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TOPIC REVIEW

enviroadmin Posted - 11 Jun 2007 : 08:05:34

Dear Readers, if there ever was a time to make your voice heard on Nuclear Energy in South Africa it is NOW !!!
We are all busy but this is something you need to make time for and you only have until this Friday to do so.
There really is NO TIME TO WASTE.

CALL FOR WRITTEN SUBMISSIONS ON NUCLEAR ENERGY IN SOUTH AFRICA

In line with parliament's core objective of facilitating public participation and involvement in legislative processes, the Portfolio Committee on Environmental Affairs and Tourism will host public hearings on Nuclear Energy on Wednesday 20 June, 2007. The purpose of these public hearings is to solicit public written and oral

input on the socio-economic, waste management and security of supply, human resource development as well as science and technological implications of Nuclear Energy in South Africa.

Interested Individuals and Groups wishing to comment on the subject of Nuclear Energy are kindly requested to forward written submissions to the committee by no later than Friday 15 June 2007. Stakeholders interested in making oral submissions are also requested to contact our office by no later than Friday 15 June 2007.

All correspondence should be addressed to:
Mr Langa Zita (Chairperson) and marked for the Attention of Ms Albertina Kakaza
Box 15
Parliament
Cape Town
8000

Tel: (021) 403-3749/65
Fax: (021) 403-2808
E-mail: akakaza@parliament.gov.za

PLEASE make sure to CC all your correspondence to: nuclear@environment.co.za

15 LATEST REPLIES (Newest First)

enviroadmin Posted - 28 Jun 2007 : 11:19:59

From:Mitchell Krog
Sent: Friday 15 June 2007 –03:45 am
Via: Email
Contents of Message:

DATE: 2007-06-15

ATTENTION: MS ALBERTINA KAKAZA

MR LANGA ZITA

CHAIRPERSON

PORTFOLIO COMMITTEE

DEPT OF ENVIRONMENTAL AFFAIRS AND TOURISM

NUCLEAR ENERGY HEARINGS

Dear Sir

Introduction

Firstly I welcome some sort of open, transparent dialogue regarding the issue of nuclear energy in South Africa. I assume from your very advert requesting submissions that you too are concerned about this issue and are finding the

misinformation and propaganda presented in the media greatly inconsistent. Certainly the issue of nuclear energy is not one to be taken lightly as it will affect all generations to come and I trust that your portfolio committee will conduct a thorough and intensive investigation into all aspects of the nuclear industry.

I think it is crucially important to note at this early stage of my submission that environmental

groups have been quickly ridiculed and passed off as hysterical freaks by the very factions who wish to push forward with nuclear energy. You must know that the environmental groups are all non-profit organisations and do not stand to make any financial benefit from nuclear energy. Their primary concerns are a safe and healthy lifestyle for every South African as afforded to every citizen under Chapter 3 of the Constitution of South Africa. In light of this I sincerely hope you will take submissions from private citizens and environmental groups even more seriously than the propaganda and misinformation that ESKOM, NECSA, PBMR and DME have been distributing and will continue to distribute to your portfolio committee, they are the ones who will profit out of this.

It is equally vital that you read a very lengthy study conducted by Storm van Leeuwen and Phillip Smith available at http://www.stormsmith.nl. These two men, one a nuclear physicist and the other a chemist and energy specialist conducted their own private study on the entire process of nuclear energy from the mining to the production of electricity. They bring to light the truth of this industry.

Again you must note that these two men were not paid by the nuclear industry to conduct this study, they did it privately and they too do not stand to benefit financially from their study. But I can assure you that Dr Rob Adams, Dr Kelvin Kemm and the rest of the nuclear industry in South Africa will tell you otherwise, they sure like to create confusion and pass off anything other than their own words as nonsense.

Finally I invite you to peruse through over 200 articles, studies and reports (local and international) on nuclear issues available at http://www.environment.co.za/nuclear/ , keeping in mind that this is a tiny percentage of the information available on the Internet.

1. Socio Economic Issues

It is a known fact that nuclear reactors are often closely situated to vast water resources and this is why most of them worldwide end up being built on a coastline. It is also a known fact that reactors sited in such areas have increased cancer rates in the local populations swimming in those waters and eating fish from those waters

because the water used to cool the reactors are simply pumped back into the sea. There are adequate documented cases on this and much of this has been presented to you already through other people's submissions that have been brought to my attention.

Tourism is one of South Africa's biggest industries. Is South Africa really willing to risk losing international visitors and investors who would avoid visiting an area or country if radioactivity may be a concern for them or their family? People living in first world countries are much wiser to issues of nuclear energy and radioactivity than what this government may know.

What about the citizens of South Africa? Property values near reactors will drop and in the case of accidents would become worthless. It certainly is unconstitutional towards any South African to place his hard earned property at risk of losing value due to a reactor being sited in their backyard. It is also unethical and uncalled for to just expect people of South Africa to suffer the loss and move elsewhere.

Prime agricultural lands are some of the areas in South Africa where much of the Uranium is situated that the Department of Minerals and Energy is now encouraging to be mined. Is South Africa really willing to lose agricultural lands so that a minority of mining companies with enough wealth already can further starve the masses of this country? What about other agricultural lands that are situated near to Uranium mining operations? They will stand the risk of radioactive dust from Uranium mining operations settling on their lands and contaminating their lands for years to come. How is this benefiting a country that is supposedly on a road to repair?

The pro nuclear factions, Eskom, NECSA, PBMR and DME are quick to use the draw card of creating jobs. Firstly we are not talking about enough jobs to satisfy the risk of putting the rest of the population at risk. Secondly the jobs they speak of are low-level, high-risk jobs while the CEO's and senior management of these companies (all state owned) will be the ones raking in the ludicrous, obscene and downright unjust salaries. Is South Africa really going to continue on this path of enriching a tiny minority while the masses are forced to do all the donkey work and suffer the health consequences? Sounds to me like the South Africa under Apartheid that I grew up in.

The costs stated for building ONE conventional reactor by Eskom is R150 Billion. That is at today's price as per the media. Given that it is going to take a number of years, if an additional reactor is built at all, I can assure you that this cost will increase greatly over that time. Add to this the fact that NECSA and the PBMR company also wish to build 36 PBMR's all over South Africa at a stated cost of about R16 Billion each. We are talking of Hundreds of Billions of tax-payers money. Why must the South African taxpayer be expected to fit the bill for this? Why are our taxes not being allocated towards that which they are intended? The government cannot afford to settle a wage dispute with striking workers in this country because and I quote "We have no Money" ... really? Where on earth then can the government find several

Hundred Billion Rand to build nuclear power stations when they cannot even pay educators, the lifeblood of this country, a decent salary? Priorities are severely disjointed.

2. Waste Management

The issue of nuclear waste is an issue that plagues ever single country that ever installed a nuclear reactor. The high level nuclear waste which remains radioactive for 80,000 years or more tends to stay at the power station because there is nowhere to dispose of it. If First World countries are plagued by their own nuclear waste then what makes South Africa think that we will magicly solve that problem? Is digging a hole in the ground and hiding it away really a solution? Seems very much to me like the way an Ostrich will bury his head in the sand and pretend his enemy does not exist.

To think of disposing of nuclear waste in this way is unethical, immature and certainly not safe. The nuclear industry say they will produce such a dumping site and the waste will be buried down in hard rock. Well no matter what hard rock they are referring to, water can pass through ALL types of rock and water will indeed pass through whatever underground rock they have in mind. What this means is that over many years gradual seepage of water that has passed through radioactive materials buried under the ground will eventually enter our water tables and the future generations of this country will drink contaminated water and will eat radioactive foods irrigated from underground water sources.

Sealing this radioactive waste in concrete is also not a viable alternative. Concrete is porous and seepage does and has already occurred at various radioactive waste sites all over the world even in South Africa. Currently this method is only used for low-level radioactive waste and all the high level waste like spent fuel rods still lie at Koeberg and Pelindaba.

We simply cannot go on as a human race by simply burying our mistakes deep underground and hoping they will disappear.

3. Security of Supply

This is an ambiguous topic to discuss as it can be interpreted in many fashions. Security of this country? Security of Electricity Supply? Security of Uranium Supply?

Multiple nuclear reactors will pose a security risk to the State of South Africa and to every citizen of this country. South Africa is certainly not immune from terrorist attacks or sabotage. Already a court case is underway in South Africa relating to smuggling of Uranium from South Africa. At present we have limited areas of availability of enriched uranium. What will happen when we have 40+ reactors all over South Africa with Uranium being transported all over our national roads? Highly secure armoured vehicles cannot escape the clutches of crime rings in South Africa, what makes the government think that it will be any different with their highly guarded vehicles transporting Uranium everywhere?

As far as security of Electricity supply goes. The media has painted a picture that we have a current shortage which is simply untrue. Eskom themselves stated in a media report just over a month ago that and I quote “there is enough on the system to meet the demand, even before we talk about Koeberg”. This does not mean that this country should not be looking at securing future supplies of electricity but it does mean that the current frenzy, panic and emergency that Eskom, NECSA, PBMR and the DME are portraying is deceiptful to the public of South Africa to say the least. There are many viable alternatives to energy but the nuclear lobby do not want to hear of them and quickly usher out any such ideas as foolish. They simply do not want anything else but nuclear energy and the buck stops there.

The last 2 years of major blackouts and power outages were and are not as a result of any shortage.

The real reason is the fact that Eskom has not maintained the power grids supplying most of South Africa. Eskom relies on subcontractors to do most of their work and much of this work is unmonitored. Certain areas of South Africa have been experiencing massive growth in property development yet Eskom has not upgraded their grids adequately, instead they just push more power through lines that are not equipped to handle such loads. As a result transformers burn out and power lines fail. This type of information would be certified if an independent enquiry into Eskom is carried out.

South Africa is one country in the world where we have an abundance of Sunlight and Wind and vast tracks of open land. Solar technology is indeed viable and the technology has changed much in recent years that high Megawatt installations can easily be built in deserted areas of which this country has many such places. For instance in the Nevada Desert a solar trough station is nearing completion. This installation uses no more than 1 hectare of land to produce 1,000,000 Watts of Electricity. That is enough to power 1200 households. Investing in Solar technology would provide this country the means to power many thousands of South African households which in turn would reduce the strain on the national power grid. By reducing the strain in the power grid it would reduce the need to produce more electricity by conventional means. The same applies to wind generated electricity. Vast areas of this country have ample wind that could power households and even certain smaller towns which again would reduce the stress on the national power grid.

Now it is very important to note that the nuclear lobby will quickly try to pass off these ideas as foolish. They will claim that wind power is unreliable which is clearly not true. The United States produces around 7,300 Megawatts of Electricity through Wind Power, enough to power more than one city the size of Philadelphia. Many other countries have very successful wind power installations that power vast areas of their cities. So the false claims by the nuclear lobby are exactly that, false.

The nuclear fraternity will also state silly things like “migrating birds could fly into wind turbines” while this may happen on a very rare occasion is it really worth putting the whole populations safety at risk for a few birds who might get harmed by a wind turbine?

As for Uranium supply. I for one am a landowner in Magaliesburg, an area rich in Uranium. Our community, just 15 km from the Cradle of Humankind, were notified in February this year that a private mining company wishes to conduct an EIA to prospect for Uranium on our properties. We are just one of many communities who would be affected by such developments by greedy mining companies. As far as I am concerned this is my only property, my life and my future and I have worked my entire life to get to this point and now someone wants to take it away. The DME has recently proposed amendments to the Minerals and Petroleum Act which would in effect give themthe right to confiscate properties from landowners. Not only do their proposed amendments violate virtually the entire Constitution of this country, they violate any sort of ethics.

The fact is Mr Zita, there ARE other very viable alternatives to South Africa’s future power needs but only if we learn to start thinking differently and stop being driven by greed. This country certainly also does not need to dig up vast areas of valuable countryside just to satisfy their appetite for money because at the end of the day that’s what all of this relates to.

4. Human Resource Development

The only human resources development that will be introduced by Nuclear Power Stations would be:

- Development in sick workers

- Development in Cancer in the population

- Development in contaminated lands and drinking water

- Development in low-level, high-risk jobs

- Development in insanity

When you look carefully at all the evidence and “Truth” about nuclear energy, the risks are quite simply not worth it.

5. Science and Technology

As it stands NECSA, PBMR and ESKOM already have to consider bringing atomic scientists out of retirement to work on a nuclear programme. Alternatively scientists would have to be employed from other countries which does not bode well for the creation of local employment. What happens when these elderly scientists finally resign and leave these plants in the hands on people not adequately qualified to do the job? Certainly the nuclear lobby has not made me feel very safe that they have the right people for the job.

As far as actual Science and Technology goes. If South Africa focused it’s energy and finances on alternative energy sources that are truly clean and renewable we could quite easily become a world leader in clean energies. That is something that other countries would be interested in, that is a resource we can resell.

The PBMR company have produced much propaganda and misinformation regarding their PBMR reactors. They have also shown their true colours by green-washing environmentalists at every opportunity, by taking solid fact and truth about nuclear energy and twisting the truths to suit their goals, by invading public meetings and behaving like little children who cannot get their own way. I honestly have seen enough of these PBMR people to know that they do not and will not play fair and I cannot believe one word they spew out.

The PBMR company has spent vast amounts of taxpayers money already to produce all sorts of feasibility studies and to fund their operation. They make claims of how safe the PBMR is or would be but that is absolute nonsense. How can something that we have not built yet be declared safe?

It’s ludicrous and insane to just draw pretty pictures on pieces of paper and then say it’s safe.

The entire nuclear lobby continually puts out this image that nuclear power is safe, clean and our answer to global warming. No it’s not. It’s certainly not safe and there are hundreds of reports by highly regarded scientists around the world that prove this beyond the shadow of a doubt. It’s also not an answer to global warming either. Global Warming and Climate Change is merely a scapegoat for the nuclear industry.

Ask Dr Kelvin Kemm who will no doubt participate at your hearing about

Global Warming. He for one does not believe in it so then you have to ask him: If he does not believe in Global Warming then WHY is he pushing so hard for nuclear energy as a clean and safe energy?

Nuclear Energy is also NOT renewable. Once we have burned up all the world's Uranium we will be left with thousands of tons of highly radioactive waste with nowhere to store it and the mining companies who made all their billions of Dollars out of it will be long gone living in places that are not contaminated.

South Africa will also be left with a very sick population riddled with cancers and all sorts of other strange and not so wonderful diseases. This will further plague our health system. Is this the kind of Human Resource Development that the government has in mind?

The very fact that the entire Nuclear Industry is shrouded in secrecy, mystery and mistruths is enough cause for grave concern.

Conclusion

This hearing on nuclear energy should be a preliminary stage of the process as I do not believe that the future of every South African can be decided in one meeting. This is a matter that concerns every single South African and it should be a matter discussed on a national level with full involvement of all South Africans. Public workshops should be held in every major South African city spanning several days thereby allowing for full and fair participation. These workshops should be held by an independent body who will provide truthful information to the public showing BOTH sides of the story and not just the nuclear lobby side of the story. These workshops should then produce draft documents which can then be further discussed and hopefully after several months of this type of involvement we would have a fairer and more truthful look at the WHOLE picture. It could then be brought down to a referendum for the public, the taxpayer, to decide on the matter and not a hasty decision taken by cabinet.

Intensive sessions spanning almost 2 years and with full public participation were carried out in the Western Cape regarding Provincial Spatial Development and Guidelines on Golf courses and Polo Fields which ended up producing legislation that was sensible and represented the voice of the people. So why is an even more intensive procedure spanning 2-3 years not being carried out with the nuclear issue?

I trust your portfolio committee will do the right thing and take a big backward step and do a thorough and intensive investigation in this matter.

The Constitution of this country is very clear and it must be defended and upheld at all costs.

This is certainly a matter that the people of South Africa have every right to have a say in.

Thank you for your time.

Yours Faithfully

Mitchell Krog

enviroadmin Posted - 28 Jun 2007 : 11:19:07

SUBMISSION ON NUCLEAR-ENERGY IN SOUTH AFRICA

15 June 2007

SOME THOUGHTS

(in response to an invitation to the public issued by the Portfolio Committee on Environmental Affairs and Tourism) By J. F. Siebert Pro Eng:Consulting Engineer (ex S. A. Atomic Energy Board, EsKom, and the National Nuclear Corp U.K.)

For the sake of brevity only a summary of the writer's views (the results of 1 5 years of association with the nuclear power industry) follows. Paragraph headings (except the first and last) are those contained in the invitation for submissions.

BACKGROUND

0.1 Prior to any discussion of the energy mix in S Africa must be the idea of maximizing utilization efficiency ie minimizing energy consumption per unit GDP. Implicit in this is the necessity of 'energy savings. Such savings are the first line of defence against global warming which is undoubtedly the greatest challenge man has ever faced. The most significant challenge currently facing S Africa in particular is unemployment and it is worth noting that the number of (South African) man-years necessary to save (non-trivially) 1MW of electrical power is arguably more than the (largely overseas) number needed to install the same amount of generating capacity.

0.2.1 Given that an irreducible minimum of electrical generating capacity is necessary in the country the question remains as to what mix of generating modes (nuclear, coal, gas, solar, hydro etc) should be employed to achieve a minimum cost per

unit with due cognizance being taken of reliability considerations and other objectives and constraints as indicated above. A full multi-objective optimisation analysis is needed to provide an answer; in the meantime it remains essential to ensure the inclusion of all germane considerations in such a definitive study.

0.3 Even the above formulation of the problem is inadequate if one takes into account the fact that electricity is hardly the only form of exploitable energy; use of the former to provide heat is in fact thermodynamically inefficient and the direct use of nuclear energy in devices such as desalination plants, or urban district heating schemes must also be considered.

0.4 Africa is the least developed of the 5 continents and the opportunity (or duty!) exists for S Africa to guide it into a pattern of energy consumption appropriate to the novel lifestyles that (particularly) African populations will need to adopt in a century that will see critical shortages of fuels, water and other resources. Africa's greatest energy assets are its potential for hydro-electric generation and solar power (both renewable) and it would be unconscionable were these not fully exploited before turning to more problematic technologies (see Paras 2 and 3) especially in view of the limited capital available for energy investment.

0.5 Most fundamental to long-term energy-planning is an examination of the desirability (let alone possibility) of never-ending economic development and the holding out by politicians to voters of democratically constituted countries the prospect of U.S-style consumption patterns. Curtailment of these expectations and acceptance of more modest material circumstances (which do not imply less fulfilled lives) would radically influence energy forecasts.

1 SOCIO-ECONOMIC IMPLICATIONS OF NUCLEAR POWER

1.1 The socio-economic implications of nuclear-generated electrical power (to be specific) would clearly be conditioned by the extent of the 'roll-out' of any program and whether or not it was additional to, or a substitute for an alternative-program of coal-fired generating capacity possibly incorporating clean coal technology or C02 sequestration. Arguably employment opportunities would be unaffected, as (for example) a reduction in coal-mining activities supporting the latter would be offset by an expansion in uranium mining and processing. Indeed as an exporter of 'yellow-cake' the possibility of S Africa's 'adding value' to raw U308 by establishing significant facilities for its conversion to gaseous form (UF6) , and even enrichment (see later) are not beyond the bounds of possibility. (Such a scenario was examined in the 1970's with the manufacture of fuel assemblies under license the final goal)

1.2 Historically the capital cost of a nuclear power station has been 30-40% higher than that of a coal-fired equivalent although how this relationship may change with the fitting of C02-reducing measures is unclear. Whether these will become mandatory under some successor to the Kyoto Treaty on greenhouse gases is open to question; certainly China and India appear to be content with 20th century technology in their current expansion of generating capacities. S Africa has long been noted for its cheap electricity allowing it to attract international investment in energy-intensive processes; eg aluminium production, but it is unlikely this reputation could be sustained in the face of such competition without a similarly relaxed attitude to environmental concerns.

1.3 In most countries where nuclear power is a real possibility, resistance to it appears to be diminishing, no doubt in the face of the perceived greater threat of global warming and the fact that no major nuclear incidents have occurred over the

last 20 or so years. As the number of nuclear power plants world-wide increases and those now in operation age the chance of another major accident becomes statistically likely; with unpredictable effects on public opinion.

2. WASTE MANAGEMENT

2.1 Waste management remains the chief obstacle to the general acceptability of nuclear power by virtue of the malign properties of long-lived fission products produced in nuclear reactors. Consequent dangers are two-fold: (1) accidental discharge through natural processes-(eg"eaTthquake, diffusion processes) into potable water suppli~S"or the food chain; (2) dispersion ofthe waste into the environment by terrorist activity using various methods.

2.2 While in principle the waste management problem may be solvable through rigorous administrative controls supervised by bodies such as the IAEA , their effective implementation would be highly vulnerable to the well-known tendency of the taxpaying public to be unsympathetic to long-term government spending on projects with little tangible benefit. This phenomenon is already evident in S Afuca where infrastructural spending has long been subordinated to 'social' payments.

