF priorities and STI Domains



MTSF Priorities

SAForSTI Domains

CSIR Clusters



Diversify income, maintain financial sustainability and good governance



Performance Indicator	Actual Achievement 2018/19	Planned Target 2019/20	Actual Achievement 2019/20
KPI 24: Total Income (Rm)	2 582	2 859	2 764
KPI 25: Net Profit (Rm)	7.7	9	55
KPI 26: South African public sector income (% Total Income)	New KPI introduced in 2019/20	55	56
KPI 27: South African private sector income (% Total Income)	New KPI introduced in 2019/20	8	5
KPI 28: International contract income (% Total Income)	New KPI introduced in 2019/20	8	5
KPI 29: B-BBEE rating*	3	3	4
KPI 30: Recordable incident rate*	New KPI introduced in 2019/20	2	1.8
KPI 31: Audit opinion	New KPI introduced in 2019/20	Unqualified audit opinion	Unqualified audit opinion



Build and transform human capital and infrastructure



Performance Indicator	Actual Achievement 2018/19	Planned Target 2019/20	Actual Achievement 2019/20
KPI 12: Total SET staff	1 608	1 619	1 367
KPI 13: Percentage of SET staff who are black	62.08	62	63
KPI 14: Percentage of SET staff who are female	35.95	36	35
KPI 15: Percentage of SET staff with PhDs	19.47	22	22
KPI 16: Total chief researchers	14	15	11
KPI 17: Percentage of black chief researchers	7.14	13	18
KPI 18: Percentage of female chief researchers	14.29	13	18
KPI 19: Total principal researchers	190	209	149
KPI 20: Percentage of black principal researchers	27.37	31	28
KPI 21: Percentage of female principal researchers	16.84	18	16
KPI 22: Number of exchange programmes with industry	New KPI (2019/20)	8	11
KPI 23: PPE Investment (Rm)*	74	95	86

Conduct RD&I, localise transformative technologies and accelerate their diffusion



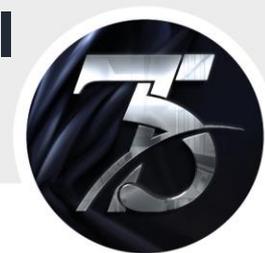
Performance Indicator	Actual Achievement 2018/19	Planned Target 2019/20	Actual Achievement 2019/20
KPI 1: Publication equivalents	536	420	438
KPI 2: New Priority Patent Applications filed	New KPI introduced in 2019/20	5	4
KPI 3: New patents granted	22	13	21
KPI 4: New technology demonstrators TDs)	50	66	37
KPI 5: Number of technology licence agreements signed	New KPI introduced in 2019/20	24	5
KPI 6: Number of localised technologies	New KPI introduced in 2019/20	12	7

Collaboratively improve the competitiveness of high-impact industries to support South Africa's re-industrialisation



Performance Indicator	Actual Achievement 2018/19	Planned Target 2019/20	Actual Achievement 2019/20
KPI 7: Number of joint technology development agreements being implemented for industry	New KPI introduced in 2019/20	39	23
KPI 8: Number of SMMEs supported	New KPI introduced in 2019/20	92	116

Drive socioeconomic transformation through RD&I that supports the development of a capable state.



Performance Indicator	Actual Achievement 2018/19	Planned Target 2019/20	Actual Achievement 2019/20
KPI 9: Number of reports contributing to National Policy Development	New KPI introduced in 2019/20	24	24
KPI 10: Number of standards delivered or contributed in support of the state	New KPI introduced in 2019/20	16	10
KPI 11: Number of projects implemented to increase the capability of the state	New KPI introduced in 2019/20	54	67

Overview of corporate governance and financial sustainability



- The CSIR made good progress in the first year of the implementation of its new strategy, achieving or exceeding 61% of its KPIs.
- Income worth R450 million from the public sector could not be achieved due to restrictions by National Treasury on collaborations between the CSIR, government departments and SOEs.
- Loss of income was mitigated through cost reductions and limited recruitment of staff.
- The latter had a knock on effect on the ability to deliver on other KPIs.
- Long-term relationships were established with the private sector.
- Focus on good corporate governance has seen a significant reduction in irregular expenditure from R5.70 million in 2018/19 to R1.36 million in 2019/20.
- The CSIR's B-BBEE level is currently at Level 2, which is a significant improvement from the end of the 2019/20 financial year.
- The CSIR obtained a clean audit report from the AG.



