



***sanedi***

South African National Energy  
Development Institute



**2020 - 2025**

**STRATEGIC PLAN**





***sanedi***

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Development Institute

# STRATEGIC PLAN

## 2020 - 2025



## CHAIRPERSON'S STATEMENT

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I am pleased to present our revised Strategic Plan (SP) 2020/25, which outlines our plan for the execution of our strategy. We are proud of being a successful, growing organisation and of the important contributions we make to the wider South African energy sector. In an era of global climate uncertainty, crippling loadshedding, and liquid fuel shortages, we believe SANEDI's role is critical in seeking solutions and creating opportunities.

We believe the strategy SANEDI adopted, and its implementation through our programmes, is proving to be correct. SANEDI, in particular, developed and piloted the concept of Smart Grids (SGs), Waste-to-Energy (WtE), Renewable Energy Technologies (RET), Cleaner Fuels, and Cleaner Mobility (CM) in South Africa in collaboration with the Department of Mineral Resources and Energy (DMRE), Department of Science and Innovation (DSI), and our partners. At the same time, the significance of Data and Knowledge Management as well as Energy Efficiency (EE), has never been more apparent. SANEDI is honoured to have been chosen by the DSI to host the DSI Energy Secretariat on its behalf.

We hope to make a positive and significant impact on the economy and society by growing and sustaining a financially strong and responsible organisation over the long term, guided by a clear purpose. We are also pleased to announce that we have repurposed our strategic focus and themes in response to global and local developments. As previously stated, providing solutions that address current socio-economic pain points is an important element of SANEDI's strategy.

Over the 2020/25 strategic period, our core programmes are Applied Energy Research, EE and DSI Energy Secretariat.

Consequently, the following are our strategic themes:

- **Energy Security**, the universal access to affordable energy and balancing energy demand and supply,
- **Climate change response**, the need to decarbonise the economy through embracing the fundamentals of the Just Energy Transition (JET) and enabling the achievement of the Nationally Determined Contributions (NDC 2030),
- **Convergence**, the integration of information systems, energy & engineering technologies to improve service delivery,
- **People Management and Energy Skills**, attract, develop & retain exceptional talent, and
- **Policies Processes and Systems**, develop processes, policies, systems, best practices & standards for operational excellence.

We are deliberate on our contribution to Energy Security as an Energy Research and Development (ERD) entity to the reduction of loadshedding in the country, unemployment, nurturing and fostering skills critical to our technical work, and supporting Small Medium Enterprises (SMMEs) and communities in transitioning to Clean Energy through the strategic planning period and going forward, in direct response to the current challenges confronting our country.

I am confident that SANEDI is well-positioned to meet the challenges of 2023 while also generating long-term energy access solutions for the country and the region. We will continue to closely monitor the performance of all our programmes to ensure the organisation executes its strategy with fiscal prudence and probity.

I would like to thank the DMRE Minister for his leadership, the DMRE and the SANEDI Board for their continued direction and guidance to the organisation. Lastly, I would like to thank our executive team for their hard work. We value our employees' dedication, skills, and professionalism. We are all committed to continued value creation and sustainability. I look forward to reporting on our progress.



**MR. BICELO XULU**  
**CHAIRPERSON SANEDI**

## CEO'S STATEMENT

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Yet again South Africa finds itself at the crossroads with several energy challenges and limited National resources. The negative impact on the economy, the major events, ongoing loadshedding and the National ambition towards Net Zero utilizing the Just Energy Transition (JET) Roadmap makes the next strategic planning period complex. This situation has now exacerbated the triple challenges of unemployment, poverty and inequality. SANEDI has a critical role to play in assisting the country to respond to these challenges. The revised Strategic Plan (SP) has identified additional goals that are critical and must be added to the original strategic goals, namely: how to guarantee Energy Security by addressing loadshedding and how to respond to National climate change commitments through the JET framework. Our revised vision talks to excellence in ERD for sustainable energy security in South Africa and beyond. To achieve this, it would require a renewed sense of urgency, commitment, high performance culture and a well capacitated organization.

SANEDI as an agency of the DMRE, is Mandated to direct, monitor and conduct ERD, promote applied energy research and technology innovation, as well as undertake measures to promote the uptake of green energy and EE throughout the economy. It's mission is to expediently conduct policy relevant research and implement innovative energy research, development EE solutions to catalyse South Africa's socio-economic growth and climate resilience.

In the previous strategic framework period, SANEDI's focus was to provide an optimal ERD and deployment environment and co-operating with persons, associations and institutions undertaking related energy programmes locally and Internationally to ensure that International learning's and 'best practices' are shared and, where relevant, adopted and applied in South Africa. This revised SP 2020/25 has been recalibrated to respond to the challenges around Energy Security and meeting climate change objectives.

In the short term, the SP is responding to the need to balance Energy Demand and Supply (ESD) for Energy Security. SANEDI's short term focus will see us making contributions in key areas of clean coal, loadshedding and shortages of liquid fuels and gas. SANEDI's response will leverage on the successes of existing projects in EE, Demand Side Management (DSM) solutions, and proven innovative market driven technologies that are ready for commercial deployment. Furthermore, there is an emphasis on Cleaner Fuels And Related Technologies to assist in mitigating emissions and negative environmental

impact, together with strategic collaborations and partnerships with State-owned Entities (SOEs) and Stakeholders.

In the medium-term, SANEDI is responding to the JET in pursuit of decarbonisation of the South African economic sectors. The emphasis is on scaling up of the renewable technology adoption, digitalisation of the grid particularly at a Municipality level, through Smart Grids (SGs) and Data Knowledge Management (DKM). In the long-term, the entity is responding to efforts aimed at making the energy sector green and clean. This will be driven largely through the DSI Energy Secretariat and collaboration with Local, Regional and International partners.

This revised SP is also focused on ensuring that the financial stability and the excellent Governance record (reflected by clean audits in two consecutive years) is maintained. Other key aspects of our strategy include energy skills development, people management (which is the bedrock of a high-performance culture), providing critical energy data to inform policy development, revision of policies and processes/systems to align with best practices, setting up for intellectual property and commercialisation management.

In conclusion, I am pleased to present this revised SP, which was drafted with inputs from the Board and Stakeholders, noting SANEDI's activities are within the framework of the National Development Plan (NDP), DMRE priorities and all National Strategic Plans. I would like to take this opportunity to thank the DMRE and the SANEDI Board for their ongoing support and strategic direction as well as guidance. Lastly, on a personal level, I am excited to be part of the SANEDI team, and I look forward to being part of reshaping the energy sector in South Africa and beyond. I would like to thank the SANEDI Board and the South African Government for providing me with this opportunity, and it is my intention to fulfil the SANEDI Mandate to the best of my ability.



**DR TITUS MATHE**  
**CHIEF EXECUTIVE OFFICER (CEO) SANEDI**



## OFFICIAL SIGN-OFF

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It is hereby certified that this Strategic Plan:

1. Was developed by the Management of the SANEDI under the guidance of the Board.
2. Considers 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 2020/25.



**LETHABO MANAMELA**  
**CHIEF FINANCIAL OFFICER DATE:**



**DR TITUS MATHE**  
**CHIEF EXECUTIVE OFFICER**

Date:



**MR. SICELO XULU**  
**CHAIRPERSON OF THE BOARD**

Date:

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## ACRONYMS

Acronym	Description
4IR	Fourth Industrial Revolution
ADA	Austrian Development Agency
AFD	French Development Agency's
APP	Annual Performance Plan
ARC	Audit and Risk Committee
BARC	Board Audit and Risk Committee
B-BBEE	Broad-based Black Economic Empowerment
BRICS	Brazil, Russia, India, China and South Africa
CapEx	Capital Expenditures
CCS	Carbon Capture and Storage
CCTs	Cleaner Coal Technologies
CCUS	Carbon Capture Utilisation and Storage
CEF	Central Energy Fund
CEO	Chief Executive Officer
CF	Cleaner Fuels
CFF	Cleaner Fossil Fuel
CFO	Chief Financial Officer
CGS	Council for Geoscience
CH <sub>4</sub>	Methane
CHP	Combined Heat and Power
CM	Cleaner Mobility
CO <sub>2</sub>	Carbon Dioxide
CoGTA	Department of Cooperative Governance and Traditional Affairs
COP	Conference of Parties
CRO	Chief Restructuring Officer
CSIR	Council for Scientific and Industrial Research
DKM	Data and Knowledge Management
DMRE	Department of Mineral Resources and Energy
DoD	Department of Defence
DoT	Department of Transport
DPWI	Department of Public Works and Infrastructure
DSI	Department of Science and Innovation
DSM	Demand Side Management



Acronym	Description
DST	Department of Science and Technology
DTU	Technical University of Denmark
EA	Executive Authority
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EE	Energy Efficiency
EEPBP	Energy Efficiency in Public Buildings and Infrastructure Programme
EET	Energy Efficiency Tax
EP&Ps	Education Project & Partnerships
ERD	Energy Research and Development
ERDI	Energy Research, Development and Innovation
Esco	Energy Services Company
ESD	Energy Supply and Demand
ESI	Electricity Supply Industry
ExCo	Executive Committee
EU	European Union
EV	Electric Vehicles
FF	Fossil Fuels
FFC	Funding and Finance Committee
FDG	Flue Gas Desulphurisation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	German Development Agency
GM	General Manager
HFCT	Hydrogen and Fuel Cell Technologies
HySA	Hydrogen South Africa
ICT	Information Communications and Technology
IEA	International Energy Agency
IoT	Internet of Things
IP	Intellectual Property
IPAP	Industrial Policy Action Plan
IR	Integrated Report
IRP	Integrated Resource Plan
IT	Information Technology
JET	Just Energy Transition
KPI	Key Performance Indicator
LEAP-RE	Europe Africa Partnership for Renewable Energy

Acronym	Description
M&E	Monitoring and Evaluation
MFMA	Municipal Finance Management Act of 2003
MTEF	Medium Term Expenditure Framework
MTSF	Medium Term Strategic Framework
MW	Mega-Watt
NDC	Nationally Determined Contributions
NDP	National Development Plan
NEA	National Energy Act
NETP	National Energy Transition Plans
NSDF	National Spatial Development Plan
N <sub>2</sub> O	Nitrous Oxide
NSI	National System of Innovation
NO <sub>x</sub>	Nitrous Oxide
NT	National Treasury
O&M	Operation and Maintenance
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
O <sub>3</sub>	Ozone
PC	Projects Committee
PCSP	Pilot Carbon Dioxide Storage Pilot Project
PGM	Platinum Group Metal
PtH	Power to Heat
PV	Photovoltaic
R&D	Research and Development
R&I	Research and Innovation
RC	Remuneration Committee
RDI	Research and Development Initiatives
RE	Renewable Energy
REIPPP	Renewable Independent Power Producer Programme
RET	Renewable Energy Technologies
RMP	Risk Management Plan
SADC	South African Development Community
SANAS	South African National Accreditation System
SANEDI	South African National Energy Development Institute
SARETEC	South African Renewable Energy Technology Centre
SARS	South African Revenue Service

Acronym	Description
SAWS	South African Weather Service
SCM	Supply Chain Management
SDC	Swiss Development Agency
SEP	Stakeholder Engagement Plan
SETAs	Sector Education and Training Authority
SG	Smart Grids
SLAs	Service Level Agreements
SMMEs	Small Medium and Micro Enterprises
SOE	State -Owned Entity
SOLTRAIN	Southern African Solar Thermal Training & Demonstration Initiative
SP	Strategic Plan
SSEG	Small-scale Embedded Generation
Stats SA	Statistics South Africa
SUNREF	Sustainable Use of Natural Resources and Energy Finance
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAF	Technical Assistance Facility
TES	Thermal Energy Storage
TID	Technical Indicator Descriptions
TVET	Technical Vocational Education and Training
UK-PACT	UK Partnering for Accelerated Climate Transitions
UNFCCC	United Nations Framework Convention for Climate Change
UI	User Interface
UoT	University of Technology
V-NAMA	Vertical- Nationally Appropriate Mitigation Action
VVISDP	Viability and Validation Innovation Service Delivery Programme
H2O	Water Vapour
WASA	Wind Atlas for South Africa
WfE	Working for Energy
WHR	Waste Heat Recovery
WtE	Waste to Energy
WWTP	Waste Water Treatment Plant

## EXECUTIVE SUMMARY

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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, six key themes emerged, underpinning the strategy that SANEDI has adopted. These themes include:

- **Energy Security**, the universal access to affordable energy and balancing energy demand and supply (e.g. loadshedding & liquid fuel shortage). In order for South Africa to achieve economic growth it is critical to have a reliable electrical power as an enabler. The Energy Security Master Plan goals are as follows:
  - Supporting economic growth and development,
  - Improving the reliability of electricity infrastructure,
  - Providing a reasonably priced electricity supply,
  - Ensuring the security of electricity supply as set by a security of supply standard,
  - Diversifying the primary energy sources of electricity,
  - Meeting the Renewable Energy (RE) targets as set in the IRP,
  - Increasing access to affordable energy services,
  - Reducing energy usage through EE interventions,
  - Accelerating household universal access to electricity, and
  - Clarifying some of the policy issues in the context of an evolving electricity sector.
- **Climate change response.** The need to decarbonise the economy through embracing the fundamentals of the JET and enabling the achievement of the Nationally Determined Contributions (NDC 2030). South Africa has a requirement to comply with certain 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.
- **Municipal service delivery.** SANEDI will collaborate with Municipalities for revenue enhancement, Asset Management, technology deployment, improving efficiencies and skills development. Municipalities are cumulatively owed in excess of 200 billion (consumer debt), while Municipalities owed Eskom a total of R35.3bn and the Water Boards in excess of R15.3 billion as of the end of March 2021<sup>1</sup>. (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 (SGs), Electric Mobility (EM), Revenue and Asset Management and EE initiatives, significant opportunities exist within the municipal environment to drive service delivery, enhance performance and create lasting impact.
- **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. Integration of information systems, energy & engineering technologies to improve service delivery.

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<sup>1</sup> National Treasury Republic of South Africa. (2021). 2021 Local Government Revenue and Expenditure Review. Retrieved from <https://www.treasury.gov.za/public%20comments/LG%20Revenue%20and%20Expenditure%20Review%202021.pdf>

- **People Management and Energy Skills**, in order for SANEDI to achieve its Mandate, it has to attract, develop, & retain exceptional talent whilst fostering employee well-being and respect.
- **Policies, Processes and Systems**, SANEDI will develop processes, policies, systems, best practices & standards for operational excellence.

SANEDI's priority programmes may be summarised as:

- Energy Efficiency,
- Smart Grids,
- Energy Secretariat,
- Cleaner Mobility,
- Renewable Energy,
- Data and Knowledge Management,
- Balance ESD in order to address loadshedding, grid stability, liquid fuels shortage & gas,
- Cleaner Fuels and Related Technologies, and
- Collaboration with Local, Regional and International Energy Partners.

SANEDI has thus repositioned itself to concentrate 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.

SANEDI's expertise and demonstrated experience in the areas of EE, Renewable Energy Technologies (RET) and SGs, 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 SGs and distributed generation, mobility, revenue enhancement and Asset Management) are 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 State is highlighted in the image below, and was considered as a key feature in the development of the Strategy.