2.3 Waste management difficulties are magnified enormously if mixed oxide fuel is used in reactors. The manufacture of the fuel containing a mixture of plutonium and uranium oxides involves the 'reprocessing" of spent uranium fuel assemblies and is a notoriously 'dirty' operation giving rise to copious quantities of high-level waste. Yet in the light of a potential shortage of natural uranium it is often seen as desirable by energy economists, and even a partial solution of the waste management problem.

2.4 The decommissioning of obsolete nuclear power stations which may be seen as another aspect of waste management represents a further often neglected and unknown nuclear power cost.

3 SECURITY OF SUPPLY

3.1 Natural uranium (U308) is widely available (Canada, S. Africa, Australia, Niger etc) generally at low concentrations. The active uranium isotope (U235) is present at 0.7% of

the total uranium content; since most power reactors operate using a U235 concentration of about 2% or more, 'enrichment' of natural uranium to that level is required. This process (in any of its various forms) is energy intensive, and politically contentious in view of its place in the chain leading to the manufacture of nuclear weaponry. Security of supply of uranium fuel for possible S. African nuclear power stations therefore hinges on the further development of the Nuclear Non-Proliferation Treaty and whatever international regime may be constructed to deal with the enrichment requirements of individual countries. Prospects are not hopeful in a world in which disruption of energy supplies is now a standard diplomatic ploy.

4. HUMAN RESOURCE DEVELOPMENT

4.1 While nuclear power exemplifies high technology, this is mainly in the design and fabrication of critical components (pressure vessels, reactor internals etc) Such activities (in the case of large 'Koeberg-type stations) would more likely than not be performed outside of S Africa by non~South African engineers. Even in the case of the Pebble-bed Reactor (PMBR) only a small cadre of South Africans need be directly involved in view of the international nature of the project (but see Para 5) and the

global nature of any engineering contractor competent enough to undertake sophisticated metallurgical and forming processes. On the other hand it is possible that in view of its foundational role in PMBR technology South Africa could in the event of the technology being widely adopted become the specialist supplier of certain components (as has already happened to some extent in the aerospace and automotive sectors)

4.2 At the moment there are (to the writer's knowledge) no South African tertiary institutions offering courses on nuclear power. This is an omission that under any circumstances should be rectified on an appropriate scale. As things are a worldwide shortage of engineering skills is proving to be a constraint in the expansion of all forms of energy infrastructure.

5 SCIENCE AND TECHNOLOGICAL IMPLICATIONS

There is no doubt that the announcement of a program of nuclear expansion including some PBMR-driven generating capacity would be a major stimulant to scientific research and development in S Africa; less so if the program were exclusively based on large 'Koeberg-type' PWR reactors of 900 Mwe or so, purchased 'off the shelf' from overseas vendors. The R+D necessary to develop a small but efficient 'African' PMBR could mesh well with S African capabilities (but see 4.2)

6 RECOMMENDATIONS

Nuclear power should not be adopted on a massive scale until the full potential of hydro-and solar-generation in the subcontinent (taking into account climate change) has been explored, and utilized. Tax concessions etc should be immediately introduced to encourage the use of the latter especially for purposes such as space and water heating. Two 'Koeberg-type' nuclear stations (900 Mwe per reactor) should be ordered by EsKom , as well as two PBMR stations of 250Mwe each, financed by international capital. These would have the effect of both providing power to the national grid as well as cultivating a core of relevant expertise. Methods of using the waste heat from such stations should be explored. Demand-side management should be used (for example the introduction of off-peak domestic tariffs) to limit peak power offtake,

To cover any shortfall between this figure (plus some minimum reserve capacity) and total available generating capacity (including the nuclear, hydro and solar components mentioned above) a number of coal-fired and/or high-efficiency combined cycle stations should be also be included in EsKom expansion plans.

enviroadmin Posted - 28 Jun 2007 : 11:18:34

From:WT Janse van Rensburg

Sent: Thursday 14 June 2007 – 22:46 pm

Via: Email

Contents of Message:

For the attention of: Ms Albertina Kakaza

Mr Langa Zita

Chairperson

Portfolio Committee

Department of Environmental Affairs and Tourism

Nuclear Energy Hearings

Dear Sir

RE: NUCLEAR ENERGY IN SOUTH AFRICA

I wish to submit the brief précis below of the following study by two experts Storm van Leeuwen and Phillip Smith, one is a chemist and energy specialist, the other is a nuclear physicist. Their study is one of several which come to the same conclusion that debunk the argument being put forth by the pro-nuclear lobby that nuclear energy mitigates against CO^2 emissions and therefore is the answer to climate change. It is not.

To make matters worse, SA's nuclear bosses have said they "intend studying the full fuel cycle" and will be spending huge amounts of public money reinventing the wheel considering that much of this work has already been studied internationally if they only cared to access it.

The entire study mentioned herein is about 2.3 Mb in size. It can be downloaded from http://www.stormsmith.nl/ the download links are in various places on the page and totals 10 files (2.3 Mb). This includes rebuttals to arguments by proponents of nuclear energy.

Thank you for taking the initiative to call for public submissions. I respectfully wish to draw your attention to the fact that the short notice given for such prevents true justice to the importance of the issue. It is my humble opinion that in order to come to an informed viewpoint, a Nuclear and Energy Summit is required so that meaningful and a balanced input involving all stakeholders, expertsacceptable to environmental groups and civil society can avoid autocratic and one-sided decisions detrimental to this country for centuries.

A democratic process that delivers a positive and publicly-backed plan (based on the best information available in the world and not pro-nuclear propaganda) is more likely to find an acceptable solution for South Africa's energy requirements.

Yours truly

WT Janse van Rensburg

Broederstroom

NW Province

enviroadmin Posted - 28 Jun 2007 : 11:17:50

A SUBMISSION ON NUCLEAR ENERGY IN SOUTH AFRICA BY

NiMBLE - Nelson Mandela Bay Local Environmentalists

NiMBLE is an independent community volunteer non-profit platform of volunteers aiming to promote pro-social aims and economic development of our community within the framework of environmentalism.

A WIN-WIN economic development and environmental management policy is vital to the well-being of our community, our socio-economic legacy and to our VISIBILITY within the INTERNATIONAL climate change effort.

Defining a National Energy Plan gives us ONE shot at getting it right, and redressing many issues and backlogs. Nuclear Energy is ONE cog in this machine, but it is a significant cog.

The significance of the role of Nuclear Energy in terms of the Eastern Cape, and future of the Nelson Mandela Bay Metro necessitates in our opinion the creation of a 'Commission on Macroeconomics, Energy and Ecosystem Services for Poverty Reduction'

We are fundamentally GAIA theorists and James Lovelock's philosophy in terms of Nuclear Energy is the backbone overiding the 'hype and over-hype of nuclear-phobia. Phobia is an apt term here.

pho.bi.a (f+,bZ f) n., pI.bi.as a persistent, irrational fear of a specific object, activity, or situation that leads to a compelling desire to avoid it. [1780-90; extracted from nouns ending in -PHOBIA]- pho,bic adj., n.-phobia a combining form meaning "dread o£:" "phobic aversion toward," "unreasonable antipathy toward" a given object: agoraphobia; xenophobia. [< L < Gk, = -phob (os) -PHOBE + -ia -IA]

Nuclear Power Plants offer a significant solution to many problems GLOBALLY and of specific consequence to our Nelson Mandela Bay Metro.

We DO NOT presume to have a NUMERUS CLAUSUS of ALL the answers but hope that our submission will elucidate the view from Nelson Mandela Bay and of a certain group of pro-Nuclear environmentalist forming a part of the community.

Clear reasoning and mindfulness form a integral part of the road forward, not only with dealing with communities 'out-of-the-loop' so to speak regarding Nuclear technology, but also with those driving the National Energy Plan for specific advantage with detriment to segments of South African citizenry like us in the far too often side-lined Eastern Cape.

For this reason, we propose the 'Commission on Macroeconomics, Energy and Ecosystem Services for Poverty Reduction'

A strengths and weakness analysis(SWOT) brainstormed at a meeting offered these insights:

Strengths (Pro-Nuclear)

1. High-tech knowledge upgrade of skills pool in our community 2. Cleaner than coal

3. Seawater vs Freshwater

4. Abundant local power, positive implications for pro-poor electrification

5. Development of a local IPP ie a REDS or RTO, Economic benefit consolidated through the above for provincial & local regions

6. Nuclear Waste 'Storage' off coastal continental shelf out to sea off the bay is easiest.

7. A 'nuclear knowledge' hub in the Eastern Cape would give us the nuclear franchise

8. Exporting not only energy but knowledge across Africa

9. CDC boast, positioning Nuclear Plants in the CDC's like Coega will maximize advantage and minimize ruining pristine coastline

10. Diversification of Energy bouquet

11. Leaves the door open for PREMIUM green energy. (We envisage this opportunity in the future where Pro-poor and CDM opportunities can exploit Alternative Energy Production for not only VISIBILITY in the global climate change effort, but for sustainable livelihood pro-poor development.

12. The opportunity to revise the NEP, giving the Eastern Cape an equitable share of energy production 'ownership'

13. If the Eastern Cape had 25% of National Energy production through nuclear at the coast and its HUB in the Eastern Cape, this would do a great deal for redressing past side-lining. Offering a quantum leap in terms of skills opportunities and sustainable livelihoods connected to this locally based high-tech industry. Nelson Mandela Bay, the home of Nuclear Energy, South Africa.

14. We advocate for an Energy bouquet spread: Coal 50 %, Nuclear(at the Coast)35 % and 15 % Alternative Energy for the account of pro-poor initiatives

15. Of the Nuclear at the Coast -75% should be for the Eastern Cape giving us 25% of the national energy production

16. 50% of National Energy production in the Highveld (Coal)The remaining 25% spread between the Western Cape and KZN.

17. Uranium enrichment and export via Coega, limiting transport

18. Redressing the Eastern Cape's historical side-lining would more than justify this.

Weaknesses:

1. Nelson Mandela Bay is driving a campaign to be the GREEN Capital of SA

2. Phobia's in terms of Nuclear Energy

3. Skills inadequacies

4. Ruining opportunities for CDM developments & alternative energy production

5. Making LNG and peaking plants redundant

6. Transmission lines

7. Side-lining of other provinces in the Energy 'race

8. Coal; 2nd biggest SA earner is marginalised

9. Uranium, transport, enrichment, and safety

10. Nuclear waste

11. Nuclear at the Coast and eco-tourism

12. Political Will and Finance is NOT centred in the Eastern Cape

13. Runririg' pristine coastline

14. Drawing an influx of people into the Eastern Cape

15. Changing the fundamental nature of the Eastern Cape to a HIGH TECH nuclear centre, with global status as a knowledge industry and scientific breeding ground

The above are intended in good faith as a number of consideration around the consideraton of Nuclear Energy in South Africa. It is not a Numerus Clausus, and intends to show the serious consequences attached to this line of thinking.

NiMBLE as Nelson Mandela Bay Metro's premier Metro Environmentalist platform for public participation in our local environment affairs for OUR collective future encourages clear reasoning into the path ahead.

A number of concerns are apparent and FOREMOST must be the side-lining of the Eastern Cape once again. Over 200 years of this kind of oversight gives us the courage to stand up and say, we have a right to demand an equitable share in the future of this country, no longer will the Gauteng, Western Cape or KZN dominate our future.

I hope you'll accept this in that spirit.

Grego!)' G. Smith, chairperson 2007, NiMBLE

enviroadmin Posted - 28 Jun 2007 : 11:17:25

Dear Mr Zita

Nuclear Energy in South Africa

I am writing to you as an individual South African and an ordinary Capetonian who is passionately opposed to atomic energy and who would like to see a South Africa entirely free of nuclear power stations and nuclear weapons.

There are several very good reasons why I think South Africa should follow the lead of Sweden and Germany (Europe's economic powerhouse) in pursuing a nuclear free future. These reasons include the following:

1. Nuclear power is expensive

Atomic power plants are hugely expensive, take around a decade to build and cost billions to decommission. A 2002 a UK Cabinet Office report showed that nuclear power costs more than on-shore or off-shore wind electricity per unit generated. Besides, nuclear power stations produce waste that remains lethal to the environment and humans for tens of thousands of years - how on Earth do you put a price on that?

The global' nuclear industry has long survived on-massive-government subsidies and South Africa has been no different: According to the World Council on Renewable Energy, it has been supported worldwide to the tune of a total of at least a trillion (i.e. a thousand billion) dollars, while only $50 billion has been spent on renewable energy. Imagine where we would be today if that ratio had been reversed?

2. Nuclear power is no solution to global warming

The nuclear industry claims that we need nuclear energy to reduce C02 emissions which are a major cause of global warming. While it is true that atomic energy plants generate substantially less C02 than coal-fired power stations, they still produce much more C02 than renewables.

If nuclear power would contribute 70% of all electricity produced worldwide by 2100 (which would require construction of 10 000 new nuclear reactors), it would lead to a reduction in greenhouse gas emissions of merely 16%. This is because electricity production is only a comparatively small part of the problem - fossil fuel powered transport being the biggest greenhouse gas emitters.

According to Amory Lovins of the Rocky Mountain Institute, "each dollar invested in electric efficiency displaces nearly seven times as much carbon dioxide as a dollar invested in nuclear

power, without any nasty side effects. If climate change is the problem, nuclear power isn't the solution. It's an expensive, one-size-fits-all technology that diverts money and time from cheaper, safer, more resilient alternatives".

3. Nuclear power is not a renewable source of energy

The world's total recoverable reserves of uranium (the fuel for most nuclear power plants) have been estimated to be around 4.6 million tonnes. There may be another 10 million tonnes in undiscovered or low-grade ores. The world's current atomic energy plants need about 75000 tonnes of uranium oxide per year. Even without building the many n~ nuclear power stations that atomic advocates are demanding,

the present recoverable reserves are enough to satisfy the world',s current nuclear capacity for only another 60 years (source: Is nuclear power a solution to climate change? by Pete Roche).

4. Nuclear power is dirty

The whole nuclear energy chain, from mining, to transport, enrichment, fission, - waste storage-and waste disposal creates pollution at every stage. Nuclear reactors generate high-level radioactive waste that will remain lethal for tens of thousands of years and operation and decommissioning of nuclear power plants produces huge amounts of low-level waste.

The Blacksmith Institute has recently declared Chernobyl the most polluted place on Earth. Twenty years after the world's worst civilian nuclear disaster, the 19-mile exclusion zone around the plant remains uninhabitable. A former soviet uranium plant in Mailuu-Suu, Kyrgyzstan, also makes the top 10 list.

Between 1956 and 1966 a uranium refining mill in Tuba City, Arizona, processed hundreds of thousands oftons of uranium ore to help fuel the United States' nuclear effort. Today, former workers at the plant and inhabitants of Tuba City are still living with the effects: mine tailings, cancer, birth defects, miscarriages, groundwater contamination... these are just some of the externalised costs of the nuclear industry and Tuba City is just one of many examples from around the world.

Advocates of atomic energy love touting nuclear power as a source of clean and green electricity, but how clean is it really? Below, is some information from the December 2006 issue of Elements - An International Magazine of Mineralogy Geochemistry and Petrology, which is published jointly by several North American and European scientific societies:' The issue is entitled The Nuclear Fuel Cycle - Environmental Aspects and contains a series of articles by scientists who are described as "recognized leaders in their fields".

Manufacturing fuel for nuclear power stations produces radioactive waste at every step of the process, but the largest volume of waste consists of mine and mill tailings (i.e. material that's left behind after uranium ore has been mined and processed).

Mining of about 17 000 tonnes of 1 % uranium ore is required to produce enough uranium to fuel a 1 GW(e) nuclear reactor for one year. To date, worldwide mining of uranium ore has generated approximately 938 million cubic meters of tailings from more than 4000 mines. In most cases, the tailings are disposed off by "near-surface impoundment" (i.e. burial) near the mine or mill.

With levels of radioactivity ranging from less than 1Bq/g to more than 100Bq/g, catastrophic or continuous release of contaminants from these disposal sites can have substantial impacts on the environment.

The principal radiation risks from uranium tailings are radon gas, windblown radioactive dust dispersal and gamma radiation. Mill tailings are also frequently associated with elevated concentrations of highly toxic heavy metals which are a major source of groundwater and surface water contamination.

Improper disposal of mill tailings in the past has led to substantial water and soil contamination and disposal sites with no effective containment of the tailings are widespread. Hundreds of incidents of containment failure, resulting mostly from slope instability, earthquakes, seepage and overtopping, have been reported.

A typical 1 GW(e) nuclear reactor generates approximately 20 metric tonnes of highly radioactive spent nuclear fuel waste per year. In the USA, the current "inventory" of this type of material stands at about 62 000 metric tonnes and is projected to at least double by the end of the operating life of currently active nuclear plants. At the moment, there are some 443 atomic energy plants in operation worldwide (with some 24.more under construction). The current global inventory of spent fuel is about 270 000 metric tonnes.

Proponents of nuclear energy argue that for atomic power to have a significant impact on greenhouse gas reduction, a three to ten-fold increase in worldwide nuclear electricity generation is necessary by 20 50.The ten fold increase scenario requires about 3500 new 1GW(e) atomic power stations to be built, which would produce some 100 000 metric tones of radioactive spent fuel every year.

The three-fold increase scenario would involve a new IGW(e) plant to be constructed every several weeks and the high level waste generated would necessitate opening a waste storage site similar to the one proposed at Yucca Mountain in the USA every three to four years.

The atomic energy industry thus generates vast amounts of toxic and radioactive waste that has already contaminated parts of our planet and much of which we have no idea what to do with as yet.

No repository for high-level nuclear waste has been established anywhere in the world, even though the USA has thrown millions of dollars at the problem. According to some estimates it may take another 25 to 40 years for a high-level nuclear waste facility to be in operation in the UK At a time when many countries, First World and developing, are looking to build more nuclear power plants this should surely be a major concern for all of us.

My friend Petrus commented the other day, that this is a bit like taking off in an airplane while knowing that the- airport at your destination hasn't even been built yet. Atomic energy pundits assure us that these are merely technical issues that will be solved in due course and should not detract us from thinking that nuclear power is the best thing since sliced cheese. I guess in terms of Petrus' analogy, they are suggesting we stay in a holding pattern above our destination until the damn runway has been laid down already.

The nuclear industry has given us a number of very telling examples of how not to store high-level nuclear waste. Here's the latest case, taken from The Ecologist Online:

"Tanks holding nuclear waste in the Russian Arctic are in danger of exploding in a spontaneous chain reaction, an environmental group has warned.

Bellona, a Norwegian group which campaigns against nuclear power and advocates clean energy generation, described the tanks as 'a powder keg' with a burning fuse.

A report distributed by Bellona states:

'Ongoing degradation is causing fuel to split into small granules. Calculations show that the creation of a homogenous mixture of these particles with water can cause an uncontrolled chain reaction. '

The three tanks are reportedly filled with 21,000 spent nuclear fuel rods and are sited at Andreeva Bay, on the Russian Kola Peninsula. Until recently, they were thought to be dry, but new investigations have shown corrosive salt water leakage.

Both Russian and Norwegian authorities said that there was 'no danger', but that steps were being taken to improve the storage facilities."

5. Nuclear power is dangerous

Just ask the people who used to live near Chernobyl! The US Department of Energy has estimated that around the globe (because yes, radiation can travel) there were around 40 000 cancer deaths that can be linked to the Chemobyl disaster.

And it isn't just dangerous when the huge disasters happen. Uranium miners are routinely exposed to substantial doses of radiation, particularly through inhalation of radioactive radon gas derived from uranium ore.

Nuclear power stations are prime targets for terrorist attacks and the civilian atomic energy industry produces highly enriched uranium and plutonium which can be used to manufacture nuclear weapons.

In March, the Oxford Research Group released a briefing paper entitled Secure Energy? Civil nuclear Dower. security and global warming, which summarises detailed evidence to show that a worldwide expansion of civil nuclear energy generation would significantly increase the risk of nuclear terrorism and nuclear weapons proliferation.

A greater role for atomic energy would result in many more nuclear research and production facilities as well as transit routes for radioactive materials, providing a growing number of hard-to-secure targets for direct terrorist attack and theft of nuclear weapons-usable materials.

There is not enough sufficiently high-grade uranium ore in the Earth's crust to sustain the anticipated expansion of nuclear power for very long. The report claims that the "energy cliff' for nuclear power (i.e. the point in time when the system as a whole would consume as much energy as it can generate in usable electricity) based on uranium will be reached between about 2050 and 2075.

As a result, the nuclear industry will be forced to rely increasingly on reprocessing spent uranium fuel into Mixed Oxide Fuel (MOX) and reactor-grade plutonium. There are several reprocessing plants in operation, for example in the UK, Japan and France, at the moment, but more would have to be built in future to-satisfy-demand

The problem is that even with the most sophisticated technical safeguards available today there is always a degree of uncertainty about exactly how much plutonium is produced by such reprocessing plants.

