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Sustainable Energy Solutions for Southern Africa

Powering Growth and Prosperity

Oliver C. Ruppel



Strengthening Africa's economic performance



Sustainable Energy Solutions for Southern Africa



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The views expressed in this Discussion Paper are the author’s own.

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Introduction

South Africa and other countries in the Southern Africa region are currently at a crossroads in terms of energy security and need to secure good policy making, improved local and international private investor participation and adequate access to funding.

This background paper, prepared for the high-level roundtable ‘Sustainable Energy Solutions for Southern Africa: Powering Growth and Prosperity’,

examines current challenges and opportunities in Southern Africa as the region seeks to greatly enhance electricity-generating capacity over the coming decade. It assesses the current energy picture in South Africa and processes in the region and examines challenges and opportunities in unlocking the region’s potential in transforming for more sustainable energy solutions.

Energy security and poverty – where do we stand?

The United Nations forecasts that the African population will be around 2 billion people in 2050, and therefore the expanding demand for energy will be one of the challenges with which the region is faced, along with poverty reduction, food security, water security and combating the impacts of climate change.

Prosperity and stability can only grow in Southern African countries if there is a stable and abundant supply of energy

Pressures linked, for example, to agriculture, food security, water scarcity and energy demands are also increasing in Southern Africa, not only putting ecosystems at risk.¹ Energy security is the indispensable prerequisite for stabilising democracy and economic growth, and for reducing poverty and the impacts of climate change.

Prosperity and stability can only grow in Southern African countries if there is a stable and abundant supply of energy. The dependency on foreign energy imports, in combination with insufficient electricity supplies, will inevitably and primarily affect the poor and the employment sector. The more energy prices increase, the higher the unemployment rate, which is already alarming in many countries of the region.

How many people living in Southern Africa currently have secure and constant access to electricity; and what is really needed in this regard in the near future?

Energy is an essential requirement for all fields of our daily life, for the functioning of social and political systems, businesses, and communication, and for economic growth and sustainable development, among others. To achieve secure, clean and efficient energy should be the target of national governments² and regional communities,³ as securing energy supply is considered to be one of the means to overcome poverty and to achieve the millennium development goals (MDGs).

Sustainable energy and climate change

In 2014 the Intergovernmental Panel on Climate Change (IPCC) launched its 5th Assessment Report (AR5) on Climate Change.⁴ This report together with the IPCC *Special Report on Renewable Energy Sources and Climate Change Mitigation* (SRREN) investigates the fact that energy and particularly renewable energies are closely linked to climate

change. A general message from the reports can be summarised as follows:

There is no doubt that we live in a world which is altered by climate change, one of the greatest challenges of the 21st century. Climate change poses risks to human and natural systems and has

the potential to impose additional pressures on the various aspects of human security.⁵ The risks and impacts related to climate change can be reduced by improving society to decrease vulnerability and hand down the overall risk level (adaptation) and by reducing the amount of climate change that occurs. Thus, energy technologies play an important role in the field of climate change mitigation. Greenhouse gas (GHG) emissions resulting from the provision of energy services have contributed significantly to the increase in atmospheric GHG concentrations and most – about 60 per cent in 2010⁶ – global anthropogenic GHG is attributed to the consumption of fossil fuels. Options for lowering GHG emissions from the energy system while still satisfying the global demand for energy services include energy conservation and efficiency, fossil fuel switching, nuclear and carbon capture and storage (CCS)

and low-GHG energy supply technologies such as renewable energy.

The deployment of renewable energies is an important means for mitigating climate change. If supported by the right enabling public policies, close to 80 per cent of the world's energy supply could be met by renewables by mid-century.⁷

In Southern Africa wind power, solar energy, hydropower plants, geothermal energy, and energy from biomass can become important economic trends and key mechanisms to mitigate climate change. Technologies, which supply energy with a limited production of greenhouse gases, contribute to reducing the dependency on fossil fuels such as coal, oil and gas and are constantly being developed further with a view to achieving a globally sustainable energy supply.

Sustainable energy solutions in South Africa – focus and direction?

Energy crisis

South Africa is in the midst of a severe energy crisis affecting its economy and people. The key player⁸ is the largest producer of electricity in Africa, Eskom, an electricity public utility, which generates, transmits and distributes approximately 95 per cent of electricity used in South Africa and approximately 45 per cent of the electricity used in Africa.⁹ To date, Eskom, with its generation, transmission and distribution divisions, is responsible for the management of the South African power grid.

Load shedding

Energy supply in South Africa is unstable. Eskom has repeatedly implemented load shedding, i.e. the interruption of power supply to certain areas, owing to a lack of electricity to meet the demand of all Eskom customers. Load shedding continues to be implemented throughout the country on a rotating schedule.¹⁰ During load shedding the energy supply to entire suburbs is switched off. Many private households and enterprises have resorted to acquiring emergency generators that can be switched on during load shedding. The use of private generators

is well known in other parts in Africa, but comes as somewhat of a surprise in South Africa.

In 2014 President Zuma's cabinet was briefed by Eskom, on what would happen if the grid failed and electricity supply shuts down indefinitely, i.e. the risk of a nationwide blackout.¹¹ While some have argued that bad leadership is responsible for the energy crisis in South Africa,¹² President Jacob Zuma blames the country's energy crisis on the apartheid regime.¹³

Solution space

There are various options to address the critical energy situation in South Africa. As can be seen from the graph below on primary energy consumption in South Africa in 2013, renewable energies could play a much more prominent role in South Africa's energy mix, considering that South Africa is a country with high wind speeds and famously bright sun, a source of energy which is particularly important for those who do not have access to the national grid.

