

THE FUTURE OF ENERGY IN SA AND SADC:

**CURRENT TRENDS &
ALTERNATIVE SCENARIOS
GIVEN KEY POLICY &
STRATEGIC CHOICES**

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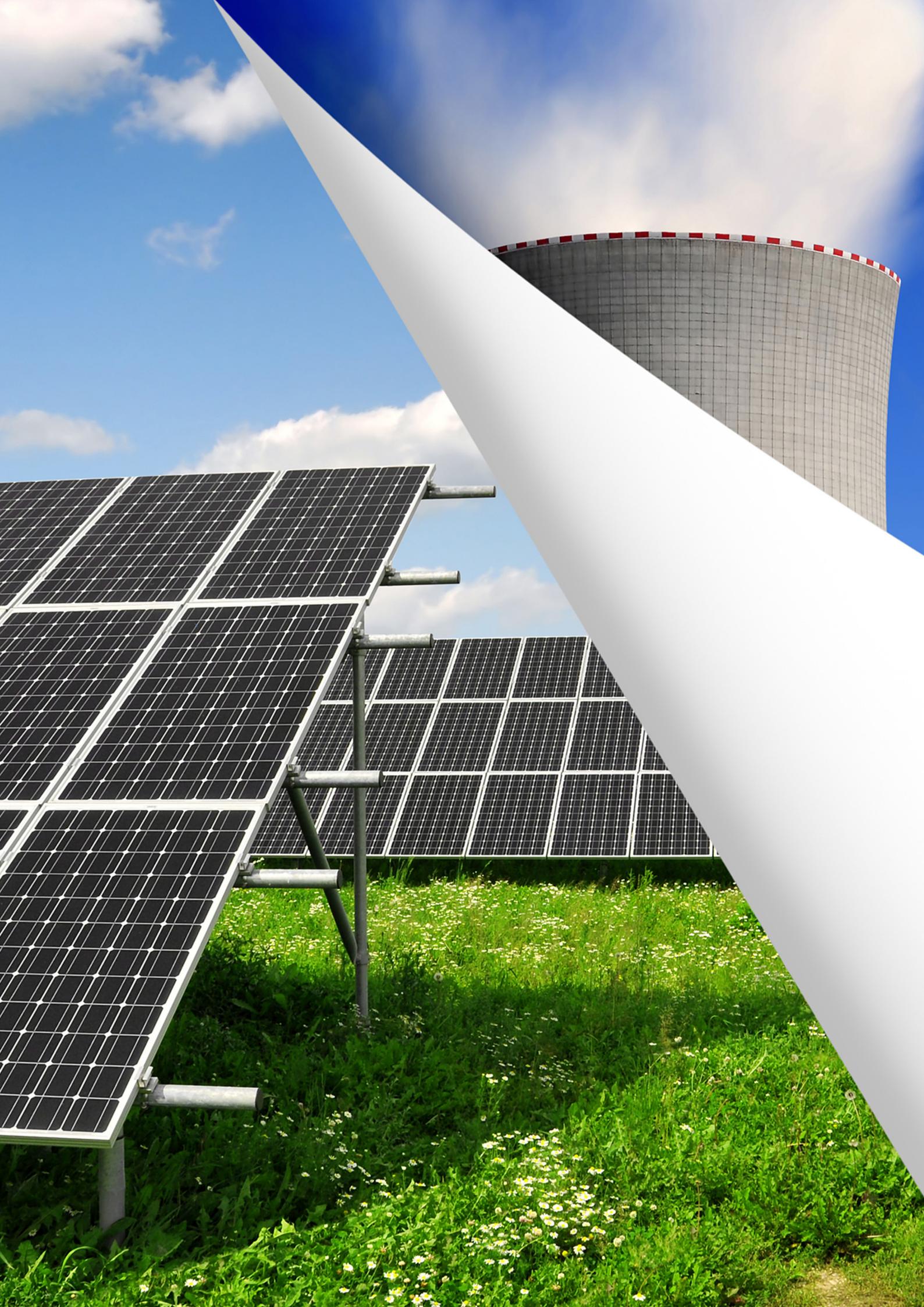
ABSTRACT

This paper explores the current trends in energy sustainability in South Africa, and the Southern African Development Community (SADC). An exploration is made of the current factors affecting energy supply, production, consumption and security and these are forecast into a baseline scenario for energy in SA and SADC. Alternative scenarios are constructed considering the policy approach and private sector strategy that would be required, to ensure energy sustainability through an integrated regional approach. We demonstrate that opportunities exist regionally in the energy sector, through new partnerships and investments and explore the antecedents required to unlock their implementation. The paper is divided into five sections. In Section 1, we examine the current state of energy in SA and SADC. Secondly, we examine the baseline future of energy in SA and SADC. In Section 3, we explore change factors, uncertainties and interventions that could reshape the future of energy. Thereafter, using scenario planning and systems thinking, we explore alternative scenarios for energy in SA and SADC. Finally in Section 5, we outline key findings and recommendations relating to the policy and strategy agenda that would be required to ensure a preferred and sustainable future for energy in the region.

KEYWORDS:

Energy, South Africa, SADC, Nuclear, Coal, Renewables, Sustainability

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EXECUTIVE SUMMARY

South Africa and the members states of the Southern African Development Community (SADC) enjoy vast natural energy resource endowments, but the region has thusfar been unable to take advantage of these in providing their citizens and industry with secure and sustainable energy.

The historic and structural reasons for this lag in development are numerous and likely to take decades to overcome. More recently, South Africa has seen instability in its energy sector brought about by a combination of economic and especially political factors, such as poor governance and policy implementation failures. Sophisticated analysis and planning by government had proceeded these recent setbacks, yet failure to implement policy, difficulties in executing infrastructure projects, combined with growing household demand and the failings of ageing powerstations and energy grid, have left the economy reeling from supply shortages. An analysis of the factors that have produced the current state of energy in South Africa and the region, an assessment of the systemic interrelationship between them, and an exploration of the trends and uncertainties resulting from these, have borne out three alternative scenarios for energy sustainability to 2045. These are:

BASELINE SCENARIO (GIVEN CURRENT TRENDS):

“Government Leads Towards High Stakes Energy Cliff: Political Expedience Trumps Pragmatism”

ALTERNATIVE SCENARIO 1 (COLLABORATIVE ALTERNATIVES):

“Private Sector Leads Energy Revolution – PPPs Models Social Transformation Effort”

ALTERNATIVE SCENARIO 2 (TECHNOLOGICAL BREAKTHROUGHS):

“Disruptive Technology Leads Radical Reformation of Energy Supply Chain”

The alternative scenarios emphasis the need for a range of policy and governance commitments, to good governance, political non-interference and building institutional capacity, in addition to robust collaboration with the private sector, to harness new technologies and renewable alternatives while migrating from energy paradigm and supply chain developed for the passing era of fossil fuel dependence.

BACKGROUND

Numerous studies (De Vos, 2015¹, Solidarity Institute²) have highlighted the complex and eminent energy challenges facing the Republic of South Africa (RSA)³ and the state-owned energy utility, Eskom. This paper suggests that four key challenges confront South Africa’s energy sector, namely; (1) security and supply: generation, distribution infrastructure, power stations and ultimately power black outs (2) energy intensity: nation’s energy usage by nation (3) electricity access in relation to business and (4) the citizenry’s environmental concerns caused by current energy stance (CSIR 2009). In addition to

these challenges relating to energy, it is important to note the prominent economic and influential geo-political role which South Africa plays in the Southern African Development Community (SADC)⁴ and the subsequent knock-on effect of the way in which energy policies and thinking will progress in future⁵. In exploring the current trend towards energy suitability, it is important to note the emerging paradigm on energy sustainability, described as follows:

“ [ENERGY SUSTAINABILITY] WAS THOUGHT OF SIMPLY IN TERMS OF AVAILABILITY RELATIVE TO THE RATE OF USE. TODAY, IN THE CONTEXT OF THE ETHICAL FRAMEWORK OF SUSTAINABLE DEVELOPMENT, INCLUDING PARTICULARLY CONCERNS ABOUT GLOBAL WARMING, OTHER ASPECTS ARE ALSO VERY IMPORTANT. THESE INCLUDE ENVIRONMENTAL EFFECTS AND THE QUESTION OF WASTES, EVEN IF THEY HAVE NO ENVIRONMENTAL EFFECT. SAFETY IS ALSO AN ISSUE, AS WELL AS THE BROAD AND INDEFINITE ASPECT OF MAXIMIZING THE OPTIONS AVAILABLE TO FUTURE GENERATIONS”⁶

In light hereof, this paper highlights and explores the current trajectory of South Africa’s energy sector and assesses the broader state of the sector in SADC.

