

Report on Nuclear Funding Models

Nuclear Energy: All Roads Lead to Economic Paralysis



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NUCLEAR ENERGY: All roads lead to economic paralysis!

INTRODUCTION

Nuclear power is globally in decline. The few nuclear reactors that are being built have to fulfil ever growing safety requirements because of the shocking impacts of past nuclear catastrophes, making them increasingly expensive to construct and to maintain. BUT, the South African government appears intent on building new nuclear power stations which would cost an estimated R1 trillion. Numerous research reports¹, have shown that nuclear is not the best option for our country. Even Finance Minister Malusi Gigaba has implied that the new-nuclear option for South Africa is both unnecessary and costly.²

Earthlife Africa has had a strong history of campaigning against nuclear power. We have challenged nuclear power on various fronts – legally, environmentally and economically. Our latest success was when the Western Cape High Court declared that all processes and agreements followed by government in pursuit of nuclear power were unlawful and unconstitutional. This means that whatever agreements have been signed with the USA, South Korea, China, Russia and France are invalid.

Unfortunately, this is not the end of the country's nuclear plans as government has publicly said that the plan to build nuclear power is still going ahead. This decision, considering the investment downgrade and rocky economy, is not only financially reckless but shows the government's gross lack of understanding of the potential for nuclear power to completely bankrupt our economy.

Whatever government's plans, we need to be prepared. Everyone needs to be aware of the different funding models and the associated risks to enable us to watch this nuclear circus with careful and informed eyes and hopefully stop it in its tracks once and for all.

THE TRUTH ABOUT NUCLEAR ENERGY

While focusing on the funding models, we must not lose sight of some of the major concerns around both South Africa's proposed nuclear programme and nuclear power in general:

- The programme to build nuclear power plants is based on an outdated energy plan that is more about enriching politically connected individuals than a serious energy plan.

¹ <https://www.fin24.com/Economy/Eskom/to-save-eskom-from-ruin-sa-should-ditch-nuclear-plan-and-cut-coal-power-study-20171116>

² Yelland C (2017), <https://www.fin24.com/Economy/Eskom/eskoms-latest-work-on-the-irp-for-the-doe-rejects-nuclear-20171124>

- The programme has been shrouded in secrecy from the very start. Dodgy deals have been struck behind closed doors and hidden agreements have been struck with Russia and others. As a result, the legitimacy of the procurement process has already been undermined.
- Nuclear waste is a toxic legacy left for centuries that will leave future generations with massive environmental and financial management costs.
- Nuclear energy is not a solution to reducing the escalating, negative effects of climate change. It takes at least 10 years to build a power station but we need to reduce our emissions now.
- Nuclear energy cannot ever hope to seriously contribute to reducing our country's massive unemployment levels. The maximum number of people employed in recent nuclear builds around the world (for example, in Finland) was about 3000 during construction and only around 400 for operations -, most of whom were/are skilled workers.³

The reality is that:

- renewable energy is cheaper and with the appropriate will and investment, can meet our demands fairly quickly
- globally, the construction of nuclear power stations has been way over budget and over time.
- there will be minimal jobs created and most of these will be for engineers and skilled workers.
- Immediately scaled-up renewable energy promises at least 100 000 sustainable jobs with the potential for many more.

FUNDING MODELS⁴

Historically, nuclear power plants were developed and funded by national governments. This was especially so during the Cold War and enabled governments to maintain a high level of control.⁵ However, as the cost of nuclear increased, it became harder for countries, particularly developing countries, to fund. This resulted in numerous funding models being devised to promote nuclear energy as a financially feasible option. Minister Mahlobo has already stated that if government does not have the funds they will go to the private market to find an

³ <http://sapressonline.com/greenpeace/wp-content/uploads/2012/07/The-Star-23-Jul-12.Nuclear-programme-jobs-a-pipe-dream.htm>

