

ENERGY RISK REPORT

2021/22

RECOMMENDATIONS FOR DECISION MAKERS





Foreword by Mpho Mookapele CEO EWSETA

The National Development Plan (NDP) 2030 details South Africa’s vision for a low carbon economy and the Integrated Resource Plan (IRP2019) further outlines clear and bold plans for a much needed just transition to clean energy. This is evidenced by the proposed energy mix that includes a set target of 41% of installed capacity to be generated from renewables by 2030.

These targets, designed to contribute to secure, affordable and clean energy, present huge skills implications and the associated risk of insufficient skills. What the energy sector needs is the right skills at the right time which means two things.

First and foremost, workers currently employed in carbon Intensive industries require re-skilling or ‘up’skilling to ensure they remain relevant and to avoid massive job losses and potentially an unjust society as the country transitions. Secondly, and equally important, unemployed youth need to be capacitated with green skills to access new jobs and business opportunities in the changing energy landscape. Capacitating the unemployed will ensure a skills pipeline for the industry and will contribute to addressing the scourge of unemployment that the country faces.

There is much training ground to be covered for the energy sector, and the Energy and Water Sector Education and Training Authority (EWSETA) has its work cut out for it. Ensuring a capable skills pipeline cannot be achieved without meaningful collaboration with local and international partners. We need to work closely with all energy sector stakeholders, not least of which employers in the sector, to ensure that we have the right skills in place to meet the industry skills demands.

Extensive research and active engagement with a wide variety of stakeholders in the sector has identified a series of strategic risks that currently, and will continue to, impact skills development planning and implementation as a whole.

A key risk is the lack of or inadequate participation by energy levy-paying employers in the EWSETA’s annual Workplace Skills Plan (WSP) process to determine a consolidated picture of the energy skills demand for the country. Whilst the submission of a WSP entitles an employer to access Mandatory Grant Funding to drive employee training, this process fulfils a critical research function in terms of determining skills demand to serve and grow the sector.

A lack of meaningful sector participation in this process means that the information being submitted by a small percentage of the sector results in skewed skills demand data for the country. The participation rate in determining South Africa energy skills demand is currently at 19.5% and it is imperative that employers in the sector collectively drive the identification of the skills gaps if we are to ensure that the NDP objectives are met.

An important mandate for the EWSETA is qualification development and realignment to meet the specific needs of the sector. Without which, the roll out of irrelevant or mismatched skills leads to the sector not benefiting from trained graduates and leading to high graduate unemployment. Once again, industry participation is key to identifying the qualifications and skills programmes needed to meet sector skills demand.

An age-old challenge experienced by most of the SETAs is limited industry participation in the provision of workplaces for the purposes of work integrated learning, otherwise known as practical experience for trained individuals. South Africa sits with a significant number of learners who have completed theoretical learning but require work-based learning due to lack of available accredited workplaces. This results in trained individuals specifically from our public college system remaining unemployable due to lack of exposure to the world of work.

This report seeks to unpack a number of risks facing the energy sector at both industry and country levels, and skills development is an important one.

People are at the centre of driving change and building a growing, inclusive and just economy. People drive planning, innovation and implementation and it is on this note that I appeal to all Energy Sector Stakeholders, including the EWSETA, to come together and break the solid silos created and become part of the skills development revolution that will build a leading energy industry for the betterment of our country and to improve people’s lives.

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The Role of Skills in a **Just Energy Transition**



EXECUTIVE SUMMARY

To support the various decision makers in government and beyond when making plans that will drive the economy, the South African National Energy Association (SANEA), embarked on a process in 2018 to unpack the energy risks facing South Africa at a country and industry level.

The EWSETA seeks to partner with energy sector employers and stakeholders to address the skills required for a Just Energy Transition

Join us on the journey!

This is SANEA's fourth South African Energy Risk Report and each year we refine and evolve our methodology, to ensure that the final product is of use to decision makers.


The definition of risk is the impact of uncertainty on the achievement of objectives and how the uncertainty is dealt with defines the outcome. The objectives used in this report are those as outlined for energy in the National Development Plan (NDP) and the uncertainties identified are those that SANEA identified as having the potential to impact on the achievement of those objectives, positively or negatively.

For the 2021 risk report the SANEA Energy Experts Group reviewed and adjusted the uncertainties highlighted in last year's report. We also included various case studies that document some of the steps taken over the last year to deal with these uncertainties.

2021 has already been a year of significant change, partly impacted by the continued presence of the Covid-19 virus, but also due to several other developments: Covid-19's emergence in 2020 resulted in significantly lowered global energy demand and economic implications included a large reduction in government and business revenue, a decrease in environmental impact and, in some cases, an increase in job losses. Dealing with the spread of Covid-19 emphasised inherent structural weaknesses and vulnerabilities in the South African economy and social inequity increased as a result. It remains to be seen what some of the longer-term impacts on the global and local energy sectors will be as a result of the continued battle against the spread of Covid-19.

Some changes (such as increased periods of working from home) may well permanently shift energy consumption levels and patterns to a new normal.

Given the change in context, the Energy Experts Group added 2 new uncertainties, namely regional geopolitics and energy storage technologies, including green hydrogen and other clean molecules. Some uncertainties identified previously were combined: decision paralysis and parochial interests, and appropriate policy and long-term vision. There are 24 uncertainties in total that are highlighted for action.




Political

- Steps taken to deal with corruption, but this could cause political instability and activism
- Climate change Presidential Committee in place



Environment

- Pressure to meet Nationally Determined Contribution (NDC)
- Coal industry pressure has escalated - No coal movement



Financial

- Financial stability at a national level - tax revenue down with many demands
- Access to capital has become worse



Technology

- Sector coupling initiatives slow
- Port infrastructure may constrain us



Societal

- Increased levels of unemployment which will impact economy



Geopolitical

- Economic growth on demand side has reduced globally
- Political disturbance in Mozambique

These changes bring uncertainty and this gives rise to some key requirements to support a robust South African energy sector: If the impact of these shifts is looked at in conjunction with changes in the energy sector, then South African energy sector uncertainties changed in the following way between 2020 and 2021.	
Long Term Vision	<ul style="list-style-type: none">• Big-picture long term vision for the energy sector now critical for increased certainty• South Africa's stance on green hydrogen unclear
Just Energy Transition	<ul style="list-style-type: none">• South Africa's understanding of and planning for the energy transition unclear
Policy Shifts	<ul style="list-style-type: none">• Mitigation strategy for energy sources continued to be implemented through the IRP• Government has made some decisive moves- private sector allowed to generate, small scale generation approved, and licensing being issued reducing uncertainty
Energy Prices	<ul style="list-style-type: none">• Electricity prices (Eskom and Municipal) continue to increase above inflation and rate and timing of increases are uncertain
Energy Market	<ul style="list-style-type: none">• The electricity market structure uncertain despite discussion between DMRE and DPE• Opportunity for oil and gas finds- reduced chances for new project development• Emergency plans made for short term energy requirements may postpone gas
Eskom	<ul style="list-style-type: none">• Slow progress on divisionalisation, how National Treasury is dealing with SOE's and Eskom debt restructuring and a declining plan performance increased uncertainty• Plans for the repurposing of coal plan decreased uncertainty
PetroSA	<ul style="list-style-type: none">• Production at PetroSA has been reduced increasing uncertainty about its longer-term future

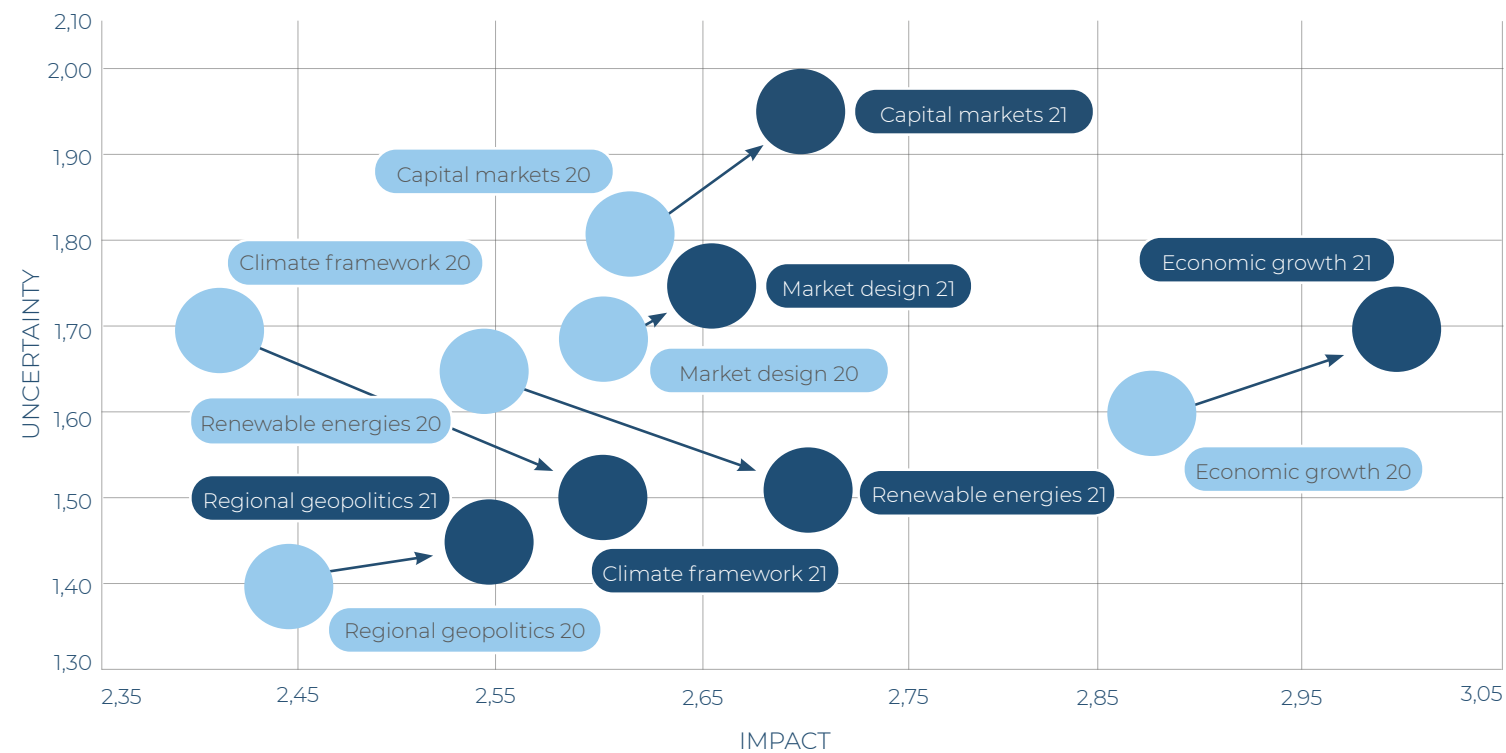
Uncertainties in the economy and in the energy industry are still increasing, continuing the trend over the last few years. This can be seen as an indication of market maturity as it diversifies in terms of technologies and the number of players. The element of uncertainty related to the mix of technologies has increased over the years – as is to be expected – the energy transition being primarily technology driven. The list of top uncertainties reflects the current economic reality in South Africa: declining economic growth and societal issues remaining high on the agenda, both exacerbated by Covid-19.

Another trend noted by the Energy Experts was that the political environment continues to be an ecosystem driver behind many of the other uncertainties and is causing a blockage to either managing or capitalising on resultant energy risks. Parochial interests, diverse priorities and changes in government ministers has led to unclear or fragmented policy. On energy pricing, for the period 2015 to 2019 energy (electricity and liquid fuel) prices increased at similar rates but from 2020 the rate of increase of electricity prices

has accelerated above the increase in fuel prices. The Government levies in the fuel price are increasing and are one of the reasons for fuel price increases, but it is not the only change driver for fuel prices. Over the last 5 years, international prices clearly have had an impact but the Rand/Dollar exchange but did not. South Africa's aging oil refinery fleet has become economically vulnerable in a context of changing demand, supply and environmental dynamics and is expected to undergo significant changes in the coming five years.

When managing risk, it is critical to understand the velocity (speed and direction) of those risks, i.e., which uncertainties are changing and/or risks are emerging at the fastest pace.

As detailed in the figure below, the Energy Experts were of the view that several uncertainties have become less certain and some have increased in potential impact, with significant implications for the energy risk landscape. The changes evident range from level of impact, to level of uncertainty or urgency. An analysis of the pace of change allows for appropriate action.



When these findings were viewed, considering the changes in context and extent of shifts in uncertainties, the following conclusions were drawn by the Energy Experts:

- Progress has been made to reduce policy uncertainty, particularly in energy policy and in the development of a National Climate Change Bill. But the action taken is not sufficient and that the change is not rapid enough
- Progress has been made to improve energy (electricity) with the process for emergency procurement of electricity generation having been concluded and self-generation enabled through reduced regulation. The next round of the REIPPP is also underway
- Covid-19 has increased the levels of uncertainty and its effects will be felt for years to come
- In some cases, the level of uncertainty has reduced. For example, around the climate change framework and the implementation of renewable technologies
- The longer-term vision for the energy sector is still not clear
- Shallow change is happening in numerous areas, rather than deep change in a select few areas
- Integrated infrastructure plans are not in place, meaning

that sector coupling, one of the key opportunities of the energy transition to lower carbon technologies, is not being prioritised.

The Energy Experts considered the recommendations made in the 2020 Risk Report still appropriate but noted that several have increased in urgency, given their potential impact and the fact that they drive the future energy sector. These recommendations include those related to the development of a country IEP and associated just energy transition trajectory, as these provide focus as well as certainty for manufacturing and other sectors.

Localisation opportunities for new energy infrastructure are evident in the increasing number of Independent Power Producers active in developing new electricity generation capacity. Another recommendation still valid is the call for a well-defined electricity sector market structure, with clear associated rules, to boost investor confidence and allow the development of appropriate business models to allow for a robust electricity sector.

THE RECOMMENDATIONS THAT REQUIRE URGENT IMPLEMENTATION ARE HIGHLIGHTED IN BLUE IN THE FIGURE BELOW:



The Energy Experts highlighted that several of these recommended opportunities were time sensitive and if they are to be realised, then quick action needs to be

taken promoting and enabling the production of green hydrogen, ammonia, other clean molecules and battery development.

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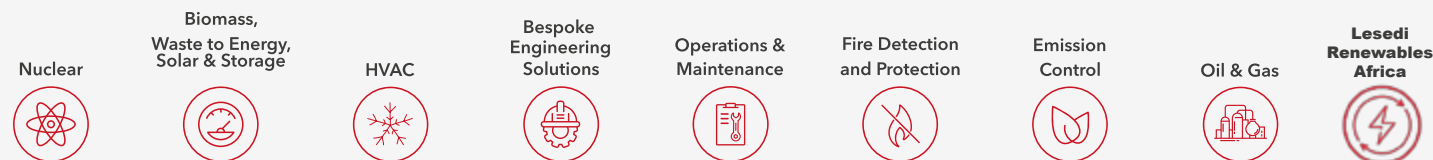
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Lesedi provides effective solutions for bespoke projects and takes projects from concept and basic design to detailed engineering, procurement, project and contract management, installation and commissioning ensuring compliance with the client's brief and requirements.



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01: INTRODUCTION

The South African National Energy Association (SANEA), embarked on a process in 2018 to unpack the energy risks facing South Africa at a country and industry level. In the first 2018 report, SANEA undertook to continue to track the energy risks for South Africa as well as evolve the debate and go deeper into risks that will fundamentally impact the energy sector.

It is envisaged that this will be an ongoing journey given the rapid pace of change and uncertainty in the world today.

This is SANEA's fourth South African Energy Risk Report. The report has begun to evolve, mature and track the progress made in the energy sector in terms of achieving the objectives in the National Development Plan (NDP) and the transition to energy technologies that avoid carbon emissions.

Each year we refine and evolve our methodology, to ensure that the final product is of use to decision makers.

02: APPROACH

The objectives used as a guide and to determine risk in this report remain as those outlined in the NDP for energy. The National Development Plan of 2012, outlines the following objectives for the energy sector:

“South Africa will have an energy sector that promotes:

- Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.*
- Social Equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households*
- Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.”*

Progress against the NDP energy objectives was reviewed by the Planning Commission in 2018, but the overall objectives did not change. At the launch of the 2019 Risk Report, the feedback received prompted SANEA to change the approach to the way in which the risk report is produced and the risk analysis methodology.

The feedback included the following improvements:

- * A focus on identifying future looking or emerging risks so that risks can be anticipated and proactively responded to
- * As an energy community, we need to make recommendations on treatment plans to head off future risks or, if an opportunity, to take advantage of it

As the definition of risk is the impact of uncertainty on the achievement of objectives, SANEA embarked on a further refinement of the methodology in 2020. This was to focus on the uncertainties that drive risk in the energy sector and to analyse whether the outcome of that uncertainty could impact on our objectives positively or negatively.

For the 2021 report the SANEA Energy Experts Group (see Appendix 2 for members of the Energy Experts Group) reviewed these uncertainties for relevance and to understand their movement over the past 12 months.

It was clear that it is critical to identify uncertainties but, as a country, concrete steps must be taken to manage the uncertainty and, where possible, reduce (if negative) or amplify (if positive) its impact. This year we therefore included various case studies in the report that document some of those steps taken over the last year.



03: 2021 SHIFTS IN CONTEXT

Already a year of significant change, 2021 remains impacted by Covid-19 but is also being impacted by several other developments. The effect of the Covid-19 virus on the way in which we live is unprecedented and has dramatically changed the energy landscape in South Africa and beyond. Covid-19's emergence not only resulted in a significant reduction in global energy demand but also in lower government and business revenue with resultant job losses. A positive outcome was a decrease in environmental impact as the world entered periods of lockdown.

Covid-19 emphasised the inherent structural weaknesses and vulnerabilities in the South African economy and social inequity increased as a result.

It remains to be seen what some of the longer-term impacts on the global and local energy sectors will be as a result of the continued battle against the spread of Covid-19. Some changes (such as increased periods of working from home) may well permanently shift energy consumption levels and patterns.

The Energy Experts identified the following additional major shifts in the global, regional and national contexts that are not in the energy sector, but which affect the energy sector, thus impacting uncertainty:



Political

- Steps taken to deal with corruption, but this could cause political instability and activism
- Climate change Presidential Committee in place



Technology

- Sector coupling initiatives slow
- Port infrastructure may constrain us



Environment

- Pressure to meet Nationally Determined Contribution (NDC)
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Societal

- Increased levels of unemployment which will impact economy



Financial

- Financial stability at a national level - tax revenue down with many demands
- Access to capital has become worse



Geopolitical

- Economic growth on demand side has reduced globally
- Political disturbance in Mozambique

FIGURE 1: Significant changes in global, regional and South African context between 2020 and 2021.



OIL REFINING - EMERGING RISK

South Africa’s “sub-scale” and aging refinery fleet has become economically vulnerable in a context of changing demand, supply and environmental dynamics. The pressure is increased with the recent publication of the Cleaner Fuels specifications that will need to be met by 2026. As a result, South Africa’s oil refinery sector is expected to undergo significant changes in the coming five years.

Engen has already indicated that it will repurpose its refinery site in Durban as a fuel importation terminal and with global and domestic shifts likely to place significant pressure on other refineries.

