Risks and barriers in renewable energy development in South Africa through Independent Power Production

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ABSTRACT

The South African energy supply is highly centralised and largely coal-fired. A transition to renewable energy sources is essential if the country is to adapt to the environmental, social, and economic challenges of climate change. Together with private-sector partners, the South African Government has embarked on a Renewable Energy Independent Power Production programme. However, the volume of private investment in renewable energy generation is still low. This article investigates the major risks and barriers to renewable energy market development. Political risk, human capacity, and corruption, are identified as the most serious and likely risks, as well as the barriers stakeholders perceive in the deployment of renewable energy sources, including governance gaps. The identified risks present obstacles to optimum market development for renewable energy and the attraction of sustainable private investment. The findings suggest that policy should focus more on managing the interface between private and the public partners, through increased consensus building, greater transparency, enhanced stakeholder management, more effective administration and improved decision-making.

INTRODUCTION

There is high path dependency in the South African energy system, which puts a brake on innovation. This situation is rooted in the apartheid period, where independence from external energy supplies was a political necessity and energy efforts and research centred on fossil fuel technologies (Pegels 2010:9). This kind of technological lock-in is typical of a coal-dependent energy system like South Africa's. The market for renewable energy technologies in South Africa is also relatively young, and this lack of maturity leads to higher volatility and thus greater risk. This means that even if renewable energy technologies can garner political

support through schemes like the feed-in tariff, there is still uncertainty as to whether passing renewable energy-friendly legislation will also provide the economic impetus needed; this also contributes to market risk.

Various factors generate multiple additional risks. The fact that most renewable energy technologies are still in their infancy entails an additional technology risk. The limited competition among South African financial institutions inhibits lending and financing, making it difficult for project developers to secure private capital. There is public resistance to higher prices, which are perceived as a threat to the aspirations of economic growth and poverty reduction in the country.

The South African Government recognises the need for private capital for renewable energy and envisages that this will come from the Independent Power Producers (IPPs). Government set up the IPP procurement programme in order to leverage private capital to stimulate the renewable industry in South Africa without burdening the public budget. Currently, the volume of private investment in renewable energy infrastructure is still low.

One reason for the limited participation of private capital is the recognition by potential investors and other stakeholders of the numerous barriers, and thus risks, to renewable energy generation. This recognition may itself be a barrier to further deployment of renewable energy sources, especially via private capital. Studying different stakeholder perceptions is thus not only important for understanding how energy policy can address concerns; it can itself become a vehicle for stimulating renewable energy deployment. Reference to stakeholder perceptions reflects the opinions and views of the research survey and questionnaire respondents. The research focuses on determining stakeholder perceptions regarding:

- the major risks and barriers to renewable energy market development; and
- the implementation of renewable market development through the Independent Power Producer (IPP) procurement programme.

This article represents several stakeholders' opinions and views regarding the risks and barriers of the development of the renewable energy market.

RATIONALE FOR THE DEPLOYMENT OF RENEWABLE ENERGY SOURCES IN SOUTH AFRICA

South Africa has a centralised power supplier—the public utility monopoly Eskom—which produces 90% of the country's electricity (Baker 2011:5). Moreover, 93% of Eskom's electricity production is coal-generated (NER 2000), and this, in turn, is responsible for over 60% of South African greenhouse gas emissions (Blignaut, Mabugu & Chitiga-Mabugu 2005). Recognising these challenges, the South African government has set policy goals aimed at decarbonising the country's energy generation system. Achieving these goals will require a significant amount of investment in renewable energy infrastructure. There is only limited public capital available; thus, private funding needs to be leveraged for construction, operation, and maintenance of new infrastructure (Pegels 2010:14). As mentioned earlier, this research considers the perceptions of stakeholders towards the introduction of and investment into renewable energy generation through IPPs. Scientific research shows that when such stakeholders perceive investment in renewable energy sources as risky, the result

can be much higher deployment costs (Komendantova, Patt & Williges 2011:4832) or no private capital investment at all (Komendantova, Patt, Barras & Battaglini 2012).

RENEWABLE ENERGY POTENTIAL AND TARGETS

In 2003 the South African *White Paper on Renewable Energy* was published. This sets the target of increasing the share of renewable energies, such as biomass, wind, solar, and small-scale hydro in the final energy consumption mix to 10 000 GW by 2013 (Department of Minerals and Energy 2003). In 2009 the *Electricity Regulations on New Generation Capacity* came into force; these regulate power purchasing agreements entered into by the buyer, namely Eskom, on the one hand, and the IPP procurement program, on the other (Department of Energy 2009). In 2010 the *Integrated Resource* Plan (IRP) was instituted to determine long-term electricity demand. The IRP foresees 42% of electricity generation (17,8 GW) coming from renewables by 2030 (Department of Energy 2009; SARI 2011). Specifically, the IRP lays out the proposed power generation for 2010-2030. It stipulates that, in addition to all existing and committed power plants (including 10 GW committed to coal), the IRP will include 9,6 GW of nuclear; 6,3 GW of coal; 17.8 GW of renewables; and 8.9 GW of other generation sources (IRP 2010:6). The Climate Change Policy White Paper, which is under development, foresees a scaling-up of the low-carbon technology market in South Africa (Musango, Amigun & Brent 2011:126).

In addition to achieving climate and energy policy goals, there are other reasons for South Africa to diversify its energy generation mix. The first is growing energy demand; consumption is expected to increase from 260 TWh in 2010 to 454 TWh by 2030 (Baker 2011:12). The second is the ageing energy infrastructure; the existing Eskom power stations need to be replaced by 20 GW capacity plants within the next 15 years (Inglesi and Pouris 2010:53). The third is energy security concerns which were clearly put to the test by the energy crisis of 2008 when disparities between electricity supply and demand led to blackouts and load shedding (Inglesi and Pouris 2010:50).

