

# ENERGY DEVELOPMENT AND ECO-SOCIAL JUSTICE IN CONTEMPORARY SOUTH AFRICA

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## Contending economic models

The challenge of development in the early twenty-first century is not always easy to grasp. Part of the problem is the strength of the 'modernisation' project, which has dominated thinking about African development since the 1950s, and which was broadly implemented from independence in the 1960s to the present time. In order to interrogate this model we need to ask whether, as the dominant approach to development in the late twentieth century, it was at all suitable for Africa's needs. The reality today is that the model has failed us. According to all statistics, African development has been reversed since the days of the 1960s: investment, production, exports, livelihoods, and lifespans have fallen, whilst poverty, inequality and disease have grown. This is due to a complex network of factors, including elite formation, corruption, state failure, the removal of rights, drainage of skills, globalisation, conflict, economic mismanagement, contrary terms of trade, misguided donor aid strategies, imposed structural adjustment, neo-liberal macro-economic policies, and notions of national prestige.

Given our understanding of the many obstacles to development, how do we arrive at what is the most suitable model for development?

Although there are numerous models, we need to highlight the 'modernisation' path as the one most treaded, and contrast it against new thinking about a more equitable and just development path.

The 'modernisation' model may be summarised as promoting growth at all costs. This meant a minimum of restraints on industry and markets, and depletion of natural and human resources. In relation to the latter, we have seen the model favour jobs that are less protected, dirtier, lower paid and in more recent times, more 'flexible' (informal, outsourced, dependent on street or home production, not permanent, not linked to any benefits, often only rewarded for piecework, discouraged from unionising, etc.).

There are at least three variants of this model. In the market-based or capitalist variant of modernisation, investment depends entirely on the confidence and whims of the owners of capital who expect private profit from production. Intensified under conditions of globalisation in the last quarter of the century, there has been a veritable 'race to the bottom' in which the developing country offers the investor the lowest wage levels, environmental standards and company taxation.

A second variant, which ultimately failed to deliver, includes a number of state-led industrialisation projects, including import-substitution, state-socialism, and even African socialism (*ujamaa*) in which the state played the role of investor, and sometimes also the organiser of production, employer and provider of social services. Despite aspirations for greater equality, this variant was also not immune from the development of social hierarchies, massive pollution, resource depletion, and inefficient production. We should bear this in mind in discussions on the role of the developmentalist state.

A third variant of the model is called 'ecological modernisation', which follows the neo-liberal recipe for development, but instead requires that the environmental services be recognised and internalised in the costs of production. In other words, the variant calls for the marketisation of ecology. We are seeing this in all sorts of ways, the most recent being the carbon trading system.

In contrast to this model, we need to offer as an alternative a new model which advocates eco-social justice. Although there are many different and contending understandings of this concept, the model needs to be based on at least five principles:

- (i) trans-class and inter-generational equity,
- (ii) an approach to resource use which respects both the finite nature of many resources and upholds the integrity of the global commons,
- (iii) conversion to clean, smart industry with minimisation of waste, pollution, biological extinction and climate change,
- (iv) upholding the principles of democratisation, local control, public participation, and transparency, and
- (v) guarantees of basic livelihoods for all

In order to achieve these principles, we need a firm regulatory approach in order to raise environmental, health and safety standards, whilst simultaneously our approach to the adoption of technologies which place these goals at risk should be highly precautionary.

On paper, South Africa at any rate is committed to some of these principles. Our constitution endows us with numerous social and environmental rights, whilst our framework environmental legislation (National Environmental Management Act no. 107 of 1998) upholds a number of the principles outlined above and points toward a justice-based approach to development. We have adopted the principles embodied in many of the multilateral environmental agreements of

the past two decades, and have ratified these agreements and brought them into domestic legislation.

However, despite these solemn commitments, our economic model is still more in line with historical growth-obsessed modernisation approaches, which have only demonstrated their ability to enrich a few. The practices, plans and expectations of the South African government, constantly articulated by its ministers, appears to have none of the aspirations of realising of development through upholding the principles of eco-social justice.