⁴ The following section was compiled and adapted from Jan Haverkamp (2017 np), Briefing for Earthlife Africa Johannesburg

⁵ <http://www.world-nuclear-news.org/V-Innovative-ways-of-funding-nuclear-power-projects-18021601.html>

investor who would build at their own risk.⁶ The reality is that there is always a risk for the country as investors sign deals that are in their interests. For example, in the case of the construction of the Gautrain, the South African government agreed to guarantee returns until acceptable profit levels were achieved. By 2013, government had paid the construction company (Bombela) about R900 million a year.⁷

Regardless of the different models, it is becoming clear that new nuclear projects have little to no funding chances in liberalised markets, because they have become uncompetitive. In regulated markets, they are only financially feasible with large amounts of state aid and other guarantees, which is a burden on taxpayers as this means that the people end up paying for the risks. While, the potential profits remain mostly privatised as can be seen in the case of the UK and France. The bottom line is whatever the funding model selected it will cost the South African people an arm and a leg!

There are five different models being used globally:

1. Market based loans

Used when nuclear construction has to be financed through/by the private market. There are three types available: project, corporate and bond financing.

a. project financing

Here, banks and other investors provide all of the finance for the project and the only collateral⁸ for the loan is the project itself (the un-built nuclear plant). This is quite risky for the financiers. This is like going to a bank for a home loan and telling the bank that the new house will be the collateral if anything goes wrong. The banks or investors could lose their money if the project is not completed in time and within cost.

As a result, the banks and investors set very high interest rates which add substantially to the cost of the project. This type of funding was used in Bulgaria on the Belene project, which was stopped due to corruption and a lack of funds, resulting in huge losses to the investors. The Bulgarian government had to pay

⁶ <https://www.news24.com/SouthAfrica/News/mahlobo-rushes-nuclear-deal-20171105-2>

⁷ <https://www.businesslive.co.za/bd/opinion/editorials/2013-06-25-editorial-time-to-open-the-door/>

⁸ Collateral is a kind of security for the repayment of a loan. If you cannot pay back the loan then whatever was put up for collateral is taken. For example, people can put their house up for a loan from a bank, if they do not meet their repayments their house is then taken by the bank.

about US\$700 million to Rosatom to compensate for cancelling the project. This was in addition to the US\$1.8 billion that was already spent.⁹

Because of the incredibly high risks, banks and other institutional investors have basically stopped project financing. Besides this reality, it is even more unlikely that South Africa would obtain investors given the shaky economy and political uncertainty.

b. corporate financing

In this option, a potential investor funds the nuclear plant and offers itself as collateral. This kind of financing is only an option for the largest utilities and developers, given that the cost of a large nuclear plant - with two or three reactors - is presently around R260 billion.

The French company EdF¹⁰ (which built the Flamanville and Hinkley Point C power plants) is an example where corporate financing is used to secure the cash-flow for the construction of new nuclear capacity. While interest rates are lower than in the case of project financing, the overall risk for the utility is much bigger – if the project fails, the entire company will collapse.

c. bond financing

Using bonds reduces the financial risk to some extent. In the case of the Mochovce 3,4 plant in Slovakia – ENEL¹¹ decided to bring the project inside a much larger bond issuing in the United States that was tied to the general investment programme of the company. Because the plant was only a small part of the entire ENEL investment programme, it was not mentioned in the prospectus. This meant that investors were not aware of the special risks involved or that those risks were more or less hedged by the return on the other investments.

⁹ <https://www.reuters.com/article/bulgaria-nuclear-belene/bulgaria-to-launch-tender-to-sell-belene-nuclear-project-next-year-idUSL8N1L12IP>

¹⁰ EdF - [Électricité de France](#)

¹¹ ENEL – an Italian company, which originally stood for National Board for Electricity (Ente nazionale per l'energia elettrica and is now National Entity for Electricity

Even when ENEL later had to basically write off its entire investment into the finalisation of Mochovce 3,4 (the largest part of the total investment for which the bond was issued), this did not influence its bottom line too much. This does, of course, not make Mochovce a cost-effective investment, but rather an invisible one, largely cross-financed in the end by the client of ENEL, in this case the Slovakian government.