Renewable energy generation in South Africa has mainly been limited to off-grid generation. Large-scale energy generation has been constrained by high upfront costs (Winkler 2005:27) and currently, there are no medium or large-scale solar power installations (Musango *et al.* 2011:127). There are only a couple of small-scale projects, which are supported by international financing organisations, for example, the 24 kW dish Stirling plant, constructed as a demonstration plant by the Development Bank of Southern Africa (UNIDO 2003). In the area of wind development, the energy potential approximately ranges from a low of 500 MW to a high of 56 GW, with most potential in coastal areas, predominantly the Western Cape and parts of the Eastern and Northern Cape (Szewczuk and Prinsloo 2010). The first commercial initiative was the Darling Wind Farm in the Western Cape, which has a 5,2 MW installed capacity (Musango *et al.* 2011:127). Currently, most renewable energy is derived from biomass; the first plant of this type, which converts landfill gas to electricity, is in eThekwini Municipality near Durban and has a capacity of 7,5 MW (Musango *et al.* 2011:128). The commercial use of bio-fuels is also promising; for instance, PetroSA has produced an environmentally friendly product called eco-diesel which is available in the Cape Town area (Winkler 2005:33).

In response to concerns about the role of Eskom as both procurer and buyer, a Department of Energy (DoE)–led task force supported by the Public-Private Partnership (PPP) Unit in the South African National Treasury took responsibility for designing and implementing a procurement process for renewable energy (SARI 2011:6). The result was the Renewable Energy Independent Power Production Programme (REIPP), officially launched in August 2011 to procure 3,7 GW of renewable energy capacity. The goal was to attract[1] R100 billion of foreign and domestic direct investment (*Engineering News* 2012). Currently the REIPP is dominated by large-scale solar and onshore wind projects. A small project bidding round will concentrate on technologies such as landfill gas, small hydro-plants, bio-gas, and biomass cogeneration, including sugar and paper (*Engineering News* 2012).

It is envisaged that the involvement of the private sector in providing sources of energy will "reduce the funding burden on Government, relieve the borrowing requirements of Eskom, and introduce generation technologies that Eskom may not consider part of its core function which may play a vital role in the future electricity supply options, in particular off-grid, distributed generation, co-generation and small-scale renewable projects" (Eskom n.d.). However, despite the prospects for renewables, there has only been minor progress in their deployment to date (Pegels 2010:4947).

The first contracts between government and IPPs to add 1400 MW of renewable energy to the national grid were signed on 4 November 2012 at a signing ceremony with the 28 approved bidders for the so-called Window 1 (Sapa 2012). Government entered into 19 agreements on 9 May 2013 under Window 2 and received 93 bids the 19 August 2013 under bid Window 3 (Department of Energy 2013).

METHODOLOGY

The main empirical data was derived from different types of dialogue with stakeholders in South Africa. The research methodology includes both qualitative and quantitative methods of analysing stakeholder perceptions. The qualitative research methods include in-depth interviews and surveys with semi-open or open questions in which stakeholders were required to identify barriers and risks in the development of renewable energy sources. The quantitative methods of research include surveys in which stakeholders were required to assess the probability and likelihood of these risks occurring. Two steps are involved, each including collection of both qualitative and quantitative data. The research results comprise of responses from two data sets derived from a preliminary survey and a second survey–a Likert scale–was used requesting yes and no responses. In addition, a preliminary questionnaire was used followed by a second questionnaire; semi structured, open ended questions were used.

The first step (in-depth interviews and surveys) was conducted as part of an ongoing PhD research project at the University of Johannesburg. The data collected focused on identifying governance gaps and risk barriers in public private partnerships in South Africa. The IPPs involve a partnership between a state owned enterprise and a private entity. The data collected was used as preliminary data to understand governance complexities in public-private cooperation. The stakeholders participating in this survey were academics and private- and public-sector stakeholders. The latter were mainly from various local government municipalities. A total of 168 stakeholders participated in the survey.

Based on the data from the interviews and surveys, questionnaires for qualitative and quantitative interviews were developed, the goal of which was to analyse government and private-sector cooperation and governance gaps with reference to public-private partnerships and independent power producers (IPPs). Two separate sets of data were derived, one for private stakeholders and one for public stakeholders.

The qualitative interviews were conducted with stakeholders from the public and private sectors, including high-level decision-makers, project managers, legal advisors, technical advisors, and government officials. Altogether 66 interviews were conducted in the Gauteng province of South Africa.

As a second step in-depth expert interviews were conducted in order to understand and specify the results from the first round and to clarify and ensure the precision and accuracy of the survey results. A survey of stakeholder perceptions with respect to how serious and how likely the risks identified were, was also conducted. Overall, inputs were gathered from one public-sector representative, one private-sector representative, three non-governmental sector representatives, and three representatives from academia. No individual names or organisations are cited here as interviews followed Chatham House Rules.

A snowball sampling method was used for the qualitative data and a non-random sample was used for the quantitative data collection. The various questions and indicators in both the survey and the questionnaire were explained to respondents.

RESEARCH RESULTS AND FINDINGS

In a large-scale survey of stakeholders from private and public sectors, respondents were required to select from a number of given categories any that they perceived as to be a barrier to deployment of renewable energy sources. These categories included: implementation of broad-based black economic empowerment; intellectual property management; effectiveness of PPP legislation; business process compliance; internal auditing; monitoring and evaluation; document and information management; record keeping; information sharing; information communication technology; competitiveness of the PPP process; contract management; project management capacity; consultation; stakeholder management; partnership cooperation and collaboration; human resources; capacity and skills; training availability; corporate governance; professionalism; efficiency; quality; leadership; accountability; innovation; dispute resolution; transparency; corruption; political commitment; late payments; risk management; risk assessment; risk mitigation; risk controls; verification of risk controls; and risk communication.

Stakeholder perceptions of the level of best practice in the public and private sector and whether practice contributes to risk factors on a strategic, business and operational level were studied. A number of practices, that are indicative of the level of good governance, were measured.

Respondents were required to indicate whether current practice is reflecting negatively on the governance of public private partnerships. Respondents were required to indicate the level of best practice in the private and public sector respectively.

Figure 1 shows perceptions of governance gaps in the public sector:

- risk controls – any system for identifying and verifying risk controls, in other words, the ability to respond to risk or how to address and thus mitigate risks (43%);

- risk assessment – a system of determining the likelihood and impact of risk and the appropriate tolerance level of risk (41%);
- corruption – the presence of corrupt activities, including collusion, bid-rigging, and any other fraudulent activities (41%);
- risk mitigation – means a risk management strategy and strategic risk management controls being embedded in the partnerships (40%); and
- risk communication – a system for identification, assessment, and mitigation of communication risk (37%).