Despite the abundance of renewable energy sources, the renewable sector is battling with South Africa's powerful coal industry as the world's seventh-largest coal producer.¹⁴ With the ongoing energy

crisis, however, it has become more likely that the renewable energy sector will expand in the near future. The country should reconsider its ideal energy mix, taking the fast-changing energy landscape into account.¹⁵

Steps to put an end to the energy crisis in South Africa have to be taken rather sooner than later, as negative impacts on economic growth and international competitiveness of the country as a result of load shedding are already being felt: South Africa's important and energy-intensive mining industry is strongly affected by the planned power blackouts, which have led to a strong depreciation of the Rand as well as a stalling of economic growth and downward revisions in growth forecasts. Several ratings agencies have also downgraded the country's credit rating, which has had a negative impact on the outlook of the country as an investment destination (...) approximately 1–2 per cent of GDP could potentially be wiped out per month of load shedding.¹⁶

The Figure on the right underlines that an urgent need for the promotion of renewable energies exists in order to achieve a balanced and sustainable energy mix for South Africa's future.

The current energy situation: legal and policy framework

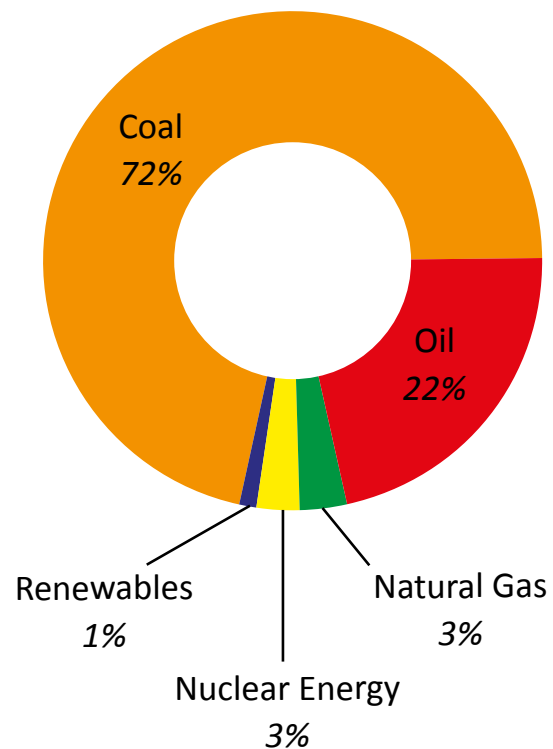
So far, the legal and policy framework for renewable energies in South Africa is varied and patchy, and there is a need for action to streamline and harmonise the regulatory framework for renewable energies.¹⁷

Legislation

While work on a number of recent legislative, regulatory and planning process developments has picked up speed, progress in renewable energy implementation and follow-up strategies is slow.¹⁸ This is ultimately resulting in a low level of urgently required investments – which in turn hampers the achievement of objectives as set out in the various policy instruments.

In addition to applicable Constitutional provisions, the National Energy Act 34 of 2008¹⁹ is the most relevant statutory law with regard to renewable energy. But other pieces of legislation might also be directly or indirectly applicable, including, among many others, the Electricity

Figure: Total Primary Energy Consumption in South Africa, 2013



Source: Compiled by author based on figures from BP (2014)

Regulation Act 4 of 2006, the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA), the Atmospheric Pollution Prevention Act 45 of 1965, and the Conservation of Agricultural Resources Act 43 of 1983.

The essential legal provisions regarding energy planning are set forth in the National Energy Act 34 of 2008 that was signed into law in 2009 and which seeks to ensure energy security, i.e. that diverse energy resources are available in sustainable quantities and at affordable prices. Although renewable energies generally fall within the scope of the National Energy Act, the Act is not able to provide legal security for producers and investors in the field of renewable energies.²⁰ Although the Act provides for energy planning and increased generation and consumption of renewable energies, renewable energies are not expressly mentioned in the Act's objectives in Section 2.²¹

Renewable energies are only mentioned in Section 19, which refers to general regulations the Minister may make, including regulations regarding

the minimum contributions to national energy supply from renewable energy sources, as well as regulations regarding measures and incentives designed to promote the production, consumption, investment, research and development of renewable energy.²²

Neither concrete measures to promote renewable energies have been prescribed, nor have minimum contributions of renewable energies to the national supply mix been stipulated

The Minister has the discretion comprehensively to introduce measures in favour of renewable energies. However, neither concrete measures to promote renewable energies have been prescribed, nor have minimum contributions of renewable energies to the national supply mix been stipulated in the Act.

The Electricity Regulation Act 4 of 2006 as amended by the Electricity Regulation Amendment Act 28 of 2007,²³ among others, aims to 'achieve the efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure in South Africa'; and to 'ensure that the interests and needs of present and future electricity customers and end users are safeguarded and met'. The Act does not explicitly refer to renewable energies but is still relevant, as it also aims at promoting the use of diverse energy sources and energy efficiency. Most importantly, the Act will be applicable for all sorts of licences required for producers of renewable energies and for the relationship between the Regulator as defined by the Act and established by Section 3 of the National Energy Regulator Act²⁴ and licensees.

National Policies

The national policy framework, relevant to promoting renewable energies, is widely spread throughout the South African policy landscape across different branches of government.²⁵ However, most relevant

for renewable energies is the 1998 White Paper on Energy Policy and the 2003 White Paper on Renewable Energy.²⁶

The 1998 White Paper has identified the main objectives for the energy sector as being 'access to affordable energy services; improving energy governance; stimulating economic development; managing energy-related environmental impacts; and securing supply through diversity'.