These changes bring uncertainty and this gives rise to some key requirements to support a robust South African energy sector:
If the impact of these shifts is looked at in conjunction with changes in the energy sector, then South African energy sector uncertainties changed in the following way between 2020 and 2021.

Long Term Vision	<ul style="list-style-type: none">• Big-picture long term vision for the energy sector now critical for increased certainty• South Africa’s stance on green hydrogen unclear
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Eskom	<ul style="list-style-type: none">• Slow progress on divisionalisation, how National Treasury is dealing with SOE’s and Eskom debt restructuring and a declining plan performance increased uncertainty• Plans for the repurposing of coal plan decreased uncertainty
PetroSA	<ul style="list-style-type: none">• Production at PetroSA has been reduced increasing uncertainty about its longer-term future

FIGURE 2: Shifts in South Africa’s energy specific context between 2020 and 2021.

The Energy Experts noted that there had been significant activity in government, with policy certainty being improved in areas such as the Integrated Resource Plan (IRP) roll out. In other areas, such as market design, there has been slow progress. These changes in the context have varying degrees of impact on the level of uncertainty and thus on positive and negative risks in the energy sector in South Africa.

On energy pricing, for the period 2015 to 2019 energy (electricity and liquid fuel) prices increased at similar rates, but from 2020, the rate of increase of electricity prices has accelerated above the increase in fuel prices.

The Government levies in the fuel price are increasing and are one of the reasons for fuel price increases, but it is not the only change driver for fuel prices.

Over the last 5 years, international prices clearly have had an impact, but the Rand/Dollar exchange did not.

04: TOP UNCERTAINTIES FOR THE SOUTH AFRICAN ENERGY SECTOR

The table details in alphabetical order, the top uncertainties that the Energy Experts felt needed to be addressed by the country in 2021 to meet the NDP objectives. They have been categorised into 6 major categories, as per the Institute of Risk Management in South Africa classification and issues specific to energy.



TABLE 1: Top uncertainties for the South African Energy Sector in 2021			
		UNCERTAINTY	DESCRIPTOR
D	1	Activism and civil disobedience	The extent of activism and civil disobedience including strikes and actions aimed at catalysing political or social change
F	2	Appropriate policy and vision	Long-term vision for the country supported by the approval and implementation of energy sector and related policy to encourage investment certainty, flexibility and agility
A	3	Capital markets	Access to capital and the ability to attract capital for energy infrastructure, in a context of high political, market and technology risks within South Africa
C	4	Climate framework	The acceptance and adoption of international policies such as the UNFCCC dealing with GHG adaptation and mitigation efforts, leading to an energy transition
C	5	Corruption	The extent of corruption in any part of the energy value chain or spheres of government, impacting confidence in the energy system
C	6	Country level development	The development of major programmes of work that involve energy, are integrated and aligned at a national level and aimed at national growth and prosperity
F	7	Decentralised system	New business models that incorporate new technologies and services and the resultant rate of change in the century old energy system
D	8	Economic growth	The effects of economic growth (or lack thereof) on energy markets
D	9	Energy affordability	Energy price levels which impact on country competitiveness to drive economic growth, and impact on the ability of the poor to access modern energy forms
F	10	Energy data availability and confidence	The widespread availability of a consistent, transparent energy data set for planning and short- and long-term decision making
F	11	Energy price volatility and uncertainty	Uncertainty due to rapid and sudden price changes for energy and related commodities including key minerals such as lithium and cobalt as well as coal, oil and gas prices
B	12	Energy-water nexus	Competition for water resources and water availability due to changing weather patterns and its effects on energy production and supply as well as food production
D	13	Global Pandemics	The rapid expansion of an infectious disease of humans that is easily spread across more than one continent
A	14	Invest or confidence	Investors' willingness to invest in South Africa
E	15	IOT/Blockchain	The rate of implementation of systems that allow direct and low-cost transactions and smart appliances driven by smart contracts and grids, supply chain tracing and labelling
A	16	Macroeconomic performance	Exchange rate fluctuations and currency devaluation which impact on energy operations and investments
F	17	Market design and energy governance	The availability of innovative market designs and policies to enable renewables integration, secure back-up and storage capacity in natural gas and electricity markets
C	18	Parochial interests and decision making	The extent to which energy players are driving narrow interests, not in the collective interest, impacting on the ability to reach consensus and have quality decisions
C	19	Regional geopolitics *	The interaction of geographic and political factors influencing a region
E	20	Renewable energies	Existence of country policies to encourage the use of renewable energies
E	21	Energy storage *	The capture of energy for use at a later time
E	22	Strong grid	Whether the transmission and distribution grids enable the changing market structure and business models or delay their implementation
D	23	Sustainable cities	Whether there is serious consideration of delivering resource-efficient urbanisation at scale; related to the management of waste, water, energy and transportation
F	24	Talent	The availability of people with the necessary skills, qualifications, credibility and experience at all levels (including leadership) required to take robust decisions
A	Economic		B Environmental
C	Geopolitical		D Societal
E	Technological		F Energy Industry
			*Additional uncertainty from the 2021 review

Given the changes in context, the Energy Experts Group added 2 new uncertainties, namely regional geopolitics and energy storage including green hydrogen and other molecules. Some uncertainties identified in 2020 were combined, namely, decision paralysis and parochial interests, and appropriate policy and long-term vision.

Uncertainties in the economy and in the energy, industry are still increasing, continuing the trend over the last few years. This can be seen as an indication of market maturity as it diversifies in terms of technologies and the number of players. The element of uncertainty related to the mix of technologies has increased over the years – and is to be expected – the energy transition being primarily technology driven.

The list of top uncertainties reflects the current economic reality in South Africa: economic growth slowing and societal issues remaining high on the agenda, both exacerbated by Covid-19.

Another trend noted by the Energy Experts was that the political environment continues to be an ecosystem driver behind many of the other uncertainties and is causing a blockage to either managing or capitalising on resultant energy risks. Parochial interests, diverse priorities and changes in government ministers has led to unclear or unintegrated policy.

05: THE PACE OF CHANGE OR RISK VELOCITY

When managing risk, it is critical to understand the velocity of those risks, i.e., which uncertainties are changing and/or risks are emerging at the fastest pace. As detailed in Figure 3, the Energy Experts noted that several uncertainties have accelerated, becoming more uncertain or potentially having a bigger impact, with significant implications for the energy risk landscape. The changes evident range from level of impact to level of uncertainty and urgency. An analysis of the pace of change allows for appropriate action.

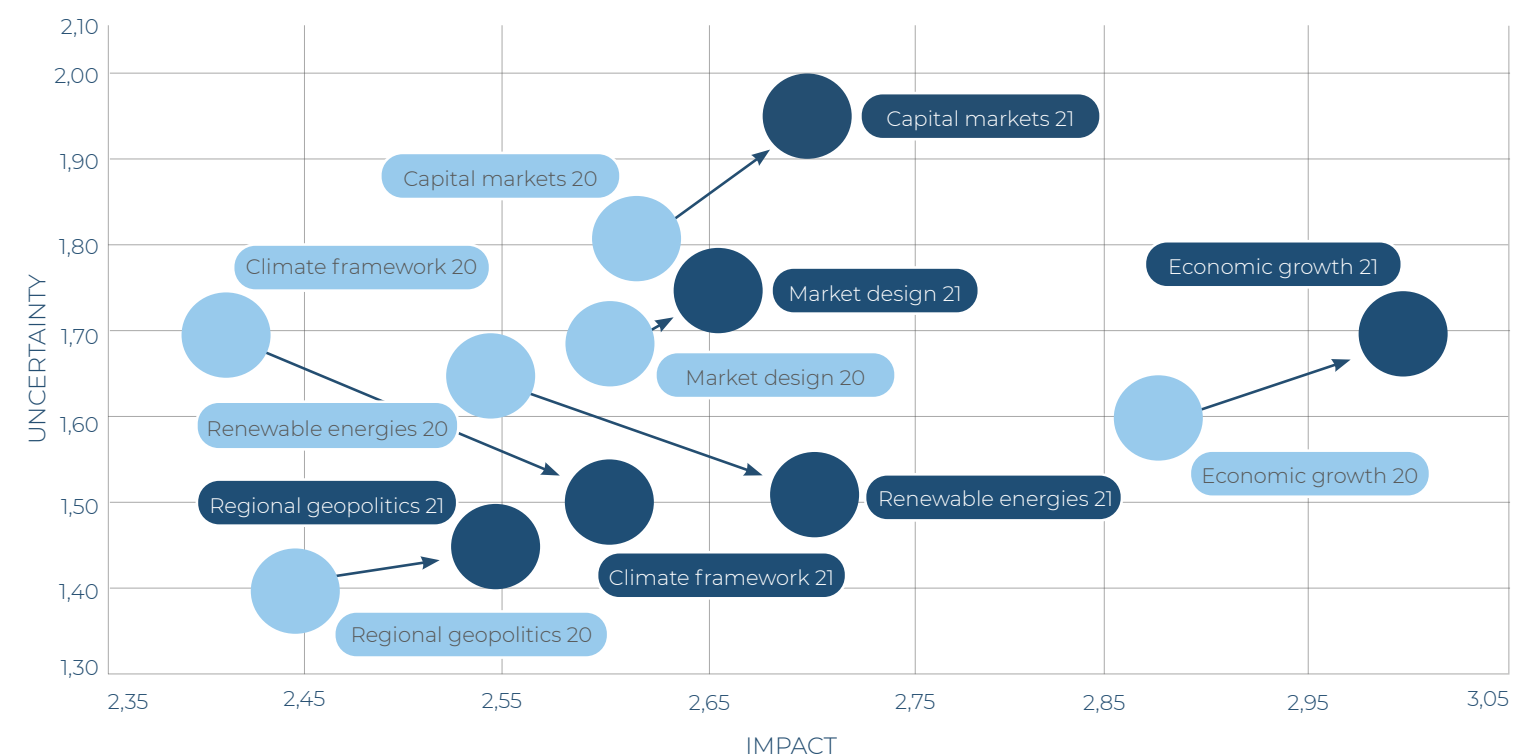


FIGURE 3: 2021 Risks for South Africa with a notable increased velocity or pace of change.

THE ENERGY EXPERTS FELT THAT THESE FAST-CHANGING UNCERTAINTIES WERE NOTABLE FOR THE FOLLOWING REASONS:

- **CLIMATE FRAMEWORK** - Climate framework issues have declined in uncertainty but increased in impact. Globally the pressure is rising in terms of dealing with climate change and in the need to deal with adapting to the changes in Earth's climate, thus increasing the velocity of this uncertainty. South Africa is particularly vulnerable, given the high carbon intensity of our economy. Despite the positive moves in the IRP and the new, more stringent, Nationally Determined Contribution (NDC) released for comment in April 2021, many are of the opinion that the country is not moving fast enough. Financing any coal-based projects is becoming increasingly difficult and many countries, including some of South Africa's biggest trading partners, are tightening their requirements. This includes consideration of carbon border tax adjustments with implications for national competitiveness and has further implications for our just transition and in particular for the coal industry. In addition, not transitioning fast enough may also leave South Africa excluded from green or transition finance programmes. An increase in civil unrest may emerge as a result.

Converging scientific analysis shows that the impacts of a changing climate will continue to affect South Africa given that the region is a climate "hot spot" and will experience higher than world average increases in temperature. This requires integrated government policy to proactively deal and adapt to inter alia impacts on water, civil society and infrastructure.

- **CAPITAL MARKETS** - Capital market issues have increased in impact and uncertainty. The velocity of this uncertainty is due to the impact on the capital markets of Covid-19. In addition, capital markets are also under increasing pressure to be clear on policy stances, particularly with regards to coal investments and Environmental, Social and Governance (ESG) issues. Investor confidence is low in the face of a volatile investment environment globally and South Africa is no exception. Nevertheless, investment in clean energy because of the new bid windows open in the Renewable Energy Independent Power Producer Programme (REIPPP) should support capital market growth in the energy sector going forward.

- **ECONOMIC GROWTH** - Economic Growth issues have increased in impact and uncertainty. GDP growth over the last year has been significantly impacted by Covid-19 and slow global growth thus increasing uncertainty velocity. As energy availability is a strong enabler of economic growth, continued load shedding has also contributed negatively to SA economic growth.

The economy contracted by 7% in 2020 according to Stats SA, the largest decrease since the end of World War II. There are nevertheless signs of recovery as stimulus packages are implemented and vaccination rates rise. In the shorter term, however, social inequality has increased off an already extremely high base primarily due to Covid-19 impacts.

- **MARKET DESIGN AND REGULATION** - Market design and regulation issues have increased in impact and uncertainty. Government has not given any longer term certainty on its vision for the energy sector, specifically the electricity sector, but has however made some policy decisions. These include building on the 2019 IRP by allowing a larger contribution from self generation and opening the market to new entrants.

The market structure and associated market rules need to be clarified to allow robust business models to be put in place and avoiding the collapse of key players. Debt associated with key energy players is also becoming unmanageable with Eskom and municipal debt rising driven by the inability/unwillingness of customers to pay for services and a lack of political will to make the necessary tough decisions. This is an area where there was not consensus amongst the energy experts in relation to the impact and risk velocity of this uncertainty. It was acknowledged that investor uncertainty has improved because of the REIPPP process. However, the larger energy market impacts remain uncertain.

- **REGIONAL GEOPOLITICS** - Regional geopolitics have increased in impact and uncertainty. This increase in velocity is driven by recent security events with militant attacks in Mozambique and the consequential risk to gas supplies from the region. Companies are suspending activities in Mozambique, and it is uncertain as to how long the situation will continue.



Given that gas could be a key bridge to support large renewable deployment, this has significant implications for the South African energy sector. Government is in the process of finalising the Gas Utilisation Master Plan and these developments may cause further delays in its implementation.

- **RENEWABLE ENERGIES** - Renewable energies have declined in uncertainty but increased in impact. Renewable energy uncertainty has declined as government continues to open new bid windows for the REIPPP on the back of the 2019 IRP where growth of renewables is projected to be significant over the next decade. In addition, renewable energy bid prices continue to decline. The impact has however increased in velocity due to the rapid uptake of renewable technologies globally, their growing share in the energy mix and the necessity to have flexible, stable grids and storage to deal with intermittency.



06: PROGRESS ON ADDRESSING UNCERTAINTY AND RISKS

The Energy Experts noted the following progress on addressing uncertainty and risk against the recommendations made in the 2020 report, using the 4I's and P (**Implementation, Innovation, Impact, Integration and People**) framework as detailed in Figure 4.



FIGURE 4: 2020 4i's and P (**Implementation, Innovation, Impact, Integration and People**) framework

The following table gives a list of case studies which have taken positive steps taken over the last year to address uncertainty, move uncertainty in a positive direction

and reduce the potential impact. The full details of the case studies can be found in Appendix 1.

TABLE 2: Case study titles and framework areas covered						
CASE STUDY SUBMITTER & TITLE	SUMMARY	I1	I2	I3	I4	P
African Energy Leadership Center (AELC) at Wits Business School: Talent in the Energy Sector	The energy skills demand profile has changed towards one requiring leadership (to manage rapid change) and a wider understanding of all the primary energy value chains and their interrelationships. In response, a Master of Management in the field of Energy Leadership and Post Graduate Diploma in the field of Energy Leadership were developed and housed in a new African Energy Leadership Centre within the Wits Business School. The identification of a gap in the market appears to have been correct as there have been approximately 200 applicants each year in the past three academic years. New courses are under development.					✓
Business Unity South Africa (BUSA): Business efforts to address Energy Risks	Business collectively has several interventions in play to address the uncertainties and implement actions to maximise opportunities and mitigate the negative opportunities in respect of Energy. Key areas included the procurement of additional generation capacity and the social compact on Eskom. In addition, Business is seeking to commission a 10-year price path anticipated to be complete by Q3. BUSA in partnership with the National Business Initiative (NBI) and the Boston Consulting Group (BCG) is undertaking a study to understand what is required for South Africa to reach net-zero emissions and social and economic implications. BUSA is represented on the Presidential Commission on Climate Change (P4C) and will feed in relevant work. BUSA will continue to advocate for changes to the regulatory regime of the Energy sector, and the urgent implementation of the IRP2019.	✓	✓	✓	✓	✓
CSIR: 21The CSIR Energy Research Centre as an enabler of a Just Energy Transition	The Council for Scientific and Industrial Research's (CSIR) Energy Research Centre provides the fact-base expertise and essential research infrastructure necessary to address South Africa's growing energy needs, and the associated industrialisation opportunities for new products and services. The Energy Research Centre provides thought leadership, innovation and capacity building providing unbiased decision support to solve the long-term sustainable energy needs of South Africa, while concurrently addressing issues such as carbon dioxide emissions, water use, uncertainty, localisation and regional development. The Centre has five research groups/programmes eight core Research Development and Innovation (RDI) plans.	✓	✓	✓	✓	✓
Eskom: Just Energy Transition Office	Eskom has established the JET Office to drive the Just Energy Transition (JET). The vision of the JET Office is net-zero carbon emissions by 2050 whilst managing Eskom's socio-economic impact and contribution towards South Africa's Just Energy Transition. The immediate focus of Eskom's JET initiative is to accelerate the repurposing of power stations that are shutting down, enabling renewables through own build, partnerships/PPAs, and acquiring natural gas options as an enabling fuel. JET is a key lever to unlock the potential for local manufacturing and industrialisation, which includes meeting the demand for electric vehicles. The JET social impact will be addressed by retraining in the required skills. Research for innovations such as new storage options and the hydrogen economy is currently underway, together with our continued focus on microgrids for greater access to electricity. Opportunities for green and climate financing will be pursued and agreements put in place with funders for repurposing, greenfield renewables, SSEG options, and grid strengthening.	✓	✓	✓	✓	✓

CASE STUDY SUBMITTER & TITLE	SUMMARY	I1	I2	I3	I4	P
EWSETA: Learning Programmes Impact Evaluation Study	The EWSETA, anticipates occupations that are in high demand through the implementation of its Research Agenda and by doing Impact Studies to evaluate the effectiveness of EWSETA work-integrated learning. The EWSETA Theory of Change (TOC). model was inspired through the vision of the SETA "becoming recognised as a reputable and leading authority in world class skills development facilitation for the energy and water services sector". The EWSETA is therefore required to maximise desirable learner outcomes with respect to further studies and employment opportunities. Partnerships between the EWSETA, government and sector employers are an important enabler in this respect. Going forward, the EWSETA will facilitate the development and mastery of digital, remote working and smart working skills and interventions specifically tailored for young entrepreneurs who have successfully started their own formal businesses. Since skills development remains a priority for organisations in the foreseeable future, the EWSETA will ensure that it provides additional support required to maintain effective delivery of learning programmes across the sector.					✓
Green Cape: Witsand Informal Settlement: Building resilient urban communities through innovation and partnership	In June 2020, 10 free-to-access, uncapped, solar-powered Wi-Fi enabled ThinkZones were set up in Atlantis, providing free internet access to between 5,500 and 10,000 people per month. Their innovative business models allow for both the infrastructure and the connectivity to be funded without the end user paying a cent. Through a co-design process with Green Cape and the Witsand leadership, the concept of adding a solar light to the Wi-Fi connection points was added as the Witsand community prioritised area lighting and connectivity as their most pressing energy related needs. Through a partnership between a diverse group of stakeholders (Non-profit organisation, an internet service provider and a group of community leaders), from different backgrounds and contexts an innovative solution has turned the lack of infrastructure in Witsand into a unique opportunity. The community for the community to access education, skills development and the potential benefits of the 4th industrial revolution. Combined with this new connectivity the community is now also provided with much needed area lighting	✓	✓			
IG3N: Lithium Iron Phosphate batteries used mostly as energy storage in Solar PV installations	IG3N (Pty) Ltd is a light manufacturing start-up that produces LiFePO4 (Lithium Iron Phosphate) batteries used mostly as energy storage in Solar PV installations. Looking for funding for a business such as IG3N turned out to be a very difficult undertaking. A specialised equity funder was brought into the business with focus on start-ups and that has tools and mechanisms to significantly grow businesses. The funder took an equity share and, on their strength, were able to crowd in more investment into business. Their skills and knowledge allowed packaging of the business so larger funders could understand. With the private equity funder on board, the business was able to access more funding and more importantly, the kind of funding that is more patient and suited to a business preparing for rapid grow. Lessons learnt was the financing ecosystems in the energy sectors are still geared towards large investments – and business that are in the "middle" and looking for growth should rather spend the time looking for appropriate partners than for funding.	✓	✓	✓		
Mpact: Rooftop solar PV to reduce electricity costs and contribute towards emissions savings targets	Mpact has been rolling out rooftop solar PV to all factories on sites to reduce electricity costs and mitigate the future impacts of electricity price increases above inflation as well as contribute towards emissions savings targets set by the Group. The project started in 2017 and the company is now on their sixth installation, with a number of additional projects currently in the pipeline for 2021/22. A comparative quotation process has been developed to ensure the best financial and technical solution. All the projects are bought with a five-year operations and maintenance guarantee which de-risks the financial model and returns on capital invested. Over time the process has been refined, and the specifications improved project to project, and Mpact now has a good idea on project high level design, procurement, costing, contracting, construction, commissioning and operation. The uncertainty has been shifted through deployment of capital for self-generation to avoid higher costs both now and into the future. Mpact has a number of large manufacturing sites that now have reduced day time electricity demand in the day when the national grid is under the more pressure.	✓	✓	✓		

The case studies showed that there is a very strong focus on implementation and people, particularly skills development.