## Energy Politics Continue to Serve a Modernisation Model

Without varying from a modernisation approach, the state is unable to take stock of the country's developmental needs. It will continue to favour prioritisation of energy for the large energy-intensive corporations, rather than moving towards an industrial programme which values the smart use of natural resources. At the WSSD, which Johannesburg hosted in 2002, Wolfgang Sachs argued that the countries in South Africa's situation had the chance to "leapfrog into the solar age" without having to make the severe energy and industrial mistakes of the North.<sup>1</sup> We have ignored this suggestion.

Our energy policy makers envisage a future in which both coal and nuclear have a substantial part to play in providing our electricity.

While in a sense we are historic "prisoners" of coal, in that we have substantial resources for at least two hundred years, we are still in a position to choose whether to make future heavy investments in nuclear.

I would like to make some substantive arguments about why I believe further investments in nuclear as an energy source are inappropriate and mistaken. I will do this by examining the industry's own claims, and also examining governance difficulties and other risks posed by expansion of the industry.

## Nuclear Industry Claims

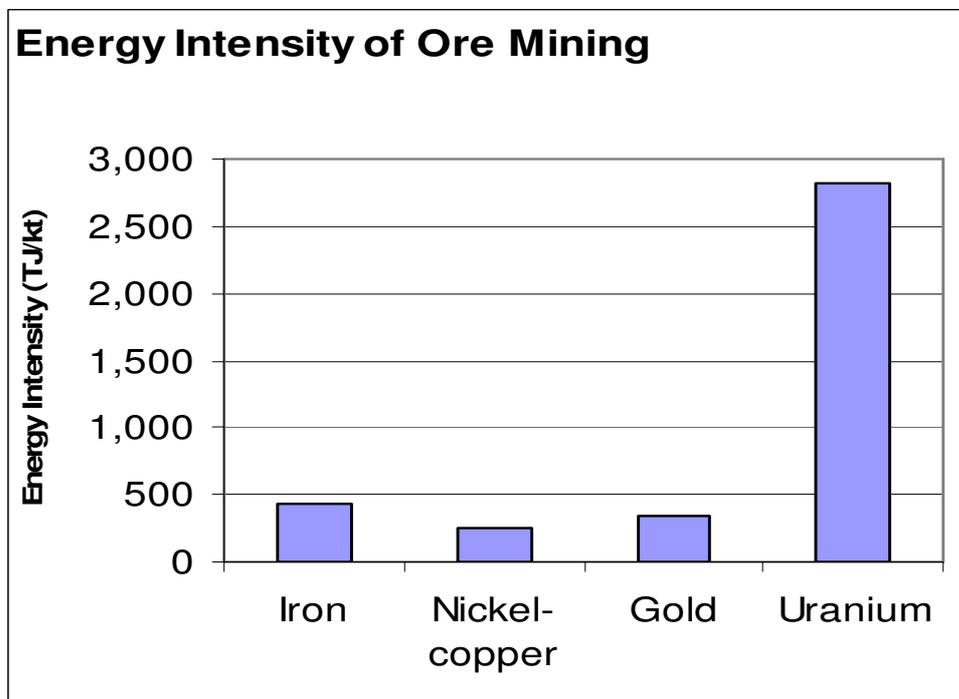
Globally the nuclear industry is using two arguments to move out of its longstanding doldrums. The first claim is that nuclear can reduce the risks of climate change, that it is a low-carbon option, and the second is that there is a role for nuclear in reducing energy insecurity, especially reducing reliance on external countries, some potentially hostile, in the meeting of energy goals. The global nuclear industry has used these two arguments to claim that there is a

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<sup>1</sup> Sachs, W. (ed.) 2002. *The Jo'burg Memo*, Berlin: Heinrich Boell Foundation, p.23 ).

post-Chernobyl “nuclear renaissance” under way, a bandwagon that countries should seek to climb onto for fear of being left behind.