This is inherent to the system and is not a matter of efficiency or competence of operators and safety inspectors. Even based on the most optimistic estimates (more than 99% efficiency), the potential amount of plutonium that may go statistically unaccounted for in one reprocessing plant, and could be diverted by unscrupulous govenunents or employees without being detected, is enough to manufacture a nuclear weapon each month.

Some atomic energy enthusiasts suggest that so-called "Generation N" or "breeder" reactors are the answer. These reactors use mostly plutonium and only little uranium,

and in theory they produce more nuclear fuel than they use - they "breed" plutonium-239.

After 50 years of very expensive and intense research, no one has so far been able to demonstrate that this technology is actually technically feasible. Two of the current "breeders" have been out of operation for years and one has a long history of serious accidents. None of them have actually ever "bred" any plutonium-239. If they ever should become viable, "Generation N" reactors will only add to security worries because they produce super-weapons grade plutonium.

An increase in worldwide nuclear power generation will thus lead to a massive increase in radioactive material that can be used to manufacture atomic bombs.

To build such weapons is easier than most of us imagine. It has been estimated that 19 people with about US$l 0 million would be able to assemble a nuclear weapon in a year - not out of the question for a terrorist organisation or a rogue government.

6. Nuclear power has blood on its hands

Critics may consider this point a historical irrelevancy that should not cloud our rational judgment of the "peaceful" uses of atomic energy, but the civilian nuclear industry will forever be linked to the most hideous weapons of mass_ destruction invented and used by humans.

The connection between atomic bombs and nuclear power plants are, of course, as intimate in –South Africa as they are around the world . In the words of George Monbiot, “[…] we will never rid the world of nuclear weapons if we do not also rid it of nuclear power. Every state which has sought to develop a programme over the past 30 years - Israel, South Africa, India, Pakistan, North Korea, Iraq and Iran - has done so by manipulating its nuclear power program".

In recent years, the the USA and the UK have made use of depleted uranium ammunition (considered by some as a convenient vehicle to get rid of nuclear waste produced by the atomic energy industry) in the wars in the Balkans and Iraq. These weapons have been connected with horrendous increases in cancers, deaths, birth defects and environmental contamination that are just the latest outrage in a long history of violence and bloodshed.

7. Nuclear power is unnecessary

Pro-atomic energy pundits will tell you that nuclear power provides 70% of France's electricity, that renewable energy sources are immature, unreliable and expensive and that their supporters are unscientific smelly hippies who don't know what they're talking about and whose sources are dubious at best.

They will not tell you that Germany, Europe's biggest economy, is in the process of phasing out atomic power entirely and they will not tell you that there have been numerous .scientific studies showing that currently available renewable energy technologies in conjunction with improved energy efficiency are capable of reducing global C02 emissions enough to keep global warming and climate change under control while allowing for continued economic and population growth. And all of it without the help of nuclear power.

Atomic energy generation has some very major unresolved environmental and socio-economic problems (including long-lived radioactive waste, the danger of

environmental contamination and atomic weapons proliferation), so surely if the job can be done without it, plain common sense should dictate that we do.

Below, I've summarised a number of extremely thorough international scientific reports from reputable institutions and individuals that support the claims above.

A 2004 study by the Swiss Federal Institutes of Technology ("Steps towards a sustainable development ') showed that simply by improving energy conservation and energy efficiency in a technologically feasible manner, the per capita energy demand of Switzerland could be reduced by two thirds while simultaneously increasing energy services by two thirds by 2050. In the US, it is estimated that energy demand could be reduced to one sixth of current use simply through more efficient technologies.

A 164-page study entitled "A Clean Energy Future for Australia" published in 2004 by WWF Australia and other members of the Clean Energy Future Group explores how Australia can cut its C02 emissions by 50% by 2040 through a combination of existing renewable energy technologies and improved energy efficiency while taking into account economic and population growth.

A recent study by researchers at the University of Delaware and Stanford University found that H[t]he wind resource off the Mid-Atlantic coast could supply the energy needs of nine states from Massachusetts to North Carolina, plus the District of Columbia-with enough left over to support a 50 percent increase in future energy demand [.. .]", and Gar Lipow showed that the USA could replace all of its non-hydro power plants with wind generators and electricity storage and still lower its overall electricity bill.

In January of this year, the American Solar Energy Society, with the backing of amongst others NASA.' s chief climate change-scientist, Dr.-James released a report entitled Tackling Climate Change in the U.S” This detailed study reveals that most, if not all, US C02 emission reductions needed to keep the global average temperature from rising more than 1 °c can come from energy efficiency and renewable energy technologies (solar, wind, biofuels, geothermal) without requiring any new nuclear power plants.

A 2003 study into the employment potential of renewable energy in South Africa (which is summarised here) found that electricity generation from renewable resources (solar, wind, biomass, landfills) would create many more jobs than conventional technologies (coal, gas, nuclear including PBMR).

The joint European Renewable Energy Council- Greenpeace report "Energy {R] evolution - a sustainable world energy outlook" concludes that “[r]enewable energy, combined with efficiencies from the 'smart use' of energy, can deliver half of the world's energy needs by 2050 [.. .]". The report “[...] provides a practical blueprint for how to cut global C02 emissions by almost 50% within the next 43 years,. whilst providing a secure and affordable energy supply and, critically, maintaining steady worldwide economic development. Notably, the plan takes into account rapid economic growth areas such as China, India and Africa [.. .]".

This is-accomplished using-only mature, proven and sustainable technologies, while phasing out nuclear energy and ,continuously reducing fossil fuel consumption.

South Africa with its long coastline, strong winds and long hours of sunshine has massive renewable energy resources. If countries like Switzerland, Australia and Germany can overcome the energy and global warming crisis, then why can't we?

For all of these reasons, I believe that nuclear power is not the answer to the world's or indeed South Africa's looming energy problems. It is imperative that ordinary South Africans are empowered to inform and educate themselves about atomic energy, that they are allowed to have input into the country's future energy policy and that they, in fact, should be directly involved in the decision making processes around this very important issue.

For South Africa to pursue a nuclear energy future would in my opinion be a grave mistake, economically, politically and environmentally. What is at stake is the kind of country we leave to generations of South African's to come.

Yours sincerely Andreas Spath

enviroadmin Posted - 28 Jun 2007 : 11:17:00

PEARLY BEACH CONSERVATION SOCIETY

14 June 2007

Dear Sir

WRITTEN SUBMISSION ON NUCLEAR ENERGY IN SOUTH AFRICA

As Bantamsklip, which is situated 10 km South-East of Pearly Beach, is one of the 5 identified sites for the potential construction of a nuclear power station, we as the Pearly Beach Conservation Society would like to comment as follows:

Bantamsklip is situated within a rather unspoilt piece of coastal fynbos veld and the possible construction of a nuclear power station and associated infrastructure will definitely have a very negative effect on the conservation of this piece of land. We as an organization are not against the use of nuclear power as such. as we understand that this is one of the best options to meet the growing demand for electricity in South Africa. We would however like to request that a full environmental impact study be undertaken to identify the best site where the potential damage to the environment will be restricted to the minimum.

We also want to request should the nuclear power station be constructed near Bantamsklip. that the exterior of the building should be painted (using special and very expensive paint) a blue which blends in with the colour of the sky in order to camouflage the station. We further request that there should be NO overhead pylons. It is perfectly possible to bury the access in underground cables and is an absolute must for the Bantamsklip site.

There will be considerable damage when the building is being build, normally mud, building detritus, and silt, so we should ensure the damage to the local environment is put right on completion of the building operations. This would include in our area a need to replace vegetation with the opportunity to use indigenous plants and trees. Our experience has been that the use of the reactor does not cause the same environmental problems.

We are aware that the process takes cold water out of the sea and at the end of the process warm water is put back into the sea. This is safe water so the effect is dependent on whether it is acceptable to have sea water a bit warmer in tht3 vicinity. Our biggest concern however is whether the whale population would be affected and we demand that a special report be submitted on the environmental effect the

warmer water will have on the whale population.

On a more general point the power station will create jobs in an area of high unemployment and we would like to say at this stage that we expect work to be made available for the local population.

Another point of extreme concern is where the construction people and-eventually the operational staff will be housed, as' Pearly Beach is the nearest town to Bantamsklip, but as this town was developed as a holiday destination, we are very concerned that the internal services of the town will not be adequate to cater for a huge influx of permanent residents.

Another point of extreme concern is where the huge amounts of high levels of radioactive waste will be disposed of.

It is trusted that these concerns will be thoroughly considered and discussed before a final resolution is taken as to which site will be used for the construction of a nuclear power station.

Yours faithfully

ELRINA VERSFELD: CHAIRPERSON
PEARLY BEACH CONSERVATION SOCIETY

enviroadmin Posted - 28 Jun 2007 : 11:16:30

SOUTH AFRICAN COUNCIL OF CHURCHES

SUBMISSION ON NUCLEAR ENERGY SUBMISSION TO THE PORTFOLIO COMMITTEE ON ENVIRONMENT AND TOURISM

20th June 2007

Introduction

1. The South African Council of Churches (SACC) is the facilitating body for a fellowship of 26 Christian denominations and associated Para-church organisations. Extrapolated information from Statistics SA's National Census in 2001 religious communities analysis indicates that the SACC represents some 15-16 million Christians in the country. Founded in 1968, the SACC includes among its members Protestant, Catholic, African Independent, and Pentecostal churches, representing the majority of Christians in South Africa. SACC members are committed to expressing jointly, through proclamation and programmes, the united witness of the church in South Africa, especially in matters of national debate.

2. The South African Council of Churches (SACC) thanks the Portfolio Committee on Safety and Security for the opportunity of making this submission. In the spirit of ensuring justice through its traditional prophetic witness for the poorest, marginalised and most vulnerable of the nation, a Parliamentary Office has been established and hereby we make this submission.

3. We welcome this opportunity to make a submission to government on Nuclear Energy and affirm government in its practice of promoting participatory and deliberative democracy through parliamentary hearings and other methods such as Imbizos. Furthermore, we believe that Christian churches, and the religious sector as a whole, have significant roles to play in shaping the path of moral transformation,

the promotion of values such as justice, peace for humanity together with respect and care of all forms of life - known and unknown - and therefore for all creation.

4. While science and technology have the ability to further social and economic progress, they must never be allowed to exceed the pace and development of society's ability to reason and judge their moral and ethical implications for the human and earth communities. To this end an ad hoc group has utilized an exercise in deliberative democracy to reflect on the use of nuclear energy as part of a complex system of thought. We engaged in the broadest expression of thought, interest - allowing difference of opinion while working toward consensus on issues related to the use of nuclear energy.

Sustainable development

5. What is sustainable development? In short, taking the lead from various ecumenical sources, sustainable development concerns the provision for human basic need and reliance on water, energy and food as a priority over the neo-liberal and multi-national priority of gain and profit over the production and provision of these needs. In brief, sustainable development is about the "re-imaging" of global and local economic systems, their capacity for production as well as the reasons for such production. Such decision making needs to be participatory and creative because, as claimed in the example of the Indian State of Kerala, "non-creative participation will not be just, and unjust things are not sustainable."

6. So then, an approach to sustainable development warn us against the danger of economic policies that promote the principles of "bigger is better" or of economic systems based on exponential growth resulting from capital intensive business. Globally - and to large extent in South Africa as well - similar capital intensive economy has resulted in disciplined fiscal growth but has been accompanied equally by a hemorrhaging of jobs and joblessness on the other. This is a dangerous symbiosis if - as we believe is the case in the Pebble Bed Modular Reactor - science is funded by government as business. As an exercise in the promotion of sustainable development, we therefore urge government to invest in research that explores alternative energy sources and usages more extensively. This would mean exploring more fully a "zone of complexity" that relates to " traditional energy sources and their alternatives - fossil fuels and nuclear as well as renewable sources - in order to come to broader consensus in complexity.

7. While war and conflict may open up certain areas of marketability for energy resources - witness the wars in Iraq, Afghanistan and ongoing conflict in the Middle East - such options never sustain development but rather fuel a spiral of conflict demanding an ever spiraling increase in demand for human, financial and natural capital. We caution that future joblessness is a greater challenge to human security than the protection of economic and state systems of security. What, however, if such joblessness continues and safety and security becomes plotted through jobs that rely on a path to weapons production? And what if such weapon production becomes reliance on access to enriched Uranium and Plutonium stocks whose availability and access become defined by an energy industry that makes proliferation to such material easier? War and terrorism, we argue, become political and economic ends that begin a downswing to a cycle of sustainable dest5uction rather than development.

8. The SACC has never been alarmist - and neither are we here - but argue that the level of possible nuclear harm can in no way be compared to an overdose of permissible and regulated harms caused by, say, smoking cigarettes and/or

consuming alcohol. While we understand that there exist elements of harm in every source of energy we question whether - in comparative situations such as Long Mile Island and Chernobyl disasters - regulation would provide sufficient and adequate protection for such disasters should the occur South Africa. We have then now not even begun to question dealing with such problems as Uranium depletion, Plutonium storage and destruction or even of radiation.

9.We note that South Africa has a number of international duties to protect the environment such as, amongst others'

· The African Peer Review Mechanism.

· The United Nations Millennium Development Goals.

· The World Summit on Sustainable Development Plan of Action.

· The Rio Declaration.

· The African Charter on Human and People's Rights.

10. At the same time, we note that there is consensus by the United Nations and scientific communities worldwide that global warning is a threat to environmental and human security.

11. Without deeper analysis of these implications at this stage, suffice it to say that these times constitute for the Churches in South Africa - if not on a global level -a Kairos - or crisis or turning point - at which we need to take stock and make decisions on global, continental, regional, national, provincial, city, local and-personal levels to live in a sustainable way. The original Kairos document in the mid eighties challenged then churches' way of reasoning' on social and political issues. This was referred to as "Church theology". It challenged what way in which the churches supported the status quo of economic and political trends of the day and called it "State theology". But it proposed a way forward with and for those who bore the brunt of apartheid - the poor, marginalized, vulnerable, especially women and children.

So, in these times of energy crisis, a Kairos would provide for a way forward through the melee of status quo energy provisions and their complementary sources as well as for alternatives. In order to do this, we recommend that extended public space be provided for questioning, deliberations, decision making on policy processes and prescriptions on our use of nonrenewable resources and fossil fuels, the production of waste, population development, economic growth - especially as they relate to jobs

and inequality -amongst other environmental, human security and energy related issues. We commend government for this process of deliberations and suggest that it is necessary to plot a path toward a common understanding and progression for sustainable development and livelihoods. Such a Kairos or turning point must include extended democratic decision making so as to ensure that the quality of life envisaged by our Constitution - as a base line - becomes consensus driven as well as an agreed path for present and future generations.

12. We therefore call on the government - in all transparency and through the provision of access to all relevant information - to partner civil society and the churches in the promotion of awareness and education on issues of sustainable development and livelihoods in order to deal with the threat of global warming. Furthermore, we urge government to facilitate deliberations towards reaching consensus on the way forward through parliamentary and extra-parliamentary hearings.

Nuclear energy

13. There are others who are more qualified to make contributions on the "science and technological" implications of Nuclear energy in South Africa. We make the following submissions of principle and process in the hope that we will assist the Portfolio Committee to search for consensus on charting a progressive course not necessarily or essentially toward nuclear energy as a logical progression - but rather toward a sustainable future for a range and mix of energy sources. We encourage government to deal with this matter as one of considerable complexity. We therefore make reference, in no particular order, to a diversity of socio-economic, waste management, human resource development as well as human-security related principles as they may apply to the supply and use of nuclear energy in South Africa.

13.1 Energy policy decisions should contribute to sustainable development

A legal prescription for "sustainable development" may be found in the National Environmental Management Act 107 of 1998 (NEMA) which lies at the heart ofNEMA2. Our points 5-10 above on sustainable development provide a forum, we believe, for an additional interrogation on the sustainability of energy sources. Essentially, government is required to evaluate the social, economic and environmental impacts of activity - in this case the use of nuclear energy - as it may affect the environment. The public needs to be actively involved in any decision government may take to proceed with energy development that affects the social, economic or environment of its communities.

13.2 Energy policy decisions should be based on a full accounting of current economic costs as well contributions to global warming

The People's Budget Campaign has estimated earlier this year that government has already spent R 3,85 billion likely to balloon to over R 14,84 billion for the reference module and – if the full decommissioning of the PBMR is included - on may be as high as R 25 billion by 2012. The problem of finance allocation and of priority choices is two fold. In the first instance, the PBC has no reference point as to measure the allocation for the PBMR and therefore believes it (PBMR) to be one of government's "follies"

Secondly, the PBC has no reference to a rigorous public interrogation that underlies nuclear energy as a feasible choice. The PBC therefore suggest that the policy principle of cost-reflective pricing should be applied to the full costs of energy use be

phased in while interim measures are also used. While not being prescriptive on this matter, we would refer the Portfolio Committee to the work of Herman Daly, a former economist on the Environment at the World Bank and John Cobb Jr., a professor of theology to their work "For the Common Good: Redirecting the economy towards community, the environment and a sustainable future" in which they develop a useful "Index of Sustainable Economic Welfare".

This work points further to a procedure proposed by economist Salah El Serafy (1988) in which he calculates the amount of money that would need to be set aside from the proceeds of the liquidation of a natural asset to "generate a permanent income stream that would be as great in the future as the portion of receipts from nonrenewable assets that are consumed at present.

13.3 Energy policy decisions should be transparent and take into account environmental and social impact assessments that consider threats to (a) the environment and (b) human security including threats to nuclear energy plants by war and terrorism.

13.4 Energy policy decisions should recognize and consider more equitably - when compared with considerations for nuclear energy - sustainable energy sources such as sun, wind, wave power and the use of bio-fuels as advantageous in developing a sustainable future.

In addition to 13.2 above, we note that South Africa is blessed with an abundance of renewable sources of energy, in particular solar and wind. We believe that renewable energy is a neglected aspect of our energy mix. Of particular concern is the significant amount of nuclear waste produced by nuclear energy sources, especially the PBMR. In the case of Uranium 235, which has a half life of 7l3 million years, there exists no licensed high-level storage cite in the world. Since the time frame of decay is incalculable, we dare not take a hasty decision in sanctioning its implementation and further use. In terms 'of climate change, it is true that nuclear sources produce lese CO2 emissions than either coal or gas. However, not much is considered by factoring that nuclear energy produces much more CO2 emissions than either wind, solar thermal and/or tidal energy sources.

13.4 Energy policy decisions for the above sustainable energy sources should allocate at least an equivalent support for research and development as is currently expended on nuclear energy.

We have learnt that, in comparison with the billions spent and planned on nuclear energy, a mere R140 million has been set aside on research and development of the complete mix of renewable sources of energy. An equal investment in renewable energy part for part as for nuclear energy, we believe, will deliver an achievable goal of 15% of all electricity generation from renewable sources by 2020. This is not only achievable, but will significantly impact on the lives of all people and particularly of the poor and working class people who fork out significant increases on current energy sources.

13.5 Energy policy decisions should give practical consideration to local and consumer generation of energy and savings in order to maximize energy security and minimize cost of energy generation.

Local use of solar generation through solar thermal panels for example and other popular alternatives such as wind and tidal energy generators may easily be regulated to feed into the energy grid and compensate the consumer" or community

of consumers for the production of energy. Since such generation occurs closer to the consumer and/or community of consumers, management, control and repair would be easier and cheaper to deal with than from a source/s tens or hundreds of kilometers away from supplementing the grid with energy, such alternatives also provide for greater energy security, energy savings and minimize the cost of energy generation.

13.6 Energy policy decisions should factor in and support the opportunities for local and consumer energy generation as possibilities for sustainable job creation.

In line with the above, the factorization of local energy production could provide for opportunities of local job creation through and alongside the provision of energy. An example of recycling waste into landfills for compost which in turn provides a source of food and/energy such as at the Sustainability Institute outside Stellenbosch is an excellent example of a mix of job creation from biogas and other alternatives that should be more creatively explored.

13.7 Energy policy should facilitate a choice of alternatives to consumers and regulate against the monopoly of ESKOM.

The current options toward nuclear energy occur because of a lack of alternatives or alternatives such as wind turbines proven to be uneconomical through monopolized research. During the energy crisis in the Western cape in November 2005 and through to 2006, it was generally known that the electricity grid had not been sufficiently upgraded over the past 13 years or more. ESKOM, however, is known to be accumulating significant profits, sufficient to pay extremely large salaries to its executive operating officers. Upgrading of the grid, an allowance of alternatives as well as a closer monitoring of measures ESKOM is able to promote toward alternative energy usage, could provide for both cheaper and more affordable energy sources. An example of one of ESKOM's questionable alternatives was the provision of "energy-saving lamps" for incandescent lamps. These lamps do not use significantly less energy than an incandescent lamp but still ensure that ESKOM makes a profit from energy supply. There are also environmental problems with these lamps in that they contain mercury vapour. A suggestion might be for ESKOM to consider the subsidy and/or free provision of solar panels to households and to count real cost savings in, say, five years.

13.8 Energy policy should amend building regulations to include the compulsory installation of solar/thermal water heaters for reduction of energy consumption costs which in turn could subsidize poorer households.