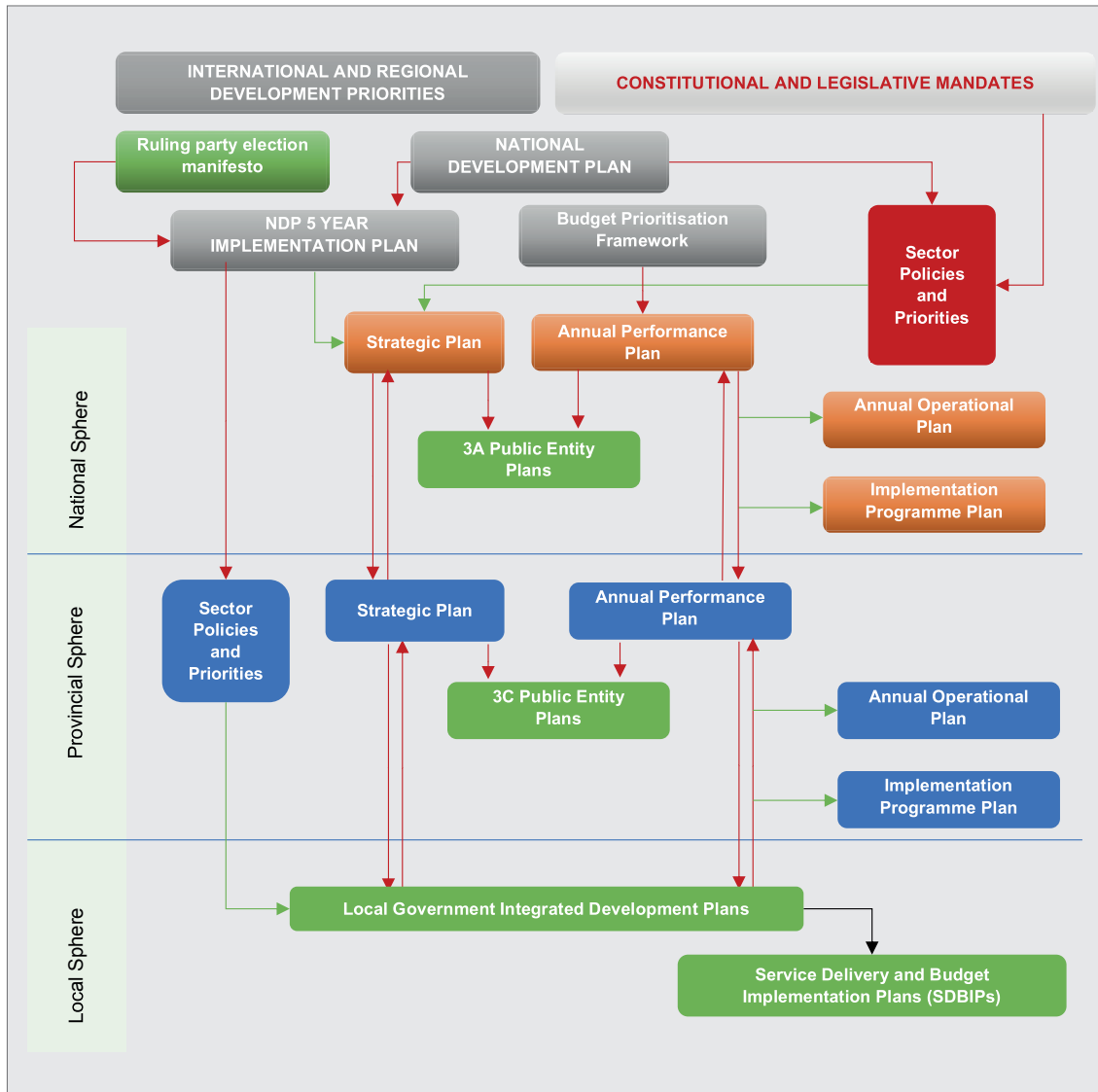


Figure 1: Context for Strategic Alignment



## 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 Energy Efficiency (EE) in the field of energy (other than nuclear energy), thereby improving the overall energy landscape within the country.

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

1. Chapter 2, The Bill of Rights, where:
  - a. Everyone has the right to an environment that is not harmful to their health or well-being. Thus, we must:
    - i. prevent pollution and ecological degradation,
    - ii. promote conservation, and
    - iii. 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 concerning Municipalities and the issue of local Government matters related to:
  - a. 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:-

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

**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 (NDP) 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

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

As highlighted, the National Planning Framework must align with the National Development Plan (NDP), policy priorities, as well as the Executive focus of the National Government, including the seven key priorities of the 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:

- iv. Youth empowerment,
- v. Gender equity,
- vi. 4th Industrial Revolution (4IR),
- vii. Environmental sustainability (climate change), and
- viii. National Spatial Development Plan (NSDF).

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

- ix. Economic transformation and job creation,
- x. Education, skills and health,
- xi. Consolidating the social wage through reliable and quality basic services,
- xii. Spatial integration, Human Settlements and Local Government,
- xiii. Social cohesion and safe communities,
- xiv. A capable, ethical and developmental State, and
- xv. 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 to assist 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



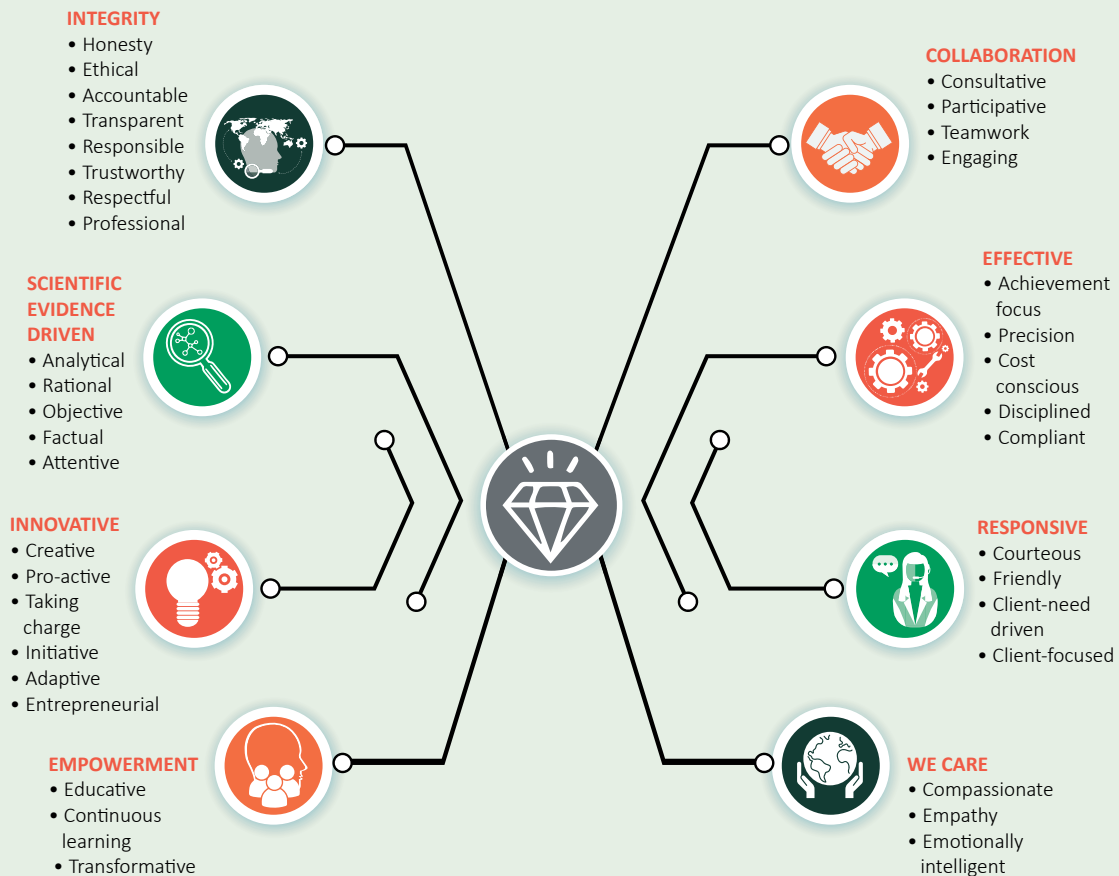
To be a leading research and innovation organisation for sustainable and inclusive energy development that influences energy policy goals in South Africa and beyond.

## 6. MISSION



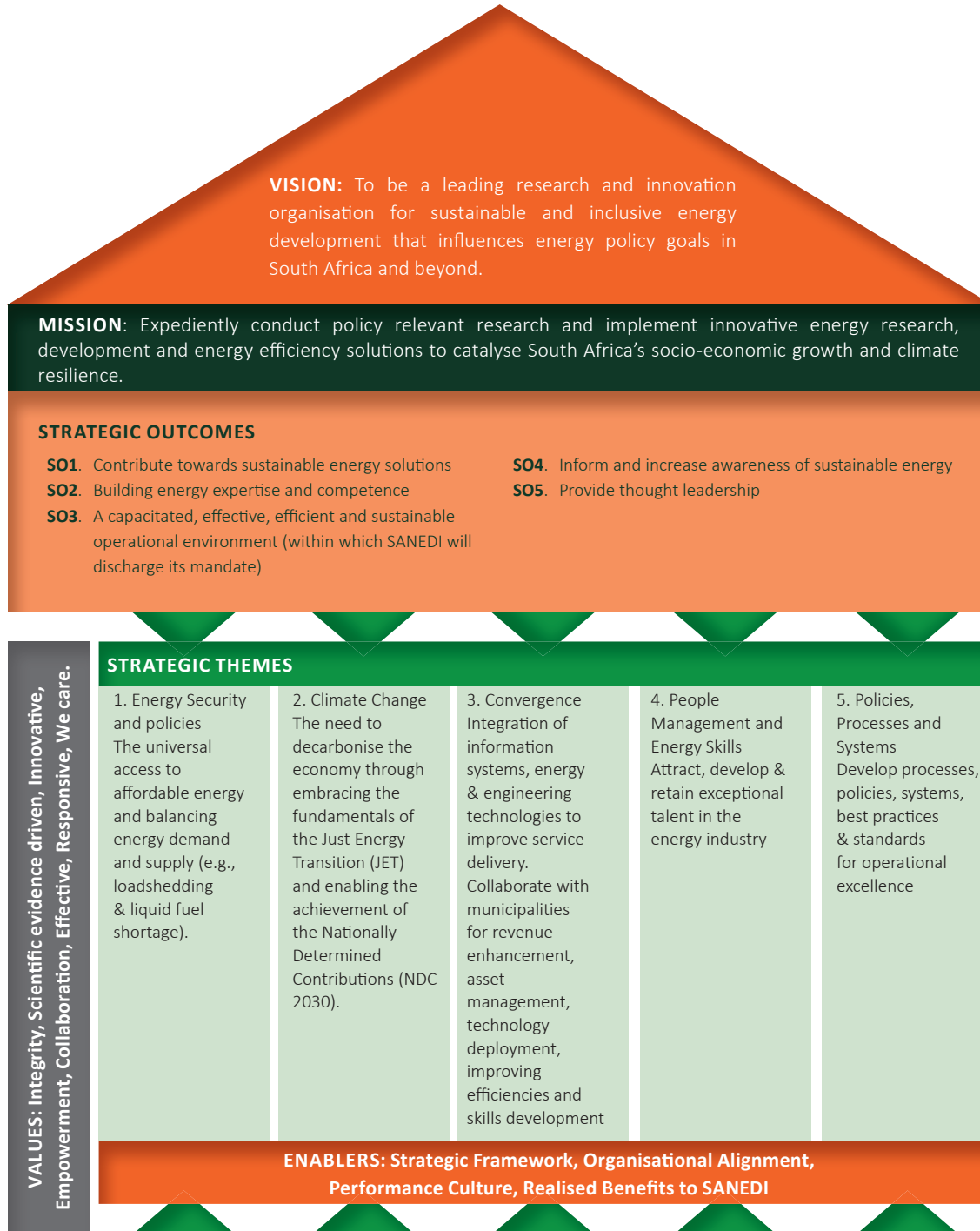
Expediently conduct policy relevant research and implement innovative energy research, development and Energy Efficiency (EE) solutions to catalyse South Africa's socio-economic growth and climate resilience.

## 7. VALUES



## 8. STRATEGIC THEMES

The following themes underpin SANEDI's 2020/25 strategy: -



## 9. SITUATIONAL ANALYSIS

SANEDI has adopted the revised framework for the Strategic Plan (SP) and Annual Performance Plan (APP) in the strategic term 2020/25. 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 Monitoring & Evaluation (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 on 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 Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, below.

STRENGTHS	WEAKNESSES
<p><b>Collaboration stock:</b> We have established and maintained relationships and partnerships with both internal and external Stakeholders.</p> <p><b>Organisational capability:</b> Great organisational capability to deliver and implement programmes and projects.</p> <p><b>Recognised brand:</b> Built and maintained a strong brand Locally and Internationally.</p> <p><b>High quality work output:</b> we have consistently produced high quality work output over the years.</p> <p><b>Management team:</b> Management has extensive experience in Energy, Research and Development (ERD).                      - <b>Resilient and committed workforce:</b> Resilient and committed workforce with extensive experience in energy research and program/project management. Well-equipped team to handle challenges.</p>	<p><b>Human Capital constraints:</b> High labour turnover, as SANEDI is losing experienced and skilled employees being replaced by young graduate engineers together, hence, <b>many positions are vacant. Skillset built around certain projects</b> might not work in the future.</p> <p><b>Financial constraints / funding model:</b> The organisation does not collect any form of revenue, and is reliant on the Shareholder and largely the donor community for funding.</p> <p><b>Prioritisation of programmes:</b> SANEDI manipulates donors to support its priorities</p> <p><b>Stakeholder Engagement:</b> SANEDI needs to improve on Stakeholder programmes.</p>
OPPORTUNITIES	THREATS
<p><b>New collaborations and partnerships:</b> There is a growing community of partners, and organisations working on various energy development initiatives including the <b>Decadal Plan<sup>2</sup></b>.</p> <p><b>Research:</b> There is a growing demand for theoretical and empirical investigations on energy policy and development.</p> <p><b>Financial self-sufficiency:</b> There are avenues (consulting fees, royalties, data sales) available for SANEDI to generate revenue and ensure financial self-sufficiency.</p> <p><b>Government Policy and programmes:</b> Promotion of programmes and policies designed to solve the Nation's and the World's energy issues.</p>	<p><b>Evolving Mandate:</b> Technology change and new energy problems are driving policy shifts.</p> <p><b>Local and Geopolitical instability:</b> Escalating International and internal political tensions affecting the economy, energy policies and SANEDI's Mandate.</p> <p><b>Funding risks:</b> The ability of SANEDI to carry out its Mandate is put at risk by a limited budget, and reduced funding commitments from the Shareholders.</p> <p><b>Skills shortage:</b> South Africa has a big shortage of critical engineering skills. The shortage of engineering professionals means that we don't have enough practitioners available for ongoing programmes and projects.</p>

Figure 3: SANEDI SWOT Analysis

It is noted that SANEDI conducts its research and pilot programmes using the laboratories and demonstration sites of its partners.

<sup>2</sup> The Decadal Plan is a roadmap for driving science, technology and innovation policy and programmes over the next ten years with specific areas of focus and development.

## 9.1 EXTERNAL ENVIRONMENT ANALYSIS

Socio-environmental issues currently dominate the global discourse. The effect of climate change is evident across the world, forcing political, economic and technological shifts. 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 present 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.

### 9.1.1 GLOBAL MACRO TRENDS

A key theme that underpins all the global mega trends, and which is therefore one of the mega trends, is the increasing convergence between industries and sectors through technology and its integrative power. Figure 4 shows a selection of trends and their impact. Note, these are global trends, which finds varying degrees of relevance within the South African context.

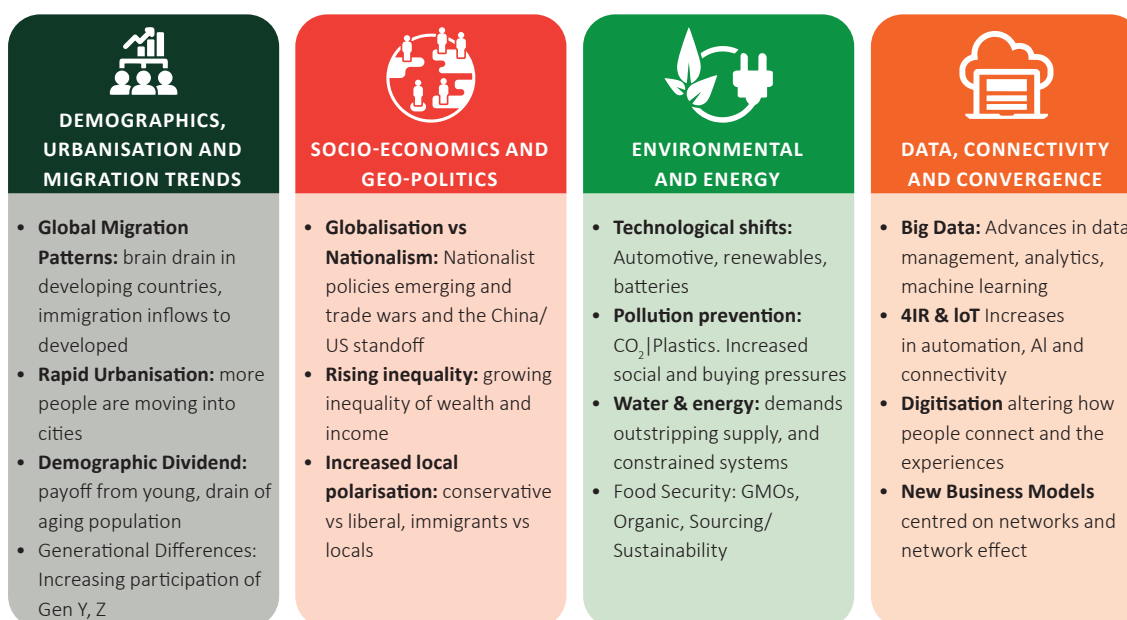


Figure 4: Global trends and their impact

#### 9.1.1.1 GLOBAL URBANISATION

Frost and Sullivan (2019) rated urbanisation as one mega trend 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 (GHG) emissions and use two-thirds of the world's energy. This calls for special focus on the transformation of cities to sustainable environments that can cater to the 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 Energy Efficiency (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.