2. **BOO(T) – Build, Own, Operate and Transfer**

The BOO(T) financing model was introduced by the Russian state-owned utility, Rosatom in order to secure the construction contract for a four-reactor nuclear power station in Turkey. It has since used the model in different forms in Hanhikivi (Finland) and in its proposals for projects in other countries.

This model has one investor – a state or private entity – that puts up the money for the plant, is responsible for building it and oversees operating it. If the investor is the state, then this means that the host country will take on all the risks due to delays, budget overdraws and nuclear waste.

In the case of Akkuyu in Turkey, the agreement is linked to a guaranteed price for 50% for 15 years of the delivered electricity (i.e. a guaranteed return for the investor Rosatom). This price is slightly higher than the market price in Turkey, but it is also stable. The rest has to be sold on the private market at market prices. That means that Akkuyu most likely is going to run at a loss, but that loss will be in the books of Rosatom and not on the shoulders of the Turkish taxpayer.

The T in BOO(T) stands for Transfer, which depending on the agreement between the client and Rosatom, includes that transfer of technology, transfer of waste or the long-term transfer of ownership. In the agreement with Turkey, Rosatom promised to take back the spent fuel from Akkuyu. However, because current Russian legislation does not allow such importation of spent fuel, it remains to be seen to what extent Turkey will have to take care of the radioactive waste of Akkuyu, or Russia will change/bend its own domestic laws rules.

The main reason for Rosatom offering such a model is political. Turkey has basically sold part of its sovereignty over Akkuyu to Russia for the next 100 years or so and Russia perceives the inevitable financial losses as a good political investment.

While the South African government has stated that the model it hopes to select will depend on the proposals received, Minister Mahlobo has publicly stated that his approach would be informed by a “build, operate, train and transfer” model¹², which appears to closely resemble the Rosatom model. If, as is the case with the BOO(t) model, it is not economically viable, one then has to wonder what political gains will accrue to Russia from in South Africa.

3. **Fixed prices (contracts for difference) and guarantees**

In this model, a fixed price is set for the price of the electricity produced by the nuclear plant(s). The type of ownership is often private companies. This is similar to that of a ‘feed-in tariff’ that is used for renewable energy and which have been successful in leading to a steep decrease in the production costs of wind turbines, photovoltaic cells, concentrated solar heat power and geothermal energy. The rationale is to support new technologies that cannot compete on the market yet and to ensure a guaranteed return of investment that will accelerate innovation.

However, nuclear energy is not a new technology. It has been in existence for over 70 years and has always benefited from state subsidies. This particular model arose in the United Kingdom where the government was desperate to restart nuclear construction using guaranteed feed-in tariffs.

The British government’s desperation to build a nuclear power station resulted in an agreement that was totally in favour of EDF. For renewable energy, the feed-in-tariffs are valid for a period of between 10 and 15 years (depending on project and generation source), for the first nuclear project at Hinkley Point C in Summerset it is for 35 years that will have British consumers covering the bill.

As long as the market price is under the fixed price, the government pays the difference to the utility. However, when the utility can get a higher price on the market, it pays back the difference to the government. In the case of Hinkley Point C the fixed price was set at GBP 92.5 per MWh (US\$104 /MWh). This is between two and three times the current wholesale market price for electricity in the UK, which means that if the market is still offering this price level when Hinkley Point C comes on grid, the government will have to pay as much as US\$55 /MWh to the private operator EdF, as compensation.