Some critical learning are starting to emerge which will need to be applied if the new gold rush is to be realised.

07: CONCLUSIONS

Overall, the uncertainty in the energy risk environment in South Africa has escalated over the last year, primarily due to the impact of Covid-19, but also due to inherent weaknesses in the South African ecosystem. When the findings from the 2020 report are viewed considering the changes in context and shifts in uncertainties identified above (Figures1-3), the following conclusions were drawn by the Energy Experts:

- **Progress has been made to reduce policy uncertainty**, particularly in energy policy and in the development of a National Climate Change Bill. In 2020, the SANEA Risk Report concluded that “global forces are not within our control but there are opportunities and unique resources for enabling a complete redesign of the energy system that could leapfrog South Africa’s global market share in the new energy system”. The Publication of the 2019 Integrated Resource Plan (IRP) and the proposed revision of Nationally Determined Contribution (NDC) as well as other government policy measures, are positive moves but as stated in the 2020 report, “timeous implementation of policy is critical to drive the just energy transition and build investor confidence”. It may therefore be argued, that given the impact, **the action taken is not sufficient and that the change is not rapid enough.**
- **Steps have been taken to improve energy (electricity)**, with the process for emergency procurement of electricity generation having been concluded and self-generation enabled through reduced regulation. The next round of the REIPPP is also underway to secure additional electrical capacity strongly focused on renewable technologies. Legal challenges to fossil fuel based projects are noted and could impact implementation of these projects and thus electricity security.
- **Covid-19 has increased the levels of uncertainty** and its effects will be felt for years to come. The opportunity for post Covid-19 economic stimulus, using clean energy and its access to capital markets, has not been sufficiently leveraged.
- **In some cases, the level of uncertainty has reduced.** For example, the uncertainty has declined around global commitment to a climate change framework and the implementation of renewable technologies as global forces strongly drive these two issues. In both cases, however, the impact increased, so the consequences of doing nothing or not enough, may negatively impact on country competitiveness for decades to come.

- **The longer-term vision for the energy sector is still not clear** – the lack of integrated policy, a final Integrated Energy Plan (IEP) Gas Plan and updated Integrated Resource Plan (IRP) that talk to each other as well as South Africa’s new National Determined Contribution (NDC) and Just Energy Transition Plan creates a vacuum. This drives high levels of uncertainty in the market and discourages investment (foreign and local), hampering decision making and allowing parochial interests to slow progress because of conflicting stakeholder objectives.
- The resulting lack of focus means that South Africa’s limited economic resources are sparsely distributed across too many initiatives some of which are not viable or scalable. This results in **shallow change in numerous areas, rather than deep change in a select few areas** to shift the energy sector onto a new trajectory and realise “South Africa’s new gold rush”. Instead, uncertainty has increased as the sector continues to “drift” due to lack of direction.
- **Integrated infrastructure plans are not in place**, meaning that **sector coupling**, one of the key opportunities of the energy transition to lower carbon technologies, **is not being prioritised**. For example, to retain jobs in the manufacturing sector, the energy transportation nexus should be highlighted as a key mechanism for clean molecule development and localisation of new value chains.

In the 2020 Energy Risk Report, it was highlighted that several risks could materialise if key uncertainties were not managed. **These risks continue to be present in 2021** and have either increased in uncertainty or have bigger potential impacts.

They are identified as:

- **Economic growth will continue to decline** if South Africa’s unique natural resources of solar insolation, mineral resources are not leveraged.
- **Energy demand will not be met** due to the economic losses suffered by energy producers and suppliers and capacity risks affecting primary energy supply (notably coal). This includes addressing the effective integration of variable renewable energy from new geographic sources into the transmission system, and municipal distribution failure.
- The **ability of energy actors to raise capital will be severely limited** for new energy plant such as power plants, oil refineries, new coal supplies, upgraded municipal distribution, etc.
- Goods exported from South Africa may be adversely impacted by **potential border taxes** due to their high carbon intensity.

- A **deficit of the required talent** will mean that South Africa in the public and private sectors will not be able to plan and execute energy projects, costs will escalate, and the mismanagement of energy will impact significantly on economic growth.
- Activism and **civil disobedience will escalate**, and decision paralysis will grow.
- **Parochial interests** remain a threat to the energy sector.

The 2020 report also identified that by taking proactive action to influence the direction of key uncertainties, the negative risks can be managed, and opportunities identified. Realisation of these positive risks remains a key incentive for action in 2021, giving the following benefits:

- Clean energy is an **active driver of economic recovery post Covid-19.**
- **A reduction in South Africa’s emissions** (Carbon as well as Sulphur Dioxide, Nitrous oxide etc).
- **Beneficiation and localisation of energy value chains by leveraging local resources** (solar insolation, minerals required for batteries, hydrogen production etc) and expertise developed nationally and in SADC – a “new gold rush”.
- **Improved economic growth and new job creation** with social upliftment of our people.
- **Positioning of South Africa as a leader** in new and emerging markets.
- An **aligned and coordinated policy framework** that promotes broad based national strategies.
- **Improved investor confidence** due to a clear vision and Waligned policy.



08: 2021 RECOMMENDATIONS TO REDUCE NEGATIVE AND AMPLIFY POSITIVE RISKS

The recommendations made in the 2020 framework of 'People and the 4 I's' were reviewed in terms of their relevance and whether they address the uncertainties identified. 'People' remain at the centre of all decisions and so they form the heart of the recommendations.

The recommendations are interconnected in some cases, so it is essential that all the elements of the framework are simultaneously addressed for maximum benefit at a national level.

The Energy Experts were of the view that the recommendations made in 2020 are still appropriate but that several have increased in urgency given their potential impact and the fact that they drive the energy sector. There is still great potential for South Africa to experience a "new gold rush" if there is serious intent to implement recommendations from this report. These recommendations include those related to the development of a **country IEP** and **associated just energy transition** trajectory, as these provide focus as well as certainty for manufacturing and other sectors.

Localisation opportunities must be harnessed for new energy infrastructure being developed by an increasing number of Independent Power Producers. Another recommendation still valid is the call for a **well-defined electricity sector market structure, with clear associated rules**, to boost investor confidence, to ensure sufficient capacity to support a growing economy and to allow the development of appropriate business models for a robust electricity sector. The recommendations that require urgent implementation are highlighted in blue in Figure 5.

The energy experts were of the view that several of the opportunities discussed above were time sensitive and if they were to be realised, then quick action needs to be taken in the following areas:

- Promoting and enabling the production of green hydrogen, ammonia and other clean molecules: Many countries are driving ahead with initiatives on clean molecules and Power to X projects, meaning that South Africa could miss the opportunity of “the new gold rush” this opportunity affords. A coordinated approach at a national level is urgently required.
- Battery development: The rise in demand for energy storage and the extended use of batteries worldwide provides an opportunity for South Africa to participate in the market, with great opportunities for beneficiation of our extensive minerals resource, for localisation of manufacture and with that, job creation.

The opportunity links to the production of clean molecules mentioned above but requires an integrated, well-defined strategy to ensure South Africa's mineral wealth provides local benefit for all its citizens.



FIGURE 5: Recommendations to maximise positive and minimise negative risks in the energy sector

09: REVIEW BY SUB-SECTOR ENERGY AND RELATED ASSOCIATIONS



In order to ensure a holistic approach is taken and all uncertainties and recommendations are identified.

The draft 2021-22 Risk Report was sent to various, specialised energy and related associations for comment. This commentary is included in Appendix 2 of the report. These observations are included to deepen the debate generated by this report as well as input for next year's report.

SOME KEY UNCERTAINTIES THAT WERE AGREED WITH BY MORE THAN ONE OF THE ASSOCIATIONS WERE:

- Appropriate policy for the energy sector as it impacts on planning and certainty
- The climate framework as linked to vision and as it will impact investment patterns and confidence
- Market design and energy governance given the long-term nature of the sector and also investor confidence if market rules are not clear

Other uncertainties the associations agreed with included energy price volatility, country level development, investor confidence, sustainable cities, parochial interests and decision making, regional geopolitics and activism and disobedience.

UNCERTAINTIES THAT THE ASSOCIATIONS FELT WERE MISSING WERE:

- Fuel volatilities specifically for fuels important to the energy transition
- The influence of capital markets, specifically their policy which is driving energy choices
- International oil market dynamics and the impact of this locally
- Lack of respect for the rule of law and the impact of this on the energy sector eg. theft

SOME KEY RECOMMENDATIONS THAT WERE AGREED WITH BY MORE THAN ONE OF THE ASSOCIATIONS WERE:

- The need for a long term vision for the sector with a transition journey map
- Future skills roadmap

Other recommendations that resonated with the associations included streamlined regulation, in country production of liquid fuels, aligned policy and a review of systemic risk allocations.

SAPIA included a recommendation they felt was missing, namely that under innovation there should be more research required into 2nd and 3rd generation biofuels and chemical derivatives.



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APPENDIX

10: APPENDIX 1
– DETAILED CASE STUDIES



TITLE: Talent in the energy sector

ORGANISATION: African Energy Leadership Centre, Wits Business School	SECTOR: Education																				
UNCERTAINTY: Talent	4I's AND P ADDRESSED: People																				
BACKGROUND: The global energy context is one of rapid change driven, simultaneously, by technologies associated with the 4th Industrial Revolution and market interventions related to decarbonisation. The combined effect of these changes is increasing intermixture, substitution and interdependence of primary energy value chains, that had previously operated more as stand-alone silos. Consequently, the skills demand profile changed towards one requiring leadership (to manage rapid change) and a wider understanding of all of the primary energy value chains and their interrelationships.																					
ACTIONS TAKEN: A decision was taken to investigate a perceived gap in the market for postgraduate energy skills. Market research and consultation with energy experts was conducted, out of which grew proposals to offer a new suite of postgraduate energy leadership degrees that sought to address the changes summarised in the “Background” above. These new degrees were developed and housed in a new African Energy Leadership Centre within the Wits Business School. A partnership with business provided senior executives for a steering committee to steer the new centre. A partnership was formed with the Chemical Industries Education and Training Authority (CHIETA) which provided seed funding. These actions relate to the need to create new talent for the energy sector.																					
PROGRESS TO DATE LESSONS LEARNT: Progress has been made. Curriculums for two new degrees were developed, accredited and offered to the market, viz Master of Management in the field of Energy Leadership and Post Graduate Diploma in the field of Energy Leadership. The identification of a gap in the market appears to have been correct as there have been approximately 200 applicants each year in the past three academic years. The number of students registered was as follows:																					
<table><tr><th>AELC Candidate Registration Summary</th><th>2019</th><th>2020</th><th>2021</th></tr><tr><td>Masters</td><td>40</td><td>41</td><td>45</td></tr><tr><td>Post Graduate Diploma</td><td>27</td><td>39</td><td>32</td></tr><tr><td>Post Graduate Diploma Part-time</td><td>-</td><td>29</td><td>26</td></tr><tr><td>Total</td><td>67</td><td>143</td><td>139</td></tr></table>		AELC Candidate Registration Summary	2019	2020	2021	Masters	40	41	45	Post Graduate Diploma	27	39	32	Post Graduate Diploma Part-time	-	29	26	Total	67	143	139
AELC Candidate Registration Summary	2019	2020	2021																		
Masters	40	41	45																		
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Post Graduate Diploma Part-time	-	29	26																		
Total	67	143	139																		
So far, this initiative has created four full-time jobs and several part-time jobs and fixed period contract jobs. Barriers encountered include the extremely slow process for the accreditation of new degrees by the Council for Higher Education. It has an approximately three-year backlog. Also, the large, old Wits University did not have administrative and financial systems designed for the needs of new, small, agile centres that were required to be financially self-sufficient and therefore to take on consulting work to supplement its income. There was also a dearth of academic skills available to teach the new degrees. This was resolved by bringing industry experts into the University on a full time and part-time basis. Foreign students from African countries faced serious visa obstacles which has almost extinguished our ability to grow in these markets.																					
NEXT STEPS: After the two new degrees were launched the government announced a further attempt to restructure the state-dominated electricity supply industry along more market-related lines. This has increased the demand for skills in this new area for South and Southern Africa. Work is underway in designing a new additional course that will provide more of an electricity market reform bias whilst maintaining an interdisciplinary approach.																					

TITLE: Business efforts to address Energy Risks

ORGANISATION: Business Unity South Africa	SECTOR: Organised Business
UNCERTAINTY: Appropriate policy, climate framework, decision paralysis, economic growth, energy affordability energy price volatility and uncertainty, global pandemics, investor confidence, long term vision, market design and energy governance, renewable energies	4I's AND P ADDRESSED: People, Implementation, Innovation, Integration, Impact
BACKGROUND: Business collectively has several interventions in play to address the uncertainties and implement actions to maximise opportunities and mitigate the negative opportunities in respect of Energy.	
ACTIONS TAKEN: Much of BUSA work is cross-cutting and the following actions highlight the most relevant and impactful work areas covered over the last 12 months. Following the outbreak of COVID-19, the Business for South Africa (B4SA) initiative was established to help manage the pandemic; the response thereto; and critically the economic recovery. Energy was identified as one of the key areas requiring focused intervention for economic recovery. Many of the uncertainties flagged in the SANEA Report were also flagged by Business and included as areas to be addressed in the Economic Recovery Plan; and many of the 4I's and P Recommendations were similarly aligned. Key areas included: <ul style="list-style-type: none">· Procurement of additional generation capacity through the implementation of the IRP2019 to ensure security of supply and enable economic growth.· The social compact on Eskom which aims to ensure the unbundling of Eskom operations, deal with Eskom's debt and deal with energy affordability and price volatility and price uncertainty. This process will see a fundamental shift in market design and energy governance which is wholly supported by Business. <p>These initiatives are being pursued through the Nedlac structures. In addition, Business is seeking to commission a 10-year price path to provide much needed price certainty.</p> <p>Climate Action and Just Transition Pathways BUSA, in partnership with the National Business Initiative (NBI) and the Boston Consulting Group (BCG) is undertaking a study to understand what is required for South Africa to reach net-zero emissions and what the social and economic implications for the country to reach net-zero. The study is conducted along sector pathways, i.e., energy including electricity. This evidence base will be used to inform BUSA's policy recommendations and policy-related engagements. It is recognised that dealing with emissions from the Energy Sector is fundamental to reducing overall emissions and that this so-called "Just Energy Transition" must include support socio-economic aspects as well as technical and financial aspects. This includes employment, skills, education etc. There is in-principle agreement that success of South Africa's Just Transition can only be achieved when there is an agreed visions; policy alignment and all social partners working together to achieve the agreed outcomes.</p> <p>This long-term vision, particularly for the Energy Sector will, with the concomitant policy coherence, boost investor confidence and create an enabling environment for economic growth.</p> <p>Climate Change Bill Following extensive engagements with all social partners, the Climate Change Bill was signed-off by Nedlac and will move into the Parliamentary processes in the coming months. BUSA worked extensively on the Bill to ensure that it would achieve the necessary management of climate change and form a critical component of the overall policy framework.</p> <p>Presidential Commission on Climate Change (P4C) This structure had its inaugural meeting in February 2021 and is tasked with defining the long-term vision for the Just Transition for SA and further with developing the pathways or roadmap to implement this vision. BUSA, through its representative will engage in the work of this commission, feeding the evidence-based input from the Climate Action and Just Transition Pathways into these process.</p> <p>Notably, key members of the business community have announced plans or projects to develop R&D into emerging technologies like hydrogen. This includes Anglo American and recent announcements by Toyota and Sasol.</p>	



PROGRESS TO DATE LESSONS LEARNT: The implementation of the ERAP is currently still in progress. Government has announced preferred bidders in the Risk Mitigation Independent Power Producer Programme (RMIPPP) and bidders are expected to supply power to the grid by August 2022. Business is working with government to ensure that any regulatory challenges to this process are addressed. Business is advocating for the amendment of Schedule 2 of the ERA, in particular the lifting of the threshold exempting a generation Facility from requiring a licence to 50MW. This will trigger significant investment from the private sector in embedded generation with of potential of up to 5GW. This will also assist with security of supply and energy affordability. Consultation on the amended schedule is anticipated in coming months.
Climate Action and Just Transition Pathways The first phase of this work is nearing completion, with the report for the Energy, Mining and Petro-Chemicals Sectors anticipated early in Q2 of 2021. The second phase of analysis has begun and is focussed on the Agricultural and Transport sectors. BUSA and its partners are currently planning a series of workshops based on the outcomes of phase 1 to plan policy roadmaps to enable the pathways and consider what support is required from a socio-economic point of view. The P4C commissioners are appointed for a term of 5 years, however it is hoped that the commission will publish at least its vision before the end of the year; Business is strongly advocating for this and a programmatic work plan.
NEXT STEPS: BUSA will continue to advocate for changes to the regulatory regime of the Energy sector, including on the requirements and processes for licencing and push for more open access to the grid. BUSA will also continue to advocate for the urgent implementation of the IRP2019 as the current shortage of electricity supply is unsustainable and inadequate to support economic growth. In parallel, more and more businesses are calling for an update to the IRP to correctly reflect the required procurement as well as an updated and more ambitions decarbonisation plan. BUSA work on the price path is anticipated to be complete by Q3 to allow it to be used as part of the NEDLAC considerations, as well as engagement on the upcoming price application from Eskom. This study will consider the changing market structure of the electricity sector to help business and other stakeholders ensure electricity affordability. As already stated, the P4C is at least a five-year process, however Business is urging for prioritisation of agreeing and setting a vision and developing pathways/programmes to achieve the vision.



