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05 August 2015

Email: trevor@grasslands.co.za

Dear Trevor Elliot

RE: ESKOM EIA CONCERNS FOR THE PROPOSED NUCLEAR-1 NUCLEAR POWER STATION (NPS) AND ASSOCIATED INFRASTRUCTURE (DEA Ref. No: 12/12/20/944)

GIBB (Pty) Ltd acknowledges receipt of the submission received from Trevor Elliot dated 20 June 2013. We thank you for your valuable comments and your participation in the Eskom Nuclear Power Station (NPS) Environmental Impact Assessment (EIA) process to date. Your questions and comments concerning the Nuclear-1 have been noted.

Comment 1:

Fusion is not the future: If Germany can phase out nuclear energy and thrive, why any country would choose to follow a uranium-fuelled path, wonders Jochen Flasbarth

At the start of this year Germany officially entered the Dark Ages again - at least according to it's state weather service. A mere 22.5 hours of sunshine were recorded in January- a 60·year low. Despite this, the country's power supply, which has a world leading input from solar panels, firmly stood its ground, even without the eight nuclear reactors that were switched off in 2011? There was sufficient energy for charging smartphones, running dishwashers and the like – and enough for slightly more essential things such as industry or life support systems in hospitals. And people in need of a fake tan could easily get one.

Such good news probably did not go down well with the pronuclear lobby. Grim and cold spells of this type had been their favourite doomsday scenario. Talk of a Stromlucke or electricity gap made headlines after the 2011 decision to shut nearly half of Germany's 17 reactors in the wake of Japan's Fukushima disaster, The fear ran rampant that, without a nuclear backbone, blackouts might push German industry out of business - or at least out of the country. This proved groundless. Despite the reactor switch-offs, Germany was able to help nuclear neighbour France as she struggled to meet electric heating needs in the winter immediately after Fukushima. According to recent figures released by the Federal Statistical Office, German electricity exports in 2012 hit a four-year high, which also rebuts the popular fallacy that the country relies on imported electricity from nuclear plants in France or the

Czech Republic. When a highly industrialised country such as Germany can cut a third of its nuclear capacity. almost at the flick of a switch and still export more electricity than it imports, the pursuit of a nuclear renaissance elsewhere is puzzling. For example. the UK recently agreed to a new nuclear plant, Hinkley Point C, in Somerset and work began on reactors in South Carolina and Georgia in the US.

Response 1:

Your comment has been noted.

It is not the intention of the Nuclear-1 EIA to debate the pros and cons of alternative electricity generation technologies. The EIA process is project-specific in nature and has a specific mandate in terms of the applicable South African legislation, namely the National Environmental Management Act, 1998 and the EIA Regulations (Government Notices no. R 543 to 546 of 2010), to assess the impacts of a proposed nuclear power station. An EIA, as a tool of environmental management, is not able to revisit strategic government decisions on the relative contributions of different electricity generation technologies to the mix of generation in the country as a whole.

The recommendations made in the Integrated Resource Plan 2010 with regards to the contributions of the nuclear, coal, renewables, etc. are strategic government decisions outside the ambit of the Nuclear-1 EIA process. Neither the Nuclear-1 EIA process nor any other EIA for a power generation project has any mandate to revisit the recommendations of the IRP 2010, which recommendations have been adopted as government policy through acceptance by cabinet. The IRP is reviewed periodically and some of its recommendations may change, but it is likely that the majority of the changes will be with respect to timing and not with respect to the mix of generation technologies.

With regards to the German power generation situation, various studies have been done on the implications of removing power from the supply side. Because of the pooled nature of European supply and seasonal variations, an overall analysis of the German situation is both complex and not necessarily directly comparable to the South African situation. The decisions on the generation mix taken in the IRP 2010 are based on the South African situation.

Comment 2:

Why would anyone choose to reinvest in a form of power that seems not to have been harnessed properly? At Chemobyl and Fukushima the world had two very close shaves. Not a very impressive safety record for technology that has been pampered with billions of dollars of investment over 60 years: Nuclear power incurs risks and costs beyond the operation of its reactors: getting uranium out of the ground devastates the ecology of countries that mine it.

Response 2:

Your comment has been noted.

All power generation technologies have some form of environmental and social costs. Whilst the environmental and social costs of nuclear accidents like Fukushima and Chenobyl are highly publicised, the environmental costs of other more socially accepted technologies like coal-fired generation have not been publicised to the same extent, but are no less severe. Impacts of coal-fired generation (from a life cycle perspective) include, but are not necessarily limited to: deaths and injuries from coal mining, acidification and salinisation of water sources, large scale sterilisation of farmland due to open-cast mining and ash dumps, use of large volumes of water (with associated impacts on aquatic systems) and potential respiratory health impacts. Whilst a nuclear accident such as Chenobyl had a single and large impact, coal technologies result in smaller scale and less visible impacts, but no less significant when considered cumulatively over time.

It is significant to note that although the Fukushima incident has received extensive publicity, the release of radioactivity from this plant has not resulted in any deaths or incidents of radiation sickness. It must also be noted that the technology of plants such as Fukushima and Chenobyl are several decades older than the proposed Generation III technology for Nuclear-1, which is much safer than the older technology. The two technologies mentioned also have different reactor types; Chernobyl was a Reaktor Bolshoy Moshchnosti Kanalniy (RBMK) / High Power Channel-type reactor and the Fukushima Daiichi reactor was a Boiling Water Reactor type (BWR) reactor, which are both completely different from the Pressurised Water Reactor (PWR) type reactors that Eskom proposes to use for Nuclear-1.