Government must improve its ability to address the development of renewable energy resources.²⁷ With this, the White Paper aims to ensure that economically feasible renewable energy technologies are implemented and that an equitable level of national resources is invested in renewable technologies.

The 2003 White Paper on Renewable Energy was designed to bring about integration of renewable energies into the mainstream energy economy. The expansion of renewable energy has been formulated as one policy goal in conjunction with a commitment to diversifying the power market and promoting private investment in renewable energy.

A target of a 10 000 GWh (0,8 Mtoe) renewable energy contribution to final energy consumption by 2013 has been formulated in this policy, to be produced mainly from biomass, wind, solar and small-scale hydro sources.²⁸ The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and biofuels.

Government must improve its ability to address the development of renewable energy resources

The 2003 White Paper recognises sustainable development, an enabling environment, and specific institutional arrangements as being key for renewable energy implementation; and underlines the need for creating an enabling environment through the introduction of fiscal and financial support mechanisms within an appropriate legal and regulatory framework.

Financial and legal instruments, technology development, awareness raising, capacity building, and education are identified in the 2003 White

Paper as key strategic areas to create an enabling environment. Goals, objectives and deliverables are laid down for each strategic area:

The long-term goal of the 2003 White Paper is to establish a fully non-subsidised alternative to fossil fuels and to attain full competitiveness of the renewable sector.²⁹

To this end, government has committed itself to develop, implement, maintain and continuously improve an effective legislative system to promote renewable energies;³⁰ to develop an appropriate legal and regulatory framework for pricing and tariff structures to support the integration of renewable energy into the energy economy; to attract investment in the renewable energy sector;³¹ and to foster the integration of independent power producers that feed renewable energy sources into the existing electricity system.³²

The 2003 White Paper also states that a strategy on renewable energy is to be developed, which will translate the goals, objectives and deliverables of the White Paper into a practical implementation plan.³³ However, more than 10 years after the launch of the 2003 White Paper, this strategy has so far not been developed!

In 2005 the Energy Efficiency Strategy³⁴ was released by the Department of Minerals and Energy in support of the 1998 White Paper on Energy Policy, to

encourage sustainable energy sector development and energy use through efficient practices, thereby minimising the undesirable impacts of energy usage upon health and the environment, and contributing towards secure and affordable energy for all.³⁵

The Strategy, which is currently under review, stipulates a final energy-demand reduction of 12 per cent by 2015, as measured against the national energy usage projected for that year. The Department of Mines and Energy has included the aims of the Energy Efficiency Strategy in the drafting of subsequent policy documents aimed at ensuring energy security, such as the 2007 Energy Security Master Plan – Electricity 2007–2025 and the 2008

National Response to South Africa's Electricity Shortage.³⁶

In March 2011, the Integrated Resource Plan 2010 (IRP) was promulgated to help to minimise GHG emissions related to fossil fuels and to boost job creation. The Department of Energy (DoE) released the IRP 2010–2030,³⁷ a 20-year capacity addition plan for the electricity sector. The plan marks a 20-year projection on electricity supply and demand in the country, and takes into account the import and export of power. In terms of the IRP, about 42 per cent of the electricity generated in the country is required to come from renewable resources.

Government has committed itself to develop, implement, maintain and continuously improve an effective legislative system to promote renewable energies

After a round of public participation was conducted near the end of 2010, several changes were proposed and a second Policy Adjusted IRP was recommended and adopted by Cabinet in March 2011. The IRP sets ambitious targets, one of which is to install an additional renewable-energy generation capacity of 17 800 MW by 2030. The 2010 IRP, however, indicates that it should be a 'living plan', which is revised by the DoE every two years. The IRP 2010 has thus been updated.³⁸ To date, no approved document has, however, been promulgated and published in the *Government Gazette*.

NERSA

The National Energy Regulator of South Africa (NERSA) started a consultation process for the introduction of a feed-in tariff system as policy instrument to support renewable energy technologies in 2008 and in order to attract developers and investors.

REFIT

The final Renewable Feed-in Tariffs (REFIT) decisions were published in 2009, as well as the NERSA regulatory guidelines on the REFIT system.³⁹

The South African REFIT scheme provided for concrete tariffs, which guaranteed purchase prices for a fixed amount of time. The tariffs were designed to cover the costs of generation plus a reasonable return on investment.⁴⁰ As both the cost structures and the investment environment vary according to the different renewable energy technologies, different tariffs had to be calculated for each single technology. The tariff system included, among others, on-shore wind, small hydro, landfill gas, concentrating solar power, solid biomass, biogas and solar photovoltaic systems.⁴¹ The tariffs adopted by NERSA in 2009 ranged from R0,90/kWh for landfill gas, up to R3,94/kWh for large-scale grid-connected photovoltaic systems.⁴² Investors and environmental organisations were satisfied with the tariff levels designed by NERSA, as, after accounting for generation cost, the tariffs would have provided investors with an approximate return on equity of 17 per cent.⁴³

All renewable energy producers have the responsibility to ensure that their power production makes use of credible renewable energy sources

The term for the tariffs was to be applicable for 20 years and the adopted tariffs not subject to degeneration. The tariffs were subject to an annual review for the first five-year period of implementation and every three years after this period. Should the review process have resulted in the need to adjust the tariffs, these would only have been applicable to new projects.

Further regulations supporting the market introduction of renewable energy technologies were contained in NERSA guidelines and decisions.⁴⁴ The NERSA guidelines contained qualification criteria for renewable energy generators and set out that all renewable energy producers have the responsibility to ensure that their power production makes

use of credible renewable energy sources. It was furthermore provided that if a producer of renewable energies wanted to participate in the REFIT regime, such producer needed a generation licence issued by NERSA under the Electricity Regulation Act 4 of 2006. The licence was subject to specific conditions including the termination conditions in case of non-compliance on the production of renewable energy. NERSA guidelines furthermore contained comprehensive monitoring and reporting obligations for the Regulator, the generators and the Renewable Energy Purchasing Agency (REPA).