The future of energy in SADC presents both challenges and opportunities. The point of departure of calling for a united regional approach, to analyzing and addressing the energy challenges of South Africa and the region, is informed by the objectives laid out by the RSA government in its 1998 “The White Paper on energy policy for South Africa”. This paper explained that there are five overarching national energy policy objectives, (1) increased access to affordable energy services: Government will promote access to affordable, adequate and secure energy services for disadvantaged households, small business, small farms and community services; (2) Improved governance of the energy sector to achieve greater integration

1 De Vos, D. 2009. Analysis: The crisis at Eskom, a dry run for South Africa itself. Daily Maverick . March. Accessed on 10 May, <http://www.dailymaverick.co.za/article/2015-03-23-analysis-the-crisis-at-eskom-a-dry-run-for-south-africa-itself/#.VVy57vnuOUk>.
 2 Solidarity Institute. Eskom’s power crisis: Reasons, impact & possible solutions. Accessed on 10 May, http://www.solidarityinstitute.co.za/docs/eskom_crisis.pdf.
 3 De Vos, D. 2012. South Africa’s Eskom problem. Techcentral. Accessed on 10 May, <http://www.techcentral.co.za/south-africas-eskomproblem/37098/>.
 4 Southern African Research and Documentation Centre. Southern Africa grapples with energy shortages. Accessed on 15 May, <http://www.grida.no/publications/et/ep5/page/2826.aspx>.

in energy policy development an energy services delivery; (3) Stimulating economic development by encouraging fair competition within energy markets by means of targeted interventions through appropriate mechanisms; (4) Management of energy related environmental impacts by promoting access to basic energy services for poor households to ameliorate negative health impacts arising from the use of certain fuels and establishing broad national targets for the reduction of harmful energy-related emissions; and (5) Pursuing energy supply security through greater diversification, both in supply sources and primary energy carriers⁷.

However, seventeen years after the adoption and subsequent implementation of this policy paper, South Africa continues to face numerous and complex energy supply challenges as briefly described below:

“ *TAKING INTO ACCOUNT THAT GDP GROWTH AVERAGED 3% ANNUALLY SINCE THE MID 1990'S AND EXPORTS INCREASED AS A RESULT, IT IS UNSURPRISING TO NOTE THAT BY 2008 SOUTH AFRICA EXPERIENCED AN ENERGY CRISIS. DEMAND FOR ELECTRICITY EXCEEDED THE AMOUNT OF AVAILABLE SUPPLY, LEADING TO SHORTAGES ACROSS THE COUNTRY. CONSEQUENTLY, LOAD SHEDDING WAS INTRODUCED; WHICH IS THE*

*PHENOMENON OF SYSTEMATICALLY LIMITING SUPPLY IN CERTAIN AREAS TO LESSEN THE PRESSURE ON POWER STATIONS. THE QUESTION OF A LACK OF SUSTAINABILITY IN THE ENERGY SECTOR EMERGES, BUT IT IS EQUALLY IMPORTANT TO CONSIDER THE NATURE AND METHODS OF ESKOM'S POWER SUPPLY*⁸ (KASSIER 2012:317).

This phenomenon, of energy shortages and “load shedding”, has again surfaced in 2015 as a result of a failure to address the underlying energy sustainability issues since 2008. It is against this backdrop that this paper provides a brief overview of the current state of energy in SADC. This perspective is critical when one considers that globally, the issue of energy sustainability has gained traction with experts, governments and citizens, expressing concern over issues such as securing the supply of reliable, affordability of energy, movement towards effecting a rapid transformation to a low-carbon, efficient and environmentally benign system of energy supply. (Barnard, 2008)⁹. As middle-income countries seek to address these challenges alongside the need for economic growth, regionalism offers opportunities to leverage diverse national resource assets for cross-benefits between countries. South Africa's energy challenges, and the future energy needs of the region, are likely to require a regional perspective rather than a singular or insular approach. The importance hereof is outlined by Rafey and Sovacool (2011)¹⁰, who explain the crisis facing Eskom and by extension South Africa, will affect the economic growth and development of SADC and that a broad and regional approach to energy suitability is required ●



5 Maupin, A. 2014. 'Energetic' Dialogues in South Africa: The EU Example. March. Policy Briefing 85. Global Powers and Africa Programme.
 6 World Nuclear Association, Suitable Energy. Accessed on 14 May 2015, <http://www.world-nuclear.org/info/Energy-and-Environment/Sustainable-Energy/>.
 7 Department of Minerals and Energy, 1998. White Paper on the Energy Policy of the Republic of South Africa. December.
 8 Kassier, C. 2012. South Africa's Energy Sector Realities: scope for sustainability and governance? Economic and Environmental Studies. Vol. 12, No.4 (23/2012), 311-335, Dec. 2012.
 9 Barnard, M. SADC's response to climate change the role of harmonised law and policy on mitigation in the energy sector. Faculty of Law, North-West University, Potchefstroom Campus.
 10 Rafey, W and Sovacool, B. 2011. Competing discourses of energy development: The implications of the Medupi coal-fired power plant in South Africa. Global Environmental Change 21. 1141-1151.

THE CURRENT STATE OF ENERGY IN SA AND SADC





THE ENERGY SECTOR ENVIRONMENT IN SOUTH AFRICA

Energy is a vital input to any modern industry and will become increasingly important to South Africa. It seeks to grow the economy and provide employment to the large unemployed cohort in the population. This is especially true given the current drive by government towards “reindustrialisation”. The nature of electricity production, due to the long-term nature of the investment required in infrastructure, which requires securitisation through sovereign debt, dictates the involvement of the state as opposed to mere private provision. This is compounded by the technical nature of the industry, and has resulted in state owned enterprises being seen as the preferred vehicle for delivery of national energy needs. In addition, the practical need for a monopolistic approach to transmission further reinforced the role of the State.

However, it also exposes the industry to issues of bureaucratisation, inefficiency and corruption due to political interference. Private provision tends to be more efficient, due to the profit incentive and imperatives for quality delivery. However, experience has shown that it does not automatically lead to lower prices for the consumer. Furthermore, constraints in the technological ability to store electricity, have hampered the adoption of alternatives due to their intermittent supply – resulting in the need or producers to balance supply and demand by coordinating production in line with peak consumption. These nuances set the scenario for the energy sector in South Africa.

South Africa enjoys the benefits of large mineral resource endowments, including the largest coal reserves in the world. This in part, informed the establishment of a state owned energy provider and the construction of coal-fired plants. Eskom was formed in 1923 by the then National Party, to provide energy to an industrialising economy and led subsequently to the raising of capital for Eskom through bonds in 1970s, which resulted in South Africa having some of the lowest energy costs in the world. While Eskom has historically always been highly regulated, the parastatal was able to operate largely independently politically, and was able to employ highly competent technical experts to ensure the institutional capacity required to deliver on its mandate. Apartheid’s political setting however, resulted in a predominantly white workforce, especially in management and senior positions, setting the backdrop to some of the current challenges.