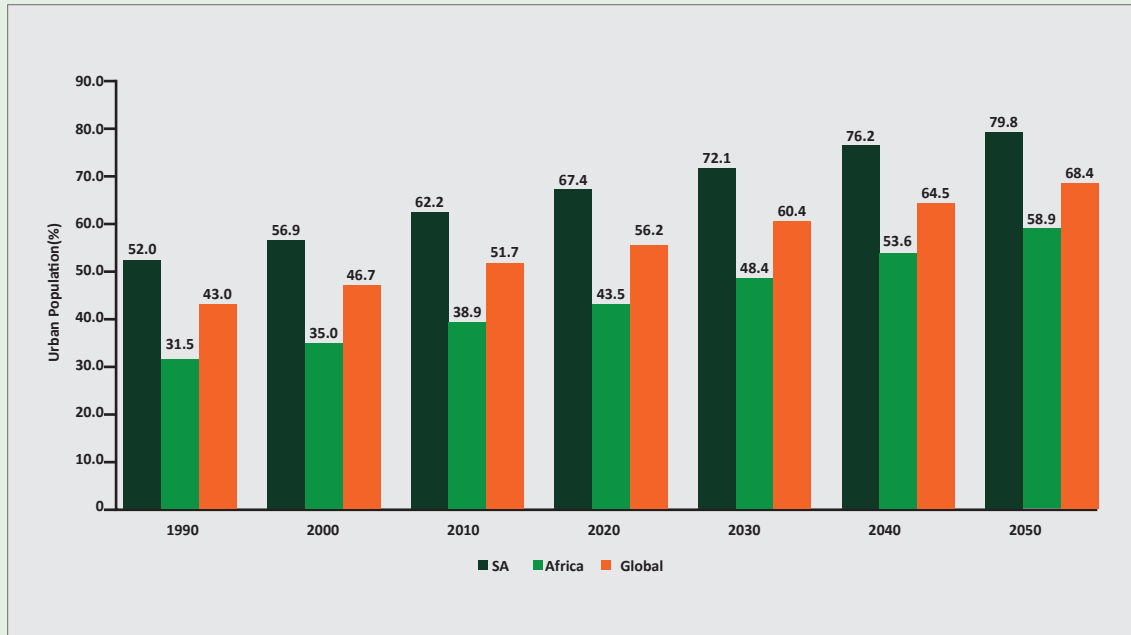


Figure 5: Global Urban Population Historical Trend and Forecast

### 9.1.1.2 CONVERGENCE AND SMART CITIES

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 aspects namely, 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.

### 9.1.1.3 ENERGY DEMAND

Changing energy policy, technology and consumer preferences will have an impact on how the world uses energy. Each driver has an impact on the other. The interaction varies according to local circumstances (available resources, public support) and can shift over time.

- **Technology**

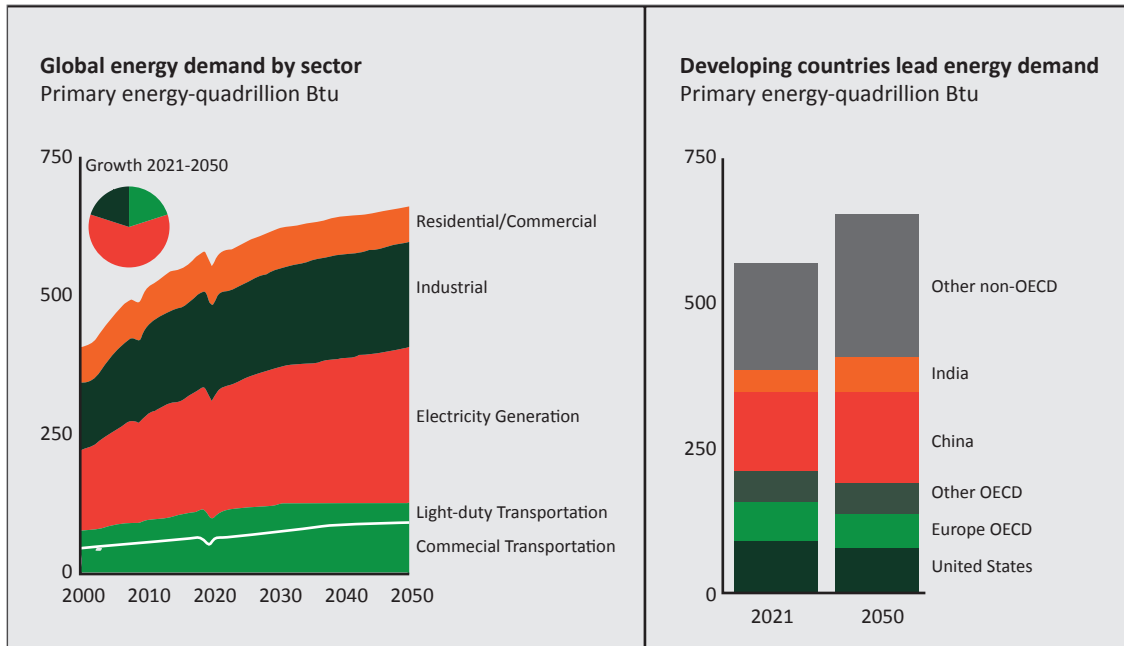
People can now do more with less thanks to advances in technology. The most successful technologies, frequently have supporting Government policies and commercial frameworks to achieve scale. Tax incentives, for example, can encourage the development of new technology, which must then compete without subsidies in order to reach a large enough scale to impact global markets. Consumer preferences can also generate a “pull effect,” increasing market demand for new technologies.

- **Policy**

Clear and consistent Government policies can stimulate new technology and influence consumer choices. Policies, for example, can encourage the adoption of new technology (free parking for electric vehicles) or discourage the use of an existing technology (restrictions on coal-based power). The converse is also true, policy that is not enabled by competitive technology or is not aligned with consumer preferences can be difficult to implement. It is difficult to impose something that consumers believe is inferior to current options.

- **Consumer preferences**

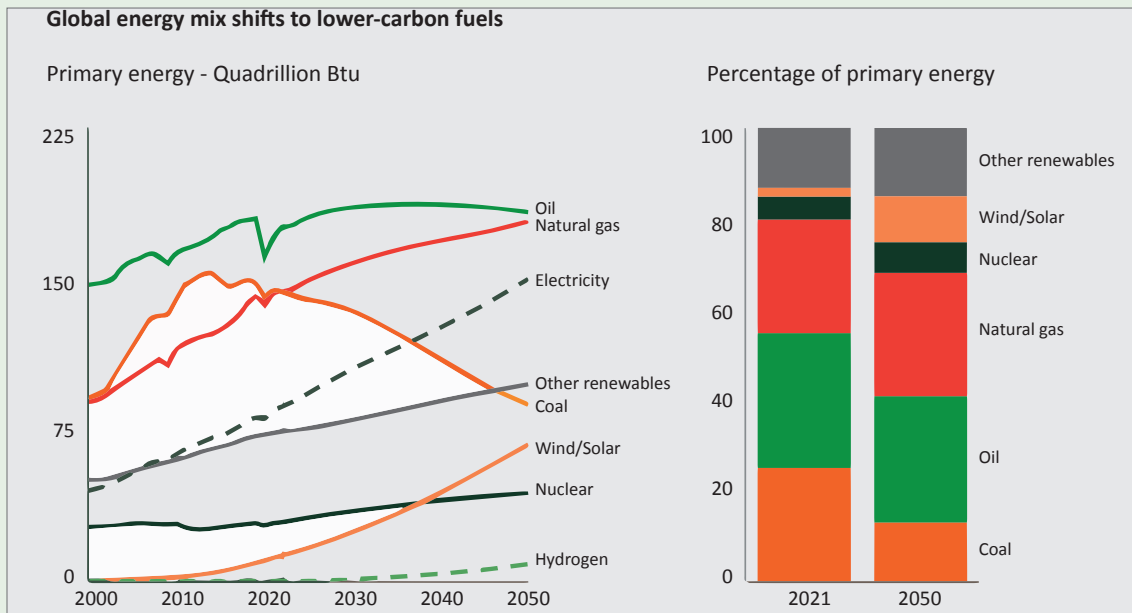
Consumer choices influence energy demand. These preferences may shift as new technology enables better options, such as lower costs and lower emissions. Policies that reward choices, such as a carbon tax, can also influence consumer preferences over time.



**Figure 6: Global Energy Demand by Sector and Country**

Source: IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: “Likely below 2°C” scenarios, IEA WEO 2021

- Global energy demand is expected to reach approximately 660 quadrillion Btu in 2050, up ~15% versus 2021, reflecting a growing population and rising prosperity.
- Residential and commercial primary energy demand is expected to decline by ~10% to 2050 as efficiency improvements offset the energy needs of a growing population.
- Electricity generation is expected to be one of the largest and fastest growing sectors, owing primarily to increased access to reliable electricity in developing countries. Increasing electrification is offset in part by efficiency gains in developed countries.
- Commercial transportation is expected to grow as expanding economies increase the need to move goods. Personal mobility also expands, but efficiency improvements and more Electric Vehicles (EVs) offset the increase in vehicle miles travelled.
- Global energy consumption continues to shift proportionally to developing economies where population, and economic growth are both faster than the global average. Non- Organisation for Economic Co-operation and Development (OECD) share of global energy demand reaches ~70% in 2050.
- Developing countries account for more than 100% of the global energy demand growth.
- Efficiency gains outpace economic growth in developed countries, which helps offset energy demand increases historically linked to economic expansion.
- The combined share of energy used in the U.S. and Europe declines from about 30% in 2021 to about 20% in 2050.



**Figure 7: Global Energy Mix**

Source: IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: “Likely below 2°C” scenarios, IEA WEO 2021

- Oil will continue to play a leading role in the world’s energy mix, with growing demand driven by commercial transportation and feedstocks for the chemicals industry.
- Natural gas to grow over the period, reaching almost 30% of all demand.
- Renewables and nuclear to see strong growth, contributing around 65% of incremental energy supplies to meet demand growth.
- Coal use to remain significant in parts of the developing world. It is expected to drop below 15% global share as China and developed nations shift toward lower-emission sources like renewables, nuclear and natural gas.
- Electricity, an energy carrier and not an energy source to grow approximately four times faster than overall energy demand.
- Future energy mix has a large range of potential outcomes.
- Share (%) by fuel type within primary energy mix in 2050.

#### 9.1.1.4 ELECTRICITY AND POWER GENERATION

##### Global electricity demand to rise by more than 70%

Electricity demand is expected to rise globally, fuelled primarily by increases in wind, solar, natural gas-fired generation, and nuclear power. In addition to meeting residential, commercial, and industrial demand, the growth of EVs in light-duty transportation is driving up electricity demand. Transportation battery cost reductions are being leveraged for other applications, including larger-scale electricity storage.

Today, batteries represent a small share of installed capacity on the grid, and they are primarily used for short-duration storage. Increased production from weather-dependent wind and solar leads to increased transmission, storage, and natural gas peaker plants that can generate power on short notice. To maintain reliable and affordable electricity, the world will require new commercially deployable solutions.



## Electricity generation highlights Regional diversity

Net delivered electricity – thousands of terawatt-hours

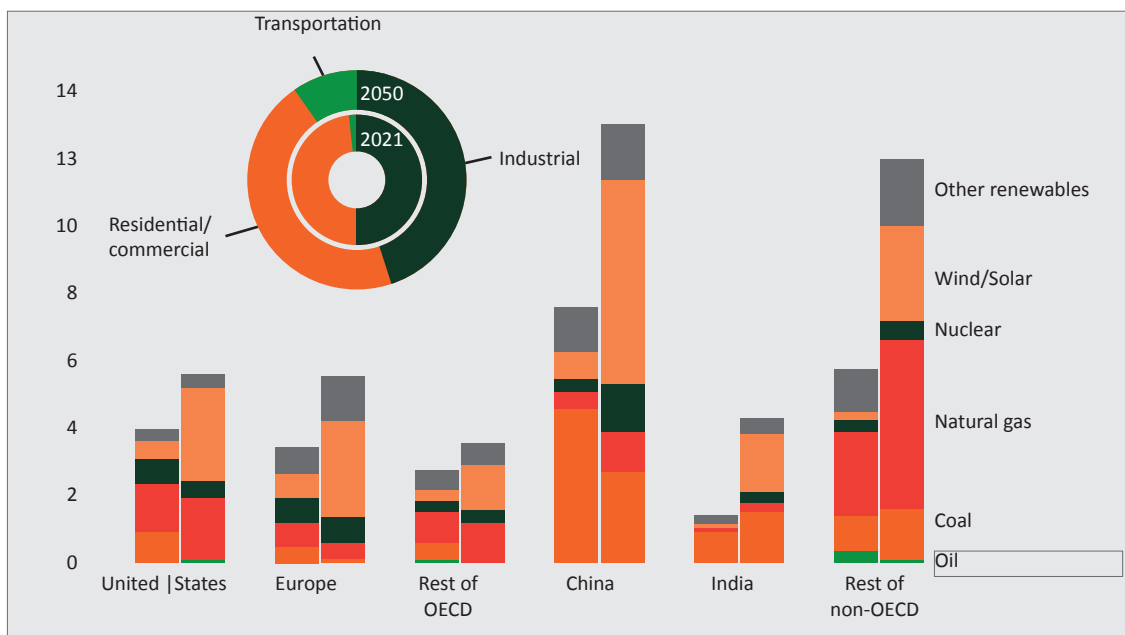


Figure 8: Electricity Generation Highlights Regional Diversity

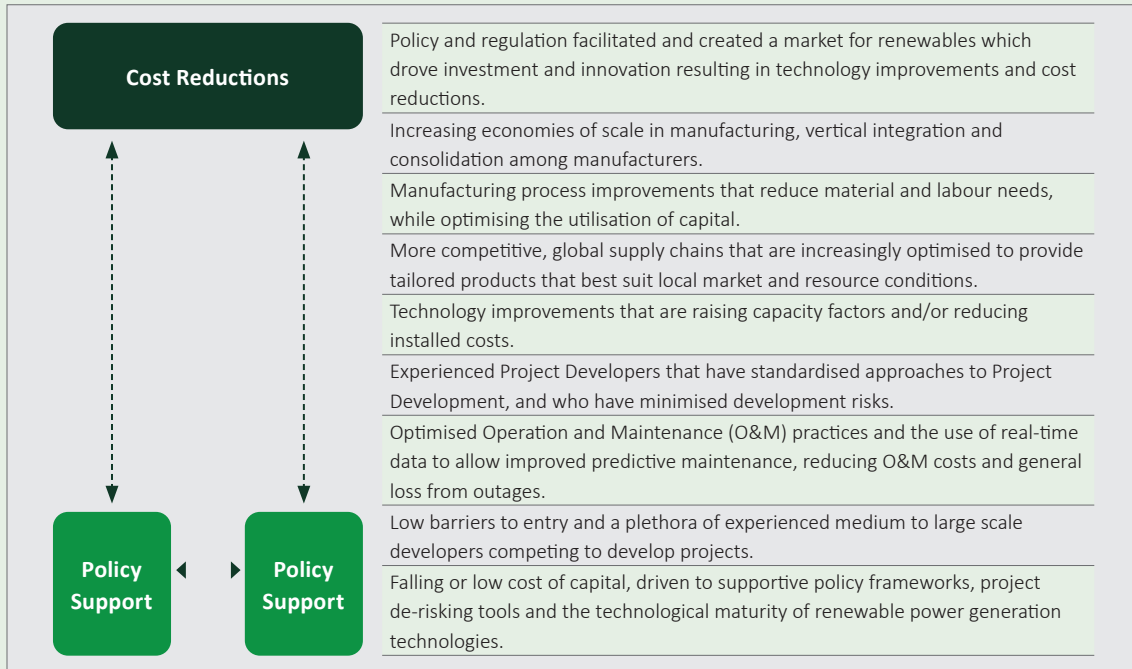
Source: IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: “Likely below 2°C” scenarios, IEA WEO 2021

- Geographically, the mix of electricity generation varies due to factors such as technology costs, domestic resource availability, and policy objectives (for example, renewable portfolio standards for local generation).
- Much of the world’s electricity generation continues to shift toward lower-emission sources, led by wind and solar, natural gas, and nuclear, based on local opportunities and policies.
- Coal-fired generation was the leading source of electricity in 2021 (accounting for more than 45% in developing countries). China’s coal-fired electricity is expected to decline by nearly 40% by 2050, with wind, nuclear, natural gas, and solar power replacing it primarily.
- As a result of emissions/fuel economy targets and cheaper batteries, the share of electricity used in transportation is expected to increase from its current low levels.