In line with 13.7 above and with creative alternative energy exploration, policies that amend building regulations to enable the use and provision of alternative energy sources for households such as water heaters and the inclusion of energy conservation measures, measurable savings would be made. Municipal and local government systems could then provide for wider reaching subsidies for poorer households.

13.9 Base policy on comprehensive and symbolic nuclear non proliferation as a signal of intent and purpose to the world. Apply the "do no harm principle" to health and environment first.

The energy crisis has implications for personal, community, national, regional and global levels. Much of the above principles have dealt with the first four levels. South Africa, as we stated earlier international obligations just as international socio

obligations rights relate to South Africa being a part of the international and global family of humanity and ecosystems. The application of policy that led South Africa to dismantle its nuclear facilities - for whatever socio-economic and/or political cause - must under gird its intentions toward ongoing nuclear non-proliferation. In a world that faces this Kairos -and which is caught up in a spiral of nuclear program intentions as well as an end to dependence on oil - South Africa has the opportunity to lead the world in seeking the "do no harm first" principle and to promote energy alternatives that deliberately seek to compound human and environmental health rather than promote energy alternatives with unknown future and present risks such as nuclear energy.

13.10 Energy policy should explore application of nuclear energy as a final, desperate measure on indication that balance of all probabilities of current energy systems and alternatives have been sufficiently explored and applications indicate absolute non-viable, non-sustainable future use.

"Finally, it would appear logical that, seeking to promote the use of nuclear energy in any way as an alternative to fossil fuels and renewable energies would need far proof and study other than popular media strategies. As we have indicated before, proof that energy sources comply with the sustainable development criteria as well as with the most rigorous social, economic and environment impact assessments would require the most extensive democratic and participatory decision making mechanisms if it is to justify its inclusion in a mix of alternative energy sources. And then, it should not receive and/or be given priority funding over other sources that it IS currently receiving.

Conclusion

We thank the Department of Environment and Tourism for this opportunity to have made submission on nuclear energy. We are grateful for the democratic initiative extended to public participation for this submission. We would urge and recommend far more extensive and deliberative democratic decision making processes in order to reach the nation's common mind on nuclear usage. Due to the serious nature of climate change before the world, all face energy usage as a crisis - or theological Kairos - that needs to be weighed against the most stringent criteria for sustainable development possible. Against this backdrop the Churches have proposed a selection of criteria and/or principles for energy use. Chief amongst these must be the need to evaluate current energy sources together with nuclear and renewable in the most objective fashion possible in order to find a combination that cares for the environment while also generating sustainable livelihoods for our present generation and for generations to come.

Submitted:

Mr. Eddie Makue. General Secretary, SA Council of Churches

enviroadmin Posted - 28 Jun 2007 : 11:16:04

2007 SUBMISSION OF HABITAT COUNCIL WITH RESPECT TO THE PUBLIC HEARINGS ON NUCLEAR ENERGY

20 June 2007

Prepared by Marie- Lou Roux Executive Officer

Honourable chairman and members of the Portfolio Committee, we appreciate the

opportunity to address the committee on this issue.

I speak here particularly on behalf of those of our members who are especially concerned for the way in which we as a country are dealing with waste and pollution which includes nuclear waste, and the plight of our poorer communities.

1. General disillusionment with the inadequate implementation of our legislation and the gradual erosion of some of our environmental legislation

We are deeply saddened and concerned about what we perceive to be a gradual weakening of the fine principles embedded in our Constitution,. (with its section 24, guaranteeing an environment not harmful to the health and well-being of present and future generations), and in NEMA, the National Environmental Management Act (15 of 1007). This weakening takes place through the failure to implement and monitor implementation of our laws and through progressive changes to these laws.

At the time NEMA was being finalised we suffered the disappointment, which those of you who were members of this committee then will recall contained a section providing for an Environmental Appeal Tribunal. Such a Tribunal (which exists in some other countries), would hand down decisions in cases affecting the environment based on the actual merits of the case, not merely review whether the correct procedures had been followed in the origina1 trial. This provision ,vas thrown out by the Council of Provinces after considerable lobbying by developers and industrialists.

During the past decade we have seen a gradual weakening of our environmental safeguards. The first Amendment of NEMA scuppered the provision that any action which would cause "significant environmental harm" would trigger an Environmental Impact assessment. After this was to follow the NEMA have ill this regards, is that inappropriate waste resources can be authorised as fuel. A case in point is the burning of tyres in cement kilns, test burns of which are taking place at the moment, and the lobbying to incinerate Municipal Solid Waste to produce energy, (so-called waste to energy plants). Such processes indisputably produce dioxins and furans and other heavy metal emissions and contaminated bottom ash. These are serious threat to the health of communities and the environment.

2. Concerns with respect to nuclear waste management

2a Lack of independence of National Nuclear Regulator

This possibly lies at the heart of many of the incursions on human health that have been taking place in the industry.

We wish to refer you to the Draft National Radioactive Waste Policy Framework of 2003 (although to our knowledge this has not yet been finalised).

Section 2 gives International Policy Principles, developed by the international community through the International Atomic Energy Agency (IAEA) and applicable to all countries, including South Africa.

I quote:” As a member state of the IAEA. and in accordance with National and International objectives, it is government's policy to deal with radio active waste in a manner that protects human health and the environment, now and in the future, in accordance with the following principles”

It is important to note the principle of having an appropriate national Legal

Framework, with the requirement that provision shall be made for " clear allocation of responsibilities and independent regulatory functions"

This requirement is not honoured.
The Draft Framework referred to is exemplary in its provisions.

The internationally recognised Precautionary Principle, which stems from the Rio World Summit, in NEMA reads: "that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions".

Among the other principles listed are: Protection of Human Health, of the EnvirolID1ent and of Future Generations, and that radioactive waste management will not «impose undue burdens on future generations".

2b Absence of transparency and public participation on the part of the nuclear industry

Other parties present cite examples of this lack of transparency today. We just wish to refer you to the Draft National Radioactive Waste Policy Framework of 2003 (although to our knowledge this has not yet been finalised).

The Draft National Radioactive Waste Policy Framework, under section 3, has as its second bullet point: Transparency regarding an aspects of radioactive waste management, and requires "that the public shall have access to infom1ation regarding waste management where this does not infringe on the security of radioactive material. "

It cannot be clain1ed that information requested on the number of spills and accidents, or the numbers of workers falling ill can be seen to compromise the "security of nuclear material".

This draft Policy framework includes the necessary principles, such as the Precautionary Principle (bullet point 4). "Where there is uncertainty about the safety of an activity, a conservative approach should be adopted."

and on Public Participation (bullet point 8): "Radioactive waste management should take into account the interests and concerns of all interested and affected, \"hen decisions are being made"

If the concerns of citizens were truly taken into accow1t, we believe that there would be a change of heart by the authorities with respect to its nuclear program. We are fearful of mishaps in the nuclear plants. Human frailty has proven that human error can never be discounted. We here in the vicinity of Koeberg feel especially vulnerabJe.

Without transparency and dependable reporting, and public participation there can be no honourable planning.

3. In conclusion

On a perhaps flippant note, I should like to admit that every time an Orange Alert or Red Alert message flits across our television screens, I feel that it is Eskom conditioning the people of South Africa to panic about our so –called shortage of electricity and condition them to feel that we must get nuclear power as soon as

possible to fend off this disaster of cut-offs.

However , seriously, if Eskom were sincere when it states that it does support alternative sources of energy , such as wind or sun energy, the moneys spent on research of those technologies would show that. To me the integrity of Eskom is compromised by the fact the more than 6 billion rands have bben spent on the Modular Nuclear Pebble Bed and not yet even 50 million on wind turbine research in this country.

Considering the potential for job creation in a country desperate for work opportunities such as the development of these alternate technologies offers, we hold this push for nuclear power generation to be morally indefensible

Can the Radioactive Waste Management Policy and Strategy be finalised, with the retention of its laudable clauses for the protection and safety of our people and environment?

We look to your committee to help is achieving these objectives.

I thank you

enviroadmin Posted - 28 Jun 2007 : 11:15:39

From Andy W Pienaar

To

Date: 14 June 2007

We representing the Namaqualand Action group for Environmental Justice has learnt about the public hearings of the portfolio committee on Environmental Affairs and Tourism.

We herewith give notice that we wish to make an oral submission at the public hearings on Nuclear Energy on Wednesday 20 June 2007 and could please arrange a spot for us during the hearings.

Regards

Andy W Pienaar

INSAKE : KERNKRAG IN SUID AFRIKA

Ons in die Namakwalandse Aksiegroep vir Omgewingsgeregtigheid wens graag in reaksie tot u uitnodiging die volgende voorlegging aan u te maak oor ons vertolking van die kemkrag industrie in Suid Afrika en spesifiek in Namakwaland.

"We have noted the intense haste in the debate on this subject by informed people. For us the most crucial; aspect and the crux of the matter is that we are stewards of our land, lives and of the future of our community. We are in no position to bargain our future away for a new crumbs namely jobs, infrastructure or a fleeting moment in the limelight. Let us remember that the whole reason for this new dispensation in South Africa was to gain dignity and a better quality of life, jobs, housing and energy, not as a privilege, but as fundamental rights for all our people. We urge the representatives of the very people not to entice our communities with short term advances at the expense of sustainability;

In our community our heritage is our land, already encroached on by sanctimonious monopoly-mines and estranged by a cynical government. When the mines close, as they will, and the nuclear facilities break down, as they will, we do not want to live in the shadow of the gallows."

Vir ons behoort kernkrag nie 'n opsie vir Namakwaland, Suid Afrika, Afrika en die hele wereld te wees nie.

"The representatives of bureaucracy and all kinds of elites often argue that we must sacrifice for the common good. We see no economic sustainability in nuclear power as opposed to alternatives like hydro or solar electricity. Our people as a whole are in tremendous need of basic facilities. The billions of rands to be spent on nuclear power could very well open the door to a creative future if spent on our real needs.

The technocrats of all stripes urge us to trust them and not stifle the advancement of science. Eskom go as far as to argue that the containment of nuclear waste is a problem solved. Leave it to the experts, they argue. One Eskom representative even complemented the Namaqua Community and said they have reason to be proud of the "Mercedes-Benz of a facility in waste disposal at Vaalputs". Our community decline that sort of compliment. As a community of faith, rooted in the absolute presence of God, we know it is impossible to put our trust in science and the assurances of men. We urge all the stakeholders not to belittle the moral imperatives and set themselves up as God.

Lastly, we regret that some heavy voices are calling for an energy industry that in essence will be a betrayal of the nature of our struggle. To invest billions of rands in a nuclear facility, clearly is no technical decision. It is an investment in everything that is undemocratic, even anti-democratic, where a few secretive groups control vast resource, where power is concentrated to an extraordinary extent. We cannot argue that "this government will not be prone to the temptation of misusing power.

Will history perhaps be witness to the fact that energy policies of a new government in SA laid the cornerstone for an authoritarian future or a future of participation, ecological health and dignity."

For the Komaggas and Namaqua people

Andy W Pienaar

recognizing the contributions of V Clarke; C Clarke JB Ruiter and T Mathews-Grove

enviroadmin Posted - 28 Jun 2007 : 11:14:37

Pelindaba Working Group[1]

COPY OF ORAL SUBMISSION PRESENTED TO ENVIRONMENT AND TOURISM PORTFOLIO COMMITTEE PUBLIC HEARINGS ON NUCLEAR ENERGY 20 JUNE 2007

Honourable Chairperson Zitha, honourable members, I sincerely thank you for this opportunity that you have created to open up the debate on nuclear energy so that we can bring to your attention today some of the issues facing the people of this country, and which are being withheld from the public.

There are many issues which cannot adequately be addressed in the short time we have today, and possibly a Nuclear Summit that includes the involvement of all affected communities and representatives acceptable to civil society, could better serve this purpose. Nevertheless, I will focus on some of those issues that have a direct bearing on democratic principles as enshrined in our Constitution that are being side-shafted, and also on the issue of environmental justice that will - for years to come -affect our future generations. Some of these amounts to environmental racism whereby the most disadvantaged communities often have never been consulted and end up the most critically affected – especially by the nuclear industry.

I live next to what I've come to consider the heart of the beast, the nuclear installation at Pelindaba. As a school leaver in the 70s my first job for R235 pm was working in the Environmental Studies Unit at Pelindaba where my tasks involved having to collect samples in order to check for radioactivity in the surrounding environment – Crocodile River, Hartbeespoortdam, around Brits, to as far away as Krugersdorp, Rustenburg, Pretoria and towards Johannesburg. Over the years Necsa's environmental study area appears to have narrowed considerably.

Those years when people in the area whose boreholes, for example, dried up they found it difficult to raise bank funding because, they were told, there was a policy for keeping the area underpopulated because of the potential danger from the nuclear activities at Pelindaba. In recent times, land claimants that included Necsa's vast property, have been told the ground is too radioactively polluted and that they'd better focus their land claim elsewhere.

During that time I worked at Necsa called the Atomic Energy Corporation at the time, I witnessed rows and rows of 44 gallon drums of so-called "low active waste" – liquid radioactive waste – being lined up on the banks of the Crocodile River not far from the their picnic and sports terrain. These drums, and probably hundreds of thousands of others have since the 60s to this day systematically been released into the Crocodile River which flows into the Hartbeespoortdam (considered one of the most toxic internationally) in much the same way as toxic radioactive waste is released into the Atlantic Ocean from Koeberg. These practices have continued unabated to this day for over 40 years. There are considerable other sources to the pollution in this river and the dam, but Necsa appears to have hidden its radioactive contribution behind these and continue to this day to assert that what they do falls within "internationally acceptable" levels and practises. But people depend on this water for drinking, crop irrigation, fish and thus the poison of radioactivity enters the food chain. More often than not it is formerly disadvantaged communities and the poor of poor who are most affected and have absolutely no knowledge of the dangerous, deadly consequences to them and their families. But no-one remains unaffected.

These toxins could be flowing into the underground water aquifers of the entire region, and together with the radioactive and chemical pollution from the gold mines on the West Rand, the entire “Cradle of Humankind” World Heritage Site and Hartbeespoortdam is being contaminated and affected.

During that time, the 70s, I was involved in a study of milk from cows in the area that had become irradiated from the AEC’s radioactive sources planted into the ground. The cow milk had been sent into a major Pretoria milk distributor. Literally hundreds of thousands of people could have been drinking irradiated milk without knowing about it. What action was taken, if any, was never made known to me. Certainly the public were never informed.

Also during this time, the Three Mile Island disaster occurred in the United States and thus there was focus on Pelindaba. Although a teenager, I remember how those at the AEC minimalised the disaster and instead turned their venom on the media – this practise continues to this day. All working there were against transparency – a practise that continues to this day despite assertions to the contrary.

Over the years this area has become highly populated with massive developments and thousands of people daily now living far too close to a nuclear complex where we now know nuclear bombs were developed, and where from time to time there were leaks and spills, accidents and fires, emissions so dangerous that their 30,000 or so employees were forced to remain indoors for hours. In the last number of years more and more information passed through our community, and made known to us from the company’s former workers – all victims of occupational disease you’ll also be told about later today - indicates a worrying lack of maintenance at the Pelindaba complex. The PWG has been informed that many who were retired and too old to return to work, are accepting not only because of the enormous packages they’re being offered, but because they are so shocked about the lack of maintenance there. They’re worried we’re sitting on the time-bomb waiting to happen.

I have begun my own research into the health, safety and environmental issues of nuclear energy and development which forces me today to stand here – although not an expert - but very much more aware that the nuclear industry have effectively killed public debate, largely swayed public opinion through misinformation, secrecy and cover-ups, and going to great trouble to discredit environmentally minded groups in the media, disregarding massive amounts of expert information that is available internationally – all of which tell a different story.

The devastating environmental effects of ionizing radiation, some of the chemicals used in the processes, the resultant nuclear waste, the potential for contamination along transportation routes, and not to forget tailings from uranium mining are overwhelming and well-documented.

There are many reports based on actual first hand accounts, or from experts and academics or scientists, which we could make available to this committee. Most involve international communities, but in SA some of this information is beginning to surface but is not being given publicity and is certainly not being taken seriously by regulators or those entrusted with custodianship of our environment or public health and concerns. We recently managed to find a report written several years ago by a Danie van As from Necsa that states that much of the Witwatersrand's general population has been exposed for many years to excessive amounts of radioactive Radon – a uranium by-product from decades of mining on the West Rand. This report has never been made public.

A meeting earlier this year of the Pelindaba Working Group was thoroughly disrupted and heckled by a large contingent from the nuclear industry preventing many issues from being raised. And heckling alongside employees of Necsa, the PBMR Company and others in the nuclear industry was the chairman of our Public Safety Information Forum - ostensibly a resident's forum representing the interests of the community.

The meeting, held earlier this year, was called after the Pelindaba Working Group had given up hope for any meaningful results from involvement in the Environmental Impact Assessment (EIA) processes held for the Nuclear Pebble Fuel Manufacturing Plant and the two Nuclear Smelter Plants earmarked for Pelindaba. Bearing in mind that we are ordinary community members and not nuclear scientists, we've had to go to extraordinary lengths to access and understand information in order to exercise our democratic right to participate in these processes. In the process, we've accessed an enormous amount of information readily available off the internet and include reports by experts and scientists all of which I could make available to this committee. Most "experts" in this country have been co-opted by the nuclear industry and are unwilling to provide a balanced view. I would like to add, that we've consistently raised the issue that the many disadvantaged communities in the area have never been adequately informed of these processes, let alone been able to participate in them.

The nuclear industry's flippant and often sarcastic responses in official documents to genuine concerns that the public raised, have largely been dismissed, never answered or addressed and leave us with no choice but to consider these as "greenwashing" processes that have little bearing on the intention as prescribed by law or our Constitution. Non-nuclear industry viewpoints or concerns have simply been dismissed. The nuclear industry and the various authorities involved appear to be more concerned with "the process" than the content. For example, in the most far-fetched of the responses given by Necsa on the question of safety, the company stated in an official document that an aircraft crash into its facility would be of "no environmental impact" whatsoever. Nobody in their right minds could believe that to be true.

The Pelindaba Working Group meeting was held for all community members to discuss the implications of what seems to be an unstoppable nuclear programme in

this country, and in particular the lack of evacuation plans for anyone beyond 5km from Pelindaba, non-existence of community health surveillance or monitoring programs (Necsa and the NNR hide behind a smokescreen methodology to produce official results they say are internationally acceptable although these follow an ALARA – As Low As Reasonably Achievable - principle and not the Precautionary Principle which states that if you don't know what the effects are going to be don't allow it), and also to discuss the dismal third party liabilities and insurance policies which fall way short of those international countries which have considered these issues with knowledge and insight. Our meeting was thoroughly disrupted and many of these issues could not even be discussed adequately by the community because of the way in which the nuclear industry hijacked it. The nuclear industry has wide-spread access to the media and holds many of its own meetings. This sort of behaviour is, to say the least, very sinister, smacks of a fascist approach to transparency and accountability, and is far removed from the hard-won democratic principles of public participation.

Against this backdrop, current reports on the lack of decommissioning or clean-up costs in this country (when the UK's nuclear industry recently found its nuclear waste clean-up program could cost more than #8356;70bn) are further cause for concern.

Of equal concern is that there are a number of international treaties, protocols and agreements to which countries with a nuclear industry become signatories. While South Africa has signed some of these, there are a significant number of others, particularly concerning health, safety and liabilities to which SA has not become a signatory. These would also force a measure of international transparency.

The public has tried as best it can to back up EIA submissions with reports by experts: these say "no dose of ioninzing radiation is a safe dose". (Radiologist R M Sievert, after whom the radiation measure was named, said 'There is no known tolerance level for radiation'). We also have research documents stating that even routine emissions from nuclear installations cause cancer and whole array of other deadly illnesses. We have reports of how these routine emissions affect the health of people for miles around these installations, waste sites or uranium mines – possibly as far away as Johannesburg or Pretoria depending on windspeeds – and the deadly causes of longterm low doses of ionizing radiation on civilian populations. Low dose, ionizing radiation is the major cause of the public health catastrophe at Chernobyl and its surrounds today, as well as other parts of the world where nuclear installations exist.

There are extensive lists of nuclear accidents and disasters reported on the internet, all of which wreck communities and often kill nuclear workers, but the industry passes these off as "incidents" and makes light of even the most devastating known nuclear disaster Chernobyl – still passing it off as media propaganda.

Over and above, nowhere in the world has any scientist figured out what to do with radioactive waste which has already starting piling up in the backyard of several communities including ours and is only set to get worse if this country's nuclear program is favoured over renewable alternative energies for which immense research globally and even in our own country is producing remarkable results.

Worst still, there is growing irrefutable documentation that suggests the main reasons being put forward for a uranium and nuclear renaissance have all been disproved. These include:

· The suggestion that it is safe

· The suggestion that it provides mitigation for climate change – it does not and reports suggest that its full fuel cycle may even produce more CO^2 than even our conventional dirty coal stations;

· There have only been 2 nuclear disasters and they weren't so bad anyway – this is simply not true. The impacts of these disasters were devastating.