South African energy consumption is today in keeping with developed countries and is the highest in Africa. However, current infrastructure is ageing and has not been well maintained. Building projects are behind schedule and fought with problems relating to execution and labour stability. Capacity shortages, and the need for immediate solutions resulted in the construction of “gas turbines” in Mossel Bay and Atlantis, which run on diesel, while these were initially meant as temporary of cheap supply in a previous era. Government’s decision to ultimately forbid Eskom from building new power stations in the late 90s, resulted in the

consequence of delay in supply growth. This policy failure was dramatically compounded by a political decision to shift to new and incapacitated coal suppliers, under the guise of “racial transformation” between 2007 and 2014; resulting in poor quality coal being supplied and vulnerability of the product to other factors such as weather conditions. In parallel to these developments, steps were taken to increase supply, but the new stations being built experienced a combination of overly ambitious plans, a dire lack of build competence in Eskom today, labour instability and inhibiting shortages of artisan skills such as welding. These have essentially crippled the projects and lead to multi-year delays. It is estimated that the completion of the Medupi, Kusile and Ingula stations will ensure adequate supply in the medium-term. Meanwhile, a series of operational accidents at Eskom in the turbines and furnaces, appear to have been the result of a combination of ageing infrastructure, negligence and general incompetence creeping into the parastatal. More recently a tension has emerged between Eskom’s interests and the political interests of the African National Congress (ANC) on a local government level.

While greater efficiencies could be obtained by privatising transmission, the revenues thereof currently constitute the bulk of municipalities’ income. To complicate matters further, vast arrears have been accrued by previously disadvantaged communities who have been given access to electricity, but without the political will to enforce payment. Most recently, this has resulted in local protests by communities and the regional ANC in the Gauteng metropol, against the very SOE operated by their party counterparts in government at a national level. It is apparent that Eskom has seen political interference as a consequence of social goals, transformation, broad-based black economic empowerment (BB-BEE), and the lingering insistence on low cost provision have clouded decision-making at the SOE. The current gap between domestic consumption and supply, and resultant “load-shedding”, has come about largely through a failure of governance. The consequences have been damaging to the SOE and the country. Ratings downgrades of Eskom and economic losses have accrued. Not even the unexpectedly low economic growth to 2007 (3%), which had been projected at double that, was not enough to ensure adequate supply. Even with construction commencing in 2004, the provision came too late to avert shortages. Given the aforementioned, three major factors appear to have created the status quo namely; poor policy implementation, inadequate planned supply and inappropriate pricing. These three would need to succeed to secure South Africa’s future energy. More recent attempts at managing consumption have also fallen foul of these issues. The use of smart meters for instance in Tshwane, while they would allow dynamic pricing and could allow private provision to feed into the grid, have been halted due to administrative failure at a cost of R1 billion. This, while the National Energy Regulator of South Africa (NERSA) is faced with an application for a 25% increase in rates by Eskom. While NERSA has constrained Eskom in their plans for aggressively hiking the price of energy in the past, the reality of the current crisis and the recent departure of the head of NERSA, points to compliance to political pressure and expedience as the likely outcome. Long term, a commitment appears to have been made by

government to nuclear as an important component of the South African future energy mix. This option remains ideologically unpopular due to environmental concerns and extremely high capital costs. In addition, concerns over corruption and cost overruns on projects of scale, make the proposition unpopular with the public and civic groups.

Paradoxically, the nuclear option may in fact be a better path than coal, natural gas or renewables due to the polluting effects of coal, proven environmental degradation resulting from of gas extraction and the prohibitively high costs of renewables. Recent decisions to review the terms for Fracking in South Africa’s Karoo region, points to a recognition by government to consider these trade-offs. Possibly the biggest “game changer” to the status quo is the development of new storage technologies, ironically lead by South African expat, Elon Musk’s Tesla. The ability to affordably and reliably store electricity for domestic and industrial consumption, will in years to come undermine the old assumption that a monopoly was needed to facilitate transmission. Instead, local production and local storage will lead to a revolution of the structure of the energy sector.

ENERGY SUPPLY CHAIN IN SOUTH AFRICA

The South African energy supply chain has been dictated by the current energy mix, which is predominantly centered on coal, that provides 88% of total energy generation and one-third of the country’s liquid fuels. Notably, 25% of the coal produced is exported for energy generation elsewhere. The domestic supply chain is constituted of three models of coal-based energy supply, namely coal to the Eskom coal-fired power stations, coal transformation into liquid fuels by Sasol and coal for export from South African ports. Electricity provision is controlled by the State through the state-owned enterprise Eskom, which also has ownership of the national grid. Similarly, the transport logistic for export coal, is controlled by the State through the state owned enterprise Transnet, leaving mining and the leading coal terminal at Richards Bay, as the only infrastructure components under private sector control. This arrangement has rendered coal as the primary source of energy in the country and produced a constrained collaboration between the public and private sector. South Africa’s energy mix is presently made up of 13 coal-fired power stations, nuclear, gas-turbine, pumped storage, hydro and wind. The 13 coal-fired power stations, are geographically situated in the province of Mpumalanga, where most of the oldest coal mines are located due to historic but now fast depleting coal reserves. One of the two new coal-fired power stations Kusile, is also in the Mpumalanga area, while Medupi is in the Waterberg, situated near the coalfields of Limpopo province. The developing scenario wherein coal reserves in the Mpumalanga coalfields are fully depleted, and the now ageing coal-fired power stations reaching their end of life, poses great supply risks to the state owned energy provider. Consequently, the original coal mines which were designated to supply a specific power station with coal via conveyor belts, no longer have enough capacity to supply the needs of the station. The result has been that Mpumalanga power stations have had to obtain extra coal from distant mines via road networks and trucks. This has dramatically increased the logistical costs and led to unsustainable air pollution levels and

11 Gorlach, V and Le Roux, P. 2013. The Impact of Economic Freedom on Economic Growth in the SADC: An Individual Component Analysis. Economic Research Southern Africa (ERSA) is a research programme funded by the National Treasury of South Africa.

12 ESI Africa. 2014. SADC seeks investors for US\$4bn cross-region energy projects. August. Accessed on the 10 May, <http://www.esiafrica.com/sadc-seeks-investors-for-us4bn-cross-region-energy-projects/>.

damage to the environment. The environmental degradation in these areas since around 2005, has increased sharply due to extensive road use by heavy coal-trucks and has also resulted in a notable increase in road accidents. The coal-based energy supply chain in its current form comprises three major stages namely; mining (privately operated), transportation (public and private operated) and the customer (public and private consumers). The rail infrastructure and coal-fired stations are State owned, while the mines and the major coal-terminal at Richards Bay are private as mentioned above. Thusfar, State intervention through legislation and policies, have been largely compatible with the private sector needs, while more recently discouraged new investments in coal mining in the last decade. The Mineral and Petroleum Resources Development Act of 2002 (MPRDA), which is currently under review, is viewed as cumbersome and discourages new investors, especially due to the lengthy waiting period for licenses. The liquid fuel energy supply chain is comparatively short, since the previously state owned energy company Sasol, operates its own coal mines that provide coal for transformation into liquid fuels (coal-to-liquid) which is then distributed to consumers through Sasol service stations nationally. This capacity is the result of the global isolation, and resultant statistic domestic economic model of the apartheid regime. South Africa's export coal is presently sourced from mines in the Mpumalanga coalfields and transported by Transnet Freight Rail (TFR) from Ermelo to Richards Bay Coal Terminal (RBCT), a 650km distance for export.

In view of the prevailing situation, it is apparent that South Africa' energy supply chain will require a vastly different model in order to enhance integration and collaboration in the industry and accommodate future energy needs. Specifically, a range of public-private partnership (PPP) would be likely be required, to balance the interests of all role players, as has been demonstrated in developed countries such as Australia where mining has played a significant role in recent economic growth.