A just energy policy would seek solutions that minimise **carbon emissions**, since we know that our planet is extremely vulnerable to climate change. It is perfectly true that nuclear fission inside a reactor does not contribute towards carbon emissions. The industry has used this fact to make claims that it is low-carbon. But let us look at the context of the entire value chain of uranium used for energy. The ore has to be mined and then the uranium extracted, one of the most energy intensive processes relative to other minerals (around 2700 terajoules per kiloton, cf. gold, copper, nickel and iron under 500 terajoules).



Uranium then has to be enriched, to increase the amount of the fissile isotope in its contents. Depending on the enrichment process, it often, like in South Africa in the 70s and 80s, has first to be converted into a gas. The gas is then cascaded through an enrichment plant. Once again, this is an extremely energy intensive process. In South Africa in the 70s and 80s, when we operated an enrichment plant at Valindaba, outside Pretoria, this necessitated a dedicated coal-fired power station being built adjacent to the process. It was calculated that the energy consumed in the enrichment process amounted to between a quarter and a third of Koeberg’s subsequent output. Once our bomb programme was retired, it was too expensive to enrich uranium locally, and it was cheaper to import enriched uranium for nuclear fuel. The current nuclear policy envisages the

reconstruction of an enrichment facility in South Africa (using the argument of “beneficiation” of our mineral wealth).

Reactor construction requires vast quantities of cement, also an extremely energy intensive material, for which separate statistics are kept in climate change analysis. And when the reactor ends its life, the entire building has to be treated as nuclear waste, decommissioned, dismantled, and buried. The transportation of nuclear materials, from fuel plant, from ports, from reactors, to different nuclear facilities is also likely to depend on substantial burning of fossil fuels. And our nuclear policy also calls for reprocessing of the spent fuel, in order to extract plutonium, certain to be an extremely energy process.

Currently nuclear provides only 5% of our electricity. Even if we treble this output, unlikely in the short run, we will still be 85% reliant on carbon burning for most of the processes that go into the nuclear fuel cycle. So the claim that the industry is low-carbon cannot be made until the bulk of our electricity is sourced from nuclear. This is a scenario that is unlikely to occur for at least the duration of this century, even with a full-scale nuclear build programme. By then, with business as usual, the intensification of climate change is likely to have escaped human control. Nuclear is therefore not a reliable strategy for reducing carbon emissions.

Can nuclear energy improve **energy security**? Here we need to distinguish between locally produced pebble bed reactors and foreign produced conventional pressurised water reactors. The Pebble Bed Co. recently announced that it was seeking a total of R31bn to construct a demonstration model, double the previous estimate, and that each reactor would only generate 80MW of electricity, down from 110MWe, a drop of 37,5%. So the home-grown component of our nuclear industry is unlikely to generate the volumes of energy we require. This has caused government to investigate the construction of up to three large-scale imported pressurised-water reactors, each costing around R100bn. However, before the tendering process for the first of these could be completed, government cancelled the process. In the height of the credit crunch it was deemed that the new generation of reactors was unaffordable.

Even if Eskom were to renew these orders, South Africa would become extremely reliant on one of three companies currently building reactors, Areva of France, Westinghouse of Japan (owned by Toshiba), and GE-Hitachi of US/Japan. Areva’s CEO already sits on our President’s Investment Council, while Westinghouse owns 15% of the Pebble Bed Co. These corporations would not only be responsible for building the large scale reactors, training all its operators, and possibly sourcing the nuclear fuel and other components. South Africa would become highly dependent on a single foreign corporation for a substantial part of its energy needs. This might be very risky, especially during times of crisis. Minister Erwin will recall that the electricity outages in the Western Cape were attributed to a malfunctioning bolt in one of the Koeberg reactors. A small piece of equipment

took a number of months to replace, stalling electricity production, and only due to the special pleading of President Mbeki in France did this happen on schedule.

The point is that with highly centralised and highly complex technologies, their malfunction will have a huge impact on the society as a whole. Contrast this with renewables which may be decentralised, empowering local communities to determine priorities, and employing local people in the installation, maintenance and repair of much more easily managed technology. The jobs dividend of renewables would be huge, since we know that nuclear reactors employ few people in higher-end jobs, many of which require imported operatives because of South Africa's very limited technological skills base. And even if we train more local nuclear operators, and even if we transfer some technology, we will not be able to do this on a scale that makes a big difference. We will still be reliant on imported components for our electricity production. We will become yet more energy dependent.

