



sanedi

South African National Energy
Development Institute



Annual Performance Plan 2021 - 2022



sanedi

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Development Institute

About SANEDI

The South African National Energy Development Institute (SANEDI) was established in 2011 under the National Energy Act, 2008 (Act No. 34 of 2008) (NEA). The Act provides for SANEDI to direct, monitor and conduct energy research and development, promote energy research and technology innovation as well as undertake measures to promote energy efficiency throughout the economy.

SANEDI's energy development agenda is a key part of our country's energy journey. SANEDI's portfolio of initiatives is closely attuned to technology advancements, declining technology costs and continued innovation in the energy sector. As a whole, these can enable South Africa to take full advantage of our energy resources and the associated infrastructure development as a vehicle for economic growth, industrialisation, employment creation, and sustainable development.

SANEDI is committed in fulfilling the objectives of South Africa regarding energy security and universal access. The entity is fully behind the Integrated Resource Plan (IRP) 2010–2030 that considers the energy security as well as energy demand-supply balance. We are equally concerned that most of the communities who lack access to energy are in the rural areas where “energy poverty” is more prevalent. Whereas, the provision of universal access to energy requires scaling up of capital investment, the country is likely to experience budget constraints due to the effects of COVID-19. In the context of the post-COVID recovery, SANEDI will strengthen its

obligation to energy transformation pathways in line with its mandate.

SANEDI considers itself a key part of the National System for Innovation (NSI), as defined by the Draft White Paper on Science, Technology and Innovation published under the custodianship of the Department of Science and Technology (DST) on 10 September 2018. This White Paper builds on the previous version adopted in 2006, and sets out the medium to long term policy direction for Government to ensure a growing role for science, technology and innovation in a prosperous and inclusive society in which the potential of all South Africans is realised. SANEDI will continue its commitment to the policy statements in this White Paper, and the decadal plans that will follow detailing implementation of the policy. Additionally, as an innovation body, SANEDI will continue its long-standing collaboration with the DST.

SANEDI has been released on the obligation to Carbon Capture Utilization and Storage (CCUS) in the 2019/20 financial year, and this role has been allocated to its sister entity, Council for Geoscience (CGS) to further the objectives of this programme. SANEDI has also been officially assigned, the Energy Secretariat role by the Department of Science and Innovation (DSI). The objective of the Energy Secretariat is to support the Department of Energy and Innovation (DEI) in commercialisation and upscaling of knowledge outputs from the broader energy Research and Development Initiatives (RDI) portfolio and ensuring systemic impact in the NSI.



Accounting Authority Statement



Mr Nkululeko Buthelezi

Interim Chairperson: SANEDI Board

This Annual Performance Plan (APP) is a result of deep reflection and consultation with key stakeholders on the global, local and organisational context we find ourselves in. The world is dealing with the worst global socio-economic crisis in living history, that is the COVID-19 pandemic. The pandemic outbreak and the consequent lockdowns have had severe impacts on people's lives and economies. It is widely acknowledged that recovery from the effects of the COVID-19 pandemic will take at least several years, with great uncertainty as to if, and when further waves or other pandemics may strike. Therefore, it is important and necessary that the world needs to, remain vigilant and build resilience in relation to the coronavirus.

Several key impacts of the pandemic have become conspicuous, including the loss of millions of jobs resulting into extreme poverty for the now unemployed. There have been significant declines in manufacturing activities and direct foreign investment. Most importantly, the pandemic has highlighted inequalities in our society, with the poorest being hardest impacted.

The pandemic compounds the global context the world is already dealing with, which include a perpetually

changing global environment, advancements in Information Technology (IT) and increased environmental sensitivity. These mega issues continue to shape today's socio-political and economic trajectory.

South Africa's own environment has long been characterised by economic challenges, rising unemployment and income inequality, and this continues to challenge SANEDI to seriously consider how this impacts SANEDI's mandate of delivering Energy Efficiency (EE) and Energy Research and Development (ERD). SANEDI's analysis and reflection leads to a conclusion that the existing National Priorities remain key to fulfil at an accelerated pace going forward. SANEDI, as a key enabler of access to energy solutions that are vital to the country and the livelihood of people, understands its contribution and the requirement to be even more effective in delivering against its mandate.

SANEDI, as described in our Strategic Plan (SP) 2020-2025, has previously adopted three themes that would strengthen and drive our mandate. The themes are: Climate Change and Decarbonisation, Service Delivery within the Municipal Environment, and Information Knowledge and Technological Convergence. SANEDI believes that the repositioning of its focus around these

three themes which play to our existing strengths and expertise in the areas of sustainable energy, Renewable Energy Technologies, and Smart Grids, continues to be the appropriate focus enabling us to evolve and harness the changing global and local environment.

SANEDI has attained some remarkable successes in the mandate of delivering EE and ERD and more remains to be done to deliver the ultimate impact of enabling decarbonisation and a just transition from a Fossil Fuel-based economy, to a cleaner energy economy for sustainable development. This APP details our refined approach that build on past successes and to continue to add more value.

SANEDI intends in this financial year, to scale the impact of its innovations through an increased focus on commercialisation. Commercialisation of the energy solutions that SANEDI has, will lead to job creation with a focus on youth, women and People living with Disabilities (PwDs) in line with National Priorities as well as the strategic intentions of the White Paper on Innovation (WPI). In pursuit of this intent, strategic partnerships and collaboration with key stakeholders will be of utmost importance. Therefore, SANEDI will aim to lead and drive collaboration in the energy sector locally and internationally.

SANEDI will be affected by National Budget Reprioritisation that has been effected in response to the pandemic. We expect that budgets will be cut over the Medium Term Expenditure Framework (MTEF) period. This has prompted reprioritisation of projects and an enhanced approach to project selection. We will focus more on self-sustainable projects and place even more emphasis on alternative project funding.

I invite all our stakeholders to support our APP aimed at continuing to making a contribution to our National Priorities, and that envisages an era of equitable energy access, EE and advancements that will solidify the country's growth, benefiting all South Africans.



Mr Nkululeko Buthelezi
Interim Chairperson
SANEDI

Chief Executive Officer's Statement



Ms Lethabo Manamela CA (SA)
Interim Chief Executive Office: SANEDI

The COVID-19 pandemic has shaken and changed the world. It has highlighted the deep socio-economic inequalities in society the world over and locally. People were unequally impacted, with poorer people severely impacted both in terms of sustaining their livelihoods, and having access to resources required to physically cope with and prevent the spread of the coronavirus.

The energy sector is the backbone of the South African economy, and SANEDI plays a crucial role in enabling the country's socio-economic advancement. Heating, food preparation, communication, and education are some of the basic needs that energy access facilitates and that have been highlighted as ongoing challenges for a majority of our people.

From a business perspective, the ongoing threat of load shedding continues to impact industry and economic activities and threatens economic growth.

The world is embarking on a journey of recovery, and striving to build resilience in the face of uncertainty as future waves of COVID-19 and other possible pandemics may occur. SANEDI's contribution to recovery and

resilience-building, will focus on energy solutions, energy availability and promoting access to energy solutions.

SANEDI, an agency of the Department of Mineral Resources and Energy (DMRE), is mandated to direct, monitor and conduct ERD, promote applied energy research and technology innovation, as well as undertake measures to encourage the uptake of Green Energy (GE) and EE throughout the economy. Its mission is to use applied and energy research and resource efficiency to develop innovative, integrated solutions that will catalyse growth and prosperity to meet its vision of sustainable living for growth and prosperity in Africa. This APP reflects a deep commitment to deepening SANEDI's impact in line with National Priorities.

SANEDI's focus is mainly developing innovative, integrated clean energy and resource-efficient solutions that aim to catalyse growth and prosperity. As technologies develop and mature, opportunities for innovative energy solutions that can make a meaningful contribution are becoming increasingly relevant to improved energy access and lowering the country's carbon footprint.

At the beginning of the Medium Term Strategic Framework (MTSF) period and as described in our Strategic Plan (SP) 2020/2025, SANEDI was dealing with a global context shaped by several megatrends including climate change, urbanisation, demographic shifts, Fourth Industrial Revolution (4IR) and growing inequalities. Programmes of action were shaped taking these trends, local context and National Priorities into account.

SANEDI, as mentioned in our SP 2020/2025, has previously adopted three themes that would strengthen and drive our mandate. The themes are: Climate Change and Decarbonisation, Service Delivery within the Municipal Environment, and Information Knowledge and Technological Convergence. SANEDI believes that the repositioning of its focus around these three themes which play to our existing strengths and expertise in the areas of sustainable energy, Renewable Energy Technologies and Smart Grids continues to be the appropriate focus enabling us to evolve and harness the changing global and local environment.

The COVID-19 pandemic was an unexpected global event, that sharply highlighted the shortcomings in universal distribution of, and access to resources and the negative impacts created by the megatrends under consideration.

In our assessment, COVID-19 does not replace these trends and does not invalidate the existing programmes of action and in fact, compounds the context we operate in and calls for increasing the pace of delivery of the strategic intents envisaged in the Global sustainability goals, the National Priorities and indeed SANEDI's own mandate.

SANEDI understands that it is uniquely positioned and is required to carefully balance the short term needs of the country as far as energy solutions are concerned, while taking into account where the country wants to be in decades to come, and therefore develop energy solutions and technologies ahead of time.

Our SP 2020/25 and this APP aim to maintain this careful balance of focus. SANEDI is building even closer collaboration and alignment with the DMRE to ensure that the key priorities of the Department, in line with National Priorities, are delivered effectively.

SANEDI is a key part of the country's innovation system, and can make a contribution to the elevation of innovation in the country by increasing its alignment with the White Paper on Innovation. This will achieve

several aims, namely aiding economic recovery, creating jobs focussed on the youth, women and PwDs.

SANEDI expects, and is aware of the budget reprioritisation measures being put in place by National Treasury (NT) over the next few years that will impact the operations of the organisation. SANEDI therefore, through this APP, is making the necessary adjustments in its approach to its programmes and projects to deal with the new realities without diluting the impact that it aims to make.

Considerable thought, through reflection and in consultation with key stakeholders in the sector, has gone into shaping the approaches adopted in this financial year without deviating from the mandate of SANEDI and strengthening delivery in a challenging environment.

SANEDI intends, in this financial year, to scale the impact of its innovations through an increased focus on commercialisation. Commercialisation of the energy solutions that SANEDI has, will lead to job creation with a focus on youth, women and PwDs, in line with National Priorities as well as the strategic intentions of the (WPI). In pursuit of this intent, strategic partnerships and collaboration with key stakeholders will be of utmost importance. Therefore, SANEDI will aim to lead and drive collaboration in the energy sector locally and internationally

In the last strategic framework period, SANEDI's focus was to provide an optimal energy research development and deployment environment, and co-operating with persons, associations and institutions undertaking related energy programmes locally and internationally, to ensure that international learnings and 'best practices' are shared and, where relevant, adopted and applied in South Africa. Co-operation and membership of international bodies has led to significant financial support for such endeavours in South Africa. We will still continue with these as part of our being a global citizen and links to a better world and better Africa.

SANEDI's Smart Grids, EE, Cleaner Fossil Fuel and Renewable Energy (RE) programmes all contribute to energy development and innovation in this area.

Successful collaboration between SANEDI and industry has allowed us to drive several research, development and pilot projects, that will contribute to the National energy objectives. In this regard, SANEDI has facilitated and supported several National and Provincial Departments to understand possible mitigation actions that would lead to more efficient and swift deployment of RE in the country.



Working for Energy

A major change in the organisation, is that the Working for Energy (WfE) programme has been retired as part of rationalising and focussing our work. This programme had focused on developing and demonstrating energy solutions suitable to rural and low income urban and peri-urban communities. SANEDI has installed 80 biogas digesters in Gauteng, Limpopo, Eastern Cape and the North West Provinces. Demonstrated use of clean energy and EE technologies serve to refine a blueprint that can be applied for communities countrywide. Lessons and intellectual property have been consolidated, and recommendations for roll out by other stakeholders have been prepared and SANEDI will promote and support adoption of these solutions going forward.

Smart Grids

SANEDI, in collaboration with the DMRE developed and piloted the concept of Smart Grids in South Africa. The programme mainly focused on “Technology as an Enabler for Change” in the municipal environment. Municipalities are currently under huge financial pressure, largely as a result of poor revenue collection and incorrect tariff designs. The Enhanced Revenue Management project, piloted in 10 municipalities, was designed to assist municipalities in collecting the electricity revenues. For projects that were properly designed and implemented, results have shown that technology can be used to improve revenue collection while also enhancing the effectiveness and efficiency of the municipalities, thereby returning them to sustainability. Lessons learnt from this collaboration have highlighted the role of Smart Grids and the importance of Advanced Metering Infrastructure (AMI) in solving the Eskom debt crisis.

Additionally, SANEDI, through the South African Smart Grids Initiative (SASGI), supports the South African Local Government Association (SALGA) and the Department of Cooperative Governance and Traditional Affairs (COGTA) with the development and institutionalisation of the Smart Grid programme as an approach to enable municipal revenue management, the introduction of RE and effective service delivery.

Energy Efficiency

SANEDI’s co-ordination and implementation of the EE tax incentives (Section 12L and 12I), have produced phenomenal results, both in terms of energy savings and reduction in Greenhouse Gas Emissions (GGE).

Over 19 TWh have been saved and the emission of 18 730 Mega-tonnes of Carbon Dioxide (CO₂) has been avoided. Based on the success of this activity over the last five years, NT has decided to extend the Section 12L incentive from January 2020 to January 2022. This also saw the development of various (secure) online tools and databases for the processing of these applications, which over the last few years, has resulted in the establishment of a significant repository of EE data, for use in modelling impacts of these interventions.

Furthermore, the Cool Surfaces programme, which initially started out as a small activity within the international Clean Energy Ministerial series of activities, has gained traction in South Africa with impressive results achieved in a Northern Cape pilot programme managed by SANEDI. This has resulted in SANEDI being chosen as one of 10 countries globally to win an award of USD 100 000 in 2019, for accelerated implementation of the initiative in South Africa.

SANEDI will roll out Cool Surfaces to 1000 000m² of roof surface area in households and selected buildings in selected municipalities, as an inexpensive way of improving ambient air quality in buildings, especially low-income housing, develop the Cool Surfaces industry and thereby creating jobs in the clean energy space. This project was made possible by the prize of \$100 000 SANEDI won in the Global Cool Roofs Challenge in 2019.

Following the successful implementation of the commercial solar water heating at the Regional Works Unit Military Base in Limpopo, through our collaboration with Department of Defence (DoD), SANEDI and Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN) will continue to demonstrate the energy-saving option for State institutions in converting conventional water and thermal heating systems to RE services, thereby reducing the operational cost of running such facilities.

Energy derived from various forms of municipal and industrial wastes, is an avenue that SANEDI will be supporting municipalities in, in realising the mitigation of GGE, minimising waste to landfills and diversifying energy sources. These interventions will reduce the amount of energy required by municipalities to run Waste Management Plants.

Through the 12L and 12I programmes, SANEDI will continue to support the industry to reduce their energy and carbon intensity through the verifiable deployment of RE and EE initiatives.



Cleaner Fossil Fuels

Another major change in the organisation has been the transfer of the Pilot Carbon Dioxide Storage Pilot Project (PCSP) and the team to the CGS for further implementation and custodianship.

The PCSP had made a major financial gain with the signing of a World Bank grant of USD 23 million. It also saw the application of new techniques, not previously available, to analyse existing geological data in the KwaZulu-Natal (KZN) Basin, the outcome of which was the identification of two prospective injection sites. Work was directed to the characterisation of those two sites. As part of the monitoring programme, the CO₂ surface monitoring protocols were developed through field trials at Bongwana natural gas releases, and these included atmospheric, soil and water concentrations.

A survey of the industry regarding the implementation requirements of the Carbon Capture and Storage (CCS) technology, revealed most significant concerns pertained to cost and regulation. Regarding the impact of the carbon tax on CCS, it has been shown that the tax at introduction would be insufficient by itself to finance CCS. An appraisal of Fossil Fuel and RE hybrid systems, had indicated feasibility and an analysis and assessment of global Carbon Capture and Utilisation technologies indicated possible commercial application in South Africa.

As alluded to earlier, the PCSP, the Carbon Capture Utilisation and Storage (CCUS) project, and the team have been transferred to the CGS for further implementation and custodianship. SANEDI believes that exploration of solutions in the area of Cleaner Fossil Fuels is important and that there is scope outside of CCUS that should be explored. Therefore, SANEDI retains the Cleaner Fossil Fuels sub-programme and is exploring other applied energy research including clean coal pilots and bio-fuels.

Through demonstrated clean energy initiatives, SANEDI will support the Sector Education and Training Authorities (SETAs) and Incubators to enable the development of skilled Small, Medium Micro Enterprises (SMMEs) in the clean energy sector.

Solar Thermal Technologies

Our local and international cooperation and collaboration have grown stronger and over the period, SANEDI through the Austrian Government supported SOLTRAIN programme, has supported a number of Solar Thermal

Initiatives for commercial and industrial applications and building skills to support the growing industry. Renewable Energy and Energy Efficiency Partnerships (REEEP), supported by the United Nations Industrial Development Organisation (UNIDO), established the Energy Agriculture Platform and has also successfully completed 2 demonstration initiatives in the !Kheis and Nelson Mandela Bay Metros. These were to improve energy and water efficiencies in municipal water and wastewater infrastructure. Besides saving energy, the solutions also helped the municipalities save water, improve water quality, improve service delivery and realise cost savings.

The success of the SOLTRAIN Project highlights the potential for solar thermal energy solutions for the country. SANEDI will build on this success by raising the profile of SOLTRAIN and solar thermal, and seek to establish and deepen partnerships that can help drive the exploitation of opportunities for this technology

Wind Energy

The Wind Atlas for South Africa (WASA) Programme has completed the countrywide wind mapping and launched the WASA Book. WASA maintains the national wind database. We also identified, through the South African Wind Energy Programme (SAWEP) (the UNDP funded programme) a review study on the small-scale wind development sector, scope to enhance growth in this sector and focusing on training and capacity building, as we grow the wind sector.

Based on the success of the earlier Wind Programme, SANEDI will continue to enable the development of wind energy in South Africa through mapping and creation of demonstration of small wind projects for complementary energy applications, through the Wind Atlas of South Africa (WASA 3) and SAWEP Programmes. This programme ended December 2020 and may only be extended by 6 months. We are unsure at this stage if there will be a further extension and if this will be funded.

Cleaner Mobility

SANEDI's Cleaner Mobility programme, with support from UNIDO, has been actively engaging with the Department of Transport (DoT) as well as various cities to explore and introduce cleaner mobility options. SANEDI has been instrumental in doing applied research and demonstration regarding the use of electric vehicles and charging batteries using solar PV with good success.



Going forward, the Cleaner Mobility sub-programme will continue solving key challenges including energy security, EE in transportation, urban air pollution, traffic congestions, local industry development and climate change.

Although we have had great success in attracting funding from external partners, there has been a significant decline in third-party funds available towards renewable technologies as a result of policy changes by some international Governments and donors, who are beginning to focus on countries less developed than South Africa. This significant decline poses a tremendous threat to funding requirements of SANEDI, given its already constrained budget. We are also aware that the fiscal challenges faced by the fiscus have led to a general decline in research and development funding. Therefore, we shall be exploring various funding sources in order to supplement or compensate for the shortfall in funding.

Data and Knowledge Management

SANEDI plans to be a data repository for energy data in South Africa. SANEDI is in the process of establishing a data centre that will house reliable, accurate and up-to-date energy datasets that will be made available to stakeholders.

SANEDI at present is responsible for maintaining the following datasets that are annually maintained and available at no cost to stakeholders: WASA database, ESCO register, 12L Tax Incentives database, Big EE database, Transport database and Residential database.

For the MTSF period, SANEDI will continue to maintain the above datasets, and create and maintain these to the following datasets: Commercial database, Industrial database, Agricultural database, Standards & Labelling database and Public Infrastructure database (Public Buildings & Wastewater Treatment Plants).

The Energy Secretariat

SANEDI is proud to have been awarded the right by the DSI to run on its behalf, the DSI Energy Secretariat Programme. The Secretariat is an administrative office which carries out the substantive and administrative work as directed by the Chief Director Hydrogen Energy. The objective of establishing the Energy Secretariat is to support the successful commercialisation, and upscaling of knowledge outputs from the broader energy RDI portfolio and ensuring systemic impact in the NSI.

The SANEDI-DSI collaboration is initially a 3 year programme with an estimated budget of R150 million per annum. SANEDI made readiness preparations towards the end of the last financial year, and this year will see the Secretariat tackling substantive work towards the objectives of the Secretariat.

Organisational Review

SANEDI, with the support of the Board, undertook an Organisational Review process to re-focus its strategic mandate to optimise its impact. To this end, proposed focal areas have been made with proposed concomitant structures.

These recommendations will be implemented in this planning period. As an organisation in transition, we shall continue to consolidate our gains and ensure that the envisaged improvements will find expression in sustainability and relevance, and also support the organisation's critical role in responding to the strategic outcome areas identified by Government.

In the upcoming strategic framework period, SANEDI's activities are within the framework of the National Development Plan (NDP), the 7 Priorities derived for Electoral Mandate and the President's State of the Nation Address and other DMRE priorities. Energy research and development of technologies, have a role to play towards the sustainability of cities and thus contribute towards economic growth. The outcome of SANEDI's endeavours will demonstrate how Smart Cities can impact different sectors, leveraging several drivers to improve city living standards and economies. This speaks to the possible interventions SANEDI can have at municipal and country level.

Scaling, Commercialisation and Partnerships

As alluded to earlier, this year will see SANEDI focusing more on self-sustainability of projects by supplementing our funding with funding by strategic partners. We will focus on facilitating the transformation of our research output into wider scale adoption and roll out, by supporting the entrepreneurial spirit of youth, women and PwDs. This effort will be supported by deeper partnerships and strategic relationships. Commercialisation of innovation will be a key area for SANEDI. The means to facilitate more commercialisation of energy solutions will be explored in this financial year. Strategic partnerships with DSI, National Youth Development Agency (NYDA), CEF Group



of Companies formerly known as Central Energy Fund (CEF), Department Trade, Industry and Competition (DTIC), SETAs, and other organisations will be deepened, and the resulting impact would include increased adoption of our innovative solutions and job creation, as well as the stimulation of youth entrepreneurship in the energy sector.

In conclusion, I am pleased to present this APP, which was drafted with inputs from the Board, DMRE and key stakeholders in the sector, noting that the achievement of these planned outcomes, will rely heavily on the organisation's ability to engage its stakeholders towards resource mobilisation and continued relevance through the execution of relevant projects. The planned activities will not only position the organisation within

the sector, but will be invaluable in National Policy formulation reform in a post COVID-19 era. This can only be achieved through committed strategic partnerships and collaboration. Therefore, I would like to express our gratitude to all our local and international stakeholders, and we are looking forward to more years of fruitful collaboration and cooperation.



Ms Lethabo Manamela CA (SA)
Interim Chief Executive Officer SANEDI

Official Sign-Off

It is hereby certified that this Annual Performance Plan:

1. Was developed by the Management of the SANEDI under the guidance of the Board.
2. Takes into account all the relevant policies, legislation and other mandates for which the SANEDI is responsible.
3. Accurately reflects the Impact, Outcomes and Outputs which the SANEDI will endeavour to achieve over the period 2020-2021.