The World Health Organisation (WHO) has estimated that the total radioactivity from Chernobyl was 200 times that of the combined releases from the atomic bombs dropped on Hiroshima and Nagasaki; about 2.3% of Europe's surface area has been contaminated. In many countries, restriction orders remain in place on the production, transportation and consumption of food still contaminated by Chernobyl fallout.

The Pelindaba Working Group has received information from a Fauna and Flora official about fish and bird deaths that occurred the extreme numbers of in the 90s along the Crocodile River. Of course, we have no backup documents of this because of an information clamp for many years. This was apparently investigated and linked to radioactivity by the Pretoria University's science faculty and then quietly taken off everyone's agenda because their funding was threatened. We've been told about the occurrence of abnormalities in animals – a five-legged dog, two headed fish, baboons born with stumps for arms – but proof is hard to find. And about spontaneous abortions in women in our area. No-one is prepared to go on record, and one of the reasons for this amongst those in the know, is that they are either afraid to talk publicly or, in some cases, more concerned over the property values than exposing the truth.

Time does not permit to go into any great depth of the overwhelming magnitude of issues, save to mention but a few more of relevancy. I briefly wish to talk about uranium – the resource that feeds the nuclear industry. Large portions of this country are being earmarked for new uranium mines, one of them being Magaliesburg near to where I live.

Shortly before Christmas one of the residents of Magaliesburg perchance found an obscure notice in the area notifying residents of an EIA process for uranium prospecting in the area, including his own farm. Like many Magaliesburg residents, I also applied to register as an “interested and affected party” because, as this committee heard earlier, uranium mine tailings get windborn and its deadly radioactive carcinogens are carried many miles downwind. These get inhaled or ingested via the food chain and can cause cancers and genetic abnormalities. I live close enough to Magaliesburg and am concerned.

To this day, no-one that has applied for involvement in the EIA process has been registered, let alone received acknowledgement of their applications.

· Uranium is extremely dangerous to all forms of life. It is often called “The Silent Slow Genocide”. We are about to witness much of this country potentially being mined for it.

· In the NW Province alone, the Province’s 2002 “State of the Environment” report states that: “There is a growing body of evidence pointing that both the long- and short-term effects of radioactive substances present in the environment may be impacting on the health of the population of the North West Province, particularly in the gold mining areas. Communities that are not currently supplied with safe, treated water and which rely on radionuclide-contaminated surface or ground water resources for their potable water are the most vulnerable to such health risks.”

It goes on to say that “elevated levels of uranium have been found in the following areas of North West Province:

Ø Koekemoerspruit, which drains parts of the Klerksdorp area (near Stilfontein);

Ø Kroomdraaispruit, near the abandoned New Machavie Goldmine, before its confluence with the Koekemoerspruit;

Ø Wonderfonteinspruit below Carltonville (draining the Far West Rand goldfields); (The radioactive pollution from this area is now known to have seeped into the water aquifer throughout the World Heritage Site to as far as Hartbeespoortdam. We can provide this honourable committee with extensive reports that back this).

Ø Mooi River after its confluence with the Wonderfonteinspruit/Mooiriverloop;

Ø Vaal River, where it flows past the Klerksdorp mining area (between the Mooi River mouth and Orkney); and Pilanesberg.”

Apart from Wonderfonteinspruit, little more is known about research, if any, into any of the other areas.

· Around 1999 the Council for Nuclear Safety (CNS) estimated that at least 10,000 mineworkers, or roughly one in 20 mineworkers, have been exposed to radiation levels that exceeded safety limits. In 1998, according to CNS estimates, 1 000 employees at Harmony Gold mine alone were exposed to radiation levels that in some instances were three times higher than the annual dose limit of 20 mSv a year. At Nigel, workers were exposed to dose levels of up to 130 mSv a year, or seven times higher than the allowable limit. (Business Report external linkOct. 7, 1999).

· In February this year during the NNR submission of its annual budget, its CEO Mr. Magumela stated that in 2002, 7 931 people had been exposed to unacceptably high doses, but this number had declined year by year to 1133, 424, and 8. He said there had been an improvement over the last five years but failed to mention this was as a result of a largely stagnant uranium mining industry at the time.

In conclusion,

1. I ask for intervention from this portfolio committee because you are the custodians of NEMA and therefore the Constitution and therefore the communities who look to these laws for their protection;

2. I ask that this committee consider scrapping in its entirety the second amendment on EIAs in NEMA and rather call for a full inquiry into nuclear energy involving all stakeholders including those acceptable to civil society, possibly in the form of a Nuclear Summit before any further nuclear and uranium developments are approved;

3. I ask that this committee also consider a full investigation into all EIA processes that have been conducted on behalf of the nuclear industry or uranium mining. These have been termed “fatally flawed” by participants and should in all probability be scrapped and re-launched so as to ensure transparency and public participation as originally intended by our law and Constitution;

4. I ask this committee to consider a parliamentary office of non-aligned independent environmental groups (much like the unions have here) because in the face of climate change, the environment globally has become one of the biggest issues facing this planet. Developments in this country are being fast-tracked without sufficient public participation;

5. I ask you to consider recommendations that do not allow the DME to hand our mining licences before environmental laws are in place to protect the health of the people;

6. I ask that this committee considers the severity of the submissions it will hear today, and try to use its influence to persuade other organs of the state, namely Minerals and Energy, and Public Enterprises to also reconsider this country's nuclear future; and for Science and Technology not to waste what may have been spent on training new skills but to use them to find environmental and energy solutions that are sustainable.

I am here today because I am a mother of a young child, because I took the trouble to find out more, because I have learned of the pain and suffering of ordinary people that accompanies nuclear energy.

I wish to end with a QUOTE with which I concur and read somewhere: "Human rights in the context of environment and sustainable development recognize that for human communities to survive, they must have an adequate and secure standard of living; they must be protected from harmful substances and unsafe products; they must learn to conserve and equitably share natural resources. Without these environmental and public health policies in place, human rights for respect, dignity, equality, non-discrimination and the ability for the public to participate in decisions that affect their lives cannot be achieved". I thank you.

Presenter: Dominique Gilbert

enviroadmin Posted - 28 Jun 2007 : 11:14:04

Submission by Ms Mariette Lieferink:

PARLIAMENTARY PORTFOLIO COMMITTEE ORAL SUBMISSION: NUCLEAR ENERGY IN SOUTH AFRICA

HISTORIC PRECEDENT OF INSTITUTIONAL CONTROL, MONITORING AND MANAGEMENT OF HAZARDOUS WASTE, P ARTICULARL Y URANIUM: WONDERFONTEINSPRUIT CATCHMENT

INTRODUCTION

The following is submitted with deference and diffidence, but not with timidity since the matter of U contamination and the handling of hazardous waste are of appreciable magnitude. U is, as you may reflect, radio-active and chemically toxic. The half life of U is 10 8 to 10 10. It therefore implies a long term hazard or risk.

Prefatory or preliminary to my submissions, permit me please to briefly advert to the Law of Evidence.

LAW OF EVIDENCE

In terms of the law of evidence, evidence of reputation or general character is admissible in a Court of Law in order to adduce evidence or to suggest that it is likely or unlikely that a person of historic reputation or record would have committed the offence with which he is charged. Evidence can be adduced of either good character or bad reputation.

For the purpose of our discussion I shall adduce evidence of the historic precedents which were established regarding institutional control, the monitoring and

management of hazardous waste, particularly uranium and its radioactive daughter or transformation products, such as thorium, radium; radon and radon gas and the enforcement of environmental legislation pertaining to hazardous waste. From the past or historical performance of organs of state, particularly the DME, the NNR and the DW AF we can then arrive at the conclusion whether there had been poor or good institutional control regarding hazardous waste, particularly U. The historic management and monitoring of U has relevancy because of the proposed pebble bed modular technology.

HISTORICAL PRECEDENT: WONDERFONTEINSPRUIT

A historical precedent of U contamination and the handling of hazardous waste have been established in the Wonderfonteinspruit catchment.

In terms of official scientific Reports, inter alia the WRC Report 1095/1/02, the WRC Report 1214/1/06, entitled An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas 'of the Wonderfonteinspruit Catchment and the Wetlands Report, 2005 of the Council of GeoScience it was found that the uranium concentration at many of the sites sampled, inside and outside mine property, significantly exceeds the legislated exclusion limit for regulatory control. 16mg/kg uranium is equivalent to an activity concentration of 0,2Bq/g, the limit for regulatory control set by the NNR is 0,5Bq/g. The National Nuclear Regulator was called upon to take a regulatory decision in this regard.

The NNR responded by disclaiming the radiological (carcinogenic) health risk quotient of the U by stating that tl1e assessment was based upon the US Environmental Protection Agency methodology and not upon international methodology. The NNR undertook to conduct its own investigation and to make the findings available to the public. At the time of this submission, the NNR has not made the findings available. In the absence of evidence to the contrary, the findings of the WRC. Report 1214 therefore hold.

The WRC Report No 1214 found that:

· the tailings dams contain 100 000 tons of U;

· the gold mining industry discharges 50 tons of U into the water courses annually;

· 24 tons of U is discharged into the receiving water courses from seepage or percolation from tailings dams. We are credibly informed by the learned authors that the levels of U concentrations in the seepage water are 1 000 to 1 million times higher than the background U concentrations;

· 12 tons of U is discharged from point discharges

· 10 tons of U is discharged from storm water discharges

sinkholes that had historically been filled with uraniferous tailings will become secondary sources of U contamination after mine closure, when pre-mining flow patterns and volumes restore itself.

- Sediments in the Upper Wonderfonteinspruit have very high uranium concentrations - I 000 mg/kg in places (the background of U concentration recorded at the Klerkskraal Dam is Img/kg).

- One specific dam, the Andreis Coetzee's farm dam has concentrations of up to 900 mg/kg.

At present the U and other heavy metals, such as cadmium, copper, zinc, arsenic and cobalt are adsorbed in the sediment. Plausible environmental conditions such

- Acid mine drainage

- Acid rain

~ Drying out of the sediment and influx of water

- Dredging operations

- Tailings spillages

- Turbulence caused by cattle drinking the water or children playing in the water can cause the mobilization or transport of uranium in the Wonderfonteinspruit.

We here refer our esteemed listeners to what had happened in 2002 in the KrugersorpRandfontein area where water has started to decant from a number of shafts into the rates of HIV / Aids and chronic and acute malnutrition is particularly vulnerable to additional stress of the immune system by contaminants such as uranium.

Risks associated with the ingestion of riverbank material by young children and pregnant mothers - 'pica' - are widespread in rural African communities and are not quantified. It is worth noticing that uraniferous salt crusts were found to contain extremely high concentrations of uranium 9up to 1 100mg/kg.)

At the time of this submission, there had been no efforts on the part of organs of state to create awareness of the risks or hazards amongst affected communities.

At the time of this submission there has been no epidemiological studies done in order to determine pathways of contamination or health impacts. Abundant anecdotal evidence, however, exists of mental retardation, pancreatic cancers, etc .

Strong institutional control is required to prevent the remobilization of U into the water column. Regrettably institutional control has been poor.

PROMULGATED ACTS OF PARLIAMENT

The duty of care provisions contained in both then National Water Act, No 36 of 1998

and the National Environmental Management Act, No 107 of 1998, and the Mineral and Petroleum Resources Development Act, No 28 of 2002 create a general duty not to pollute and remediate where pollution has been caused. In addition, these provisions create retrospective liability.

Under both the MPRDA And NEMA (and by implication the NWA). Liability is specifically extended to the director of the business concern in his or her personal capacity, i.e personal liability

· MPRDA section 38(2): Notwithstanding the Companies Act, 1973 (Act No. 61 of 1973), or the Close Corporations Act, 1984 (Act No 69 of 1984), the directors of a company or members of a close corporation are jointly and severally liable; for any unacceptable negative impact on the environment, including damage, degradation or pollution; advertently or inadvertently caused by company or close corporation which they represent or represented, inside and outside the mine property.

· Under section 19(4) of the NW A costs to prevent further pollution or degradation or to make the area safe can be recovered from any other person who benefited from the remediation measures to the extent of such benefits.

Apportionment of liability is provided for in NEMA and the NW A, but not under the MPRDA since the holder of the right or permit is deemed to be the responsible person. If more than one person is liable under the NW A, "the responsible authority (D WAF or CMA) agency must apportion the liability, but such apportionment does not relieve any of them of their joint and several liability for the full amount of the

costs" (section 19(8)). Liability may also be apportioned by DEAT in terms of NEMA section 28(11): If more than one person is liable, "...the liability must be apportioned among the persons concerned according to the degree to which each was responsible for the harm to the environment resulting from their respective failures to take the measures required.

Regrettably, in a written response to question raised in Parliament in March 2007, the honourable Minister of Water Affairs and Forestry, stated that "No steps are being taken to lay criminal charges against past polluters.

By the failure of the relevant organs of state to have taken timeous actions against polluters and to enforce the Polluter must Pay principle, ordinary taxpayers, who have no connection whatsoever to the harm and degradation caused by historic and current gold mining activities, and derived no benefit from it, are now compelled to carry the costs that is the health costs, the ecological degradation, the loss of agricultural potential, the pollution of ground and surface water.

CONCLUSION

The only way we can judge future environmental performance is by historic precedents. Poor institutional control and failure to adequately monitor and manage the U contamination of the Wonderfonteinspruit, and to enforce the Polluter must Pay principle have resulted in long term ecological degradation and pollution and an

inequitable and unfair externalization the costs upon the general public. It is trusted that this historic precedent will stand as testimony in the assessment of the foreseeable environmental impacts of the pebble bed modular technology

enviroadmin Posted - 28 Jun 2007 : 11:12:56

Submissions by DEAT:

DEPARTMENT OF ENVIRONMENT AND TOURISM: NUCLEAR REGULATION

The role of DEA T Presentation to the Portfolio Committee: June 2007

The Intergovernmental Context

· DME main department responsible for nuclear issues - policy and legislation as well as National Nuclear Regulator. Includes policy on radioactive waste management

· DPE as custodian of state owned enterprises as role in relation to establishment of facilities

· DST role in relation to custodianship of R+D

· Deat has limited regulatory role - no policy role

DEA T's Role

· Establishment of nuclear facilities is a listed activity in terms of EIA Regulations

· DEAT responsible for authorising applications for nuclear related EIAs

· Also role in relation to nuclear waste to the extent that it is not dealt with by other legislation. (NNR Act, Nuclear Act, Health legislation)

Managing Nuclear EIAs

· Deat authorising body

· Currently two applications - PBMR and conventional nuclear

· MOU with the NNR. NNR responsible for licencing safety case and DEAT responsible for EIA authorisation. DEA T represented on NNR Board.

· Agreement that the two bodies will not duplicate or repeat each others' work environment & tourism

In assessing technical issues DEA T establishes panel of national and international nuclear experts

All existing government policies, legislation and prescripts taken into account in decision making

DEAT takes decisions on nuclear issues in relation to the facts of the given application and in the context of established policy and legislation.

THANK YOU

enviroadmin Posted - 28 Jun 2007 : 11:11:54

Submission by PBMR:

THE SOCIO-ECONOMIC, WASTE MANAGEMENT AND SECURITY OF SUPPLY, HUMAN RESOURCE. DEVELOPMENT AS WELL AS SCIENCE. AND TECHNOLOGIAL IMPLICATIONS OF NUCLEAR ENERGY IN SOUTH AFRICA

Paper submitted by Pebble Bed Modular Reactor (Pty) Ltd to the Portfolio Committee .on Environmental Affairs and Tourism as input for a Public Hearing held on 20 June 2007

1. INTRODUCTION

Global energy demand, which is governed by population growth and increase in standards of living, is presently growing at about 2% per annum. The electricity component of demand is increasing more rapidly than the overall energy growth and is projected to increase by some 70% between 2000 and 2020, almost two-thirds of which will be from developing countries.

Currently, about 2 billion people have no access to electricity. Most electricity in the world is generated in coal-fired power stations (39%) followed by hydro (19%), nuclear (16%), gas (15%) and oil (10%). Apart from hydro-based power generation, renewable sources of electricity such as wind, solar, tidal, geothermal and biomass are intrinsically or economically not yet suitable or feasible for large-scale power generation where continuous, reliable supply is needed. These sources will have most appeal where demand is for small-scale, intermittent supply of electricity.

The World Nuclear Association lists 435 nuclear power plants in operation worldwide.

About 30 more are under construction, over 60 power reactors with a total net capacity of nearly 70,000MWe are planned and over 150 more are proposed. Civil nuclear power has accumulated more than 11 000 reactor years of operational experience to date.

There is as much electricity generated by nuclear power today as from all sources worldwide in 1960. Nuclear power is increasingly being regarded as an important component of the energy mix in countries as part of their strategies to combat global warming and meet their Kyoto Protocol commitments for reduction in C02 emissions. The revival of nuclear power expectations is also reflected in the world uranium price, which increased from $10/lb in 2001 to the present $135/lb.

South Africa presently has approximately about 39 000 MWe local generating capacity, 87% of which is coal based and 5% nuclear. The projected future electricity demand indicates that this capacity will have to double over the next twenty years to keep up with growing demand. According to the South African Energy Policy and various statements by government, nuclear power must be retained as part of the energy mix and the relative contribution should even be increased.

Mention was further made of the planned establishment of a nuclear power export industry based on Pebble Bed Modular Reactor (PBMR) technology. Sustainable implementation of these expectations will require a review of, and coordinated RSA national strategy for, all the components of the nuclear fuel cycle, particularly in view of the major changes and downscaling within certain areas of the nuclear industry over the past 15 years.

The potential contribution of nuclear power to future electricity generation in South Africa should be viewed against the background of the sustainability of present plant as well as the anticipated growth in demand.

Assuming that the replacement of the existing 39 000 MWe does not include any additional nuclear plant, it can be seen that the stated objective of 4 000 MWe PBMR plant within 20 years (24 PBMR modules) would comprise only 5% of the anticipated 80000 MWe demand by then. This growth scenario would further allow all nuclear plants to be located at coastal sites, thus avoiding the high transmission premiums for delivering Highveld coal power to coastal regions.

This document presents information on the status and expected future developments in the various components of the fuel cycle in South Africa. It was generated as an input to the formulation of national strategy and policy making for the future deployment of additional nuclear power in South Africa.

2.PBMR TECHNOLOGY

The PBMR reactor is a helium-cooled, graphite moderated HTR which uses carbon and silicon carbide coated particles of enriched uranium enclosed in graphite to form a pebble or sphere as fuel. Helium is used both as the coolant and energy transfer medium. PBMR technology was initially developed in Germany, where two PBMR-type demonstration reactors operated successfully between 1965 and 1989. The PBMR project in South Africa was launched .in 1993 after Eskom acquired a licence from the German developers of the technology.

2.1. Plant Design

The DPP features a helium-cooled pebble bed reactor with a power output of 400 MWt

coupled to a closed cycle gas turbine power conversion unit that consists of a power turbine driving a compressor on one shaft end, and the generator on the other as well as a recuperator, a pre-cooler and an intercooler. The main power system utilizes a recuperative Brayton cycle with helium as the working fluid. This differs from the German approach, which used a steam cycle. The rated power output of the DPP is 165 MWe. Reactor inlet and outlet temperatures are < 500 C and 900 C respectively. The DPP will be a single plant module, and PBMR power plants will subsequently be marketed as stand-alone or as multi-module plants, starting with four-module, 660 MWe units. The targeted levelized unit electricity cost for the four-module plant is < $40/MWt.

2.2. Fuel Management

A PBMR core contains nominally 452 000 fuel spheres, each with a diameter of 60 mm and a uranium content of 9 g. Loading of spheres is done online from the top, and spheres are extracted through de-fuelling chutes at the bottom. For initial loading, the core is filled with graphite spheres which are gradually replaced with LEU containing spheres until an equilibrium core, which operates with 9.6% enriched uranium containing spheres, is obtained. During operation, fuel spheres are continually extracted from the bottom and, depending on the burn-up achieved, either reloaded or transferred to the spent fuel tanks. Fuel spheres will traverse the core on average six times over some 900 days before attaining a target discharge burn-up of 92000 MWd/tU. An equilibrium core of a 400 MWt reactor will contain 4.068 t of 9.6% enriched uranium, while the annual requirement for fresh fuel (on average 489 spheres per day) will be 1.6 t of enriched uranium, which can be produced from 30 t to 40 t of natural uranium.

2.3. Safety Features

Several critical safety objectives which are normally achieved in existing commercial power reactors by means of custom engineered active safety systems are already passively and inherently present in PBMR reactors as result of its design, materials used and the physics involved. Some of the critical features include:

· the high radionuclide capability of the coated fuel particles even beyond operational temperatures;

· the large negative temperature coefficient of reactivity which will ensure prompt shutdown upon loss of coolant;

· the effective heat removal capability, which will prevent significant degradation of the fuel and the release of harmful quantities of radioactivity under loss of coolant conditions;

· the high heat capacity of the core.