¹² <https://www.news24.com/SouthAfrica/News/mahlobo-rushes-nuclear-deal-20171105-2>

Given this agreement, once completed, Hinkley Point C will be the most expensive power plant in the world.¹³ This agreement arose out of the British government's intense desperation to build a nuclear plant. It is an important example for South Africans to watch as our government displays similar desperation and keen to strike deals without considering the country and the people.

4. Sovereign loans

Because of the sheer impossibility of having new nuclear projects wholly financed by the private market and the incredibly high risks of other schemes, some governments are applying for loans from other governments. Countries like Belarus, Hungary and Bangladesh are financing their new nuclear projects with a sovereign (country to country) loan from Russia with a credit guarantee from the Russian export credit bank. In this way, they can benefit from relatively low interest rates. However, in the process they will become, of course, financially dependent on the Russian government.

In the case of Paks II, a nuclear power plant in Hungary, analysts have suggested that there is simply no way that the project can become financially viable, unless Hungary adopts one of two supplementary options; either to regulate its electricity market in such a way that the consumers of Paks II electricity will pay higher rates than in the surrounding markets (i.e., market closure and regulation leading to a competitive disadvantage); or to ensure that the difference is covered by the state budget (which will require higher taxes).¹⁴

5. Private financing with government support mechanisms

For projects seeking private financing, the role of the government is key; and the government support mechanisms made available can be crucial to getting deals underway. These mechanisms can take a number of forms, including a guarantee to support debt coming into a project, a revenue support mechanism (such as a Power Purchase Agreement or Contract for Difference), or in some cases both together. Much depends on the country in which the plant is being developed, taking into account a range of factors including its credit rating, financial reserves, electricity market, and the rights and obligations of generators.

¹³ <https://www.theguardian.com/news/2017/dec/21/hinkley-point-c-dreadful-deal-behind-worlds-most-expensive-power-plant>

¹⁴ <https://www.euractiv.com/section/electricity/interview/energy-analyst-new-nuclear-reactors-will-heavily-increase-hungarys-debt/>

This could apply to any of the previous models with the possible exception of the BOO(T) one. This is therefore not a separate model but could form part of the other models.

WHO CARRIES THE (MOST?) RISK?¹⁵

There are many models for funding nuclear power plants. Most of these have been created to make nuclear power attractive under the guise of being affordable. The question that we must ask of each of these models is: “who carries the(most?) risk?”.

Bankers, investors and politicians too often answer such a question by saying that “there are risks in everything”. The risks to the construction companies are mostly experienced in terms of costs due to delays in construction, budget overdraws and mistakes. The risks for the bankers and investors lies in the increasing cost of nuclear and thus the lack of profitability of such a project. In addition, in the case of Belene in Bulgaria, cancelling a project leaves the investors with a huge debt.

Often, the risks to the host country are not considered enough. The risks to the host country range from government guarantees to the various costs associated with high-level radioactive waste. There can also be an excessive cost for electricity if governments have agreed to a guaranteed price for the electricity or a guaranteed profit for the private company involved. In addition, in the case of sovereign loan financing, the risk is largely placed on the shoulders of the recipient country and the state budget (and thus on the people). For countries with an already shaky economy like South Africa, that risk could theoretically make the country insolvent if/when the worst comes to worst.

Every financier should and in many cases, will be highly aware of the risks of nuclear projects. The more market dependent the project is, the more important the above-mentioned risks will be. Still, this awareness is hardly ever complete. There is always a lack of awareness of the depth of the risk factors in the nuclear industry. This is particularly important for ordinary people who simply do not know enough about the economic risks of nuclear energy.

It is our hope that we can stop this nuclear train that the government seems intent on moving with. If we cannot put a stop to it in the immediate term then we must ensure that the procurement process is open and transparent and that the funding model that the government chooses, have clear and informed risks. For us though, the picture is clear: the risks make absolutely no sense for a country like South Africa.

¹⁵ The following section was compiled and adapted from Jan Haverkamp (2017 np), Briefing for Earthlife Africa Johannesburg