It is true that nuclear generation results in uranium mining impacts. However, the same is true for any other technologies, including renewable technologies like solar and wind generation. Raw materials for solar panels and wind turbines and their associated infrastructure are also obtained through extractive and destructive processes, including mining. Silicon for solar panels is obtained from soil, which is mined. Iron and other metals required for the construction of wind turbine towers is also mined. Thus, if a life cycle approach (from mining to decommissioning and waste disposal) is adopted to assess the impacts of nuclear power, the same approach must also be objectively applied to renewable technologies to provide a comparative assessment of the impacts of all these technologies. Renewable technologies are not free of environmental impacts over their life cycles. However, a life-cycle impact assessment is not possible within the constraints of a project-specific EIA process.

Please refer to Appendix E 33 for futher details on Fukushima and Chernobyl within the Beyond Design Accidents Report.

Comment 3:

Then there is the risk of nuclear proliferation and of terrorist attacks on a reactor site. Finally, Germany and many other countries have no fatality (sic) for the final storage of nuclear waste.

That's a bit like taking off in an aeroplane without having a proper landing strip ready. Fortunately, there are far better alternatives. In 2010 my agency devised a study which showed how Germany could source all of its electric energy from sun, wind or water. Now

the Energiewende, or energy transition, the country needs to make is high on the political agenda and gathering pace quickly. Remaining nuclear power stations will be shut by 2022 and fossil-fuel dependence reduced bit by bit.

Response 3:

Your comment has been noted.

Whilst Germany may have a suitable wind regime for substantial generation of power, South Africa has a limited wind power potential. It must also be remembered that the capacity factor of wind turbines in the South African context is around 30% or less. Thus, although the development of some regions in South Africa are very suitable for the development of wind power, these areas are relatively small and concentrated when compared to the national grid. Even if extensive wind and solar power generation is developed, significant backup power supplies (e.g. gas, which is very expensive in the South Africa context, or pumped storage, which is expensive to develop and has limited capacity) are still required in order to level out the often erratic nature of renewable power generation. Thus, the environmental and costs impacts of renewable technologies are not limited to these technologies only and need to include those of the backup technologies that inevitably need to be developed in parallel to the renewable technologies.

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Comment 4:

Some fear carbon emissions will raise. However, Germany is still way ahead of its Kyoto target. In 2012 emissions were already down 25.5 per cent compared to 1990 levels. Under Kyoto only 21 per cent is expected. One of the most pressing challenges of a 100 per cent renewable world is how best to use energy sources that by their very nature do not run constantly. Your average German wind turbine operates for 1600 hours of the year. Equally, there are times when wind turbines or Solar panels produce too much electricity. How to store this excess? This can be done conventionally by pumping water to fill a reservoir during the day and using it to produce hydroelectric power at night.

More sophisticated is power- to gas: carbon dioxide and water are combined in a series of steps to produce methane. Renewables will supply the electricity and the methane can be fed into the gas network to heat homes, fuel cars or generate electricity. The technology has yet to mature. But firms such as Audi are trying to get it off the ground commercially. Another challenge is to transport power from the wind rich north to the more populous southern and central Germany.

That will mean building hundreds of kilometres of new power lines. Opposition is predicted. But this could be tackled by offering locals a financial share in mid-scale private solar power installations or wind fans.

Response 4:

Your comment has been noted. Please refer to Response 1 in this regard.

It is also to be noted that the greenhouse gas footprint of nuclear power generation per kWh of electricity produced is also very similar to that of renewable technologies (See Chapter 4 of the EIR).

Comment 7:

A quick word on prices: the financial support for renewables has taken some flak. Critics argue that ladling out money for solar panels has overheated the market and created too much capacity at too high a price. But this can be dealt with. Cuts to payments to panel owners for the electricity they generate. The feed-in tariff have been made, more will follow. To put things in perspective: under the present system the average German is expected to pay €5 a month towards the feed-in tariff. This is a sound investment in clean technology protecting us from the spiralling prices of conventional energy. In a recent study we showed that in 2030, renewable electricity on average will cost 7.6 cents' per kilowatt hour; electricity from gas or coal-fired power plants will probably be 9 cents. Onshore wind turbines already match prices of some fossil fuels. Critics of the Energiewende have argued that it was a knee-jerk reaction after Fukushima. In fact, it was a very rational decision that ended a long and emotional debate over energy policy. We in Germany are not missionaries for this approach. Everybody is free to ignore the facts. Put simply, nuclear power is unsafe and fossil fuels are not a long-term option because of climate change.

Response:

Your comment has been noted.

Comparisons of the Levelised Costs of Electricity (LCOE) of various generation technologies, including nuclear, coal, wind, solar photovoltaic and concentrated solar are provided in Chapter 5 of the Environmental Impact Report (EIR) Version 2. These cost comparisons are provided for the South African, UK and USA markets. All three of these comparisons indicate that the costs of nuclear technology per kWh are competitive with coal-fired generation and with renewables. Although nuclear power has a high start-up (capital) cost, its operational cost per kWh is relatively low.

Yours faithfully

For GIBB (Pty) Ltd
Nuclear-1 EIA Manager