Programme Managers



Mr Mthetheleli Baqwa
Corporate Planner



Ms Lorraine Ramaotsoa CA(SA)
Chief Financial Officer



Ms Lethabo Manamela CA(SA)
Interim Chief Executive Officer



Mr Nkululeko Buthelezi
Interim Chairperson of the Board

List of Acronyms

ACRONYM	DESCRIPTION	ACRONYM	DESCRIPTION
ADB	African Development Bank	GEF	Global Environment Facility
APP	Annual Performance Plan	GGE	Greenhouse Gas Emmissions
AV	Autonomous Vehicles	GHG	Greenhouse Gas
4IR	4th Industrial Revolution	GIDZ	Gauteng Industrial Development Zone
BARC	Board Audit and Risk Committee	GIZ	German Agency for International Cooperation
B-BBEE	Broad-based Black Economic Empowerment	GMO	Genetically Modified Organisms
BRICS	Brazil, Russia, India, China and South Africa	ICT	Information Communications and Technology
CCS	Carbon Capture & Storage	IEE	Industrial Energy Efficiency
CCSP	Carbon Capture and Storage Pilot	IR	Integrated Report
CCUS	Carbon Capture Utilisation and Storage	IRP	Integrated Resource Plan
CEF	CEF Group of Companies formerly known as Central Energy Fund	IT	Information Technology
CEO	Chief Executive Officer	IoT	Internet of Things
CFO	Chief Financial Officer	IPAP	Industrial Policy Action Plan
CGS	Council for Geoscience	KPI	Key Performance Indicator
CO2	Carbon Dioxide	kWh	Kilowatt hour
CoEs	Centres of Excellence	KZN	Kwa-Zulu Natal
COGTA	Cooperative Governance & Traditional Affairs	LCOE	Levelised Cost of Electricity
CSIR	Council for Scientific and Industrial Research	LEDA	Limpopo Economic Development Agency
DEI	Department of Energy & Innovation	M&E	Monitoring and Evaluation
DKM	Data and Knowledge Management	MTEF	Medium Term Expenditure Framework
DMRE	Department of Mineral Resources & Energy	MTSF	Medium Term Strategic Framework
DoD	Department of Defense	MW	Megawatt
DoE	Department of Energy	NDC	Nationally Determined Contributions
DoT	Department of Transport	NDP	National Development Plan
DPWI	Department of Public Works and Infrastructure	NEA	National Energy Act
DSI	Department of Science & Innovation	NRF	National Research Foundation
DST	Department of Science & Technology	NSDF	National Spatial Development Plan
DTIC	Department Trade, Industry and Competition	NSI	National System for Innovation
Dx	Distribution	NT	National Treasury
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortisation	NYDA	National Youth Development Agency
EE	Energy Efficiency	OECD	Organisation for Economic Co-operation and Development
EEP	Employment Equity Plan	OEM	Original Equipment Manufacturer
EEPBP	Energy Efficiency in Public Buildings and Infrastructure Programme	PCSP	Pilot Carbon Dioxide Storage Pilot
ERD	Energy Research & Development	PM	Particulate Matter
ESCo	Energy Service Company	PwDs	People Living with Disabilities
EU	European Union	R&D	Research and Development
EV	Electric Vehicles	RDI	Research & Development Initiatives
GCF	Green Climate Fund	RE	Renewable Energy
GDP	Gross Domestic Product	REEEP	Renewable Energy and Energy Efficiency Partnerships
GE	Green Energy	REIPP	Renewable Energy Independent Power Producer
		REMCo	Remuneration Committee



List of Acronyms (continued)

ACRONYM	DESCRIPTION	ACRONYM	DESCRIPTION
SA	South Africa	SWOT	Strengths Weaknesses Opportunities and Threats
SALGA	South African Local Government Association	TAF	Technical Assistance Facility
SANEDI	South African National Energy Development Institute	TVET	Technical Vocational Education and Training
SARChi	South African Research Chairs Initiative	Tx	Transmission
SARETEC	South African Renewable Energy Technology Centre	UL	University Limpopo
SASGI	South African Smart Grids Initiative	UNFCCC	United Nations Framework Convention for Climate Change
SAWEP	South African Wind Energy Programme	UNIDO	United Nations Industrial Development Organisation
SAWS	South African Weather Services	UoT	University of Technology
SCM	Supply Chain Management	UP	University Pretoria
SDBIP	Service Delivery and Budget Implementation Plan	UWC	University Western Cape
SEP	Stakeholder Engagement Plan	V-NAMA	(Vertical) Nationally Appropriate Mitigation Action
SETAs	Sector Education and Training Authorities	WASA	Wind Atlas of South Africa
SMMEs	Small, Medium Micro Enterprises	WB	World Bank
SOE	State-Owned Entity	WFE	Working for Energy
SOLTRAIN	South African Solar Thermal Training & Demonstration Initiative	WPI	White Paper on Innovation
SP	Strategic Plan	WWTPs	Wastewater Treatment Plants
SUNREF	Sustainable Use of Natural Resources and Energy Fund	WSP	Workplace Skills Fund





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Executive Summary

SANEDI's strategy draws from the contextual environment within which it sees itself, including primarily a global shift, driven by (1) information and technological advancements towards convergence and sector coupling, (2) changing demographic patterns and increases in urbanisation and (3) increased environmental sensitivity and awareness driving socio-political and economic discourse.

Within this global context, the South African environment is characterised by an unsustainable economic trajectory, with stagnating economic growth, rising unemployment and income inequality. It is in this environment, both with significant opportunities and threats, that SANEDI must discharge its mandate of delivering EE and ERD.

From an operational perspective, fiscal pressure has resulted in a constrained budget requiring a reprioritisation of resources to create a lasting and sustainable impact. In the analysis of the broader

environment directly impacting SANEDI, three key themes emerged, underpinning the strategy that SANEDI has adopted.

SANEDI has thus repositioned itself to focus on three key thematic areas, with an Integrated and focused approach. This includes:

1. Service delivery through the Smart Cities programmes, particularly as it relates to transport, energy, revenue and asset management,
2. Decarbonisation through technological programmes, compliance monitoring and awareness campaigns, and
3. Information and knowledge management to increase the national dataset on energy-related information, thereby facilitating improvements in public sector policy-making and private sector investment decisions.

These themes include:

CLIMATE CHANGE AND DECARBONISATION

South Africa has a requirement to comply with specific international targets so that we have the licence to operate on a global scale. With South Africa's high carbon intensity, energy is intrinsically linked to climate change, requiring accelerated adoption of clean energy and mitigation solutions towards meeting national and international commitments.

[1] National Treasury, *Towards an Economic Strategy for SA, 2019*

SERVICE DELIVERY WITHIN THE MUNICIPAL ENVIRONMENT

Municipalities are cumulatively owed R184.7 billion (consumer debt), while municipalities owe Eskom and the Water Boards in excess of R100 billion¹ (as of end FY17). In addition, there are significant challenges faced by municipalities to maintain their distribution networks, resulting in additional losses while delivering on universal access objectives and integrating new distributed technologies. Through Smart Grids, electric mobility, revenue and asset management and EE initiatives, significant opportunities exist within the municipal environment to drive service delivery, enhance performance and create lasting impact.

(1) StatsSA, *four facts about municipal debt, 2016/17 FY*, Published June 26 2018





Information, Knowledge and Technological Convergence

Information is being generated at a rapid rate, where centralised sources of information (sensory and other) can be utilised to derive real insights that can influence decision-making, thereby contributing towards the socio-economic development of the country.

SANEDI's expertise and demonstrated experience in the areas of EE, Renewable Energy Technologies and Smart Grids uniquely positions it to support local Government and the broader public sector in the journey towards greater resource efficiency, service delivery and the national aspiration for Smart Cities.

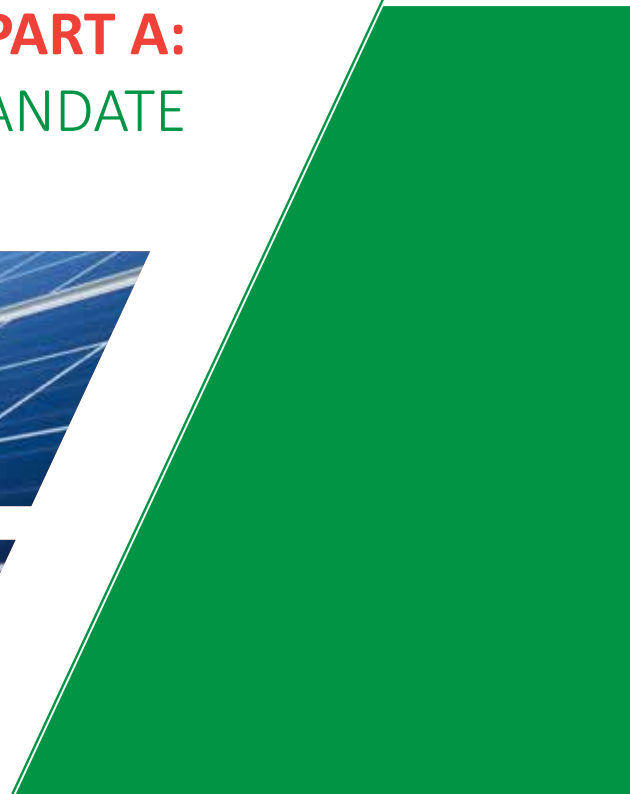
SANEDI is acutely aware that focus on programmes that create maximum impact is required, preventing dilution of effort and resources. The Smart City Programme (with a focus on Smart Grids and distributed generation,

mobility, revenue enhancement and asset management and further detailed as it pertains to SANEDI in section 8.1.3 of the document) is a crucial driver of the strategy, as it provides the most significant potential area of opportunity, based on the current state of municipalities and the future trend towards increased urbanisation.

However, it must be noted, though priority is placed on this programme, SANEDI has national and international commitments that it must adhere to, requiring resource allocation towards decarbonisation programmes (including the development of appropriate technologies) and related compliance-driven initiatives.

Finally, a relevant operational structure, underpinned by Integrated and accessible information sources, is a necessary enabler in realising and maximising the value of SANEDI to the local, national and international environment.

PART A:
OUR MANDATE



In order to drive optimal resource allocation through the various layers of State, consistency in strategic and budgetary planning is required. The relationship between the mandate, policy priorities and entities of the State is highlighted in the image below and was considered as a critical feature in the development of the Strategy.

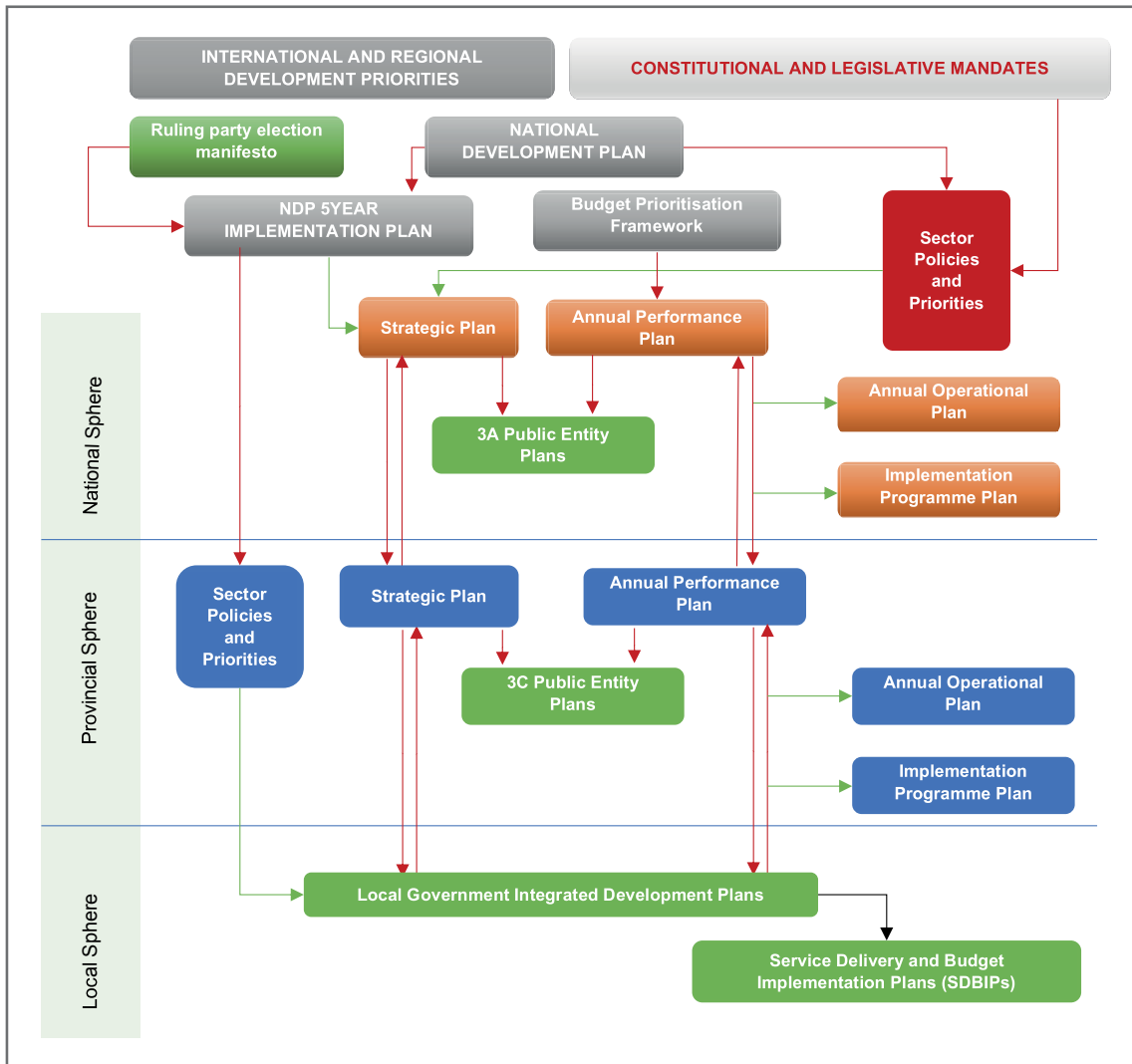


Figure 1: Context for Strategic Alignment

1. CONSTITUTIONAL MANDATE

SANEDI, as an entity of the State, derives its mandate from the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996) and relevant Legislative and Policy Frameworks. SANEDI has a functional responsibility towards the technological development and EE in the field of energy (other than nuclear energy) – thereby improving the overall energy landscape within the country.

The strategy developed by SANEDI seeks to ensure alignment with two critical components of the Constitution, namely:

1. Chapter 2, The Bill of Rights, where: Everyone has the right:
 - i. To prevent pollution and ecological degradation,
 - ii. To promote conservation, and

- iii. To secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

2. Schedule 4, The Functional Areas of Concurrent National and Provincial Legislative, specifically with respect to municipalities and the issue of Local Government matters related to:

- i. Electricity (and gas reticulation).

SANEDI has a clear role to play, contributing towards an environment that is sustainably utilised for the socio-economic development of the country, as well as municipal development for the distribution of electricity (and potentially other energy sources) to the residents of the country.

2. LEGISLATIVE AND POLICY MANDATES

As a Schedule 3A State-Owned Entity(SOE), SANEDI’s authority is derived from Section 7(2) of the National Energy Act, 2008 (Act No. 34 of 2008) (NEA). Section 7(2) of the NEA gives effect to SANEDI’s powers and functions and provides for its responsibilities as stated below:

Energy Research and Development	
SANEDI's Legislative Mandate	<ul style="list-style-type: none"> • Direct, monitor, conduct and implement energy research and technology development in all fields of energy, other than nuclear energy, and • Promote energy research and technology innovation; • Provide for: <ul style="list-style-type: none"> – Training and development in the field of energy research and technology development, – Establishment and expansion of industries in the field of energy, and – The commercialisation of energy technologies resulting from ERD programmes. • Register patents and intellectual property in its name resulting from its activities, • Issue licences to other persons for the use of its patents and intellectual property, • Publish information concerning its objects and functions, • Establish facilities for the collection and dissemination of information in connection with RDI,
	<ul style="list-style-type: none"> • Undertake any other energy technology development related activity as directed by the Minister, with the concurrence of the Minister of Science and Technology, • Promote relevant energy research through cooperation with any entity, institution or person equipped with the appropriate skills and expertise within and outside the Republic, • Make grants to educational and scientific institutions in aid of research by their staff or for the establishment of facilities for such research, • Promote the training of research workers by granting bursaries or grants-in-aid for research, • Undertake the investigations or research that the Minister, after consultation with the Minister of Science and Technology, may assign to it, and • Advise the Minister and the Minister of Science and Technology on research in the field of energy technology.
Energy Efficiency	
<ul style="list-style-type: none"> • Undertake EE measures as directed by the Minister, and • Increase EE throughout the economy. 	<ul style="list-style-type: none"> • Increase the Gross Domestic Product(GDP) per unit of energy consumed, and • Optimise the utilisation of finite energy resources.

Figure 2: Primary Legislative Mandate



SANEDI's operational mandate is also influenced by the following legislation and policies:

- Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended,
- White Paper on Energy Policy, 1998,
- Petroleum Products Act, 1977 (Act No. 120 of 1977), as amended,
- Central Energy Fund Act, 1977 (Act No. 38 of 1977), as amended,
- Petroleum Pipelines Act, 2003 (Act No. 60 of 2003),
- Petroleum Pipelines Levies Act, 2004 (Act No. 28 of 2004),
- Gas Act, 2001 (Act No. 48 of 2001),
- Gas Regulator Levies Act, 2002 (Act No. 75 of 2002),
- National Energy Regulator Act, 2004 (Act No. 40 of 2004),
- Abolition of the National Energy Council Act, 1991 (Act 95 of 1991),
- The National Environmental Management Act, 1999 (Act No. 107 of 1999),
- The Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002),
- South African Revenue Service Act, 1997 (Act 34 of 1997),
- National Development Plan Vision 2030,
- Medium-Term Strategic Framework,
- National Energy Efficiency Strategy of the RSA, 2008,
- Energy Security Master Plan for Liquid Fuels, 2007,
- Energy Security Master Plan, 2007,
- Integrated Resource Plan for Energy, 2010,
- Department of Science and Technology 10 Year Innovation Plan,
- Measurement and Verification Guideline for Energy Efficiency Certificates (DRAFT),
- Industrial Policy Action Plan (IPAP) 2010/11 – 2012/13, published Feb 2010,
- Carbon Capture and Storage Road Map,
- Climate Change Response White Paper, and
- Draft White Paper on Science, Technology and Innovation.

3. INSTITUTIONAL POLICIES AND STRATEGIES OVER THE FIVE-YEAR PLANNING PERIOD

As highlighted, the National Planning Framework must align with the NDP policy priorities, as well as the Executive focus of the National Government, including the seven key priorities of Government.

In driving towards strategic alignment, the five-year NDP implementation plan was considered, with a focus on the three pillars that describe the strategic priorities of the National Government for the following five years, namely:

- i. Pillar 1: Inclusive Economic Growth,
- ii. Pillar 2: Capabilities of South Africans, and
- iii. Pillar 3: Capable State.

With the following themes cutting across all three pillars:

- i. Youth empowerment,
- ii. Gender equity,
- iii. 4th Industrial Revolution,

- iv. Environmental sustainability (climate change), and
- v. National Spatial Development Plan (NSDF).

Furthermore, the seven key priorities for Government were considered and are as follows:

- i. Economic transformation and job creation,
- ii. Education, skills and health,
- iii. Consolidating the social wage through reliable and quality basic services,
- iv. Spatial integration, human settlements and Local Government,
- v. Social cohesion and safe communities,
- vi. A capable, ethical and developmental State, and
- vii. A better Africa and World.

As energy is central to socio-economic development and the growth of a country, SANEDI has a defined and clear role in assisting in the achievement of the National Priorities.

4. RELEVANT COURT RULINGS

There were no court rulings that impacted SANEDI's strategic context.



PART B:
OUR STRATEGIC FOCUS





5. VISION

Sustainable energy for growth and prosperity in Africa.

6. MISSION

Using applied and energy research and resource efficiency to develop innovative, integrated solutions that will catalyse growth and prosperity for all in South Africa.

7. VALUES

Table 1: Organisational Values

Values	Operating Principles
Innovative	creative / proactive / taking charge / initiative / adaptive / entrepreneurial
Integrity	honest / ethical / accountable / transparent / responsible / trustworthy / respectful
Scientific evidence driven	analytical / rational / objective / factual / attentive
Development oriented	educative / continuous learning / transformative
Consultative	collaborative / participative / teamwork / engaging
Productive	punctual / cost conscious / disciplined / compliant
Responsive	courteous / friendly / client need driven / client focused
Caring	compassionate / empathy / emotionally intelligent



8. SITUATIONAL ANALYSIS

SANEDI has adopted the Revised Framework for Strategic Plans (SP) and Annual Performance Plans (APP) in the strategic term of 2020-2025. The revised framework shifts strategy development from the previous convention of ‘goals’ and ‘objectives’ to a more measurable impact and outcomes-based approach that creates more explicit M&E linkages. This new framework is reflected in this document.

In formulating the strategy, a macro trend analysis, as well as an internal analysis, was conducted to provide a relevant and comprehensive contextual analysis to frame both the options, but also the preferred path for which SANEDI will focus its resources. This was completed through both a document review, as well as through facilitated discussions with key stakeholders. A key feature is a focus on creating value in the economy while creating a better life for all. A summary of this is provided in the SWOT analysis.

STRENGTHS	WEAKNESS
<ul style="list-style-type: none"> • Leveraging fiscal funding through partnerships for much larger reach and impact, • Sound Governance structures supported by robust systems and processes (clean audits), • Technical expertise at top and middle Management level, • Demonstration capacity (energy mission deployment at pilot level), • Continued refinement of applied research prototype, • Established national and international partnerships, and • Unique position in the energy Research and Development (R&D) value chain in South Africa. 	<ul style="list-style-type: none"> • Large share of operational budget from project funding, offering limited job security, career development, does not easily attract and retain employees, • Lack of clarity in SANEDI’s role and strategic direction, • Ineffectual stakeholder relationships, • Broad mandate not aligned to available resources, • Perceived lack of visibility, • An Internal structure that enables compliance at the cost of performance, and • Translating R&D concepts into funded projects.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Socio-economic growth and sustainability requires innovative clean “MEV Solutions, • Increasing Interest In the Renewable Energy(RE) and Energy Efficient (EE) sectors, • Need for just transition to sustainable energy paradigm, • Alternative revenue generation through consulting and advisory, • Untapped opportunities across the R&D value chain, • Partnerships with key players across the value chain, • Interfacing Government and the private sector, and • Alignment with National Treasury (NT) priorities to harness Government funding. 	<ul style="list-style-type: none"> • COVID-19 and recovery, • Inadequate value proposition, • Competition with the sector from other research entities and project partners that are funded, • Funder processes create challenges at accessing “green climate funding”, • Duplication of efforts with other Institutions, • Reduced interest from foreign investors/donors, • Political alignment and support, • Lack of technical skills pipeline, and • Processes that are associated with green climate funding making access difficult.

Figure 3: SANEDI SWOT Analysis

8.1. EXTERNAL ENVIRONMENT ANALYSIS

8.1.1. COVID-19

Socio-environmental issues currently dominate the global discourse. The effects of climate change and COVID-19 are evident, and they force political, economic and technological shifts. Although there are structural connections between COVID-19 and climate change, the COVID-19 pandemic has compelled a break with business. Currently, Governments are compelled to align economic responses to the COVID-19 pandemic. Global consensus, international accords and treaties, National Policies and incentives spurred by a more demanding populace, has created a snowball effect that has dramatically altered the energy landscape over the past 10 – 15 years. This shift has seen a movement away from Fossil Fuels and coal towards more renewable technologies, as well as gas.

Amid such transition, several megatrends are presenting further uncertainty to the energy sector, impacting both supply and demand. Urbanisation, with expected accelerated growth in urban populations over the next 30 years, will shift (and increase) energy demand and consumption, especially in developing countries. This calls for a particular focus to be placed on redesigning the city of the future, to cater for such increased energy demands while aligning with global drives towards reduced carbon emissions and cleaner energy sources.