2.4. Nuclear Material Safeguards

The inherent design and operational characteristics of the reactor also provide certain non-proliferation attributes to the reactor. These include closed system online fuelling and de-fuelling, the storage of all spent fuel in the facility, the sensitivity of the reactivity balance to the introduction of neutron-absorbing material into the core, and the unfavourable isotopic composition of the formed plutonium for the production of nuclear explosives.

2.5. Project status

Since its establishment in 1999, Pebble Bed Modular Reactor (Pty) Ltd has grown into the largest nuclear reactor design team in the world. In addition to the core team of some seven hundred people at the PBMR head-office in Centurion, more than a thousand people at universities, private companies and research institutes are involved with the project. Around the world, scientists and governments are looking to South Africa with great interest to see how the local nuclear reactor developments unfold.

The PBMR team is currently preparing for the building of a commercial scale power reactor project at Koeberg and a fuel plant at Pelindaba. The current schedule is to start construction in 2009 and for the first fuel to be loaded four years later. Construction of the fist commercial PBMR modules are planned to start three years after the first fuel has been loaded into the demonstration reactor.

2.6. Further Development

Further development objectives include the demonstration of PBMR technology for process heat application in the chemical, petrochemical and mineral industries as well as for hydrogen production.

While PBMR's research and development efforts were initially focused mainly on electricity generation, it has become increasingly apparent that the high-temperature, gas-cooled reactor technology will also enable access to markets that call for process heat applications. Next-generation high temperature reactors such as the PBMR can produce hydrogen for transportation or for upgrading coal and heavy crude oils into usable products, thereby relieving pressure on natural gas supply (the source of most hydrogen produced today).

They can also generate process heat for desalination, to extract oil from tar sands, and for many other industrial applications. Capable through its very high temperatures of 900 degrees C, the PBMR technology is ideally placed for these applications. To this end, Sasol is in discussion with PBMR to explore the possibility of replacing its coal-fired boilers with reactors. Sasol has also had preliminary discussions with Government about the potential for PBMR technology and how it can be used in the synfuels industry. It is not inconceivable that such a nuclear heat supply system could be operating by 2015.

In Canada there is interest from companies involved in the oil sands business to use the high temperatures created in PBMRs to create extremely super-heated steam to extract bitumen from oil sands instead of gas-fired plants currently in use.

PBMR is also a partner in a concept design contract with the US Department of Energy, to consider the PBMR technology as future source of hydrogen. The project is still in its pre-conceptual phase, but it could result in the construction of a South African-designed Pebble Bed Modular Reactor in the US before the end of the next decade.

The PBMR technology furthermore has desalination properties. To this end, the Department of Water Affairs has requested PBMR to work on a proposal for utilising the waste heat of the demonstration reactor at Koeberg for desalination purposes.

3. SUPPORTING INDUSTRIES

Deployment of new PBMR-based nuclear power capacity will be dependent on several supporting industries for the supply of materials and components. Whereas the demonstration plant will contain a fairly high percentage of imported materials and components, it is envisaged that the local content of the commercial PBMR reactors will be significantly higher due to the programme's strategy of promoting the establishment of local suppliers where thought economically feasible.

Supporting industries for the supply of enriched uranium for fuel production as well as material and components for reactors such as graphite and graphite structures, turbo machinery, pressure vessels, heat exchangers and main support systems (fuel handling, reactivity control, gas conditioning and inventory control), are of particular relevance. The programme would also require a nuclear waste disposal service for operational waste and spent fuel.

Local supporting industries for the programme will have many benefits, e.g. strategic (particularly with respect to nuclear material supply), job creation, skills development, upliftment of certain industrial sectors, import reduction and export opportunities. Local supply can, of course only be considered if it makes commercial sense. It may, in this respect, be prudent to revisit the reasons for the failure of South Africa's previous ventures into the field of local uranium enrichment and fuel production.

4. URANIUM-RESOURCESAND-MINING

4.1. Background

Uranium production in South Africa commenced in 1952 as result of the demand created by international nuclear weapons programmes. Production peaked in 1959 at 5 000 t p.a. U. After a 50% decrease in production, another peak, caused by the energy crisis of the 1970s, at more than 6 000 t p.a. U, followed in 1979. Since then, a sharp drop in demand and prices resulted in less than a 1000 t U currently being produced in South Africa.

More than 95% of the approximately 160 000 t U mined in South Africa thus far was obtained as a by-product of gold from the gold mines of the Witwatersrand-Klerksdorp-Free State area. Uranium production in South Africa is heavily dependent on the future of gold mining, which in turn is governed by prevailing gold prices, exchange rates and production costs. Gold production in South Africa is on the decline, and already fell from 580 t p.a. in 1994 to 342 t in 2004. Some uranium is also recovered from the mine tailings that have been generated over more than 100 years at the gold mines. Although previously associated with the gold mining industry, the Dominion mine near Klerksdorp is now regarded as a primary uranium mine with significant future potential.

There are at least two other uranium deposits of interest which are not associated with gold. One is the Phalaborwa Igneous Complex, from where about 5% of South Africa's total uranium production originated. Uranium production in this case is determined by the copper mining strategy of the mine where it is extracted as a by-product. Another potential area of interest is the Karoo sandstones which have not been mined thus far, but where uranium deposits have been explored in several areas. Results from drilling operations carried out during the 1970s indicated that the resource may contain approximately 100 000 t U in various cost categories.

4.2 Resource estimates

South Africa's uranium resources which can be recovered at a production cost of < $130/kg have been estimated at 298 000 t. That places South Africa's reserves amongst the top four to five countries in the world. Some 60% of these resources are associated with and dependent on gold mining, while the bulk of the rest is in the Karoo sandstones. This figure must, however, be treated with caution, since the published resource estimate of 298 000 t U for 2002 has apparently not been adjusted for increases in production costs for many years.

4.3 Future needs

Uranium production in South Africa is inextricably linked to and determined by the world uranium market prices and the local production of gold. The present upswing in world demand and prices seems sustainable and will most likely stimulate increased production. Total local uranium demand for a South African nuclear energy programme consisting of the Koeberg power station and 30 PBMR reactors would be at most 1 500 t p.a U. This is modest compared to the extraction and processing facilities which have been retained by many mines in operational or mothballed status from times when production was more than 6 000 t p.a.

It seems reasonable to assume that the present level of international uranium prices, which escalated dramatically over the last two years, will result in sufficient South African production to supply the potential future need. A drop in international uranium prices could reduce South African production to below local needs. Low prices, on the other hand, would imply that uranium will be readily available on international markets and therefore also to South Africa.

When considering the security of future local uranium supply to a South African nuclear programme, the relevant question would be whether uranium reserves, in the long term, would be sufficient to guarantee commercially competitive recovery of sufficient uranium for the programme. This is, under present conditions, totally dependent on the future of gold production in the country.

As mentioned above, gold production is on the decline, and the closure of more mines over the next 20 to 30 years seems inevitable. It would, therefore, in the interest of long-term security of supply, be important to find and develop alternative uranium sources which are. not so dependent on gold or other co-products. The Karoo sandstones probably present the most promising area for further exploration and possible future uranium mines. The new focus on the mining of uranium as primary product in the Klerksdorp area by SXR Uranium One as well as uranium recovery from tailings may further contribute towards uranium production which will be less dependent on gold. It is further also important that the uranium resource estimate be updated to allow for production cost increases for the past 10 years.

5. URANIUM CONVERSION

5.1. Background

A conversion plant for the production of UF6, the feed material to enrichment plants, from Ammonium Diuranate (ADU) which was supplied by South African mines, was operated by Necsa between 1986 and 2000 as part of its nuclear fuel production programme. The plant had a nameplate capacity of 1 200 t p.a. U as UF6, but production was < 50% of the capacity for most of the operating period. A production rate of 850 t p.a. U was achieved after technical modifications in 1995. Approximately one-third of the almost 6 000 t U as UF6 produced by the plant was used as feed

material for uranium enrichment in South Africa, while the rest was exported. The Necsa plant, which included distillation of UF6 as the final purification step, was internationally highly regarded for the purity of its product.

After Necsa terminated its fuel production programme for Koeberg, an attempt was made to retain the conversion plant for the production of UF6 for export. This was not successful due to the high operational cost, and the plant was closed in 2000. The plant is scheduled for decommissioning in future. Certain critical components were already badly corroded at that stage, and are no longer fit for plant use. The main reason for the poor economic performance was the low capacity of the plant. International experience has shown that a commercial plant should have a capacity of at least five times the nameplate capacity of the Pelindaba plant.

The conversion process required facilities for the production of HF (from locally mined CaF2, fluorspar) and F2 gas. The HF plant with a capacity of 4 500 t p.a. HF is still operational, and supplies HF to Necsa's commercial fluorochemical programme for local industry and also for export. F2 is also still being produced at Necsa for its fluorochemical business.

5.2. Future conversion requirements

Local production of fuel for 30 PBMR reactors would require a UF6 production capacity of approximately 750 t p.a. U as UF6. Even if all of Koeberg's fuel were produced from locally converted uranium, a total local conversion capacity of approximately 1 000 t p.a. U as UF6 would be required.

The establishment of an economically viable conversion plant in South Africa could therefore only be considered if the bulk of production were exported as UF6, enriched uranium or reactor fuel, if such plants of economic capacity were available locally. The transport penalty of exporting UF6 instead of .uranium oxides should be further noted. Global demand for commercial conversion services (52 000 t U as UF6 for 2005) is presently met by the five major commercial producers. It seems likely that some existing producers (Areva, for example) will expand their capacities to meet the expected growth in demand in future.

5.3. Future strategies

South Africa's future needs for enriched uranium will largely be determined by the requirements of the Light Water and PBMR power reactors. Enrichment levels of approximately 5% will be required for Light Water Reactors and 9.6% for PBMR reactors. Assuming a scenario where the nuclear power component of Eskom gradually increases to 14.5% in 2030 when 5 000 MWe will be generated by Light Water Reactors and a further 4 950 MWe by PBMR reactors, an enrichment capacity of almost 1 500 000 SWU p.a. would be required to fuel the reactors.

There are three broad approaches which can be considered for meeting the SWU deand:

Firstly, the construction of an independent indigenous enrichment facility in South Africa under fulllAEA safeguards can be considered. This would, in all probability, be based on centrifuge technology, which should provide the best and lowest risk opportunity for establishing commercially competitive enrichment technology in South Africa. Recent statements by South African researchers that an improvement of the old vortex tube technology can be expected to lower the power requirement for uranium enrichment would still require confirmation by an extensive and costly

Research and Development (R&D) programme before any view on the competitiveness of the improved technology for uranium can be formulated. Unfortunately most of the other unfavourable characteristics of the process, such as the use of hydrogen as carrier gas, will also still apply. The option of a local plant may possibly be seen as providing maximum assurance of supply, but it suffers from serious disadvantages such as the availability of mature competitive technology, very high capital investment and low economy of scale, particularly matching of the enrichment plant capacity to the growing product requirement over time. The approach of constructing an independent plant in South Africa would certainly result in the highest cost of enrichment services for Eskom.

Secondly, procurement of-enrichment services on international markets is of course an option. Uranium at enrichment levels of up to 5% is readily available from various suppliers as part of an extensive international trade network. Security of future supply should be very high, particularly for countries that forego the building of their own enrichment facilities. There is, however, no diversity of supply for 9.6% enriched uranium for PBMR reactors. The initial limited demand for this level of enrichment will also not stimulate diversity of supply, and the programme may be dependent on a single supplier with the associated risk. When Generation IV nuclear reactors come into commercial production, there may be a growing demand for higher enrichment fuel for future High-temperature Gas-cooled Reactors (HTGRs). This may lead to a diversity of suppliers entering this market, resulting in an assurance of supply situation similar to that in the current up to 5% services market. It should, however, be noted that the bulk (91.4%) of the separative work required for the production of 9.6% enriched uranium is required for taking it up to 5%. If, therefore, 5% enriched uranium is procured on the normal market and a single enricher (or more) is contracted to upgrade it from 5% to 9.6% (8.6% of the total-separative work), it would not be too serious to even pay a significant premium for this last step. A centrifuge facility required to do the upgrading for 20 PBMR reactors would hardly be more than a laboratory scale facility.

Thirdly, joint ownership in facilities either in the country of the technology holder or in South Africa is an option. The plant will be financed, managed and staffed on a multinational basis and partners of the technology holder will not gain access to sensitive technology. Details of this type of arrangement are still being developed, but it can be accepted that it would result in adequate assurance of non-proliferation as well as assurance of supply. Economy of scale would be an advantage of such a jointly owned facility. It would also require a more manageable investment for each member state than building an indigenous national facility. In addition, it would be suitable for enrichment levels up to 9.6% or more.

Another possibility for the procurement of 9.6% enriched uranium which may be worth exploring is linked to the down-blending of HEU from Russian and American nuclear warheads. Dow-blended HEU from both sources is presently being used in USA power reactors. The question arises whether 9.6% enriched uranium could be obtained from the USA or Russia for the interim period until such time as this level of enrichment becomes generally available as a result of future demand by High-temperature Reactors (HTRs).

In conclusion, the PBMR requirement for fuel enriched to 9.6% may well turn out to be the determining factor in deciding on a procurement strategy. It is important that a feasible and economically acceptable strategy for the procurement of the 9.6% enriched fuel be found and agreed with a reliable producer in good time.

The supply of 20% enriched uranium for SAFARI-1 fuel is not addressed in this

document, since it involves very small quantities of material for which international supply lines are well developed and secure.

6. FUEL FABRICATION

6.1. Background

South Africa-is nuclear fuel requirements for the foreseeable future will be determined by the needs of the Koeberg Nuclear Power Station, the SAFARI-1 reactor and the PBMR programme.

Koeberg procured all its fuel requirements from Framatome (now Arera) since commissioning of the two reactors in 1984/1985 until 1988, after which Necsa provided the fuel until the closure of the Beva plant in 1996. The Beva plant had a production capacity of approximately 200 fuel assemblies per annum while the Koeberg requirement was approximately 70. The plant was closed due to cost considerations as result of the low throughput and the negative expectations of future growth in local demand, as well as the inability to find export opportunities. Eskom has since procured its fuel on the open market and recently entered into a long-term contract with Areva for fuel production, and with Russia for the supply of the enriched uranium.

Highly Enriched Uranium (HEU) fuel for the SAFARI-1 reactor was procured from the USA from commissioning of the reactor in 1965 until 1977, when the USA terminated the agreement. Since 1982, SAFARI-1 fuel has been produced by Necsa -in the Materials Test Reactor (MTR) fuel fabrication facility after locally produced HEU became available. The South African inventory of HEU is presently used to fuel the reactor, as well as for target plates for the commercial production of radioisotopes. The fuel consumption of the reactor, on average 40 fuel elements containing 300 g U-235 each, is largely determined by the isotope production programme.

Following the licence agreement between Eskom and the German PBMR technology holder, a laboratory was established at Pelindaba, where PBMR fuel production

technology has been demonstrated on laboratory scale. Fuel spheres for irradiation testing will be available from the laboratory by the end of 2007. The design and licensing of a Pilot Fuel Plant (PFP) is at an advanced stage.

6.2. Future strategies

Koeberg will continue its practice of procuring fuel production and enriched uranium on the open market. Should uranium conversion and enrichment be resumed in South Africa, it can be expected that preference for locally enriched uranium will be considered for the production of Koeberg fuel. It is unlikely that local PWR fuel production will be considered in South Africa again, as a fuel production plant would face the same obstacles as the Beva plant. Koeberg will continue to strive for higher burn-up of fuel and would thus require fuel with higher enrichment levels (up to 4.95%). The introduction of MOX fuel could also be considered in future.

The SAFARI-1 reactor will, as part of the worldwide trend, convert to operation with Low Enriched Uranium (LEU) fuel. LEU fuel implies a technology changeover for the MTR fuel plant, and it is likely that future fuel production will be a mix of imported and locally manufactured components. The optimum mix will have to be determined. LEU will have to be imported in any case. That would result in the existing HEU inventory possibly becoming available for the production of isotope production targets

only. SAFARI-1 may consider upgrading to 30 MW in future, which would result in 30% higher fuel consumption.

PBMR fuel spheres from the laboratory facility will be irradiated in foreign facilities as part of the fuel qualification programme. Construction of a PFP will commence by the middle of 2007 and production will start by the end of 2009. Sufficient fuel (450 000 fuel spheres) must be available for loading the Demonstration Power Plant (DPP) by the end of 2010. The PFP will have an initial capacity of 270 000 fuel spheres per annum. It will be upgraded gradually to 540 000 fuel spheres per annum and later on to even higher capacity. The present PBMR strategy would require a fuel production capacity of at least 900 000 fuel spheres per annum to service the equilibrium cores of PBMR reactors by 2015. A commercial fuel plant with a capacity of at least 3.6 million fuel spheres per annum would be required to service the equilibrium cores of six four-pack power plants for Eskom as envisaged in the PBMR strategy. Development of a next generation PBMR fuel will be initiated in future. It would be necessary for a fuel development laboratory to be maintained at Pelindaba, for SAFARI-1 to be equipped for test irradiations, and for a Post-irradiation Examination (PIE) capability to be established at Necsa.

7. NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING

7.1. Background

The following categories of nuclear waste are formed during the generation of nuclear power:

· The production of fuel for nuclear reactors creates radioactive waste containing un-irradiated natural and enriched uranium from conversion, enrichment and fuel production processes;

· During reactor operations, small quantities of fission products from the fuel and neutron activation products from construction materials are recovered during decontamination of liquid and gaseous effluent streams. This type of radioactive waste, together with redundant components, is classified as Short-lived Low and Intermediate Level Waste (LILW-SL) and consists predominantly of radionuclides with half-lives of < 31 years.

· Spent fuel assemblies contain uranium and other actinides with long half-lives formed from uranium as well as a broad range of fission products. This waste is classified as High-level Waste (HLW).

7.2. Strategies for South African radioactive waste

7.2.1. Koeberg Nuclear Power Station

The Koeberg Nuclear Power Station consists of two PWRs with a total capacity of 1 840 MWe. The reactors are of French origin and were commissioned in 1984/1985. Fuel containing 4.4% enriched uranium is presently supplied by Areva. Fuel burn-up of 52000 MWd/t is being achieved. On average, 35 t of enriched uranium in 75 fuel

assemblies is required annually. The natural uranium. requirement to fuel the power station is approximately 350 t per annum. Fuel for the reactors was supplied by Necsa for a period of 10 years before the Beva fuel plant was closed. The present life expectancy of the reactors is 40 years.

The extension of the reactor lifetimes to 50 or even 60 years and the possible introduction of MOX fuel is being investigated. The enrichment level of fuel will be increased to 4.95% in future. All spent fuel generated during the 40-year operation period can be accumulated in the spent fuel storage pools, but more dry storage capacity would be required for longer periods of operation.

Koeberg's solidified operational waste classified as LILW-SL is disposed of in shallow (10m) trenches at the Vaalputs radioactive waste repository. This is likely to continue for the remaining life of the two Koeberg reactors.

Except for some fuel assemblies in four dry storage casks, all spent fuel at Koeberg is stored in the spent fuel storage pools, which would be able to accommodate the rest of the spent fuel for the full expected 40-year lifetimes of the two reactors. Should the operational period of the two reactors be extended to 50 years, however, the dry storage capacity of Koeberg would have to be expC!nded to make provision for a total of almost 4 000 spent fuel assemblies. For the likely scenario where another 40 years of dry storage, preferably at the eventual disposal site, would be necessary after the closure of the reactors, more .storage casks (probably a mixture of the existing Castor casks as well as Nuhoms casks) would be required before the spent fuel would be encapsulated for final disposal.

In the event that the reprocessing option for Koeberg spent fuel is chosen, the removal of spent fuel from the storage pool for reprocessing could be scheduled such that no additional dry storage casks would be required for storage, since the waste received from the re-processor would already be contained for storage. It should, however, be noted that both the direct disposal as well as the reprocessing routes would eventually require a deep disposal facility as well as a dry storage facility at the disposal site.

The above scenario for the management of Koeberg spent fuel would imply that a deep disposal facility should be ready for final encapsulation and disposal by about 2070.

7.2.2 PBMR Programme

Operational waste generated by the demonstration PBMR on the Koeberg site will generally be in the category LILW-SL. It will be handled similarly to operational waste from the existing reactors and disposed of at Vaalputs.

Two options for dealing with spent PBMR fuel are being considered at present:

· The first option involves the direct disposal route. This implies on-site storage of the spent fuel for another 40 years after the closure of the reactor, after which it can be transferred to shipping casks for storage and disposal at the HLW repository. A multi-model plant producing 1 000 MWe will require 14 shipments per annum in standard PWR spent fuel casks.

The second option involves reduction of the HLW volume by removing the matrix and

outer pyrolytic graphite of the coated particles at an on-site facility. The coated particles are then fed into storage casks. It is further aimed to remove the C-14 isotope from the graphite and to reuse the cleaned graphite for the production of fresh fuel. This option could reduce the volume of HLW to 4% of that of the first option. The viability of the volume reduction process has not yet been demonstrated and-development work would be required before decisions can be made.

