Utilities (Electricity, Gas & Water)

Sector Overview:	▪ The Utilities sector contributed just above 2% of GDP in 2008, from a peak of 3.1% in 1995 ▪ Value addition in this sector since the 1970s has been dominated by the water services industry ▪ Eskom, a corporatised utility, produces 96% of all electricity in the country. 95% of all Eskom electricity sales are also within South Africa, with the remaining 5% sold to SADC countries (Eskom, 2009) ▪ Coal is relied upon to produce 93% of the country's electricity, with nuclear (5%), pumped storage (1.4%) and hydro (0.4%) making up the balance (NERSA, 2007) ▪ Following a period of inadequate infrastructure investment and load shedding in 2008, Eskom has embarked on an electricity capacity expansion plan amounting to R300 billion over five years. The first unit of the Medupi Coal-Fired Power Station is expected to come on line in 2012, and the first unit of the Kusile Coal-Fired Power Station in 2013 ▪ The national electrification process (universal access by 2012) and free basic electricity can be expected to place increasing pressure on the country's electricity reserve margin ▪ The proposed 6 Regional Electricity Distributors (REDs) remain under discussion ▪ Employment in the electricity, gas and steam industry has declined from a high of almost 80 000 in the mid-1980s to reach just over 40 000 in 2008, with a period of moderate growth taking place between 2004 and 2008 ▪ Since 1994 access to water supply infrastructure has improved in terms of population reach. At present 88% of the population has access to a basic level of service (DWAF, 2008) ▪ Currently 2.4 million people are without access to a basic level of water supply; a further 3.3 million people have access to a water supply but the water obtained does not meet the basic services standard

Risks		Opportunities	
Regulatory	The focus of this analysis will be placed on the electricity industry, given its key role in climate concerns. The government owned utility, Eskom, is at severe regulatory risk from climate change, including at a national and international level. According to the CDP Report for 2008, Eskom's greenhouse gas emissions amounted to 223 million tons, or approximately 51% of South Africa's total emissions for the 2000 year baseline (CDP, 2008). As per the latest national GHG inventory,	The expansion of the renewable energy industry in South Africa represents a significant economic opportunity in the electricity industry. Globally, renewable energy has undergone exponential growth, with the industry moving from providing 160GW of power in 2004 (or four times South Africa's current electricity capacity) to 280GW in 2008 (REN21, 2009). In 2008, investments in renewables eclipsed those for fossil fuels for the first time, with much of the investment being undertaken by China and India.	**Growth of Existing Markets & Industries**

Risks		Opportunities	
	sub-bituminous coal for electricity production made up 39% of all national emissions in 2000 (DEAT, 2009b). Carbon intensive electricity production also has a key role to play in the relative carbon footprint of companies and exports in South Africa, a matter discussed in more detail in Section 5 and 6 of this document. Aside from expected mandatory reporting of their emissions and targets for power generation efficiency, the Department of Environmental Affairs (DEA) has indicated that Eskom will need to render all new power stations built to be Carbon, Capture and Storage (CCS) ready, which could add an additional cost constraint on the utility. However, by far the greatest risk to this industry lies in the introduction of carbon pricing in the economy, given the high emission factor associated with South African electricity. The cost of implementing such pricing could be financially crippling for Eskom, although with a lack of effective competition in the electricity market, it is expected that carbon related costs would be passed onto consumers, with significant downstream economic impacts. Carbon pricing within electricity is a complex area that is undergoing extensive evaluation, given that excluding Eskom completely from such initiatives will avoid the majority of the country's emissions and fail to address electricity related emissions for the majority of South African businesses. In addition to a national regulatory risk of an emissions cap or carbon pricing mechanism, potential also exists for Eskom to be placed within a global sector-based agreement in the medium to long-term, which could include emissions caps and financial penalties. Whether such an activity takes place will depend much on the outcomes of future international climate negotiations and any forms of 'new agreements' which may be	The demand for renewable energy can be driven via emission reduction targets in the power sector, as well as by direct requirements that renewables make up a specific portion of the electricity supply. Currently energy legislation in South Africa provides for the potential stipulation of both renewable energy and energy efficiency targets in the national energy mix under the National Energy Act (Republic of South Africa, 2008). South Africa is also characterised by a significant renewable energy resource in wind and solar, reasonable resources in biomass and biogas, and is far advanced in the development of a Renewable Energy Feed-In Tariff (REFIT) to support the deployment of renewables. The realisation of a sizeable renewable energy industry could provide a variety of additional benefits including labour intensive employment creation in construction and manufacture, increased energy supply and heightened opportunities for foreign investment in renewable energy related projects. Macro-economic analysis for government's 10 000 GWh renewable energy target has confirmed the economic benefits of achieving this target (DME, 2004a). More recently, it has been estimated that a 27% contribution of renewable energy to the electricity mix, if matched with technological learning, could result in a net cost saving of R143 per ton of CO_2-eq avoided (DEAT, 2007b). A more recent analysis of incorporating 15% renewables by 2020, with maximum benefits for the establishment of a local manufacturing industry through the deployment of wind and solar thermal technologies, has found that overall costs from such a programme could also be minimised. This study concludes that (Marquard et al, 2008 ii): ▪ Reaching a 15% renewable target by 2020 would increase average electricity costs in 2020 only slightly	