Key Global Impacts of the pandemic

1. Trends in COVID-19 caseloads differ widely by country, illustrating the unpredictable nature of the pandemic and the importance of remaining vigilant in our battle against the virus,
2. Global foreign direct investment is now projected to fall by as much as 40 percent in 2020,
3. Global manufacturing output fell by 20 per cent in April 2020, compared to the same period of the previous year, accelerating an already declining trend,
4. The pandemic is pushing an additional 71 to 100 million people into extreme poverty,
5. Globally, the first quarter of 2020 saw a loss of the equivalent to 155 million full-time jobs, a number that increased to 400 million in the second quarter,

with lower- and middle-income countries hardest hit,

6. Simulations suggest a steep and unprecedented decline in the Human Development Index (HDI), undermining six years of progress,
7. As recipients of 43 percent of global remittance inflows, the developing economies of Asia and the Pacific are especially vulnerable to the global economic stall and its impact on the transfer of remittances by migrant workers,
8. To mitigate the impact of the pandemic in Africa, the African Development Bank (ADB) has invested USD 10.2 billion to establish a Crisis Response Facility,
9. Data from 31 countries over the period 2014 to 2019 show that about 1 in 5 people reported having experienced discrimination on at least one of the grounds prohibited by International Human Rights Law, highlighting the need for COVID-19 responses to ensure that the pandemic does not exacerbate existing forms of discrimination, and
10. Even before the pandemic, women did three times more unpaid domestic and care work than men since the pandemic, however, data from rapid gender assessment surveys indicate that women in some regions are shouldering the extra burden of an increased workload, particularly in terms of childcare and household chores.

Source: How COVID-19 is changing the world: a statistical perspective Volume II, The Committee for the Coordination of Statistical Activities (CCSA), <https://unstats.un.org/unsd/ccsa/>

8.1.2. GLOBAL MACRO TRENDS

The imperative global macro trend is COVID-19 pandemic and a recent report released by the International Renewable Energy Agency (IRENA) highlights on the impact of COVID-19 in the energy sector. The global energy sector experienced implications since April 2020. It is notable that weekly energy demand had fallen by 25% for countries in complete lockdown and 18% for those in partial lockdown. The energy needs for the transport sector also dropped and Fossil Fuels have faced the burden of the demand reduction in transport and industry. These effects will be realised in the long run.



Whereas there are effects in the energy sector due to COVID-19, there are some opportunities to pursue such as Renewable Energy(RE). Carbon Dioxide (CO₂) emissions growth decreased and turned negative in 2020. COVID-19 has prompted the move towards RE supply, and this is because global lockdowns provided experiences of how the clean environment would look

like. Fewer cars were on the roads and fewer industrial firms were operating.

The post COVID-19 recovery journey would therefore require strengthening of research and investment in renewable technologies and energy mix. The World Bank(WB) revealed “**Next Generation Africa Climate Business Plan**” and this is critical in responding to RE opportunities emanating from COVID-19.

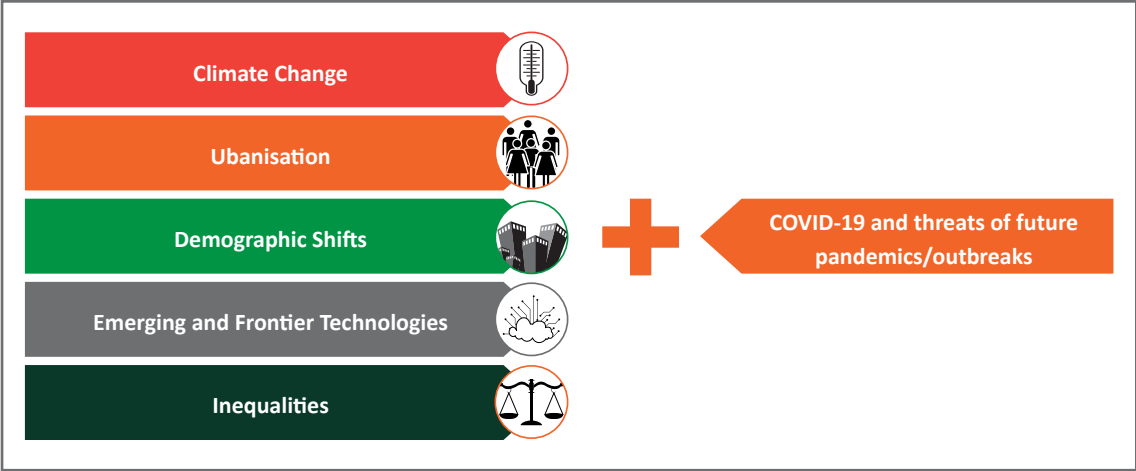


Figure 4: Global Megatrends.

Source: Adapted from report of the UN Economist Network for the UN 75th Anniversary. Shaping the Trends of Our Time September 2020

8.1.2.1. GLOBAL URBANISATION

Frost and Sullivan (2019) rated urbanisation as one megatrend that will have the highest degree of impact on the worldwide economy. With cities contributing about 80% towards a country’s Gross Domestic Product (GDP), the rapid increase in urban population will impact the outlook of energy demand. About 55% of the world population currently lives in cities, with the number set to reach 68% in 2050. According to Deloitte (2017), cities account for more than 70% of global Greenhouse Gas emissions and use two-thirds of the world’s energy.

This calls for particular focus on the transformation of cities to sustainable environments that can cater to their growing population. SANEDI is suitably positioned to make a valuable contribution towards defining South African cities of the future in line with energy demand and EE. Figure 5 shows that South Africa will have about 80% of its people living in urban areas by 2050, a number above both the global and African averages. This further amplifies the urgent need for South Africa to put particular focus on the sustainability of its cities and urban areas, in light of the transformation in the energy sector.



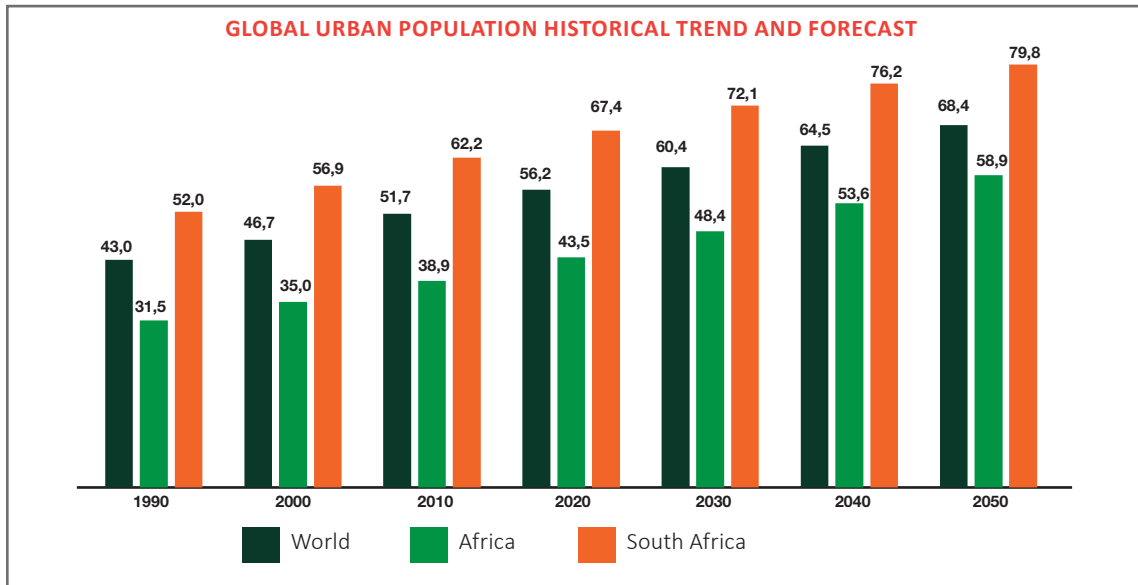


Figure 5: Global urban population historical trend and forecast

COVID-19 pandemic has also resulted in some questions and uncertainties about urbanisation. Cities are likely to look different when they start to emerge from lockdown, as this is because companies are likely to allow employees to work at home beyond COVID-19. COVID-19 is therefore likely to inform how the cities should be re-designed in terms of energy supply in households.

8.1.2.2. CONVERGENCE AND SMART CITIES

Energy has a direct or indirect impact on almost every aspect of modern life, driving economic growth and prosperity. Technology, however drives convergence. Increases in sensory information available in Integrated data sources accessible around the world, have consequentially changed how decisions are being made, how businesses operate, and how data has influenced strategic and operational considerations. These issues are encapsulated in the drive towards the Fourth Industrial Revolution(4IR), as highlighted in our National Priorities.

This issue is perhaps most relevant within the SANEDI context, in the Smart City concept (further expanded in Section 8.1.3 below). Smart technologies have matured to the point that cities of all sizes can tap into enormous computing power, driven by the integration of information and collaborative partnerships.

A Smart City uses Information and Communications Technology (ICT) to enhance its liveability, workability and sustainability. In simplest terms, there are three parts to this process; collecting, communicating and 'crunching'. First, a Smart City collects information

about itself through sensors, other devices and existing systems. Next, it communicates that data using wired or wireless networks. Third, it 'crunches' (analyses) that data to understand what's happening now and what's likely to happen next.

As highlighted in the section above, growing urbanisation will further strain, already strained cities and regions, requiring solutions that are predictive and enhance resource utilisation. Smart Cities, through rapidly evolving technology, offer a future that uses less to achieve more. This concept is further articulated in Section 8.1.3 below.

8.1.2.3. RISING ENERGY DEMAND AND CONSUMPTION

With the overall increase in global population, along with increasing urbanisation and economic growth, global energy demands are set to increase over the next 30 years. While there is a flattening demand in countries which currently have 100% access to electricity, South Africa and other developing countries are set to contribute towards the increasing global energy demand. According to the BP Energy Outlook (2020), Global energy demand continues to grow, at least for a period, driven by increasing prosperity and living standards in the emerging world. Africa's energy consumption remains small relative to its size. By 2040, Africa will account for almost a quarter of the world's population, but only 6% of energy demand, providing for significant upside potential. This number could be even higher if African countries continue to develop greater manufacturing capabilities.



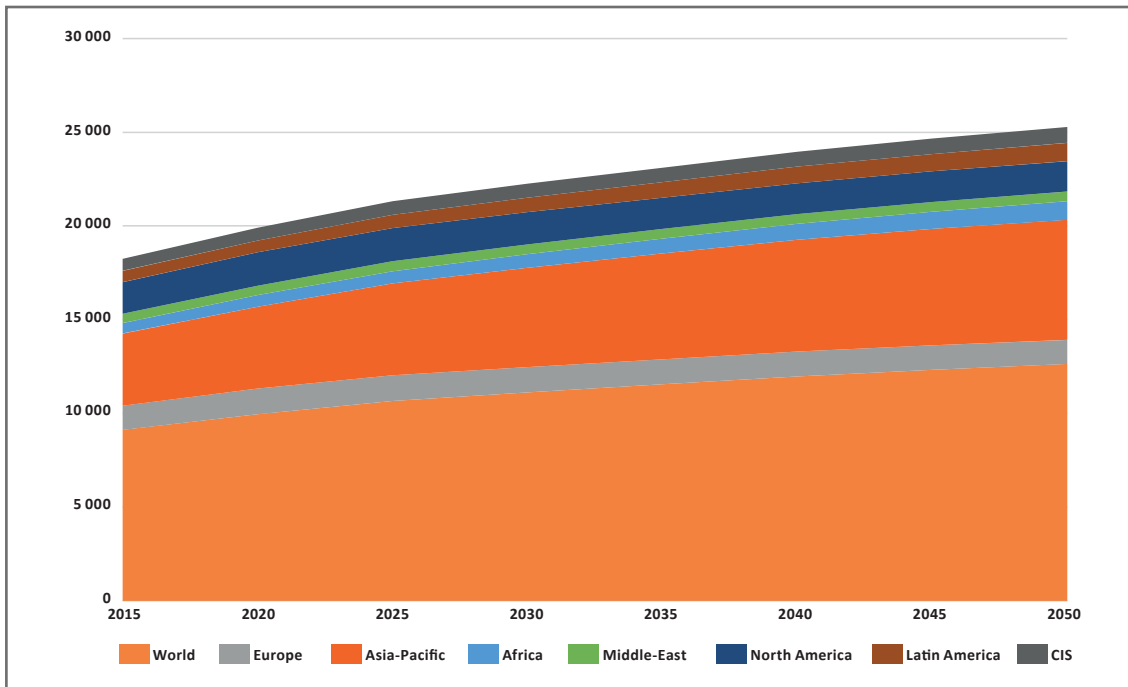


Figure 6: Global Energy Demand by Region

Source: EnerOutlook 2050.

Global energy consumption appears to be well-spread between the different sectors. Figure 7 shows that energy consumption by residential buildings and transport jointly contribute about half (51.3%) of the energy consumption. This projection is directly linked to the growing urban population, which increases the energy demand and use in cities within these sectors.

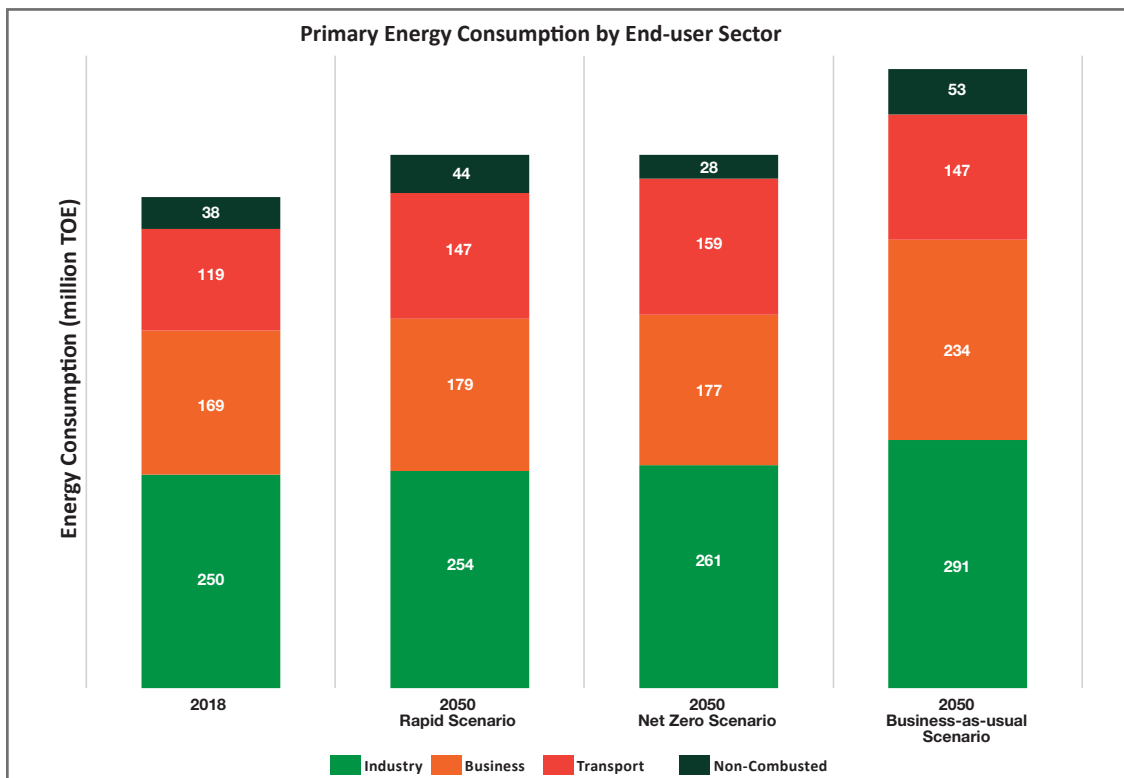


Figure 7: Energy consumption by sector

Source: BP Energy Outlook 2020



The Rapid Transition Scenario (Rapid) posts a series of policy measures, led by a significant increase in carbon prices and supported by more-targeted sector specific measures, which cause carbon emissions from energy use to fall by around 70% by 2050. This fall in emissions is in line with scenarios which are consistent with limiting the rise in global temperatures by 2100 to well below 2-degrees Celsius above preindustrial levels.

The Net Zero Scenario (Net Zero) assumes that the policy measures embodied in Rapid are both added to and reinforced by significant shifts in societal behaviour and preferences, which further accelerate the reduction in carbon emissions. Global carbon emissions from energy use fall by over 95% by 2050, broadly in line with a range of scenarios which are consistent with limiting temperature rises to 1.5-degrees Celsius.

The Business-as-usual Scenario (BAU) assumes that government policies, technologies and social preferences continue to evolve in a manner and speed seen over the recent past*. A continuation of that progress, albeit

relatively slow, means carbon emissions peak in the mid-2020s. Despite this peaking, little headway is made in terms of reducing carbon emissions from energy use, with emissions in 2050 less than 10% below 2018 levels.

The figure below indicates energy intensity⁴ both globally and regionally (OECD and BRICS) as well as for South Africa. South African energy productivity has improved since the year 2000 by 21%, but is behind both the global average and the BRICS average and seems to be plateauing. This poses a risk to the nation's competitiveness, particularly as a developing country with forecasted trends in terms of urbanisation, suggesting an increased requirement for energy to sustain the economy. National Policy points to more significant investments in mining, manufacturing and ICT as levers for future economic growth combined with an improved quality of life for all citizens. These outcomes are energy-intensive and provide an impetus to drive towards EE.

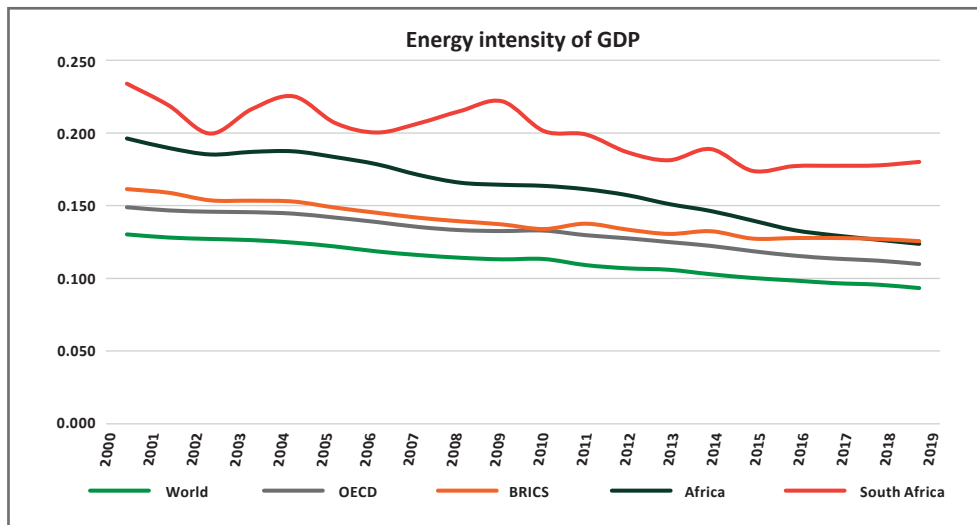


Figure 8: Global and Regional Energy Intensity^{1,2}

1 Energy Intensity is defined as the amount of energy required in kilotons of oil equivalents to produce 1 unit of GDP
 2 Enerdata Energy Statistical Yearbook 2020



Coupled with our carbon intensity, this highlights the relative improvements required to compete globally.

Table 2: 2020 Carbon Intensity

4 Energy Intensity is defined as the amount of energy required in kilotons of oil equivalents to produce 1 unit of GDP

5 Enerdata Energy Statistical Yearbook 2020

COUNTRY OR REGION	CARBON INTENSITY (ktCO ₂ /GDP) - 2020
OECD	0.093
BRICS	0.124
Russia	0.210
Brazil	0.089
China	0.128
India	0.089
South Africa	0.180

8.1.2.4. INCREASING PENETRATION OF RENEWABLES

Several global environmental and economic considerations (primarily climate change) are driving the shifts in the energy landscape, towards decarbonisation (away from coal), towards RE and natural gas. The past few years have seen a decline in the use of coal as a source of electricity, with the rise of renewable sources supplemented by gas to support renewables in providing consistent and predictable capacity.

South Africa is progressing in this transition with the implementation of the Renewable Energy Independent Power Producer(REIPP) process, which was widely heralded globally as a success and has created an environment within which renewables can succeed within the local context. However, SA remains one of the top five producers of coal globally.

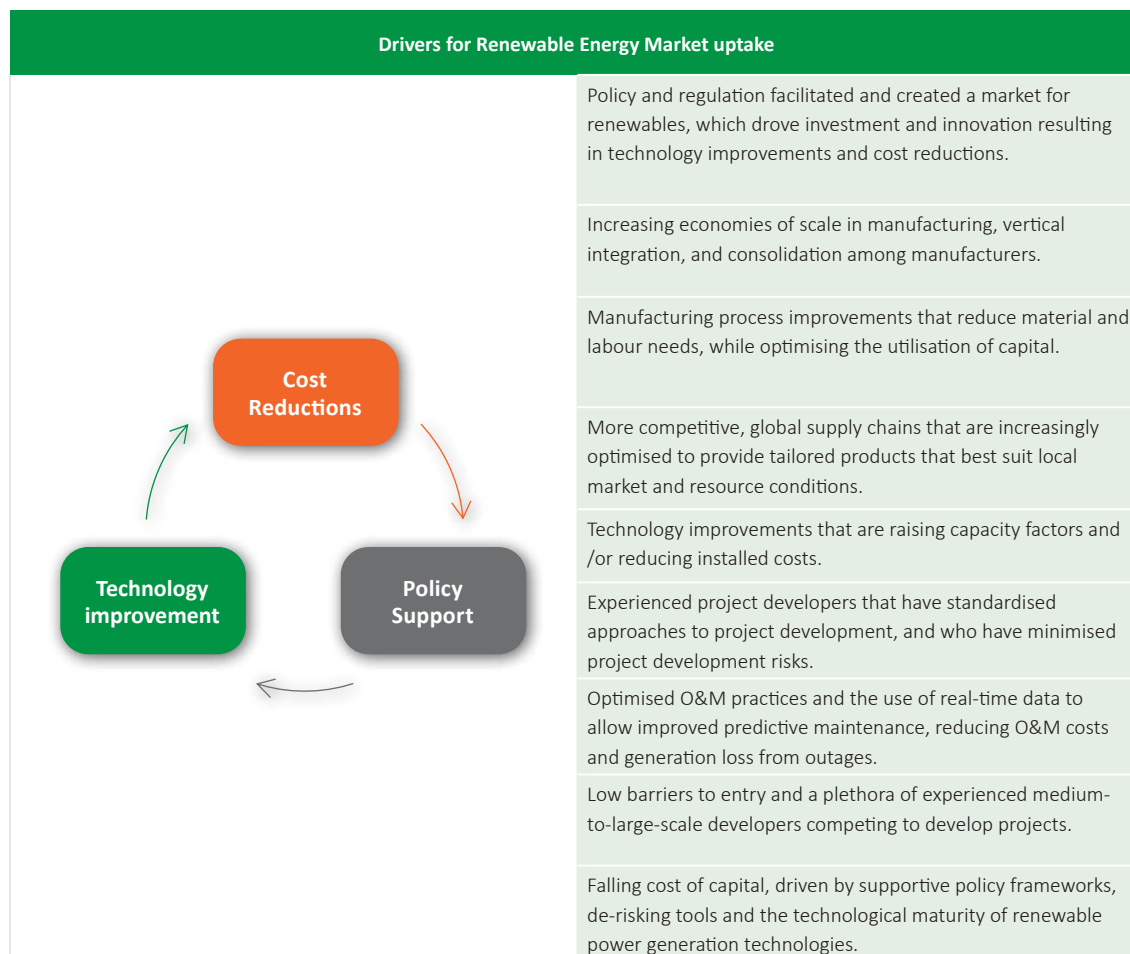


Figure 9: Drivers for Uptake



It must be clearly noted that, policy plays a crucial role in driving technological improvements which facilitates cost reductions and drives towards economically sustainable solutions. In this regard globally, due to the technological advancements in processing, renewables are already economically competitive with Fossil Fuels (refer Figure 11) – indicating new generation capacity will be renewables driven, as highlighted below.