7.2.3. Necsa

Radioactive waste at the Pelindaba site originated from:

a. Process development and production of fuel for the Koeberg reactors as well as HEU for the military programme. This waste is primarily in the category un-irradiated uranium and most of it is stored in drums in the Pelstore facility.

b. Waste associated with the operation of SAFARI-1, particularly fuel production and spent fuel.

c. R&D and radioisotope production programmes, which are mostly short-lived isotopes in the category LILW-SL.

Before 1996, some un-irradiated uranium contaminated waste as well as short-lived isotope waste was buried in shallow trenches at Thabana. Since then, Thabana has only been used as a waste storage site. Spent fuel from SAFARI-1 is stored in the reactor pool and also in a dry storage facility at Thabana.

No radioactive waste from Necsa has thus far been transferred to Vaalputs. It is envisaged that all waste meeting the Vaalputs Waste Acceptance Criteria (LILW-SL at present) will in future be disposed of there. A signifiCant portion of the un-irradiated uranium contaminated waste (LILW-LL) is not within the Vaalputs Waste Acceptance Criteria at present. It is important that a decision be obtained on the future acceptability of this category of waste at Vaalputs, possibly in retrievable storage containers at depths of more than 10m. A decision must be made on whether the existing waste in the Thabana trenches would have to be recovered or whether it will be managed as disposed-of radioactive waste on a permanent basis. The volume of SAFARI-1 spent fuel is extremely low compared to that of Koeberg and the most effective disposal method would be to follow the Koeberg approach. Provision for long-term management and storage of radioactive waste at Pelindaba will be necessary for waste which cannot be accepted at Vaalputs.

7.2.4. Reprocessing

According to the draft document on the Radioactive Waste Management Policy and Strategy for South Africa, reprocessing of spent fuel should not be excluded as an option which, if selected, would probably have to be contracted out to other countries in view of the high cost and limited expected local demand. Reprocessing technology for PBMR spent fuel is not yet available and it would probably be prudent to postpone a possible decision on the reprocessing of Koeberg spent fuel until more information is available on the future of PBMR technology in South Africa, and on the associated reprocessing requirements (if any) to ensure a holistic national strategy for the management of spent fuel.

7.3. Decomissioning

South Africa already gained some 10 years' experience in the decommissioning of

uranium contaminated plants through the ongoing Decontamination and Decommissioning (D&D) programme at Pelindaba. Necsa also developed a long-term plan and cost estimate for the D&D of its historical and some other facilities over the next 30 years, the bulk of which will be funded by government. Eskom is making financial provision for the decommissioning of the Koeberg reactors, and is already planning the decommissioning process after the closure of the reactors, probably in 2025. The present plan envisages completion of the decommissioning process by about 2055. PBMR (Pty) Ltd is providing guidelines for the decommissioning of the demonstration unit and other PBMR units. It is envisaged that decommissioning will be carried out with spent fuel stored in the spent fuel tanks to gain maximum decay advantage.

Some key guiding principles for the planning process in all cases include the following: ensure the maximum radioactive decay time practically possible before commencing operations; plan the D&D processes to be followed, and estimate as far as possible the quantities of materials and types as well as levels of contamination which must be handled; develop a funding plan; and ensure that facilities will be available to deal with all waste streams and to manage the resulting radioactive waste.

8. RESEARCH AND DEVELOPMENT

The PBMR programme is presently the main focus and strategic driver of all fuel cycle related work in South Africa, and its direct and indirect needs should therefore be a major consideration in setting the national R&D agenda in this field. Combined with technological requirements by SAFARI-1 and all South Africa's nuclear waste activities, R&D planning objectives should aim to address requirements in the following broad areas:

· A survey of resources and technology agreements to ensure the future availability of enriched uranium for fuel fabrication;

· The effective establishment and operation of the demonstration reactor and pilot fuel plant;

· The development and demonstration of next generation technologies including maximization of South African content in the supply of PBMR reactors and fuel in the medium and long term;

· Cost-effective and environmentally sensitive management of spent fuel and other radioactive waste according to national policy and strategy;

· The establishment and maintenance of R&D facilities and well-trained teams of engineers and scientists in South Africa to execute the objectives and capabilities for managing R&D projects which may have to be done in cooperation with foreign countries.

8.1. Uranium resources

Information on South Africa's uranium resources in the various cost categories should be updated and the future impact of uranium producers and initiatives in uranium mining on the resource estimates should be evaluated. More information should be obtained on the Karoo Sandstone uranium deposits, particularly the resources in various cost categories.

8.2.Coversion technology

Strategies and planning on conversion technology should be taken against the background that all commercial suppliers, including South Africa's former conversion plant, apply the same proven technology for the conversion of uranium. Conversion adds only approximately 4% to the total cost of nuclear fuel in the fuel cycle, and there is limited incentive for development work on cost reduction.

A study of cost structures (minimum commercial plant capacities, global trends, markets) in the conversion business should be undertaken and a position regarding the future of conversion in South Africa should be formulated. A strategy to retain fluorine technology in South Africa should be considered.

8.3 Enrichment technology

It is, as was already discussed earlier in this document, unlikely that South Africa will embark again on the establishment of an indigenous enrichment plant. The only mechanism whereby enrichment technology could be re-established in South Africa would be through a joint undertaking with an established technology partner, most probably centrifuge technology, in which case the. South African technological contribution would be limited to the provision of non-sensitive components, UF6 handling facilities, supporting services, etc. Negotiations on the implementation of a joint undertaking would require a core of knowledgeable people in the field.

A strategy for the supply of 9.6% enriched uranium should also be formulated and the approach chosen should be negotiated with prospective suppliers/partners.

8.4. Fuel Technology

R&D in fuel technology should be focused on the production of high-quality and cost-effective first generation PBMR fuel, and also on improving the integrity of next generation fuel (higher burn-up and corrosion resistance as well as reduced diffusion of fission products through the coating) as would be required for PBMR reactors of increased efficiency and for higher temperature New Generation Nuclear Plant (NGNP) application such as hydrogen production.

8.5. Reactor technology

In order to maintain the competitive edge achieved by the PBMR design relative to the norms set for the next generation nuclear reactors, technological development will be required in several areas, including the following:

· Improvement of reactor efficiency by developing tools for plant design optimization and conditioning technology to improve graphite radiation resistance;

· Minimization of radioactive waste generation and personnel exposure to radiation by limiting the transfer of radionuclides to the power conversion system;

· Improvement of the inherent characteristics and applicability of the reactor for New Generation Nuclear Plant (NGNP) applications.

8.6. Radioactive waste and decommissioning technology

R&D needs for the effective long-term management of existing Low and Intermediate Level Waste (LILW) in South Africa are low. Technology for the processing and disposal of short-lived LILW (LILW-SL) is well established and is dealt with on a routine basis. Processing technology for un-irradiated uranium containing waste in the category LILW-LL is also well established, but no disposal methodology has been licensed as yet. Finalization of this matter would require the design, safety assessment and licensing of a facility at a suitable site, probably Vaalputs. Management of radioactive waste arising from the PBMR programme will, due to its uniqueness and special requirements, however, require the development of special technologies. High-level Waste (HLW), predominantly spent fuel from the Koeberg power station and SAFARI-1, would use internationally developed best practices whether being directly put into final storage, or being reprocessed.

8.6.1. PBMR Radioactive Waste

Waste minimization and reuse of certain materials are the main drivers of technology development for PBMR radioactive waste. This would imply the separation of coated particles from spent fuel spheres and the reclamation of matrix graphite. HLW originating from the PBMR programme will be dealt with similarly from a. policy perspective to other HLW in South Africa.

8.6.2. High-level Waste

There is as yet no HLW disposal methodology or facility for dealing with this category of waste from Koeberg, Necsa or the PBMR. Planning of R&D work on the preparation of HLW for final disposal must await finalization of the national policy and strategy on radioactive waste, particularly with regard to reprocessing. The draft policy and strategy document does, however, indicate that investigations for the establishment of a deep geological facility must go ahead in the interim. This directive would imply that work be initiated on the selection of a suitable site (which could be Vaalputs), the conceptual design of a repository, as well as geological modelling and associated studies to support the safety assessment and licensing of the facility.

International knowledge and experience of radioactive waste technologies, particularly HLW, are generally readily accessible through the IAEA and other international forums. Inputs from such sources are most valuable and should be fully exploited in support of local activities. The key would be to establish and maintain a group of experts who would be able to absorb the international information and apply it locally.

8.6.3 Decommissioning

Decommissioning and the associated decontamination technology of non-irradiated uranium contaminated equipment is well established in South Africa and hardly merits supporting R&D. Present work in this field presents an ongoing learning experience in the optimal synchronization and costing of the full chain of activities, as well as the estimation of the full nuclear liability associated with plants and equipment.

Decommissioning experience of equipment contaminated with actinides and fission products, as found in nuclear reactors, is limited in South Africa. International experience in this field is growing rapidly and technical information is generally shared widely between countries. It can realistically be assumed that with the aid of existing D&D experience in South Africa as well as information from international sources, it should be possible to plan and execute an effective D&D programme if reactor personnel with operational experience and knowledge of plant hazards are involved in the project.

9. CAPACITY BUILDING

9.1. Background

An extensive and high-level human resource capability in nuclear science and technology was established in South Africa in the past as part of a broad range of R&D programmes and nuclear services, as well as fabrication and production facilities. The most notable of these are the following:

· The activities at Necsa, where people gained experience in research reactor operation and applications; isotope production and applications; radiation applications; various scientific and technological R&D programmes; uranium conversion and enrichment as well as nuclear fuel production; decontamination of nuclear facilities; nuclear waste management and disposal; nuclear component design and manufacturing technology; and nuclear regulation and safety. -

· iThemba Labs, which provide experience in accelerator construction, operation, maintenance and application for nuclear particle physics research, isotope production and particle therapy of patients.

· Operation and maintenance experience of PWRs at Koeberg.

· Regulatory experience of nuclear facilities and mines at the National Nuclear Regulator (NNR).

· Various universities, hospitals and clinics which provide experience and training in nuclear sciences as part of academic curricula, accelerator applications, medical applications of isotopes and radiation, and radiation protection training.

· More recently, the launch of the PBMR programme created an exciting and

demanding new earning opportunity for the South African nuclear sector. Significant experience has been gained with high-temperature power reactor design, as well as laboratory scale fuel fabrication. An extensive international technological support network with the associated skills transfer opportunities has also been established.

Apart from a number of facilities which were closed down at Necsa, all the other activities referred to above are still an ongoing part of the national nuclear Science and Technology (S&T) human resource capability. The rapid growth in the human resource requirements of the PBMR programme as well as the need for transformation in existing institutions have, however, created a high demand for suitably qualified persons which are presently just not available in the nuclear sector. The existing training capability is further insufficient to meet the demand and several actions aimed at rectifying the situation have been initiated in the recent past.

9.2. Future Strategy

The following existing and planned training opportunities will be available for addressing the shortage of skilled workers in the nuclear sector.

9.2.1. Existing Nuclear Focused Postgraduate Qualifications at Universities

- North-West University (Mafikeng)

The Centre for Applied Radiation Science and Technology (CARST) presents a two-year MSc degree in radiation sciences and technology. The first year is fulltime study at the university followed by a year at a nuclear institution during which experimental work is done for a dissertation.

- North-West University (Potchefstroom)

Two Masters' programmes in nuclear engineering for candidates holding BEng and BHons degrees are offered on a distance contact basis (including one lecture week per course) which enables full-time workers to participate. Courses are presented by local and international experts. The university is a member of the World Nuclear University. The engineering faculty developed and operates a physical model of the PBMR power conversion unit, which also serves as a useful tool for postgraduate training. (Refer to Appendix I for more information.)

- Masters in Accelerator and Nuclear Sciences

The two-year course is presented jointly by the universities of Zululand and the Western-Cape together with iThemba LABS. The first year is full-time study at the universities for an Honours degree followed by a year at a nuclear institution where experimental work is done for a dissertation. Students can specialize either in accelerator science (MANUS) or material science (MA TSCI). (Refer to Appendix I for more information.)

- Witwatersrand University

The university offers two postgraduate courses. A course on radiation protection and safety follows the syllabus of the IAEA on this subject. It is an 18-week fulltime course. The other course on physics, engineering and safety of nuclear power reactors is normally given at Koeberg and requires full-time study of about 22 weeks.

Industrial visits to SAFARI-1, the micro-model of the PBMR power conversion unit and the PBMR fuel development laboratory are included. (Refer to Appendix I for more information.)

- PHRIF

The PBMR Human Capital Research and Innovation Frontier (PHRIF) Programme was initiated by the Department of Science and Technology (DST) in conjunction with the nuclear industry in 2004. Although the programme is primarily focused on the human resources needs of the PBMR programme, it is evident from the list of projects that the whole nuclear industry will benefit from it.

The projects include support to grade 10, 11 and 12 pupils from disadvantaged areas to study science and mathematics; bursary support to undergraduate, masters, doctoral and postdoctoral students; the sponsoring of eight research chairs in PBMR-related technologies at South African universities; sponsoring of conferences; and networking for communities of practice in the nuclear sector. Programme funding for the next 10 years will amount to a total of R230 million. Although the research chairs will be focused on topics of particular interest to the PBMR programme, several of these will also be of interest to the broader nuclear industry. (Refer to Appendix I for more information.)

- Other Courses

- IAEA

Local capacity building can further benefit by a broad range of IAEA-sponsored initiatives such as:

· The fellowship scheme, whereby fellows from South Africa can receive on-the-job training at foreign institutions for periods of up to one year.

· AFRA workshops in South Africa or elsewhere in Africa where workshops, normally lasting one to two weeks, on various topics such as nuclear waste, and research reactor, medical and agricultural applications, are presented by recognized international experts.

10. INDUSTRIALIZATION AND LOCALIZATION

10.1. Introduction

The decision of the South African Government to support and finance the development of the Pebble Bed Modular Reactor (PBMR) was partially based on the economic and developmental advantages to South Africa - in addition to the provision of electric power. The future local and international sales provide a significant industrial and skills development opportunity for South Africa. PBMR (Pty) Ltd has consequently embarked upon an aggressive industrialization and localization drive in order to maximize the economic and technological opportunities for South Africa.

10.2. Supply chain

a. Following the successful completion of the demonstration unit, PBMR intends supplying pebble bed reactors to the local and international market.

b. The first 'commercial' units are scheduled for delivery to Eskom in 2018, and can thereafter be supplied at a rate of three per annum;

c. To support this programme and. the export market potential, PBMR must:

i. Establish a secure an internationally competitive supply chain capable of delivering six pebble bed reactors per annum;

ii Maximize South African local content which is economically justifiable and-sustainable,-and-technically-achievable

10.3 Localization initiative

10.3.1. Objective of Localization Initiative The objectives of the localization initiative are:

1. Active participation in the establishment of an economically viable and sustainable nuclear industry in South Africa.

2. Skills development, job creation and Black Economic Empowerment (BEE) through the nuclear industry.

3. Export promotion of capital goods and value-added products.

4. Promotion of local industrial capacity and capability and the support of Small, Medium and Micro Enterprises (SMMEs) where possible. The promotion of manufacturing improvements and R&D- in order to remain internationally competitive.

5. Promotion of technology transfer, joint ventures, new trading partners and foreign investment.

10.3.2. National Industrial Participation Programme

The National Industrial Participation Programme (NIPP) of the Department of Trade and Industry (DTI) constitutes an important mechanism whereby international suppliers will be obliged to formulate programmes which would benefit the South African economy.

10.3.3. Steps to establish a South African support industry for PBMR

The following steps have been identified in a localization initiative to establish a South African support industry for PBMR:

a. Industrial development

- Recapitalization of the heavy industry capability in South Africa.

-New industrial development for capabilities that do not currently exist.

- Industrial upgrade of existing industries that could potentially deliver components to PBMR.

- Significant NIPP opportunities.

- Production technology R&D.

- Competitiveness and cost reduction strategies.

- Optimized logistics and consolidation.

- International benchmarking.

b. Skills development

- Must be linked to other skills development programmes to support all the capital projects in the country.

- University and technikoneducation

- Artisans - especially in welding and machining.

- Learnership Programmes.

- Mentoring Programmes.

- Project-specific Training Programmes.

- International Exchange Programmes.

c. Scientific and technological development

- Technology transfer (important NIPP opportunity).

- Establishment of Centres of Excellence at universities as well as the identification of networks of expertise countrywide.

- Local R&D.

- Contracted R&D.

- Optimum utilization of existing facilities, i.e. Necsa, CSIR.

d. Quality assurance

- Re-establishment of quality assurance programmes and disciplines with the required procedures and documentation.

- Reskilling of manufacturers.

- Promotion of safety culture.

- Training f<?r manufacturers and inspectors.

- ASME and other international certification suitable for the nuclear industry.

e. Corporate structures

- Adequate corporate structures for large and technically advanced local manufacture.

- Viable corporate structures that will be able to support the long-term strategic goals of PBMR.

- Partnerships and joint ventures.

- Local and foreign direct investment.

f. Black economic empowerment

- Many equity opportunities in local manufacture.

- BEE procurement.

- Training and educational initiatives.

g. SMME development

- Many support services.

- Support of local communities during construction.

- Long-term relationship with local communities during operation and maintenance of plants.

h. Appropriate financial structures

- Investment finance through the Industrial Development Corporation (IDC) and other financial institutions.

- Strategic investments.

- World Bank and International Development Banks.

- Incentives.

- Cost of finance - especially in the face of financial support provided by other governments to their industries.

- Export credit guarantees.

i. Government support mechanisms

The government, through DTI, has instituted various support mechanisms for industrial development such as:

- strategic-Investment Programme-(SIP)

- Support Programme for Industrial Innovation (SPII).

- Technology and Human Resources for Industry Programme (THRIP).

- Competitiveness Fund.

- Support for quality assurance upgrades.

- Customs relief for capital imports.

- Export incentives.

- Industrial Development Zones (IDZs).

ii. These programmes may have to be revised in order to support the PBMR requirements, and some entirely new programmes may have to be defined and agreed

enviroadmin Posted - 16 Jun 2007 : 06:39:20

For the attention of: Ms Albertina Kakaza

Mr Langa Zita
Chairperson
Portfolio Committee
Department of Environmental Affairs and Tourism
Nuclear Energy Hearings

Dear Sir

RE: NUCLEAR ENERGY IN SOUTH AFRICA

The request from Parliament for written comment by the public on nuclear energy in South Africa has queried the impacts of this development on the following:

1. socio-economic
2. waste management
3. security of supply
4. human resource development
5. science and technology

I would also like to add:

6. environmental costs
7. health

1. SOCIO ECONOMIC
Firstly the socio-economic issue is one of grave concern for all South Africans. The economist, Professor Stephen Thomas was employed by the South African government to investigate nuclear energy and its impact on the economy as part of a panel of researchers. The official reports conducted as a result of this investigation have never been made known to the South African public, although they were presented to Cabinet and research was published in nuclear trade journals with a narrow readership.

Professor Thomas made his concerns about the financial implications of embarking on a nuclear programme very clear(1). He stated that in other countries of the world where nuclear reactors had been built, the huge costs of construction had been supported by private investors. He warned that financial institutions usually did not

invest in nuclear development as it was seen to be too risky a venture.

Aside from the huge construction costs, there would also be huge decommissioning or cleaning up costs - and these were apparently not factored in to the South African programme. There would also be vast liability costs in the case of accidents that could result in deaths to labourers, as well as poisoning and deaths to a wide area around the reactor (2).

It is for this reason that the Cape Town courts are currently prohibiting building in an area 5km around Koeberg. This has huge economic implications for South Africa because wherever a nuclear reactor is built, other industries will suffer:

*The tourism industry suffers, since no one wants to visit an area where radioactivity may be a concern for themselves or their children.
*Agriculture suffers, since no one wants to buy food produce from an area where radioactivity could leach into water supplies or be released into the air and
*Real Estate values plummet, so that the housing and other business development markets suffer. (3)

What this means is that the huge start up costs (currently stated to be R150 billion over five years by Eskom, although apparently rising every year) are added to decommissioning and liability costs as well as the losses to other sectors of the economy. (4)

The projected markets for nuclear energy may also not exist. (5) Most developing nations cannot afford to build nuclear reactors themselves and so would not embark on a nuclear programme. Many nations are also now concerned about global warming and the effects on the environment of destructive industries (and this includes nuclear reactors despite advertising to the contrary) and so energy that is sold or marketed as "green" has found instant buyers, whereas other "dirty" industries (including nuclear) cannot be endorsed by businesses as "green" and are not bought. This means that if South Africa embarks on a nuclear programme with the idea of exporting either reactors or energy, a market will be hard to find and this country will be left with yet another industrial "white elephant".