Risks		Opportunities	
	implemented to reduce emissions. Very little headway on sector-based or new agreements was made at the Copenhagen Summit, however, these issues are anticipated to gather further momentum in future negotiations. Finally, regulatory costs related to mandatory CCS in the medium to long-term could be substantial, particularly outside of the national synfuels industry. Estimates include a cost of R67-72 per ton of CO_2e sequestered for a 20 million ton capturing target by 2024 (DEAT, 2007b; DEAT, 2007d). Whilst CCS is a potentially viable technology in South Africa, it is not at an advanced stage of development and remains an expensive technology. Costs for introducing 27% nuclear energy by 2030 could also amount to R18 per ton of CO_2e avoided relative to a business as usual scenario (DEAT, 2007b). The use of imported hydroelectricity and regional gas supplies, whilst offering energy security benefits and risks, will also not be achieved without economic cost relative to a business as usual approach (ERC, 2008).	higher than the baseline scenario (around 15%) ▪ Combined with an energy efficiency programme, average electricity costs would in fact be lower than the baseline for most of the 2015-2020 period The development of renewable energy technologies such as wind could also help reduce electricity prices over the long-term. NERSA estimates that wind and biomass energy will be only 54% of the price of coal-based electricity in 2030, whilst the price of concentrating solar power will be almost comparable (see Business Report, 2 November 2009). It may be possible to employ the use of a REFIT to provide a gradually declining subsidy to renewables in the period before cost parity is achieved with other technologies. Such subsidisation, whilst having a number of socio-economic benefits, could also be internationally eligible for global climate support, either through a registered Nationally Appropriate Mitigation Action (NAMA) or through a bilateral agreement with a developed country partner. The diversification of the South Africa's electricity mix is increasingly recognised as a viable and important step for decarbonising the national grid, reducing company related electricity emissions and supporting nascent labour intensive industries in which South Africa may be able to develop comparative advantage (see CDP, 2009; NBI, 2009). Opportunities for methane extraction and use within power generation are offered within larger municipal landfills, many of which have viable levels of power generation capacity, as well as in certain waste water treatment plants. Water conservation measures in cities, whilst reducing national water requirements, will also correspond in reduced electricity consumption for water pumping, offering both energy and water savings.	