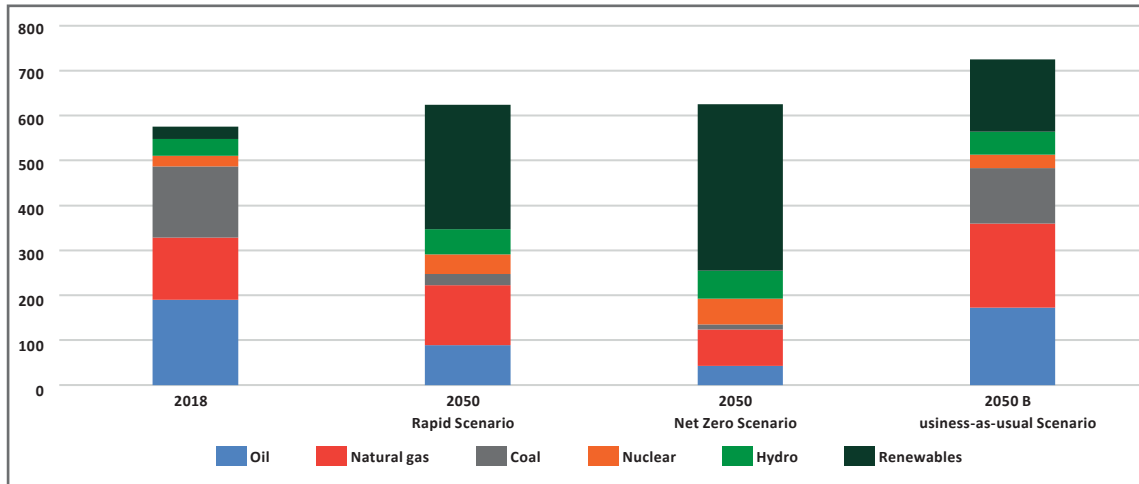


Figure 10: Electricity and Energy Outlook

The figure below shows the level of improvement in the Levelised Cost of Electricity (LCOE) for renewables, in particular: Photovoltaics, Concentrated Solar Power and Wind (both offshore and onshore). This has enhanced the feasibility of RE projects and promulgated the increased market share of RE globally. Key challenges around renewables are intermittent and unreliable production schedules for baseload requirements. Energy storage solutions for renewables raise the LCOE for renewables significantly in comparison to Fossil Fuel alternatives, providing areas of opportunity from a technology development perspective.

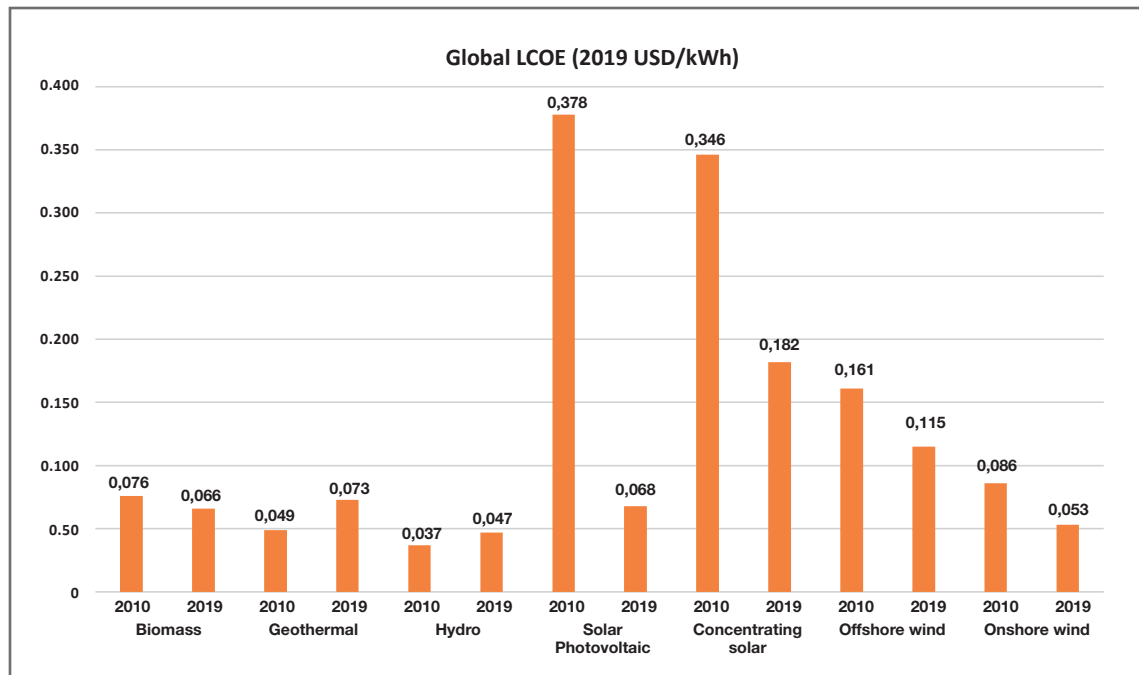


Figure 11: Improving Renewable Energy costs

Source: IRENA <https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019>



8.1.2.5. ENVIRONMENTAL SUSTAINABILITY

Along with economic and social considerations, over the past few decades, the environment has risen to prominence in energy matters. Over the preceding centuries, humankind's rapid development has been enabled by the utilisation of Fossil Fuels, first coal and then oil. The use of these high energy density carriers, has also facilitated the rapid growth in global population. Unfortunately, the expanding use of Fossil Fuels has likewise increased the emissions of CO₂ into the atmosphere that leads to global climate change.

To address climate change, the United Nations Framework Convention for Climate Change (UNFCCC) was established. South Africa is a Party to the UNFCCC and also a Party to the Kyoto Protocol that established CO₂ emission reduction targets.

The South African President stated at the Copenhagen Conference of Parties of the UNFCCC, that South Africa would increase its CO₂ emissions until the mid-2020s plateau for ten years, and then decrease in real terms from the mid-2030s. Consequently, mitigating CO₂ emissions has become a crucial factor in the National Energy Strategy. The modalities of achieving such mitigations include:

- Carbon Capture, Utilisation and Storage,
- Renewable Energies,
- Energy Efficiency Measures, and
- Nuclear Energy (not a SANEDI mandate) the first three of which are being addressed by SANEDI.

Consumer patterns continue to drive market demand. As consumer behaviour trends are shift, young consumers are more inclined towards products and services that are socially responsible, encompassing issues like climate change. In many respects, consumer demand has shifted the discourse in mobility from purely Fossil Fuel, towards Electric Vehicles (EVs) and so forth.

Tesla Inc. is a brand which initiated the trend towards EVs. Tesla leads US car sales in the 2nd quarter of 2019 within the small and midsize luxury car market. The development and growth of the company have signalled opportunities in the EV market, which global participants are beginning to exploit. EVs have an influence on lowering GHG emissions within densely populated areas.

Technological improvements in energy storage are increasing the distances travelled between charges, while reducing the cost per unit energy storage. EV adoption requires significant investment in electrical charging infrastructure that provides a network to consumers. Thus, based on Tesla's success, SANEDI's policy implementation would require a focus on the following aspects:

- Affordability,
- Availability,
- Convenience, and
- Sustainability.

Original Equipment Manufacturers (OEMs) predict that policy implementation around EV penetration could increase EV stock by six-fold globally with China significantly leading the demand. Two BRICS countries (India and China) have currently indicated clear policy targets in this direction of EV migration.

8.1.3. THE SA ECONOMY

8.1.3.1. MACRO-ECONOMIC ISSUES

The strategy comes at a time where South African sovereign debt must maintain high return levels to attract foreign investment due to lower credit ratings. Two out of the three prominent international rating agencies have rated our sovereign debt at below investment grade, namely Fitch and Standard & Poor. The figure below indicates the slowing of GDP growth and the stagnation of GDP per capita.



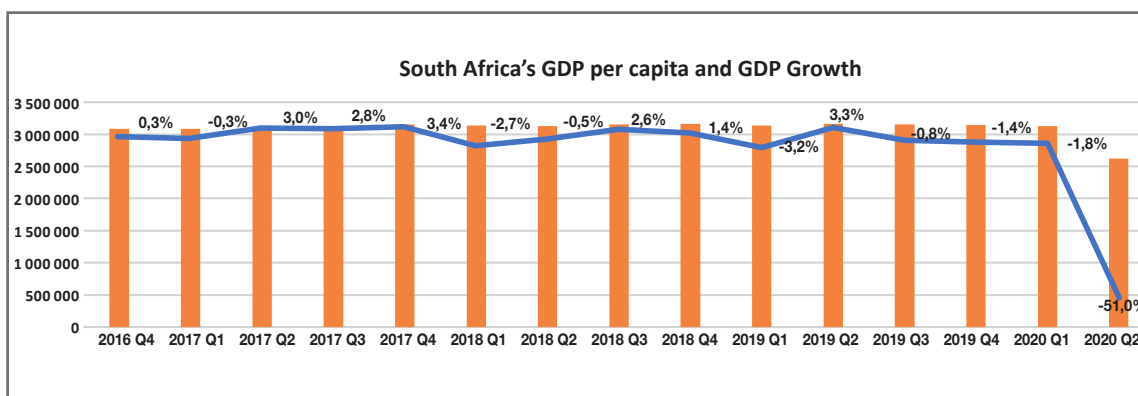


Figure 12: GDP statistics

Source: StatsSA

Unemployment continues to grow, currently at 29% by the official count. Youth unemployment sits at 56%, a rate that is amongst the highest in the world. Moreover, in 2014, South Africa had the highest level of inequality amongst 74 countries, according to World Bank Gini Index estimates.

Economic transformation in terms of Broad-based Black Economic Empowerment(B-BBEE) and poverty alleviation is enabled by strong and consistent economic growth. Thus, economic growth is a high priority outcome that has achieved consistent focus in terms of the NDP, although performance has been lacking due to various local and international factors.

The debt to GDP ratio of the country has grown significantly over the past decade as underperforming SOEs have placed an increasing burden on the fiscus. Eskom is significant SOE both in terms of scope and financials within the South African Economy. It supplies 95% of South Africa's electricity with 92% of the electricity being generated from coal.

Eskom's 2019 Integrated Report (IR) indicated an organisation with a significantly leveraged financial position, leading to interest expenses that are higher than Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA), resulting in Eskom's highest reported net loss in its history. Added to that, is the fact that 41% of Eskom's sales are to municipalities who currently have combined arrears of R19 billion. The grave situation with the SOE has promulgated the appointment of a Chief Restructuring Officer who must, amongst other priorities, transition Eskom into separate entities that focus on Generation, Transmission, and Distribution respectively. This will have a significant impact on not only the structure of Eskom but the local energy landscape as well.

8.1.3.2. SERVICE DELIVERY WITHIN THE MUNICIPAL ENVIRONMENT

South Africa's municipalities rely on electricity sales through Eskom for revenue, however, it is evident that many municipalities struggle to pay their Eskom debts of R3,4 billion (81%) to Eskom with no improvement. .

A Smart City model would assist in solving the municipality energy debt crisis through relevant technology and data, that solve both energy measurement concerns, and shortfalls in a financial management capacity. For example, Smart Grids allow for real-time energy consumption data that can alert households and municipalities to high consumption levels, during financial planning & management.

ICT systems that assist in financial management. Automated payment and/or pre-paid systems can reduce corruption and fraud and drive revenue enhancement within municipalities.

In this regard, Smart Cities, as highlighted in the section below, can provide tangible benefits in enhancing municipal revenue, while reducing costs, thereby reducing the debt burden currently felt.

8.1.4. THE SMART CITY CONCEPT

The establishment of a Smart City is not a one-stop process, it is a journey. SANEDI has been participating in this journey in various forms over the past five years. Moving away from hyperbole and terminology, the concept of Smart Cities is not a new one, it is a natural evolution of advancements made through the fields of Information Technology(IT). As more sensory information (i.e. transmitters, sensors) become connected to



centralised information stores (i.e. databases), through communication networks (i.e. telecommunications), that information can be presented through User Interfaces (UI) solutions, while predictive tools can be utilised on data sets to drive optimal resource utilisation. The benefit to this is both potentially increasing revenue, and decreasing costs associated with service delivery (i.e. water, refuse, transport, electricity) within municipalities. Without connected sensors feeding information to centralised databases, Smart Cities become impossible.

As centralised information could include electricity/energy-related information, as well as public health, public transport, water, emergency services and so forth, it becomes a cross-cutting opportunity, however, as highlighted it is centred on having Integrated information in central data stores. This can be described by the image below.

Smart Grids, within which SANEDI has significant experience, is a component (a key, underlying component) of what would constitute a Smart City. Furthermore, as seen by the rising global population in cities earlier, cities play a crucial part in energy demand and consumption. Energy Research and Development (ERD) of technologies have a role to play towards the sustainability of cities and thus contribute towards economic growth.

Within the energy sector, with a rising need for energy access, increasing utilisation of renewables and a more significant requirement for access to the grid for distributed generation, Smart Grids are necessary for the transition and to manage the complexity that comes with this. Areas for SANEDI to participate and lead (including programme management) includes the following:

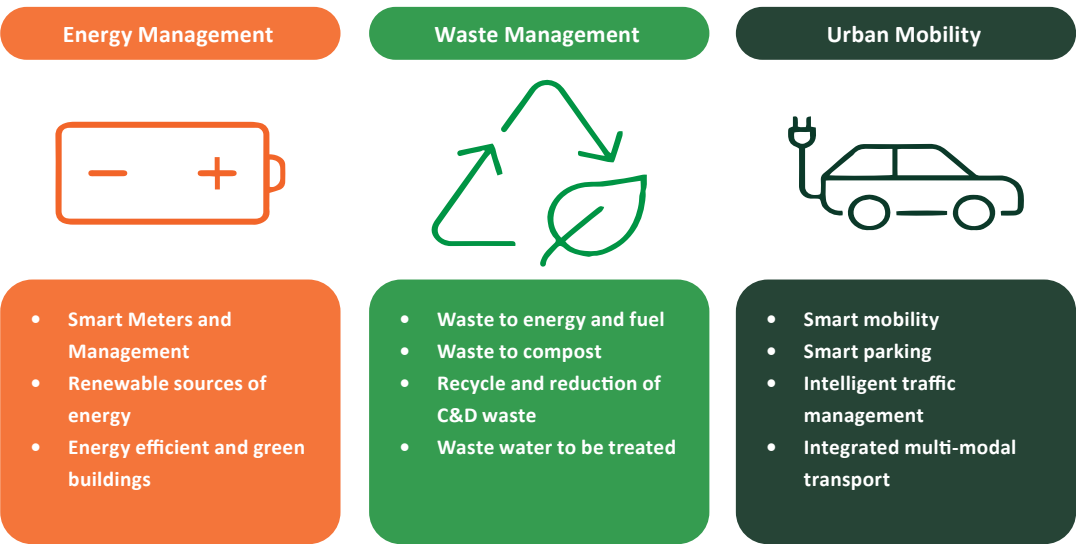


Figure 13: Key considerations from a municipal support perspective

Intervention in cities will require SANEDI to work together with municipalities, which currently do not have the skills to facilitate this transition.

8.2. INTERNAL ENVIRONMENT ANALYSIS

SANEDI is an implementation agency of Government, specifically the Department of Mineral Resources and Energy (DMRE, previously Department of Energy (DoE)), established under the NEA, with a focus on EE, Energy Research, Development and Innovation.

8.2.1. OPERATING MODEL (PEOPLE, PROCESS, TECHNOLOGY)

SANEDI’s operating model comprises three components that speak to People, Process, and Technology, which determines the organisation’s capacity to action its business processes, thereby achieving its Strategy. Robust and well-defined business processes create a well-functioning organisation.

It has been perceived that staff morale at SANEDI has been low, affecting performance and effectiveness.

This must be addressed by creating a performance enabling culture, strengthening the organisational structure, and clearly defining roles and responsibilities while integrating siloed work teams. In addition, capacity building must be a constant consideration.

Significant effort has been on process standardisation, driving towards well-defined business principles. Clear lines of accountability must be established to re-enforce current systems and procedures. Change Management becomes a key component in terms of embedding the change the organisation is undertaking.

8.2.2. ORGANISATIONAL STRUCTURE

The organogram includes the SANEDI Board directly overseeing the Board Committees: Board Audit and Risk Committee (BARC), Remuneration Committee, Projects Committee, Funding and Finance Committee, and Social Justice and Ethics Committee. The SANEDI Chief Executive Officer (CEO) reports to the Board and oversees three programmes: Administration, Applied Energy Research, Development and Innovation, and Energy Efficiency. Within those programmes are several sub-programmes as shown in the figure below.

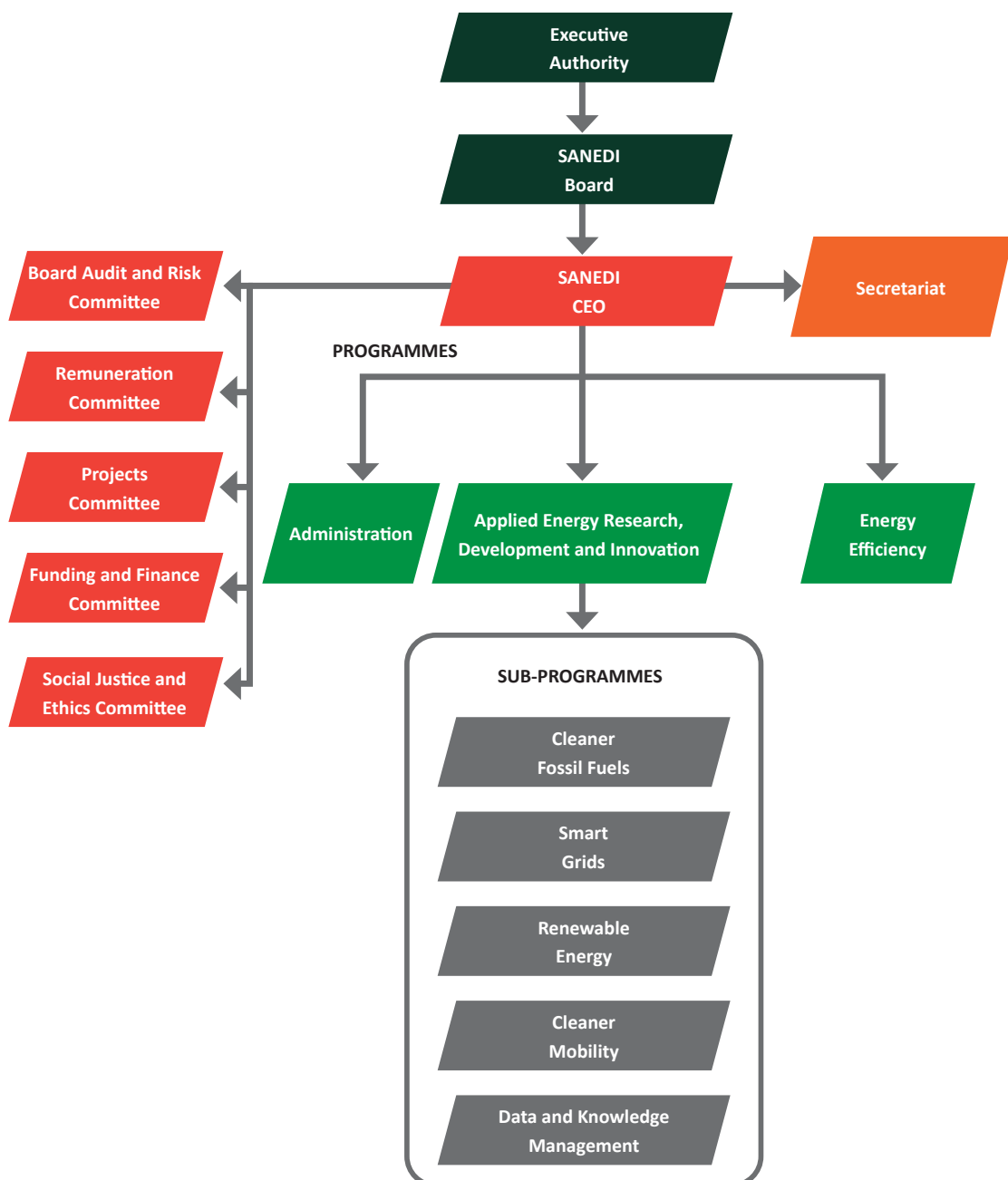


Figure 14: SANEDI Organogram



SANEDI has undergone an organisational restructuring and benchmarking exercise to ensure the efficient utilisation of resources in delivering its mandate. Implementation of the new organisational structure will likely occur during the strategic cycle presented.

Due to the broad mandate, and with limited funds available, resource effectiveness and efficiency by focusing on real value creation is key to the long-term sustainability of SANEDI.

8.2.3. FUNDING AND RESOURCE ALLOCATION

From a funding perspective, about 5% of SANEDI's budgeted income has been from donor-funded projects, ensuring appropriate selection and delivery of projects becomes an underlying strategic enabler. However, levels of funding have been falling as South Africa is perceived as an 'emerged economy' by international donors.

SANEDI is still on an establishment grant, and the funding has not ramped up as mapped out in the founding Business Case, and this has had an impact on the capacity of the organisation to deliver. National Treasury (NT) has, however, agreed to increase the baseline allocation by an additional amount of approximately R4 million with an annual inflationary increase of approximately 5% year-

on-year in response to cost pressures mainly related to Programme 2: Applied Energy, and Programme 3: Energy Efficiency. Programme 2 has historically been allocated approximately 70% of the overall funding because of its volume of sub-programmes. SANEDI has responded to the COVID-19 by reprioritising approximately R4 million from the allocation for 2020/2021.

Overall, this suggests that there may be some financial constraints due to income in-flows. SANEDI shows a trend that when funding is reduced, project spend is reduced disproportionately, which impacts effective project delivery. The organisation must respond to this by improving efficiency and productivity. Expenditure is expected to reduce from 2019/20 by an average of 4%. This is due to a combination of rising staff costs, a reduction of 7% of spending on goods and services. Staff costs are projected to increase by 5% per annum over the Medium Term Expenditure Framework(MTEF) period in line with inflation. At present, employee costs are currently 40% of total revenue which is a significant risk for an R&D organisation. SANEDI, in-line with the NT measures on spending, could potentially see the employee costs being plugged in the future in line with inflation. Expenditure on goods and services administration strategic objectives has historically increased by 6% year-on-year and is expected to increase annually by between 4%-6% in future periods.

SANEDI programmes are largely securely funded, but there may need to be increased focus on funding shortfalls in the medium-term, as Cleaner Mobility is underfunded. Additional funding needs to be sourced, or Cleaner Mobility needs to be removed from the portfolio, while reprioritising resources to higher-value creation or higher impact programmes, funds will also be reprioritised from the Working for Energy(WfE) programme.

8.3. STRATEGIC IMPLICATIONS

The following elements were highlighted as being important considerations for SANEDI.



Figure 15: Critical contextual elements for SANEDI

Source: World Energy Outlook 2020.



The situational analysis has highlighted that budgetary constraints require a more focused approach by SANEDI in delivering its mandate. The significant opportunity for SANEDI to drive service delivery improvements across the municipalities through the demonstration and roll-out of the Smart Cities programme as highlighted in Section 8.1.3 above. This would improve asset management, reduce electricity losses, improve revenue collection (and reduce consumer debt to municipalities), while lowering transport/ fuel costs and contributing towards decarbonisation efforts (by improving EE). It requires a coordinated effort between various stakeholders across National, Provincial and Local Government and includes technical, programme management and capacity building support to ensure a solution relevant to the South African context is adopted.

In addition, as the drive towards increased energy access, lower energy costs, as well as cleaner sources of energy (i.e. lower CO2), is a global imperative, SANEDI has a mandated role to play in the development of this within the SA context. SANEDI's strategic role would include managing compliance-related activities and technology development around decarbonisation. As highlighted, South Africa is still heavily reliant on Fossil Fuels for its energy requirements, and our international

license to operate depends on reducing our absolute and relative carbon emissions.