FINANCIAL SUSTAINABILITY AND GOOD GOVERNANCE



Diversify income, maintain financial sustainability and good governance



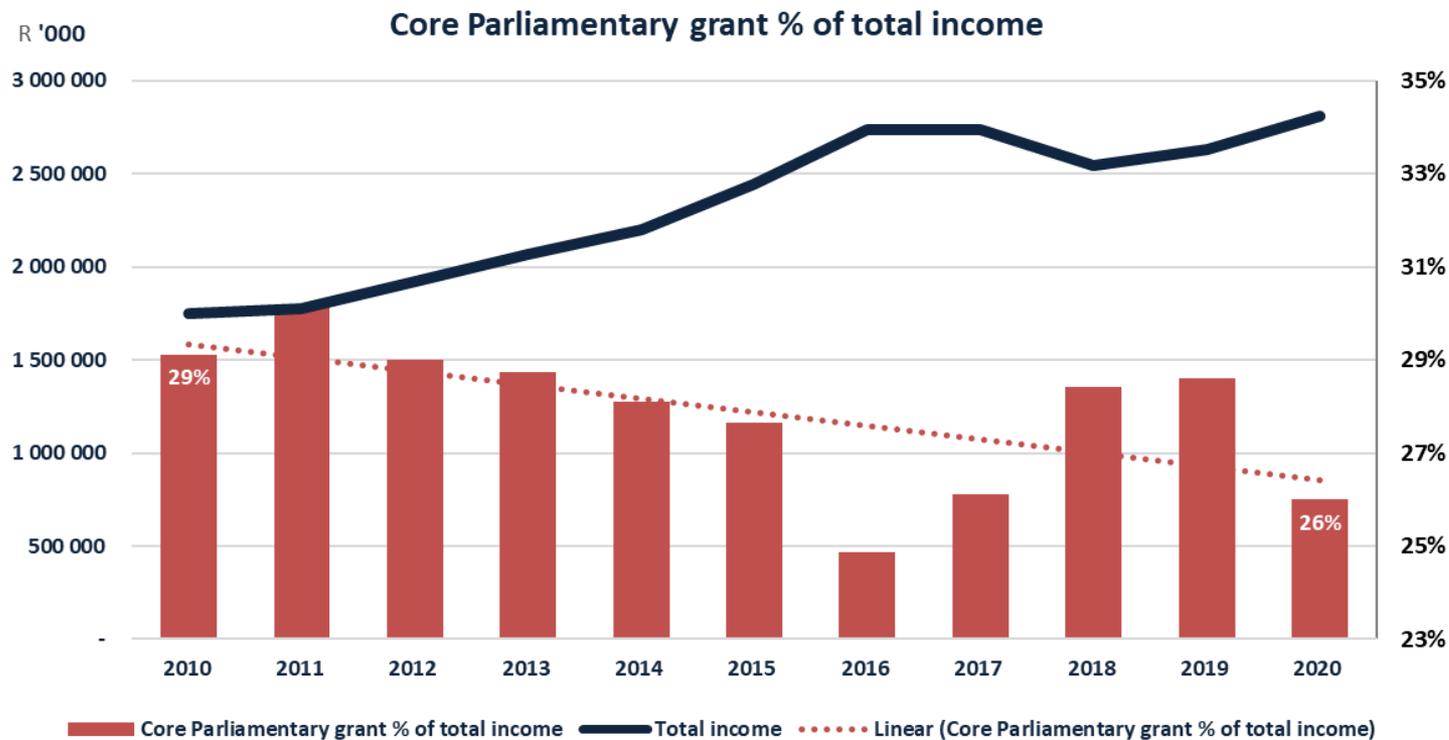
Baseline Parliamentary Grant allocations

Programme/activity/objective	2018/2019			2019/2020		
	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure
	R'000	R'000	R'000	R'000	R'000	R'000
Baseline Allocation to Clusters and Centres (SO1,SO2,S3, SO4, SO5)	497 013	512 499	(15 486)	436 614	507 457	(70 843)
Portfolios and Support Functions (SO5)	263 080	247 594	15 486	321 453	250 611	70 843
	760 092	760 092	(0)	758 068	758 068	0