THE STATE OF THE ENERGY SECTOR IN SADC

Notably, the SADC region has long understood its shortcomings with regard to the energy sector. SADC as a regional block constitutes fourteen member states namely; Angola, Botswana, Democratic Republic of the Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe, South Africa and Seychelles. The region is a kaleidoscope of socioeconomic diversity and varying stages of human of development. It is comprised of states like South Africa, Botswana and Seychelles, that have highly sophisticated economic instruments and markets. Rapidly developing states, such as Angola and Mozambique, as well as states that are still grappling with complex socioeconomic challenges caused by historical disadvantages (Zimbabwe, Lesotho and Democratic Republic of Congo) are susceptible to the volatility of evolving world financial markets¹¹. Against this complex historical backdrop, an analysis of the state of energy in the region, must be cognizant of the fact that SADC; is not (a) monetary union such as is the case in the European Union, (b) institutionally, have newly established democratic post-colonial states and has citizenry (c) business or private sectors that are unevenly developed across the region and the government of each state is at times hamstrung by the limitations of the public opinion

and the lack of desire of citizens to develop a unified regional singular entity.

As a result of these factors, the energy sector within SADC depends largely on the ability of member states to develop a unified and fiscally sustainable region. For instance, in 2012 it was explained that the region faces an electricity deficit and it was hoped that this would be addressed by 2014 in light of plans and projects that were intended to come on line (Central Transmission Corridor (CTC), the Mozambique Backbone Project, the Zambia-Tanzania-Kenya Interconnector as well as the proposed Namibia-Angola Interconnector)¹². However, this did not happen, due in part to delays in project implementation. Today the status quo is as follows;

“ THE REGION HAS A LOW ACCESS TO ELECTRICITY OF 24% COMPARED TO 36% FOR THE EAST AFRICAN POWER POOL (EAPP) AND 44% FOR THE REST OF THE AFRICAN POWER POOL (WAPP), WITH SOME OF THE SADC COUNTRIES HAVING BELOW 5% RURAL ACCESS TO ELECTRICITY” (SADC 2012:6)¹³.

It is therefore critical to understand that the energy challenge facing SADC is one that is occurring in the context of an economic climate that is in flux, and equally challenging. Furthermore, that this challenging economic climate which is a recent legacy of the 2008 financial market crises has meant that the energy options SADC, such as an investing in the likes of petroleum, gas and related context specific infrastructure, cannot be fully taken advantage of due to lack of international and local investments and capital¹⁴. This has resulted in coal remaining the energy source of choice, as explained;

“ [THE] COAL INDUSTRY SO FAR IS THE BACKBONE OF POWER GENERATION IN THE REGION AND A SIGNIFICANT SHARE OF THE RESOURCE IS EARMARKED FOR EXPORT. COAL EXPORTS ARE AN OPPORTUNITY THAT CAN YIELD ECONOMIC BENEFITS TO THE REGION IF CAREFULLY PLANNED SO AS NOT TO PREJUDICE THE LOCAL DEMAND. BOTH MINING AND TRANSPORT INFRASTRUCTURE ARE NEEDED FOR COAL REDISTRIBUTION AND EXPORT”¹⁵.

13 Southern African Development Community Secretariat. 2012. The SADC Regional infrastructure master plan. Gaborone, Botswana.

14 World Bank. Toward a sustainable energy future for all: directions for the World Bank Groups energy sector.

15 Southern African Development Community Secretariat. 2012. The SADC Regional infrastructure master plan. Gaborone, Botswana.

It is therefore evident that energy suitability remains a key development challenge and potential tool for SADC. For this reason the SADC Secretariat, in commissioning a study into the viability of a regional approach, explained that, “the region has a large potential renewable energy estimate which includes hydropower...However, the necessary infrastructure for grid connection, manufacturing and quality testing is lacking. The prices for most renewable energy technologies are coming down, but more needs to be done in the form of innovative financing”¹⁶. The potential economic opportunity for the SADC region, is further enhanced by the fact that the region’s major players such as South Africa are likely to also exploit the potential of nuclear energy, if properly researched and invested in with accompanying good governance¹⁷. Perhaps ironically, SADC is still in a position to maneuver, reconfigure its energy strategy and resultant economic make up. It is the view of this paper that with regard to Green House Gas (GHS) emissions and other environmental considerations, SADC is still in a position to review its approach. As Barnard explains, “The main sources of CO² emission in Southern Africa relate directly to the generation and consumption of energy, namely fossil fuel burning (liquid fuels and especially coal in the thermal power stations of South Africa) and deforestation due to the use of traditional source of biomass as primary energy source...Therefore, while the sub-region’s contribution to global energy-related GHG emissions is low, the SADC energy sector is the highest contributor to GHG emissions in the sub-region itself. Deforestation in the sub-region is characterised by a combination of forests cleared for agriculture or for commercial purposes and the increasing demand for biomass as an energy source” (2014:27)¹⁸. It is therefore critical for SADC as a region to take advantage of the current move towards renewable or energy suitability projects, and take advantage of its economic opportunities that are well documented¹⁹. However as has been argued this move will require new thinking and capital raised by SADC member countries, which will enable a move away from the current energy mix which still heavily dependent on fossil fuels.²⁰

THE POTENTIAL OF RENEWABLE ENERGY IN SA AND SADC

The Southern African states possess huge potential for renewable energy sources in natural gas, hydro, solar and wind. South Africa’s National Development Plan 2030 (NDP) for instance stipulates the importance of the increased development of renewable sources in future to enable the country reduce carbon emissions emanating from reliance on coal as a primary source of energy. The recent endorsement of the Renewable Energy independent Power Producer Procurement Programme (REIPPPP) is a testament to the South African government’s initiative, to speed up renewable energy development. There are a number of renewable power projects such as wind, solar and biomass currently in the pipeline. A massive solar energy project in Northern Cape with a capacity of 86.2 MW was planned to have come on stream in April 2015. The shale gas discovery at the Karoo in Northern Cape, which the government has mandated for exploration and exploitation, has been said to be a game changer for the sector. At the peak of its exploitation, it is estimated that close to a million jobs would be created and would change South Africa’s carbon footprint drastically, as a possible replacement for

coal use in electricity generation. While on the path of cleaner energy (less or no carbon emissions), the SA government has indicated the launch of nuclear power station procurement processes for 9 600 MW in the latter part of 2015.

The nuclear development plan was at first delayed to facilitate wider international consultation, as it was in fact already earmarked early in the Integrated Resource Plan (IRP) of 2010. While nuclear energy is not renewable, its generation has minimal carbon emissions and constitutes an attractive proposition to South Africa given its current coal dependence. In recent years, there have also been new discoveries of natural gas along the South African border with Namibia in Northern Cape, Namibia, Mozambique and Tanzania. The greatest potential for renewable energy sources in the region, remains the hydropower potential of the Congo river in the Democratic Republic of Congo (DRC). At its full capacity, the conceptualised Inga Dam Hydropower station, as it is called, generates 40 000 MW of electricity which would completely alleviate electricity shortages in the Southern African Development Community (SADC). Choices remain for the SADC region, such as to invest heavily in grid infrastructure development in order to facilitate power sharing among the member states, or seek decentralised supply options which leverage the array of energy advantaged in various regions. Presently, only South Africa possesses an elaborate electricity grid, but this infrastructure is ageing and would require renewal and further development to form part of a sustainable energy future. There currently exists only limited energy trading among a few of the SADC states.

SOUTH AFRICA: TWIN CHALLENGE OF ROLL OUT

South Africa is in an advantaged position compared to regional peers in relation to levels of electricity supply to its citizens and secondly its private sector. However, as advantaged as South Africa has been, the bulk of South Africa’s current energy challenges, stem from the complex balancing act its policymakers face as they navigate the historical legacy of apartheid and colonialism on the one hand and current and future demands on the other.

The Mitigation Action Plans and Scenarios (MAPS) research report supports this analysis and goes on to highlight further problems plaguing the South African energy sector, by arguing that, “South Africa’s dominant energy security perspective is still steeped in the Apartheid era’s myopic focus on stocks of mineral energy resources, the economy as an energy user and independence from oil imports. However, the challenges facing South Africa’s energy system are far more complex and insidious than this technical, ‘input-output’ approach would suggest. Over the past two decades South Africa has failed to create the conditions for adequate investments in major required energy infrastructure developments”(Maps 2014:3)²¹.