The renewable energy generator had to bear the costs for the grid connection

Most importantly, NERSA has decided on a purchase obligation, following a single-buyer approach, like in many other countries, to avoid complexity in the initial phase. The REPA, to which the Eskom Single Buyer Office has been appointed, was obliged to enter into a power purchase agreement (PPA) with renewable energy generators and to make payment for renewable energy generated and supplied under REFIT. The difference of the cost of the energy purchased under REFIT and the avoided cost for the same amount of energy acquired through another means would have been borne by all Eskom electricity customers through existing 'pass-through' arrangements for equalising the costs of independent power production. The NERSA guidelines furthermore provided for a guarantee for renewable energy generators to get access to either the distribution or the transmission networks, as appropriate. The renewable energy generator had to bear the costs for the grid connection.

Despite the attractive 2009 tariff levels, a standstill in renewable energy investments could be observed. In 2011, NERSA therefore released a paper with revised tariffs for review, in which tariffs had been greatly reduced compared to the 2009 tariffs.⁴⁵ This, of course, shook the confidence of RE project developers in investment climate stability. NERSA delayed official feed-in tariff announcements, which

in turn put increasing stress on project developers, who had already started project development processes under the generous 2009 REFIT rate assumptions. Furthermore, the legality of the REFIT programme was questioned as being unconstitutional by the National Treasury, which believed that fixed tariffs were neither competitive nor cost-effective, and thus not in line with Section 217 (Procurement) of the South African Constitution of 1996.⁴⁶

In May 2011, the DoE published conflicting new generation regulations,⁴⁷ which had made no mention of the REFIT.

REIPPPP

In August 2011, in an about-face, a competitive bidding process, known as the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) was launched, an approach contradictory to the REFIT.⁴⁸

Under the Electricity Regulation Act of 2006, the REIPPPP has been designed by the Minister in consultation with NERSA and in accordance with IRP 2010 to deliver by 2016 the target of 3 725 MW of renewable energy to start and stimulate the renewable energy industry in South Africa. Pursuant to a Ministerial determination in December 2012, a further 3 200 MW of renewable generation capacity was to be procured. Also, in April 2015 the DoE announced the intention of extending the program with 6 300 MW more⁴⁹. According to the regulations issued by the DoE, the system operator (Eskom) invites bids from independent power producers (IPPs), including renewable energy generators, for specified quantities of RE. Of the 6 925 MW to be procured in different rounds and subject to the availability of the megawatts, 3 320 MW have been allocated for wind, 2 525 MW for solar photovoltaic, 600 MW for concentrated solar power, 60 MW for biomass, 60 MW for biogas, 25 MW for landfill gas, 135 MW for small hydro and 200 MW for small projects.⁵⁰ Bidders have been invited to submit proposals containing details on the finance, construction, operation and maintenance of renewable energy generation facilities. Bidders are required to meet qualification criteria, among which legal, environmental and financial. If these criteria are met, the bid is evaluated on bid price and economic development objectives.⁵¹

The Department has received an overwhelming number of bids, representing more than double the capacity allocation of the first two bidding windows. In the four first phases of the bidding process, 92 bids have been chosen in a procurement process, representing 6 331,42 MW of renewable energy capacity⁵². Relevant documents for the procurement process included a request for proposals, a PPA, and an implementation agreement. Within the REIPPPP the fundamental contractual arrangements are thus threefold: A Government Framework Support Agreement between Eskom and Government, a PPA between Eskom and the IPP, and an Implementation Agreement between the IPP and Government.

Bidders have been invited to submit proposals containing details on the finance, construction, operation and maintenance of renewable energy generation facilities

A status report from the DoE released in 2015 reveals that in the first and second bid windows, the total capacity connected to the grid is 1 915,15 MW and the total capacity still to be connected to the grid from the two first bid windows is 163,78 MW. With regard to the third bid window, most projects are at initial construction stage. The projects of the fourth bid window are waiting for the signing and effective date of contracts and Financial Close. A fifth bid window of the REIPPPP has been announced for second quarter 2016.

The successful projects, totalling 6 331,42 MW, comprised

- 34 wind projects (3 356,49 MW);
- 45 solar PV projects (2 296,63 MW);
- seven solar thermal projects (600 MW);
- three hydro projects (19,3 MW);
- two biomass projects (41 MW); and
- one landfill gas (18 MW).

The successful projects will enter into PPAs with Eskom and receive guaranteed payments for 20 years.⁵³

*The nuclear power solution?*⁵⁴

Worldwide many countries are switching off their nuclear power plants and are searching for alternatives to supply sufficient energy. South Africa, however, is planning to expand nuclear energy, so far having the only nuclear power plant on the African continent – Koeberg 1 and 2 north of Cape Town.⁵⁵ It produces less than 5 per cent of the South African electricity demand.⁵⁶

South Africa is considering an increase
in the number of its nuclear power
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South Africa is considering an increase in the number of its nuclear power plants with *inter alia* the support of Russia, France and China.⁵⁷ In October 2014, the DoE issued a media release on the occasion of launching South Africa's Nuclear New Build Programme, which explains the objectives and the approach of the tender process in detail. Through the expansion, the Department wishes to achieve energy security/stability, reduction of CO₂ emissions, increased economic growth, creation of jobs and the attraction of more investors.⁵⁸

The procurement 'hurdle'

The aforementioned objectives are plausible. However, procurement process guidelines, as laid down under constitutional and national procurement law, also have to be taken into account.