Diversify income, maintain financial sustainability and good governance



CSIR funding trends over the past 10 years

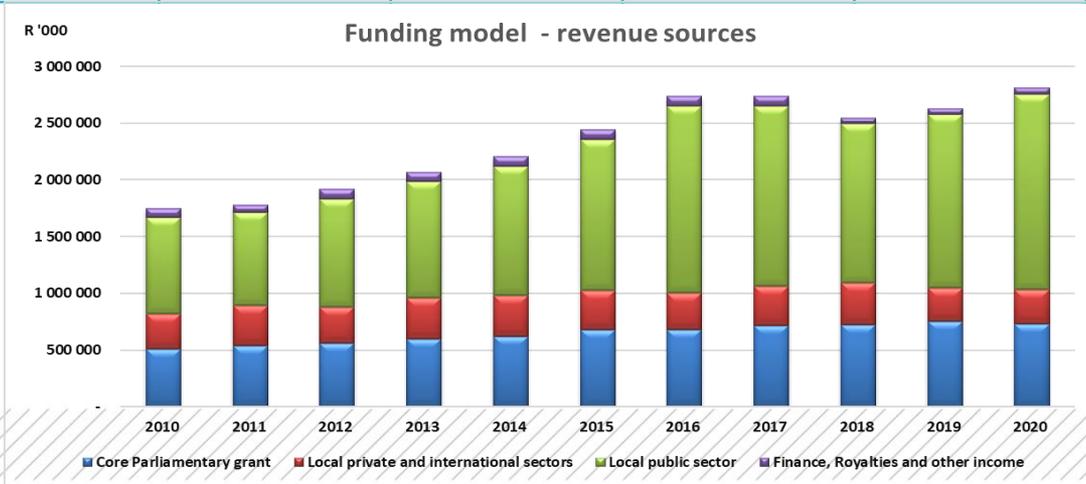


Diversify income, maintain financial sustainability and good governance



CSIR revenue sources

Sources of revenue	2019/2020			2018/2019		
	Estimate R'000	Actual Amount Collected R'000	(Over)/ Under Collection R'000	Estimate R'000	Actual Amount Collected R'000	(Over)/ Under Collection R'000
Parliamentary Grant	758 068	731 202	26 866	766 760	752 149	14 611
Contract income	2 098 168	2 006 942	91 226	1 969 524	1 746 212	223 312
Royalty income	3 090	3 616	(526)	4 000	5 422	(1 422)
Total	2 859 326	2 741 760	117 566	2 740 284	2 503 783	236 501



Diversify income, maintain financial sustainability and good governance



Procurement challenges and constraints when contracting with the public sector

- Section 217 of the Constitution read with section 51(1)(a)(iii) of the PFMA requires all government entities to maintain an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost-effective.
- The CSIR, a schedule 3B entity under the PFMA subscribes to and aligns to these Constitutional pillars.
- The CSIR's mandate is to “...foster, **in the national interest and in fields which in its opinion should receive preference**, industrial and scientific development, **either by itself or in co-operation** ..., and thereby **to contribute to the improvement of the quality of life of the people of the Republic**”.



Diversify income, maintain financial sustainability and good governance



Procurement challenges and constraints when contracting with the public sector

- The pursuit to balance the PFMA and Constitutional requirements and the drive to achieve our mandate, objectives and Shareholders' Compact targets, are often faced with near impossible challenges.
- NT exemption requests for the CSIR and/or SOEs or government departments from following a competitive bidding processes, have only been for core mandate services.
- Blanket exemptions have been requested without success.
- Several case-by-case basis exemption requests by various state-owned entities and government departments (such as Transnet, The Department of Environment, Forestry and Fisheries, various SEZs, etc) have also proven unsuccessful.
- A CSIR exemption of core mandate services would be in the national interest, as per our mandate which requires that we contribute to the improvement of the quality of life of the people of the Republic. It would also result in an overall decrease of costs and increased efficiency, agility and effectiveness.
- The annual impact of not being able to secure these exemptions is in excess of R450 million, even though the CSIR is now a B-BBEE Level 2 contributor.



Diversify income, maintain financial sustainability and good governance



Auditor-General's comments

- AG identified material misstatements in the annual performance report submitted for auditing.
- These material misstatements were in the reported performance information SO1 – Conduct research, development and innovation (RD&I), localise transformative technologies and accelerate their diffusion.
- No material findings on the usefulness and reliability of the reported performance information were raised because CSIR subsequently corrected the misstatements.

Moving forward, the CSIR will, through the internal audit function, apply tighter internal controls and oversight.