To underscore the point that centralised energy technology is risky, let me point to the recent shut down of one-third of France's 58 reactors, due to a prolonged heat wave this northern summer. France was required to import electricity from the UK. The shut downs were due to the fact that water is used to cool reactors, but when water temperatures rise too high, reactors have to be closed for safety reasons.

So the industry offers false promises on the questions of carbon emissions and energy security. Its claim to spearheading a "nuclear renaissance" requires a closer look. Whilst some new orders for reactors have occurred in Russia, China, Korea and Japan, there are still moratoria in a number of European countries. The UK has announced it will build new reactors, but only the amount of those being decommissioned due to old age. Five of eleven planned reactors in the US have already been cancelled, and four of the ones due to be built will only be viable through a Bush administration subsidy of \$18bn. The British and Finnish regulators have made strenuous objections to the safety specifications of Areva's design for a pressurised water reactor, the EPR. In Finland, Areva's construction of a new EPR have also resulted in serious cost and timetable overruns, with huge penalties being imposed on the company. The delays to the South African build programme are also symptomatic of a less vigorous revival.

Deleted: reactor

And what of our Pebble Bed reactors? The company originally formed in 1999 to revive plans for a high temperature modular reactor, based on helium as a coolant. The budget for the company has to date been R9bn, and it appears to spend about R1bn per year. It has already spent R8bn of its allocation, and by March 2010 it will have spent its full allocation. Given that it needs a total of R31bn to develop a demonstration model reactor at Koeberg and a fuel fabrication plant at Pelindaba, it is about to run into problems. It will need to raise the extra R31bn through appealing to businesses, foreign investors and banks, amidst one of the most severe credit and investment crises in living

memory. Already it has had to adjust its business plan, and make numerous changes to its design. It is keen to reinvent itself as Eskom's nuclear division, in order to preserve skills. Most recently it has postponed the potential delivery date for the demonstration model from 2013 to 2018. This is not untypical of the industry in general where cost and time overruns are notorious.

## Nuclear Governance

Ironically, despite the pebble bed reactor design not being finalised, the company went ahead in commissioning an Environmental Impact Assessment some five years ago. In 2004 the then Department of Environmental Affairs and Tourism issued a record of decision allowing for the Pebble Bed demonstration plant to go ahead. This was challenged in court by environmental watchdog Earthlife Africa, and the judge agreed that due process had not been observed. The company then announced that due to a design change, it would initiate a new EIA, rather than see through the first attempt. Given the recent further redesign of the reactor, this places the current EIA process under question.

The same can be said for the conventional reactors, the first of which has been nicknamed Nuclear 1. The EIA for this reactor is well under way even though there is no clarity on which technology will be chosen. How is it possible to make an environmental assessment on the basis of little knowledge of what will be built on site? The answer is ministerial sleight of hand. Through an agreement between cabinet ministers, it was decided that the technology would not be evaluated in the EIA but in the licencing process which the regulator, the NNR, has to undertake. This flies in the face of natural logic and justice, since the impacts of specific technologies are what is normally under scrutiny in a best practice EIA. It would not be surprising therefore if future challenges were made to the process by civil society.

In an industry like that of nuclear, it is imperative that the regulator be as impartial and as scrupulous as possible. However our regulator's integrity has been undermined through the appointment as its CEO of a senior employee of the Pebble Bed company. Whereas its activities should be open to the public, it has been extremely difficult to get public access to key documents of the regulator. Although provision is made for representation by communities and trade unions on the board, their influence has been diluted and effectively silenced. The regulator has not been given sufficient resources to act as a public protector of the impact of radioactivity on affected communities and workers in the industry. The hundred year legacy of radioactive wastes on the Witwatersrand - in waste dumps and watercourses - remains to be addressed, and the regulator has been unable to take on the mining industry to resolve the crisis. The regulator has been in no position to assist the many workers from the Pelindaba complex who have suffered occupational exposures to radioactivity. The regulator also remains legally accountable to the department of energy, which simultaneously promotes the nuclear industry.