TITLE: The CSIR Energy Research Centre as an enabler of a Just Energy Transition

ORGANISATION: CSIR	SECTOR: Research and Innovation
UNCERTAINTY: Appropriate policy and vision, climate framework, country level development, decentralised systems, energy affordability, energy data availability and confidence, energy price volatility and uncertainty, energy-water nexus, market design and energy governance, renewable energies, energy storage, strong grid, sustainable cities, talent	4I's AND P ADDRESSED: People, Implementation, Innovation, Impact, Integration
BACKGROUND: The Council for Scientific and Industrial Research's (CSIR) Energy Research Centre provides the fact-base expertise and essential research infrastructure necessary to address South Africa's growing energy needs, and the associated industrialisation opportunities for new products and services. The Energy Research Centre provides thought leadership, innovation and capacity building to address the two main energy imperatives of energy efficiency and cleaner energy. The Centre's growth and impact plan responds directly to the challenges identified in the National Development Plan (NDP) by providing unbiased decision support to solve the long-term sustainable energy needs of South Africa, while concurrently addressing issues such as carbon dioxide (CO2) emissions, water use, uncertainty, localisation and regional development. This in a context of a highly carbon intensive energy system where coal is the primary energy source as summarised in the Sankey energy diagram in Figure 1.	

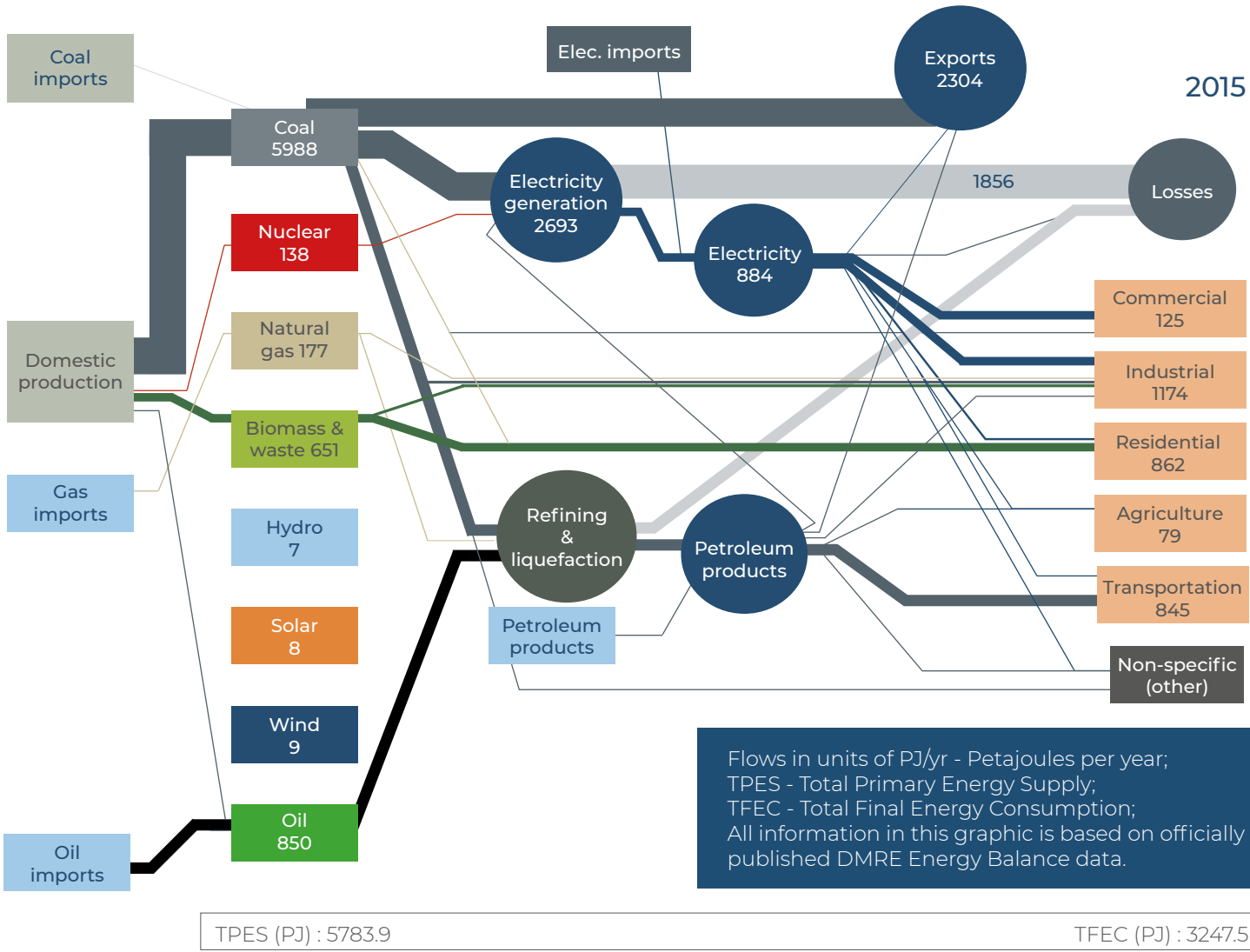


FIGURE 1
South African Sankey drawing

The Centre's activities are guided by global trends contextualised to local realities focused on developing sustainable energy systems, and can be summarised as follows:

- Conduct directed research in emerging energy technologies and system integration.
- Prove the concept of emerging energy technologies and systems.
- Demonstrate energy technologies and systems in the South African context and to support their local industrialisation and commercialization.
- Conduct directed research towards the understanding of how to optimally design, build and operate cost efficient, reliable and sustainable energy systems.
- Find optimal pathways for the expansion and operation of energy systems through modelling and simulation.
- Provide policymakers with a scientifically based analysis of market design and regulatory concepts for the integration of new energy technologies.
- Provide support for South African industries on key energy-system-related decisions and identify and action opportunities for the industrialisation of new products and services.
- Provide thought leadership for the energy research agenda in South Africa and the region; and
- Be globally recognised as the premier applied-energy-research centre on the African continent.

VISION:

“TO PROVIDE THE KNOWLEDGE BASE FOR THE SOUTH AFRICAN ENERGY TRANSITION AND BEYOND”

The CSIR's Energy Research Centre has started to become and will continue to strive towards being the first port of call for South African decision makers in politics, business and science to advise them on the energy transition. This transition is a move towards a more sustainable and cleaner energy system and will ultimately lead to energy

being used more efficiently and having a significant share of the primary energy supply being provided by renewables. The CSIR's Energy Research Centre will also leverage the learning from the South African energy transition to support the creation of sustainable energy systems for other African countries.

MISSION:

“TO RESEARCH THE ENERGY VALUE CHAIN FROM TECHNOLOGIES TO POLICIES”

ACTIONS TAKEN: The Centre has five research groups/programmes as summarised in figure 2

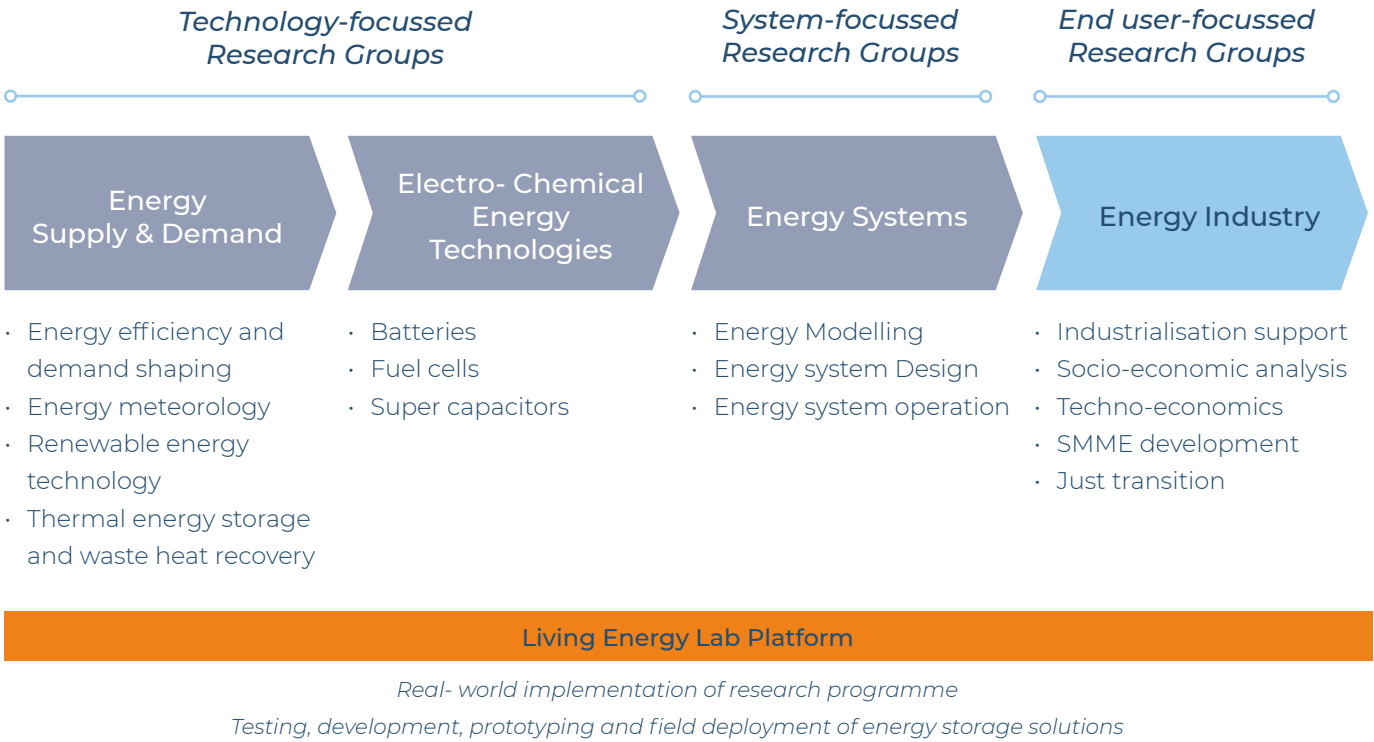


FIGURE 2: Overview of the CSIR Energy Research Centre

SOUTH AFRICA IS POSITIONED WELL TO BE AMONG REGIONAL AND GLOBAL LEADERS TRANSITIONING ENERGY SYSTEMS WHEREBY RENEWABLE ELECTRICITY FORMS THE PRIMARY ENERGY CARRIER AS ILLUSTRATED IN FIGURE 3.

STRATEGIC INVESTMENT IN RESEARCH AND DEVELOPMENT INITIATIVES THAT SPEAK TO TECHNOLOGY INNOVATION AND INDUSTRIALISATION IS PARAMOUNT.

THESE ARE:

- Research and develop energy technology solutions along the energy value chain for grid, transportation and stationary applications as used in commercial, industrial and residential sectors.
 - Creating integrated, cross-cutting teams by establishing national industrial/university/lab consortiums focused on energy storage and conversion systems.
 - Early adoption of hydrogen in niche applications (underground mining, public transportation), Power to X and Carbon Capture and Utilisation.
 - Small scale embedded generation and self-generation, growth in solar photovoltaic (PV) installation at the commercial and residential level.
 - Adding value to the South African economy through industrialisation, small business development, socio-economic development and addressing transformation challenges, over and above energy security.
- Design and operation of a smart energy system to optimise and manage the interplay between variable supply sources, demand and storage. Provide a demonstration platform for programs e.g., Hydrogen South Africa on our CSIR Pretoria campus. Supporting the implementation of a sustainable renewable energy based micro-grid.
 - Alignment with the NDP's objectives of increasing employment, reducing inequality and eliminating poverty within the energy sector.
 - Providing scientific and industrialisation support to the energy industry to improve competitiveness and market access opportunities; and
 - Energy storage technologies to support the increasing renewable energy sector are needed and there is an opportunity for the country to invest in developing the South African battery industry, which will, in turn, reduce the cost of battery cells and improve ease of accessibility of electricity in the African continent.

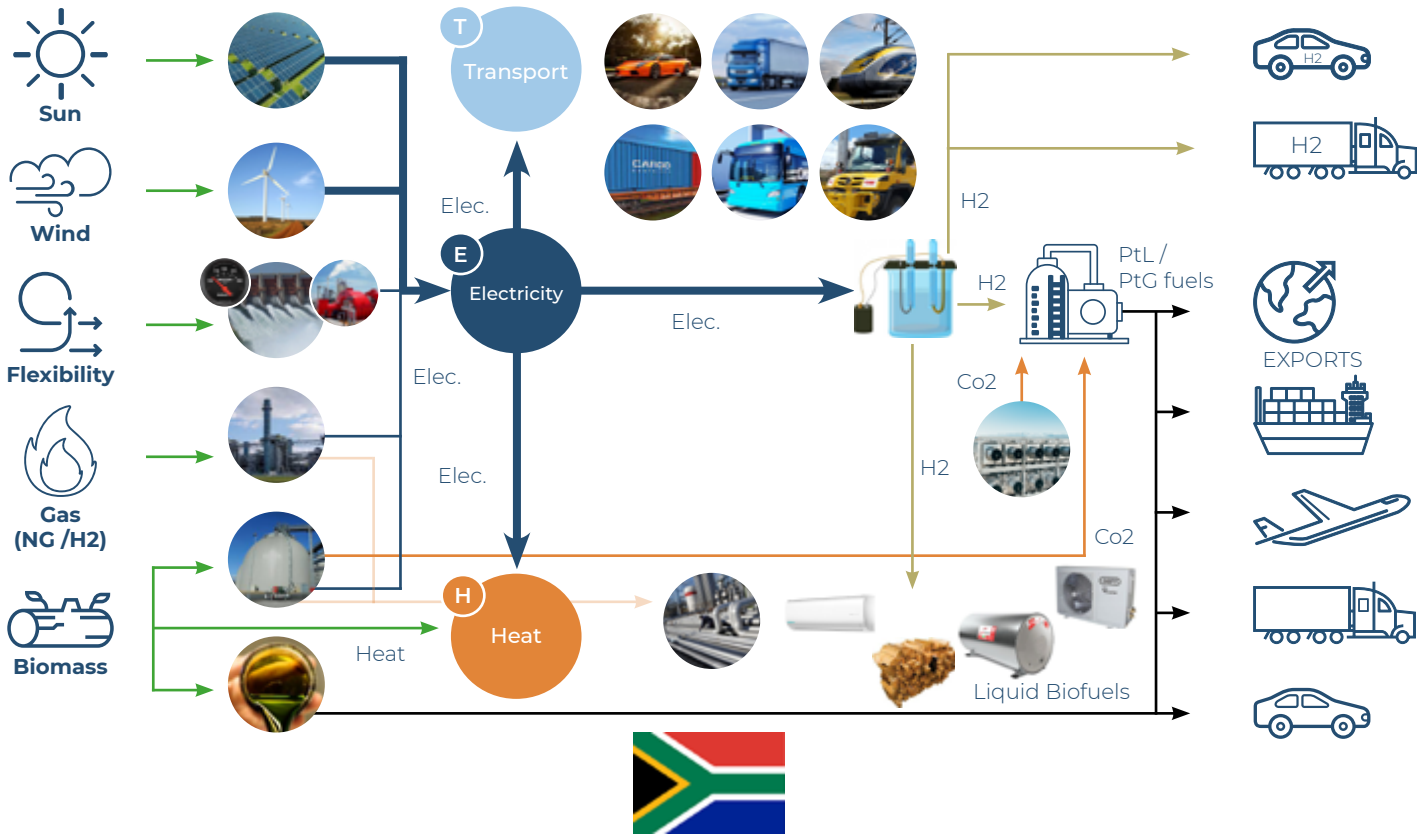


FIGURE 3: Possible future: Hypothetical energy-flow diagram (Sankey diagram) for South Africa's future energy system



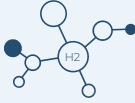

	OPPORTUNITIES - A SELECT FEW	RESEARCH AND DEVELOPMENT AGENDA
Wind & Solar 	<ul style="list-style-type: none">Abundant and inexhaustible wind and solar energy resourcesEven by 2050, RSA would not have used 10% of its exploitable wind and solar resourcesStrategic global competitive advantage (excellent resource and available land)	<ul style="list-style-type: none">Planning and operating a power system with high share of renewable (stability/reliability)Technology Localisation (industry, jobs, SMMEs)Energy storage (battery development and localisation) - beneficiating local mineral resources
Financing 	<ul style="list-style-type: none">Global finance available to decarbonise the energy system and make countries resilient to climate change effects	<ul style="list-style-type: none">Opportunities to address present liquidity challenges (Eskom and municipalities)
Hydrogen Economy 	<ul style="list-style-type: none">Hydrogen a fuel source of the futureLocal energy mix diversity, and possible export opportunity (Europe and Japan)Reduce RSA balance of payments displacing imported liquid fuelsPlatinum beneficiation in fuel cells and electrolysis	<ul style="list-style-type: none">Determining the futrue role of hydrogen in the RSA energy mix and end use applications and new industires including hydrogen as a feedstock for CO2 utilisation in the production of clean synthetic fuelsLocalisation and benefication to supply the global hydrogen value chain
Circular Economy 	<ul style="list-style-type: none">Valuation of waste	<ul style="list-style-type: none">Carbon dioxide utilisationFly ash-based geopolymers for reduced cost building materials
4IR at the core of industrialisation; Using IoT, Robotics, VR and AI to improve and enhance our way of life (productivity/efficiency)		

TABLE 1: Energy transition opportunities and linked research agenda of the CSIR (1 of 2)





	OPPORTUNITIES - A SELECT FEW	RESEARCH AND DEVELOPMENT AGENDA
Just Transition 	<ul style="list-style-type: none">New jobs in Gas, Storage and renewablesRenewable energy manufacuring and deployment in coal regionsNet increase in jobsLocalisation and industrialisation of new technologies	<ul style="list-style-type: none">Re-purposing aging coal-fired power stationsLabour migration and social plansEconomic sector diversification in coal regions (e.g. special economic zones)Skills plans for new industries (new skills and re-skilling)
Consumers Prosumers 	<ul style="list-style-type: none">Consumers participate in the provision of electricity (small scale embedded generation)Off-grid and mini-grid electrification	<ul style="list-style-type: none">New business models for prosumers and the municipal utilities. Financial sustainability of new tariff structures and trajectoriesDemocratisation of energy and opportunities for SMMEsNew tech for electricfication Universal Access
Utility Business Model 	<ul style="list-style-type: none">Change from a vertically integrated power utility business modelEntrance of new players in the Electricity Supply Industry (ESI)	<ul style="list-style-type: none">New energy markets with aggregatorsCapacitate Infrastructure maintenance and creationEnsuring the performance of exisitng (Eskom) fleet
Alternative/ Low Emissions Mobility 	<ul style="list-style-type: none">Carbon neutral synthetic fuelsBattery and fuel cell electric Vehicles for domestic and export marketsReduce dependency on imported liquid fuels	<ul style="list-style-type: none">Electrochemical technologies (batteries, fuel-cells) key to the future transportation system - localisation and industrialisationRevenue opportunities & increased electricity sales
4IR at the core of industrialisation; Using IoT, Robotics, VR and AI to improve and enhance our way of life (productivity/efficiency)		

TABLE 2: Energy transition opportunities and linked research agenda of the CSIR (2 of 2)

The strategy of the Energy Research Centre is focused on eight core Research Development and Innovation (RDI) plans as summarised in Figure 4.