Finally, as SANEDI deals with information (through research and programmatic interventions), an operational environment that leverages this information to create usable insights, data and analysis to influence policymakers and investors is a necessary and relevant requirement, specifically as we transition into a more information-centric environment.

8.4 PLANNING TOOLS

8.4.1 Project Management

SANEDI is a project-based organisation with a clear policy that defines Project Management Methodology. The policy also provides guidelines by which project selection, prioritisation and approval decisions are taken. Projects are planned within our Five-Year Strategic Plan(SP) and APP. The project planning in our APP is informed by output indicators. In planning for projects, we also take into consideration sound economic practice and fiduciary responsibility for all funds, grants and donations received by, or disbursed through SANEDI. We have a Project Management Office and its objectives are portrayed as follows:

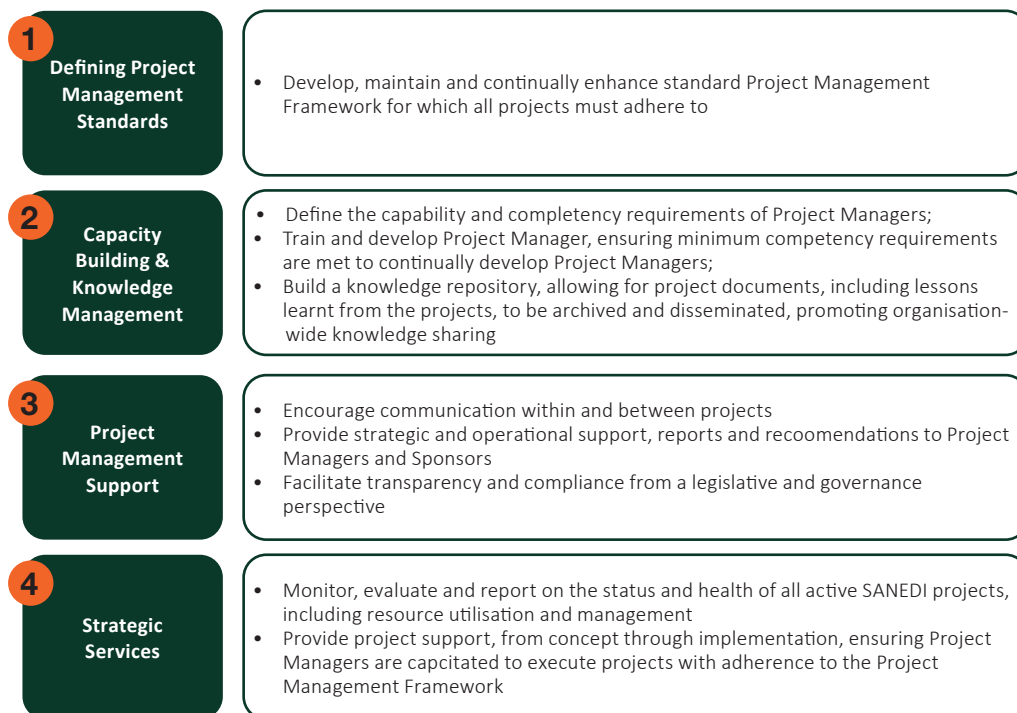


Figure 16: Project Management within SANEDI



PART C: MEASURING OUR PERFORMANCE



9. INSTITUTIONAL PERFORMANCE INFORMATION

The following is a list of programmes and associated sub-programmes conducted by SANEDI.

PROGRAMME 1	ADMINISTRATION	
Purpose	The purpose of Programme 1 is to create an effectual delivery environment for SANEDI that is fully compliant with all statutory requirements.	
Sub-Programmes	Human Resources	Information and Communications Technology
Purpose	Ensuring available, competent and happy staff.	Support efficient operations and ensuring data processing, integrity and availability.
Sub-Programmes	Corporate Services	Financial Management
Purpose	Incorporating all lines of business and support activities relating to the Board and Board Committees.	Including all lines of business and support activities relating to the effectual financial management and auditing practices.
Sub-Programmes	Supply Chain Management	Corporate Communications
Purpose	Including all lines of business and support activities relating to effectual Supply Chain Management(SCM), and compliant procurement processes.	Including all lines of business and support activities relating to effectual communications including stakeholder engagement, client satisfaction surveys, public awareness campaigns in collaboration with the DMRE and media intelligence.
Sub-Programmes	Shared Logistics	Project Management Office
Purpose	Including shared facilities/resources shared by all Managers to ensure a conducive and productive working environment. Ensure adequate project selection resource allocation, Project Management and performance monitoring.	Encourage communication within and between projects. Provide strategic and operational support, reports and recommendations to Project Managers and sponsors. Facilitate transparency and compliance from a Legislative and Governance perspective.

Programme 1 Administration

Outcomes, outputs, output indicators and targets

OUTCOME	Outputs	Output indicators	ANNUAL TARGETS							
			Audited performance			Estimated Performance				
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	
A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its mandate) – internal compliance.	Critical business risk factors identified, managed as per Risk Management Plan.	Percentage critical business risk factors managed as per Risk Management Plan.	New Indicator	New Indicator	>90%	>90%	>90%	>90%	>90%	>90%
	Implemented Corporate Stakeholder Engagement Plan (CESP).	Percentage implementation of Corporate Stakeholder Engagement Plan (CESP).	New Indicator	New Indicator	75%	55%	85%	85%	85%	85%
	Implementation of Corporate ICT Plan.	Percentage implementation of Corporate ICT Plan.	New Indicator	New Indicator	80%	80%	80%	80%	80%	80%
	Unqualified Audit Reports.	Unqualified audit achieved.	Unqualified audit report	Unqualified audit report	Unqualified audit report	Unqualified audit report	Unqualified audit report	Unqualified audit report	Unqualified audit report	Unqualified audit report
	Personnel trained as per Workplace Skills Plan (WSP).	Percentage of personnel trained as per Workplace Skills Plan (WSP).	80%	80%	80%	80%	80%	80%	80%	80%
	Filled funded positions.	Vacancy rate of funded positions.	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
	Employment equity targets adhered to.	Percentage deviation from employment equity targets.	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%

Output indicators: annual and quarterly targets

Output indicators	Annual targets	Q1	Q2	Q3	Q4
Percentage critical business risk factors managed as per Risk Management Plan.	>90%	>90%	>90%	>90%	>90%
Percentage implementation of Corporate Stakeholder Engagement Plan (CESP).	85%	25%	45%	55%	85%
Percentage implementation of Corporate ICT Plan.	80%	20%	40%	60%	80%
Unqualified audit achieved.	Unqualified audit report	-	Unqualified audit report	-	-
Percentage of personnel trained as per Workplace Skills Plan (WSP).	80%	20%	40%	60%	80%
Vacancy rate of funded positions.	<5%	<5%	<5%	<5%	<5%
Percentage deviation from employment equity targets.	<5%	<5%	<5%	<5%	<5%



Programme 2: Applied Energy Research, Development & Innovation

PROGRAMME 2	APPLIED ENERGY RESEARCH, DEVELOPMENT & INNOVATION	
Purpose	The purpose of Programme 2 is to facilitate knowledge creation that can support energy-related planning and decision-making, and accelerating the transformation of the energy market and landscape in the country.	
Sub-Programmes	Renewable Energy	Cleaner Fossil Fuels
Purpose	Support the accelerated and informed development of South Africa's clean energy portfolio and RE sector.	Alternative low carbon energy and mitigation options to limit serious, negative and environmental impacts from conventional energy sources.
Sub-Programmes	Data and Knowledge Management	Cleaner Mobility
Purpose	Collation, development and utilisation of credible, objective and high-quality data and information relating to the areas of SANEDI's Responsibility.	Developing Cleaner Mobility Solutions for Public Transportation.
Sub-Programmes	Smart Grids	
Purpose	Demonstrate and assess intelligent energy systems infrastructure, as an enabler for municipal sustainability.	

During October 2019, Cabinet approved the IRP 2019, which recognises the challenges that South Africa faces as a country within the national and global energy landscape and proposes solutions to address them. It also highlights opportunities which if realised, could have a positive impact on infrastructure planning and development going towards meeting the 2030 National Development Plan (NDP) goals.

The Integrated Resource Plan (IRP) recognises socio-economic challenges of increasing electricity tariffs, shortages of generation capacity emanating from the challenges that Eskom is faced with, as well as the over-reliance on coal as the primary source of energy. These have a significant negative impact on the economic growth of the country.

The IRP also recognises opportunities that are brought about, by emerging technological advancements and the concomitant decreasing costs of production. These developments, make global access to energy through renewable and off-grid technologies such as solar PV, bioenergy and wind through microgrids and battery storage much more possible for both rural and urban applications.

Reliance on coal for electricity or liquid fuels generation is starting to become less viable, as the banking sector moves away from financing coal-based energy generation. This constraint is making it imperative for the country to start aggressively investing in cleaner coal technologies, and ensuring that the country begins to adhere to minimum global emission standards.

South Africa, as a Party to the Paris Agreement, has obligations towards reducing its Green House Gas (GHG) emissions as set out in the 2016 Nationally Determined Contributions (NDC).

As disruptive technologies are developed and applied across the world, it becomes crucial that these technologies are assessed for their potential adoption and deployment within the South African energy landscape, to ensure their appropriateness for the country in support of the advancement of the country's development goals. Where it becomes evident that transition is required from one technology to the next, attention should also be given to issues of the impact of such a transition. In this regard, a just transition is required to minimise the adverse impacts on affected fossil energy sectors and communities who depend on them for socio-economic development. The development of concomitant policies also needs to be supported by accurate, reliable and timeous data and research information.

SANEDI's contribution then becomes crucial in supporting policy formulation, as well as piloting and demonstrating new technologies to inform policy and to support the adoption of new technologies.

For the (2020-2025) MTSF period, SANEDI will be mainly focusing on the provision of information, develop and maintain datasets and implement pilot and demonstrations projects that will enable, strengthen, and support the ability of Government and all sectors of the economy, to collectively ensure that there is the



security of energy supply through a number of targeted initiatives

The Energy Secretariat sub-programme

BACKGROUND TO THE CREATION OF THE ENERGY SECRETARIAT

During the 2018/19 financial year, the National Research Foundation(NRF) review of the Renewable Energy Hub and Spokes was conducted. As part of the management of the Renewable Energy Hub and Spokes Programme, the NRF undertook an independent review to assess the successful implementation of the programme, and put in place corrective measures prior to the programme receiving the next phase of funding support.

The outcomes of the NRF review were presented to the Department of Science and Innovation(DSI). One of the action items from an EXCO meeting, included an analysis of how the recommendations of the study could be applied across the broader Energy Research, Development and Innovation (RDI) Flagship Programmes, resident within the DSI to improve overall performance.

The Ten Year Innovation Plan included an Energy Grand Challenge which focused on advancement towards a knowledge-based economy, using the four elements of increased knowledge generation and exploitation, human capital development, knowledge infrastructure, and enablers to addressing the “**innovation chasm**” to address the energy trilemma (energy access, environmental sustainability, energy security).

With regard to knowledge generation, South Africa ranks 38th worldwide in the generation of energy publications. However, a different perspective unfolds if one also considers the size of the Research and Development (R&D) workforce. South Africa has higher levels of productivity when compared to the USA (3.28 per 100 Full-Time Equivalent (FTE) research workforce, with Japan at 2.99 and 5.75 for the energy component of the NSI. However, when it comes to the movement of technologies from lab to market by overcoming the innovation chasm, there are challenges in the system such that the conversion into commercial products happens at a rate lower than global averages¹.

THE ENERGY SECRETARIAT OBJECTIVE

The objective of establishing the Energy Secretariat, is to support the successful commercialisation and upscaling of knowledge outputs from the broader energy RDI portfolio, and ensuring systemic impact in the NSI.

THE ENERGY SECRETARIAT OUTCOMES BEING SUPPORT

SANEDI will assist the DSI in achieving its programme outcomes by providing Programme Management support to the operations of the Energy Secretariat. Listed below is the DSI Programme short term outcomes:

- Number of first-time commercial sales,
- Number SMMs supported,
- Number of artisans/technicians absorbed in employment,
- Number of PhD and Masters graduated, and
- Number of technology demonstrations with partnerships.

THE ENERGY SECRETARIAT SCOPE

The **Secretariat²** is an administrative office which carries out the substantive and administrative work, in this case of the DSI as directed by the Chief Director Hydrogen Energy. The scope of the Secretariat will cover the following DSI energy-related programmes;

- Hydrogen South Africa,
- Energy Storage RDI Initiative,
- Renewable Energy Hub and Spokes,
- Coal CO₂ to X RDI Programme,
- SARChi: Clean Coal Technologies,
- SARChi: Coal Research,
- SARChi: Clean and Green Energy,
- SARChi: Nuclear Engineering,
- SARChi: Sugarcane Bio-refining,
- SARChi: Biofuels,
- SARChi: Energy Materials,
- SARChi: Mainstreaming Gender for Energy Security & Poor Communities,
- SARChi: Solid State Luminescent and Advanced Materials,
- SARChi: Biofuels and Alternative Fuels,
- SARChi: Transport Manufacturing Technologies,
- CoE in Catalysis (C*change), and
- CoE for Integrated Mineral and Energy Resource Analysis (CIMERA).

¹ DSI information

² Google Search



THE ENERGY SECRETARIAT ROLES AND RESPONSIBILITIES

The following roles and responsibilities are applicable:

- **Monitoring the implementation of the Energy Science, Technology and Innovation Plan:** The DSI will develop an Energy Science, Technology and Innovation Plan as part of the Decadal Plan process. The monitoring of the implementation across the NSI will be one of the critical roles of the Energy Secretariat.
- **Monitoring the implementation of innovation policies relevant to the energy space:** The DSI will continue to be responsible for the development of policies and strategies, which inform the energy innovation funding from the Department within the context of the Climate Change Mission. Currently, the following policies would require monitoring: National Hydrogen and Fuel Cell Technology Research Development and Innovation Strategy, Energy Storage RDI Roadmap, Carbon Capture and Use RDI Roadmap, and the Solar Energy Technology Roadmap.
- **Monitoring the role of alternative and emerging technologies within the implementation of relevant policies at both the national, regional and international level:** There are several policies at both the national, regional and international level which have implications for the Energy RDI conducted within South Africa. For instance, the Green Transport Strategy, Green Buildings Strategy, National Energy Efficiency Strategy and the Integrated Resource Plan (IRP) all have targets for the uptake of emerging technologies such as Electric Vehicles (EVs), concentrated solar power and fuel cell technologies. Monitoring the uptake of emerging technologies as part of the implementation would allow the relevance of the Energy RDI Flagship Programmes and other instruments such as the South African Research Chairs Initiative (SARChI) and Centres of Excellence (CoEs) to be proactively managed.
- **Manage and monitor large scale deployments in partnership with public, private and academia in support of the Presidential District Model:** To date, the Hydrogen and Energy Chief Directorate has deployed fuel cell systems and solar PV for social infrastructure, and this has led to information that has helped to improve the technical performance. However, to ensure the lessons learned can be disseminated effectively to multiple stakeholders

and thus speed up the rate of adoption, new approaches (movement from a technological niche to a market niche) followed by the DSI to fund and partner in deployment will have to change.

Over the next two years, a Platinum Valley/Hydrogen Valley will be implemented in partnership with the Department of Mineral Resources and Energy (DMRE), Department of Trade, Industry and Competition (DTIC), Limpopo Economic Development Agency (LEDA), Gauteng Industrial Development Zone (GIDZ) and KwaZulu-Natal (KZN) as well as the private sector. The “hydrogen valleys” concept is a geographical area, a city, a region, an island or an industrial cluster, where several hydrogen applications are combined into an integrated hydrogen ecosystem, which will be one of the focus areas.

The consumption of a significant amount of hydrogen, and the coverage of the entire value chain in the “Hydrogen Valley” will offer a pathway for scaling up and making this technology a viable solution, and will showcase the sectorial integration capability of hydrogen. The geographic location of the corridor will start in Limpopo Province (where platinum is extracted), run through Gauteng Province (OR Tambo International Airport) and end in KZN (King Shaka International Airport). The number of stakeholders, including the ongoing monitoring of the project from the conceptualisation of the project, getting the stakeholders from across different spheres on board through to implementation, will take a dedicated team to implement.

- **Assist with coordinating the training of TVET graduates and University of Technology (UoT) graduates on emerging technologies (i.e. fuel cells, batteries):** Over the past decade, the majority of students graduated have been Masters and PhD students, however when engaging with private sector companies that will be involved in the manufacturing, the DSI has learned that there is a requirement for Technical Vocational Education and Training (TVET) and UoT graduates. The majority of the jobs will be for technicians in the manufacturing facilities, as well as installers for the operation and maintenance of the technologies once they are deployed.

The Energy Secretariat, will be required to put in place relationships with the private sector for the co-funding of Masters and PhD students that will continue to be funded under the DSI, but will also ensure that partnerships with Energy Water SETA and TVET colleges can be developed to serve the placement of graduates at the technician level in the



emerging sectors. Also, the Energy Secretariat will coordinate with Universities and Science Councils with infrastructure (i.e. University of Limpopo(UL) facility for precursor development, the University of the Western Cape(UWC) for battery manufacturing) to utilise existing infrastructure to train TVET and UoT graduates to assist the uptake into the private sector.

- **Advocate on behalf of emerging and young researchers, as well as RDI programmes with key stakeholders so that knowledge outputs can be assisted towards commercialisation:** Can be created to serve as an umbrella organisation spin-off companies, or a commercialisation entity into which Government-funded IP that is generated under the Energy RDI Programmes that are funded throughout the DSI can be licensed in, or assigned for commercialisation.

Assist consortiums in applying for and leveraging national and international funding to speed up the process of commercialisation:

The consortiums would be in the energy sector space and would be made up of Centres of Competence, Centres of Excellence and South African Research Chairs in South Africa and should also include partners in the region and globally. Currently, the funding within South Africa is constrained, but some opportunities are open to South Africa if the consortium can find partnerships on the African continent. By leveraging money that is made available by the DSI towards global initiatives such as the Global Environment Facility(GEF), Green Climate Fund(GCF), funds can be made available for scaling up clean energy technologies in South Africa.

CLEAN ENERGY SUB-PROGRAMME

The Clean Energy sub-programme will focus on developing pilot and demonstrate Renewable Energy Technologies in different applications with the aim of providing research, to showcase potential, create data, develop policy recommendations and insights for decision-makers and industry to inform potential uptake of such technologies in the commercial and industrial sectors.

COOL SURFACES PILOT

Looking forward to the upcoming MTSF period, SANEDI will extend the scope of the Cool Surfaces project utilising funds received for the demonstration of the

technology. A number of demonstration projects are planned for the MTSF period and are expected to be completed during the first two years of the MTSF. Ultimately, SANEDI intends to develop business cases for appropriate stakeholders such as the Department of Co-operative Government and Traditional Affairs (COGTA), municipalities, and businesses for a mass roll-out of Cool Surfaces.

This innovative paint technology, not only has the potential of reducing the energy demand for space cooling purposes, but also has the potential to create a new industry, local manufacturing and to create new jobs. To date, a number of people have been trained as applicators for this new paint technology, and it is expected that in the two years that pilot projects will be running, a greater number of people will be trained. Training will focus on mainly the youth and women, in an effort to create opportunities for these groups to alleviate poverty and unemployment.

In an effort to also formalise the training provided in this regard, SANEDI will be engaging with the SETAs to formalise the training provided under the Cool Surfaces programme and also to assess the potential of this, and be included as part of the curriculum at TVET colleges involved in the construction industry.

WIND ENERGY PILOT

The WASA projects is pilot demonstration projects which had built 18 WASA masts across five provinces. Data generated from these masts will continue to be a useful tool to inform policy decision-makers, investors, researchers and other stakeholders in providing reliable and accurate wind data at the five different provinces in South Africa, to enable the continuous assessment of wind potential in South Africa. The project is currently on its third phase and is being undertaken in partnership with the South African Weather Services(SAWS), Council for Scientific and Industrial Research(CSIR) and the Danish Embassy.

From the Integrated Resource Plan(IRP), wind has been identified as one of the least costs' options for electricity generation in the country and is expected to contribute 1600MW of electricity by 2030. With this in mind, SANEDI will continue its partnership with South African Renewable Energy Technology Centre(SARETEC) with regards to the training of wind technicians as we support the industry by ensuring that there will be appropriate skills available in the country. We will also pursue pilot



studies that will show the potential of locally developed wind technologies for commercialisation and mass rollout. The new policy of Government allowing their own generation by business and municipalities creates an opportunity to create sustainable businesses and jobs in the wind energy space.

PV AND ENERGY STORAGE PILOTS

In partnership with various stakeholders, SANEDI will explore opportunities for PV and battery storage as options for ensuring energy security in South Africa.

SANEDI will furthermore explore, map and through modelling of scenarios, identify opportunities for consolidating environmental rehabilitation initiatives with power generation opportunities, and exploring the potential for reusing sites from retired power plants and re-using these as sites for RE power plants/parks. Feasibility studies will, as far as funding allows, be conducted.

SMART GRIDS SUB-PROGRAMME

Electricity generation from renewable sources will need to increase significantly to achieve Sustainable Energy for All objective of doubling the share of RE in the global energy mix by 2030. Fortunately, there is growing evidence in many countries that high levels of RE penetration in the grid are technically and economically feasible, particularly as solar and wind technologies increasingly reach grid parity in economic terms. However, continuous and expanded growth of the share of renewables in centralised and decentralised grids requires an effective new approach to grid management, making full use of “Smart Grids” and “Smart Grid Technologies”. Existing grid systems already incorporate elements of smart functionality, but this is mostly used to balance supply and demand. Smart Grids incorporate information and communications technology into every aspect of electricity generation, delivery and consumption in order to minimise environmental impact, enhance markets, improve reliability and service, and reduce costs and improve efficiency (EPRI 2013).

These technologies can be implemented at every level, from generation technologies to consumer appliances. As a result, Smart Grids can play a crucial role in the transition to a sustainable energy future in several ways, by facilitating smooth integration of high shares of variable renewables, supporting the decentralised production of power, creating new business models through enhanced

information flows, consumer engagement and improved system control, and providing flexibility on the demand side.

Smart Grid technologies can help enable renewables, but the lack of experience and associated uncertainties in technology cost and performance, in costs and benefits and non-technical issues such as privacy and change management, make it challenging to settle on a strategy that makes the best use of these technologies. One logical path forward is to introduce “smartness” into electricity systems incrementally. Today’s mostly one-way electricity systems have little or no information flowing from consumers to the utility. At the other end of the spectrum is a fully integrated system that includes several types of distributed resources, advanced pricing and other Smart Grid-related technologies. Note however, that there is a wide range of possibilities between these two extremes. Pilot or demonstration projects that try out Smart Grid technologies can provide insight into how these technologies perform in a specific system but more importantly, how it can be used to solve current industry-related problems. They can also ease concerns about how the technologies affect reliability, how consumers react, and what it means to open up the electricity system to new actors and new technologies. Choosing which Smart Grid technologies to use is a system-specific decision, requiring a detailed look at the current state of an electric system as well as projections of its possible future states. When grid upgrades are required, whether to accommodate RE or for other reasons, it is typically much more cost-effective to include Smart Grid technologies than to use only conventional technology. It is, of course, essential to choose specific Smart Grid technologies wisely.

Although each electricity system differs depending on the mix of energy sources and geographical demand profiles, we consider three different levels of renewables penetration in electricity systems. The three levels are defined in terms of the grid modifications necessary to accommodate non-dispatchable renewables, rather than in terms of absolute percentage. Low levels of renewables, with capacity penetration not exceeding 15% (on any section of the grid), are generally feasible without any Smart Grid technologies. At medium levels of renewables penetration, typically between 15% and 30%, Smart Grid technologies will become increasingly important. Capacity penetration levels above 30% are considered high for renewables and usually require the use of Smart Grid technologies to ensure reliable grid operation (Kroposki, 2011).