### 9.1.1.5 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 Renewable Energy (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 Independent Power Producer Programme (REIPPP) 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.

## Drivers for RE market uptake



**Figure 9: Drivers for Uptake for RE market**

It must be clear, that policy plays a crucial role in driving technological improvements which facilitates cost reductions, and drives economically sustainable solutions. In this regard globally, due to the technological advancements in processing, renewables are already economically competitive with Fossil Fuel.

### 9.1.1.6 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 Carbon Dioxide (CO<sub>2</sub>) 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 CO<sub>2</sub> emission reduction targets.

The South African President stated at the Copenhagen Conference of Parties of the UNFCCC that South Africa would increase its CO<sub>2</sub> emissions until the mid-2020s, plateau for 10 years and then decrease in real terms from the mid-2030s. Consequently, mitigating CO<sub>2</sub> 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 are being addressed by SANEDI.

Consumer patterns continue to drive market demand. Consumer behaviour trends are shifting as younger 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 EVs and so forth.

Tesla Inc. is a brand which initiated the trend towards EVs. Tesla lead US car sales in the second quarter of 2019 within the small and midsize luxury car market. The development and growth of the company has signaled 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 effective 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.

The figure below indicates the growing demand and production of EVs by Tesla Inc. 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.

## 9.2 THE SA ECONOMY

### 9.2.1 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 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.

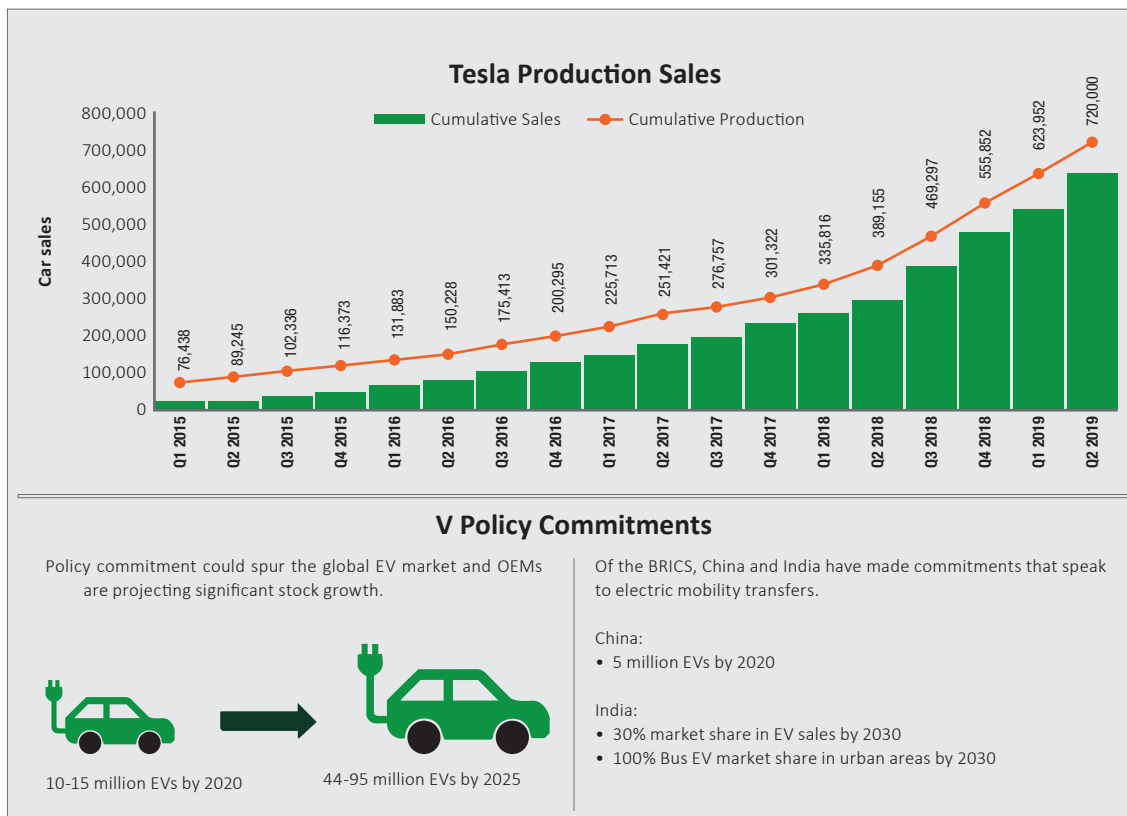
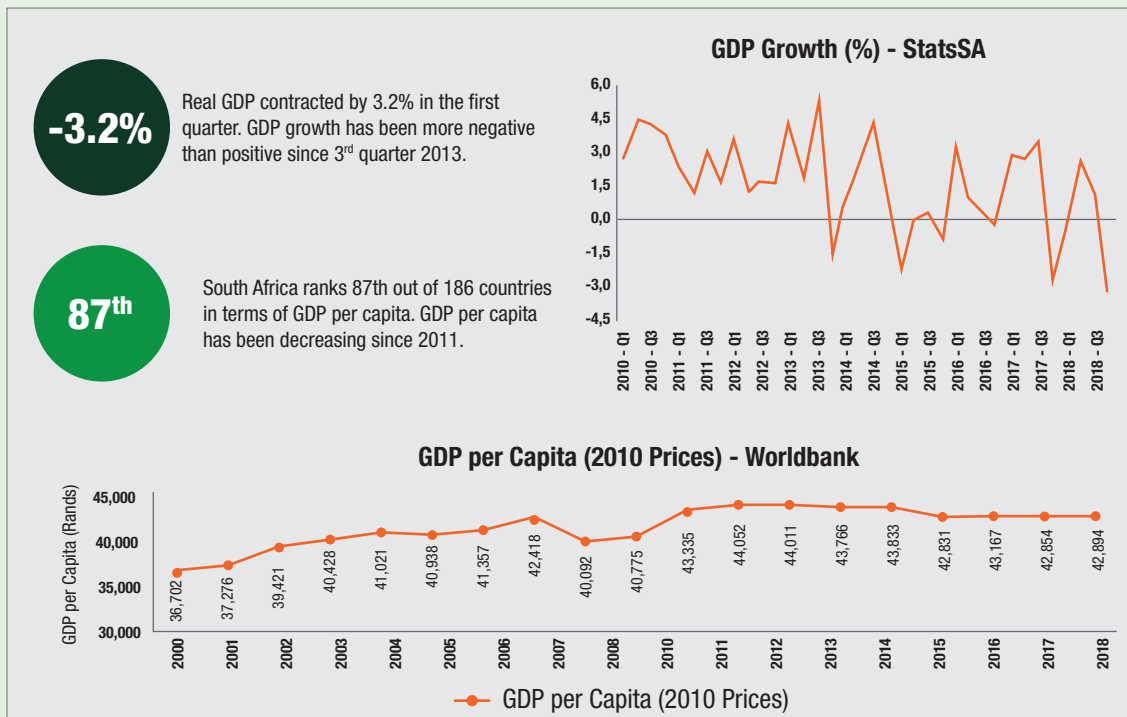


Figure 10: Global EV Market Potential





Source: World Bank Data, 2019

Figure 11: GDP statistics<sup>8</sup>

Unemployment continues to grow, currently at 29% by the official count. Youth unemployment sits at 56%, a rate that is among the highest in the world. Moreover, in 2014, South Africa had the highest level of inequality among 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 a 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, Tax, Depreciation and Amortisation (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 a combined arrears of R19 billion. The grave situation with the SOE has promulgated the appointment of a Chief Restructuring Officer (CRO) who must, among other priorities, transition Eskom into separate entities that focus on generation, transmission, and distribution respectively. This will have significant impact on, not only the structure of Eskom, but the local energy landscape as well.

### 9.2.1.1 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 debts to Eskom with no improvement. This is certainly a large factor in the extent of Eskom’s R440 billion debt that itself provides a key risk to our current sovereign debt issue. Table 3 shows the extent of the municipal debt. Moreover, only 18 out of 257 Municipalities in South Africa received clean audits.

Municipality	Debt in Rands
Free State	7 317 486 321
Mpumalanga	5 192 724 347
Gauteng	1 425 648 553
North West	424 464 273
Limpopo	402 093 606

According to Statistics South Africa (StatsSA) Financial Census of Municipalities for the year ended 30 June 2018, electricity sales made up 26.9% of municipal revenues, and electricity purchases made up 21.4% of municipal operating expenditure. Consumer debt to Municipalities sits at R165.5 billion overall. More than two-thirds of this debt is considered 'realistically uncollectable' by National Treasury (NT) as it has been owed for longer than 90 days.

A key cause of the rising debt levels is poor Financial Management, lack of financial and technical skills, and corruption.

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 financial management capacity. For example, Smart Grids (SGs) allow for real-time energy consumption data that can alert households and Municipalities to high consumption levels, while financial planning and Management ICT systems can assist in Financial Management. Automated payment and/or pre-paid systems, can reduce corruption and fraud and drive revenue enhancement within Municipalities.

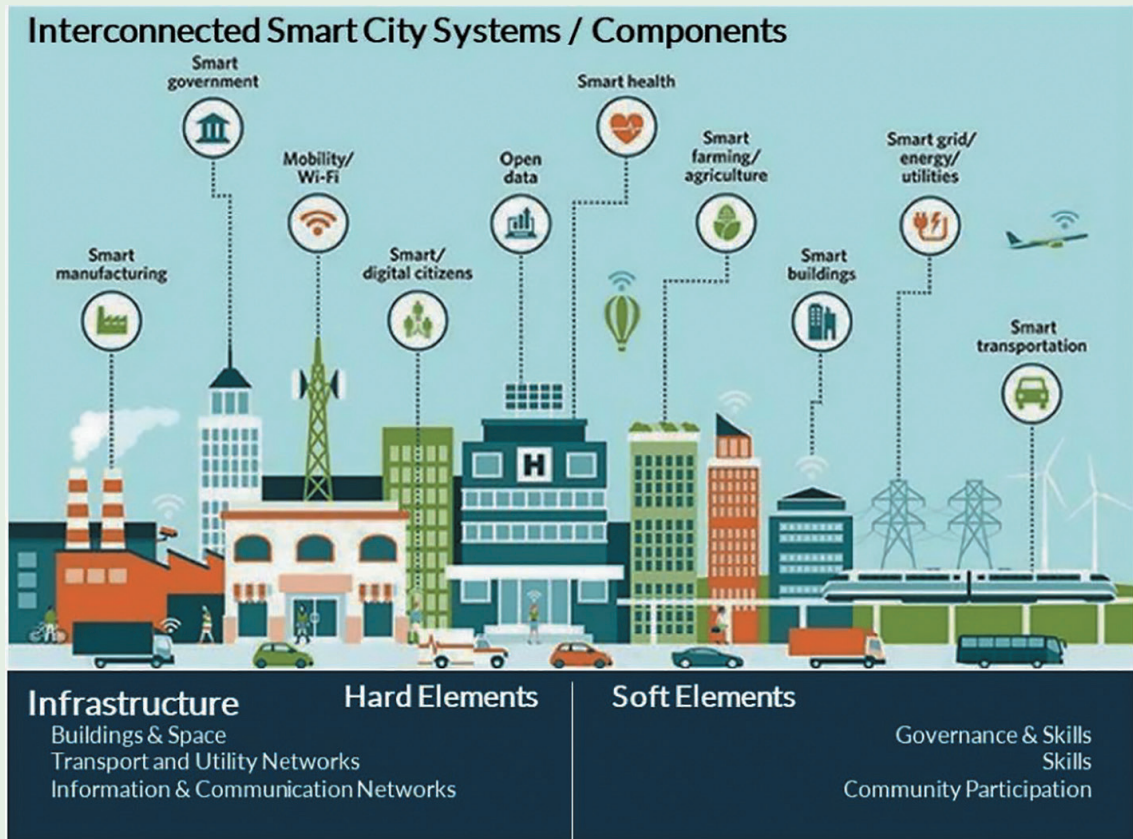
In this regard, Smart Cities, as highlighted in the section below, can provide tangible benefits in enhancing municipal revenue, while reducing costs, thereby reducing the current debt burden.

### 9.2.2 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 ways 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., user interface solutions) become connected to a centralised information store (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 centered on having integrated information in central data stores. This can be described by the image below.





**Figure 12: Dimensions of a Smart City**

SGs, 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 key part in energy demand and consumption. ERD of technologies have a role to play towards the sustainability of cities, and thus contribute towards economic growth. Figure 15 provides a framework on how Smart Cities can impact different sectors.

DEFINITION

The use of smart computing technologies to make critical infrastructure components and services of a city - which include city administration, education, healthcare, public safety, real estate, transportation and utilities - more intelligent, interconnected and efficient.

SMART CITY FRAMEWORK	CITY RESPONSIBILITIES						
	Universal Aspects	Built Environment	Energy	Telecommunications	Transportation	Water and Wastewater	Health and Human Services
ENABLERS	Inclusivity						
	Collaborativity						
	Governance						
	Instrumentation and Control						
	Connectivity						
	Interoperability						
	Security and Privacy						
	Data Management						
	Security and Privacy						
	Computing Resources						
	Analytics						

**Drivers**

- Growing urbanisation
- Growing stress
- Growing expectations
- Rapidly improving technology capabilities

**Drivers**

- Inadequate infrastructure
- Growing economic competition
- Growing environmental challenges
- Rapidly declining technology cost

**Barriers to Smart Cities**

- Siloed, piecemeal implementations
- Lack of ICT knowhow
- Lack of citizen engagement

**Barriers to Smart Cities**

- Lack of financing
- Lack of integrated services
- Lack of smart city visionary

**Benefits**

- More effective, data-driven decision making
- Enhanced citizen and government engagement
- Safer communities
- Reduced environmental footprint
- Improved transportation

**Benefits**

- Increased digital equity
- New economic development opportunities
- Efficient public utilities
- Improved infrastructure
- Increased workforce engagement

**Figure 13: Framework for Understanding Smart Cities<sup>10</sup>**

Within the energy sector, with a rising need for energy access, increasing utilisation of renewables and a greater requirement for access to the grid for distributed generation, SGs 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 14: 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.

### **9.3 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 National Energy Act, 2008 (No. 34 of 2008), with a focus on EE,ERDI.

#### **9.3.1 OPERATING MODEL (PEOPLE, PROCESS, TECHNOLOGY)**

SANEDI's operating model must comprise three components that speak to People, Process and Technology, which determines the organisation's capacity to action its business processes, thereby achieving the strategy. Strong, well defined business processes create a well-functioning organisation.

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 silo-d 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.

### 9.3.2 ORGANISATIONAL STRUCTURE

The organogram includes the SANEDI Board directly overseeing the Board Committees: Board Audit and Risk, Remuneration (BARC), Projects, Funding and Finance (PFF), and, Social Justice and Ethics (SJE). The SANEDI CEO reports to the Board, and oversees the three programmes: Administration, Applied ERDI, and, EE. Within those programmes are several sub- programmes as depicted in the figure below.