The implementation of the strategy links closely with partners and stakeholders from the public and private sector locally and abroad, including strong linkages to international R&D institutions.

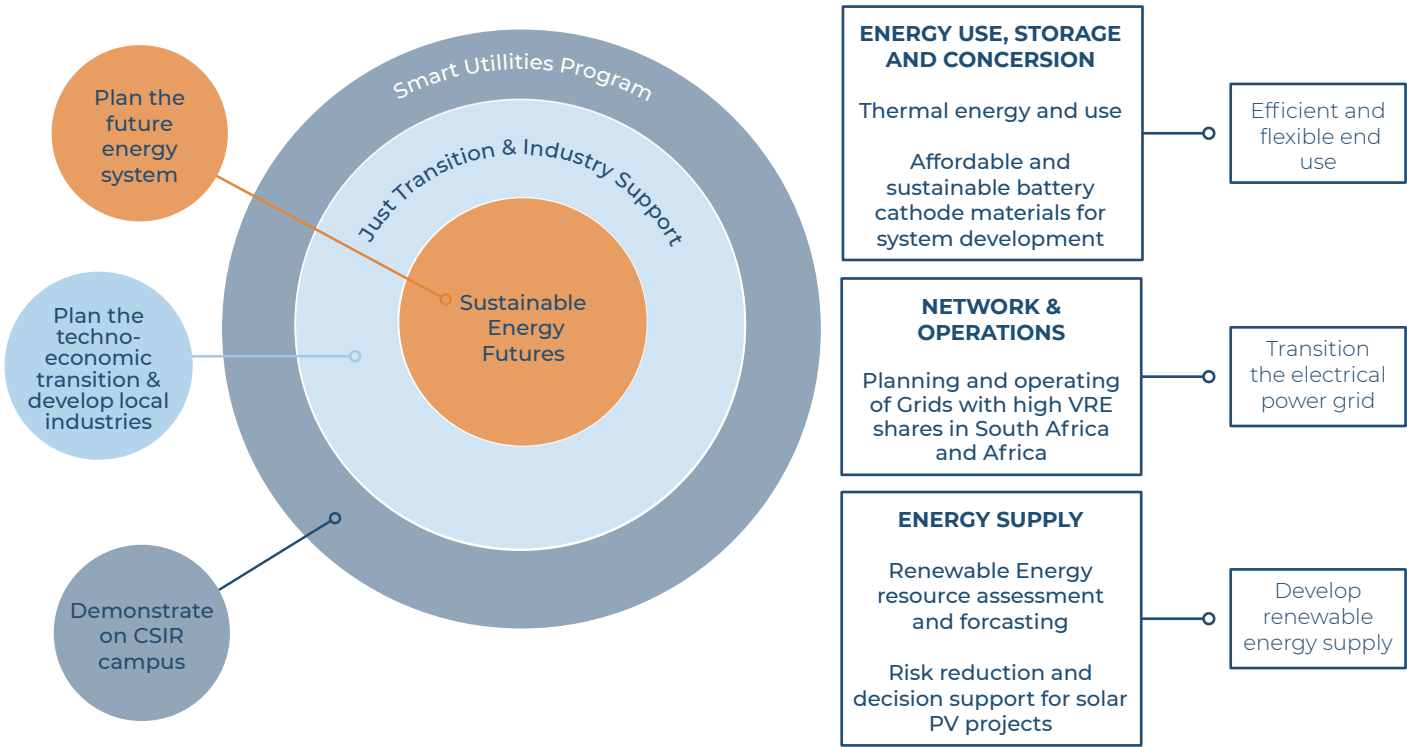


FIGURE 4: CSIR Energy Research Centre RDI plan



PROGRESS TO DATE LESSONS LEARNT:
The table below details progress made:

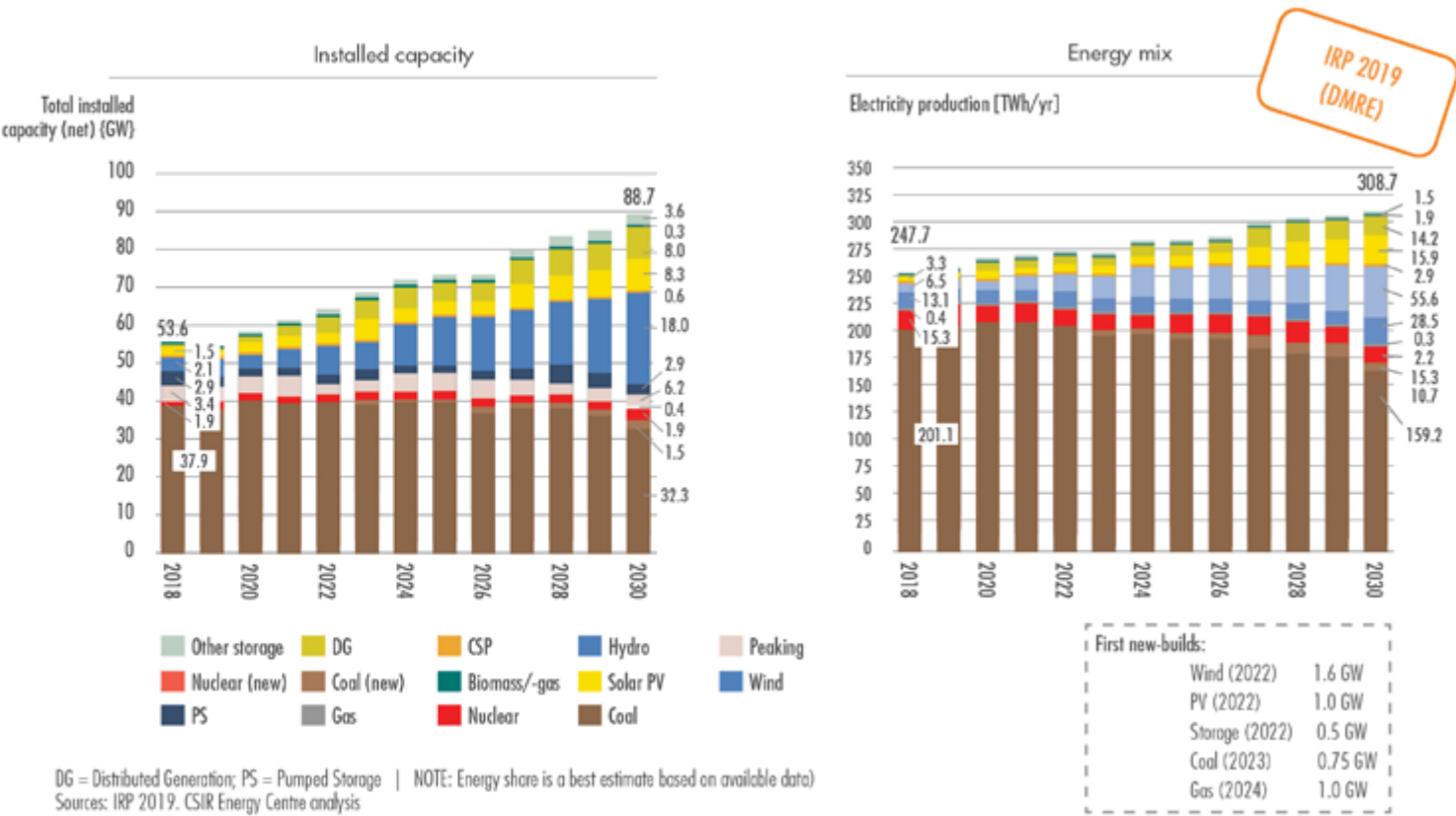


TABLE 3: Selected achievements of the CSIR Energy Research Centre

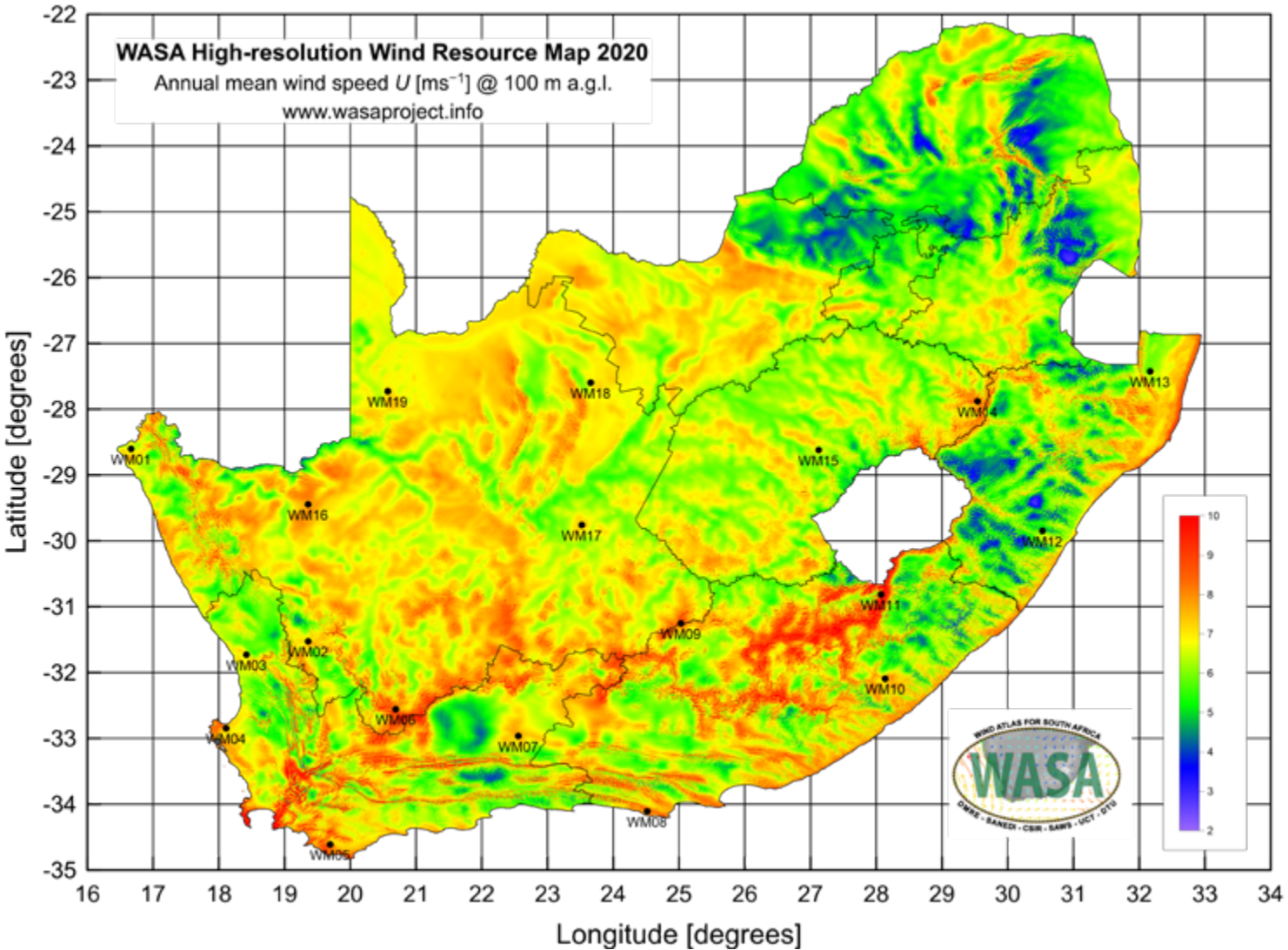
FACT AND EVIDENCED-BASED
INTEGRATED RESOURCE
PLANNING (IRP):

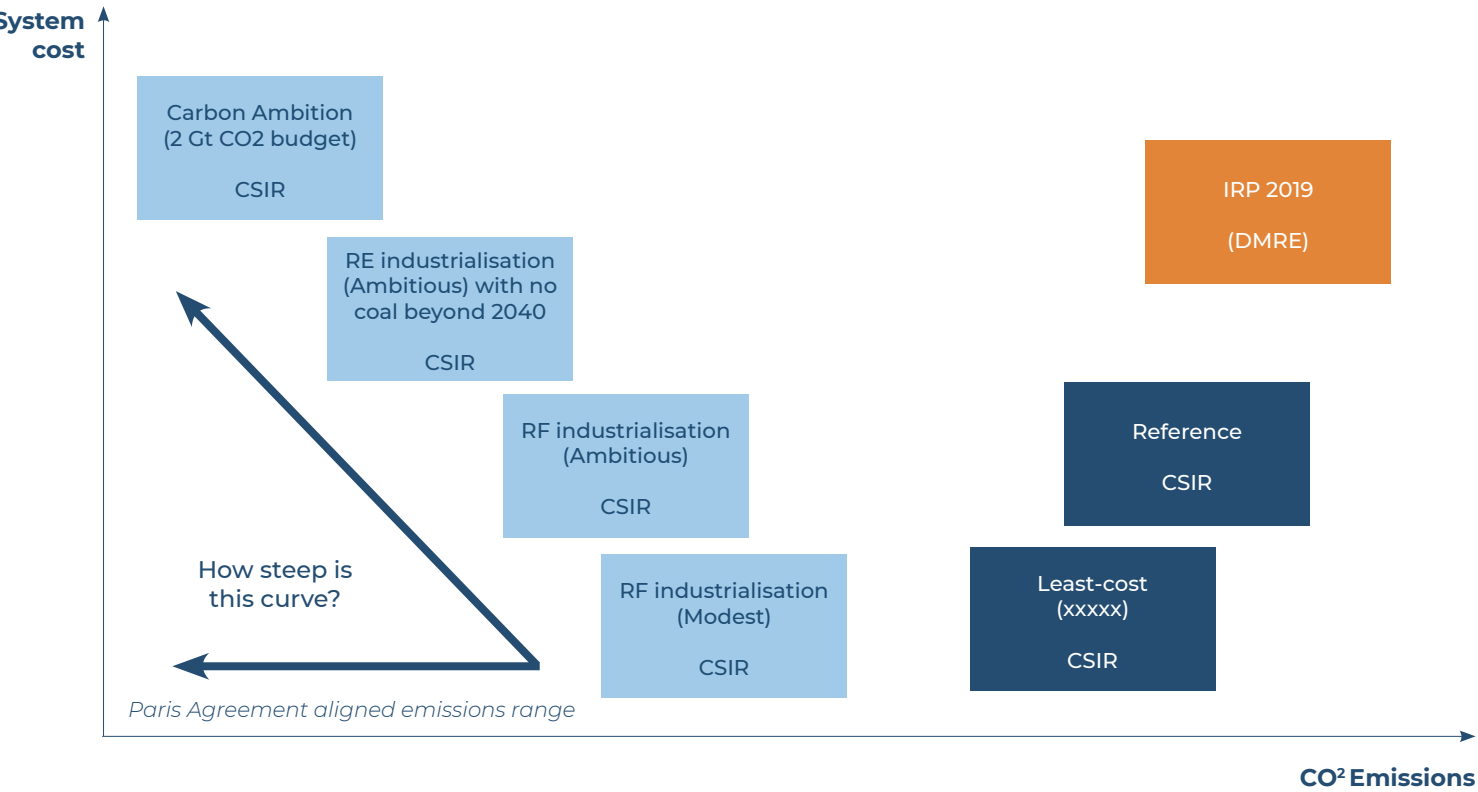
The CSIR thought leadership on South African power system development and related power generation plans has been central in the development of the national IRP, with the CSIR providing detailed [independent reviews](#) of various iterations of the South African IRP for electricity (in [2016](#), [2018](#) and [2019](#)) and engagement in the related public participation processes. More recently, comments on the concurrence with the ministerial determination on the procurement of 2500 MW of nuclear [generation capacity](#). These deep energy planning and power system modelling capabilities and experience have also been deployed at municipal and enterprise levels, assisting various role players in the development of energy plans in support of their strategic objectives.

WIND RESOURCE MAPPING
TO INFORM POWER SYSTEM
DEVELOPMENT:

The Energy Research Centre is a key partner in the [Wind Energy Atlas of South Africa](#) as it provided the essential wind resource measurement and [spatial models](#) that have substantively informed the potential for wind energy development including the planned deployment of wind energy in national policy.

The results have fundamentally informed the roadmap for wind energy development in South Africa with wind energy being a major new build technology in the IRP2019.





LONG TERM DECARBONISATION ENERGY FUTURES:

The CSIR [has analysed a range of cost-optimal energy system pathways for South Africa](#) for the period 2020-2050, with increasingly ambitious CO₂ emission trajectories in the power sector.

The analysis showed that with increasing CO₂ ambition, system costs do increase relative to least-cost (as expected), but not as much as previously assumed, clearing a path for power sector decarbonisation with minimal trade-offs and substantial power sector benefits.

This pioneering work is expanding into full energy sector modelling to include the thermal and transportation sectors and related sector coupling opportunities.

This would include the potential role of hydrogen as an energy carrier and provider as well as hydrogen based value-added products like powerfuels and chemicals for domestic use and export opportunities.

Recent [CSIR work in the opportunities in powerfuels](#) for the European Union has created substantial market interest.