One of the key facts emanating from this and other such reports, is that the South African government faces twin problems of provision. On the one hand it needs to ensure the country’s economy which has large numerous mining, varied manufacturing entities and other energy sapping demands, is able to access constant streams of affordable energy²². This on-going demand is further exasperated by the need to include

¹⁶ Southern African Development Community Secretariat. 2012. The SADC Regional infrastructure master plan. Gaborone, Botswana.

¹⁷ Van Wyk, J.2013. South Africa’s Nuclear Future. The South African Institute of International Affairs (SAIIA). June. Occasional paper 150.

¹⁸ Barnard, M.2014. SADC’s response to climate changes the role of harmonised law and policy on mitigation in the energy sector. Faculty of Law, North-West University, Potchefstroom Campus. Journal of Energy in Southern Africa • Vol 25 No 1.

¹⁹ World Bank. Toward a sustainable energy future for all: directions for the World Bank Groups energy sector.

²⁰ World Trade Organisation. 2013. World trade report 2013. Fundamental economic factors affecting international trade.

²¹ Mitigation Action Plans and Scenarios. 2014. Energy Security in South Africa. Research paper, Issue 17.

and cater for the vast majority of previously disadvantaged black communities living in rural and township areas²³. It is from within this context that this paper now illustrates the twin challenge facing South African policymakers with regard to the energy sector. The following segment is an analysis or the history of electrification in South Africa's previously disadvantaged areas through the lenses of the Department of Energy's Integrated National Electrification Programme (INEP) process.

According to National Treasury plus minus 5.8 million households were connected to the grid between 1994 and January 2014. Since 2002 to 2013/14 (68 115) households were supplied with nongrid technology (Solar panels Renewable Energy); Eastern Cape 13 202, KwaZulu-Natal 44 532 and Limpopo 10 381 Electrification progress. The non-grid electrification programme is intended to in future not only be implemented in concessionary areas, but in other areas of the country, through the Master Plan Strategy.

INEP24, MEDIUM-TERM EXPENDITURE FRAMEWORK (MTEF) ALLOCATIONS

VOTED FUNDS	MTEF 2014/15 R'000	MTEF 2015/16 R'000	MTEF 2016/17 R'000
MUNICIPALITIES	1 104 658	2 056 090	2 165 063
ESKOM	2 948 037	3 680 043	3 875 085
NON - GRID	96 621	101 067	106 424
BASELINE ALLOCATION	4 149 316	5 837 200	6 146 572

Source: (<http://mfma.treasury.gov.za/>)

ELECTRIFICATION PROCESS BY PROVINCE AND NUMBERS

PROVINCE	ELECTRIFIED HOUSES: MUNICIPALITIES AND ESKOM
Eastern Cape	1 043 324
Free State	365 703
Gauteng	683 565
KwaZulu-Natal	962 414
Limpopo	1 017 855
Northern Cape	134 621
North West	676 732
Western Cape	396 649
Mpumalanga	557 821
TOTAL	5 838 684

Source: (<http://mfma.treasury.gov.za/>)

REAL TIME MEANING OF TWIN PROBLEMS

The aforementioned dilemma was identified as being a possible challenge for South Africa's socioeconomic development, as far back as 2005 by the fourteenth United Nation Commission on Sustainable Development. This session and report listed twelve key points and constraints that government and other entities should try address to ensure South Africa's energy future can be maintained and catered for. The twelve points²⁵ explained that there is a:

- (1) General: Lack of knowledge and expertise in Government.
- (2) Lack of adequate funding from National Treasury to achieve real impacts.
- (3) Lack of funding and capacity is causing a gap between policies, goals, targets and implementation.
- (4) Integrated Energy Planning is not adequately implemented.
- (5) The low price of electricity is a serious barrier to the introduction of energy efficiency.
- (6) Measures as well as the competitiveness of energy from renewable sources.

- (7) In terms of cleaner fuels: The potential to displace Illuminating Paraffin (IP) as a household fuel with cleaner fuels such as LPG and bio-ethanol gel.
- (8) The lack of full cost accounting and perverse incentives (such as the VAT zero rating of IP) hampers the growth of cleaner fuels and technologies.
- (9) Basic energy subsidies don't reach the poorest of the poor.
- (10) In terms of renewable energy: Lack of adequate funding to achieve targets.
- (11) In terms of energy efficiency: Lack of adequate incentives from Government and the absence of regulatory measures.
- (12) In terms of transport: A lack of co-ordination between town planning and an integrated approach to sustainable urban settlements hampers the introduction of efficient transport measures.

Confronted with this mounting set of twin problems, the South African government responded by trying to exploit renewable energy through the White Paper on Renewable Energy 2003 (WPRE) ●

²² Gordon Institute of Business Sciences (GIBS).2015.Alternative Future Scenarios for South African Mining, Manufacturing and Financial Services. Future of Business in South Africa Project Centre for Business Analysis and Research.

²³ Mahajan, S. 2014. Economics of South African Townships Special Focus on Diepsloot. International Bank for Reconstruction and Development / The World Bank.

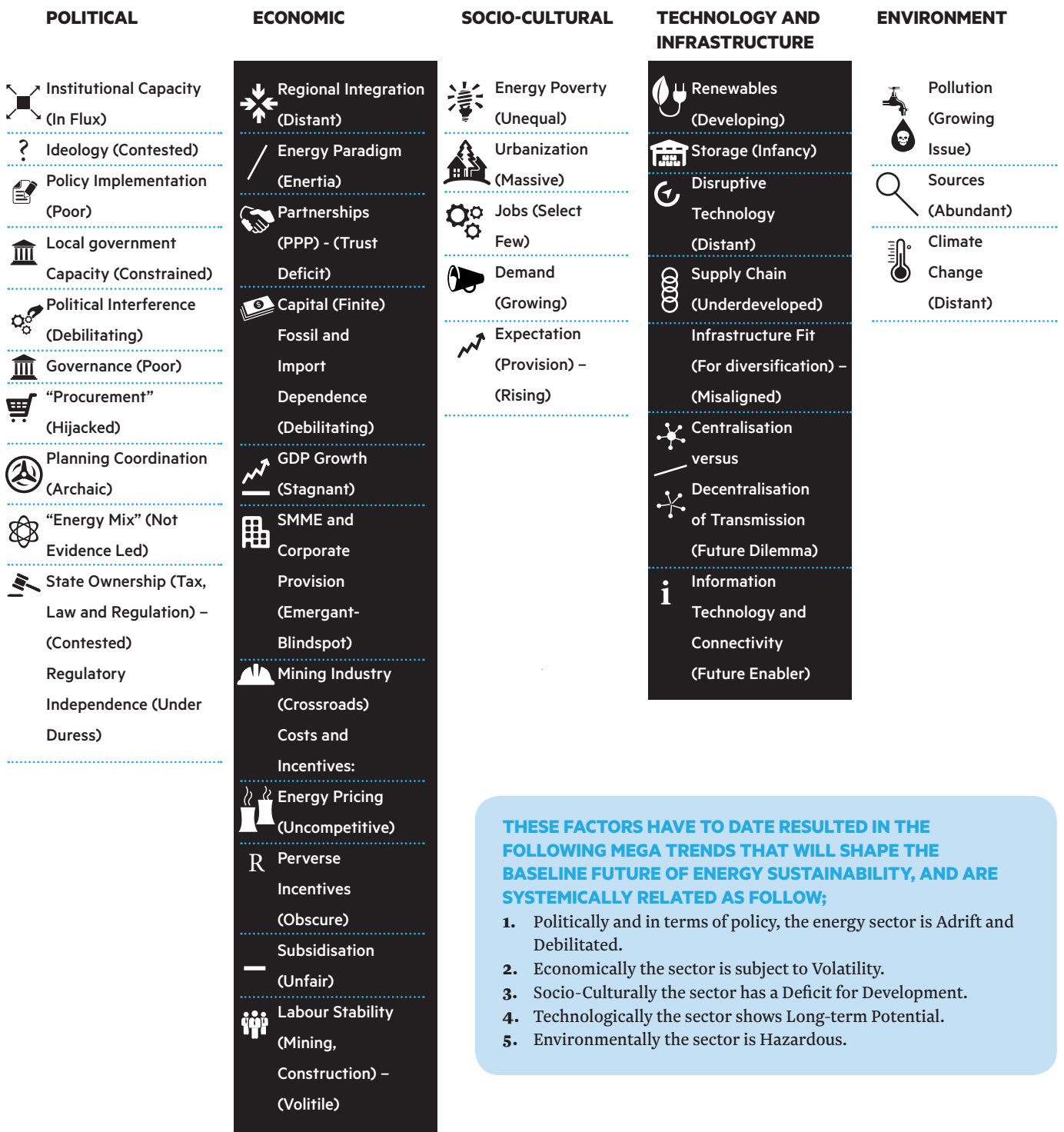
²⁴ "The purpose of the Integrated National Electrification Programme is to manage the electrification planning, funding and implementation process with the aim of addressing electrification backlog so as to reach universal access by 2014". Department of Energy. 2014. Integrated National Electrification Programme: 19 March 2014.The Government of the Republic of South Africa. Accessed 10 May, http://mfma.treasury.gov.za/Media_Releases/ReviewOfLInfastructureGrants/Documents/Review%20of%20Infastructure%20Grants%20-%2019th%20March%20Sector%20Workshop/Presentations/DoE%20-%20INEP.pdf.