In the last financial year, SANEDI, in collaboration with municipalities, developed the Smart Grid Roadmap. The Roadmap serves as a guideline to municipalities in their Smart Grid journey, and allows SANEDI to use Smart Grid technologies as an enabler to solving pressing municipal related problems. In this financial year, SANEDI will support NT and COGTA in the “Smart and financially sustainable Municipality” pilot and demonstration project. Several research projects are also proposed in collaboration with the University of Pretoria(UP).

Cleaner Mobility Programme

By 2050, about 70% of the world’s population will live, commute and work in urban areas³. Between now and then, cities and suburbs will undergo significant transformations to create sustainable living conditions for their residents. Mobility and energy are the twin pillars of these transformations, and both will require radical adaptation to meet demographic and economic growth without increasing congestion and pollution. Cities will require mobility and energy solutions that are sustainable, affordable, secure and inclusive, and integrated with customer-centric infrastructure and services. Thus, the convergence of energy and mobility is critical.

These are exciting times in which new technologies allow people to rethink the way they live more sustainably and efficiently. Smart Mobility. Smart Water. Smart Grid. Smart Integration. These are the foundations of tomorrow’s cities, which are being realised today.

Mobility is going to change rapidly in the coming years as EVs proliferate, ride-sharing continues to grow, and eventually Autonomous Vehicles (AV) enter urban fleets. This is especially true in cities where new forms of mobility are concentrated and where investment in supporting infrastructure needs to accommodate this growth. These changes coincide with the evolution towards a cleaner, more decentralized and digitalized energy systems and services, and increasing electrification.

There is an opportunity to design a different future, and reap both environmental and economic benefits with a call to action around the following three principles to be acted upon:

3 WEF, 2018

- **Take a multi-stakeholder and market-specific approach:** First and foremost, a market-specific approach that considers all relevant stakeholders should be applied to new mobility patterns with smarter and cleaner energy systems. Energy, mobility and infrastructure enterprises, along with policy-makers, regulators and urban planners, can collectively define a new paradigm for cities. The paradigm would go beyond today’s industry divisions in search of complementary municipal, regional and national policies. The investment and infrastructure to support electric mobility will vary significantly from one place to another, thus, any approach needs to be market-specific. Local stakeholders should plan for electrification while taking into account local characteristics, especially urban infrastructure and design, the energy system and the culture and patterns of mobility.
- **Prioritise high-use vehicles.** The focus should be on electrifying fleets, taxis, mobility-as-a-service vehicles and public transport, which will have a greater impact as these represent a higher volume of kilometres travelled. Although personal-use vehicles will likely remain a significant portion of the vehicle stock for many years, they are on the road less than 5% of the time, representing a low volume of overall kilometres driven.
- **Deploy critical charging and refuelling infrastructure today while anticipating the transformation of mobility.** To keep pace with growing demand and to address range-anxiety issues, charging infrastructure is needed, especially along highways, at destination points, and close to public transport hubs. To minimise the risk of stranded investments, future mobility and vehicle ownership patterns should be considered, as some current charging locations (i.e. in apartment buildings, at parking meters along city streets) may not be needed in the future. The infrastructure should be deployed in combination with grid edge technologies, such as decentralised generation, storage, microgrids and Smart buildings and integrated into Smart Grids, to fully exploit the flexibility of EVs while enabling the stability of the energy system. Digitalisation would help simplify and enhance the customer experience, support efficient infrastructure deployment and management as well as enable new services associated with electric, shared and autonomous mobility. Charging stations can become hubs for Smart City services.



DATA KNOWLEDGE MANAGEMENT SUB-PROGRAMME

SANEDI plans to be a data repository for energy data in South Africa. SANEDI is in the process of establishing a data centre that will house reliable, accurate and up-to-date energy datasets that will be made available to stakeholders.

SANEDI at present is responsible for maintaining the following datasets that are annually maintained and available at no cost to stakeholders:

- WASA database,
- ESCO register,
- 12L Tax Incentives database,
- Big EE database,
- Transport database, and
- Residential database.

For the MTSF period, SANEDI will continue to maintain the above datasets, and create and maintain these to the following datasets:

- Commercial database,
- Industrial database,
- Agricultural database,
- Standards & Labelling database, and
- Public Infrastructure database (Public Buildings & Wastewater Treatment Plants).

DATA AND KNOWLEDGE MANAGEMENT

A number of new indicators have been added to this APP, due to: i) The increasing emphasis being placed on the need for accurate and reliable energy-related data, to inform policy development in the country, and ii) The fact that after a long planning and sourcing exercise for additional funding, a number of data-intensive projects have come to fruition, for implementation in this planning period and extending over the next three to four years. These include two, three-year funded

European Union General Budget Support (GBS) projects in Public Buildings and Waste Water Treatment Plants, respectively, the V-NAMA funded Energy Efficiency in Public Buildings and Infrastructure Programme (EEPPIP) over four years and the DMRE and SANEDI component of the Industrial Energy Efficiency (IEE), phase 2 project over the next one-and-a-half years.

JUST TRANSITION

As the country transitions its power generation infrastructure from fossil-based to a cleaner, environmentally sustainable energy infrastructure, there is a need to ensure that the transition happens in a manner that is equitably and socially just, focusing on local communities and people. The decommissioning of power stations that are coming to their end of life, as well as the transition of Fossil Fuels, presents a challenge of ensuring that communities and people stand to be negatively affected.

SANEDI has been involved through a number of partnerships in upskilling and training artisans and professionals in an effort to ensure that people are capacitated and prepared for future jobs that will be brought about by this transition. The transition to new technologies will create opportunities for dialogue and engagement with stakeholders in order to bring about an understanding of the transition and the need thereof, and the need to understand the new technologies as we move away from the traditional methods of energy supply.

SANEDI will focus on the engagements with stakeholders with the objective of ensuring that there is understanding, buy-in and adoption of new technologies by communities in general, opportunities for new industries, jobs are harnessed, and there is the commercialisation of these technologies.



Sub-programme: Renewable Energy

Purpose: Support the accelerated and informed development of South Africa's clean energy portfolio and RE sector

OUTCOMES, OUTPUTS, OUTPUT INDICATORS AND TARGETS

OUTCOMES	OUTPUTS	OUTPUT INDICATORS	ANNUAL TARGETS						
			AUDITED PERFORMANCE		ESTIMATED PERFORMANCE		MTEF TARGETS		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Demonstrated GHG emissions mitigation potential in support of national commitments.	Smart public facilities Pilots and studies (Renewable Energy SANEDI driven initiative contributing towards GHG reduction).	Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	2	3	1	6	4	2	2
An awareness of the technologies to be used in the transition process (for an increasingly aware society on energy transition solutions).	Reports and analysis from stakeholder engagements.	Number of energy-related knowledge sharing events / platforms engaged in (own hosted, attended, knowledge presented, supported).	1	1	3	6	4	4	4
Evidence based planning, resource allocation and decision-making enabled by accurate and timely information, datasets and data analytics.	Clean energy technologies training in the sector (including municipalities). Research publications reflecting clean energy insights. Information and data made available for policy development.	Number of recipients of energy-related training facilitated. Number of annual Energy industry status reports (insights, trends, international and national collaboration decisions, interfacing and forums). Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities). Minimum number of energy-related datasets maintained per annum.	225	107	85	120	120	120	120
			1	1	1	1	1	1	1
			3	4	-	1	2	2	2
			3	2	3	3	2	2	1

OUTCOMES	OUTPUTS	OUTPUT INDICATORS	ANNUAL TARGETS							
			AUDITED PERFORMANCE			ESTIMATED PERFORMANCE	MTEF TARGETS			
			2017/18	2018/19	2019/20		2020/21	2021/22	2022/23	2023/24
Energy transition expertise and competence building enabled.	Training modules and programmes relevant to the current environment.	Number of policy support instruments (industry roadmaps, sector development plans and industry support tools, etc).	-	-	-	1	1	1	1	1
	Training programmes as well as trained, skilled participants.	Number of recipients of energy-related training facilitated* (see note).	225*	107*	85*	120*	40	40	40	40
	Energy Research students and researchers supported.	Number of energy-related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc).	1	1	1	1	1	1	-	-

OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual targets	Q1	Q2	Q3	Q4
Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	4	-	1	1	2
Number of energy-related knowledge sharing events / platforms engaged in (own hosted, attended, knowledge presented, supported).	4	1	1	-	2
Number of recipients of energy-related training facilitated.	120	20	20	40	40
Number of annual Energy industry status reports (insights, trends, international and national collaboration decisions, interfacing and forums).	1	-	-	-	1
Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	2	-	-	-	2
Minimum number of energy-related datasets maintained per annum.	2	-	-	-	2
Number of policy support instruments (industry roadmaps, sector development plans and industry support tools, etc).	1	-	-	-	1
Number of recipients of energy-related training facilitated.	40	-	-	-	40
Number of energy-related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc).	1	-	-	-	1



Sub-programme: Cleaner Fossil Fuels

OUTCOMES, OUTPUTS, OUTPUT INDICATORS AND TARGETS

Outcome	Outputs	Output indicators	ANNUAL TARGETS							
			Audited performance				Estimated Performance			
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	
Demonstrated GHG emissions mitigation potential in support of national commitments.	Roadmap and Business Case for Cleaner Fossil Fuels approved.	Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	-	-	-	-	1	1	1	

OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual targets	Q1	Q2	Q3	Q4
Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	1	-	-	-	1





Sub-programme: Cleaner Mobility

OUTCOMES, OUTPUTS, OUTPUT INDICATORS AND TARGETS

Outcome	Outputs	Output indicators	ANNUAL TARGETS						
			Audited performance		Estimated Performance	MTEF TARGETS			
			2017/18	2018/19		2019/20	2020/21	2021/22	2022/23
Clean Municipal Fleet, Public and Private Transport System.	Cleaner mobility: greening municipal fleet and cleaner transport massification plans.	Number of energy solutions assessed (as confirmed by (i) advisory notes, (ii) feasibility reports, (iii) complete study reports, (iv) case studies, (v) technology roadmaps, and (vi) operational demonstration facilities).	-	-	-	1	1	1	1
			1	1	1	1	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
		Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
		Number of industry roadmaps, sector development plans and industry support tools developed to promote energy related market/industry development.	-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
		Number of industry knowledge sharing events and platforms hosted to promote energy related market/industry development.	-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
			-	-	-	-	1	1	1
		Number of recipients of energy related training facilitated by SANEDI.	-	-	-	-	5	5	5
			-	-	-	-	5	5	5
			-	-	-	-	5	5	5
			-	-	-	-	5	5	5
			-	-	-	-	5	5	5

OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual Targets				Q1	Q2	Q3	Q4
	2017/18	2018/19	2019/20	2020/21				
Number of energy solutions assessed (as confirmed by (i) advisory notes, (ii) feasibility reports, (iii) complete study reports, (iv) case studies, (v) technology roadmaps, and (vi) operational demonstration facilities).	1	-	-	-	-	-	-	1
Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	1	-	-	-	-	-	-	1
Number of industry roadmaps, sector development plans and industry support tools developed to promote energy related market/industry development.	1	-	-	-	-	-	-	1
Number of industry knowledge sharing events and platforms hosted to promote energy related market/industry development.	1	-	-	-	-	-	-	1
Number of recipients of energy related training facilitated by SANEDI.	5	-	-	-	-	-	2	3

Sub-programme: Smart Grids

OUTCOMES, OUTPUTS, OUTPUT INDICATORS AND TARGETS

Outcome	Outputs	Output indicators	ANNUAL TARGETS						
			Audited performance		Estimated Performance				
			2017/18	2018/19	2019/20	2020/21	MTEF TARGETS		
						2021/22	2022/23	2023/24	
Smart City	Smart Grid	Number of energy solutions assessed (as confirmed by (i) advisory notes, (ii) feasibility reports, (iii) complete study reports, (iv) case studies, (v) technology roadmaps, and (vi) operational demonstration facilities).	5	4	1	4	4	3	3
			1	1	1	1	1	1	1
		Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	-	-	-	0	1	1	1
		Number of industry roadmaps, sector development plans and industry support tools developed to promote energy related market/industry development.	-	-	-	0	1	1	1



OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual targets	Q1	Q2	Q3	Q4
Number of energy solutions assessed (as confirmed by (i) advisory notes, (ii) feasibility reports, (iii) complete study reports, (iv) case studies, (v) technology road maps, and (vi) operational demonstration facilities).	4	-	-	-	4
Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	1	-	-	-	1
Number of industry roadmaps, sector development plans and industry support tools developed to promote energy-related market/industry development.	1	-	-	-	1

Sub-programme: Data and Knowledge Management

Outcomes, outputs, output indicators and targets

Outcome	Outputs	Output indicators	ANNUAL TARGETS						
			Audited performance		Estimated Performance		MTEF TARGETS		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Evidence-based planning, resource allocation and decision-making enabled by accurate and timely information, datasets and data analytics.	Data repository of all sustainable energy programmes (Data collection).	Number of national energy programmes for which data is available / captured.	New indicator	New indicator	New indicator	New indicator	4	4	4
	Detailed analytical reports containing data and insights of priority subsectors identified by the DMRE to inform national strategies and plans.	Sector Reports (automotive, pulp and paper, residential sectors).	New indicator	New indicator	New indicator	New indicator	3	3	3
	Sector Data analysis and modelling capability.	Fully functional Data and Knowledge Management (DKM) facility in-house within SANEDI.	New indicator	New indicator	New indicator	New indicator	1	1	1

		ANNUAL TARGETS						
Outcome	Outputs	Audited performance			Estimated Performance		MTEF TARGETS	
		2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Output indicators								
An awareness of the technologies and data to be used in the transition process (for an increasingly aware society on energy transition solutions).	Reports of engagements with relevant stakeholders on data access.	New indicator	New indicator	New indicator	New indicator	8	8	8
	Training on quality processing and analysis of data (data collection tools, quality processing of data and interpretation of data).	New indicator	New indicator	New indicator	New indicator	10	10	10
	Research publications reflecting clean energy insights.	1	1	1	1	1	1	1
Energy transition expertise and competence building enabled.	Training modules and programmes relevant to the current environment.	New indicator	New indicator	New indicator	New indicator	2	2	2
	Energy Data Analytics students and researchers supported.	-	-	-	0	1	1	1
	Number of annual Energy industry status reports (insights, trends, international and national collaboration decisions, interfacing and forums).	1	1	1	1	1	1	1

OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual Targets	Q1	Q2	Q3	Q4
Number of national energy programmes for which data is available / captured.	4	-	-	2	2
Sector Reports (automotive, pulp and paper, residential sectors).	3	-	-	-	3
Fully functional Data and Knowledge Management (DKM) facility in-house within SANEDI.	1	-	-	-	1
Number of engagements with key stakeholders relating to data access.	8	-	2	2	4
Number of recipients of energy data related training facilitated.	10	-	5	-	5
Number of annual Energy industry status reports (insights, trends, international and national collaboration decisions, interfacing and forums).	1	-	-	-	1
Number of training modules relating to data.	2	-	-	-	2
Number of energy data analytics related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc).	1	-	-	-	1





Programme 3: Energy Efficiency

PROGRAMME 3		ENERGY EFFICIENCY	
Purpose	The purpose of Programme 3 is to accelerate a shift towards a resource and particularly, an energy (including gas, liquid fuels, electricity and water) efficient society		
Sub-Programmes	The Energy Efficiency programme does not have any sub-programmes		

Outcomes, outputs, output indicators and targets

Outcome	Outputs	Output indicators	ANNUAL TARGETS							
			Audited performance		Audited performance					
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	
Demonstrated GHG emissions mitigation potential in support of national commitments.	Processed 12L tax applications.	Number of EE solutions implemented.	1	1	1	1	1.5	1	1	1
		GHG emissions reduced (tonnes CO ₂).	New indicator	New indicator	New indicator	New indicator	1.5 tonnes	1.5 tonnes	1.5 tonnes	1.5 tonnes
	Smart public facilities (and any other SANEDI driven initiative contributing towards GHG reduction).	Number of EE solutions assessed.	63	79	56	6	2	2	2	2
Evidence-based planning, resource allocation and decision-making enabled by accurate and timely information, datasets and data analytics.	Cool Roof coatings (Schools, low-cost housing, DoD).	Area coated (m ²) and GHG emissions reduced (tonnes CO ₂).	New indicator	New indicator	New indicator	New indicator	1 000 000 m ² leading to 0.5 tonnes	1 000 000 m ² leading to 0.5 tonnes	1 000 000 m ² leading to 0.5 tonnes	1 000 000 m ² leading to 0.5 tonnes
	EE data sets and information for policy decision making.	Number of EE energy-related datasets maintained per annum.	1	1	1	1	2	1	1	1
	Register of energy performance certificates for commercial buildings.	Number of EE performance certificates issued.	New indicator	New indicator	New indicator	1	4	4	4	4
	EPC Database developed.	Functional database.	New indicator	New indicator	New indicator	New indicator	1	1	1	1

OUTPUT INDICATORS: ANNUAL AND QUARTERLY TARGETS

Output indicators	Annual targets	Q1	Q2	Q3	Q4
Number of EE solutions implemented.	15	-	-	5	10
GHG emissions reduced (tonnes CO ₂).	1.5 tonnes				
Number of EE solutions assessed.	2	-	-	-	2
Area coated (m ²) and GHG emissions reduced (tonnes CO ₂).	1 000 000 m ² - leading to 0.5 tonnes	250 000m ²	250 000m ²	250 000m ²	250 000m ²
Number of EE energy-related datasets maintained per annum.	2	-	-	-	2
Number of EE performance certificates issued.	4	-	-	2	2
Functional database.	Year 1 (O4)	-	-	-	In place



A number of new indicators have been added to this APP, due to the increasing importance and focus on reducing Greenhouse Gas Emissions (GHG), as part of South Africa's international commitments. The Section 12L Energy Efficiency Tax Incentives have been extended to 31 December 2022 and future analysis and reporting will take this new focus into consideration in the current and future performance planning and reviews.

Furthermore, two three-year funded European Union General Budget Support (GBS) projects in Public Buildings and Waste Water Treatment Plants, respectively, a V-NAMA funded EEPBIP over four years and a DMRE and SANEDI component of the IEE, phase 2 project over the next one-and-a-half years have been approved and have been added to the Output Indicators in this version of the APP. A major milestone resulting from the above funding sources for SANEDI, will be the introduction, monitoring, evaluation of the newly legislated Energy Performance Certificates (EPCs) in South Africa, which will also involve further development of the Energy Service Company (ESCO) industry in South Africa.

The Cool Roofs project within SANEDI has also gained momentum over the past year, with SANEDI being awarded an international prize of \$100 000.00 towards the implementation of the project in South Africa and a new target of coating 1 million square meters of roof-space over the coming year. Depending on the success of our efforts in this Performance Planning period, SANEDI will be eligible for an additional grand prize of \$1 Million towards the further roll-out of this efficient, low-cost and labour intensive technology in South Africa.

SANEDI's co-ordination and implementation of the EE tax incentives (Section 12L and 12I) have produced phenomenal results, both in terms of energy savings and reduction in Greenhouse Gas Emissions with in excess of 19 TWh saved and 18 730 Mega-tonnes of CO₂ avoided, as at 31 December 2019.

Based on the success of this activity over the last five years, NT has decided to extend the Section 12L incentive from January 2020 to January 2023, and this activity will form a core basis for the initial phase of this five-year strategy.

The initial phase of the implementation of the tax incentives resulted in the development of various (secure) online tools and databases for the processing of these applications, which over the last years has resulted in the establishment of a significant repository of EE data. A focus for the next five years includes the use

of this data in modelling various energy, environment and economic impacts of these interventions on the participating customers and the national fiscus.

Furthermore, the Cool Surfaces programme which initially started out as a small activity within the international Clean Energy Ministerial series of activities, has gained traction in South Africa, with impressive results achieved in a Northern Cape pilot programme managed by SANEDI.

This has resulted in SANEDI being chosen as one of 10 countries globally to win an award of USD 100 000 in 2019, for accelerated implementation of the initiative in South Africa. The results of this 'boost' award will see SANEDI in the running for the final global prize of USD 1 million at the end of 2020 and it is anticipated that the further national roll-out of this technology by SANEDI will result in significant positive socio-economic benefits for low-income houses in the country.

The termination of Eskom's Integrated Demand Management funding for energy efficiency left a huge vacuum in the market for Service Providers (Energy Service Companies (ESCOs)), who are instrumental in realising energy savings on the ground. SANEDI, with the support of German Agency for International Cooperation (GIZ), has managed to partially resurrect this market, with the development of training programmes and a national register of ESCOs, that provide potential customers with a resource on where to find suitably qualified EE practitioners to assist in solving their energy problems/high energy bills. This activity will be continued and expanded over the next five years, creating a favourable and sustainable market for the implementation of EE across the various programmes introduced by both the public and private sectors.

The success of the French Development Agency's (AFD), green credit facility saw them introduce a 2nd phase of this funding opportunity in 2016, known as Sustainable Use of Natural Resources and Energy Fund (SUNREF 2). SANEDI hosted the Technical Assistance Facility (TAF) for the participating financial institutions and customers in the first phase of this clean energy funding initiative and based on the success thereof, was duly appointed to provide the TAF for SUNREF 2 for an extended period of one year, (2020). The objective is for SANEDI to provide the same level of technical assistance to financial institutions and potential customer, post this funding period by the AFD.



Furthermore, SANEDI (EE) will be involved as a partner with the DMRE, the Department of Public Works and Infrastructure (DPWI) and the Department of Co-operative Governance and Traditional Affairs (COGTA, in the implementation of two, three-year European Union (EU)funded projects in the public sector, focusing primarily on data collection and modelling energy performance:

1. To improve energy and environmental performance of Government buildings, through an accelerated integration of RE and energy-efficient technologies, and
2. To achieve net-zero energy of South African Wastewater Treatment Plants (WWTPs), through

the deployment of integrated biogas cogeneration/ Combined Heat and Power (CHP) and energy-efficient technologies.

Lastly, SANEDI (EE), will be responsible for the Measurement and Evaluation (M&E) function of a five-year (Vertical) Nationally Appropriate Mitigation Action (V-NAMA) funded programme, titled 'Energy Efficiency in Public Buildings and Infrastructure Programme (EEPPIP)', involving various Government Departments, (Nationally, Provincially and at a Local Government level). The SANEDI/M&E component of this programme has a grant budget of Euro 700 000, and the project is due to officially commence during 2020.

10. EXPLANATION OF PLANNED PERFORMANCE OVER THE MEDIUM-TERM PERIOD

In developing its strategy, SANEDI has to align with key National Priorities and DMRE focus areas. Its strategy thus seeks to add value and contribute towards specific areas of these priorities. The table below details the alignment of the strategic outcomes to the NDP, MTSF and DMRE priorities.

OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
Smart Grid systems Piloted for Smart Cities¹³	<ul style="list-style-type: none"> • Chapter 4: Economic infrastructure At least 20 000 MW of this additional generated capacity should come from renewable sources. • The proportion of people who use public transport for regular commutes will expand significantly. By 2030, public transport will be user friendly, less environmentally damaging, cheaper and integrated or seamless. 	<ul style="list-style-type: none"> • Priority 5: Spatial integration, Human Settlements and Local Government • Smart Cities are equipped with Smart Grid systems using the Smart Cities framework to enhance municipal revenue management, energy asset management and improved demand-response. 	<ul style="list-style-type: none"> • Policy, Planning and Clean Energy • Smart Cities aim to utilise a cleaner and more efficient energy system with less detriment to the environment.



OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
Smart Grid systems Piloted for Smart Cities13.	<ul style="list-style-type: none"> The concept of Smart Cities is based on cleaner and more efficient energy technologies, offering cleaner and more efficient buildings and transportation. 	<ul style="list-style-type: none"> Priority 2: Economic transformation and job creation The move towards Smart Cities will have an impact on the economic outlook of the country through increased access and uptake of ICT, creating new opportunities and improved competitiveness for the country. Transport massification in the municipal environment will result in greener municipal fleet. The massification will also result in the introduction of new technologies, creating opportunities for new jobs and business opportunities and innovation in the sector. 	<ul style="list-style-type: none"> Policy, Planning and Clean Energy Smart Cities aim to utilise a cleaner and more efficient energy system with less detriment to the environment.
Energy transition expertise and competence building enabled.	<ul style="list-style-type: none"> Chapter 5: Environmental sustainability and resilience - Zero-emission building standards by 2030 The drive towards zero emissions starts with identifying and reducing current sources of GHG emissions in our energy systems. 	<ul style="list-style-type: none"> Priority 7: A better Africa and World In reducing GHG emissions, South Africa would be aligning itself with goals towards the mitigation of climate change, hence contributing to a better world. This will entail developing strategic policy and regulatory frameworks and programmes to promote a low carbon economy. 	<ul style="list-style-type: none"> Policy, Planning and Clean Energy Petroleum and Petroleum Products Regulation: The focus will be on strengthening the role of the regional offices in the licensing process, by improving the capabilities in the regional offices and delegating certain functions to the regional offices. The DMRE also aims to diversify the country's energy sources and reducing GHG emissions.
Demonstrated GHG emissions mitigation potential in support of national commitments.	<ul style="list-style-type: none"> Chapter 4: Economic infrastructure – the foundation of social and economic development Aims to promote: (i) Economic growth and development through adequate investment in energy infrastructure and the provision of quality energy services that are competitively priced, reliable and efficient, and (ii) Environmentally sustainable through efforts to reduce pollution and mitigate the effects of climate change. 	<ul style="list-style-type: none"> Priority 2: Economic transformation and job creation Promote a just transition to an environmentally sustainable economy. High impact environmental sustainability research, evidence gathering, and systematic review commissioned. Priority 7: A better Africa and World Transition towards an environmentally sustainable economy. 	<ul style="list-style-type: none"> Policy, Planning and Clean Energy The DMRE aims to foresee the implementation of energy policy interventions, mapping out future power generation technologies. Top of their priorities are diversifying energy sources and reducing GHG emissions.

OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
	<ul style="list-style-type: none"> Chapter 9: Improving education, training and innovation Expand science, technology and innovation outputs by increasing research and development spending by the government and through encouraging industry to do so. 	<ul style="list-style-type: none"> Priority 2: Economic transformation and job creation Awareness creation to enable investments for inclusive growth, industrialization, localization, exports, and as well as innovation. Priority 3: Education, skills and Health Address the challenge of poverty across society through providing skills and creating economic opportunities, especially for vulnerable groups. An awareness of clean technologies opens up an opportunity for South Africans to acquire new skills. 	
<p>An awareness of the technologies to be used in the transition process (for an increasingly aware society on energy transition solutions).</p>	<ul style="list-style-type: none"> Chapter 13: Building a capable and developmental State Clear Governance structures and stable leadership enable State-Owned Enterprises (SOEs) to achieve their developmental potential. 	<ul style="list-style-type: none"> Priority 2: Economic transformation and job creation Awareness creation to enable investments for inclusive growth, industrialisation, localisation, exports and as well as innovation. 	
<p>Evidence-based planning, resource allocation and decision making enabled by accurate and timely information, datasets and data analytics.</p>	<ul style="list-style-type: none"> Chapter 3: Economy and Employment Public employment programmes should reach 1- million people by 2015 and 2-million people by 2030. Chapter 13: Building a capable and developmental State Staff at all levels have the authority, experience, competence and support they need to do their jobs. 	<ul style="list-style-type: none"> Priority 3: Education, skills and Health Expanding the high-tech industry by ensuring that the legal and regulatory framework promotes innovation, scaling up skills development for young people in new technologies, and reducing data costs. Priority 1: A capable, ethical and developmental State Scaling up skills development for young people, women and Government officials in new technologies. 	<ul style="list-style-type: none"> Electrification and Energy Programme and Project Management Through economic development initiatives, such as Education Project & Partnerships (EP&Ps), the programme will: <ul style="list-style-type: none"> Create job possibilities through EP&Ps, Create opportunities for skills development within the energy sector, Re-establish electrical engineering training programmes that support the municipalities' capacity building and poverty alleviation, and Develop small businesses in rural areas that support the mission of rural development.



OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
A capacitated, effective and efficient operational environment (within which SANEDI will discharge its mandate) – internal compliance.	<ul style="list-style-type: none"> • Chapter 13: Building a capable and developmental State • A public service immersed in the development agenda but insulated from undue political interference. • Clear Governance structures and stable leadership enable SOEs to achieve their developmental potential. 	<ul style="list-style-type: none"> • Priority 1: A capable, ethical and developmental State • Clean administration, accurate and reliable reporting. Strengthening Internal capacity and collaboration with other organs of State. 	<ul style="list-style-type: none"> • The Implementation of Best Management Practices • In support of Government’s cost-cutting measures, outlined by the Minister of Finance in his medium-term budget policy statement in 2013, the DMRE has begun and will continue to review and implement internal policies aimed at containing operational costs.



11. PROGRAMME RESOURCE CONSIDERATIONS

11.1 STATEMENTS OF HISTORICAL FINANCIAL PERFORMANCE AND POSITION

Statement of Financial Performance	Budget	Audited Outcome	Budget	Audited Outcome	Budget	Audited Outcome	Budget estimate	Audited Outcome	Outcome/Budget Average %
R thousand	2016/17		2017/18		2018/19		2019/20		
Revenue									
Tax revenue	-	-	-	-	-	-	-	-	
Non-tax revenue	16 130	30 593	4 716	17 744	6 000	20 341	6 330	17 391	262,0%
Economic classification item	16 130	30 593	4 716	13 968	6 000	20 341	6 330	17 391	246%
Transfers received	308 522	54 177	234 203	124 852	168 031	97 099	226 084	78 942	61%
Total revenue	324 652	84 770	238 919	142 596	174 031	117 440	232 414	96 333	67%
Expenses									
Current expenses	324 652	110 432	238 919	146 431	174 031	90 066	232 414	74 640	62%
Compensation of employees	51 961	49 637	46 512	47 084	50 233	36 404	50 735	39 214	87%
Goods and services	267 084	59 450	190 018	99 348	121 278	50 044	179 020	31 617	53%
Depreciation	5 607	1 345	2 389	-	2 520	3 617	2 659	3 810	99%
Interest, dividends and rent on land	-	-	-	-	-	-	-	-	
Total expenses	324 652	110 432	238 919	146 431	174 031	90 066	232 414	74 640	62%
Surplus/(Deficit)	-	- 25 662	-	- 3 834	-	27 374	-	21 693	
Statement of Financial Position									
Balance sheet item									
Total assets	196 231	302 537	147 102	256 922	84 768	84 768	90 933	262 464	205,85%
Balance sheet item									
Total equity and liabilities	196 231	302 537	136 302	256 922	84 768	84 768	90 932	262 464	205,85%



11.2 STATEMENTS OF ESTIMATES OF FINANCIAL PERFORMANCE AND POSITION

STATEMENT OF FINANCIAL PERFORMANCE	REVISED ESTIMATE 2019/20	AVERAGE GROWTH RATE (%) 2016/17 - 2019/20	AVERAGE:			AVERAGE GROWTH RATE (%) 2019/20 - 2022/23	AVERAGE: EXPEN-DITURE/ TOTAL (%) 2019/20 - 2022/23	
			EXPEN-DITURE/ TOTAL (%)	MEDIUM-TERM ESTIMATE				
				2020/21	2021/22	2022/23		
Revenue								
Non-tax revenue	6 330	-40,9%	13,7%	6 678	1 000	4 672	-9,6%	2,1%
Economic classification item	6 330			6 678	1 000	4 672	-9,6%	2,1%
Transfers received	226 084	-40,9%	13,0%	227 563	205 190	199 311	-4,1%	97,9%
Total revenue	232 414	61,0%	86,3%	234 241	206 190	203 983	-4,3%	100,0%
Expenses								
Current expenses	232 414	-	-	234 241	206 190	203 983	-4,3%	100,0%
Compensation of employees	50 735	28,2%	100,0%	54 103	57 540	59 927	5,7%	25,6%
Goods and services	179 020	0,7%	31,9%	177 333	145 676	140 030	-7,9%	73,0%
Depreciation	2 659	44,4%	67,1%	2 805	2 974	40 268	14,8%	1,4%
Interest, dividends and rent on land	-	-	-	-	-	-	-	-
Transfers and subsidies								
Total expenses		28,2%	100,0%	234 241	206 190	203 091	-4,3%	100,0%
Surplus / (Deficit)		-100,0%	-	-	-	-	-	-
Statement of Financial Position								
Balance sheet item								
Total assets	90 932	172,9%	-33,0%	96 342	101 640	107 231	5,6%	100,0%
Balance sheet item								
Total equity and liabilities	90 932	172,9%	-33,0%	96 342	101 640	107 231	5,6%	100,0%



Expenditure for the organisation is linked to the total amount of income the entity is able to secure for implementation of various projects. As a result, significant fluctuations occur year-on-year. Over the previous medium-term period, SANEDI's revenue declined by 32% mainly due to a reduction in donor funding secured for new projects. Most projects are funded over a period of two to three years and new funds can only be secured for the next phase once the current phase is completed.

Historically, SANEDI has seen an average growth in expenditure and revenues by 17.3% over the medium term to-date. Future projections indicate, based on our strategy, suggest that in the medium term there will be average increases in expenditure and revenues by 100% as a result of new projects that will be undertaken, and as the entity moves into new phases on some of the existing projects. Specifically, the following projects will have a significant impact on the expenditure estimates:

- Carbon Capture and Storage Pilot,
- The Smart Grids projects,
- Data knowledge Management,
- Energy Efficiency 12 L project,

- Energy Efficient Waste water treatment, and
- Energy Efficiency in Government buildings.

Expenditure on goods and services has on average increased by 83,6% and is projected to increase by 73,3% over the MTEF period, mainly as a result of World Bank funded Carbon Capture and Storage Pilot and the two EE projects that SANEDI, in partnership with the DMRE, will be undertaking. Cost containment measures will continue to be implemented to contain expenditure. Administrative expenditure related to Programme 1, Governance and Administration will be expected to increase by 20,5% over the remainder of the medium term as we focus on improving control efficiencies and automation of processes of data management processes. New business development will also be our core focus, as well as implementation of the organisational review recommendations. Core mandate expenditure relating to Programmes 2 and 3, that is Applied Energy Research and Energy Efficiency, will increase by 79,5% in the future periods with the Carbon Capture and Storage Pilot (CCSP) being the largest contributor to the expenditure estimates.





11.3 PERSONNEL INFORMATION

POST STATUS ESTIMATED FOR 31 MARCH 2019		NUMBER AND COST1 OF PERSONNEL POSTS FILLED/PLANNED FOR ON FUNDED ESTABLISHMENT												Average growth rate (%)	Salary level/ total: Average (%)			
SALARY LEVEL	Number of posts on approved establishment	Actual			Revised estimates			Medium term expenditure estimate										
		Number of funded posts	2018/19	Unit Cost	Number	2019/20	Unit Cost	Number	2020/21	Unit Cost	Number	2021/2022	Unit Cost	Number	2022/23	Unit Cost		
Salary level	64	64	36 404	569	64	50 735	793	64	54 103	845	64	57 540	899	64	59 927	936	5,7%	98,4%
1-6	17	17	1 805	106	17	2 428	143	17	2 590	152	17	2 759	162	17	2 877	169	5,8%	26,6%
7-10	22	22	7 947	361	22	11 418	519	22	12 181	554	22	12 977	590	22	13 533	615	5,8%	34,4%
11-12	10	10	7 011	701	10	10 073	1 007	10	10 746	1 075	10	11 448	1 145	10	11 938	1 194	5,8%	15,6%
13-16	14	14	19 099	1 364	14	24 096	1 721	14	25 685	1 835	14	27 265	1 947	14	28 355	2 025	5,6%	21,9%
17-22	1	1	542	542	1	2 720	2 720	1	2 902	2 902	1	3 091	3 091	1	3 224	3 224	5,8%	-

COMPENSATION OF EMPLOYEES

Employee compensation costs have historically increased by 6%-7%. Actual costs increased from R46 million to R47 million as vacancies were being filled in both the administrative and technical functions of the entity to cater for new projects. The expectation in future years will be that they will increase to R59 million mainly as a result of proposed amendments to SANEDI's operating model following the organisational review that was carried out in 2018.

12. KEY RISKS

OUTCOME	KEY RISKS	RISK MITIGATION
Number of Smart Grid systems Pilots for Smart Cities.	<ul style="list-style-type: none"> Lack of coordination between departments and teams, Lack of municipal skills to drive implementation, and Political will to drive change. 	<ul style="list-style-type: none"> Driving the linkages between the current requirements of Local Government and the benefit that Smart Cities will provide (e.g. Smart Grid linkage to the Smart City), and Communicating the business case for Smart Cities.
Energy transition expertise and competence building enabled areas of influence.	<ul style="list-style-type: none"> Limited support and buy-ins from stakeholders and constituents (e.g. municipalities / other Government Departments), and Limited Resources to execute (knowledge, finance, and human resources). 	<ul style="list-style-type: none"> Stakeholder engagement, demonstrable outcomes, Communication, and awareness, and Partnerships and International linkages/ collaborations (knowledge- sharing).
Reduction of GHG emissions in line with national commitments.	<ul style="list-style-type: none"> Lack of funds and investment to drive GHG emission reductions programmes. 	<ul style="list-style-type: none"> Explore alternative funding sources.
Create awareness for the solutions to be used in the transition process.	<ul style="list-style-type: none"> Funding for adequate reach and depth, and Limited participation. 	<ul style="list-style-type: none"> Creating a localised reference case.
Evidence-based planning, resource allocation and decision making enabled by accurate and timely information, datasets, and data analytics.	<ul style="list-style-type: none"> Lack of centralised information to drive evidence-based planning, and Not being able to access relevant stakeholders (not getting stakeholders to utilise our solutions). 	<ul style="list-style-type: none"> Building ICT capability, Building relationships and partnerships, and Linkage to the DPME.
Compliance with legislative and departmental requirements – external compliance.	<ul style="list-style-type: none"> Inadequate resources to execute. 	<ul style="list-style-type: none"> Explore alternative funding sources.
A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its mandate) – internal compliance.	<ul style="list-style-type: none"> Limited funding and budget allocations. Instability within leadership and Governance structures, and Mandate of SANEDI pertaining to Governance and funding. 	<ul style="list-style-type: none"> Reprioritise projects and re-channel funding to focus on building internal capability, Explore external opportunities for funding capacity building, and Motivate for potential revision of Governance aspects of Section 7 of the NEA.
A resilient organisation in the face of COVID-19.	<ul style="list-style-type: none"> Interruption of the service, delivery value chain by COVID-19, including staff, delivery partners, beneficiaries being incapacitated. 	<ul style="list-style-type: none"> Reprioritise projects and re-channel funding to focus on building internal capability, Geographically reprioritise projects away from hotspots for as long as required, Use partners as proxies, Enforce observation of COVID-19 regulations (including PPE) on all SANEDI work and projects, Develop an operational model that responds to COVID-19 (detailing how SANEDI operates and deliver projects in this new environment), Have backup and redundancy solutions (addressing people and systems, MOAs, NDAs) for key functions (considering public sector / private sector service providers), and Review policies and bring them up to date with all updated risks.



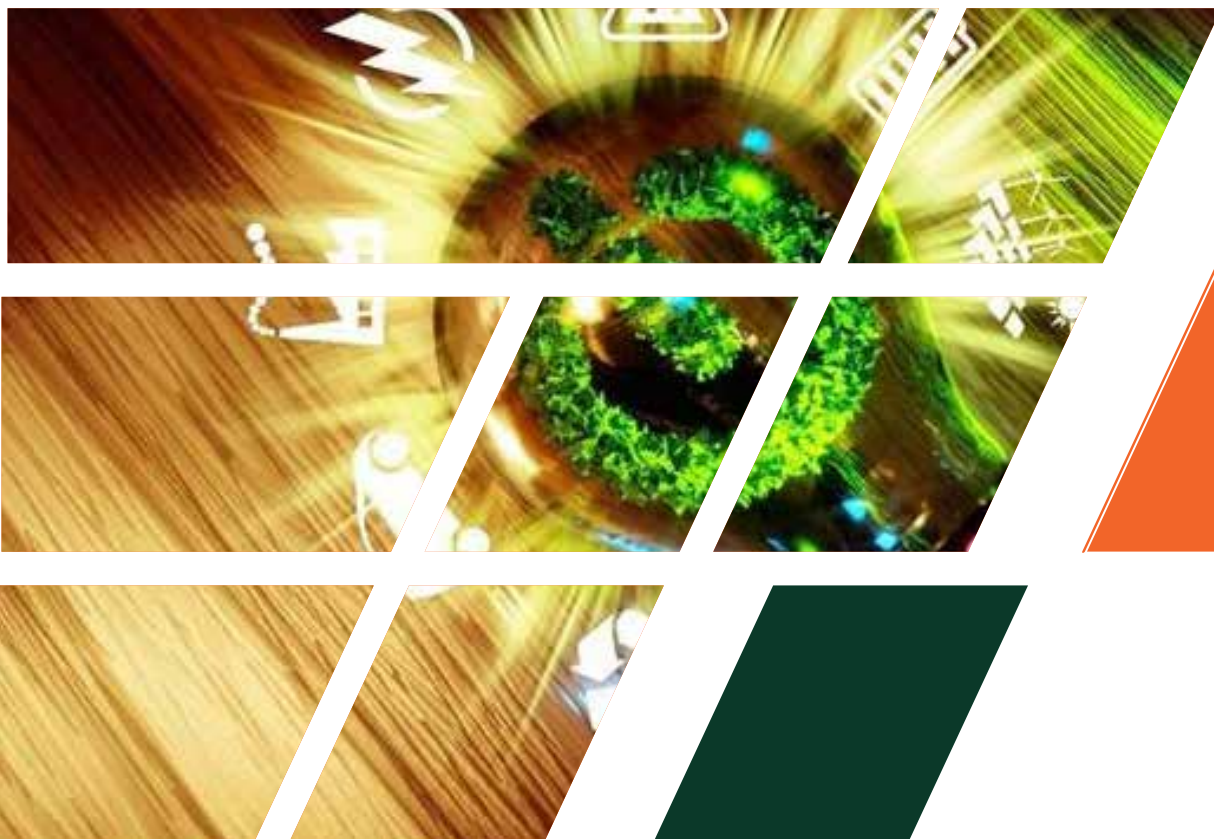
OUTCOME	KEY RISKS	RISK MITIGATION
A resilient organisation in the face of COVID-19.	<ul style="list-style-type: none"> COVID-19-induced challenges at municipalities necessitating diversion of funds, and reassignment of staff capacity. 	<ul style="list-style-type: none"> In the short term, work with municipalities who are ready and able to work with SANEDI (reprioritisation).
A resilient organisation in the face of COVID-19.	<ul style="list-style-type: none"> National budget cuts and policy changes in response to a prolonged COVID-19 environment. 	<ul style="list-style-type: none"> Explore / review future capital asset investments, Explore possible restructuring of capital investments made, Explore opportunities for cost savings in existing contracts, and Explore opportunities for converting fixed costs to variable costs as much as possible (across the organisation).

13. PUBLIC-PRIVATE PARTNERSHIPS

SANEDI is not currently part of any formal public-private partnerships as defined by South African law. SANEDI does, however, intend pursuing the establishment of such partnerships, particularly with metropolitan councils and municipality involvement. In such a case, a public-private partnership model will be explored to allow the Local Government institution to provide a concession to SANEDI to develop key projects in their jurisdiction. In the case where a private management company is required to operate a facility allocated to SANEDI on a concessional basis, it intends establishing a public-private partnership to manage such a relationship.



PART D:
TECHNICAL INDICATOR
DESCRIPTIONS (TID)



1.1 PROGRAMME 1: TECHNICAL INDICATOR DESCRIPTIONS

1.1.1 PROGRAMME PERFORMANCE INDICATORS

INDICATOR TITLE	Unqualified audit achieved
SHORT DEFINITION	Achieve an unqualified audit and maintain over the planning period.
PURPOSE/IMPORTANCE	Internal and external audits effectively assess the adequacy of SANEDI's control environment with respect to Finance, Procurement, and ICT. Unqualified audits provide assurance that an effective and efficient control environment has been established.
SOURCE/COLLECTION OF DATA	Internal and external Audit Report.
METHOD OF CALCULATION	Audit opinion.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly performance and internal audits and Annual external audit.
DESIRED PERFORMANCE	Unqualified audit or a clean audit.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with Chief Financial Officer(CFO) of SANEDI.

INDICATOR TITLE	Vacancy rate of funded positions
SHORT DEFINITION	Vacancy rate maintained every year within 5% vacancy rate of funded positions.
PURPOSE/IMPORTANCE	Number of vacancies against the approved and funded organisational structure.
SOURCE/COLLECTION OF DATA	Count of vacancies as a percentage of the approved and funded positions in the organisational structure.
METHOD OF CALCULATION	Audit opinion.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	5% or less vacancy rate is desirable.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the Human Resources(HR) Manager.

INDICATOR TITLE	Percentage of personnel trained as per Workplace Skills Plan (WSP)
SHORT DEFINITION	Active development of skills and competencies within the SANEDI team, achieving at least 95% of personnel trained as per SANEDI's approved Workplace Skills Plan as relevant for each year.
PURPOSE/IMPORTANCE	Ensure staff members are suitably trained and skilled for SANEDI to become the leading clean energy solution provider for a low carbon South Africa.
SOURCE/COLLECTION OF DATA	HR records of staff training.
METHOD OF CALCULATION	Assess achieved training against WSP.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieving 95% or more against WSP.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the HR Manager.

INDICATOR TITLE	Percentage deviation from employment equity targets
SHORT DEFINITION	A team that is adequately representative of the national demographics with no more than 5% deviation from SANEDI approved employment equity targets throughout the planning period.
PURPOSE/IMPORTANCE	Ensure SANEDI staff complement is suitably reflective of the country's demographics and in compliance with the EE Act, Act 55 of 1998.
SOURCE/COLLECTION OF DATA	HR records.
METHOD OF CALCULATION	Assess achieved against SANEDI approved Employment Equity Plan (EEP).
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieving less than 5% deviation against EEP.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the HR Manager.



1.1.1 PROGRAMME PERFORMANCE INDICATORS (continued)

INDICATOR TITLE	Percentage critical business risk factors managed as per risk management plan
SHORT DEFINITION	All (100%) critical strategic and operational risks factors are identified and mitigated throughout the planning period.
PURPOSE/IMPORTANCE	Ensure SANEDI are aware of and actively mitigates and manages strategic and operational risks that would impede delivery against targeted objectives.
SOURCE/COLLECTION OF DATA	Strategic and operational risk assessment workshops, SANEDI Risk Reports and Internal Audit Risk Reports.
METHOD OF CALCULATION	Records of workshops and reports.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Full compliance.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the General Manager responsible for Risk and the Corporate Planner.

INDICATOR TITLE	Percentage implementation of corporate stakeholder engagement plan (CESP)
SHORT DEFINITION	Proactive and targeted engagement with SANEDI stakeholders achieved by developing and implementing an effective and comprehensive Stakeholder Engagement Plan (SEP) and ensuring at least 95% implementation according to the annual, approved plan.
PURPOSE/IMPORTANCE	Proactively and effectively build relationships and interfaces with SANEDI's key stakeholders to ensure effective service delivery.
SOURCE/COLLECTION OF DATA	Stakeholder engagement events and activities measured against the SEP.
METHOD OF CALCULATION	Assess achieved engagements against SEP.
ASSUMPTIONS	All engagements to be recorded.
REPORTING CYCLE	Quarterly.
NEW INDICATOR	Continues without change from previous year.
DESIRED PERFORMANCE	95% or greater implementation of SEP.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the Public Awareness Officer, Communications.

