A powerful new strategy to shape SA's energy future

by Anton Eberhard, August 21 2012| Business Day

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THE National Development Plan, presented to President Jacob Zuma in Parliament last week, sets out steps to transform South Africa's energy system. By 2030, coal will contribute proportionately less to primary energy needs, while gas and renewable energy resources — especially wind, solar and imported hydroelectricity — will play a much larger role.

Energy powers economic development and contributes to the welfare of citizens. But these benefits need to be accomplished within the bounds of environmental sustainability. About 80% of our greenhouse gas emissions are from the energy sector, mainly electricity production from coal.

Some argue that South Africa will not be able to meet its climate-change mitigation commitments if it continues to promote electricity-intensive mining and mineral beneficiation. However, modelling by the National Planning Commission (NPC) shows that this is possible. Direct, on-site emissions from these sectors are only 5% of national carbon emissions and will not grow much in the next 20 years.

Two-thirds of the carbon emissions associated with mining and minerals processing derive from the electricity they consume. The current integrated resource plan (IRP) envisages that the carbon intensity of electricity generation will decline by a third by 2030 as renewable energy technologies are introduced. The structure of our minerals sector will also change as gold mining declines, inefficient smelters are upgraded and aluminium plants close at the end of their favourable Eskom contracts.

The National Development Plan shows that our coal, iron, ferro-alloy and platinum sectors could grow and total emissions would be lower in 2030 than they are today.

The core challenge in the coal sector is to ensure that the needs of Eskom's existing power stations are met for the remainder of their design life, while export revenues are maximised. Most of South Africa's coal reserves are in the underdeveloped Waterberg field in Limpopo. As coal resources in the central highveld basin — the location of most Eskom power stations — diminish, a new heavy-haul rail corridor to the Waterberg will need to be developed. The

coal line to Richards Bay also needs strengthening to match port export capacity of at least 91-million tons a year by 2020. Expanded coal exports will strengthen our balance of payments.

Coal export markets are changing. We export less to Europe and more to India, which accepts lower ore grades, some of which are needed for Eskom power stations. This has led to calls for restrictions on exports. However, the government should be cautious in applying policy measures that might have unintended consequences. For example, banning exports of coal lower than, say, 5,500 kilocalories per kilogram, could disincentivise investments in the new multiproduct mines necessary for supplying future Eskom demand. Instead, a win-win solution between Eskom and coal miners should be sought. This is possible, as the highest value option for most coal mines is an income stream from exports and Eskom.

South Africa needs to meet 29,000MW of new power demand between now and 2030. A further 10,900MW of old Eskom power stations will be retired. The integrated resource plan lays out power generation options in a policy-adjusted scenario that seeks a trade-off between least-cost investment, carbon emissions, technology risks, water-use implications, localisation and regional imports. The plan calls for 21,500MW of new renewable energy capacity to be in place by 2030.

International bidding rounds have already been held to fast-track renewable energy procurement, with positive outcomes in terms of falling prices and new private investment that will total more than R100bn in the next three years. While the price of solar energy fell by 40% between the first and second bidding rounds, its cost is still more than three times the current average price of electricity generation in South Africa. Further modelling is necessary to test the short-and medium-term sustainability of renewable energy investments.

According to the integrated resource plan, more nuclear energy plants will need to be commissioned from 2023. Although nuclear power provides a low-carbon, base-load alternative to coal, South Africa needs a thorough investigation of the implications of nuclear energy, including its costs, financing options, institutional arrangements, safety, environmental costs and benefits, localisation and employment opportunities, and uranium enrichment and fuel-fabrication possibilities.

A fleet of nuclear power stations will involve a level of investment unprecedented in South Africa. An in-depth investigation into the financial viability of nuclear energy is thus vital. The National Nuclear Energy Executive Co-ordinating Committee will have to make a final decision on South Africa’s nuclear future after costs and financing options are revealed.

South Africa needs a "plan B" should nuclear energy prove too expensive, sufficient financing be unavailable or if timelines are too tight. All possible alternatives need to be explored, including regional hydropower and greater use of gas, which could provide reliable and flexible power generation through combined-cycle gas turbines. Gas power plants have lower economies of scale and smaller plants can be built quickly to match demand growth. While the operational costs of gas power are arguably higher than those of nuclear, their unit capital costs are cheaper, they are more easily financed and they are more able to adjust their output to make up the shortfall from variable renewable energy sources. Gas supplies from Karoo shale, even if economically viable and environmentally acceptable, will take many years to develop. In the meantime, west coast gas resources should be developed and

investments should be made in liquefied natural gas import infrastructure as insurance for the future.

Further refinements and regular updates of the integrated resource plan will be necessary to track electricity demand (which could be lower because of energy-efficiency gains, sharp price increases and a sluggish economy, or higher if economic growth accelerates) and to assess whether new-generation technologies are delivering timely and affordable power. Planning capability needs to be vested in an independent system and market operator, which should be spun out of Eskom. The operator will also be responsible for procurement and contracting of new power, including independent power producers.

To ensure a level playing field between Eskom and such producers, transmission assets and operations should be transferred to the operator. Remaining regulatory uncertainties include the question of independent producers selling to customers other than Eskom, fair access to the electricity grid and rights to trade electricity.

The National Development Plan addresses other energy policy and planning issues, including energy demand management, electricity prices, electrification targets, reliability and maintenance backlogs in municipal distribution networks, the desirability and timing of petroleum refinery investments and transport changes.

Planning for our energy future is vital for the prosperity and wellbeing of South Africans. It involves a complex alignment with economic, social and environmental policies, strategies, programmes and investments. We must ensure our energy sector delivers reliable, competitively priced and environmentally sustainable services.

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