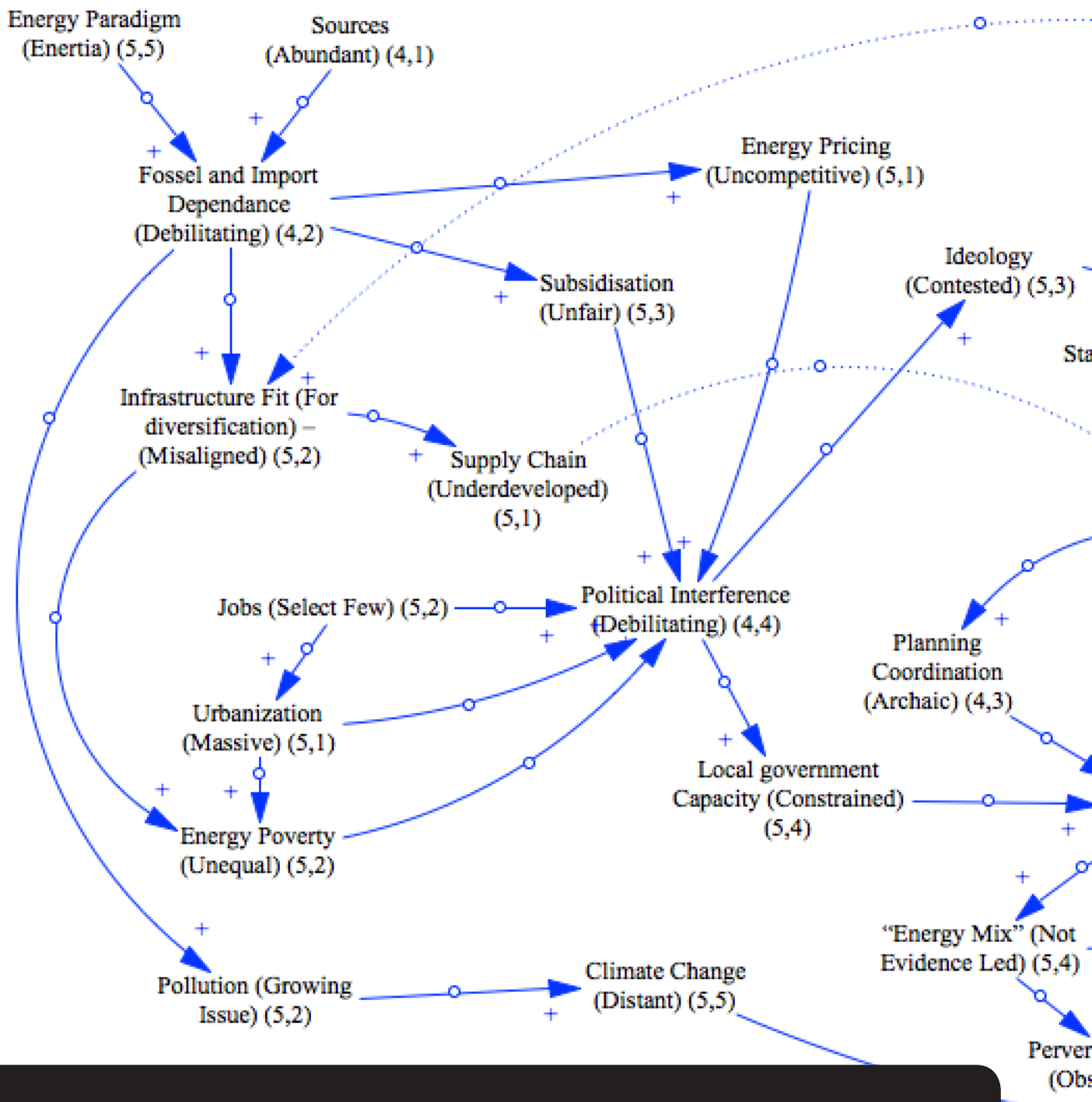
²⁵ Department of Environmental Affairs and Tourism. 2005. South Africa country report. The Republic of South Africa government.



THE BASELINE FUTURE OF ENERGY IN SA AND SADC

An analysis was done of 38 key drivers of change that were identified, and of the systemic relationships between them, that are shaping the future of energy in South Africa. These were identified as;





BASELINE SCENARIO:

“GOVERNMENT LEADS TOWARDS HIGH STAKES ENERGY CLIFF: POLITICAL EXPEDIENCE TRUMPS PRAGMATISM”

Government attempts to stabilise the sector through dominant intervention in the form of large-scale policy interference and infrastructure projects, while ageing infrastructure and slow delivery of new build projects precipitate a reaction from the private sector, that adapts to energy uncertainty through investment in private provision, especially clean alternatives. Households cope by seeking an alternative to supplement energy supply, while the urban poor bear the brunt of rising costs and intermittent energy security. The rural poor are neglected and excluded, systemically trapped in energy poverty. Regulators are left to navigate the treacherous pitfalls of political expedience on the one hand and economic imperatives and rising social demands on the other ●

CHANGE FACTORS, UNCERTAINTIES AND INTERVENTIONS (RESHAPE THE FUTURE OF ENERGY)

An analysis was done of the “impact” and “uncertainty” of each of the drivers of change in order to rank and understand their potential to alter the trendlines and produce alternative future scenarios. These were ranked “1-5”, “1” being low and “5” being high, in order to focus the alternative scenario on the key uncertainties in the sector.