Governance of the industry remains fractured between Public Enterprises, Energy, Mining, Environment, Labour, Health, Science and Technology, and a weak regulatory body. There are few and highly limited opportunities for public discussion of the country's energy policy and governance structures.

## Other Concerns and Risk Factors

These observations are quite apart from other concerns about the expansion of the industry: added problems of massive costs, additional radiation risks, transportation dangers, the insoluble problem of waste disposal, the risks of proliferation of weapons of mass destruction, and the return to a security state.

These risk factors place a much higher social, political and environmental burden on future generations, since high-level nuclear waste must be isolated from the environment for up to ten times the half-life of plutonium ( $10 \times 24,400 = 244,000$  years). If not a technically impossible task, this is certainly a time-scale fraught with unpredictable elements. We cannot be certain, therefore, that future generations will be insulated from this risk.

Neither can we know that future political life will be stable such that no leaders will appear wanting to make use of nuclear material for weapons purposes.

Having painstakingly sacrificed and won a democratic political dispensation, it cannot be acceptable for us to opt for a technology that requires high levels (and long duration) of secrecy, policing, and the reviving of a culture of undemocratic security procedures. The industry is notoriously secretive - we have had suppression of information on costs, negotiations with investors, and of public documents.

This is nothing new, since by its nature the nuclear industry requires a climate of secrecy, high security, and guarantees that there will be no proliferation of weapons of mass destruction. During apartheid, the industry along with Armscor manufactured such weapons. Although they were dismantled on the eve of democracy, our thousand or so bomb makers were never brought before the TRC. Where are they all now? A couple were apprehended recently for trafficking in dual use equipment destined for Libya. Government tried to keep the courtcase in camera, but was successfully challenged by the FXI.

Another example - when Earthlife Africa reported an unsafeguarded radioactive calibration facility, President Mbeki accused it of scaremongering and Minister of Minerals and Energy Phumzile Mlambo-Ncguka threatened to pass legislation against this kind of whistleblowing. Earthlife was vindicated when the regulator confirmed that it had been telling the truth.

The most telling aspect of the nuclear policy document is the intention on the part of government to create a nuclear security force. This will have to police increasing movement of nuclear materials between an increased number of nuclear facilities. The nature of the industry is such that it requires significant security provisions, and will mark the return to the kind of security state that we knew under apartheid.

Before we spend hundreds of billions of rands on the nuclear programme, we should be entitled to determine whether this is in our best interests. We need an objective evaluation of the opportunities and risks associated with a range of energy options. These should be assessed in line with the principles of eco-social justice which were iterated earlier.

Such an assessment will reveal that the amount of money devoted to the promotion and development of renewable energy sources in South Africa has been derisory. Despite our wealth of sun and wind, renewable energy sources are not being taken seriously as strong carbon-free alternatives to coal. Instead, the nuclear industry is dominating resources that could be devoted to renewables, which are also likely to employ more people in our job-scarce society. As we have seen, nuclear energy also requires a high degree of centralisation of the energy industry, whereas renewables allow for decentralisation and local control.

## Conclusions

Achieving ecological and social justice will require substituting the existing model of economic development, and challenging the current commitment to those technologies which violate the basic principles. The evaluation and adoption of technologies will require more rigour to ensure compliance with such principles. Instead of endorsing all high-tech options in the name of a spurious technological nationalism, our government needs to think about building eco-social principles into its evaluation of technological innovation. We need as a nation to increase public participation in decision making on appropriate technologies for development, including those in which the public has an important stake in the fields of energy, manufacturing, extractive industries, transport and agriculture.

All parts of public policy - including technological choice - need to be placed in line with such principles. Without this we will constantly be compromising our hard-won democracy and bowing down to short-term gain for the few at the expense of establishing long-term benefits for all.