Figure 1 Major governance gaps in the public sector

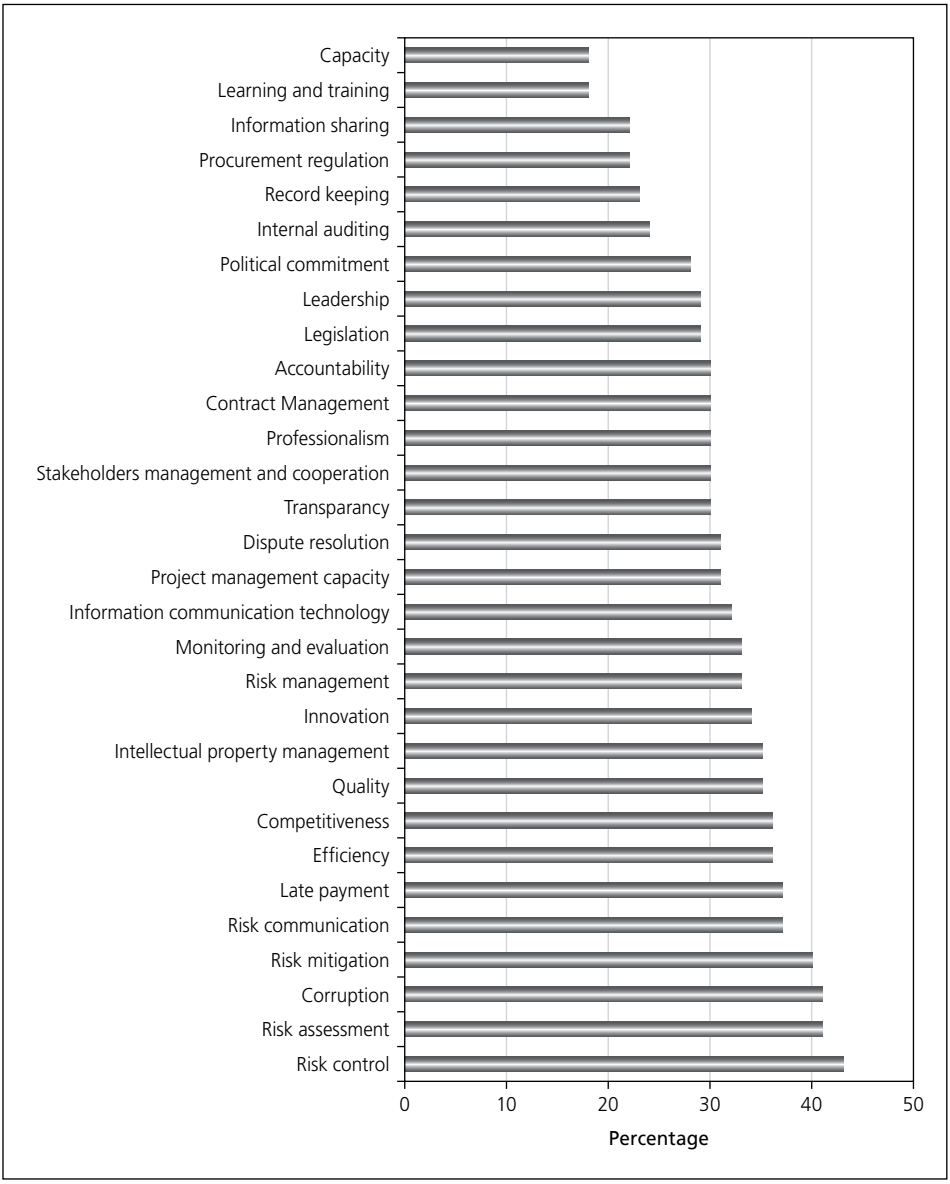
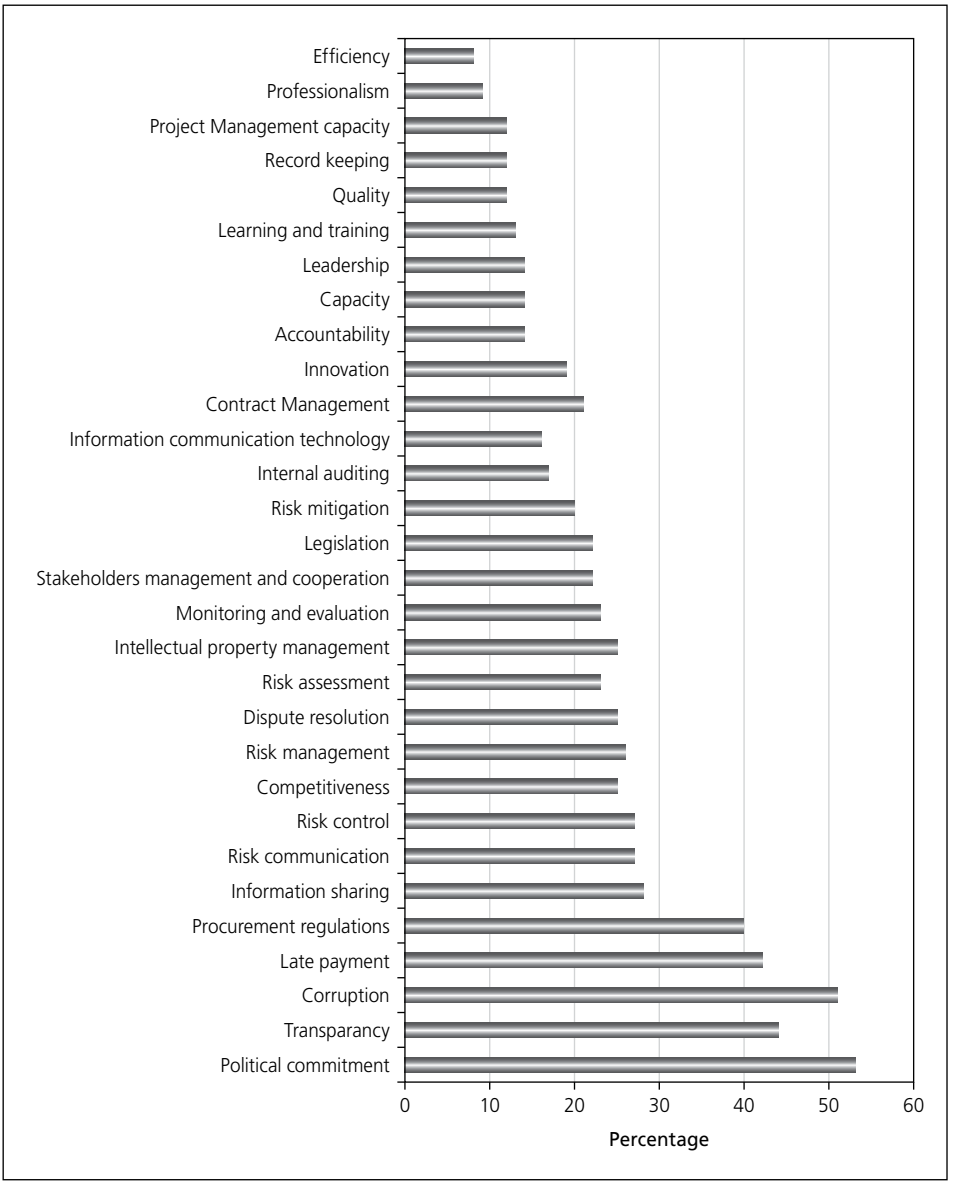