POLITICAL

- Institutional Capacity (In Flux) (5,3)
- Ideology (Contested) (5,3)
- Policy Implementation (Poor) (4,4)
- Local government Capacity (Constrained) (5,4)
- Political Interference (Debilitating) (4,4)
- Governance (Poor) (5,4)
- “Procurement” (Hijacked) (5,1)
- Planning Coordination (Archaic) (4,3)
- “Energy Mix” (Not Evidence Led) (5,4)
- State Ownership (Tax, Law and Regulation) (Contested) (4,4)
- Regulatory Independence (Under Duress) (4,3)

ECONOMIC

- Regional Integration (Distant) (2,3)
- Energy Paradigm (Inertia) (5,5)
- Partnerships (PPP) - (Trust Deficit) (5,5)
- Capital (Finite) (5,4)
- Fossil and Import Dependence (Debilitating) (4,2)
- GDP Growth (Stagnant) (4,3)
- SMME and Corporate Provision (Emergent-Blindspot) (5,2)
- Mining Industry (Crossroads) (5,5)
- Costs and Incentives:
 - Energy Pricing (Uncompetitive) (5,1)
 - Perverse Incentives (Obscure) (4,3)
 - Subsidisation (Unfair) (5,3)
 - Labour Stability (Mining, Construction) – (Volatile) (5,2)

SOCIO-CULTURAL

- Energy Poverty (Unequal) (5,2)
- Urbanization (Massive) (5,1)
- Jobs (Select Few) (5,2)
- Demand (Growing) (5,1)
- Expectation (Provision) – (Rising) (5,1)

TECHNOLOGY AND INFRASTRUCTURE

- Renewables (Developing) (4,4)
- Storage (Infancy) (5,4)
- Disruptive Technology (Distant) (5,5)
- Supply Chain (Underdeveloped) (5,1)
- Infrastructure Fit (For diversification) – (Misaligned) (5,2)
- Centralisation versus Decentralization of Transmission (Future Dilemma) (5,5)*
- Information Technology and Connectivity (Future Enabler) (5,3)

ENVIRONMENT

- Pollution (Growing Issue) (5,2)
- Sources(Abundant) (4,1)
- Climate Change (Distant) (5,5)

26 Bowman Gillfillan. 2013. History of Renewable Energy in South Africa. July. Accessed on 15 May, <http://www.bowman.co.za/News-Blog/Blog/History-of-Renewable-Energy-in-South-Africa>.
 27 Aurecon. 2013. Forward planning of Energy in South Africa. Accessed on 16 May, <http://www.sahra.org.za/sahris/sites/default/files/additionaldocs/Forward%20planning%20of%20Energy%20in%20SouthAfrica.pdf>.
 28 Bowman Gillfillan. 2013. History of Renewable Energy in South Africa. July. Accessed on 15 May, <http://www.bowman.co.za/News-Blog/Blog/History-of-Renewable-Energy-in-South-Africa>.
 29 Vanderschuren, M. Jobanputra, R and Lane, T. 2008. Potential transportation measures to reduce South Africa's dependency on crude oil. August. Journal of Energy in Southern Africa, Vol 19, No 3.
 30 Flavin, C. Gonzalez, M. Majano, A. Ochs, A. Rocha, M and Tagwerker, P. 2014. Study on the Development of the Renewable Energy Market in Latin America and the Caribbean. The Inter-American Development Bank.

EXPLORATION OF RENEWABLES

The WPRE stated mission according to Bowman Gilfillan was to produce “10 000GW of energy from renewable energy sources, specifically biomass, wind, solar and small-scale hydro, by 2013” (2013)²⁶. In operationalising this vision to have part of South Africa’s energy mix and challenge be addressed through renewables energy the RSA government (through the Department of Energy) initiated the Integrated Resource Plan (IRP) in 2010. This plan was gazetted on 6 May 2011 by the DOE (Aurecon, 2013)²⁷. What is critical to gain from this initiative and plan is that through the IRP,

“ GOVERNMENT UNDERTOOK TO INCREASE SOUTH AFRICA’S TOTAL INSTALLED ELECTRICITY CAPACITY BY 170% TO 454TW BY 2030, 3725 MEGA WATTS (MW) OF WHICH WOULD COME FROM RENEWABLE ENERGY TECHNOLOGIES. THE IRP SET OUT HOW THE 3725 MW OF NEW GENERATION CAPACITY WOULD BE APPORTIONED BETWEEN EACH RENEWABLE ENERGY TECHNOLOGY, AND THAT THE NEW GENERATION CAPACITY SHOULD BE ACHIEVED USING, AND SHOULD BE EXECUTED IN ACCORDANCE WITH, THE SPECIFIED APPORTIONED CAPACITIES AND TECHNOLOGIES AS LISTED IN THE IRP. THE PROCESS FOR PROCURING THE NEW GENERATION CAPACITY AS SPECIFIED IN THE IRP IS KNOWN AS THE RENEWABLE ENERGY INDEPENDENT POWER PRODUCER PROCUREMENT PROGRAMME” (BOWMAN GILFILLAN, 2013)²⁸

This bold strategy by the South African government must also be understood to be occurring within a context where the State currently relies heavily, if not exclusively, on costly fossil fuels. Vanderschuren et al. bring this point into better perspective, when they explain that, “Nearly 80% of the primary energy supply imported into South Africa is in the form of crude oil. This represents the single largest item on the country’s import account. Gasoline and diesel fuels, which are almost exclusively used for the transportation of goods and passengers significant proportion of these imports and their demand is continuously increasing” (2008:20)²⁹. It is for this reason among others that policies and plans like the IRP, WPRE and other initiatives are being implemented by states like South Africa. An additional reason for wanting to move towards renewables and away from fossil fuels is to try lead in development of renewables technologies, for the purpose of reducing energy costs (Flavin et al., 2014)³⁰ and leading the world in attempting to make a profit from such plans (Anderson, 2015)³¹. Further evidence of the need to have to move towards renewables energy, was provided from one of the most unlikely states, namely the Kingdom of Saudi Arabia. On 6 March UPI reported that, “Saudi Arabia has unveiled ambitious plans to develop

renewable energy programmes that will produce 54,000 megawatts of electricity by 2032, part of a strategy by the Persian Gulf petro-monarchies to save their oil for export...With peak power demand expected to rise by more than 60 percent in the next 20 years, Saudi Arabia is aware that it must swiftly move forward with power projects to avoid severe shortages...” (United Press International, 2013)³². It is within this ever changing world context that the SADC Secretariat report and the South Africa government renewables policies become increasingly important. It affirms their intentions to move away from fossil fuels to cleaner energy, not only for environmental reasons but also economic development purposes in a twenty first century global context. While skeptics might be right in not fully trusting Saudi Arabia’s change of heart towards renewable energies, the UPI acknowledges that more thorough planning/research is being done by the government of Saudi Arabia. It does explain that, “Under the plan, Saudi Arabia is to produce 23,900 MW of electricity from renewable energy sources by 2020 and 54,000 MW by 2032...Demand is expected to increase sharply in the next 20 years, to 75,000 MW by 2020 and 123,000 MW by 2032, based on an average growth rate of 4.5-5 percent a year...To help meet this demand, Saudi Arabia plans to build a chain of at least 16 nuclear power stations under a \$109 billion program, with the first operational by 2019” (United Press International, 2013)³³. This major injection and strategic move towards renewables by a major oil producer and fossil fuel enabler and user, demonstrates to South Africa and the rest of SADC that proper investment, research and strategic planning is vital to ensure future energy sustainability.

More than that, this strategic move by nations in the Gulf area, bring into question African governments’ strategic socioeconomic development plans as far as fossil fuels are concerned. The United Nations Economic Commission for Africa’s African Climate Policy Centre report explains where Africa’s dominant energy reserves are located, “Over 80% and 90% of the oil and natural gas reserves respectively, are found in Northern and Western Africa. Libya accounts for over 70% of the oil reserves in Northern Africa and Algeria accounts for about 55% of the natural gas reserves in the same region. Nigeria accounts for almost all the oil and natural gas reserves in Western Africa. In addition, three countries—Libya, Nigeria and Angola account for about 80% of the proven oil reserves in the continent...This distribution of energy resources across the continent becomes more uneven considering South Africa accounts for about 95% of the coal reserves in the continent” (UNECA 2011:2)³⁴. While these reserves are an advantage, if not utilised correctly in the short and medium term, can eventually see African countries again need to be a net-importers of new renewables technologies and products emanate from not only states like Saudi Arabia, but more technologically advanced states like Federal Republic of Germany, the United States and others, who are heavily investing in the potential of renewable energy for environmental and business purposes (Frankfurt School-UNEP, 2013)³⁵. It is important to note that, while a small amount has been invested by the South African government into renewable energy, it has nonetheless been considered a potential leader and business area for renewables by the Frankfurt School-UNEP, 2013 report. This recognition by this prestigious and well-read study means that given the right investment and research work, South Africa could position itself to assist the rest of SADC leapfrog other regions in exploiting renewable energy sector for socioeconomic and environmental purposes ●

31 Anderson, J. 2015. Tesla unveils battery storage system for home, business and utility use. Accessed on 15 May, <http://www.gizmag.com/tesla-battery-powerwall/37283/>.