Diversify income, maintain financial sustainability and good governance



Fruitless and wasteful expenditure

- No loss was incurred by the CSIR in the 2019/20 financial year.

Irregular expenditure

- During the 2019/20 financial year, four transgressions that constitute irregular expenditure were detected.
- Of the four, one offence was committed prior to 2019/20 year.
- Disciplinary action has been taken against officials who committed two of the four offences, while no action was taken for two instances because the employees have left the employ of the CSIR and **no loss was suffered by the public entity.**





HUMAN CAPITAL HIGHLIGHTS



Build and transform human capital and infrastructure



The CSIR has supported the academic development and transformation of its staff, both in the science, engineering and technology and support bases. In 2019, 57 staff members obtained their Master's or Doctorates in line with the organisation's values of excellence.

2 104

CSIR Total staff base

1 492 (71%)

Black South Africans

924 (44%)

Female South Africans

1 367

Total SET base

861 (63%)

Black South Africans in SET base

478 (35%)

Female South Africans in SET base

304

SET base with PhDs

423

SET base with Master's

786

Number of students the CSIR bursary programme supported over the last five years.

23

Disabled CSIR employees

In 2019/20, the CSIR retained **39** out of **42** final-year students in specialised internships. Others opted to further their studies, with eight enrolling for Honours degrees and two pursuing Master's.

The CSIR appointed 19 recent graduates from its bursary programme to participate in its graduate-in-training programme.

As at 31 March 2020

Build and transform human capital and infrastructure



Performance against employment equity targets: Disabled staff

OCCUPATIONAL LEVELS	DISABLED STAFF			
	Male		Female	
	Current	Target	Current	Target
Top Management	0	1	0	1
Senior Management	0	1	1	1
Professional qualified	7	7	3	4
Skilled	8	9	4	5
Semi-skilled	0	0	0	0
Unskilled	0	0	0	0
Total	15	18	8	11



Build and transform human capital and infrastructure



Employment and vacancies by occupational category

Programme/activity/objective	2018/2019 No. of employees	2019/2020 Approved posts	2019/2020 No. of employees	2019/2020 Vacancies	Percentage of vacancies
Top Management	13	16	14	2	14%
Senior Management	88	101	89	12	13%
Professional qualified	1 144	924	777	147	19%
Skilled	788	1 058	935	123	13%
Semi-skilled	280	342	262	80	31%
Unskilled	29	27	27	0	0%
Total	2 342	2 468	2 104	364	17%



Build and transform human capital and infrastructure



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Bahle Mkhize,
CSIR project manager
MSc (Project Management) with
distinction, University of Cape Town



Dr Belinda Matebese,
CSIR researcher
PhD (Applied Maths), Stellenbosch
University



Chane Pieterse,
CSIR engineer
MEng (Electronic Engineering),
University of Pretoria



Dr Chemist Mabena,
CSIR researcher
PhD (Physical), University of the
Witwatersrand



Dr Moses Dlamini,
CSIR senior engineer
PhD (Computer Science), University
of Pretoria



Muzi Maryla,
CSIR senior engineer
MSc (Computer Science & Info
Systems), University of South Africa



Dr Nobuhle Majazi,
CSIR researcher
PhD (Remote Sensing and
Geographical Information Systems),
University of Twente, the Netherlands



Dr Ntsoaki Mathabathe,
CSIR senior researcher
PhD (Metallurgy and Materials),
University of Pretoria



Coral Featherstone,
CSIR principal researcher
MSc (Computer Science and Info
Systems), University of South Africa



Dr Dimakatso Gumedde,
CSIR postdoctoral researcher
PhD (Medicine), University of Cape
Town



Duwan Bester,
CSIR engineer
MEng (Mechanical Engineering),
North-West University



Fhumulani Mphadza,
CSIR systems engineer
MEng (Engineering Management),
University of Pretoria



Dr Paul Makilane,
CSIR senior researcher
PhD (Statistics), University of the
Witwatersrand



Ridwaan Hanslo,
CSIR senior engineer
MSc (Computer Science), University
of South Africa



Dr Samuel Mabakane,
CSIR senior systems administrator
PhD (Computer Science), University
of Cape Town



Sarah Dikgale,
CSIR senior technologist
MTech (Operations Management),
University of Johannesburg



Dr Ghanesree Moonsamy,
CSIR senior researcher
PhD (Biotechnology), Durban
University of Technology