- **Board Structure**

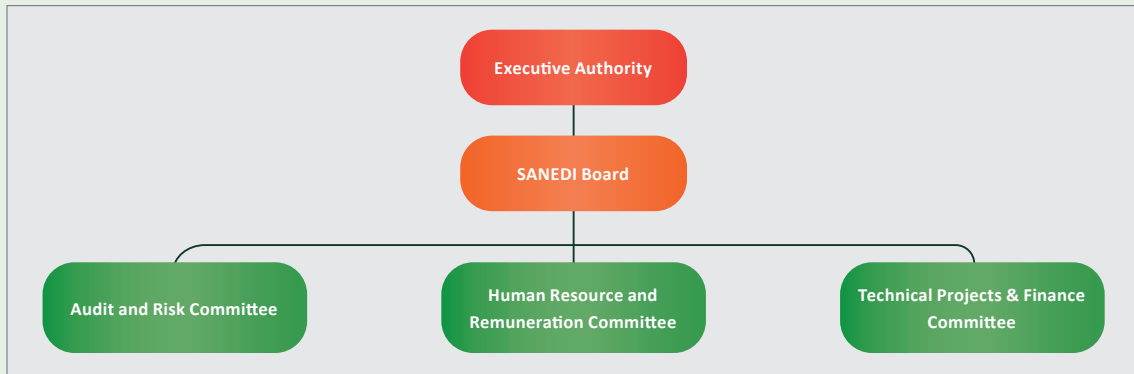


Figure 15: Board Structure

- **Management Organogram**

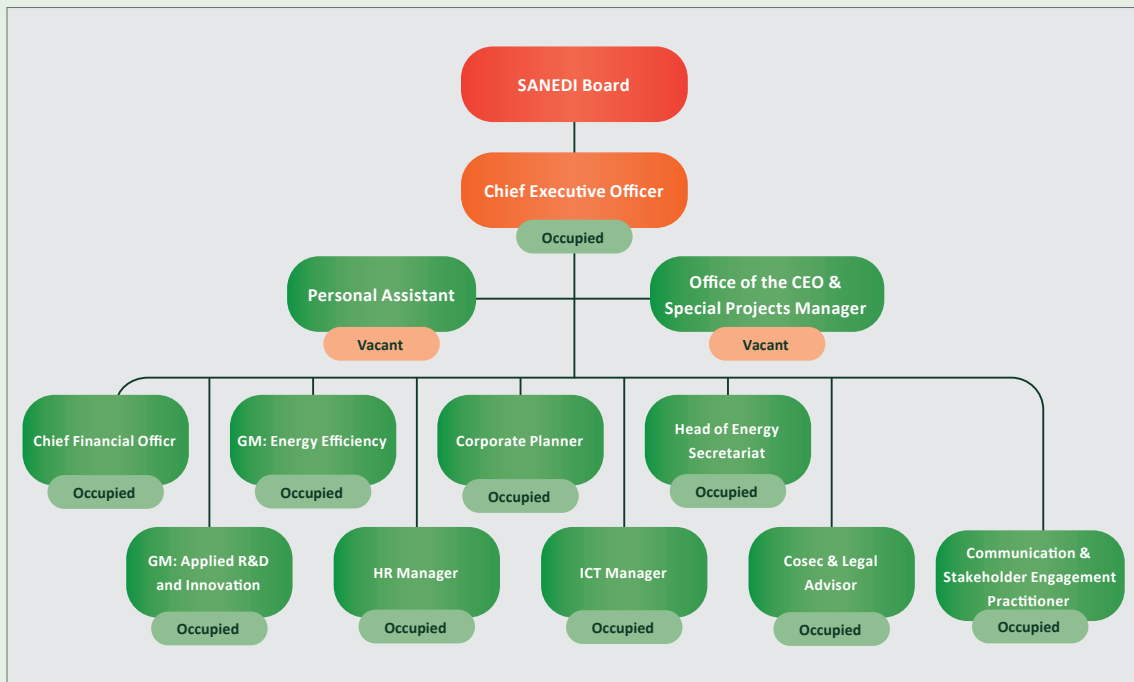


Figure 16: Management Organogram

- **Programmes and Sub-Programmes**

SANEDI has undergone an organizational restructuring and benchmarking exercise, to ensure efficient utilization resources in delivering the Mandate. Implementation of the new organizational structure will likely occur during the strategic cycle presented. Due to its broad Mandate, and limited funds available, resource effectiveness and efficiency by focusing on real value creation is key to the long-term sustainability of SANEDI. The programmes and sub-programmes highlighted in red are new as shown in Figure 17 below.

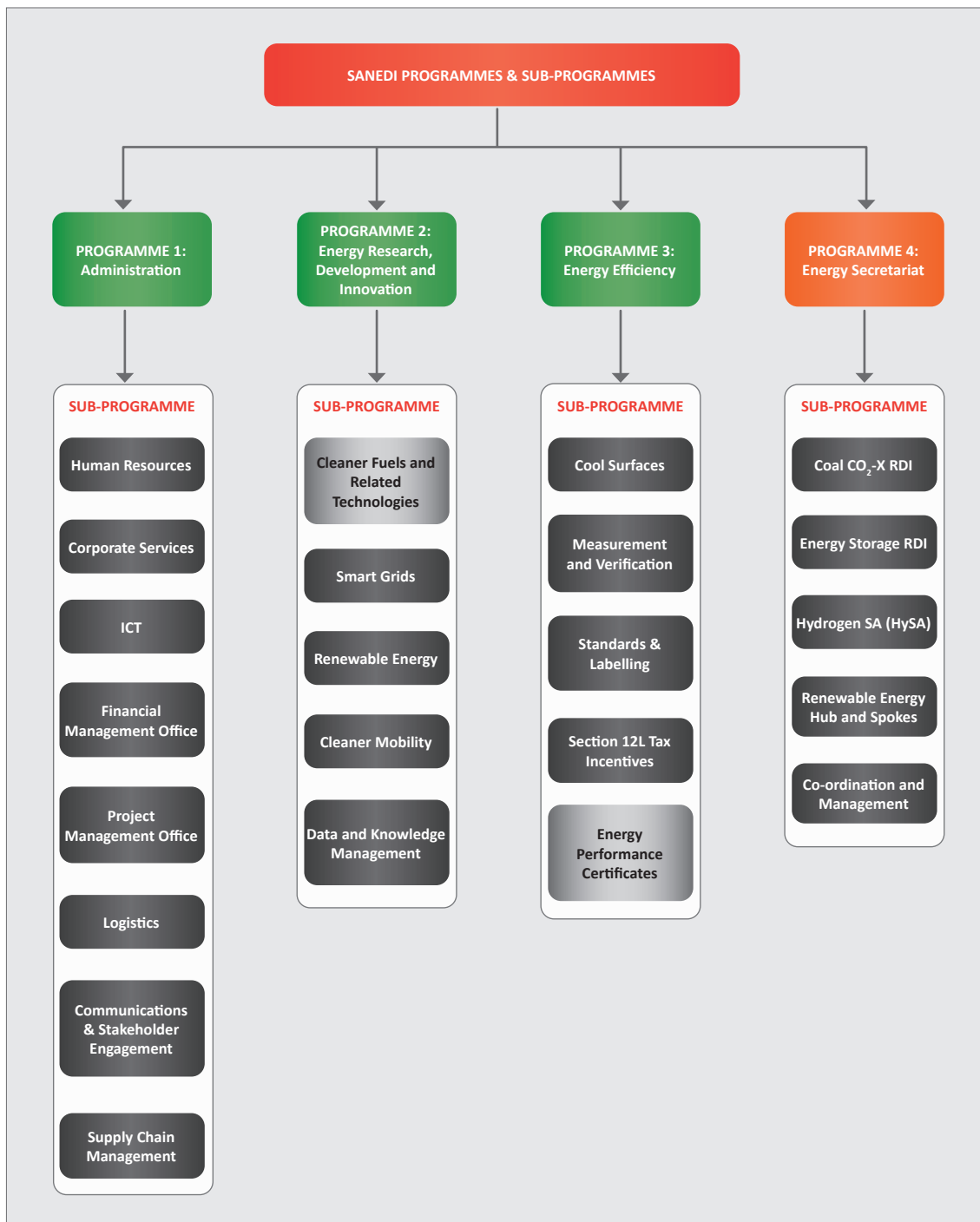


Figure 17: Programmes and Sub-programmes

### 9.3.3 FUNDING AND RESOURCE ALLOCATION

From a funding perspective, 65% 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. NT has, however, agreed to increase the base line allocation by an additional amount of R7 million, with an annual inflationary increase of 6% year on year in response to cost pressures, particularly 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.

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 increase from 2017/18 by an average of 4%. This is due to a combination of increasing staff costs and expenditure on goods and services. Staff costs are projected to increase by 6-7% per annum over the Medium Term Expenditure Framework (MTEF) period in line with inflation. At present, employee costs are currently 32% of total revenue which is a major risk for an Research and Development (R&D) organisation. Expenditure on goods and services administration strategic objectives has historically increased by 6% year-on-year, and is expected to increase annually by between 5.5-6% in future periods.

SANEDI programmes are largely securely funded, but there may need to be increased focus on funding shortfalls in the medium term.

### 9.4 STRATEGIC IMPLICATIONS

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

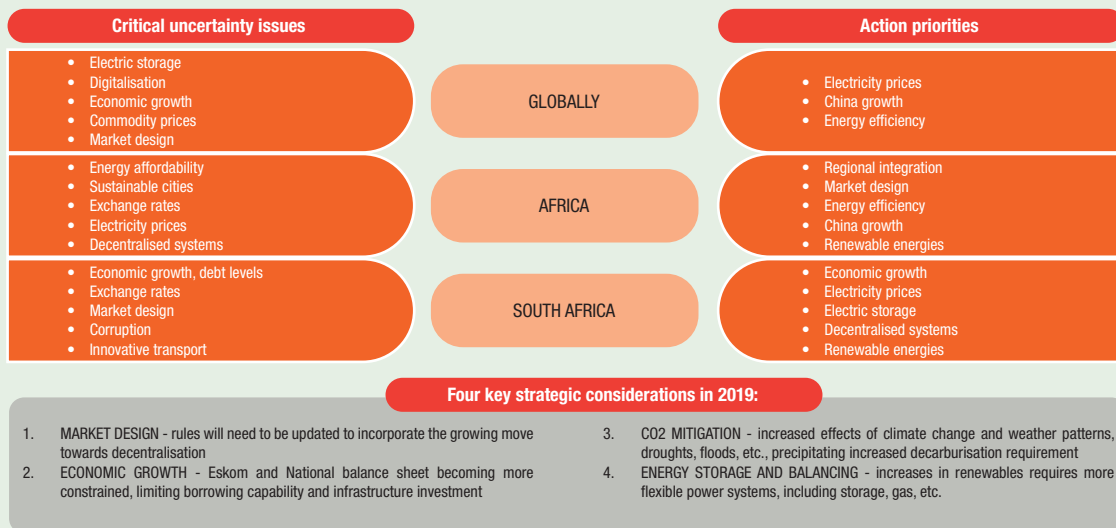


Figure 18: Critical Contextual Elements for SANEDI12

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. 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). This requires a co-ordinated effort between various Stakeholders across National, Provincial and Local Government, and include 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 CO<sub>2</sub>) 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, SA is still heavily reliant on Fossil Fuels for its energy requirements, and our International licence 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 policy makers and investors is a necessary and relevant requirement, specifically as we transition into a more information-centric environment.



# PART C: MEASURING OUR PERFORMANCE



## 5. INSTITUTIONAL PERFORMANCE INFORMATION

### 5.1 MEASURING THE IMPACT

No.	Statement
1.	Enabling decarbonisation and a just transition from a Fossil Fuel-based economy, to a cleaner energy economy for sustainable development.

### 5.2 MEASURING OUTCOMES

#### 5.2.1 INTERNAL PROCESSES AND CORE BUSINESS PERSPECTIVE

STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA (KPA)	KEY PERFORMANCE INDICATOR (KPI)	5 YEAR TARGET
1. Contribute towards sustainable energy solutions.	KPA1	Digitalised energy systems.	Number of energy solutions assessed ,either Advisory notes, or Feasibility reports, or Study reports, or Case studies, or Technology Roadmaps and demonstration projects/ facilities.	40
			Approved report on Cleaner Coal Technologies collaborations.	5
	KPA24	Technical and Research Publications.	Number of approved annual Energy Industry status reports.	5
			Number of Industry Roadmaps, or Sector Development plans, and industry support tools developed to promote energy related market/industry development.	10
			Annual energy industry insight (Trends) publications reflecting insights from extensive International, and National collaboration, interfacing and forums.	5
			Public Relations Management.	5
	KPA20	Public Relations Management.	Number of energy-related knowledge sharing events / platforms engaged in either, hosted by SANEDI, or attended by SANEDI staff, or knowledge presented by SANEDI staff.	5
	KPA12	Implement skills development interventions.	Number of recipients of energy-related training facilitated (excluding SANEDI staff).	15
	KPA6	Balancing Energy Supply and Demand (ESD).	Report on proof of concept to demonstrate load shifting and/ or reduction of up to 1000MW.	3
			Project definition (scoping and basic design) of Small-scale Embedded Generation (SSEG) contribution to load shifting and / or reduction 10MW.	3
	KPA2	Green House Gas (GHG) reduction through sustainable energy interventions.	Number of Energy Efficiency (EE) solutions implemented (12L).	125
			GHG emissions reduced (Mega tonnes Carbon Dioxide (CO <sub>2</sub> )).	0.5 Mega tonnes
			Number of EE solutions assessed.	15



STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA (KPA)	KEY PERFORMANCE INDICATOR (KPI)	5 YEAR TARGET	
1. Contribute towards sustainable energy solutions. (continued)	KPA9	Energy Secretariat.	Approved report detailing number of post-graduate students (Master's and Doctoral) supported in designated energy areas.	12	
			Approved report detailing number of commercial outputs in designated energy areas.	3	
			Approved report detailing number of artisans and/or technicians trained in the energy sector of the economy.	12	
				Approved report detailing number of University of Technology (UoT)/ Technical Vocational Education and Training (TVET) graduates offered experiential learning opportunities in the energy sector.	12
				Approved report detailing number of Intellectual Property Rights (IPRs) filed based on energy Research Development and Innovation (RDI).	3
				Approved report detailing number of stationary fuel cells/clean energy technologies deployed in partnership with Municipalities/District Municipalities.	12
	KPA13	Small Medium and Micro Enterprises (SMMEs) and Enterprise Development.	Approved report detailing number of SMMEs assisted/supported with business development and commercialization.	6	
	KPA8	Intellectual Property (IP).	IP Audit conducted.	3	
			Approved IP Management Policy.	3	
			Number of internal trainings on IP Management.	6	
	KPA13	SMMEs and Enterprise Development.	Number of localised technologies.	6	
			Number of SMMEs supported.	6	
	KPA17	Local, Regional and International partnerships.	Local- Maintaining representation/ partnership/ agreements on: Councils, Boards, Reference groups, Steering Committees, NATJOINTS, NACI, IPP office, State-owned Entities (SOEs).	24	
			Regional: Maintaining representation/ partnership/ agreements on: memberships, Councils, Boards.	6	
			International: Maintaining representation/ partnership/ agreements on: IEA memberships, Councils, Boards, Reference groups, Steering Committees.	12	



STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA (KPA)	KEY PERFORMANCE INDICATOR (KPI)	5 YEAR TARGET
1. Contribute towards sustainable energy solutions. (continued)	KPA4	Catalyse balanced Just Energy Transition (JET).	Approved Research study providing insights on technology options, or benchmarks and lessons learnt, or employment vulnerability and sector jobs resilience plans for JET to enable Policy development.	3
			Number of Stakeholders trained on JET in various interventions.	150
	KPA23	Publications.	Published updated 5-year Strategic Plan (SP).	3
			Published Annual Performance Plan (APP).	3
			Published Annual Report (AR).	3
			Approved report detailing number of UoT/ TVET graduates offered experiential learning opportunities in the energy sector.	12
			Approved report detailing number of IPRs filed based on energy RDI.	3
			Approved report detailing number of stationary fuel cells/clean energy technologies deployed in partnership with Municipalities/District Municipalities.	12
	KPA13	SMMEs and Enterprise Development.	Approved report detailing number of SMMEs assisted/supported with business development and commercialization.	6
	KPA8	Intellectual Property.	Conduct IP Audit	3
			Approved IP Management Policy.	3
			Number of internal trainings on IP Management.	6
	KPA13	SMMEs and Enterprise Development.	Number of localised technologies.	6
			Number of SMMEs supported.	6
	KPA17	Local, Regional and International partnerships.	Local- Maintaining representation/ partnership/ agreements on: Councils, Boards, Reference groups, Steering Committees, NATJOINTS, NACI, IPP office, SOEs.	24
			Regional- Maintaining representation/ partnership/ agreements on: Memberships, Councils, Boards.	6
			International- Maintaining representation/ partnership/ agreements on: IEA memberships, Councils, Boards, Reference groups, Steering Committees.	12

STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA (KPA)	KEY PERFORMANCE INDICATOR (KPI)	5 YEAR TARGET
1. Contribute towards sustainable energy solutions. (continued)	KPA4	Catalyse balanced JET.	A research study providing insights on technology options, or benchmarks and lessons learnt, or employment vulnerability and sector jobs resilience plans for JET to enable Policy Development,	3
			Number of Stakeholders trained on JET in various interventions.	150
	KPA23	Publications.	Published updated 5-year SP.	3
			Published APP.	3
			Published AR.	3

## 5.2.2 LEARNING & GROWTH PERSPECTIVE

STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	5 YEAR TARGET
2. Building energy expertise and competence.	KPA11	5.Collaboration with industry, tertiary education bodies and Sector Education and Training Authority (SETAs).	Number of energy-related research students / contracted researchers supported either bursaries or non-bursaries.	25
			Number of recipients of energy data related training facilitated (excluding SANEDI).	75
			Application for full South African National Accreditation System (SANAS) accreditation for Measurement & Verification, and Energy Performance Certificates (EPCs) works.	5

## 5.2.3 PEOPLE PERSPECTIVE

STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	5 YEAR TARGET
3. A capacitated, effective, efficient and sustainable operational environment (within which SANEDI will discharge its Mandate).	KPA14	HR recruitment.	Percentage of training undertaken as per Executive Committee (Exco) approved Annual Training Plan.	80%
			Vacancy rate of funded positions.	<5 %
			Percentage deviation from Employment Equity (EE) targets.	<10 %



## 5.2.4 CUSTOMER & STAKEHOLDER PERSPECTIVE

STRATEGIC OUTCOME	KPA	KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	5 YEAR TARGET
4. Inform and increase awareness of sustainable energy.	KPA19	Developing and implementing communications strategy.	Communications and Stakeholder Engagement strategy, and plan reviewed and approved.	3
			Report on implementation of Communications and Stakeholder Engagement strategy and plan.	
			Review Communications and Stakeholder Engagement strategy and plan.	12
			Implementation of Communications and Stakeholder Engagement strategy and plan.	12
			Number of media engagements (media releases).	36
	KPA20	Public Relations Management.	Strategic Energy Dialogue.	3
			Outreach programmes (Community consultations to obtain buy-in).	3
			Number of Stakeholder perception surveys.	3
			Number of Strategic Energy Dialogues.	3
	KPA21	Social / Digital media / Radio and Television.	An interactive website maintained annually	6
			Social Media Perception Index Report.	3
			Radio and Television engagements.	24
	KPA22	External Events.	Number of industry knowledge sharing events and marketing platforms hosted to promote energy related market/industry developments.	3
			SANEDI Annual Conference.	3
	KPA5	Energy Research, Development and Innovation (ERDI).	Number of energy-related knowledge sharing events / platforms engaged in, either hosted by SANEDI, or attended by SANEDI staff, or knowledge presented by SANEDI staff,	12
Number of recipients of energy-related training facilitated (excluding SANEDI staff).			600	
KPA24	Technical and Research publications.	Number of approved Annual Energy Industry Status reports.	10	
		Minimum number of energy-related datasets maintained per annum.	10	
		Number of policy support instruments, either Industry Roadmaps, or Sector Development plans, or Industry support tools.	5	
5. Provide thought leadership.	KPA3	Energy Policy support.	Number of approved Sectorial reports produced.	6
			Number of EE energy-related datasets maintained per annum.	15
			Number of EE solutions implemented (Standards and Labelling (S&L)).	48

### 5.2.5 FINANCE PERSPECTIVE

STRATEGIC OUTCOME		KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	5 YEAR TARGET
3. A capacitated, effective, efficient and sustainable operational environment (within which SANEDI will discharge its Mandate).	KPA18	Financial Management.	Approved sustainable Funding model.	1
			External Audit outcome.	3
			Percentage of Internal Audit findings resolved.	80%
			Ratio of project costs to admin expenditure.	0
			Percentage Capital Expenditures CapEx budget spent.	95%
			Funding leveraged as percentage of received allocation.	20%
			Percentage of expenditure in relation to approved budget.	100%
			Percentage of funded budget overspent.	0%
	KPA15	Supply Chain Management (SCM).	Procurement as per the Procurement Plan.	60%
	KPA7	Information and Communications Technology (ICT).	ICT vulnerability assessment and penetration test.	6
ICT Governance maturity assessment.			70%	

### 5.2.6 COMPLIANCE PERSPECTIVE

STRATEGIC OUTCOME		KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	5 YEAR TARGET
3. A capacitated, effective, efficient and sustainable operational environment (within which SANEDI will discharge its Mandate).	KPA16	Governance, Risk and Compliance.	Quarterly review of strategic risks and operational risks.	12
			Compliance Universe report.	12

### 5.3 PROGRAMME 1: ADMINISTRATION

The following is a list of programmes and associated sub-programmes conducted by SANEDI. The purpose of Programme 1 is to create an effectual delivery environment for SANEDI that is fully compliant with all statutory requirements, and covers the following sub-programmes.

Sub-Programmes	
<b>14.1.1. Human Resources</b>	<b>14.1.2. Information and Communications Technology (ICT)</b>
Managing employee related processes and affairs, as well as administration of employee benefits in an efficient manner to ensure that SANEDI has an adequately capacitated, motivated staff complement.	Support efficient operations and ensuring data processing, integrity and availability.
<b>14.1.3. Corporate Services</b>	<b>14.1.4. Financial Management</b>
Facilitate transparency and compliance from a Legislative and Governance perspective. Incorporating all lines of business and support activities relating to the Board, and Board Committees.	Delivery of business and support activities relating to the effectual financial management, financial reporting and auditing practices.
<b>14.1.5. Supply Chain Management</b>	<b>14.1.6. Communications &amp; Stakeholder Engagement</b>
To ensure efficient and effective SCM processes, that are compliant procurement regulations.	To ensure effective communications with all Stakeholders through robust Stakeholder engagement, client satisfaction surveys, public awareness campaigns in collaboration with the DMRE and media intelligence support services.
<b>14.1.7. Shared Logistics</b>	<b>14.1.8. Project Management Office</b>
To ensure compliant health and safety shared facilities, resources for a conducive and productive working environment.	Ensure adequate project selection resource allocation, Project Management and performance monitoring.

### 5.4 PROGRAMME 2: APPLIED ENERGY RESEARCH, DEVELOPMENT & INNOVATION

During October 2019, Cabinet approved the Integrated Resource Plan (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 in meeting the 2030 National Development Plan (NDP) goals.

The 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 Photovoltaics (PV), bio-energy and wind through micro grids 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 makes it imperative for the country to aggressively start investing into Cleaner Coal Technologies (CCTs), 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 Greenhouse 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 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 adoption of new technologies.

For the (2020/25) Medium Term Strategic Framework (MTSF) period, SANEDI will be mainly focusing on provision of information, develop and maintain datasets, and implement pilots 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 security of energy supply through a number of targeted initiatives.

### **Pilot studies to test the viability of new technologies:**

#### **Cleaner Fuels and Related Technologies Sub-programme**

There are changes in the Cleaner Fossil Fuels (CFF) programme, and as from 1 September 2020, certain sub-programmes under CFF were transferred to the Council for Geoscience (SGS) as per the Minister's approval. To this end, the Pilot Carbon Dioxide Storage Pilot Project (PCSP), the Carbon Capture Utilisation and Storage (CCUS) project, and the team have been transferred to the Council for Geosciences (CGS) for further implementation and custodianship. The transfer of CCUS to CGS is a logical step, as SANEDI had been working with the CGS throughout the CCS programme. The move has resulted in extra staff being available to work on the programme. Moreover, it has resulted in two major revisions to the CCUS programme: -

- Since the launch of the original Atlas, the CGS has undertaken further geological analyses indicating further possible geological storage sites. Consequently, the PCSP has been moved from the KZN Province to the Mpumalanga Province, closer to the source of point CO<sub>2</sub> emissions, and
- Technologies, enhanced coal-bed methane, underground coal gasification and enhanced geothermal energy extraction, have been added to the scope of utilisation under investigation.

We believe that exploration of solutions in CFF is important, and that there is scope outside of CCUS that should be explored. We are now moving from CFF to Cleaner Fuels & Related Technologies and through demonstrated cleaner energy initiatives, SANEDI will support the SETAs and Incubators, to enable the development of skilled (SMMEs) in the clean energy sector.

Going forward, SANEDI's Cleaner Fuels & Related Technologies portfolio will focus on cleaner coal technologies such as sulphur emissions reduction technologies like Flue Gas Desulphurisation (FGD), particulates emissions reduction technologies like high-frequency transformers combined with chemical injection, Nitrous Oxide (NOx) reduction technologies and ash utilisation and beneficiation.

#### **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 several partnerships in up skilling, 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, 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.



## 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. Several 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, several 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. Pilot projects have already demonstrated, and increased skills capacity, as well as creating small and micro businesses particularly within the Limpopo Province to date. As SANEDI rolls out this technology, we are expecting to see even more skills creation and small/micro businesses capacitated and empowered. This is expected to be supported through the SANEDI collaboration with the Cool Surface Associations in establishing an accreditation laboratory for South African manufactured Cool Surface products. Training will focus on mainly the youth and women, to create opportunities for these groups to alleviate poverty and unemployment.

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 Resource Map

The Wind Atlas for South Africa (WASA) project is a renewable resource measurement project, for wind potential in South Africa, that has seen 18 wind measurement masts built across five Provinces. Providing reliable high-resolution data on the wind energy resource for South Africa, has the ultimate benefit of being able to level the playing field for wind energy developers, and provide a much-needed boost in RE site development. 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, to enable the continuous assessment of wind potential in South Africa. The project is currently in its third phase and is being undertaken in partnership with the DMRE, South African Weather Services (SAWS), Council for Scientific and Industrial Research (CSIR) and the Danish University of Technology (DTU).

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. 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 and collaborators, SANEDI will explore opportunities for Photovoltaics' (PV) and battery storage as options for ensuring energy security in South Africa.

SANEDI will furthermore explore, map, with thorough modelling of scenarios, identify opportunities for consolidating environmental rehabilitation initiatives with power generation opportunities, and exploring the potential for repurposing sites from retired power plants as sites for RE power plants. Feasibility studies supporting this concept will, as far as funding allow, be conducted with the aim of developing viable business cases should they be a pursuable option.

Through its partnership with the Department of Defense (DoD), SANEDI is exploring the possibility of piloting fit-for purpose micro, small and medium scale PV with battery storage for energy security to meet National priority demand within the Defence Force mandate.



## Plaswen

SANEDI commissioned the South African Nuclear Energy Corporation (NECSA) to design, build and demonstrate a proof-of-concept waste pyrolysis machine. The unit can treat between 0,2 and 0,5 tonnes of municipal green waste per day, while able to produce between 10 and 25 kW. The unit can further treat COVID-19 material waste, mixed solid waste, and tyres. It is scalable and can treat larger waste volumes and produce more electricity over time.

## SOLTRAIN

The Solar Thermal Training and Demonstration Initiative (SOLTRAIN), funded by the Austrian Development Agency (ADA) has been active within South Africa since 2009. SANEDI has collaborated with this initiative since its inception, and since 2016 is the official implementation partner of this project in the country. To date, it has achieved over 600 demonstration systems, over 4000 persons trained, awareness generation, industry capacitation and boost, as well as developing business cases and roadmaps for solar thermal implementation across six South African Development Community (SADC) country partners. Through this project, South Africa has been able to place the largest district heating system in Saharan Africa, marking the country in the top 20 in 2019.

## SANEDI CSIR Thermal Lab

South African industry has historically developed in an environment of low coal and electricity prices. This has resulted in a wide range of industrial processes that are inefficient and carbon intensive. Rapidly increasing energy costs, coupled with the need to reduce GHG emissions, requires industrial consumers to optimise, and in some cases redesign their thermal generation and distribution systems. Waste Heat Recovery (WHR), Power-to-Heat (PtH) and Thermal Energy Storage (TES) technologies have the potential for concurrent cost savings and decarbonisation, but the development of these technologies requires innovative Research and Development (R&D) solutions for the South African market.

Initial objectives of this lab are to conduct modelling and technology development into WHR, PtH and TES systems to support industrial competitiveness. Simulation and analysis will guide the optimisation of thermal energy systems, and in cases where off-the-shelf solutions are not readily available in the market, targeted R&D will be conducted in partnership with industry to develop novel solutions.

## SANEDI DoD partnership

SANEDI and the DoD are currently engaged in an energy collaboration that allows them to essentially pilot and demonstrate technologies that are fit for purpose in South Africa on DoD facilities. These technologies stretch across the EE and RE space, and are designed to be able to prove that RE technologies can be adapted to deliver according to requirements across the variety of sectors. Currently SANEDI has 17 active projects at different scales with the National Defence force, demonstrating technologies such as Cool Surfaces, PV, Biogas, Storage, Energy Efficient Lighting, Energy Efficiency, Energy Security, Water Treatment using EE and RE. Included in all of these is skills development, technology proof and transfer, ultimately leading to an economic boost through industry support during project duration, focused on business case and return on investment in situ real application.

## DSI Solar RDI Programme

This program is designed to accelerate solar technologies in the market, create industry and skills in the sector in South Africa, and advance new and innovative technologies to pilot and potential commercial stage. The mainstream component of this project has yielded three primary outputs, an innovative inverter technology, waste to energy technology, and a portable solar energy device that can be scaled up to container size for small and micro business use. This program is currently winding down, though further offshoots will be showcased under the Energy Secretary within SANEDI.

## International relations

SANEDI represents South Africa and the DMRE in several International fora. At least three of these are within specific technologies of the International Energy Agency (IEA) task projects, which focus on solar heating and cooling technologies, bio-energy and GHG. The renewables program also collaborates closely with the German Development Agency (GIZ), the Austrian Development Agency (ADA) and the Swiss Development Agency (SDC), towards Cleaner Energy Technologies and a sustainable future.



## **Viability and Validation Innovation Service Delivery Programme (VVISDP).**

The Department Science and Innovation (DSI) submitted a proposal and successfully secured European Funding. The programme management comprises a consortium from the CoGTA, DSI, TIA and SALGA. TIA appointed SANEDI to manage the Energy Management component of the VVISDP. The programme is divided into four work streams and six projects. Viable Energy Management technologies will be demonstrated at selected Municipalities whose submitted proposals were approved. These Municipalities include City of Cape Town, Drakenstein, City of Mbombela, and Rustenburg. SANEDI will earn an 8% Management Fee from the overall Energy Management sub-programme budget of an estimated R50 million.

### **Data Knowledge Management Sub-programme**

SANEDI plans to be a data repository for energy data in South Africa, and 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. These are annually maintained and available at no cost to Stakeholders:

- WASA database,
- Energy Services Company (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 the following datasets:

- Commercial database,
- Industrial database,
- Agricultural database,
- Standards and labelling database, and
- Public Infrastructure database (public buildings & wastewater treatment plants).

### **Cleaner Mobility Sub-programme**

Top of the agenda for the country with respect to reduction of GHG emissions and also ensuring reliable transportation, under the MTSF, Government plans to focus on making improvements to the rail infrastructure to divert traffic from roads to rail systems. An opportunity, therefore exists to invest in energy efficient technologies, and to incorporate RE sources as part of this infrastructure improvement project.

SANEDI plans to investigate the feasibility of incorporation of renewables within the SA rail networks, as a way of reducing the carbon footprint from rail transportation, reduction of electricity costs, and ensuring that stations are energy efficient. Subject to available funds, a business case in co-operation with the relevant department and utility, will then be created for the incorporation of such in the future and made available to possible Stakeholders.

In collaboration with the Department of Transport (DoT), CoGTA and Municipalities, SANEDI will be exploring funding opportunities to green municipal fleets. SANEDI will, working with CoGTA and the DoT, be guided by the district model in prioritising areas for demonstration pilots.

### **Smart Grids (SGs) Sub-programme**

Since 1994, Municipalities have faced service delivery challenges which are attributed to poor financial management, inadequate human and institutional capacity, overstretched infrastructure, and generally weak governance systems. The service delivery challenges persist, despite Government channelling increasing resources (transfers) to the Local Government sphere. The increased resources channeled into the local sphere, have not translated into commensurate service delivery improvements in most Municipalities. Therefore, injecting more resources is a necessary intervention, but may not be enough to solve all the challenges facing the sector.