Even if there is currently no particular Act governing the procurement process for nuclear power plants, the DoE is bound by constitutional principles with regard to the allocation of tenders. In Section 217 of the South African Constitution the procurement process is described as having to be 'fair, equitable, transparent, competitive and cost-effective'. These principles constitute a complementary system in which every individual aspect must be taken into

consideration independently and in which the individual aspects cannot be applied randomly. Adherence to these principles guarantees the integrity of the tender process.⁵⁹ In this regard, it is particularly remarkable that the DoE emphasises in the abovementioned media release that the procurement guidelines must be adhered to. In fact, in the media release, the government 'undertakes' to adhere to a 'fair, competitive and cost-effective' approach with regard to the procurement process.⁶⁰ It thus only upholds three of the five principles. Transparency and equitableness are not mentioned.

'Equitable' essentially denotes fairness that places particular emphasis on the equal rights and equal value of all. This principle must be seen against the background of apartheid, which thus implies that it should serve to strengthen the previously disadvantaged people. For this reason South Africa has developed the concept of preferential procurement.⁶¹

Can the construction of the
nuclear power plants generate
new jobs for South Africans?

The question is whether, and how, the strengthening of the previously disadvantaged population will be taken into consideration in the planning of new nuclear power plants. To what extent will jobs be created for the previously disadvantaged, since nuclear power plants mainly require qualified workers? In this respect it must also be asked whether the construction of the nuclear power plants can generate new jobs for South Africans.

The transparency 'hurdle'

Transparency requires that the public be granted access to general information and the selection criteria.⁶² This is important to allow interested or affected persons the opportunity of gaining information on the procurement process, so that they may verify its lawfulness and take the necessary legal steps in the event of illegal conduct.⁶³

The DoE is not acting transparently in this regard: access to information is difficult, helpful explanations

and documents are only issued selectively, and different institutions provide contradictory information. These are not characteristics of a transparent process – neither for the citizens nor for parliament and the other government departments.

It is not clear, in the nuclear power plant decision-taking process, whether cost-effectiveness is sufficiently considered

In planning the new nuclear power plant, three particular ministries should be involved from the beginning: the Department of Finance, the DoE and finally the Department of Public Enterprises, since the state-owned energy company (Eskom) falls under the latter. However, the nuclear process is uniquely driven by the DoE. The other two departments are excluded from the planning processes although they clearly should have legitimate interest to participate in the procedure.

Moreover, the Department of Environmental Affairs is responsible for environmental assessment of projects, and has a cooperative agreement with the National Nuclear Regulator for nuclear projects. The exact involvement of the Department of Environmental Affairs in the planning of new nuclear power plants is unknown.

The cost-effectiveness ‘hurdle’

Finally, it is not clear, in the nuclear power plant decision-taking process, whether cost-effectiveness is sufficiently considered. This principle implies that cost utilisation must be taken into account.⁶⁴

Nuclear energy as an option of cost-effective utilisation should be compared with possible alternatives, as specified by the Integrated Resource Plan 2010 (IRP). Other energy sources exist and could replace nuclear energy with more cost-effective and efficient options, for example gas.

It is unclear what costs would arise for South Africa with the new-build programme. The budget also still seems to be under evaluation.⁶⁵ To what extent the respective nuclear power plant partner(s)

will be giving financial support to the South African nuclear construction programme through so-called ‘funding’ is also not clear.⁶⁶

An open approach to the costs would foster competitiveness. The underlying idea of the procurement law is to ensure that tax monies are used prudently.

The nuclear waste and safety ‘hurdle’

The Nuclear Energy Act 46 of 1999 gives responsibility to the Minister of Energy for nuclear power generation, management of radioactive wastes and the country’s international commitments. The South African Nuclear Energy Corporation (Necsa) is a state corporation established under the Act, and is responsible for most nuclear energy matters, including wastes and safeguards, but not power generation. The National Nuclear Regulator Act 47 of 1999 sets up the National Nuclear Regulator (NNR) – previously the Council for Nuclear Safety – covering the full fuel cycle from mining to waste disposal.

Experts have warned about the costs and dangers of final storage and later disposal of nuclear waste. Decisions that are taken behind closed doors in the absence of the South African taxpayer and other relevant government departments have given rise to questions about whether the government is really taking the best possible decision in the interest of the people.

The fracking solution?⁶⁷

Due to the enormous shale gas mining (‘fracking’) activities in North America, the global oil price has been drastically on the decline. Nevertheless, the run for energy resources in Southern Africa continues as especially European countries become more and more dependent on energy resources from that region.

The water contamination ‘threat’

Fracking is a South African conundrum as it presents an opportunity to develop the economy but will simultaneously harm the environment. The initial backlash against hydraulic fracturing focused on concerns regarding the potential for hydraulic fracturing practices to contaminate underground drinking water. Then, studies began to indicate that

the life cycle emissions from natural gas production, transportation, and combustion might actually exceed life cycle emissions from coal. Further studies linked natural gas production to groundwater contamination, surface water contamination, increased localised air pollution, degradation of habitat for imperilled species, and earthquakes.⁶⁸

Other environmental and public health 'threats'

The debate regarding the climate benefits of natural gas has intensified in a very short time, and this has certainly tarnished the image of natural gas as a golden fuel in the eyes of many. Moreover, a number of other environmental and public health concerns have emerged as unconventional natural gas production has boomed. Although these have generally gained less attention than concerns about groundwater contamination, they may present even greater environmental and public health risks.

Short-term economic gains – long-term losses?