Figure 2 Major governance barriers in the private sector



The first step of data collection focused on determining the perception of respondents' about current governance gaps in the public and private counterparts, in public-private partnerships. This served as baseline data to determine the major barriers in public-private cooperation. The stakeholders' perceptions of the level of best practice in the private sector differed significantly from those of their public-sector counterparts. More than half (53%) perceived the absence of political commitment as a major barrier (Figure 2). This was followed by corruption (51%), transparency issues (44%), late payments (42%), and procurement regulations, in general, and challenges posed by broad based black economic empowerment implementation in particular (40%).

Thus, perceptions of stakeholders of the level of best practice in the private and public sectors differed significantly, stakeholders identified political and institutional governance gaps in the private sector, whereas stakeholders identified risk management inefficiencies in the public sector.

The second set of empirical data was derived from qualitative in-depth interviews with stakeholders from the private and public sectors, and from government and academia. Mainly qualitative results were obtained, which was classified into five groups:

- structure of the decision-making process;
- involvement of private sector and local communities;
- prices and market development;
- policies and regulations; and
- bureaucracy and governance-related gaps in the decision-making process.

Table 1 outlines the barriers identified by each group that could constrain the successful deployment of renewable energy sources. These barriers are discussed below.

Table 1 Perceived major barriers for the successful implementation of IPPs

Classification of response	Barriers
1. Structure of decision-making process	• Centralised decision-making structure with a top-down approach • Lack of coordination between governmental decision-making entities
2. Involvement of private-sector and local communities	• Lack of participation • Lack of capacity
3. Prices and market development	• Limited competition • Perceived higher cost of energy integration • Conflicting objectives and goals
4. Policies and regulations	• Uncertainty and ambiguity regarding procurement regulations • High level of regulation
5. Bureaucracy and governance gaps in decision-making process	• Institutional inefficiencies • Lack of capacity • Fragmented structural nature of the industry and of governance arrangements

Structure of the decision-making process

The decision-making process with respect to who builds the energy-generation infrastructure and who buys energy has a strongly centralised structure; its approach is top-down, with the Ministry of Energy having complete authority in this regard. Stakeholders interviewed advocated that the Renewable Energy Independent Power Production Programme should be independent from government, and that the overall procurement process should be competitive and independent of state involvement. Government participation should only be through the Industrial Development Corporation (IDC) and the Development Bank of Southern Africa (DBSA).

Respondents were required to clarify the role of various players in the decision-making and regulatory process of the REIPP. A prominent respondent involved in REIPP management made it clear that, as the procurer has to be represented by a publicly owned entity, the Department of Energy (DoE) had a significant role in the decision-making process. The respondent further emphasised that a conflict of interest would occur if Eskom was to be simultaneously procurer and generator. Thus, in the current REIPP, the DoE was mandated as procurer, with Eskom remaining as buyer. Moreover, power purchase agreements (PPAs) are concluded between Eskom, the IPPs, and their lenders. The Department of Energy is excluded. Thus, a PPA is still a direct agreement between Eskom (the sole purchaser) and the IPP.

The respondent further clarified that the PPP Unit of the National Treasury is involved in REIPP programme management because of its experience. The respondent explained that the type of energy infrastructure development chosen is up to the Independent Power Producer Procurement Programme. Further, Eskom has an integrated risk management plan for its Single Buyer Office, which also applies to the Renewable Energy Independent Power Production Programme. This risk management plan is specific to power purchase agreements and is not used in any contract mechanisms affecting individual power producers. Such divisions of power and the uncertain and drawn-out procurement process, together with the government's own procurement practices, represent significant contract management challenges.

Another respondent suggested that the need for Treasury involvement is questionable, and there has been a significant amount of lobbying against it. The decision to go the independent power producer (IPP) rather than National Treasury (PPPs) route, the respondent asserted, was to promote competition in the energy sector and to encourage alternative producers to the usual national energy suppliers.

Another respondent argued that following the IPP rather than the PPP track may indicate that the State wants a smaller role in operating industrial assets. The respondent perceived the lack of capacity as risky but said that the same also applied to Eskom. In the decision-making structure, the respondent argued, the main barrier was the lack of coordination and the absence of alignment between government bodies. This respondent also suggested that decision making currently had too many conflicting and incompatible objectives, because too many government entities are involved and the approvals processes are both onerous and time-consuming. The respondent agreed that the relations between the various ministries involved are a barrier to sustainable energy implementation, and that the perception of bidders was also the surfeit of government departments involved in the process.

In the context of public policy development and management, another respondent argued that while the existing policy and regulatory environment is not a barrier, the implementation process definitely was, owing to the lack of available skills and capacities, compounded by the fact that renewable energy market development, despite being a political buy-in, is currently not a major focus of the government.