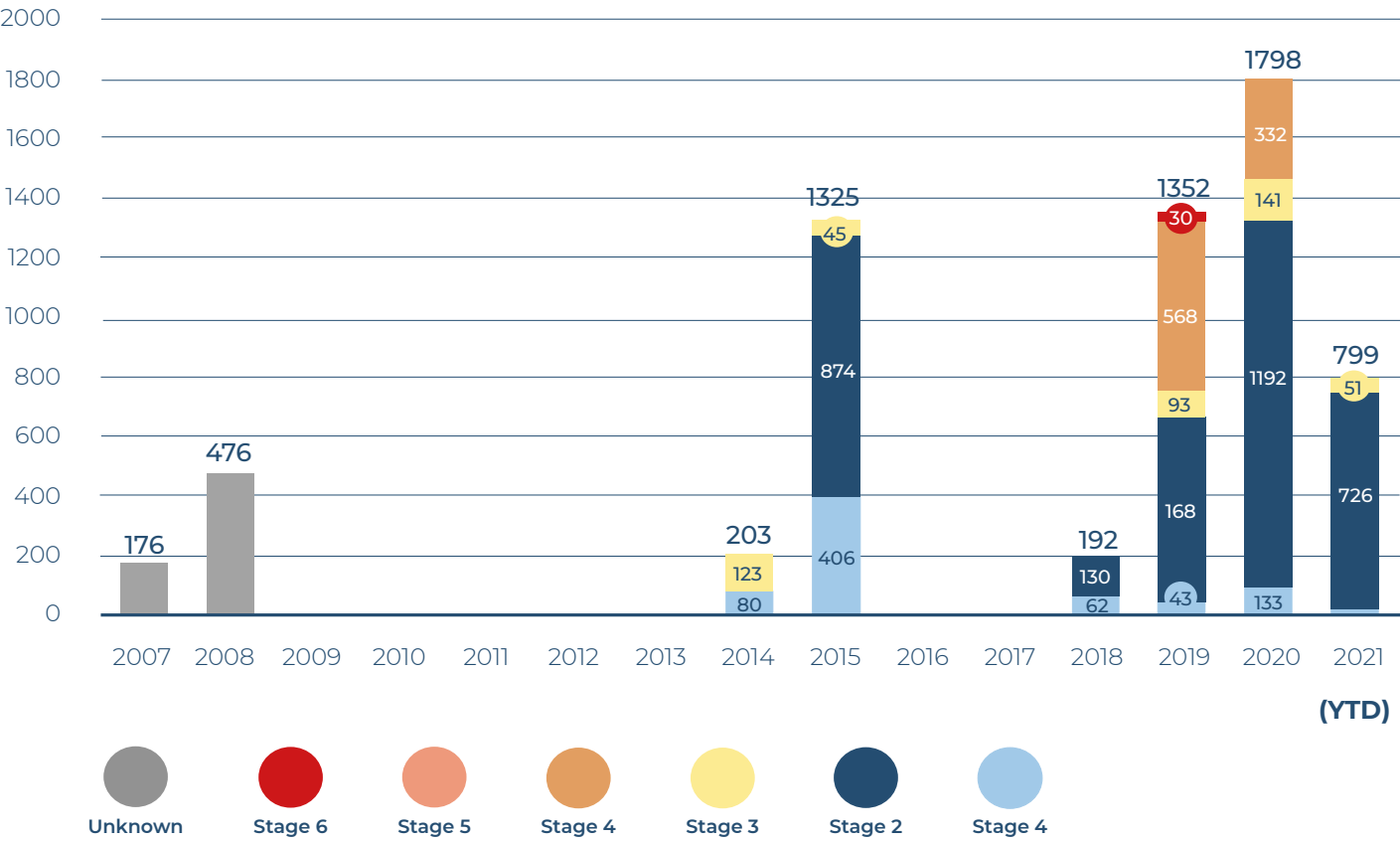
SETTING UP FOR THE 2020's - ADDRESSING SOUTH AFRICA'S ELECTRICITY CRISES AND GETTING READY FOR THE NEXT DECADE:

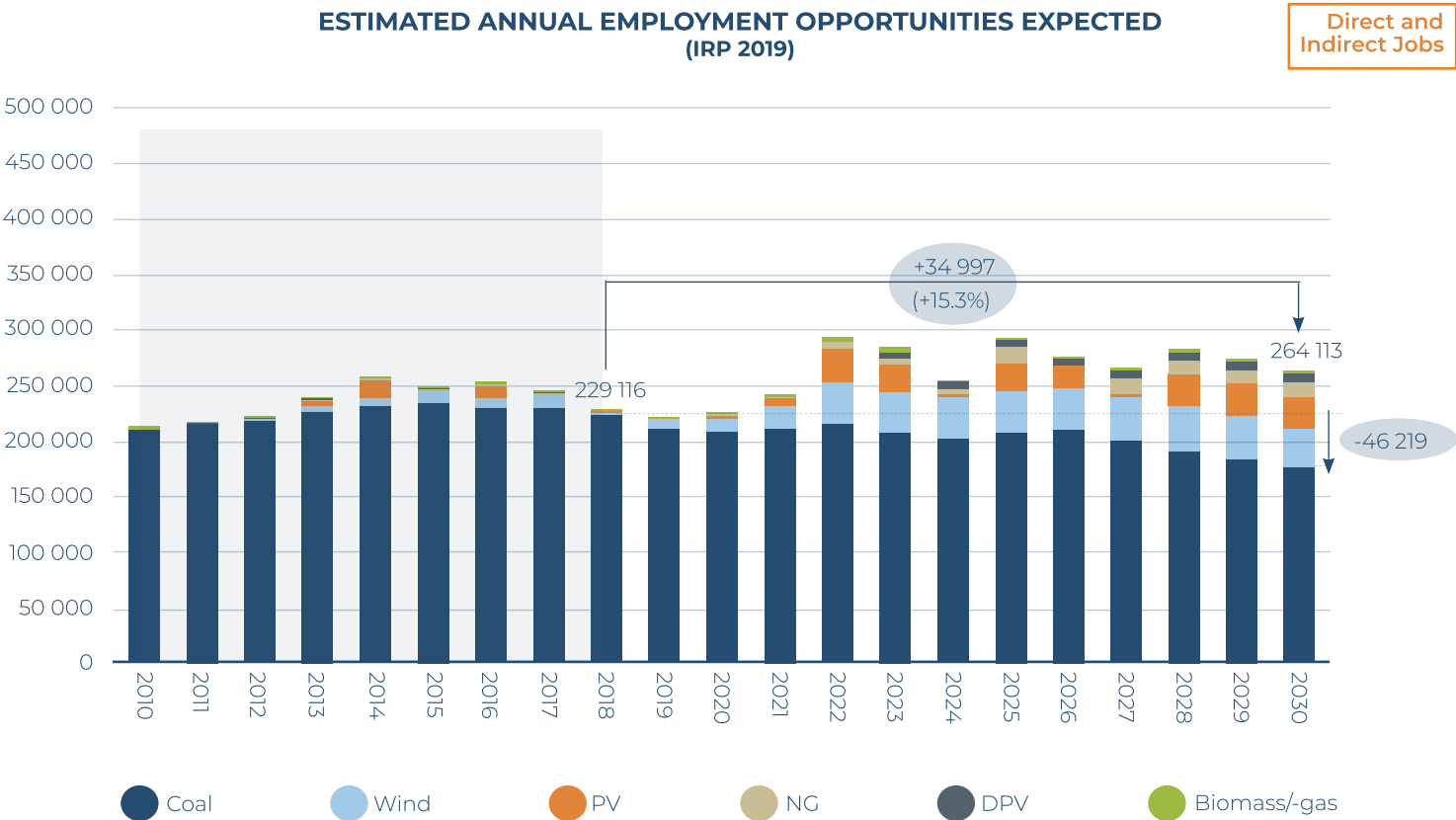
The CSIR's analysis [of the South African electricity crisis](#) has informed a credible and independent analysis of the likely frequency, scale and duration of load shedding due to system inadequacy, and the practical solutions to the mitigation thereof.

The analysis informs an understanding of the extent of the crisis and the urgent need for a range of actions and the recommendations arising.

Further contributions include the publication of [statistics of utility-scale power generation in South Africa in 2020](#) (now becoming an annual publication from CSIR utilised by a number of domestic and international role players).

LOAD SHED [GWh]





MANAGING ENERGY TRANSITION THROUGH JOB CREATION AND THE DEVELOPMENT OF SMALL, MEDIUM AND MICRO ENTERPRISES (SMME):

The CSIR’s leadership in the Just Energy Transition has resulted in a number of benchmark studies of the economic impacts and opportunities of the transition to sustainable energy sources.

The [Co-benefits of climate change mitigation](#) study quantified the benefits to the national economy and society of South Africa associated with the transition in the power sector.

The [SAPVIA Jobs Study](#) quantified the number of jobs created by the solar PV industry and developed job intensity metrics to forecast job creation into the future.

Study outcomes have provided a fact and evidence base in assessing the existing and future job creation and the

opportunities to replace job losses in the coal value chain with new local jobs in the green economy.

The related outcomes of a net gain in jobs is central in the further development of just transition plans to manage impacts in coal regions.

DEPLOYMENT OF A SMART UTILITY ON THE CSIR PRETORIA CAMPUS:

Detailed micro-grid energy modelling and power system studies have been performed on the CSIR Pretoria campus power system, with [2MW of solar PV deployed](#).

In addition to the direct electricity cost savings achieved by the CSIR, the solar PV plants have made a substantial contribution to the national power system, offsetting coal and diesel fuel costs of R1.6million and R4.4million respectively.

Furthermore, the PV energy contribution during periods of load-shedding have resulted in a net economic gain of R43.1million by displacing load that would otherwise have been shed.





SUPPORT TO THE LOCAL SOLAR PV INDUSTRY THROUGH THE PV RELIABILITY LAB:

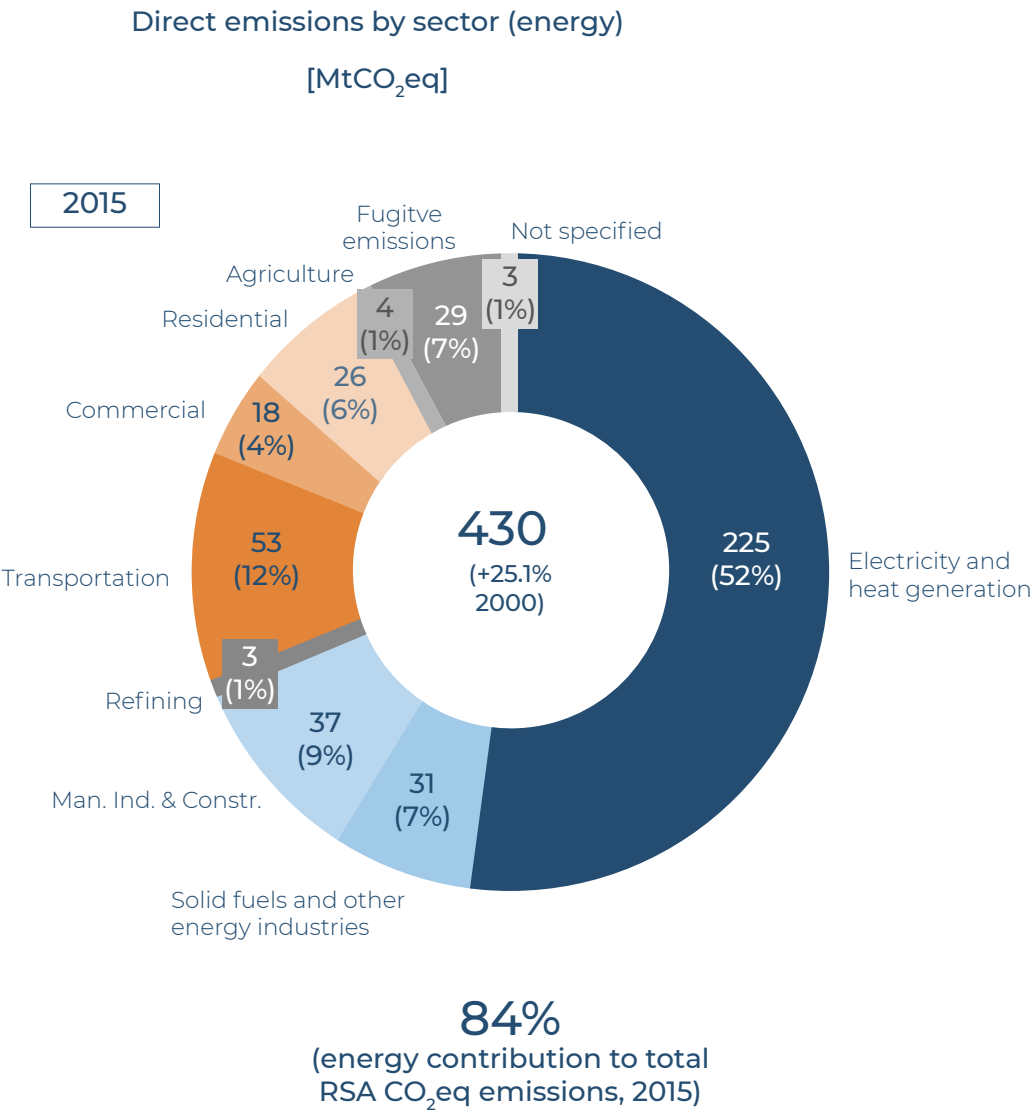
The CSIR has developed a [state-of-the-art solar PV reliability lab](#) to support the local solar PV industry in the development and localisation of solar PV technology, and support to solar PV project developers, financiers and owners to manage the risks of technology implementation.

The laboratory supports a range of testing services, including the only accelerated stress testing capability in Southern Africa to assess the expected long term (25 year) performance of solar PV panels.

ENHANCING THE COMPETITIVENESS OF THE SOUTH AFRICAN INDUSTRY THROUGH THE THERMAL ENERGY LAB:

The CSIR in partnership with SANEDI has created a thermal energy lab as a way of providing solutions to local industry in thermal energy efficiency, waste heat recovery, solar thermal energy systems and thermal energy storage.

Initial technology development is being tested with a local SMME with pilot scale operation of a waste heat recovery system due in 2022



Decarbonisation Potential?

E

Electricity

- High RE potential
- RE more than cost competitive
- Unlimited RE tech. potential

H

Heat

- Biomass limited potential
- Needs coupling to clean electricity (direct/ indirect)

T

Transport

- Biofuels limited potential
- Needs coupling to clean electricity (direct/indirect)

Climate change has accelerated decarboisation drives, green transportation opportunities being rapidly accelerated.

1 Total CO₂eq emissions were ~512 MtCO₂eq (2015) when including IPPU, AFOLU and Waste; IPPU = Industrial Processes and Product Use; AFOLU = Agricultural, Forestry and Other Land Use. Sources: Department of Environmental Affairs (DEA). (2015). South Africa's GHG Inventory Report 2000-2015

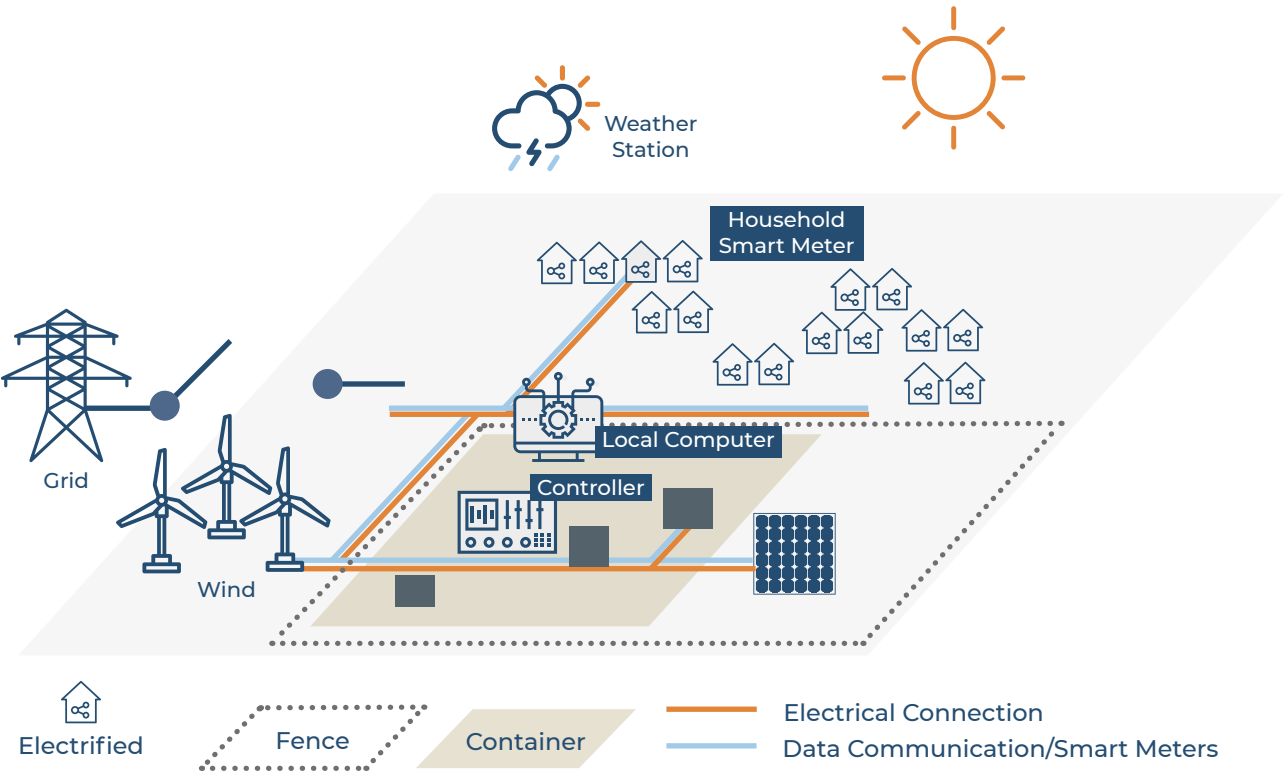


DEVELOPING THE LOCAL ENERGY STORAGE INDUSTRY THROUGH AN ENERGY STORAGE TEST BED:

Development of an energy storage testing and development facility in partnership with VITO and the World Bank Group as linking to [ESMAP](#). The facility is presently being developed with the first phase of the indoor battery testing equipment planned for commissioning and operationalisation in the first quarter of 2022.

The facility will focus on the testing of battery cells and modules to support the industrial development of local energy storage technologies, with expansion to outdoor testing of utility scale energy storage technologies.

UPPER BLINKWATER MICROGRID SCHEMATIC



ELECTRIFICATION AND TRANSITIONING THE ENERGY SYSTEM THROUGH EMBEDDED GENERATION, MICROGRIDS AND SMART GRID DEVELOPMENT:

The CSIR worked closely with partners and municipalities to develop and implemented processes for the deployment of embedded generation in distribution grids, and the power system analysis and tools for variable renewable energy integration. Smart grid implementation includes the power system analysis of the CSIR campus microgrid (grid-tied) distribution system, and the [Upper Blinkwater microgrid](#) (off-grid) supplying a remote unelectrified village in Raymond Mhlaba municipality in the Eastern Cape, where the CSIR led the integration of wind into the microgrid and conducted optimisation studies to determine the operational dispatch strategy employed for generation in the microgrid.

NEXT STEPS:

The Energy Centre will continue to strive towards being the first port of call for South African decision makers in politics, business and science to advise them on the energy transition.

This transition is a move towards a more sustainable and cleaner energy system, and will ultimately lead to energy being used more efficiently and having a significant share of the primary energy supply being provided by renewables.

The CSIR's Energy Research Centre will also leverage the learning from the South African energy transition to support the creation of sustainable energy systems for other African countries.