The US experience so far should serve as a cautionary tale about the potential environmental and economic risks. While it is true that the natural gas industry has had an important impact on the US economy, it is unclear whether these short-term economic gains will benefit the country over the long-term.

Concerns about a natural gas bubble raise troubling questions about how the US electricity sector and economy will respond if a bubble actually bursts. Moreover, as concerns about the environmental impacts increase, regulators and political leaders have struggled to address proven and suspected consequences of fracking. In many US jurisdictions, the only viable response has been to ban hydraulic fracturing entirely. And while this response may make sense, it will undoubtedly spur litigation and further increase the costs associated with unconventional gas production. At the very least, South Africa can learn from the US experience and engage in a much more critical and precautionary approach.

Challenges and opportunities in unlocking Southern Africa's Energy Potential

Investment

Many challenges and opportunities in unlocking Southern Africa's energy potential are related to investment. While the level of investment in renewable energy is increasing, the gains made are still marginal and Southern Africa is still a long way off providing clean energy to all.

Regulators and political leaders have struggled to address proven and suspected consequences of fracking

To unlock its potential, Southern Africa has to contend with some of the challenges undermining the growth of the sector. A key primary challenge in adopting renewable energy is the high initial investment outlay these technologies require. Undoubtedly, in the long run, lower fuel and

operating costs often result in renewable energy being cost competitive. However, higher initial costs may make it impossible to install the renewable energy and this thus leaves its potential unlocked. This is because renewable energy technologies often require heavy financing to generate comparable capacity to other conventional forms of energy generation. The high costs coupled with the low purchasing power have hindered the growth of the renewable energy market.

Apart from the heavy initial costs, subsidies on fossil fuels have resulted in an un-level fiscal playing field that has rendered renewable energy less competitive. The failure in pricing of fossil fuels has placed renewable energy at a competitive disadvantage.

The total global investment in the renewable energy sector has been growing since 2004. However, Africa's share in this investment is marginal. In 2012, of the US\$268,7 billion invested globally in renewable energy, only about US\$4,3 billion

was invested in Africa.⁶⁹ For the same period, only 1,5 per cent of the total solar trade came to Africa and even then most of this was directed primarily to South Africa. In 2013, only South Africa and Kenya were included in the top tier for their investment in renewable energy in general and geothermal energy, respectively.⁷⁰

Foreign financing has provided a reprieve to the renewable energy sector. However, this form of financing has not been without its challenges. Donor investments in renewable energy from agencies such as Global Environment Facility have focused efforts on the rural poor. This has led to the perception in Africa that renewable energy, such as solar energy technologies, is for the rural poor who are often not supplied by the centralised grids servicing urban centres. This perception, it is argued, has led to a lack of interest by middle class investors, thus undermining any potential for local investment in renewables.⁷¹

Most renewable energy projects and initiatives in Africa have tended to focus on the rural areas where demand for energy is high and the supply very low. Consumers or investors in this area often lack access to the credit necessary to invest in renewable energy. The lack of certainty with respect to the market for renewable energy renders these investments risky, thus reducing the capacity of renewable energy investors to access long-term credit facilities.

What needs to be improved?

Southern African power utilities (i.e. Eskom) enjoy a monopoly on electricity production and distribution. The absence of more supportive legal frameworks often render it complicated if not impossible for new entrants into the renewable energy field to sell power either to the utility or independently to third parties. Moreover, even where such utilities are willing to negotiate PPAs, they tend to abuse their status to enter into one-sided and often commercially non-viable agreements.

Southern African countries must attract more investment in new energy solutions. This in turn will require political support, competence and courage in making foreign investment as attractive as it needs to be. A favourable investment climate is essential. Various factors, however, lead to an unfavourable investment climate. These *inter alia* include poor

governance, institutional failures, macroeconomic policy imperfections and inadequate infrastructure, as well as rampant corruption, bureaucratic red tape, weak legal systems and a lack of transparency in government departments.

Key risks for private-sector investors

Key risks for private-sector investors are linked to political and/or regulatory instabilities, including political instability, insecurity of property rights, lack of knowledge of legal systems, currency risks and the instability and uncertainty of the regulatory and policy environment, including, for example, the longevity of incentive programmes.

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The national state has to balance the interest of attracting (and securing) international investment while promoting peace and security for its population. The most appropriate approach for achieving both of the aforementioned is adherence to and promotion of the rule of law while creating incentive structures for investors to act sustainably and to respect national social development goals, empowerment policies, labour standards and human rights.⁷² However, the shared contents of human rights and the investment disciplines relate among others to non-discrimination, due diligence, procedural fairness, equity and proportionality.⁷³ Good governance centres on questions of democratic legitimacy, transparency, participation, accountability and predictability.⁷⁴

Mobilising investment requires political commitment to overcome substantial barriers at various levels. To enable new markets for improved energy solutions, governments require adequate regulatory frameworks in order to give investors the necessary confidence.

With the exception of a few key markets in Southern Africa, many countries in the region suffer from high (perceived) political risk that prevents private investors, and specifically banks, from entering. Political risk insurance (PRI) is available for many countries and sectors (including from multilateral organisations such as the Multilateral Investment Guarantee Agency, MIGA), albeit on a limited scale and associated with high premiums that can undermine the bankability of individual transactions.

Much has improved on the African continent during the past decade, and some countries have been able to attract significant private investment on the back of an improved investment climate and enhanced political stability. However, reputations tend to be sticky and thus political risk will remain as a key hurdle, especially for power investments that require long-term investor commitments.