Involvement of private and local communities

With respect to the role of private-sector and local community involvement, the establishment of the REIPP did constitute, according to the experts interviewed, a move away from government toward market-based mechanisms. The Government and Eskom

had shown initiative, respondents stated, in promoting renewable energy to consumers. However, because of the abundance and availability of coal in South Africa, electricity generation from coal is still the preferred approach. According to respondents, renewable energy procurement by IPPs is expected to boost a number of indicators targeted by the government, including employment and growth rates. However, some respondents perceived that IPPs present a systemic risk, as some operators do not really seem to fully understand the renewables sector and aspects of its technologies; botched renewable energy projects, it was said, would harm the reputation of the entire energy sector.

Interviews revealed that the most significant perceived risk is structural in nature, and is related to the division of roles between the private and public sectors, for instance between the Government, Eskom, and the IPPs. Currently the entity that is the buyer—Eskom—wishes to continue to be the buyer to show the market its commitment to renewable energy and IPP development. Respondents, however, perceived that Eskom cannot both manage the playing field and be a player, and that this situation should change.

Respondents did perceive, however, that while the role of government should be to manage the field, the relationship between government and the private sector should change. In terms of laws and regulations, Eskom is a dominant, monopolistic, vertically integrated national utility, which allows consumers to only play a reactive role and there is a lack of public participation. The only proactive activities, which government allows the private sector, are relatively minor contributions, such as installation and use of solar geysers or solar panels for off-grid applications and which are not used for large-scale generation.

According to respondents, the renewable energy market is fairly new to the private sector in South Africa; some private participants are still unable to meet the bid criteria, as they are not well prepared and there is a lack of ownership amongst these stakeholders. Private sector participation is marked by a lack of ownership responsibility and independence, compounded by minimal existing market competition. Moreover, the private sector lacks maturity and the market itself is still immature, with a resultant lack of partnerships and combined/unified efforts.

Respondents argued that Eskom dominates or dictates the energy market which is why it is underdeveloped, ill-prepared, and not really ready to deliver electricity from renewable energy sources to distribution companies. The distribution sector itself is not fully capable of facilitating or connecting renewable energy generation companies and of distributing the electricity to end users.

Respondents' overall consensus was that private involvement needed to be strengthened, especially in the energy generation sector, which is currently almost 100% state-owned, and that the diversification of the energy supply would help reduce the risk of interrupted or poor electricity supply and availability. However, respondents pointed to the probability of some increased risk in the scheduling of electricity generation using renewable energy sources because of their diverse nature. Similarly, the risk inherent in grid frequency control and electricity distribution will increase due to the distributed nature of renewable energy generation plants.

According to respondents, local communities usually only provide the site or land for an electricity generating plant; however, this situation should change to give communities a larger responsibility in the decision-making and operating processes, as well as in ownership of the assets. Nevertheless, respondents were sceptical of this happening in practice. They

suggested that the community's role should be adjusted, with better public education and more debate taking place to increase the level of knowledge about energy provision and utilisation. Currently, every potential bidder has to meet minimum qualification criteria, which include having 40% of the total shareholding, of which 2-4% must be held by a local community trust within a 50 km radius of the planned energy infrastructure. The aim of this regulation is to stimulate skills development, create employment, and encourage shareholding through the community trust.

Some respondents perceived that local communities in South Africa do not really care about the impacts of energy generation on the environment, as poverty and unemployment concerns are more important to them. Another primary issue was perceived to be energy access, which communities wish to be as easy as possible, irrespective of what the energy generation sources might be.

Prices and market development

According to respondents' perceptions of the pricing and competing development goals of renewable energy forms, environmental stakeholders in South Africa want to see higher renewable energy targets. The pricing mechanism for renewable energies is transparent, but the renewable energy market itself is underdeveloped. The level of competition is still too low due to the complicated regulatory procedures, which require additional investment and add uncertainty. Another challenge is the structure of the energy market with Eskom at its centre. For example, respondents spoke about Eskom realising that it would have to default, if the IPP contracts were not serviced, which would adversely impact its credit rating.

Some respondents perceive that the deployment of renewable energy sources will lead to higher energy prices and thus threaten the goals of economic growth and poverty reduction in South Africa. This resulted in a discussion of whether environmental goals should be prioritised over poverty reduction goals. This discussion is also in line with the environmental Kuznets curve which considers the broad relationship between economic development and environmental quality (Dasgupta, Laplante, Wang and Wheeler 2002:149).

Some respondents also argued that although renewable sources promise lower environmental impact compared to coal, they still have a certain environmental footprint. Another concern of respondents was that in the IPP context, it may not be cost-effective for small-scale producers to incorporate environmental externalities in their costing.

Regarding the pricing mechanism for energy in South Africa, respondents generally perceived that the goal was the best price option and not the most sustainable. Deployment of renewable energies would require improvement of legal and regulatory frameworks and an introduction of the feed-in tariff, which would need to be regularly revised–combined with technology improvements.

There were also concerns among respondents about the structure of the energy market in South Africa. In other words, given the fragmented nature of the distribution industry and the underperformance of municipalities, there were concerns as to whether the industry could deliver renewable energy to electricity end users.

According to respondents, current renewable generation costs are higher than those associated with traditional fossil fuels, which respondents said, could be due to Eskom quoting the costs of generation by their new coal-fired power stations as lower than they

really are. As currently no other entity is allowed to build coal-fired power stations in South Africa, no comparison of costs is possible.

Another issue was the availability of electricity from renewable energy sources. Respondents pointed out that renewable energy is not available on demand, but rather based on supply. This has to do with the fluctuating nature of renewable energy sources, such as sun only being available during the day, while coal-fired energy is there round the clock. This puts extra pressure on transmission system operations, which need to balance energy from different fluctuating sources. This will require new scheduling procedures to be implemented and energy generation optimisation algorithms to be modified.

The respondents also perceived the significant level of uncertainties to be hampering deployment of renewable energies and influencing energy prices. *Firstly,* there is no sufficient clarity from Eskom about bids, competition, and pricing mechanisms. *Secondly,* there is significant uncertainty about when construction of power plants and grids development is going to start. *Thirdly,* there are uncertainties regarding the components supply market in South Africa: it is still difficult to purchase a turbine or a wind plate. As international investment in deployment of component-manufacturing capacities in South Africa is also hampered by existing uncertainties about financing and benefits, a critical number of projects are needed before the deployment of local manufacturing of renewable energy components.