INDICATOR TITLE	Percentage implementation of Corporate ICT plan
SHORT DEFINITION	Measures performance implementation of appropriate IT Governance as per the approved ICT plan and strategy.
PURPOSE/IMPORTANCE	Ensure proper ICT Governance.
SOURCE/COLLECTION OF DATA	ICT activities measures against ICT plan.
METHOD OF CALCULATION	Qualitative.
ASSUMPTIONS	All.
REPORTING CYCLE	Quarterly.
NEW INDICATOR	Continues without change from previous year.
DESIRED PERFORMANCE	95% or greater implementation of SEP.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the Public Awareness Officer, Communications.

1.2 PROGRAMME 2: TECHNICAL INDICATOR DESCRIPTIONS

1.2.1 PROGRAMME PERFORMANCE INDICATORS

INDICATOR TITLE	Number of energy solutions assessed
SHORT DEFINITION	Assess and/or demonstrate energy solutions for relevance in South Africa.
PURPOSE/IMPORTANCE	Develop a portfolio of assessed or demonstrated energy solutions that can inform high-confidence energy planning, decision-making and policy development.
SOURCE/COLLECTION OF DATA	As confirmed by (i) Advisory notes, (ii) Feasibility Reports, (iii) Complete Study Reports, (iv) Case studies, (v) Technology Roadmaps, (vi) Operational demonstration facilities/ projects, pilot studies among others, (vii) Business cases, and (viii) Proof of concepts.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	Outputs not published or released to the public or intended recipients because of Government moratorium, preference or sensitivity of content.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the respective General Managers of sub-programmes.

INDICATOR TITLE	Number of Annual energy industry insight (trends) publication
SHORT DEFINITION	Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums produced annually.
PURPOSE/IMPORTANCE	Produce an annual industry insights publication that can support and inform high-confidence energy planning, decision-making and policy development throughout the sector.
SOURCE/COLLECTION OF DATA	Published industry insights publication.
METHOD OF CALCULATION	Count outputs.
ASSUMPTIONS	None.
REPORTING CYCLE	Annual.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for sector inputs resides with the respective General Managers, responsibility for final publication resides with the CEO of SANEDI.

INDICATOR TITLE	Minimum number of energy related datasets maintained per annum
SHORT DEFINITION	Develop and maintain (update and expand) energy-related datasets.
PURPOSE/IMPORTANCE	Collate and keep safe a current and relevant knowledge asset that can support and inform high-confidence energy planning, decision-making and policy development throughout the sector.
SOURCE/COLLECTION OF DATA	Datasets developed and maintained.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting resides with the respective General Managers that leads sub-programmes and/or programmes.

1.2.1 PROGRAMME PERFORMANCE INDICATORS (continued)

INDICATOR TITLE	Number of policy support instruments
SHORT DEFINITION	Develop industry roadmaps, sector development plans, and industry support tools to promote energy-related market/industry development including tools, that enable sector skills development and training for future capacity development in line with policy.
PURPOSE/IMPORTANCE	Develop plans and tools that will accelerate industry development and market transformation towards the green economy.
SOURCE/COLLECTION OF DATA	Count of industry roadmaps, sector development plans and industry development/ support tools, developed.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Annual.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that lead sub-programmes.

INDICATOR TITLE	Number of energy-related knowledge sharing events/platforms engaged in (own hosted, attended, knowledge presented, supported)
SHORT DEFINITION	Host at least industry knowledge sharing events and platforms to promote energy-related market/industry development.
PURPOSE/IMPORTANCE	Host events and platforms that enable knowledge sharing and industry-wide collaboration that will accelerate industry development and market transformation towards the green economy.
SOURCE/COLLECTION OF DATA	Count of knowledge sharing events hosted.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that lead sub-programmes.

INDICATOR TITLE	Number of recipients of energy-related training facilitated by SANEDI
SHORT DEFINITION	Extend training offered or facilitated by SANEDI to recipients.
PURPOSE/IMPORTANCE	Stimulate and strengthen activity in the green economy by creating relevant awareness, skills and capacity (with specific focus on youth, women and Persons with Disability(PwDs) in line with SANEDI targets).
SOURCE/COLLECTION OF DATA	Count of trainees attending SANEDI offered or facilitated training. This may include interns hosted at SANEDI for on-the-job training, course and workshop attendees.
METHOD OF CALCULATION	Count records of attendees.
ASSUMPTIONS	Documented and signed attendance registers.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

1.2.1 PROGRAMME PERFORMANCE INDICATORS (continued)

INDICATOR TITLE	Number of energy-related research students / contracted researchers supported
SHORT DEFINITION	Support for full time energy research studies through bursaries or non-bursary support.
PURPOSE/IMPORTANCE	Stimulate and strengthen energy skills development, research and innovation by enabling students and researchers in the sector with specific focus on youth, women and PwDs in line with SANEDI targets.
SOURCE/COLLECTION OF DATA	Count of pre- or post-graduate students, research chairs, fellowships, or other supported/enabled by a SANEDI programme or bursary.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

NEW INDICATORS

INDICATOR TITLE	Number of national energy programmes for which data is available / captured
SHORT DEFINITION	
PURPOSE/IMPORTANCE	
SOURCE/COLLECTION OF DATA	Count of pre- or post-graduate students, research chairs, fellowships, or other supported/enabled by a SANEDI programme or bursary.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

INDICATOR TITLE	Sector Reports
SHORT DEFINITION	Annual energy sector insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums produced annually.
PURPOSE/IMPORTANCE	Produce an annual industry insights publication that can support and inform high-confidence energy planning, decision-making and policy development throughout the sector.
SOURCE/COLLECTION OF DATA	Published industry insights publication.
METHOD OF CALCULATION	Count outputs.
ASSUMPTIONS	None.
REPORTING CYCLE	Annual.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for sector inputs resides with the respective General Managers; responsibility for final publication resides with the CEO of SANEDI.



1.2.1 PROGRAMME PERFORMANCE INDICATORS (continued)

INDICATOR TITLE	Fully functional Data and Knowledge Management (DKM) facility in-house within SANEDI
SHORT DEFINITION	Develop and maintain an in-house facility for Data and Knowledge Management.
PURPOSE/IMPORTANCE	
SOURCE/COLLECTION OF DATA	Count of pre- or post-graduate students, research chairs, fellowships, or other supported/enabled by a SANEDI programme or bursary.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

INDICATOR TITLE	Number of engagements with key stakeholders relating to data access
SHORT DEFINITION	Host industry knowledge sharing events and platforms to promote energy-related market/industry data development.
PURPOSE/IMPORTANCE	Host events and platforms that enable knowledge sharing and industry-wide collaboration that will accelerate industry development and market transformation towards the green economy.
SOURCE/COLLECTION OF DATA	Count of knowledge sharing events hosted.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

INDICATOR TITLE	Number of recipients of energy data related training facilitated
SHORT DEFINITION	Extend training offered or facilitated by SANEDI to recipients.
PURPOSE/IMPORTANCE	Stimulate and strengthen energy data activity by creating relevant awareness, skills and capacity (with specific focus on youth, women and PwDs in line with SANEDI targets).
SOURCE/COLLECTION OF DATA	Count of trainees attending SANEDI offered or facilitated training. This may include interns hosted at SANEDI for on-the-job training, course and workshop attendees.
METHOD OF CALCULATION	Count records of attendees.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

INDICATOR TITLE	Number of training modules relating to data
SHORT DEFINITION	
PURPOSE/IMPORTANCE	
SOURCE/COLLECTION OF DATA	Count of pre- or post-graduate students, research chairs, fellowships, or other supported/enabled by a SANEDI programme or bursary.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.



1.2.1 PROGRAMME PERFORMANCE INDICATORS (continued)

INDICATOR TITLE	Number of energy data analytics related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc.)
SHORT DEFINITION	Support for full time energy data research studies through bursaries or non-bursary support.
PURPOSE/IMPORTANCE	Stimulate and strengthen energy skills development, research and innovation by enabling students and researchers in the sector with specific focus on youth, women and PwDs in line with SANEDI targets.
SOURCE/COLLECTION OF DATA	Count of pre- or post-graduate students, research chairs, fellowships, or other supported/enabled by a SANEDI programme or bursary.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the respective General Managers that leads sub-programmes and/or programmes.

1.3 PROGRAMME 3: TECHNICAL INDICATOR DESCRIPTIONS

1.3.1 PROGRAMME PERFORMANCE INDICATORS

INDICATOR TITLE	Number of EE solutions implemented
SHORT DEFINITION	Assess EE solutions for relevance to local applications. i.e. Section 12L projects fully approved and Tax Certificates issued.
PURPOSE/IMPORTANCE	Assess new EE solutions to inform the promotion of suitable technologies, enable improved technical assistance to EE implementation projects and inform planning, policy- and decision-making, thereby accelerating the adoption of EE in the country.
SOURCE/COLLECTION OF DATA	As confirmed by (i) Advisory notes, (ii) Feasibility Reports, (iii) Complete Study Reports, (iv) Case studies, (v) Technology Roadmaps, and (vi) Operational demonstration facilities/projects or pilots that document an assessed EE solution.
METHOD OF CALCULATION	Count of EE solutions assessed. Section 12L projects fully approved and Tax Certificates issued.
TYPE OF INDICATOR	Measures outputs.
ASSUMPTIONS	Outputs not published or released to the public or intended recipients because of Government moratorium, preference or sensitivity of content.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the General Managers for EE.

INDICATOR TITLE	Number of current energy datasets maintained
SHORT DEFINITION	Develop and maintain (update and expand) energy-related datasets.
PURPOSE/IMPORTANCE	Collate and keep safe a current and relevant knowledge asset that can support and inform high-confidence energy planning, decision-making and policy development throughout the sector.
SOURCE/COLLECTION OF DATA	Datasets developed and maintained.
METHOD OF CALCULATION	Count outputs collated across all sub-programmes.
ASSUMPTIONS	None.
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for sector inputs resides with the General Manager EE.



1.3.1 PROGRAMME PERFORMANCE INDICATORS (continued)

NEW INDICATORS

INDICATOR TITLE	GHG Emissions reduced
SHORT DEFINITION	Section 12L tax incentive, i.e. emissions reduced, as a result of the 12L projects implemented and approved by SANEDI.
PURPOSE/IMPORTANCE	More emphasis is being placed on South Africa's emissions and its international commitments to reduce this.
SOURCE/COLLECTION OF DATA	All units of energy (kWh) saved are verified by SANAS-accredited professional bodies and reviewed and approved by SANEDI, using an online data repository.
METHOD OF CALCULATION	Using local Emission Factors for the different energy carriers qualifying for the Section 12L tax incentive, SANEDI then calculates and reports on the GHG avoided as a result of the implementation and approval of these projects.
TYPE OF INDICATOR	Measures outputs. (Tonnes of CO2 avoided)
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the General Manager for EE.

INDICATOR TITLE	Area coated (m²)
SHORT DEFINITION	Total area of painted roofs by the Cool Roofs Challenge project.
PURPOSE/IMPORTANCE	This is an important and innovative way to provide a low-cost thermal cooling solution to all building stock in South Africa, with the potential to create a huge number of new jobs.
SOURCE/COLLECTION OF DATA	Field reporting and GIS verification, captured in an internal Excel-database.
METHOD OF CALCULATION	Square Meters covered and independently verified.
TYPE OF INDICATOR	Measures outputs. (Square Meters applied)
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the General Manager for EE.

INDICATOR TITLE	Number of EE performance certificates issued
SHORT DEFINITION	Number of EE performance certificates issued.
PURPOSE/IMPORTANCE	This is an important initiative to counter the impacts of the Carbon Tax.
SOURCE/COLLECTION OF DATA	Verified data captured on the online 12L SANEDI database.
METHOD OF CALCULATION	According to the South African National M & V Standard, (SANS500 10:2019).
TYPE OF INDICATOR	Measures outputs. (Units of energy saved, (kWh))
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the General Manager for EE.

INDICATOR TITLE	Functional Database
SHORT DEFINITION	To have developed and implemented a fully functional database to issue Energy Performance Certificates (EPCs) in Commercial and Public Buildings.
PURPOSE/IMPORTANCE	Due to the anticipated volume of applications expected for EPCs in the country and based on international best practice, it is critical to have a reliable and accurate online database in place.
SOURCE/COLLECTION OF DATA	Verified building and energy data from SANAS-accredited EPC Energy Auditors.
METHOD OF CALCULATION	According to the South African National EPC Standard, (SANS 1544:2014).
TYPE OF INDICATOR	Measures outputs. (Energy rating, based on energy consumption per square meter).
REPORTING CYCLE	Quarterly.
DESIRED PERFORMANCE	Achieve at least the stated target or more.
INDICATOR RESPONSIBILITY	Responsibility for reporting with the General Managers for EE.



1.4 PERFORMANCE FRAMEWORK DEFINITIONS

The following terms used in SANEDI's performance framework were defined to ensure a common understanding and consistent interpretation by implementers and auditors:

TERM (ALPHABETICALLY LISTED)	LINK TO DMRE PRIORITIES
Affordable	Affordable, as used in SANEDI's strategic outcome-orientated goal to describe the energy system, refers to an energy solution that can be delivered at a levelised cost of energy that is within the means of the economy. When considering affordability in the context of the wider economy, all costs (including capital investment, operating costs, environmental impacts, climate change, air quality and health) should be considered.
Assessed	<p>The assessment of energy solutions may be done through desktop studies, feasibility assessments, cost benefit analyses, pilot projects, demonstration plants, or retrospectively through impact assessments/studies or case studies based on piloted, demonstrated or implemented solutions.</p> <p>The results of assessments would be communicated using any one of (i) Advisory notes, (ii) Comprehensive Reports, (iii) Feasibility Reports, (iv) Case studies, (v) Technology Roadmaps, (vi) Policy recommendations, and (vii) Showcasing of demonstrated facilities, among others.</p>
Cleantech solutions	Refers to a cleantech concept, technology, application or solution that is taken from R&D to the market through incubation of a new business, commercialisation of the technology/solution or broader market adoption or deployment as a result of SANEDI support.
Dataset	May also be referred to as an inventory, data repository or database. The term is used to describe a store of information collected and related to a field of study. A dataset may consist of measured data points (seismic measurement data), data records (e.g. EXCO register or Big EE appliance data), a repository of information and/or publications (e.g. RECORD library of industry publications and information).
Demonstration project	<p>Physical installation or implementation of an energy solution to demonstrate and assess performance. A project may consist of multiple similar installations to demonstrate one solution at a suitable scale.</p> <p>Different projects may be defined to test similar solutions with specific or unique differences in technology application, geographic location, climatic conditions, social and/or cultural conditions. A project unit will be clearly defined within this context.</p>
Enabled	Used with specific reference to skills development and particularly with respect to researchers that are active or productive in the sector as a result of SANEDI support. Research can be made possible (enabled) through a bursary, a part bursary or non-bursary support.
Energy solutions	Energy solutions may include entirely new technologies, application of new or old technologies in different configurations, locations or environments, adoption of international technologies in South African conditions or altered applications or operational regimes of existing energy solutions or technologies.
Facilitated	Training facilitated by SANEDI incorporates courses offered directly by SANEDI, courses taught by a SANEDI representative(s), courses presented as a result of sponsorship from/via SANEDI or attendance of a course by individuals made possible by SANEDI (refer also definition of training / skills development with respect to format and recipients of training).
Industry development platforms	Platforms or fora created with main activities related to dissemination, lobbying and information sharing of local and global industry developments. Platforms and knowledge sharing events aim to promote harmonious collaboration of all stakeholders (including industry, Local and National Government, academia, international experts, etc).
Knowledge sharing events	Events including workshops, webinars and conferences with main activities related to dissemination, lobbying and information sharing of local and global industry developments. Platforms and knowledge sharing events aim to promote harmonious collaboration of all stakeholders (including industry, Local and National Government, academia, international experts etc).

TERM (ALPHABETICALLY LISTED)	LINK TO DMRE PRIORITIES
Maintain	<p>Maintain, as it relates to the datasets/databases, entails continual data collection, updating and/or expansion of the datasets with the most current and relevant data. This is not an IT maintenance function. For the sake of the performance indicator, data maintenance covers all activities from development of the dataset, collation and updating of information.</p> <p>The establishment of a new dataset or database will therefore also be reflected under this measure.</p>
Researchers	<p>Researchers (including pre- or post-graduate students, research chairs, fellowships and professionals), at formal research institutions including institutions for tertiary education (universities, technical colleges, universities of technology), research institutes, research organisations or NGOs.</p>
Training / skills development	<p>Dedicated/focused training sessions aimed at building capacity and skills at various levels (school goers, teachers, train-the-trainers, students, industry players) varying from half a day to full length courses.</p>



APPENDIX: PLANNED PROJECTS



The following table lists the projects that will be executed to achieve SANEDI's predetermined objectives.

OUTPUT INDICATORS	ANNUAL TARGETS	PROJECTS
ENERGY EFFICIENCY		
Number of EE solutions implemented.	15	<ul style="list-style-type: none"> Section 12L projects fully approved and Tax Certificates issued.
GHG emissions reduced (tonnes CO ₂).	1,5	<ul style="list-style-type: none"> Section 12L tax incentive, i.e. emissions reduced, as a result of 15 12L projects implemented and approved by SANEDI.
Number of EE solutions assessed.	2	<ul style="list-style-type: none"> EU-funded General Budget Support (GBS) project for Waste Water Treatment Plants, (WWTP).
Area coated (m ²) and GHG emissions reduced (tonnes CO ₂).	1 000 000 m ² - leading to 0,5 tonnes	<ul style="list-style-type: none"> 1 Million Cool Roofs Challenge Project.
Number of EE energy-related datasets maintained per annum.	2	<ul style="list-style-type: none"> Section 12L database and Section 12I database.
Number of EE performance certificates issued.	4	<ul style="list-style-type: none"> EU- funded General Budget Support (GBS) project for Public Buildings.
Functional database.	1	<ul style="list-style-type: none"> V-NAMA – funded project, referred to as Energy Efficiency in Public Buildings and Infrastructure Programme, (EEPBIIP).
DATA AND KNOWLEDGE MANAGEMENT		
Number of national energy programmes for which data is available / captured.	4	<ul style="list-style-type: none"> EU-funded General Budget Support (GBS) project for Public Buildings, EU-funded General Budget Support (GBS) project for Waste Water Treatment Plants, (WWTP), GEF/ UNIDO-funded Industrial Energy Efficiency (IEE) Phase 2 project, and Residential Energy Efficiency Research Programme, focussing on Domestic Appliances.
Sector Reports (automotive, pulp and paper, residential sectors) .	2	<ul style="list-style-type: none"> GEF/ UNIDO-funded Industrial Energy Efficiency (IEE) Phase 2 project.
Fully functional Data and Knowledge Management (DKM) facility in-house within SANEDI.	1	<ul style="list-style-type: none"> A fully resourced DKM function, fully operational within SANEDI and providing a repository of energy data for use by the DMRE and other stakeholders.
Number of engagements with key stakeholders relating to data access.	8	<ul style="list-style-type: none"> University of Cape Town, International Energy Agency (IEA), Lawrence Berkeley National Laboratory (LBNL), Department of Environment, Fisheries and Forestry (DEFF), National Energy Regulator of South Africa (NERSA), Eskom, Energy Planning at the Department of Mineral Resources and Energy (DMRE) and StatSA.
Number of recipients of energy data related training facilitated.	10	<ul style="list-style-type: none"> GEF/ UNIDO-funded Industrial Energy Efficiency (IEE) Phase 2 project.
Number of annual Energy industry status report (insights, trends, international and national collaboration decisions, interfacing and forums).	1	<ul style="list-style-type: none"> Contribution to SANEDI Annual Corporate publication.
Number of training modules relating to data.	2	<ul style="list-style-type: none"> GEF/ UNIDO-funded Industrial Energy Efficiency (IEE) Phase 2 project.
Number of energy data analytics related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc).	1	<ul style="list-style-type: none"> Centre for Energy Systems Analysis (CESAR) contract with the University of Cape Town, (UCT).



OUTPUT INDICATORS	ANNUAL TARGETS	PROJECTS
SMART GRID		
Number of energy solutions assessed (as confirmed by (i) Advisory notes, (ii) Feasibility Reports, (iii) Complete Study Reports, (iv) Case studies, (v) Technology Roadmaps, and (vi) Operational demonstration facilities).	4	<ul style="list-style-type: none"> Enterprise Service Bus Requirements for Smart Grid Applications, Network Communication Technologies for Smart Grid Implementation, Advanced Distribution Automation Systems, and Customer Information Systems for Smart Grid Implementation.
Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	1	Contribution to SANEDI Annual Corporate publication.
Number of industry roadmaps, sector development plans and industry support tools developed to promote energy-related market/ industry development.	1	Asset Management Roadmap for Small Municipalities in South Africa.
CLEANER MOBILITY		
Number of energy solutions assessed (as confirmed by (i) Advisory notes, (ii) Feasibility Reports, (iii) Complete Study Reports, (iv) Case studies, (v) Technology Roadmaps, and (vi) Operational demonstration facilities).	1	Public Transport Roadmap (Clean Bus Transport system)- The roadmap document will inform all relevant stakeholders in South Africa regarding the potential and immediate benefits of developing, and deploying clean energy Bus transport system in Metropolitan Cities.
Annual energy industry insight (trends) publication reflecting insights from extensive international and national collaboration, interfacing and forums.	1	EV Industry annual publication.
Number of industry roadmaps, sector development plans and industry support tools developed to promote energy related market/ industry development.	1	Hydrogen fuel cells for transportation Roadmap- Develop a document that will inform all relevant stakeholders in South Africa regarding the potential and immediate benefits of developing and deploying hydrogen technologies and how such systems can be integrated into the South African energy mix.
Number of industry knowledge sharing events and platforms hosted to promote energy related market/industry development.	1	Support host of EVIA Annual conference.
Number of recipients of energy related training facilitated by SANEDI.	5	Trained recipients in clean energy technology systems.
CLEANER FOSSIL FUELS		
Number of energy solutions assessed (advisory notes, feasibility reports, Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities) complete study reports, case studies, technology roadmaps and operational demonstration facilities).	1	A survey report: Determination of which CFF technologies would be commercially and sustainable implementable in South Africa.
RENEWABLE ENERGY		
Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	4	<ul style="list-style-type: none"> Cool surface Limpopo project phase 1 (as per bid 152), Biogas for DOD, Specialised domestic SWH for DoD hard water areas, and Expect another DoD project, it will be the first of 3 in the pipeline.





OUTPUT INDICATORS	ANNUAL TARGETS	PROJECTS
Number of energy-related knowledge sharing events / platforms engaged in (own hosted, attended, knowledge presented, supported).	4	One event presented per quarter.
Number of recipients of energy-related training facilitated.	120	30 persons trained per quarter in energy awareness and EE/RE technology.
Number of annual Energy industry status report (insights, trends, international and national collaboration decisions, interfacing and forums).	1	No plans at present for this, it should come from the CSIR thermal centre collaboration.
Number of energy solutions assessed (advisory notes, feasibility reports, complete study reports, case studies, technology roadmaps and operational demonstration facilities).	2	<ul style="list-style-type: none"> • WTW Hoedspruit (5 year project). and • WASA.
Minimum number of energy-related datasets maintained per annum.	2	<ul style="list-style-type: none"> • WASA, and • SOLTRAIN.
Number of policy support instruments (industry roadmaps, sector development plans and industry support tools, etc).	1	WASA/SAWEP.
Number of recipients of energy-related training facilitated.	40	SOLTRAIN training (2-3 sessions).
Number of energy-related research students / contracted researchers supported (e.g. bursaries, non-bursaries, contract opportunities, infrastructure support, etc).	1	DBREV final year of bursary.





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