The efficiency, and effectiveness, with which resources are used in this sphere are critical for optimal service delivery. Poor service delivery characterises many Municipalities, producing outcomes such as the frequent, and sometimes violent protests by residents clamouring for better services. Local Government is at the coalface of service delivery, and any failure in the sector is fundamental, not only in shaping public opinion about the entire Government system but also, more importantly, has the potential to undermine the overall socio-economic development of the country. Since 1994, the South African Government has instituted several public sector reforms to enhance the performance of Municipalities. The list includes Policy and Legislative changes (e.g., Municipal Finance Management Act (MFMA) of 2003), benchmarking exercises, Monitoring and Evaluation (M&E) systems, capacity building initiatives, annual municipal audits, performance-based budgeting, performance appraisal schemes and performance-based contracts. However, despite all these initiatives, the performance gaps in the Local Government sphere remain a cause for concern. Performance gaps manifest in the high incidence of weak audit reports, under-spending/overspending, poorly maintained infrastructure, large and growing consumer debt problems, billing challenges and the non-payment of creditors. Therefore, it is necessary to rethink the traditional support programmes, and focus on addressing root causes so that Municipalities can deliver on their service delivery mandate in an effective, efficient and sustainable manner.

Local Government is constitutionally mandated to provide basic services to communities within a three-sphere decentralised system of Governance. Schedules 4B and 5B of the Constitution of South Africa (Act No. 106 of 1996) assign an array of service delivery responsibilities to the country's 257 Municipalities. The most essential of these is the provision of water, sanitation and electricity services. In addition to their service delivery mandate, Municipalities continue to invest significantly in social and economic infrastructure in the country. Urban Municipalities play a central role in local economic development through their planning and managing of the urban built environment. In contrast, rural Municipalities continue to roll out basic social infrastructure to eradicate the massive service backlogs in these areas.

Municipalities are empowered with an array of revenue instruments that equip them to deliver on their mandates.

The legal framework provides for Municipalities to generate their revenues, which include levying a property tax, user fees, surcharges on services and a wide range of other local taxes. However, Municipalities will continue to rely on their allocations from the National fiscus as they are unable to maximise the revenue generation potential of their existing revenue sources. National Government supplements municipal revenue with inter-governmental transfers, in the form of unconditional and conditional grants.

The development of innovative strategies and technological advancements are needed to change the status quo in the quality of electricity, to deliver a stable and secure electricity output. The effective deployment of Smart Grids (SGs) in the Electricity Supply Industry (ESI), is recognised as a critical business enabler. The implementation of an appropriate technology contributes amongst others to improved customer service, improved business efficiency and business sustainability. Thus, the positive outcomes that are observed from the deployment of SGs provide an effective solution to address some of the challenges that Municipalities and utilities are faced with. The investment into SGs takes a value inclusive approach to test solutions that transition a utility into becoming more efficient, and competent in managing their systems and processes.

Energy access and distributed generation are not possible without smart technologies being incorporated. Smart Cities, and a post-apartheid future city will also not be attainable without ensuring that there is a SG that takes advantage of technological advancements in the Information Technology (IT) space, the Internet of Things (IoT), big data, and use of smart devices to manage the electricity grids. Real-time availability of data becomes crucial in a SG for responsive electricity supply and demand.

SANEDI has, in the past MTSF period, been working on SGs pilots demonstration, focusing on Assets Management and Revenue enhancement pilots in seven Municipalities. As a result of the success of these Pilots, SANEDI is providing support to CoGTA and the National Treasury (NT) for a larger scale pilot which is expected to form a basis for implantation of SGs across Municipalities in South Africa.



## 5.5 PROGRAMME 3: ENERGY EFFICIENCY

SANEDI's co-ordination and implementation of the Energy Efficiency Tax incentives (Section 12L and 12I), have produced phenomenal results, both in terms of energy savings, and reduction in GHG emissions, with more than 19 TWh saved and 18 730 mega-tonnes of CO<sub>2</sub> avoided, as of 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 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 \$100 000 in 2019, for accelerated implementation of the initiative in South Africa. The results of this 'boost' award saw SANEDI in the running for the final global prize of \$1 million at the end of 2020. 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, as well as measurable energy and emission savings.

The termination of Eskom's Integrated Demand Management funding for EE 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 the German Development Agency (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 second phase of this funding opportunity in 2016, known as SUNREF 2 (Sustainable Use of Natural Resources Fund). 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 customers, post this funding period by the AFD.

Furthermore, SANEDI (Energy Efficiency) has been involved as a partner with the Department of Mineral Resources and Energy (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 Renewable Energy (RE) and EE technologies.
2. To achieve a net-zero energy of South African Wastewater Treatment Plants (WWTPs), through the deployment of integrated biogas co-generation/Combined Heat and Power (CHP) and EE technologies.
3. SANEDI will continue to assess further opportunities going forward.

Lastly, SANEDI (Energy Efficiency), will be responsible for the 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 €700 000.00 and the project was due to officially commence during 2020.

## 5.6 PROGRAMME 4: ENERGY SECRETARIAT

The DSI commissioned the National Research Foundation (NRF) to conduct a review of the Renewable Sustainable Energy (RSE) Hub and Spokes programme. Recommendations proposed the establishment of an Energy Secretariat. The DSI contracted SANEDI to establish an Energy Secretariat in the 2019/20FY. The Secretariat would promote the 10- Year Innovation Plan and leverage the Energy Grand Challenge. The Grand Challenge stimulates and advances a knowledge-based economy, and advances increased knowledge generation and exploitation, human capital development, knowledge infrastructure, and enablers to addressing the “innovation chasm.” These efforts will seamlessly address the energy trilemma which encompasses energy access, environmental sustainability, and energy security.

The role of the Secretariat is to commercialise and upscale knowledge outputs from the RDI portfolio. The outputs will systematically ensure impact in the National System of Innovation (NSI). The Secretariat will monitor and evaluate implementation of the Energy Science, Technology, and Innovation Plan. Monitor implementation of innovative, alternative, and emerging technology policies influencing the energy landscape. Co-ordinate and monitor the training of TVET and UoT graduates. Deploy scalable technologies with the public and private sector, as well as academia. Align deployments with the Presidential District Development Model. The Science and Innovation flagship programmes are summarised here.

The **coal CO<sub>2</sub>-X programme** demonstrates CO<sub>2</sub> captured from the flue gas emitted from coal-fired power stations, along with green hydrogen produced from RE sources by way of the electrolysis of water, to green, clean burning 0% sulphur diesel. This is a RE carrier for local demand and developing global renewables trade. The programme seeks to reduce CO<sub>2</sub> emissions, while honouring our National obligations under the Paris Agreement.

The **Energy Storage programme** advances energy storage technology research. Lithium-ion battery development supports stationary and mobile applications. Lithium, nickel, and cobalt minerals can be supplied by neighbouring countries. Research focal areas include value-added precursor materials like lithium manganese oxide and lithium nickel manganese cobalt. Universities and science councils undertake computational modelling, precursor material development, cell manufacturing, and battery testing research. The research programme consortium comprises Universities and Science Councils alike.

HFCT RDI strategy approved by cabinet in May 2007. The programme consortium comprises local Universities and Science Councils researching the beneficiation of Platinum Group Metal (PGM) resources. The research contributes actively towards energy security and RE. It further supports Government’s ambition to supply green hydrogen into Africa. It also exploits component manufacture throughout the HFCT value chain.

The **Renewable Energy Hub and Spokes programme** advances research and technology innovation in the RE landscape, postgraduate skills development, and increases the knowledge base. It stimulates new science, technology, and innovation industries supporting Government policies and plans. The hub and spokes model involves administrative support at the hub, while computational modelling, PV, solar thermal, and wind technology research and demonstrations are undertaken by the hubs.

SANEDI on boarded a new DSI programme, the VVISDP. DSI applied and secured European Union (EU) funding. Strategic programme management is undertaken by a consortium comprising CoGTA, DSI, TIA and SALGA. TIA recently appointed SANEDI to implement the energy management component of the programme. The City of Cape Town, Drakenstein, City of Mbombela, and Rustenburg submitted successful proposals that were approved.

## LEAP-RE (Europe Africa Partnership for Renewable Energy)

The LEAP-RE is a 5-year program co-funded by the European Commission (EC) under Horizon 2020. It aims to develop long-term partnerships between Europe and Africa on Research and Innovation (R&I) in Renewable Energy (RE). The consortia comprise 83 partners from European and African countries. The overall budget is €32million, including €15 million from the EC. There are three pillars, Pillar 1 is a joint call for RE research proposals, Pillar 2 focuses on the management of R&I and capacity building projects, and Pillar 3 fosters long-term RE partnerships between African and European countries. The DSI has committed the full budget for Leap-Re over the project duration.

## 5.7 EXPLANATION OF PLANNED PERFORMANCE OVER THE FIVE-YEAR PLANNING PERIOD

In developing its strategy, SANEDI must 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
SO1. Contribute towards sustainable energy solutions.	<p><b>Chapter 4: Economic infrastructure</b></p> <p>At least 20 000 MW of this additional generated capacity should come from renewable sources.</p> <p>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.</p>	<p><b>Priority 5: Spatial integration, Human Settlements and Local Government.</b></p> <p>Smart Cities are equipped with SGs systems using the Smart Cities framework to enhance Municipal Revenue Management, Energy Asset Management and improved demand-response.</p>	<p><b>Policy, Planning and Clean Energy.</b></p> <p>Smart Cities aim to utilise a cleaner and more efficient energy system with less detriment to the environment.</p>
	<p><b>Chapter 4: Economic infrastructure</b></p> <p>At least 20 000 MW of this additional generated capacity should come from renewable sources.</p> <p>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.</p>	<p><b>Priority 5: Spatial integration, Human Settlements and Local Government.</b></p> <p>Smart Cities are equipped with SGs systems using the Smart Cities framework to enhance Municipal Revenue Management, Energy Asset Management and improved demand-response.</p>	<p><b>Policy, Planning and Clean Energy.</b></p> <p>Smart Cities aim to utilise a cleaner and more efficient energy system with less detriment to the environment.</p>

OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
SO1. Contribute towards sustainable energy solutions. (continued)	The concept of Smart Cities is based on cleaner and more efficient energy technologies, offering cleaner and more efficient buildings and transportation.	<p><b>Priority 2: Economic Transformation and job creation.</b></p> <p>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 a 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.</p>	<p><b>Policy, Planning and Clean Energy.</b></p> <p>Smart Cities aim to utilise a cleaner and more efficient energy system with less detriment to the environment.</p>
	<p><b>Chapter 5: Environmental sustainability and resilience - Zero-emission building standards by 2030.</b></p> <p>The drive towards zero emissions starts with identifying and reducing current sources of GHG emissions in our energy systems.</p>	<p><b>Priority 7: A better Africa and World.</b></p> <p>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.</p>	<p><b>Policy, Planning and Clean Energy.</b></p> <p>Petroleum and Petroleum Products Regulation: The focus will be on strengthening the role of the Regional offices in the licensing process, by improving their capabilities and delegating certain functions to these offices. The DMRE also aims to diversify the country's energy sources and reducing GHG emissions.</p>
	<p><b>Chapter 4: Economic infrastructure – the foundation of Social and Economic Development.</b></p> <p>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.</p>	<p><b>Priority 2: Economic Transformation and job creation.</b></p> <p>Promote a just transition to an environmentally sustainable economy. High impact environmental sustainability research, evidence gathering, and systematic review commissioned.</p> <p><b>Priority 7: A better Africa and World</b></p> <p>Transition towards an environmentally sustainable economy.</p>	<p><b>Policy, planning and Clean Energy.</b></p> <p>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.</p>
	<p><b>Chapter 13: Building a capable and developmental State.</b></p> <p>Clear Governance structures and stable leadership enable SOEs to achieve their developmental potential.</p>	<p><b>Priority 2: Economic Transformation and job creation.</b></p> <p>Awareness creation to enable investments for inclusive growth, industrialisation, localisation, exports and as well as innovation.</p>	



OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
SO2. Building energy expertise and competence.	<p><b>Chapter 9: Improving education, training and innovation.</b></p> <p>Expand science, technology and innovation outputs by increasing R&amp;D spending by the Government and through encouraging industry to do so.</p>	<p><b>Priority 2: Economic Transformation and job creation.</b></p> <p>Awareness creation to enable investments for inclusive growth, industrialisation, localisation, exports, and as well as innovation.</p> <p><b>Priority 3: Education, skills and Health.</b></p> <p>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>	
SO3. A capacitated, effective, efficient and sustainable operational environment (within which SANEDI will discharge its Mandate).	<p><b>Chapter 13: Building a capable and developmental State.</b></p> <p>A public service immersed in the development agenda, but insulated from undue political interference.</p> <p>Clear Governance structures and stable leadership enable SOEs to achieve their developmental potential.</p>	<p><b>Priority 1: A capable, ethical, and developmental State.</b></p> <p>Clean administration, accurate and reliable reporting.</p> <p>Strengthening Internal capacity and collaboration with other organs of State.</p>	<p><b>The Implementation of Best Management Practices.</b></p> <p>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.</p>
SO4. Inform and increase awareness of sustainable energy.	<p><b>Chapter 13: Building a capable and developmental State.</b></p> <p>Clear Governance structures and stable leadership enable SOEs to achieve their developmental potential.</p>	<p><b>Priority 2: Economic Transformation and job creation.</b></p> <p>Awareness creation to enable investments for inclusive growth, industrialisation, localisation, exports and as well as innovation.</p>	



OUTCOME	LINK TO NDP	LINK TO MTSF	LINK TO DMRE PRIORITIES
SO5. Provide thought leadership.	<p><b>Chapter 3: Economy and Employment.</b> Public employment programmes should reach 1- million people by 2015 and 2-million people by 2030.</p> <p><b>Chapter 13: Building a capable and developmental State.</b> Staff at all levels have the authority, experience, competence and support they need to do their jobs.</p>	<p><b>Priority 3: Education, skills and Health.</b> 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.</p> <p><b>Priority 1: A capable, ethical and developmental State.</b> Scaling up skills development for young people, women and Government officials in new technologies.</p>	<p><b>Electrification and Energy programme and Project Management.</b> Through economic development initiatives, such as Education Project &amp; Partnerships (EP&amp;Ps), the programme will:</p> <ul style="list-style-type: none"> <li>• Create job possibilities through EP&amp;Ps,</li> <li>• Create opportunities for skills development within the energy sector,</li> <li>• Re-establish electrical engineering training programmes that support the Municipalities' capacity building and poverty alleviation, and</li> <li>• Develop small businesses in rural areas that support the mission of rural development.</li> </ul>

## 5.8 KEY RISKS

Risk Management provides an enabling environment in support of the identification, management and oversight of risks across strategic risks. This role includes ensuring that countering fraud and/or corruption is made an integral part of the strategy.