With the exception of a few key markets, countries in Southern Africa lack creditworthy off-takers that meet the stringent requirements of developers and their banks. Lack of cost-reflective tariff regimes in many countries mean that the balance sheet of off-takers is frequently weak, raising concerns among investors and banks that they may not be able to meet long-term payment obligations under PPAs. While the actual incidence of non-payment or default under PPAs in Africa has been rather low, the concern is a real one, specifically in light of the political-economic trade-offs that are typically associated with tariff-setting in the individual countries. In addition, the very fact that many power markets offer US\$ tariffs to independent power producers (IPPs) also means that off-takers have to shoulder a rather significant currency exposure that is costly (and in some cases impossible) to hedge, putting the stability of their balance sheets further at risk.

Energy sector reform

While many countries in Southern Africa have undertaken notable steps during the past decade to initiate sector reform and to open their power markets for private investments, these reform procedures tend to be far from uniform or complete. In some cases, a lack of experience and capacity has resulted in weak institutional regimes in the respective power sectors, making it difficult and costly for the private

sector to engage. In other countries, unresolved political-economic conflicts surrounding efforts at (partial) unbundling and tariff-setting have resulted in incoherent policy regimes, which also undermine private investment.

While many countries on the continent have started to experiment with renewable energy promotion initiatives such as renewable energy feed-in tariff programmes (REFITs), many of these programmes do not provide for tariff levels that are sufficient to make renewable energy IPPs bankable.

Even in those countries where a conducive legal and regulatory regime is in place, a lack of a model contract structure for IPPs means that negotiations with IPPs are typically protracted and can extend over years, significantly raising risks and developer costs for investors.

With the exception of a few key markets, countries in Southern Africa lack creditworthy off-takers that meet the stringent requirements of developers and their banks

As the experience in South Africa shows, the integration of renewable energy into transmission systems presents technical and financial challenges. The total system cost of promoting renewables must be considered appropriately. Transmission networks in many African countries are in dire need of rehabilitation and upgrading and few currently have the potential to absorb significant amounts of (variable) renewable energy.

All in all, and notwithstanding efforts on the part of various countries in the region to provide greater space for the private sector in their power sectors, thus far private sector investment falls far short of what is needed to make any significant dent in the development of power sectors in the region. Significantly, most ongoing private sector engagement is heavily focused on fossil fuel-based power generation projects that are characterised by (comparatively) high returns and short payback times.

The main challenge, however, hindering growth of renewable energy is arguably the lack of political will in embracing clean energy, though this is by no means a problem peculiar to Southern Africa. Globally, the shift to renewable energy and the implementation of initiatives that reduce the GHG emissions caused by fossil fuels has been an uphill task. Even among developing countries, nations have continued to focus efforts on cleaning the conventional energy generation modes as opposed to substituting these for renewable energy.

In Southern Africa, this despondency about implementing change is exacerbated by the fact that

even the non-renewable energy resources are to a large extent still underutilised and thus the urgency to reduce GHG emissions has not been perceived as urgent. The need to meet the energy demand required to end poverty and achieve economic development is perceived as a more pressing need. The underutilisation of even the non-renewable energy resource is the result of a myriad of factors, including lack of access to modern energy services (particularly in rural areas), poor infrastructure, low purchasing power and the over-reliance on traditional biomass to meet domestic energy needs.⁷⁵

Regional integration⁷⁶

The Southern African Development Community (SADC) region has been experiencing a crippling power shortage that was first detected as early as 1999. This situation has forced most countries in SADC to implement demand-side management policies such as load shedding that have to some extent succeeded in restraining overall electricity demand in the region. However, load shedding has also had a negative impact on companies, by forcing them to scale down production due to limited electricity, thereby affecting socio-economic development.

SADC energy mix

The envisaged SADC Renewable Energy Strategy and Action Plan 2015 to 2020 (RESAP I) aims to encourage the region to achieve a renewable energy mix of at least 32 per cent by 2020, which should rise to 35 per cent by 2030. Currently, SADC generates about 74 per cent of its electricity from coal thermal stations. Renewable energy sources, which are in abundance across the region, are not yet considered as major contributors to the region's electricity needs, save for hydropower that accounts for about 20 per cent of SADC's total energy generation.

According to the African Development Bank, the SADC region has the potential to become a 'gold mine' for renewable energy due to the abundant solar and wind resources that are now hugely sought after by international investors in their quest for clean energy.⁷⁷

Energy related strategies in SADC

Although implementation of energy related strategies have been slow, the region has made some strides, particularly in electricity. At present, nine member states of SADC have merged their electricity grids into the Southern African Power Pool, reducing costs and creating a competitive common market for electricity in the region. Similarly, SADC has established the Regional Electricity Regulatory Association, which has helped in harmonising the region's regulatory policies on energy and its subsectors. The establishment of the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) could increase the uptake of clean energy in Southern Africa, enabling the region to address its energy challenges. SADC energy ministers have approved the establishment of the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE). The establishment of SACREEE was discussed at the 34th Meeting of the Ministers Responsible for Energy in SADC. The objective of the meeting was for ministers to note progress, make decisions and give guidance on implementation of the SADC Energy Programme whose aim is to facilitate and coordinate availability of sufficient, reliable, least cost energy services in the SADC region.⁷⁸

So far SADC has identified two chief points of focus, namely:

- **Electricity generation** – Southern Africa has ample resources for electricity generation, though it occasionally lacks the capacity for development.

- **Hydropower and renewable energy** – Renewable energy has grown in importance for both regional and global energy markets.⁷⁹

Both of the aforementioned require significant foreign investment for their successful implementation.