Respondents also mentioned that there is very little experience of IPPs in South Africa, and the level of uncertainty about them on the South African energy market is high. There is currently political will to stimulate IPPs to deploy renewable energies at scales that, frankly, would be impossible without private-sector involvement. Although IPPs have spread–experience of using them, available expertise, and track records are all limited. Too many people have tried to get involved in the process, without actually having a detailed knowledge or understanding about it. The IPPs are still in the learning phase regarding their cooperation with Eskom and the government. Additionally, it is still unclear as to whether IPPs can deliver or whether everything they promised will come unstuck as soon as construction and operation of specific projects gets under way.

Policies and regulations

Respondents perceived the existing regulations relating to IPPs to be a major barrier to renewable energy deployment. For example, a recent regulatory change stipulating that land licenses and permits to generate renewable energy must be obtained from the Department of Mineral Resources created uncertainty, as it did not feature in the original IPP regulations. Another aspect of current regulation is the centralised focus on energy supply and procurement and the low level of attention given to decentralised, small-scale production. According to respondents, financial regulation of the projects will improve, especially as the the costs of lending to IPPs and the regulations with respect to obtaining financial closure are the main obstacles to risk management in renewable energy IPP delivery.

Another challenge in the existing regulatory system, according to respondents, is regulation regarding distribution and delivery of energy. This regulation fails to address conditions in South Africa, such as the vast tracts of uninhabited land and the numerous areas with high concentrations of population, combined with the fact that renewable energy stations can only be placed in specific geographical areas, which makes distribution particularly difficult.

Respondents perceived the legal and regulatory environment as a significant barrier to further deployment of renewable energies and that a new legal and regulatory environment is required, based on more liberal electricity market principles and regulatory improvements such as implementation of an independent system operator and an independent market operator, combined with appropriate market rules and grid codes. However, according to respondents, the Government is unwilling to establish a new legal and regulatory framework based on more liberal electricity market principles.

Bureaucracy and governance gaps

According to respondents, there are bureaucratic and governance gaps in the decision-making process, including with respect to IPP procurement procedures, ensuring IPP quality, and transparency of the decision-making process. As IPPs are a relatively new area of procurement in South Africa, the Government will need to go through a huge learning curve if it is to establish a more efficient bureaucracy able to deal effectively with procurement questions. Currently, the bureaucratic procedures entailed in gaining approvals are slow and time-consuming. The long and drawn-out nature of bureaucratic procedures is also a significant barrier to foreign direct investment, as it is expensive and adds uncertainty.

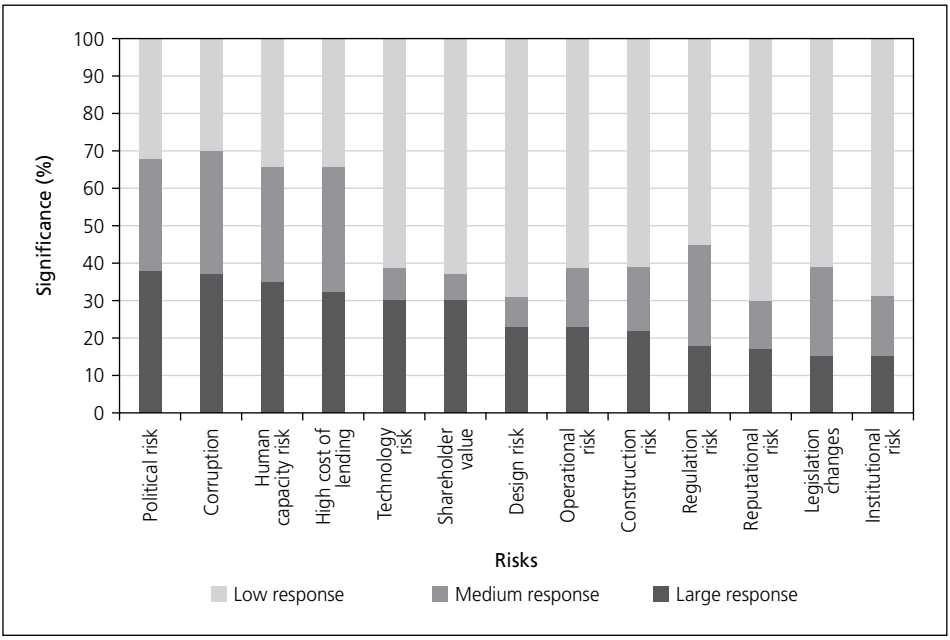
Regarding the quality of governance, respondents perceived corruption to be under control but that communication and transparency are significant barriers to renewable energy deployment. Respondents saw no direct evidence of corruption regarding renewable energy projects, but with the corruption problem being endemic to South Africa, it would be naïve not to expect it to be an issue. The respondents observed that some companies with very unsavoury corruption histories are trying to enter the renewable energy market. Some of them were expected to be granted projects, despite their complete lack of experience and technological know-how, simply because of their links to the "right people".

At the third stage of the data collection, perceptions of the likelihood of renewable energy projects taking off and how serious the concerns of stakeholders were with respect to different risks, were quantified. Stakeholders were required to estimate the following risks: political risk, corruption, human capacity risk, high cost of lending, technology risk, shareholder value, design risk, operational risk, construction risk, regulation risk, reputational risk, legislation changes, and institutional risk. Stakeholders were also required to rank the degree of risk exposure that renewable energy projects might face through the application of such financing schemes as IPPs. In addition, stakeholders were required to estimate both the likelihood of those risks occurring and to rank the risks as low, medium, or high. This was to determine which risks are the most important and which are the most likely (Figures 3 and 4).

The results showed that stakeholders perceive political risk as the most serious to the further deployment of renewable energy sources. Political risk includes acts of government, where "the possibility that political decisions, events, or conditions in a country, including those that might be referred to as social, will affect the business environment in such a way that investors will lose money or have a reduced profit margin" (Howell and Chaddick 1994:71). Nel (2010:196) emphasises that political risk includes government interference and political events posing a risk to investments.

Design, construction, and operational risks are internal project risks affecting the delivery of the infrastructure on time, within budget, and its scope. Risk of shareholder

Figure 3 Significance of risk



value is understood as the risk to shareholder dividends, the share price, or other returns on investment.