RISK #	STRATEGIC OUTCOME	KEY RISK	RISK DEFINITION	RISK MITIGATION
1.	A capacitated, effective, and efficient sustainable operational environment.	Major Business Interruption.	Inability to adapt to a new operating environment, resulting in a weak internal control environment, and inefficiencies in operations. Inability to operate from the office / project sites.	<ul style="list-style-type: none"> <li>• Business Continuity Plan.</li> <li>• Remote working capabilities (HS Committee and working from home protocols).</li> <li>• Project funding strategies to supplement fiscal funds.</li> <li>• Project planning and monitoring.</li> <li>• Health and Safety Protocols.</li> <li>• Performance management system.</li> <li>• Insurance over assets.</li> <li>• Site visits for external Stakeholders and Stakeholder Engagement.</li> </ul>
2.	A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its Mandate).	Loss of specialised skills within SANEDI.	Lack of expertise to meet the needs of the changing environment (JET). Inability to attract and retain scarce and specialised skills.	<ul style="list-style-type: none"> <li>• Retention and succession plan linked to training and development.</li> <li>• Collaborations with other research institutions (CSIR, GIZ, Universities etc.).</li> </ul>



RISK #	STRATEGIC OUTCOME	KEY RISK	RISK DEFINITION	RISK MITIGATION
3.	A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its Mandate).  Evidence-based planning, resource allocation and decision-making enabled by accurate and timely information, datasets and data analytics.	Disruption to operational IT systems.	Inability to react timeously to disruptions.	<ul style="list-style-type: none"> <li>• ICT Continuity Plan.</li> <li>• Off-site Disaster Recovery Plan.</li> <li>• Service Level Agreements (SLAs) in place with IT service providers (MTN, hardware providers &amp; Software providers).</li> <li>• Insurance over hardware assets.</li> <li>• End point security for cyber attacks.</li> <li>• System documentation and operational architectural designs.</li> </ul>
4.	A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its Mandate) – internal compliance.	Non-adherence to good Corporate Governance.	Key Governance structures are not in place.	<ul style="list-style-type: none"> <li>• Charters reviewed annually.</li> <li>• Governance Policy.</li> <li>• EXCO recommends all relevant aspects to the Board and Board Committees.</li> </ul>
5.	A capacitated, effective, and efficient operational environment (within which SANEDI will discharge its Mandate).  Internal operational effectiveness and efficiency.	Fraud and Corruption.	Illegal or improper acts by employees.	<ul style="list-style-type: none"> <li>• Loss of assets and resources.</li> <li>• Reputational Damage.</li> <li>• Possible litigation.</li> <li>• Non achievement of SANEDI Mandate.</li> <li>• Disruption of day-to-day business.</li> <li>• Low staff morale.</li> <li>• Irregular, fruitless and wasteful expenditure.</li> <li>• Adverse impact on the external audit opinion.</li> </ul>
6.	All outcomes.	Insufficient funding from the fiscus.	The current trends demonstrate insufficient funding from the fiscus to accommodate growth of SANEDI in terms of building capacity, and requisite expertise Multi Stakeholder interdependencies. Unavoidable reliance on external parties for the implementation of strategy.	<ul style="list-style-type: none"> <li>• Leveraging external funds (donor funds).</li> <li>• Budgetary controls (planning based on available funds, cost containment etc.).</li> <li>• Oversight monitoring over budget utilisation (BARC and Board).</li> <li>• Stakeholder Engagement Plan.</li> <li>• Contracts, Memorandum of Agreements (MoAs) and SLAs with all Third Parties.</li> <li>• Legal function reviews all contracts.</li> <li>• Monitoring of contracts at project level.</li> </ul>
7.	All outcomes.	Inadequate implementation of Stakeholder Management.	Inadequate financial resources to implement effectively Stakeholder Management. Evolving Stakeholders' groupings in the energy sector.	Stakeholder Engagement Plan.



# PART D: TECHNICAL INDICATOR DESCRIPTIONS (TIDs)



## 6. TECHNICAL INDICATOR DESCRIPTIONS

Indicator title	Digitalized energy systems
<b>Short Definition</b>	Smart Systems. Cities as identified and aligned to the District Model and Government priority areas. Smart Energy being defined as energy that integrates Information Technology (ICT) to optimise generation, distribution, efficient utilisations, and enhances the availability of energy supply. Smart transportation, for the purposes of this indicator includes all transportation modes that make use of alternative energy not from fossil- based fuels, and Cleaner Fossil Fuels (CFF) and their link to technology innovation (IoT, Bigdata, data analytics etc.) to improve consumption efficiencies, and reduce negative environmental impacts in transportation.
<b>Source/collection of data</b>	Internally generated data from sources which include (i) Advisory notes, (ii) Feasibility reports, (iii) Complete study reports, (iv) Case studies, (v) Technology Roadmaps and (vi) Operational demonstration facilities/ projects, among others, (vii) Business cases, and (viii) Proof of Concepts.
<b>Method of calculation/assessment</b>	Quantitative.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting reside with the respective General Managers (GMs) of sub-programmes.

Indicator title	Green House Gas (GHG) reduction through sustainable energy interventions. <sup>3</sup>
<b>Short definition</b>	Total projected/modelled emissions potential that can be reduced from the atmosphere as a result of the adoption of SANEDI piloted/tested/ demonstrated initiatives. GHG emission is defined as the emission of gasses such as Water Vapour (H <sub>2</sub> O), Carbon Dioxide (CO <sub>2</sub> ), Methane (CH <sub>4</sub> ), Nitrous Oxide (N <sub>2</sub> O), and Ozone (O <sub>3</sub> ) into the atmosphere resulting in a GHG effect.
<b>Source/collection of data</b>	Internally generated project closeout reports such as 12L reports, Data models and Data Analysis reports.
<b>Method of calculation/assessment</b>	Summation of all GHG emission reduced by an initiative implemented during a 12 month cycle.
<b>Assumptions (data limitations)</b>	GHG emissions can be reliability estimated at the project conceptualisation stage, and these can also be quantified at project closeout.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting resides with the respective GMs of sub-programmes.

<sup>3</sup> Supporting programmes to drive GHG reduction in line with national aspirations

Indicator title	Technical and Research Publications
Short definition	Perceptions studies are those studies that will be designed, and carried out to measure the impact of the engagements with Stakeholders. These will be conducted after every 2 years during the Medium-Term Strategic Framework (MTSF) cycle.
Source/collection of data	Stakeholder Engagement events and activities measured against the Stakeholder Engagement Plan (SEP).
Method of calculation/assessment	Qualitative: % implementation of the SEP, including an analysis audience reached through perception studies performed twice in the MTSF period.
Assumptions (data limitations)	All engagements are recorded.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator Title	A centralised and maintained data repository available to Stakeholders
Short definition	A data repository being an IT data management system that houses all of the databases developed by, or on behalf of SANEDI, publications, Data Analysis reports, Research reports, Advisory notes, and Data models.
Source/collection of data	Draw information from available data, producing analysis, results, findings and recommendations that can support, and inform high-confidence energy planning, decision-making and Policy development throughout the sector.
Method of calculation/assessment	Collation of all initiatives that are implemented as a result of SANEDI Policy advisory notes/Research report recommendations.
Assumptions (data limitations)	Stakeholder engagements, as well as Stakeholder buy in necessary for implementation will take place within the strategic planning period.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Financial Management
Short definition	The ability of the institution to maintain good Governance practices and comply with all applicable requirements from the Executive Authority (EA) and National Treasury (NT).
Source/collection of data	Internal audit reports, external audit reports, correspondence from the EA and NT.
Method of calculation/assessment	Qualitative. Non-cumulative.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting reside with the Chief Financial Officer (CFO).

Indicator title	Energy Policy support
Short definition	Capacitated workforce/Persons with adequate skills to enable the implementation of the National Energy Transition Plans (NETP), as noted in the IRP. Persons being defined to include both Natural as well as juristic persons.
Source/collection of data	Reports on capacity buildings initiatives, Bursary awards letters, training programmes, internship programme and attendance registers, reports on the implementation of gender mainstreaming, Supply Chain Management (SCM) reports.
Method of calculation/assessment	Qualitative (Counts the number of Persons that SANEDI has been able to impact to Persons).
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Human Resources (HR) recruitment
Short definition	A new operational model that has been pre-defined that is adopted, and implemented to improve operational efficiency and improve delivery methods while also to strengthen Governance and ability to delivery on pre-determined objectives.
Source/collection of data	Implementation Plan Progress report.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Developing and implementing Communications Strategy
Short definition	A new Communication Strategy will be developed and implemented to improve Stakeholder Engagement and information dissemination.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.



Indicator title	Collaboration with Industry, Tertiary education bodies and Sector Education and Training Authorities (SETAs)
Short definition	The development and implementation of a new collaboration framework will enhance collaboration and partnerships with industry, tertiary education bodies, and SETAs, as well as the delivery of the SANEDI Mandate.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Public Relations (PR) Management
Short definition	Public Relations plays a vital role in building, and maintaining relationships between an organization and its Stakeholders. An effective PR strategy can help an organization to improve engagements with Stakeholders, enhance its image, and ultimately, fulfill its mandate. To achieve this, a comprehensive PR strategy will be developed and implemented.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Implement Skills Development interventions
Short definition	The energy sector is constantly evolving, and it's important for employees in the industry to have the necessary skills to stay current and competitive. To ensure that the skill gaps within the energy sector are effectively addressed, interventions will be thoroughly planned and executed to enhance the workforce skills.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Balancing Energy Supply and Demand
Short definition	Provide support needed in balancing energy supply and demand in the broader context of the country's needs. Balancing energy supply and demand refers to the process of ensuring that the amount of energy produced, and distributed is equal to the amount of energy consumed. This is a critical task as an imbalance between energy supply and demand can lead to power outages, brownouts, and blackouts.
Source/collection of data	Internally generated data from sources which include (i) Advisory notes, (ii) Feasibility reports, (iii) Complete Study reports, (iv) Case studies, (v) Technology Roadmaps, (vi) Operational demonstration facilities/ projects, among others, (vii) Business cases, and (viii) Proof of Concepts.
Method of calculation/assessment	Quantitative.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting reside with the respective GMs of sub-programmes.

Indicator title	Energy Secretariat
Short definition	A key aspect of successfully implementing the Department of Science and Innovation (DSI) programme within the Energy Secretariat, is ensuring that the employees involved have the necessary skills and knowledge to effectively carry out their roles. In order to achieve this, a comprehensive strategy will be developed to capacitate, empower, and support employees within the Energy Secretariat with the skills they need to implement the DSI programme.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Intellectual Property (IP)
Short definition	Intellectual Property plays a crucial role in protecting the innovative ideas, technologies, and creations of an organization. Effective management of IP is essential for the growth and success of any organization, particularly in the competitive business environment. To ensure that the organization's IP gaps are effectively addressed, interventions will be thoroughly planned and executed to enhance and protect it. This will be achieved through an IP audit, IP strategy development, IP training and education, IP Policy development and IP enforcement.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the Information Technology (IT) Management.



Indicator title	Catalyse balanced Just Energy Transition (JET)
<b>Short definition</b>	A key aspect of successfully implementing a JET programme, is ensuring that the employees involved in the programme have the necessary skills and knowledge to effectively carry out their roles. In order to achieve this, a comprehensive strategy will be developed to capacitate, empower, and support employees in the energy sector with the skills they need to drive the development and implementation of the JET programme.
<b>Source/collection of data</b>	Implementation Plan Progress reports.
<b>Method of calculation/assessment</b>	Quantitative, measured % implementation against a pre-determined plan.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Publications
<b>Short definition</b>	To keep pace with the ever-evolving energy sector, technical papers will be published to document advancements and developments in the field, as well as to address the key energy challenges facing the country. These papers will provide valuable insights and information to Stakeholders and decision-makers and will help to inform the development and implementation of policies and strategies to address these challenges. The publications will be regularly updated to reflect the latest Research and Developments (R&D) in the energy sector.
<b>Source/collection of data</b>	Implementation Plan Progress reports.
<b>Method of calculation/assessment</b>	Quantitative, measured % implementation against a pre-determined plan.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Internal and External communications
<b>Short definition</b>	A comprehensive communication strategy will be developed and implemented, to enhance engagement with stakeholders and improve the dissemination of information both internally and externally. This strategy will be reviewed and updated regularly to ensure its effectiveness and its ability to adapt to changing circumstances.
<b>Source/collection of data</b>	Implementation Plan Progress reports.
<b>Method of calculation/assessment</b>	Quantitative, measured % implementation against a pre-determined plan.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting resides with the respective GMs of sub-programmes.



Indicator title	Events Management
Short definition	A plan will be created and put in place to improve communication and engagement with Stakeholders through events, and regularly evaluated for effectiveness and adaptability.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Energy Research, Development and Innovation (ERDI)
Short definition	To keep up with the constantly changing energy sector and remain competitive, it's crucial for ongoing Research, Development, and Innovation (RDI) to have the proper skills. To tackle any gaps in the industry, well-planned and executed interventions will be implemented to improve industry knowledge.
Source/collection of data	Implementation Plan Progress reports.
Method of calculation/assessment	Quantitative, measured % implementation against a pre-determined plan.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting resides with the respective GMs of sub-programmes.

Indicator title	Supply Chain Management (SCM) Procurement as per the Procurement Plan
Short definition	The ability of the institution to maintain good procurement and SCM practices, and to comply with all applicable requirements from the Procurement Plan, EA, and NT is essential for its overall performance and success. Good procurement and SCM practices ensure that the institution procures goods and services in a responsible and efficient manner, and that the interests of all Stakeholders are taken into account.
Source/collection of data	Internal reports, External reports, correspondence from the EA and NT.
Method of calculation/assessment	Qualitative. Non-cumulative.
Assumptions (data limitations)	None.
Reporting cycle	Annually.
Desired performance	Achieve at least the stated target or more.
Indicator responsibility	Responsibility for reporting reside with the SCM Manager.



Indicator title	Information and Communications Technology (ICT)
<b>Short definition</b>	The institution's ability to maintain good ICT management practices, and comply with all applicable requirements from the ICT policy is crucial for its overall performance and success. This includes ensuring the efficient functioning of ICT systems and protection of the organization's interest, and compliance with ICT policy requirements to operate securely and ethically, avoiding any potential IT issues or security breaches.
<b>Source/collection of data</b>	Internal reports, External reports.
<b>Method of calculation/assessment</b>	Qualitative- Non-cumulative.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting reside with the ICT Manager.

Indicator title	Governance, Risk and Compliance
<b>Short definition</b>	The institution's ability to maintain good Governance, Risk, and Compliance Management practices, and comply with all applicable requirements from the Governance, Risk, and Compliance Policy is crucial for its overall performance and success. This includes ensuring efficient operation of the organization and compliance with policy requirements to operate securely and ethically, avoiding any potential Governance and compliance issues.
<b>Source/collection of data</b>	Internal reports, External reports.
<b>Method of calculation/assessment</b>	Qualitative- Non-cumulative.
<b>Assumptions (data limitations)</b>	None.
<b>Reporting cycle</b>	Annually.
<b>Desired performance</b>	Achieve at least the stated target or more.
<b>Indicator responsibility</b>	Responsibility for reporting reside with the Governance, Risk and Compliance Manager.

# PART E: STRATEGIC ENABLERS



SANEDI's intended impact Statements and Outcomes will be realised through several enablers, which are listed below:

## 7. STRATEGIC FRAMEWORK

SANEDI's strategy must be enabled by an appropriate operating model, which pivots on its Knowledge and Energy Data Management functions. SANEDI's strategic framework outlines the central role played by Knowledge Management in driving its functions, thereby contributing towards the mitigation of Carbon Dioxide (CO<sub>2</sub>) emissions, while contributing towards service delivery and the realisation of South Africa's Smart City aspirations. Central to this, is its capacity to provide advisory services and leverage its Knowledge Management function to extract value and generate revenue. This also has the potential to drive private sector investments through increased data availability, assisting in decision-making for companies seeking opportunities in the energy space.

Within this are several key components:

- **Knowledge Management:** Knowledge Management involves the standardisation, and institutionalisation of knowledge developed through SANEDI's research initiatives and technological advancements in the energy space. This further includes Data Management and storage.
- **Service delivery:** Service delivery speaks to the enablement of entities of State to better deliver their Constitutional requirements. An example of this speaks to Municipalities and the potential for improvement through the adoption of Smart City technologies that would drive improvements in service delivery.
- **Decarbonisation:** This contributes towards CO<sub>2</sub> mitigation, Carbon Capture Utilisation and Storage (CCUS), democratised energy production, embedded generation and movement away from coal technologies. The drive towards decarbonisation requires certain interventions in the supply side of energy. Part of such interventions includes the introduction, and demonstration of renewable technologies to encourage their utilisation by the private sector and Municipalities.
- **Policy investments:** These make use of the knowledge generated to assist in Policy development and refinement. The aim is for policies to be more conducive for investors to be attracted to the energy space.
- **Advisory services:** These contribute to revenue generation, knowledge sharing and training services central to SANEDI's business model. SANEDI can also offer training services at a cost to contribute towards revenue generation.

## 8. ORGANISATIONAL ALIGNMENT

The developed strategy, and the strategic process, must be broadly integrated into the operational environment, to ensure organisational alignment. While fulfilling its Legislative Mandate, SANEDI's strategy needs to be in alignment with National priorities.

## 9. REALISED BENEFITS TO SANEDI

The developed strategy seeks to help SANEDI focus its efforts and resources on creating lasting impact and value to the South African socio-economic environment, while effectively carrying out its Legislative Mandates.

- **Policy input:** Analysed data can give input to National policies, with the aim of creating a conducive environment for private sector investments.
- **Revenue generation:** Through commercialising SANEDI's advisory and training services on Renewable Energy Technologies (RET) and insights.
- **Partnership:** Through knowledge sharing platforms with relevant institutions.
- **Encouraging private sector participation:** Through establishing SANEDI as a source of data and insights in the energy space, private sector companies would want to approach SANEDI when making investment decisions in the energy space.:

## NOTES:

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