Investment related strategies in SADC

SADC has included the issue of investment on its agenda. As a result, the 2006 SADC Protocol on

Finance and Investment and the 2012 SADC Model BIT (Bilateral Investment Treaty) Template form part of the goal to gradually harmonise investment laws for improved foreign investors' protection. Many countries in Southern Africa have understood the necessity of improving their image and of offering increased incentive-oriented and institutional support structures to foreign investors. South Africa may perhaps not be the best example to follow.

2013 Promotion and Protection of Investment Bill in South Africa

It was introduced to promote, and to protect, investment and to achieve several balances between the rights and obligations of investors.⁸⁰ According to the South African Department of Trade and Industry the Bill also attempts to redress the balance between the needs of foreign investors and the Government's right to implement policy.⁸¹

Investors perceived the Bill critically. If enacted into law, it might make room for government to enact other legislation limiting foreign ownership. The SADC Model BIT rather recommends the inclusion of a provision that allows, as an exception to the National Treatment non-conforming measures under a state party's law existing at the date of entry into force of the BIT provided, that any amendment, or modification, after the BIT is concluded, should not decrease the conforming measure involved. This actually limits the government's power to amend any existing law limiting the rights of foreign investors, which seems much in line with Article 1 of the SADC Protocol on Finance and Investment, which explicitly places an obligation on state parties to create a favourable investment regime in the region.

Although the Promotion and Protection of Investment Bill has not been enacted yet, there is little doubt that

South Africa is shifting from the use of BITs over many years to investment regulation through domestic laws. Several BITs between South Africa and other countries have already been terminated. 'South Africa has allowed the BITs of Netherlands, Spain, Luxembourg and Belgium and Germany to expire',⁸² which had raised concerns, especially among foreign investors who are from states that are currently party to BITs, as well as potential foreign investors.

The concern has been that foreign investors will not be accorded the same standard of protection that they would have been given under the provisions of BITs.⁸³ This is because the states concluded BITs, because they are made on an *ad hoc* basis, and since they could be negotiated in a way that suited the mutual interests of the parties concerned.⁸⁴ When the BITs are terminated, foreign investors fear that they will not have the same level of protection. This was the view of the Federal Republic of Germany, who would have preferred to continue BITs with the South African government.⁸⁵

Conclusion

Energy security is one of the most important topics of our times, as energy is an essential requirement for all fields of our daily life, for the functioning of social and political systems, businesses, and communication, and for economic growth, prosperity and sustainable development.

One of the biggest challenges of our time is to reduce climate change, and in light of the fact that *energy-related* carbon dioxide emissions make up most of the harmful GHGs we produce, the world community is necessarily charged with the task of

balancing the extension of energy supply, on one hand, and the consumption of energy, on the other.

There is an urgent need to develop policies so that, in the next few years, the emission of carbon dioxide and other highly polluting gases can be drastically reduced, for example, substituting for fossil fuels and developing sources of renewable energy. Worldwide there is minimal access to clean and renewable energy.⁸⁶

Support mechanisms for renewable energies have been introduced in many countries worldwide, with different types of promotion models. The success of these models – such as in South Africa, for example – varies and is crucially determined by political commitment. Two main support models for renewable energies have emerged, namely feed-in tariff schemes and capacity-driven models.

Different policies and laws may be appropriate in different countries regulating energy transformation, depending on factors such as a 'country's legal tradition and policy history or the maturity of

the technologies being targeted'.⁸⁷ Likewise, it is also very clear that countries which are still in the process of developing energy-related legislation can and should be inspired by lessons learnt from more developed countries which started much earlier with the drafting of law and policy frameworks for energy security and renewable energies. Thus, existing energy legislation can serve as an example for lawmakers in other countries. While the South African example definitely plays a pioneer role in Southern Africa, it has been suggested that perhaps no other piece of legislation has been copied worldwide as much as Germany's Renewable Energy Act (EEG).⁸⁸

Sustainable energy solutions for Southern Africa, which can power growth and prosperity, are dependent on innovation and technology, long-term investment strategies, smart policy-making, high levels of government attention, effective diplomacy, regional integration and international cooperation. Synergy effects can occur from innovative actions that make for a more secure energy system that counters poverty, boosts development and reduces warming emissions that come from energy supplies.⁸⁹

Endnotes

This Paper draws significantly on O.C. Ruppel & B. Althusmann (Eds), 2015, *Perspectives on Energy Security and Renewable Energies in Sub-Sahara Africa – Practical Opportunities and Regulatory Challenges*, Windhoek, Macmillan Publishers and Konrad Adenauer Stiftung; free download available at http://drop.sun.ac.za/files/2015/05/Energy-Perspectives_e.pdf.

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- households and communities have access to affordable and appropriate energy supplies; and to establish an energy sector that is efficient and that makes contributions to Namibia's economic competitiveness. Vision 2030 defines, as one of its strategies, the promotion of renewable energy sources and the implementation of projects for production from these sources to meet industry demand. See Government of the Republic of Namibia, 2004, *Namibia Vision 2030*, Windhoek, Office of the President, 87.
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- does not provide the necessary requirements for the implementation of the REFIT Programme. It was only prudent for the department to take a responsible decision and implement another programme outside of the REFIT Programme, whilst dealing with the legal challenges associated with it. It was essential for the department to precede with the implementation of renewable energy initiatives to maintain credibility of the country. In due time, a REFIT Programme may be implemented depending on the successful amendment of the primary legislation to allow for execution of such a programme. I am of the view that the REFIT Programme will play a vital role in bringing small projects into the grid.' See Renewable IPP Programme Speaking Notes for the DG, 31 August 2011, available at <http://www.energy.gov.za/IPP/Aug%202011/Renewable%20IPP%20programme%20speaking%20notes%20for%20the%20DG.pdf>, last accessed 29 January 2015.
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