ORGANISATION: Energy & Water SETA	SECTOR: Education and Training
UNCERTAINTY: Talent	4I's AND P ADDRESSED: People
BACKGROUND: EWSETA on an annual basis, anticipate occupations that are in high demand through the implementation of its Research Agenda. Impact Study is one of the topics informing the Research Agenda. EWSETA has been developing curriculum/qualification since its inception and what has been lacking is the provision of a deeper insight into the effectiveness of the EWSETAs' work integrated learning (WIL)-related interventions designed to respond to skill needs across the energy and water (EW) sector. In retrospect, the impact study evaluation study sought to answer a number of fundamental questions. From how well learners have been equipped with the necessary skills to positively acquire and participate in the larger scheme of the South African workforce as skilled and qualified practitioners in their respective fields of choice, to whether or not EWSETA learning interventions have indeed contributed to shaping the personal achievements, experiences and value systems of its learners. The learning programmes considered in the study, includes Artisan Development, Learnerships and Internship Programmes. Both employers and learners participated in the study.	
ACTIONS TAKEN: EWSETA conducted an Impact Study to empirically evaluate the effectiveness of EWSETA work-integrated learning (WIL) interventions in terms of learner outcomes post-completion of respective learning programmes, with the aim of determining whether the said outcomes were indubitably caused by the consummation of EWSETA Work Integrated Learning programmes. Thus, the study sought to investigate causal relationships between learning programmes and learner outcomes. The learners and employer key findings are based on analysis and synthesis of data sets collected during the course of research. Due to COVID-19 and related restrictions, qualitative data collection was conducted remotely through telephonic interviews and online platforms (i.e., "Zoom Meetings" and "video conferencing"). Qualitative sampling of employer [organisations] who participated in the study was based on non-probability sampling using the quasi-randomisation technique. According to the overwhelming majority of learner respondents, completing WIL programmes indeed inspired learners to want to pursue further studies within the Post School Education and Training (PSET) system; despite there not necessarily being the opportunity to do so to support the goals of the National Skills Development Plan (NSDP). More than seventy stakeholders participated in a combination of in-depth interviews and a focus group session. The EWSETA must develop learning programmes that respond to emerging top-up skills such as digital skills in a continuously advancing technological age. The EWSETA Partnership model should make provision for facilitating further studies and enhancing relationships between prospective employers and learners who continue to seek work opportunities in the sector.	
PROGRESS TO DATE LESSONS LEARNT: The majority of learners and employers, as the direct beneficiaries of education and training, experienced inspiringly positive outcomes when considering the goals of the EWSETA Theory of Change (TOC). The EWSETA TOC model was inspired through the vision of the SETA "becoming recognised as a reputable and leading authority in world class skills development facilitation for the energy and water services sector". Over and above all challenges reported, learners confirm to be more productive in their respective jobs post-completion of programmes, employers supported this insight by affirming education and training (i.e. WIL programmes) significantly contributed to overall organisational productivity and organisational performance, which in turn would make a collective contribution to the overall performance and productivity of the energy and water sector. Though majority of respondents managed to secure employment since completing respective learning programmes, a significant proportion were not as fortunate (especially when considering the tough economic climate faced by South Africa).	

PROGRESS TO DATE LESSONS LEARNT CONTINUED...: Therefore, the EWSETA must strengthen curricula by incorporating entrepreneurship skills, business management learning content and corresponding practical training components across learning programmes. The SETA must support respondents who managed to start their own businesses through additional skills development opportunities such as exposing incumbents to sectoral partnerships aimed at affording young emerging entrepreneurs' mentorship, as well as other potential business-related opportunities within the sector. Approximately 77% of respondents affirmed that the energy and water sector require more job opportunities in order to improve chances of acquiring suitable employment. Therefore, greater cohesion between government, sector employers and the EWSETA is therefore required to maximise desirable learner outcomes with respect to further studies and employment opportunities. Partnerships between the EWSETA, government and sector employers are an important enabler in this respect.
ACTIONS TAKEN: EWSETA conducted an Impact Study to empirically evaluate the effectiveness of EWSETA work-integrated learning (WIL) interventions in terms of learner outcomes post-completion of respective learning programmes, with the aim of determining whether the said outcomes were indubitably caused by the consummation of EWSETA Work Integrated Learning programmes. Thus, the study sought to investigate causal relationships between learning programmes and learner outcomes. The learners and employer key findings are based on analysis and synthesis of data sets collected during the course of research. Due to COVID-19 and related restrictions, qualitative data collection was conducted remotely through telephonic interviews and online platforms (i.e., "Zoom Meetings" and "video conferencing"). Qualitative sampling of employer [organisations] who participated in the study was based on non-probability sampling using the quasi-randomisation technique. According to the overwhelming majority of learner respondents, completing WIL programmes indeed inspired learners to want to pursue further studies within the Post School Education and Training (PSET) system; despite there not necessarily being the opportunity to do so to support the goals of the National Skills Development Plan (NSDP). More than seventy stakeholders participated in a combination of in-depth interviews and a focus group session. The EWSETA must develop learning programmes that respond to emerging top-up skills such as digital skills in a continuously advancing technological age. The EWSETA Partnership model should make provision for facilitating further studies and enhancing relationships between prospective employers and learners who continue to seek work opportunities in the sector.
NEXT STEPS: The EWSETA will facilitate the development and mastery of digital, remote working and smart working skills through skills developing interventions aimed at quipping learners with these skills in preparation for a working world largely driven by technological advancement, change and adaptability. 22% of respondents confirmed being self-employed since completing respective programmes. This finding was encouraging as self-employment and entrepreneurship have become crucial in an economy plagued by high unemployment rates, especially amongst the youth. Thus, government should strive to support small and emergent businesses by creating sustainable growth opportunities, especially in a sector as critical as energy and water. Furthermore, those respondents who managed to start their own businesses should be supported through additional skills development opportunities such as business management and entrepreneurship skills. It would be ideal for the EWSETA to consider starting interventions specifically tailored for young entrepreneurs who have successfully started their own formal businesses since completing respective learning programmes. This could also potentially serve to encourage other young aspiring entrepreneurs in the sector. There will be planned advocacy interventions aimed at encouraging employers to introduce "smart working" and "remote working" policies to guide new work processes in the "new normal" age. Gearing organisations to be more resilient may serve to assist employers to better cope with unforeseen challenges such as COVID-19. Since skills development remains a priority for organisations in the foreseeable future, the EWSETA will ensure that it provides additional support required to maintain effective delivery of learning programmes across the sector.

ORGANISATION: Eskom	SECTOR: Energy
UNCERTAINTY: <i>1. Activism and civil disobedience</i> <i>2. Appropriate policy</i> <i>3. Capital markets</i> <i>4. Climate framework</i> <i>5. Decentralised systems</i> <i>6. Decision paralysis</i> <i>7. Economic growth</i> <i>8. Energy affordability</i> <i>9. Energy price volatility and uncertainty</i> <i>10. Investor confidence</i> <i>11. Long term vision</i> <i>12. Parochial interests</i> <i>13. Renewable energies</i> <i>14. Strong grid</i> <i>15. Talent</i>	4I's AND P ADDRESSED: <i>Implementation-</i> Eskom Net-Zero 2050 vision including associated socio-economic initiatives; the JET Strategy developments and roadmap with implementation plans are underway. <i>Innovation-</i> RT&D programmes and Renewable Energy projects including PV, BESS, Biomass, Gas, hydrogen. Integration- Alignment with national policy and IRP. Repowering and repurposing of power stations reaching end-of-life. <i>Impact-</i> Accelerated investment in new generation, especially clean energy technologies e.g. micro-and mini-grid solutions, energy storage, etc. <i>People-</i> Impact on jobs and skills of employees and communities affected by the Power Station Shutdown. Development of skills required for the energy transition
BACKGROUND: Background and Motivation for the development of the Eskom Just Energy Transition Office: According to the IPCC Special Report on 1.5°C, reaching and sustaining net-zero anthropogenic global emissions is necessary to halt anthropogenic global warming. The GHG emitted locally has a global impact and it is this impact that has resulted in a need to govern GHG emissions through international agreements such as the United Nations Framework Convention on Climate Change (UNFCCC). While all countries and regions will experience the varying effects of climate change they do not all bear equal responsibility for contributing to the current risks. The global climate change negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol are essentially about how countries share the remaining carbon climate “budget” that will limit global climate change. Climate change is already a measurable global reality, and South Africa as a developing country is especially vulnerable to climate change impacts. While climate change could be seen as an environmental challenge, it will have profound economic and social impacts as well. South Africa has an energy-intense economy and is a significant contributor to global carbon emissions. The South African national greenhouse gas (GHG) inventory highlights that electricity generation from fossil fuels contributes approximately 45% of South African emissions. Therefore, to address climate-related risks, electricity-related risks need to be reduced. This will require significant new resources, access to state and private capital, and access to financial markets through additional instruments to attract capital for energy infrastructure. Addressing other environmental and social development issues will also require additional resources. For Eskom and South Africa, this means transitioning towards business models that are compatible with a net-zero economy within the next three to five decades. A just transition addresses both socio-economic development and climate. A transition in the energy sector is from fossil fuels to lower-emission energy sources and systems is critical for mitigation globally and in South Africa. To be just, the socio-economic needs of affected communities and workers need to be addressed to prevent activism and social unrest including strikes and actions aimed at catalysing political and social change. Eskom currently will be shutting down some of the older coal-fired power stations (but also to gradually decommission almost all coal-fired power stations over the next 30 years) and also ensuring it plays its part in meeting the climate change challenge. Eskom is committed to transitioning to lower-carbon technologies such as renewables in a “just” manner by ensuring that socio-economic development is not eroded or hindered. The shutting- down of power stations will have a significant impact on the workers and communities, specifically, job creation and skills development will be of concern.	

<p>South Africa's energy landscape is regulated through an interlinked series of laws, policy documents, and position papers. The White Paper on Energy Policy (1998), supplemented with the White Paper on Renewable Energy in 2003, sets out the Government's overarching position on the supply and consumption of energy. Other applicable policies include The National Development Plan; The Integrated Energy Plan (IEP); The Integrated Resource Plans (IRP); The Electricity Pricing Policy (EPP) and The National Energy Act, 2008 (Act No. 34 of 2008).</p> <p>As a result, Eskom has established the JET Office to drive the Just Energy Transition (JET) and manage these risks.</p>
<p>ACTIONS TAKEN:</p> <p>Eskom is a key enabler of South Africa's transition towards an economically inclusive and lower carbon future. For Eskom, the Just Energy Transition is about leveraging the opportunities presented by the transition towards a cleaner and greener energy future while enabling new job opportunities to be created for those displaced by replacing coal with such cleaner technologies.</p> <p>Eskom has established the JET Office to drive the Just Energy Transition (JET). The vision of the JET Office is net-zero carbon emissions by 2050 whilst managing Eskoms socio-economic impact and contribution towards South Africa's Just Energy Transition.</p> <p>The immediate focus of Eskom's JET initiative is to accelerate the repurposing of power stations that are shutting down, enabling renewables through own build, partnerships/PPAs, and acquiring natural gas options as an enabling fuel. JET is a key lever to unlock the potential for local manufacturing and industrialisation, which includes meeting the demand for electric vehicles. The JET social impact will be addressed by retraining in the required skills.</p> <p>Research for innovations such as new storage options and the hydrogen economy is currently underway, together with our continued focus on microgrids for greater access to electricity. Opportunities for green and climate financing will be pursued and agreements put in place with funders for repurposing, greenfield renewables, SSEC options, and grid strengthening.</p> <p>The transparency of Eskom's JET initiatives will adhere to local, national, and international standards for disclosure and reporting will be a priority. In pursuing these activities, Eskom aspires to meet its long-term JET vision of net-zero carbon emissions in 2050 with an increase in sustainable jobs.</p>
<p>PROGRESS TO DATE LESSONS LEARNT:</p> <p>The JET strategy developments are currently underway, however great strides have been made in various focus areas.</p> <p>The JET office, Government & Regulatory Affairs Division (GRAD) has developed a Stakeholder Engagement Plan to ensure policy alignment and garner support from the key South African government departments (Presidency, DPE, DTIC, NT, DMRE and DEFF), labour, civil society, and business. At these engagements the Eskom JET strategy, messaging and prioritized deliverables for 2021 have been shared. To realise Energy transition, Eskom aims to influence DMRE allocations, NERSA approvals, licensing & tariffs through trade-off engagement platforms.</p> <p>The JET Office and Eskom Treasury department have also engaged with various counterparties and key investors/ funders to build relationships and to create awareness on the direction that Eskom is taking with regards to transitioning towards cleaner energy. As a result secure key Governmental support and attract green/ climate financing. Eskom is also considering other funding options in terms of balance sheets and partnership structures.</p> <p>The Socio-economic Impact Assessment (SEIA) studies to understand the impact of repurposing and closing down of power stations; and how the existing level of employment would change given a shift in energy technologies and skills required are nearing completion for Komati, Grootvlei, and Hendrina power stations. Eskom is currently developing internal mitigation plans for the Komati power station as the priority project.</p> <p>Currently, zero carbon and reduced carbon emission projects are being explored through energy systems modelling that will define the energy mix and will contribute to the overall reduction in emissions. Various scenarios have been preliminarily modelled thus far to propose possible pathways.</p>

TITLE: Establishment of the Eskom Just Energy Transition Office
(continued..

NEXT STEPS:

The next steps are to accelerate investment in new generation, especially clean energy technologies. This includes the repurposing of power stations – both where we can accelerate the closure of less efficient and polluting stations, and through the use of existing land to support green energy generation, ancillary services, and related community-oriented projects (including supporting and growing local manufacturing and re-industrialisation). The repurposing of power stations to include the accelerated construction of the renewable plant and cleaner-fuel technologies will enable the leveraging of existing transmission infrastructure, networks, and connections, to continue extending economic opportunities to those communities who have supported Eskom over the past 50 years.

Given Eskom’s funding constraints, such initiatives would need to be achieved through partnerships and collaborations with the private sector and other stakeholders. Future steps are subject to Shareholder and regulatory approval, as well as consultation with the affected communities and Organised Labour.

The established Special Economic Development Zones (SEDZ) and Renewable Energy Development Zones (REDZ) are key to re-igniting industrialisation and local manufacture. This is a key success factor for the Just Energy Transition. Embarking on a JET pathway has multiple reinforcing benefits for the country. There are obvious benefits to the environment with concomitant social benefits and our modelling work shows it is the least cost pathway in the longer term.



TITLE: Witsand Informal Settlement:
Building resilient urban communities though innovation and partnership

ORGANISATION: GreenCape	SECTOR: Energy
UNCERTAINTY: Economic growth, energy affordability, renewable energy	4I's AND P ADDRESSED: Innovation, Implementation
BACKGROUND: <p>In June 2020, 10 free-to-access, uncapped, solar-powered Wi-Fi enabled ThinkZones were set up in Atlantis, providing free internet access to between 5,500 and 10,000 people per month. Seven of these access points also include solar street lighting. This project was enabled by ThinkWiFi and GreenCape as part of an alternative service delivery project.</p> <p>Witsand informal settlement is based in a suburb of the City of Cape Town Metropolitan Municipality, South Africa. It is 40km from the City central business district (CBD). As of the last census, it had 4 689 residents. Although Witsand is a diverse, vibrant and active community, it is characterised by a lack of formal tenure, insufficient public space and facilities, and inadequate access to basic services. The Witsand leadership team has focused on improving conditions, service delivery, and the wellbeing of its residents, and have, in partnership with GreenCape and ThinkWifi, co-designed wifi enabled solar street lights that provide both area lighting and internet connectivity.</p> <p>The Alternative Service Delivery Unit (ASDU) has been established to design, facilitate and manage the provision of energy services to unserved and unserviceable communities, on behalf of relevant stakeholders. ASDU applies an adaptive co-design framework to facilitate community led energy provision. The ASDU model is built on three interrelated fundamentals of modern service delivery - social inclusion/mobilisation, customised technical design and financial sustainability. ASDU is being implemented by the GreenCape Sector Development Agency (GreenCape) and is directed by GreenCape's institutional identity, governance, standards and compliance frameworks.</p>	
ACTIONS TAKEN: <p>GreenCape has been working in Witsand since 2018.</p> <p>The partnership with ThinkWiFi, to set up the Wi-Fi ThinkZones in Witsand, was supported by an enumeration completed by the Community Organisation Resource Centre (CORC) on behalf of GreenCape. This exercise enumerated more than 2,500 households in the Witsand informal settlement working with local enumerators, local leaders, organisations and public stakeholders.</p> <p>This enumeration, and the subsequent community co-design, was done with a focus on creating a strong social foundation for service delivery, building an inclusive platform for local community members to express infrastructure preferences, and to understand the communities' propensity to pay for infrastructure services while also mapping existing infrastructure assets. From this process, the Witsand community prioritised area lighting and connectivity as their most pressing energy related needs.</p> <p>These priorities were corroborated by the data for the area. Witsand has no area lighting and the majority of people have experienced criminal activity in the area. Households are spending upwards of 10% of their total income on data/ cellphone costs. ThinkWifi, a local service provider, provided a unique solution to the challenge in Witsand. ThinkWifi is building world-class public wifi infrastructure to provide free, uncapped wifi in communities, townships, universities and transportation hubs across South Africa. Their innovative business models allow for both the infrastructure and the connectivity to be funded without the end user paying a cent.</p> <p>They are currently active in 125 locations across Langa, Khayelitsha, Gugulethu, Delft, Elsies River, and Philippi. It is their mission is to empower people, to work with local communities to find employment solutions and to work with organisations to bring digital skills education to each of these communities. Their ultimate aim is to close the digital divide whilst laying the foundations for the 4th industrial revolution for all under-served communities in South Africa.</p> <p>Through a co-design process with GreenCape and the Witsand leadership, the concept of adding a solar light to the wifi connection points was added.</p>	



PROGRESS TO DATE LESSONS LEARNT:

This ThinkWiFi network has now seen the community use the service more than 1,200,000 times since the sites were installed, and has had a positive impact on various local community initiatives by not only providing them with much needed access to the internet but also saving them money. The average saving per household is over R300 per month, with many people using ThinkWifi service as their primary Internet service.

Through a partnership between a diverse group of stakeholders (Non-profit organisation, an internet service provider and a group of community leaders), from different backgrounds and contexts an innovative solution has turned the lack of infrastructure in Witsand into a unique opportunity. The community for the community to access education, skills development and the potential benefits of the 4th industrial revolution. Combined with this new connectivity the community is now also provided with much needed area lighting - The lack of effective public lighting plays a major role in creating unsafe areas where crime can thrive. Informal settlement residents are at risk due to the darkness many people must face when accessing public transport early in the morning and late at night.

Key insights:

- This multi-stakeholder cooperation allows for the culture of participation to develop, giving owners of the social challenge control over how technical systems are used, and which functionality underlies the usage of these systems.
- Embedding an action-orientated participatory approach to delivering interim basic services can address immediate and pressing day-to-day challenges within informal settlements and increase community “buy-in” and participation in the relocation process.
- An Asset-Based Community Development (ABCD) approach should be part of the wider relocation strategy and interim service delivery. This approach should focus on discovering and mobilizing the “assets” that are already present in a community.
- There is need for a dedicated national programme and fund to provide the necessary resources (human and capital) to stakeholders to undertake this duel approach to relocation.
- Co-design is not enough: A participatory co-design process is important, but it needs to be overlain with a typological data approach. This allows a more targeted approach to co-design and avoids unnecessary delays.