32 United Press International. 2013. Saudis rev up plans for renewable energy. Accessed on 16 May, http://www.upi.com/Business_News/Energy-Resources/2013/03/06/Saudis-rev-up-plans-for-renewable-energy/10491362593301/.

33 United Press International. 2013. Saudis rev up plans for renewable energy. Accessed on 16 May, http://www.upi.com/Business_News/Energy-Resources/2013/03/06/Saudis-rev-up-plans-for-renewable-energy/10491362593301/.

34 United Nations Economic Commission for Africa African Climate Policy Centre. 2011. Fossil Fuels in Africa in the Context of a Carbon Constrained Future. Working Paper 12.

35 “In 2012, the balance in overall investment changed from roughly a two-thirds-one-third split between developed and developing economies to one that was much closer to 50:50. Renewable energy outlays in the developing world reached \$12 billion, up from \$94 billion in 2011, and some 46% of the world total”. Frankfurt School-UNEP Centre/BNEF. 2013. Global Trends in Renewable Energy Investment 2013. Accessed on 17 May, <http://www.unep.org/pdf/GTR-UNEP-FS-BNEF2.pdf>.





ALTERNATIVE SCENARIOS FOR ENERGY SUSTAINABILITY IN SADC

Two alternative scenarios were forecast for energy sustainability, the first emphasized the utilization of private sector expertise to alleviate institutional capacity issues, and the second drew on technological advances to overcome infrastructure constraints and the mismatch between demand and supply.

ALTERNATIVE SCENARIO 1:

“PRIVATE SECTOR LEADS ENERGY REVOLUTION – PPPS MODELS SOCIAL TRANSFORMATION EFFORT”

Government stabilizes the sector through inviting aggressive private partnership participation in the form of large-scale infrastructure projects delivered efficiently, while harnessing clean alternatives and semi-decentralization of transmission. Households benefit by contributing in the manufacture of alternative technologies, while the urban poor enjoy off-grid solutions to domestic energy consumption. The rural poor receive the systemic benefits of growth industries around mining, as regulators are able to unlock investor interest through trade-offs between political imperatives on the one hand and economic imperatives and rising social needs on the other.

ALTERNATIVE SCENARIO 2:

“DISRUPTIVE TECHNOLOGY LEADS RADICAL REFORMATION OF ENERGY SUPPLY CHAIN”

Government turns the ailing energy sector into a hive for innovation through incentivising knowledge networks and private partnership in the form of wide ranging research and development projects aimed at new technologies in energy storage. Combined with low carbon alternatives, clean energy is harnessed and transmitted in an array decentralization hubs.

Households benefit from access to and export of low-cost locally manufactured energy solutions, while the urban poor enjoy off-grid solutions to domestic energy consumption. The rural poor receive the systemic benefits of regionally integrated growth industries around mining and assembly, as regulators are able to attract talent and unlock ingenuity through trade-offs between political imperatives on the one hand and economic imperatives and rising social needs on the other ●

KEY FINDINGS AND RECOMMENDATIONS (POLICY AND STRATEGY AGENDA)

The natural endowments of hydro to the north, coal to the south and gas across large swaths of the region should mean that SADC and South Africa in particular, have ample energy to drive their economic growth and transformation for decades to come.

However, the legacy of fossil fuel and import dependence are likely to prove difficult to overcome. Growing social demands and rapid urbanization is likely to undermine planned supply efforts and pose difficulties for infrastructure development. Perhaps the largest single challenge to impact on energy sustainability will be the coalescing of political interference, government incapacity and resultant poor governance. The effects hereof on the quality of policy implementation will pose risks to government's hegemony in the sector and present the private sector with the choice of high costs with uncertain supply, or private provision.

Should the political will exist to harness the energy sector's next phase of development as an engine and enabler for economic growth and the accompanying private public-partnership be forged to ensure institutional capability and efficient delivery, technological breakthroughs in clean energy alternatives are likely to reinforce the region's innate advantages. This will require a commitment to the following key principles, both in terms of policy and private sector strategy in the short and medium term;

1. More can be achieved through a collaborative relationship between the private and public sectors than can be achieved by either sphere independently.
2. Support industries, such as mining and manufacturing, must be enabled to return to a state of global competitiveness and growth.
3. Investments in technology and innovation, especially in storage, remain a critical part of a sustainable energy future.
4. The ambiguity between centralization versus decentralization of transmission will mark the future of energy.
5. Clean and ecologically friendly alternatives, such as renewable, must be pursued to combat climate change and avoid the long-term affects of pollution.
6. An openness to adaptation of the current energy paradigm will be required to develop adequate solutions.
7. The selection of an appropriate "energy mix" must be informed by pragmatism and evidence where possible.
8. Local government remains a vital role player in the development of a sustainable energy environment and must place political interests secondary to delivery to local industry and consumers in the execution of policy.
9. Good governance is not only an ethical yet a pragmatic imperative to secure energy sustainability.
10. Policy implementation, not formulation, must become the focus of monitoring and evaluation mechanisms at all levels of government.
11. Political interference, especially in the state owned energy supplier and regulator must be recognized as a debilitating malpractice.
12. State ownership in energy and other sectors must be utilized, only where pragmatically sensible, to ensure orderly development and prioritization of economic development due to the resultant social benefits.
13. Institutional capacity must be intentionally built to support a changing energy environment, especially in terms of technical and operational competence.
14. Ideological convictions must be set aside in favor of ethically informed pragmatism through stakeholder dialogue.
15. While capital must be raised for the development of capital-intensive infrastructure, cognizance must be taken of the limitations of the South African fescues.
16. Fossil fuels and petroleum imports must be employed as a short-term means to enable alternatives.
17. The adaptive role of SMMEs and corporate provision must be harnessed in favor of energy security.
18. Energy pricing must be rationalized and employed to incentives private participation where needed.
19. Incentives must be rigorously assessed within the context of stakeholder relations and publicized with the required support services.
20. Subsidization must be targeted and reviewed regularly to ensure appropriateness and effectiveness.
21. Labor stability should be recommend as a vital component of stability and in the national interest.
22. Energy poverty should enjoy priority in light of the economic consequences.
23. Urbanization and its consequences for energy must be encouraged and harnessed through long-term integrated regional planning and coordination.



24. The creation of sustainable jobs must be understood as a consequence of the creation of sustainable enterprises in the sector.
25. The energy supply chain must be developed in a flexible and adaptive manner to ensure an infrastructure fit which will accommodate the aforementioned ambiguity inherent in new technologies and their application.
26. The potential of information technology and connectivity in particular must be recognized and employed to create a responsive relationship between energy supply and demand.
27. Energy sources across the SADC region ought to be leveraged for inter-state benefits and serve as a mechanism for closer regional cooperation and trade.
28. The procurement of energy infrastructure and related services, while a useful mechanism for transforming the economic landscape and redressing historic imbalances, must function with the needed transparency, accountability and good governance mechanisms to avoid abuses and supply failure ●

“ THE EFFECTS HEREOF ON THE QUALITY OF POLICY IMPLEMENTATION WILL POSE RISKS TO GOVERNMENT’S HEGEMONY IN THE SECTOR AND PRESENT THE PRIVATE SECTOR WITH THE CHOICE OF HIGH COSTS WITH UNCERTAIN SUPPLY, OR PRIVATE PROVISION.”

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