Risks		Opportunities	
		Finally, the widespread adoption of energy efficiency measures and mandatory targets has consistently been identified as a fundamental means to promote enhanced energy security, provide net costs savings and improve industrial competitiveness in South Africa. Residential, commercial and industrial efficiency measures have all been identified as negative cost measures in targets modelled up to 2030 (DEAT, 2007b). The introduction of Solar Water Heaters (SWHs) and insulation, for example, offers the opportunity to reduce residential peak demand, a key component in requirements for further power station development, whilst creating a local SWH and insulation industry of manufacturers, installers and retailers. Whereas traditional electricity production tends to be highly capital intensive, the promotion of energy management diverts expenditure towards comparatively more labour intensive industries, resulting in a net increase in employment despite reduced energy consumption. The promotion of energy efficiency could also be supported by the development of a national energy efficiency trading scheme in order to reduce implementation costs even further and to drive extended efficiency measures.	
Investor	Investor risk for the development of new coal fired power stations has emerged as an area of concern globally, including for larger multinational banks and multilateral lenders. Widespread coverage of the World Bank's hesitancy to fund a portion of the Medupi Power Station as a result of climate concerns, serves to highlight the emerging investment related risks in large-scale fossil fuel infrastructure (Reuters, 7 March 2010). Whilst *developed* countries can be expected to proceed with building their own coal fired power stations, the availability of external finance to support coal projects in	A number of opportunities for financial support and technology transfer are evident in the electricity industry. Areas of potential assistance include wind and solar energy, the REFIT, advanced energy efficiency technologies, combined heat and power (CHP), CCS and clean coal technologies such as Integrated Gasification Combined Cycle (IGCC) and supercritical and ultra-supercritical power generation. Clean coal technologies may be implementable at manageable cost. Indeed, initial assessments of the production of 27% of electricity from clean coal	**Country Level Investment, Finance & Technology Transfer**

Risks			Opportunities
	advanced developing counties could be an area of concern in the future. It is critical that fossil fuel infrastructure projects are effectively screened, and assurance provided that financing is available, whilst ensuring that a balanced and fair agreement on fossil fuel investment is achieved between developed and developing countries.	technologies by 2030, using supercritical coal and /or IGCC coal technologies, indicate these technologies to offer a net economic saving of R4.8 per ton of CO_2e avoided, relative to the baseline scenario (DEAT, 2007b).	
Supply Chain	As indicated earlier, in the absence of a competitive electricity market in which low carbon energy sources are employed, it is highly likely that any carbon related costs stipulated for the national utility will be passed onto consumers. Whilst some efforts will be taken to shield poorer households, the net effect could be a significant increase in electricity prices and inflationary pressures. The use of carbon taxation revenues in support of enhanced social grants, consumer VAT support and other such measures will need to be effectively evaluated, whilst other measures to support energy efficiency in all sectors, including power generation, will be required to reduce potential cost implications.	The socio-economic and environmental benefits from adopting low carbon technologies in electricity production are significant. These range from significantly reduced air pollution, with related benefits for the national health care system, substantially reduced water usage relative to water-cooled power stations, and enhanced energy security benefits through reduced electricity demand and diversified domestic supply. The promotion of efficiencies in power generation is a key component of linking modern power station development in South Africa to current practices in developed countries where efficiencies of 45% can be achieved. Efficient generation will not only result in long-term energy and cost savings, but mitigate the effects of carbon pricing mechanisms.	**Risk Management, Efficiencies & Competitiveness**
Reputational	Climate change has emerged as a key area of global and national concern, and there are considerable reputational risks for utilities that do not effectively provide low carbon energy sources or are perceived to be taking insufficient action on climate change. This risk is likely to increase over the medium term, but may be dependent on the establishment of a liberalised electricity market in which customers can shift purchasing. Investor related risks may be created in the interim, however, as discussed above.		

Risks		Opportunities	
Litigation	Fossil fuel based power generation has been earmarked as the focal point for legal damage cases in the United States. Whilst the risk of climate change litigation is low in South Africa at present, it is not inconceivable that public or private entities may wish to take legal action against the electricity industry for failure to consider climate change related financial risks in project evaluations, or for failure to encourage a more diversified electricity mix.		

Summary:	The national electricity utility, Eskom, is at marked regulatory risk from climate change, including through mandatory power efficiency requirements, CCS requirements and the pricing of carbon emissions. Key investor concerns are also evident in this industry, with the country's current power generation plan recently placed under scrutiny by lenders. In a non-competitive electricity market, end users of electricity are at considerable risk of carbon pricing being passed down by the national utility, in the form of higher electricity prices, and remedial measures would be required to address inflationary pressures and social equity concerns. The combination of commercially viable renewable energy technologies and energy efficiency has the potential to reduce overall electricity prices within a decade relative to conventional practices. Renewable energy and energy efficiency also offer benefits for labour intensive growth in an industry currently characterised by high capital intensity. Additional benefits relate to improved air quality, enhanced energy security, reduced power station investment requirements, and opportunities to attract new forms of international investment, whilst supporting enhanced carbon competitiveness for a range of South African businesses.