The third-ranked risks perceived as being serious threats to deployment were corruption and human capacity risks. Human capacity risk in this study is viewed as a qualitative risk, emanating from the lack of or insufficient human capital, for example, skills, expertise, attitude, self-awareness, quality, productivity, efficiency–and the effectiveness of human resources.

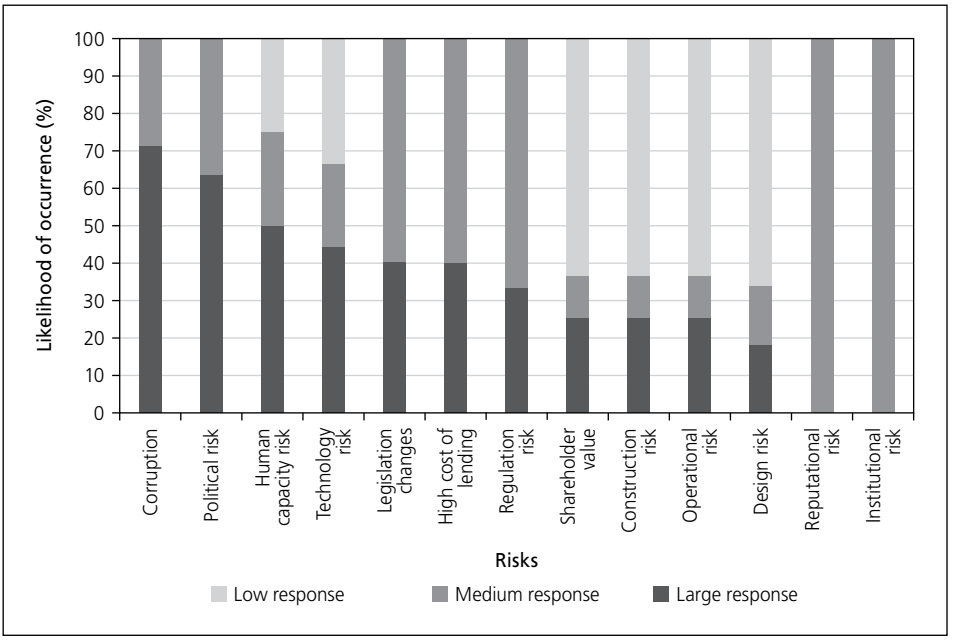
It is interesting to note that reputational and institutional risks were perceived as only moderately serious barriers to deployment of renewable energy sources. For the purpose of this research, institutional risk refers to systems management issues, for instance structure, strategy, systems, and culture within an organisation. These risks are risks of organisational inefficiency, including coordination, ownership, planning, decision-making, roles and responsibility, objectives and relationships within the organisation itself.

The regulatory risk was perceived by only 20% of all stakeholders as a serious barrier to renewable energy deployment, something which runs counter to research in other countries where regulatory risk was perceived as being the most serious barrier (Komendantova *et al.* 2012). As a next step, stakeholders had to estimate the same risks according to their likelihood of happening (Figure 4).

The results showed that corruption risk was perceived as being the most likely to occur, followed by political, human capacity, and technology risks. Technology risks in this study refer to the infrastructure, namely, "the risk that the project will not achieve its objectives due to an underpinning technology not maturing in the required timeframe" (DSTO 2010:12).

These risks are followed by the risk of legislative changes, which is understood as the risk that changes in legislation will negatively impact an investment or overall project delivery.

Figure 4 Likelihood of the occurrence of risks



This risk is perceived with an equal degree of concern as that of the high cost of lending. The latter is a financial risk, where high borrowing and lending costs have a negative effect on the sustainability of the projects.

It is noteworthy that, in both sets of results, reputational and institutional risks were perceived as the least serious concern and least likely to happen–reputational risk refers to damage to the reputation of a stakeholder or shareholder, and includes negative publicity and visibility. As there were responses missing from this section, the low ranking of this risk perception may be due to a technical limitation of the survey, attributable to two possible factors. First, respondents might have knowledge or experience of these indicators that could deter them from responding. Second, respondents may have perceived institutional risk as an element of political risk, and reputational risk as an element of shareholder value.

Political risk, corruption, and human capacity risks are viewed as both significant and likely. When comparing all results from the survey, interviews, and estimations of risks, likelihood, and probability; one risk stands out: political risk, which is the most overlapping risk in all three data sets. Thus, political risk is the most critical risk, and should be mitigated appropriately. When risk significance and likelihood are compared, a pattern emerges, as both data sets reveal the same indicators, except for corruption, which features in risk significance but not in risk likelihood.

DISCUSSION

The qualitative results from the interviews reinforce the quantitative results from the large-scale stakeholder survey regarding barriers to renewable energies and perceptions regarding

the likelihood and seriousness of concern about different types of risks for deployment of renewable energy sources.

The private sector stakeholders perceived as major barriers the lack of political commitment, transparency, late payments, and procurement regulation challenges. The interviews also showed that even though there is no direct evidence of corruption, the lack of transparency represents a significant governance gap. Other governance gaps relate to contract management, which indicates contractual and partnership management challenges, the lack of market incentive which hampers market development, and the lack of competition which indicates the immaturity of the market. The performance management challenges include monitoring and evaluation processes, and quality and capacity gaps. They also include the structural challenges of the power, legitimacy, and institutional capability of individual actors, as well as the lack of understanding and experience among stakeholders involved in the deployment of IPP practices.

The interviews showed that the structure of governance is a serious barrier because of government interrelations with private stakeholders, local communities, and Eskom. The structure is marked by the division of powers, the lack of legitimacy and institutional capability of government entities, and the cooperation and coordination roles and responsibilities of government entities. This results in a slow and inefficient decision-making process, which represents a significant bureaucratic barrier. For the purpose of this research, two views of institutional capacity are held, the first is institutional capacity focusing on structural governance capacity. The second includes organisational performance and the ability of institutions to perform their organisational objectives.