Dr Haloise Meyer,
CSIR senior engineer
PhD (Computer Science), University
of Pretoria



Dr Ireshyn Govender,
CSIR postdoctoral researcher
PhD (Biochemistry), University of the
Witwatersrand



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CSIR intern
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Shirley Nobaza,
CSIR events practitioner
Master of Public Administration
University of Pretoria



Dr Shivani Goolab,
CSIR postdoctoral researcher
PhD (Veterinary Science), University
of Pretoria



Tshepo Fothane,
CSIR senior systems administrator
Master's (Business Administration),
The Management College of
Southern Africa



Dr Vusani Mandiwana,
CSIR postdoctoral researcher
PhD (Pharmaceutical Sciences),
North-West University



Dr Karien Venter,
CSIR senior researcher
PhD (Civil Engineering), Stellenbosch
University



Dr Laticha Walters,
CSIR senior researcher
PhD (TeleHealth), University of
KwaZulu Natal



Dr Luyanda Ndlelo,
CSIR postdoctoral studentship
PhD (Zoology), Stellenbosch
University



Magau Sepopa,
CSIR candidate researcher
MEng (Civil Engineering),
Stellenbosch University



Dr Jako Nice,
CSIR senior researcher,
PhD (Architecture), University of
Pretoria



Windy Makuwe,
CSIR researcher
MSc (Information Technology),
University of Pretoria

Build and transform human capital and infrastructure



The CSIR is building a pipeline of well-rounded future researchers



The CSIR granted Thembelihle Thema a bursary to study civil engineering through the University of Cape Town in 2016.



Michandre Smit has a BSc in zoology, a BEng in civil engineering and is working on her Honours in pavement engineering, through UP.



Jody Julies obtained his BEng in mechatronics from Stellenbosch University through the CSIR's bursary programme. He is now a candidate for the new graduate-in-training programme.



Half a million learners reached through science engagements



- Team CSIR participated in 30 outreach activities across the country and reached approximately 500 000 learners.
- In one such event, the CSIR hosted just over 600 school learners as part of National Science Week for an interactive climate change-inspired exhibition, featuring careers and projects in this field.
- The organisation also participated in the 6th Annual Green Youth Indaba 2019, an event that brings industry experts and youth together to expose them to careers, skills and entrepreneurial opportunities within the green economy.



RESEARCH, DEVELOPMENT AND INNOVATION HIGHLIGHTS



CSIR COVID-19 solutions and interventions



- A 100% local ventilator
- Medical quality protective facial shields
- Modelling the spread of COVID-19
- Mapping vulnerable communities
- Information and decision-support centre
- Geo-spatial modelling to identify the level of internet connectivity to students' locations
- Mobility platform to track people movement
- Taxi rank use for Gauteng response plans
- Small business impact study
- Impact on North West economy study
- Improve broadband through use of Television White Space technology

- COVID-19 sample testing
- One-step PCR test kit for rapid detection
- Extraction kits for naso/oropharyngeal swab
- Medicinal plant products to treat COVID-19
- Sanitisation of bank notes
- Pulmonary delivery systems
- Anti-viral face masks
- Anti-viral sanitiser and lotion
- Infection prevention and control programmes: infrastructure standards, surface disinfection
- Environmental aspects of COVID-19 study
 - Testing of drinking water
 - Testing of wastewater
 - Lockdown impact on air pollution study

Research, development and innovation for chemicals, agriculture, food and health



Generating potent anti-HIV antibodies using a chemically modified plant-based system



- The CSIR, in collaboration with the National Institute of Communicable Diseases, is developing broadly neutralising antibodies against HIV-1, the most widespread human immunodeficiency virus, for the prevention and treatment of HIV/Aids.
- The technical achievement to date has underlined the potential of a plant-based immunisation or antiretroviral therapy regimen, and proven South Africa's capability to make such antibodies.

Technology development for local manufacture of chemical oxygen demand kits



- The CSIR assisted a local SMME with the development of SA's first locally produced chemical oxygen demand kits.
- The kits were validated for use in municipal and industrial waste effluents and work in six of the top-selling photometer brands.
- Previously, SA relied on the importation of the equipment and measuring kits at a fluctuating and high cost.
- The technology was licensed and transferred to PLS Pty Ltd for local manufacture and supply to the African and global market.