2. WASTE MANAGEMENT
The second issue of waste management is also a major concern for all South Africans. Currently high level radioactive nuclear waste has been produced by overseas nations that has a lifespan of thousands of years - and there is nowhere to put this waste.(6)

According to a recent report a new spent nuclear fuel facility will have to be constructed: "In other countries that make use of nuclear energy, the cost of building such a waste facility has reached around R5-billion, says Necsa nuclear liability management divisional manager Dr Piet Bredell.

"Low- and medium-level radioactive nuclear waste from Koeberg is currently transported to the Vaalputs near-surface repository, in the Northern Cape, where it is buried in seven- to eight-metre- deep trenches. Higher-level waste, such as spent nuclear fuel, is kept in storage pools on site at Koeberg. Necsa's own waste is stored on site at Pelindaba. Low-level waste typically consists of gloves, clothes, paper and cleaning material, and medium-level waste of resins, filters and smaller components.

"It is planned that high-level waste from Koeberg and Pelindaba, and possibly other nuclear plants, will go to a "future high-level waste repository site", says Bredell. Such a deep geological repository is typically 500 m to a kilometre deep, and costs

around R5-billion to develop. Bredell says South Africa is in the process of preparing legislation to establish a radioactive waste-management agency, as well as a waste fund, all before 2010. It is expected that the Bill regarding the agency will be before Parliament in March next year, while that on the fund will follow later.

"It will be the task of the radioactive wastemanagement agency to initiate the project to establish a deep-level disposal site for South Africa. The establishment of such a site is normally an extremely sensitive social issue, with Bredell noting that several similar initiatives failed abroad, as they were “wrongly initiated”. “It can take up to 20 years to get a site adopted.” One example of where this happened is the proposed Yucca mountain site, in the US. “We need to ensure the timely selection of a site for Eskom’s nuclear power station needs,” emphasises Bredell. Eskom Generation nuclear fuel procurement manager Hans Lensink says the power utility has a reference plan for its spent nuclear fuel, which includes not only disposal, but also reprocessing. Reprocessing nuclear fuel reduces the volume of waste, through the removal of plutonium and uranium. However, even reprocessing nuclear fuel leaves waste products in need of disposal at the end of the cycle". (6)
When issues have arisen regarding waste spills, the Nuclear Energy Corporation of South Africa (Necsa) has refused to make the information known to the public. This lack of accountability on the part - not only of Necsa, but also Eskom and the National Nuclear Regulator (NNR) have led the South African public to doubt whether they could ever trust in future transparent dealings with these bodies. (7)

Necsa requires environmental organizations that are operating on behalf of the public - like Earthlife Africa - to go to court in order to get information regarding public safety issues. This smacks not only of a lack of transparency, but also a deliberate attempt to hide the truth from the public.

Workers who have had complaints against Necsa regarding health compensation have also been forced to go to court and still have received no reddress from the company. And yet research documents from the company and from the Department of Minerals and Energy (DME) clearly show the dangers of radiation to human beings.

This has been highly misleading for the South African public - nuclear energy has been advertised through the press in a public relations campaign as being both "green" and "safe" which it is obviously not. The waste that builds up through the uranium mining and milling process to the nuclear reactor itself and the spent fuel rods all comprises an extreme danger to the immediate community and the nation as a whole.

People have learned from the accident at Chernobyl that there are immediate deaths and a wide area of land, air and water polluted for years to come causing cancers and mutations in children and pregnant women and sterilization of men. Nuclear waste cannot just be "swept under the carpet" or buried out in the desert. It will eventually pile up and pose a disposal crisis. (8)

The United States and Europe have still not been able to find a site to locate a deep repository for high level waste since no one wants it in their backyard. They cannot store it at sea, or launch it into space. There is simply nowhere to put this waste. (9)

In this sense, nuclear energy is not sustainable since it requires 50 000 tonnes of uranium to fuel a reactor every year and the uranium supply will come to an end but the waste will not. (10) Even the waste that the reactor deems "low level" that is pumped back into the air and water systems has proven to be deadly to residents who live around the water sources.

Research has shown "cancer clusters" around dams where the community fish and swim, such as the Trawsfynydd Lake in Wales. Ex-Environment Minister Michael Meacher of the UK said these research findings were "a sensational development" and true health effects of radioactive discharges should be resolved before any commitment to new nuclear power stations was made. (11)

Unfortunately radioactivity cannot be seen or smelled, but as Chernobyl investigator Vladimir Chernousenko said: "It has a voice". This is the ticking of the geiger counter. (8)
The Nuclear Age Peace Foundation states: "The majority of high level radioactive waste produced comes from the fuel in the core of nuclear power reactors. Irradiated fuel is the most radioactive fuel on the planet and accounts for some 95% of radioactivity generated in the last 50 years from all sources, including nuclear weapons production. Once removed from the core, irradiated fuel is stored in cooling pools on the nuclear reactor site. Each 1000 megawatt nuclear power plant produces about 500 pounds of plutonium a year and about 30 metric tons of high-level radioactive waste". (12)
3. SECURITY OF SUPPLY
According to the Nuclear Age Peace Foundation: "There have been repetitive problems with security, safety and environment impact in the nuclear industry. Radioactive contamination does not discriminate between national borders and nuclear power plants threaten the health and well-being of all surrounding environments.
Nuclear power plants produce extremely toxic radioactive wastes that are long-lived and have no safe means of disposal. Disposal is neither scientifically credible nor is there any sustainable options for interim storage. Producing long-lived radioactive wastes with no solution for its disposal will leave serious and irreversible environmental damage and degradation for generations to come, which is contrary to the principles of sustainability". (12)
Nuclear reactors obviously comprise one of the highest risk factors to any nation in terms of terrorist attacks or sabotage. The potential for devastation to an area from either of these factors, or even the purely human factor of error, is huge. Contrary to advertising by the pro-nuclear sector, there have been many accidents and spills in nuclear reactors over the past years, causing radioactive contamination to the community and spreading as far as contaminants have been carried. It is not possible for anyone to guarantee the safety of a nuclear reactor. (13)

Even in Russia - one of the countries that is proposing to trade nuclear science and technology with South Africa - there have been a number of accidents and the hightened security alert required by nuclear reactors has been impossible to maintain in terms of manpower and costs. (14)

Aside from the dangers to reactors themselves, there have been many documented cases of transport spills and accidents involving radioactive material such as uranium hexafluoride. (15) Since traffic accidents, sabotage and thefts from energy facilities are common in South Africa, this becomes a high risk factor.

The court case being enacted in South Africa at the moment - that certain people have wanted totally cut off from the media - is proof of the dangers of a nuclear programme. (16) The smuggling of nuclear weapons or weapons' material has put South Africa in the world spotlight as a nation where companies have been able to trade covertly with other nations. (17)The potential danger of nuclear arms smuggling only increases with the expansion of a nuclear programme - regardless as to whether this programme is intended to be for civil or defence reasons. There are

always elements of society who will attempt to bribe and corrupt in order to get hold of nuclear materials. This makes the country extremely vulnerable unless South Africa is willing to spend even more money on high alert security systems.

The environmental group Greenpeace showed how easy it was to break into Koeberg - South Africa's one existing nuclear facility - let alone ten, twenty or more reactors around the nation. (7) South Africa already struggles to protect electrical wiring and cables from sabotage and theft. South Africa could be put in a position of extreme risk either from planned theft and sabotage from foreign or neighbouring nations, or accidental interference by local communities, as has happened in other developing nations where the people are not aware of the dangers of radioactive materials.
The Nuclear Age Peace Foundation states: "The Nuclear Non-Proliferation Treaty (NPT) was signed on July 1, 1968 and entered into force on March 5, 1970. Its initial duration was 25 years. In 1995 it was extended indefinitely, with a review conference to be held every five years. At the heart of the NPT is a central bargain in which the Non-Nuclear Weapons States (NNWS) agreed to refrain from acquiring nuclear weapons. In exchange the Nuclear Weapons States (NWS) pledged to end the nuclear arms race and to negotiate nuclear disarmament (Article VI). As an incentive, the NNWS were promised assistance with research, production and use of nuclear energy for "peaceful" purposes (Article IV). Each NNWS also agreed to accept "safeguards" under the auspices of the International Atomic Energy Agency. These safeguards do not apply to the NWS. The treaty defined a NWS as one that had manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967. However, any country with a nuclear reactor can in theory produce a nuclear weapon.
"MOX, or mixed oxide plutonium, is an experimental fuel in which plutonium, usually from dismantled nuclear weapons, is mixed with uranium for use in commercial nuclear reactors. The MOX projects require transporting plutonium by rail, ship or truck. The use of plutonium MOX fuel creates serious security threats as the transportation of plutonium increases the possibilities for theft and/or diversion of plutonium.
"In a study conducted in 1999, the Nuclear Control Institute determined that a severe accident at a civilian reactor powered by plutonium or MOX fuel could cause twice as many fatal cancers as an identical accident at a reactor that uses uranium fuel. MOX plutonium fuel produces more radioactivity than does uranium fuel.
"The use of plutonium MOX fuel also greatly exacerbates the problem of storing and disposing high-level radioactive waste. The use of plutonium in a nuclear reactor will not get rid of plutonium, which is an impossible goal. The idea behind using MOX plutonium, rather, is to render it less approachable by terrorists or "states of concern" because it is so lethal". (12)
4. HUMAN RESOURCE DEVELOPMENT
Unfortunately any people working in a nuclear reactor, or even in the uranium mines and mills that supply a reactor, are subject to ill-health unlike most other working environments. In Canada, primary cancers are regarded as an occupational health hazard of working in uranium mines. Research that has been conducted into cancers caused by uranium mines, the "milling" process and nuclear reactors is extensive. (18)

Since there is no cure for cancer, workers should not be subjected to this kind of "occupational health hazard". Necsa still refuses to compensate workers who have been affected by this, let alone an extended nuclear programme that would affect so many millions more. Once again the government will have to pay out health compensation and medical costs for years to come. There is no electricity supply that is worth the sacrifice of so many lives.

To consider sacrificing labour in this way is a form of "environmental racism" that has been widely experienced by the Navajo people in the United States who worked in uranium mines there. (19) It is devaluing and "writing off" a sector of the population as worthless. The human resources or labour that South Africa has to offer would be better off in alternative energy sectors such as solar, wind or tidal energy industries that would not comprise the kind of threat to themselves or their community that is posed by nuclear energy.

It is also sad that despite the fact that Necsa, the PBMR company, the DME and Department of Public Enterprises realises that South Africa does not have the atomic scientists available for this nuclear programme or manufacturing skills - and would have to import these scientists from Russia or elsewhere - they have chosen to forge ahead with a nuclear programme and throw millions of rand at this concept, instead of focusing funds on local skills and capacity. (14)

Statements by Necsa regarding nuclear energy have been contradictory. On the one hand, CEO Rob Adam has been quoted as saying to the media that PhDs do not come cheap and so they require the millions that government has been allocating each year. On the other hand, they persist with advertising the concept that "nuclear energy is cheap".

Adam has also been quoted as saying on the one hand that not just anyone can do rocket science in their backyard, but on the other hand he has stated that the average person can work in a nuclear plant. Perhaps he means that the CEOs and "rocket scientists" need high pay packages but the workers at the bottom do not. This is the usual pyramid of society with company directors bringing home the bacon while the majority of labourers live on the breadline. And perhaps this is the way society functions on many levels.

But in the nuclear industry, labourers are literally putting their lives on the line every day and may not realise the true cost to their lives and futures. For example, DME documents on radiation protection state that pregnant women must make their condition known immediately since radiation would harm the foetus. (2)

5. SCIENCE AND TECHNOLOGY

Necsa has stated that South Africa would have to bring atomic scientists out of retirement in order to work on a nuclear programme. Alternately they would have to employ nuclear scientists from other countries, such as Russia. In either case, the outlook is not good for South Africans. In the first scenario, there is a case where nuclear reactors that are developed with elderly staff in charge would soon be left with under-qualified staff to manage and maintain them. In the second scenario, South Africa would be spending a great deal of money investing in foreign skills, instead of investing in local skills (such as the scientists who are able to develop solar energy programmes).

Eskom also wishes to build Pebble Bed Modular Reactors (PBMRs). (20) According to research from Earthlife Africa: "The proposal is that the fuel for these PBMRs be produced at Pelindaba. There are fourteen thousand tons of radioactive weapons scrap metal at Pelindaba from decommissioned nuclear facilities. Necsa wants to smelt this waste and sell the metal on the open market, followed by commercialisation of the smelter process - this process is not international best practice, and could turn South Africa into the North's radioactive waste dumping ground. The proposed reactors, radioactive fuel plant, and the proposed radioactive waste smelter, will emit many kilograms of radioactive emissions into the air, water and soil every year. Pelindaba is located within two kilometres of a World Heritage Site, The Cradle of Humankind, and ten kilometres from the townships of

Atteridgeville and Diepsloot.
"At full production, for all the planned reactors, there would be nine trucks carrying nuclear material, and 145 trucks carrying chemicals every day between Durban, Pelindaba and Koeberg for forty years. There is no doubt that radiation is harmful. Furthermore, the level of what is considered a "safe" dose has been lowered consistently, and now stands at a few percent of what was originally considered a "safe dose".
"One of the arguments for the PBMR is that South Africa will need massive amounts of new power. This will not be true for at least ten years. In this time, we will be able to install all of South Africa's power requirements using safe and clean Renewable Energy Technologies, which are available off the shelf, and can be installed within weeks. The planned nuclear reactors for South Africa will generate little electricity for so great an expenditure and carry with them hazardous consequences for hundreds of thousands of years".
ENVIRONMENTAL COSTS:
On its website, Eskom claims that nuclear sites will be "revegetated" and environmentally restored after nuclear reactors are decommissioned. In reality in other areas of the world, this has not proved successful.
As an example, scientists have studied the area around Chernobyl to examine the health of the environment after this nuclear disaster. Douglas Birch, wrote for Associated Press: "In the journal Biology Letters in March, a group led by Anders Moller, from Pierre and Marie Curie University in Paris, said that in a study of 7,700 birds examined since 1991 they found 11 rare or unknown abnormalities in a population of Chernobyl's barn swallows. Roughly one-third of 248 Chernobyl nestlings studied were found to have ill-formed beaks, albino feathers, bent tail feathers and other malformations. Mousseau was a co-author of the report. In other studies, Mousseau - whose work is funded by the National Science Foundation and National Geographic Society - and his colleagues have found increased genetic damage, reduced reproductive rates and what he calls "dramatically" higher mortality rates for birds living near Chernobyl. The work suggests, he said, that Chernobyl is a "sink" where animals migrate but rapidly die off. Mousseau suspects that relatively low-level radiation reduces the level of antioxidants in the blood, which can lead to cell damage. "From every rock we turn over, we find consequences," he told the Associated Press in a phone interview. "These reports of wildlife flourishing in the area are completely anecdotal and have no scientific basis." (8)
The Nuclear Age Peace Foundation states that: "While electricity generated from nuclear power does not directly emit carbon dioxide (CO_2), the nuclear fuel cycle does release CO_2 during mining, fuel enrichment and plant construction. Uranium mining is one of the most CO_2 intensive industrial operations and as demand for uranium grows because of new electricity generation and new plant construction, CO_2 levels will also rise. (12)
"In a case study in Germany, the Oko-Institute determined that 34 grams of CO_2 are emitted per generated kilowatt (kWh). Other international research studies show much higher figures (up to 60 grams of CO_2 per kWh). In comparison to renewable energy, energy generated from nuclear power releases 4-5 times more CO_2 per unit of energy produced, taking into account the entire nuclear fuel cycle.
"US government regulations allow radioactive water to be released into the environment at "permissible" levels. Accurate accounting of all radioactive wastes released into the air, water and soil from the nuclear fuel cycle is simply not available. The Nuclear Regulatory Commission relies on self-reporting and computer modeling from reactor operators to track radioactive releases and project dispersions".
HEALTH:
The Nuclear Age Peace Foundation states: "It has been scientifically established that low-level radiation damages tissues, cells, DNA and other vital molecules. Effects of

low-level radiation doses cause cell death, genetic mutations, cancers, leukemia, birth defects, and reproductive, immune and endocrine system disorders. (12)
Radioactivity is measured in "curies." An average operating nuclear power reactor core has about 16 billion curies at its core, which is equivalent to the long-lived radioactivity of at least 1,000 Hiroshima bombs. In comparison, a large-sized medical center with as many as 1000 laboratories in which radioactive materials are used, has a combined inventory of about 2 curies".
Dr Helen Caldicott, Pediatrician and President of the Nuclear Policy Research Institute states: "The classic dictum in medicine states: If a disease is incurable, prevention is the only recourse. While the specter of global warming looms large with associated epidemics of arthropod-borne diseases and millions of ecological refuges escaping catastrophic meteorological conditions, nuclear power as an alternative energy has an equally dire prognosis. (18)
"Nuclear power is responsible for the emission of substantial quantities of global warming gases from each step of the nuclear fuel chain, and the medical consequences of nuclear power are equally catastrophic.
"Each nuclear reactor contains 1000 times more long-lived radiation than released by the Hiroshima bomb, in the form of 200 new biologically dangerous isotopes - some with minuscule half-lives and others with half-lives of 17 million years. This material - radioactive waste - must be isolated from the environment for geological time spans, a scientific and physical impossibility. Already radioactive isotopes are leaking into soil and water from nuclear waste repositories in many countries, and these isotopes bioconcentrate by orders of magnitude at each step of the food chain. Invisible and cryptogenic to the senses, these mutagenic radioactive materials will migrate to and concentrate in specific bodily organs - iodine 131 in the thyroid, cesium 137 in brain and muscle, strontium 90 in bone, and plutonium 239 (with a half-life of 24,400 years) in lung, liver, bone, fetus, and testicle. Ultimately, these radioisotopes will induce malignancy; however, because of the latent period of carcinogenesis, the cancers will not be diagnosed for many years.
"Over generations, radioisotopes in gonads will increase the incidence of genetic and chromosomal diseases. Animals and plants will be similarly affected. Nuclear power is therefore a fundamentally mutagenic industry that results in cancer with a transient byproduct - electricity generation. As such, nuclear power is medically contraindicated".
CONCLUSION
Since the proposed nuclear programme affects all South Africans, regardless of the siting of nuclear reactors, it is vital that this issue should be addressed by all stakeholders at a summit meeting where the alternative energy resources offered by renewable and sustainable projects could be given the necessary time, research and opportunities afforded to the nuclear sector by large budget allocations. Nuclear energy has been advertised as sustainable, yet uranium is a finite source. A great deal of money will be spent on reactors that need large quantities of water and will run out of fuel, unlike solar, wind and tidal energy options that are truly sustainable and renewable. South Africa cannot afford to go backwards in scientific and social development, but must progress into a new "greener" future, where the health of the people and the environment on which they rely, is made a priority.
Yours faithfully
INGELA RICHARDSON
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enviroadmin Posted - 16 Jun 2007 : 06:37:57

Att: Ms Albertina Kakaza
Dear Mr Langa Zita

Thank you for this opportunity to air views on Nuclear Energy in South Africa.

1. We all know Nuclear Power Stations and the storage of the hazardous radio active waist is Not 100% safe . Radio active waist remains hazardous for 240 000 years , no debate on responsibility there. An accident will cause very serious problems to the health and well being of South African citizens. Our country is also not 100% seismically inactive and the Radio active waist issue is a world wide problem that still has no solution.

2. Nuclear Power is Not sustainable development. Too often the word Sustainable Development is used where it does not belong. Further more the jobs that are created by these power stations will be few and will be for highly experienced , trained and sometimes foreign personal.

4. New technologies are coming to life all the time and by the time new nuclear power stations are running they will be out dated by Renewable Energy .

4. Only "Renewable Energy " rightfully deserves to be classed as " TRUE Sustainable Development" technology.

5. The statement used by Eskom that renewable energy's only work when it is sunny or windy is false .
When we produce more than we use with renewable energy we should incorporate the "hydro pump water uphill and let it flow down hill to generate energy later system" which would prove that renewable energy can be used at any time. There is also the air car example as another technology. These and other new and old technologies should be developed and incorporated with renewable energy. Now there is even tidal energy !

6. Government subsidies and tax incentives for renewable energy should be a top priority today.
Creating affordable alternative energy for all will mean healthy competition and a great market for renewable energy .
As a result a new industry will develop in South Africa creating countless jobs and new PROUDLY SOUTH AFRICAN companies and products. :)
This would all dictate accelerated technology in the field of renewable energy letting us all sleep at night.

7. Solar power should be made affordable for the individual to install at home.
Since solar panels are placed on the roof , no EIA process is needed .

8. Many leading countries push alternative energy , and better efficiency. For the sake of serious Global Issues, lets not follow , lets proudly lead the way !
Below is a nice video example of a booming solar industry in California:

http://www.youtube.com/watch?v=jX-zfCDhHrY

9.We have faxed through our F.A.C.T. members list with objections and suggestions and have received conformation of receipt.

Once again , we sincerely appreciate the opportunity to speak.

Kind Regards
Ryan Donnelly
Founder and chairperson of F.A.C.T. (((for a clean tomorrow)))