Traditional institutional capacity focuses mainly on government institutions and public sector organisations, "to include the judicial and legal system, the electoral and parliamentary system, political parties, the media, the private sector and civil society organisations", the intention of the governance approach is to satisfy the above stakeholder demands, to instil and develop accountability, transparency, legitimacy, pluralism and participation (Bhagavan and Virgin 2004:1). This is referred to as structural institutional capacity or structural governance capacity. The second view of institutional capacity is mainly concerned with organisational performance and is "strongly influenced by how well the institutional arrangements of ownership and operation are matched with institutional 'outputs' in the context in which the institutions are embedded" (Bhagavan and Virgin 2004:1). For the purpose of this research, traditional institutional or structural capacity and organisational performance are combined as institutional gaps and barriers.

Both private and public stakeholders perceive institutional gaps as major barriers. The public stakeholders mainly see the inability to manage risks as a barrier. The results from the large-scale stakeholders' survey indicate that the public sector requires technical expertise to overcome barriers mainly for incorporation of risk control, assessment, mitigation, and communication. This barrier could be attributed to the lack of risk management practice in the public sector in South Africa.

At the same time, private stakeholders mainly consider the lack of political commitment, the inability to enforce or speed up payments, and the political goals and procurement regulations, as major barriers. However, the answers regarding political commitment are strongly polarised, with 50% seeing it as a barrier and 50% who do not agree. A reason may be political affiliation or the personal interest of stakeholders.

Corruption is regarded as a serious barrier to both private- and public-sector stakeholders, as are late payments. This could indicate a gap in the institutional framework and the inability to enforce contracts. Procurement regulations are a very interesting barrier, as this ranks first in the private stakeholder data, and at the bottom of the public data. A possible reason why the corruption indicator is not prominent in the qualitative assessment is, according to respondents, the fact that although there is speculation that corruption exists in the IPP projects, it is not a serious concern, as there is no real evidence of it to date.

The comparison of results from the survey, interviews, and analysis of risk perceptions shows that the final stage of data review reinforces the preliminary results. For instance, the qualitative data results in the final data set reveal that there is a procurement challenge, which reinforces the preliminary quantitative results of late payments and political commitment, a political risk. The qualitative data in the final analysis reveal a number of structural issues, including governance structure, coordination and regulation, thus confirming the preliminary qualitative results. The final quantitative assessment reveals that the most systemic risk is political risk and this is also reinforced by all the data sets applied in this study. With respect to stakeholder perceptions, the need for greater community involvement is expressed.

When the qualitative and quantitative data for both stages of the analysis are compared, the most overlapping risks are human capacity and political risks, with these risks featuring in all the underlying data sets. The study thus deduces that significant efforts in good governance should be directed toward increasing and strengthening human capacity, mitigating the effects of the high cost of lending and preventing political risk. The results seem to indicate that the main challenge to the development of a renewable energy market is the perception by stakeholders of the risk involved in attracting the capital necessary for renewable energy to take off, rather than the societal integration of renewable energy.

When all the data sets in this study were compared, a number of factors were identified that may be crucial to the successful delivery of these IPPs. The results deduced from the various stages of the analysis and data sets all correspond, which may suggest that these crucial factors are highly inter-dependent and overlapping in nature, and this would explain the high number of structural, cultural, strategic, and systems challenges identified.

Overall, the first set of quantitative data from private-sector perceptions identified a number of cultural and systems challenges, focusing on political commitment, transparency, late payments, and corruption. The second set of public perceptions focused more on systems challenges through risk management. The qualitative results corresponded to the above challenges.

The second set of data identified more structural, cultural, strategic, and systems challenges. These included barriers such as decision-making, roles and participation, plus regulatory and policy challenges, which are highly strategic in nature. The quantitative results in the second stage of the analysis revealed cultural and systems challenges related to political risk and corruption.

The quantitative and qualitative sets of results of both stages of the analysis are highly correlated. This could indicate overlapping results, which might suggest that in a developing country like South Africa, there needs to be a revision of the strategy for implementing

renewable energy through IPPs, as the systems, structure, and culture do not seem to be in place to support the strategy that has been adopted.

The research findings suggest that government should focus policy directives and implementation resources on managing the interface between various stakeholders, which in turn could contribute to increased institutional, stakeholder and political efficiency and thus minimise the effect of overlapping risks.

Overall, the low integration of the above risk factors denotes governance gaps, which present barriers to good governance for the effective market development of renewable energy. Respondents confirm a high level of institutional, regulation, political, and human capacity risk: all indicative of governance barriers. The political risk is the most overlapping risk in all the data sets; this is noteworthy as, after the study was conducted and results obtained, the results were confirmed by real world examples. Political risk is seen as a serious concern in South Africa, which may contribute to investors withdrawing from the South African market. This contributes to a greater lending risk. The rating agency Moody's downgraded South Africa's Government Bond Rating in 2012, the main driving force being "Moody's lowered assessment of institutional strength to 'moderate' from 'high', an important factor in the rating agency's judgment of a sovereign's economic resiliency". The downward adjustment reflects Moody's view of the South African "authorities' reduced capacity to handle the current political and economic situation and to implement effective strategies that could place the economy on a path to faster and more inclusive growth" (Global Credit Research 2012).

Thus, in light of the current political and economic situation, there should be a review of whether under the present conditions, South Africa is capable of attracting private capital and introducing and maintaining the necessary political and economic stability for the REIPP to gain momentum in deploying renewable energy.

CONCLUSION

A number of structural, cultural, systems and strategic impediments were identified in this research. These impediments present a plethora of overlapping risks. Firstly, in terms of structural challenges a lack of sufficient market development for the REIPP impetus, lack of effective decision-making and planning were identified. Secondly, structural challenges in terms of stakeholder relations and roles and responsibilities were acknowledged. The perceptions of stakeholders observed in this study indicate a lack of consensus as to what the various roles and responsibilities of stakeholders should cover. These perceptions should be addressed by encouraging representative participation through varied stakeholder appointments, consensus building through encouragement of public awareness and clear policy goals and objectives. Political risk, as the most overlapping risk, also negatively affects stakeholder perceptions. Thus, the Government needs to guard against decisions, actions, policies, and processes that may contribute to politically based risks or losses. Furthermore, cultural challenges in terms of commitment were also identified. Lastly, systems challenges were recognised, including institutional and human capacity. From a governance viewpoint, there should be an increased focus on participant interface risk management in order to decrease the identified risks and increase investor potential for South Africa.

NOTE

1 The current South Africa Rand (ZAR) value is R11,68 to 1 US $

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