Research, development and innovation for mining, manufacturing, defence and security



Partnering with industry to offer laser-based manufacturing expertise



- The CSIR developed a laser-based metal deposition technology for MAN Energy Solutions, which was jointly implemented to improve the efficiency of in-service blower rotors at Sasol.
- The refurbishment project improved the efficiency of the rotors by more than 10%.
- This resulted in significant energy cost savings for Sasol, because of the lower energy input required to achieve the same airflow output.

Reducing road freight costs and emissions through green tyres



- The CSIR, in collaboration with Wits and Cambridge universities, and tyre manufacturer Michelin, performed full-scale research trials of energy-saving green tyres on trucks.
- Tests were carried out on two 56-tonne trucks and demonstrated a significant 8% to 10% reduction in fuel consumption.
- This equates to an 8% to 10% reduction in carbon emissions and 4% saving in operating costs.

Research, development and innovation for mining, manufacturing, defence and security



Optimising shift cycles in mining for improved productivity, health and safety



- The Mandela Mining Precinct, contracted the CSIR and UJ to develop a draft framework for optimising shift cycles to maximise productivity, while ensuring optimal health and safety outcomes in SA's mining operations.
- The study forms part of the Longevity of Current Mines programme, which is one of six focus areas of the Mandela Mining Precinct in support of the greater SAMERDI strategy. The programme aims to ensure that SA mineral resources are mined adequately and ensure efficiency of extraction, while operating cost effectively and safely.

Improved visual quality for counter-poaching surveillance



- The CSIR-developed long-range surveillance system used in the fight against rhino poaching now has an even sharper eye, achieved through a new cross-illumination configuration of the optical system.
- The configuration allows for the development of a much-simplified design of the next-generation camera.
- The combination of near-infrared laser illumination and selected sensors creates a more affordable detection solution, making the system ideal for smaller game farms and other civilian security applications.

Research, development and innovation for nextgen enterprises, smart places and smart mobility



Assisting the Gauteng Department of Roads and Transport with managing its road assets



- The CSIR assisted the department with the appointment, management and control of professional service providers to carry out visual condition assessments of the road network, bridges and major culverts; profile and strength measurements of the paved roads; and subsequent lifecycle cost analysis.
- The data collected was used to prepare road asset management plans for the Province.

Assisting a local SMME to comply with Television Whitespace (TVWS) regulations

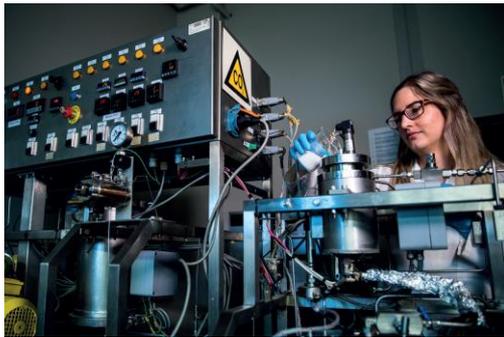


- The CSIR has assisted an SMME, Indigo Broadband SA, to achieve regulatory compliance for their TVWS network devices. Indigo Broadband is the sole distributor of the Carlson Wireless TVWS equipment brand in Africa.
- This is a critical milestone in the introduction of commercial TVWS services in SA, as these are the first network devices that are fully compliant with SA TVWS regulations.
- Several other local and international companies have since approached the CSIR for assistance with meeting regulatory compliance.

Partnering for African research, development and innovation



DSI and CSIR to establish the first supercritical carbon dioxide encapsulation facility in Africa



- The facility will enable local SMMEs and firms to produce products at scale and investigate market uptake.
- The establishment of this pilot facility at the CSIR will allow industry partners access to CSIR scientists for training and skills transfer, as well as technology development and transfer to industry.
- It will also allow the de-risking of supercritical carbon dioxide-based technologies to enable rapid market uptake and toll manufacturing.

Sharing knowledge for climate resilient rural access in Africa



- Africa is experiencing changes to its climate, which are resulting in widespread damage to road infrastructure and its associated assets.
- The CSIR and partners are contributing to the development of climate resilient road networks in rural communities in Africa.
- CSIR researchers enhanced the capacity of Ethiopia, Ghana and Mozambique, to deal with the effects of climate on their low-volume access roads.
- The CSIR and partners produced a climate adaptation handbook and guidelines that provide a methodology for carrying out a climate adaptation assessment. These have been translated into French and Portuguese.



Thank you

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THROUGH INNOVATION



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



CSIR

Touching lives through innovation