TITLE: Small businesses in the energy sector

ORGANISATION: IG3N (Pty) Ltd	SECTOR: Energy Storage assembly
UNCERTAINTY: Business sustainability, supply chains and availability of key materials, global pandemics	4I's AND P ADDRESSED: Innovation, Impact, Implementation
BACKGROUND: IG3N (Pty) Ltd is a light manufacturing start-up that produces LiFePO ₄ (Lithium Iron Phosphate) batteries used mostly as energy storage in Solar PV installations. The company imports base cells and the battery management system; and sources the rest of the materials locally, including the battery enclosures and electricals. The company was registered in 2018 and reached post-revenue stage in September 2019 through self-funding. The focus was also on small battery units for residential and light commercial applications. From September 2019 focus was also on seeking funding for growth as well as to increase local content by locally manufacturing the battery management system.	
ACTIONS TAKEN: Looking for funding for a business such as IG3N turned out to be a very difficult undertaking. The longer the business remained underfunded, the more uncertain its future became. The best action taken was to change tact – bring a specialised equity funder into the business with focus on startups and that has tools and mechanisms to significantly grow businesses. The funder took an equity share and on their strength, were able to crowd in more investment into business. They were better skilled and were knowledgeable about how to package the business so larger funders could understand.	
PROGRESS TO DATE LESSONS LEARNT: With the private equity funder on board, the business was able to access more funding and more importantly, the kind of funding that is more patient and suited to a business preparing for rapid growth. Lessons learnt was the financing ecosystems in the energy sectors are still geared towards large investments – and business that are in the “middle” and looking for growth should rather spend the time looking for appropriate partners than for funding.	
NEXT STEPS: The next round of funding is concluded and this investment will provide capital for increased localisation of the batteries. The benefit to the country is skills development and creation of new jobs. The funding will be used to increase capacity to build larger and utility-scale batteries.	



ORGANISATION: Mpact	SECTOR: Packaging
UNCERTAINTY: Energy Affordability, Energy Price Volatility and Uncertainty	4I's AND P ADDRESSED: Implementation, Innovation, Impact
BACKGROUND: <p>Mpact has been rolling out rooftop solar PV to all factories and sites that are fully owned by the company to reduce electricity costs and mitigate the future impacts of electricity price increases above inflation. Mpact has over thirty-five operating sites across South Africa, Namibia and Mozambique, and has completed solar installations at six sites and currently has five projects in progress for the 2021/22 period. There is a sixth project currently in construction to increase the size of one of the earlier solar PV demonstration of concept solar plants.</p> <p>As well as insulating the company from above inflationary increased in electricity, the solar PV installations reduce scope 2 greenhouse gas emissions and contribute towards emissions savings targets set by the Group.</p> ACTIONS TAKEN: <p>The project was started in 2017 and the company is now on their sixth installation, with a number of additional projects currently in the pipeline for 2021/22. Future plans include a solar PV installed capacity greater than thirty percent of the company's connected load in the next five-year horizon.</p> <p>A lot of research was initially undertaken, and a robust high-level design process that allows comparative quotations to be sought from the market has been developed. The process ensures that a number of suppliers can put their best insights forward, and Mpact can choose the best financial and technical solution presented. From receipt of bid documentation, to site visits, shortlisting and presentation of the solution; a dropout rate of around thirty percent of the field is seen in each step. This is either through the solar companies self-selecting not to participate when they see their competitors at the site visits, or deciding that the bid documentation and requirements are more detailed than other tenders in the market. The final shortlisting for presentation to the project team is four to five companies from a much larger bidder field. It has been Mpact's experience that different companies shortlist at different sites often with their differentiator being the ability to cost effectively deliver services in that specific location. Innovation in design and how the components of the system are put together to match the operating profile and load of the site puts the bidding companies in a more favourable light for selection. Thus, the procurement process is agile enough to consider different methods to deliver the desired solution and the main principles of the projects that are most important for Mpact, while still being fair to all participants. The fairness is regularly assessed through feedback from both successful and unsuccessful bidders with any suggested changes that are usually around documenting information from the bidder site visits to a greater degree implemented from year to year. While it is impossible to document everything that happens at the bidder site visits, in addition to the information pack a two page write up of key points is provided as well as a reasonable timeline for questions to be submitted. Signed attendance registers are taken at all site visits, and only companies that attended the site visits are permitted to submit quotations. Detailed answers are provided to the full field for any questions asked. Any lack of clarity in the principles based procurement is revised and updated in the procurement documentation through discussions with appointed suppliers and how they interpreted the documentation, independent experts and through independent reviews by professional engineers.</p> <p>To further mitigate risk, the successful bidder is appointed after the CAPEX/EPC/EPCM project for a five-year Operations and Maintenance (O&M) agreement with a power production guarantee that effectively de-risks the business case and project through legal and financial contractual agreements. Therefore, as Mpact does not follow the power purchase agreement (PPA) route there are no PPA price escalations that could be risky when compared to an uncertain future electricity price in the contract years beyond the first ten. PPA signature can in some case trade off short-term uncertainty for the possibility of a higher than market tariff in the long term unless the agreements are structured in a flexible manner. However, structuring the agreements with price flexibility can often make the projects unable to be financed by a commercial bank.</p> <p>In addition, the guarantee in the O&M agreement is based on the power that Mpact is actually going to use within the site, and/or the power that can be sold with certainty through a feed in tariff.</p>	

ACTIONS TAKEN (continued): <p>This is enabled by sharing the detailed thirty-minute interval data for the plant with the bidders during the process so the power production guarantee can be based on the power that Mpact will actually absorb in the operation/at the site based on historical data and operations. This is then checked through online calibrated metering that is compared to the contractual agreements. The impacts of load-shedding are taken out of the power production guarantee based on historical data at all the sites that do not have diesel generator integration. The solar projects have reduced electricity costs and minimised the impact of the risk and uncertainty of rising electricity prices.</p> <p>In the early project stages, the suppliers that have operational plants within the Mpact Group and ongoing O&M maintenance agreements are consulted during the project development stages to ensure that the Mpact plans and process are still relevant in a time of fast changing and improving technology.</p> <p>Furthermore, to ensure that Mpact solar PV projects remain innovative and cutting edge, new suppliers entering the market are considered after a detailed technical interview, and once passed are added to the list of companies who receive requests for proposals for future projects. Thus, Mpact is able to consider established market players as well as new entrants that bring innovative thoughts and design techniques. The quality of the installations is assured by professional engineers sign off; and Mpact works with our insurers to manage the risks they are concerned about in solar installations. If there are any concerns or issues in the project process, independent professional engineering review and sign off is conducted.</p> <p>Due to the success of Mpact's solar PV projects to date, the company is developing greater in-house skill in the areas of design, review, installation and implementation for future larger projects in areas of low irradiance or lower electricity tariffs that need to compete with other sites for internal funding. The Mpact Solar PV projects touch on the Implementation, Innovation and Impact aspects; and the future has Integration and People aspects included in the plans for further development of the solar projects.</p>
PROGRESS TO DATE LESSONS LEARNT: <p>The roll out was approached slowly with a pilot site and expansion thereafter. As the installations have gotten older, maintenance issues such as cleaning fans on inverters have emerged, but there have been no major failures. Replacement of technology after warranty and guarantee period has been pre-priced into the business cases and financial models for all the projects that have gone into implementation. To date this has not been required as maintenance has kept all equipment in operating condition, but it is something that we are tracking and monitoring. One change that has been implemented is the requirement to only install or procure equipment with a large global market share to ensure that there is support and continuity for equipment that may fail in five to ten-year horizons.</p> <p>The process has been refined, and the specifications improved project to project, and Mpact now has a good idea on project high level design, procurement, costing, contracting, construction, commissioning and operation.</p> <p>The uncertainty has been shifted through deployment of capital for self-generation to avoid higher costs both now and into the future on PPAs with set inflationary increases. The process followed should ensure that Mpact has flexibility to combine the lowest costs of generation of electricity for usage, and can plan a number of sources of electricity supply going forward as the South African electricity market opens up to more electricity generators, suppliers and traders.</p>
NEXT STEPS: <p>The next steps include taking a greater role in solar PV project development and execution and increasing the skilled group of people within the company to roll out further projects across the Group. The installations are already national, and Mpact has a number of large manufacturing sites that now have reduced day time grid electricity demand when the national grid is under the more pressure.</p> <p>In addition to solar installations, data collection and tracking of electricity consumption, generation and interruptions have been planned and implemented for all Mpact connected sites to understand, track and store data. The shifting pattern of the data will be tracked and can be used to inform future projects and wheeling project opportunities as the electricity system starts to transform.</p> <p>Lastly, battery storage projects for peak shifting or maximum demand management are constantly being re-examined to determine the point in time when the returns warrant investment and the technological risks are reduced through multiple projects implemented in South Africa in similar applications.</p>

11: APPENDIX 2: COMMENTARY FROM ENERGY ASSOCIATIONS



NAME OF CONTRIBUTING ORGANISATION:	<div>sapia</div> <div>South African Petroleum Industry Association</div>	
BRIEF DESCRIPTION OF ORGANISATION (Not more than 100 words)	SAPIA plays a strategic role in addressing a range of common issues relating to the refining, distribution and marketing of petroleum and LPG products, as well as promoting the industry's environmental and socio-economic progress. SAPIA fulfills this role by proactively engaging with key stakeholders, providing research information, expert advice and communicating the industry's views to government, members of the public and media.	
COMMENTS ON THE UNCERTAINTIES IDENTIFIED IN THE SANEA 2021/22 RISK REPORT		
WHAT UNCERTAINTIES DO YOU STRONGLY AGREE WITH AND WHY?	UNCERTAINTY	WHY
	Appropriate policy and vision	Policy is disjointed and non-existent likely as a consequence of little in-depth understanding of the industry. Results also in a lack of vision.
	Climate framework	South Africa lacks a strong evidence based framework with the consequence that many opportunists trying to dictate the type and pace of change.
	Investor Confidence	Downgrades, corruption, the inability (or lack of will) of government to combat corruption, erosion of the rule of law, vilification of the judiciary which include questionable judgements amongst many other issues raises country risk and reduced confidence.
	Market design and energy governance	This issue also affects oil markets – DMRE is notoriously slow to act on issues which require a quicker response. Furthermore, governance is essentially rooted in a 40 – 50 year old outlook which requires significant modernisation.
	Sustainable cities	This should be changed to 'Sustainable municipalities' – the increasing inability for municipalities to manage services threatens to disrupt the entire economic structure – see the poisoning of the Vaal from the dumping of sewage; the relocation of some of Clover activities; the large Eskom debts of a number of municipalities etc. The general collapse of the municipalities will increase tensions in the large metropolises eventually resulting in item 1 in the original list above.
WHAT UNCERTAINTIES DO YOU DISAGREE WITH AND WHY?	UNCERTAINTY	WHY
	Decentralised systems	While important for the electricity sector this is a longer term issue and not for the immediate term

ARE THERE UNCERTAINTIES THAT YOU FEEL ARE MISSING AND WHY?	RECOMMENDATION	WHY
	International oil market dynamics and their impact on the local sector	The shift in spending by energy majors away from E&P to cleaner energy likely means that the world will face an oil squeeze in a few years' time. Rationalisation of energy majors' assets means the world may become more dependent on supply east of Suez with all their geopolitical issues. These impacts could also see further refinery closures meaning South Africa will become more dependent on imported fuel increasing country risk, impacting the Balance of Payments and likely leading to still further downgrades.
	General lack of respect for the rule of law and the inability of government to combat this	The police service is unable to conduct its primary duty – serve and protect citizens exemplified by the recent unrest in KZN / Gauteng and their complete lack of action. Furthermore, compromised by their inability to bring those responsible to book. As a consequence, increasing disrespect for the police and increased levels of crime – for example regular interference with the pipeline network to tap fuel and sell this illegally. For electricity – illegal connections are rampant.
WHAT RECOMMENDATIONS DO YOU STRONGLY AGREE WITH AND WHY?	RECOMMENDATION	WHY
	Transition journey and roadmap (Implementation)	For proper planning and policy adjustment / implantation. Furthermore provides a vision.
	Future skills roadmap (People)	This needs to include the lost generations of school leavers who do not have sufficient education to serve the current let along future economy.
	In country production of liquid fuels (Integration)	Liquid fuels manufacture has one of the highest GDP and employment multiples in the country. There are a number of significant upstream linkages from a people developments point of view that will be lost if (or when) the refinery fleet is lost. This will have ramifications for other industries. From a human capital point of view a comparison needs only to be made on what is required for liquid fuels manufacture compared to (say) the operation of wind turbines.
WHAT RECOMMENDATIONS DO YOU DISAGREE WITH AND WHY?	RECOMMENDATION	WHY
	The NDP aligned with global long-term policy (Integration)	This is not necessarily a disagreement. The NDP is to all intents and purposes dead – in fact it was still born since it is not, nor ever has been properly supported by government and they have only paid lip service to it. One decade into implementation and one decade to go and very little to show for it. This must be reconfigured.
ARE THERE RECOMMENDATIONS THAT YOU FEEL ARE MISSING AND WHY?	RECOMMENDATION	WHY
	Innovation – more research required into 2nd and 3rd gen biofuels and chemical derivatives	In the South African context internal combustion engine vehicles will not disappear soon but greener fuels will be necessary. Development of these technologies can also promote the development of sequestration technologies – ie Carbon Capture Utilisation and Storage (with emphasis on U).
ANY OTHER COMMENTS ON THE REPORT?	None	

NAME OF CONTRIBUTING ORGANISATION:	<div> Energy Intensive Users Group SA <small>Est. 1999</small></div>	
BRIEF DESCRIPTION OF ORGANISATION (Not more than 100 words)	<p>The Energy Intensive Users Group of Southern Africa (“EIUG”) was established in 1999 as a voluntary, non-profit association. It was incorporated as a Non-Profit Company in 2019. The group was founded on the belief that energy is the engine for economic growth and development in the country.</p> <p>The EIUG represents intensive energy users consuming around 40% of electricity, contributing over 20% of GDP and employing over 650 000 employees. The EIUG is committed to working with Government, power utilities and other stakeholders to ensure South Africa has an energy supply industry that is financially viable, technically healthy, and less carbon intensive.</p>	
COMMENTS ON THE UNCERTAINTIES IDENTIFIED IN THE SANEA 2021/22 RISK REPORT		
WHAT UNCERTAINTIES DO YOU STRONGLY AGREE WITH AND WHY?	UNCERTAINTY	WHY
	Appropriate policy and vision: Long-term vision for the country supported by the approval and implementation of energy sector and related policy to encourage investment certainty, flexibility and agility.	The country does not have a clear vision that is shared by most stakeholders. This makes it difficult for stakeholders to plan ahead with some level of certainty.
	Climate framework: The acceptance and adoption of international policies such as the UNFCCC dealing with GHG adaptation and mitigation efforts, leading to an energy transition.	Considering our carbon-intensive electricity supply, failure to mitigate climate change, will be a stumbling block in attracting investments, access to capital markets and competitiveness in global markets.
	Country level development: The development of major programmes of work that involve energy, are integrated and aligned at a national level and aimed at national growth and prosperity.	Until the recent draft of the National Infrastructure Plan 2050 is implemented this risk remains relevant. Even so, the draft still has to be improved to cover this risk in full.
	Energy price volatility and uncertainty: Uncertainty due to rapid and sudden price changes for energy and related commodities including key minerals such as lithium and cobalt as well as coal, oil and gas prices.	The sharp price increases over the past years have made electricity unaffordable for many consumers. However, the volatility and uncertainty of price path makes it difficult to properly plan for operations or to invest for future economic growth.
	Market design and energy governance: The availability of innovative market designs and policies to enable renewables integration, secure back-up and storage capacity in natural gas and electricity markets.	As the country we still lack a coherent strategy of the future ESI and our decarbonisation efforts do not seem to be purposefully driven with the same policy direction.

WHAT UNCERTAINTIES DO YOU DISAGREE WITH AND WHY?	UNCERTAINTY	WHY
	None	
ARE THERE UNCERTAINTIES THAT YOU FEEL ARE MISSING AND WHY	UNCERTAINTY	WHY
	None	
WHAT RECOMMENDATIONS DO YOU STRONGLY AGREE WITH AND WHY?	RECOMMENDATION	WHY
	Implementation: A cohesive South Africa Inc long term energy vision that is clear and involves all levels of society with defined and achievable goals.	This will bring certainty to the industry for all stakeholders and stimulate investments that will grow the economy.
	People: A future skills roadmap to guide and incentivise the development of the required talent	To mitigate the identified risks and drive implementation of recommendations, institutions will need to be capacitated with capable resources. In addition, for just energy transition skills development is critical for adapting to new technologies.
	Integration: Enabling and streamlined regulation to enable investment in energy	An adaptive and responsive regulatory regime is important in creating an enabling environment for investor confidence.
	Integration: Aligned energy and related policy such as for trade and industry, education, transport, and mineral resources.	Alignment of policies are crucial as that assist in catalysing and enabling investments knowing all policies are pulling in the same direction.
	Impact: A review of systemic energy risk allocations to ensure that the limits of risk appetite are not breached. These risks include financial risk, energy security, energy adequacy, government support required for growth, etc.	This will assist in mitigating any sudden failures of projects or policies.
WHAT RECOMMENDATIONS DO YOU DISAGREE WITH AND WHY?	RECOMMENDATION	WHY
	None	
ARE THERE RECOMMENDATIONS THAT YOU FEEL ARE MISSING AND WHY?	RECOMMENDATION	WHY
	None	
ANY OTHER COMMENTS ON THE REPORT?	This is a useful report as it not only provides an opportunity to reflect in our energy challenges in their totality. The report also provides the stakeholders a platform for shared views on what is important for the energy sector. This will hopefully lead to mitigation of identified risks and implementation of recommendations.	

NAME OF CONTRIBUTING ORGANISATION:		
BRIEF DESCRIPTION OF ORGANISATION (Not more than 100 words)	Industry association of players in the broad spectrum of nuclear technology ranging from mining, power generation and other industrial applications	
COMMENTS ON THE UNCERTAINTIES IDENTIFIED IN THE SANEA 2021/22 RISK REPORT		
WHAT UNCERTAINTIES DO YOU STRONGLY AGREE WITH AND WHY	UNCERTAINTY	WHY
	18. Parochial interests and decision making	Policy uncertainty on energy was affected by narrow self-interests of players in the industry
	19. Regional geopolitics	Pressure is being exerted on the country/region to pursue policies that suit other geographical areas with different levels of economic development
	1. Activism and civil disobedience	Activism sometimes results in cultism when certain NGOs and church-based organisations adopt a strong antinuclear stance devoid of any scientific basis.
ARE THERE UNCERTAINTIES THAT YOU FEEL ARE MISSING AND WHY?	UNCERTAINTY	WHY
	Volatility of prices of some of fossil fuels used for the energy transition (No. 11 does not quite capture this point)	Justification for excluding some baseload technologies in order to rely on gas to back up intermittent renewables
	Capital markets dictation of energy policies by choosing what they fund	There is a danger that the global North which controls financial resources will dictate on the global South what policies to follow through the control of funding (or lack thereof) of infrastructure projects

12: APPENDIX 2: MEMBERS OF THE ENERGY EXPERTS GROUP



THE FOLLOWING PEOPLE WERE MEMBERS OF THE 2020 ENERGY EXPERTS GROUP.
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The South African National Energy Association (SANEA) is a not for profit company founded in 1924. SANEA represents a hub for objective thought leadership on energy and related matters. In so doing, SANEA stimulates original thinking to catalyse transformation of the South African Energy Sector.



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The fourth South African Energy Risk Report 2021 has been compiled in collaboration with the Institute of Risk Management South Africa (IRMSA) as a strategic initiative between SANEA and IRMSA. as the main aim of the IRMSA Risk Report is to identify risks facing South Africa and South African industries. IRMSA believes that this will assist leadership, management and risk practitioners in better identifying and managing the risks that their organisations face. This ensures that the reach of the conversations and considerations for energy risk is broadened and deepened within the South African industry and government environments.



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