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Nuclear Energy: WESSA Position Statement.

This position statement is based on the principles of ecologically sustainable development, and reflects the Vision; Mission; Aim; Style and Values of WESSA.

This position statement recognises that the socio-economic and environmental landscapes are complex and so must make space for continuous change and emergence.

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This position statement replaces all other WESSA Nuclear Energy statements which were written before November 2012.

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INTRODUCTION

WESSA works from the principle that we should seek to meet the need of current generations without compromising the ability of future generations to meet their needs. As South African's we are constitutionally bound to ensure a safe and healthy environment.

Thus, we recognise that both coal and nuclear power, while meeting our needs may severely compromise future generations and undermine the safety and health of our environment.

A national grid supplied almost entirely by nuclear power stations is possible. At present, however, a national grid supplied entirely by other CO₂-free technologies, such as by wind and solar is not practical in South Africa. In order to accommodate a substantial contribution from renewable energy, our national grid would have to be strengthened and re-engineered to sense which wind-farms and solar stations have energy available, and to disconnect major consumers at times when power is not available.

A credible scenario, therefore, for South Africa is a combined system with conventional power sources supplying the continuous 'base load' power requirement day and night. Renewable energy backed up as far as possible by 'pumped storage', and other systems would then contribute largely to additional day-time energy requirements.

Nuclear power and renewable energy should be seen as complementary rather than competing systems.

POSITION STATEMENT: NUCLEAR ENERGY

1. WESSA's first preference is to maximise the potential for renewable energy and reduce inefficient use of energy.
2. Given the fact that we will require a base load and that for the foreseeable future the choice will be between nuclear and coal we acknowledge the need to develop a nuclear energy supply within South Africa.
3. WESSA calls for an independent oversight of the regulating body for the nuclear industry. There can be no compromise on safety and disposal issues, either currently or for the complete timespan of the radioactive products.

CONTEXTUAL INFORMATION

Maximizing renewable energy potential

The costs of renewable energy must be assessed on a valid basis equivalent to the alternatives. This will require a costing of nuclear power that builds in the full cost of the storage and/or disposal of nuclear waste until that waste has reduced to acceptable radioactive levels. It will also require that coal is similarly priced, including the costs of its direct and indirect long-term negative impacts. From a renewable energy perspective, WESSA will continue to support the uptake of low energy technologies and lifestyles in all sectors of society and business.

Nuclear over Coal

The Integrated Resource Plan 2010 (IRP), which includes the balanced scenario for the energy mix for South Africa, has been approved through the Inter Ministerial Committee (IMC). This has now become our energy growth path and WESSA is supportive of this strategy.

In the strategy, there is an increase capacity for nuclear energy and a reduction from coal-fired power stations. This will constitute South Africa's base load with up to 6 additional nuclear stations planned in the next 20 years. These facilities will generate 40,000 GW of electricity for South Africa's requirements.

The Policy-adjusted IRP sets nuclear up from 5% – 20% and coal down from 90% – 65%

Compliance

WESSA is concerned that the management of nuclear facilities has potential for disastrous mistakes on a greater scale than almost any other form of technology, and that the industry has previously seen serious shortcomings in various countries.

WESSA therefore calls for a clear chain of responsibility and accountability to be published, so that they can easily be contacted by anyone who knows of or suspects a problem related to infrastructural and/ or operational systems.

WESSA further calls for an international body to audit South Africa's compliance to international nuclear standards. WESSA recognises the importance of setting up regulating bodies (see text box). Our watchdog role cannot allow government to self-regulate, thus, we will lobby government to make a commitment to fund an inclusive monitoring role in order to give these processes legitimacy.

In South Africa, the National Radioactive Waste Disposal Institute (NRWDI) has been established to overview waste handling and disposal. Experience around the world has shown that it will be imperative for NRWDI to involve the public at each stage in the waste disposal site selection and planning process.

Management of the nuclear energy industry in South Africa

The 2008 National Radioactive Waste Disposal Institute Act provides for the establishment of a National Radioactive Waste Disposal Institute which will manage radioactive waste disposal in South Africa.

The Nuclear Energy Act of 1999 gives responsibility to the Minister of Minerals & Energy for nuclear power generation, management of radioactive wastes and the country's international commitments.

The National Nuclear Regulator Act of 1999 sets up the National Nuclear Regulator (NNR) covering the full fuel cycle from mining to waste disposal.

The Department of Minerals and Energy (DME) has overall responsibility for nuclear energy and administers the above Acts.

Nuclear and Renewable Energy progression.

WESSA is concerned that the commitment to nuclear power may reduce the political will to embrace other shared generation options like wind and solar. We therefore will remain diligent in our resolve to promote appropriate renewable energy generation at all times.

Spent nuclear fuel and high level nuclear waste.

The uranium fuel for most commercial power reactors remains in the reactor core for about four years. It is then transferred to storage pools on site for several years more to allow radiation levels around it and heat still being generated inside it to slowly reduce. However it cannot be ignored that toxic levels in spent nuclear fuel will remain for a significant amount of time. Thus, plans to set up a nuclear programme without taking this into account ignore both the precautionary principle and any notion of sustainable development.

In reactors such as the two pressurised water reactors at Koeberg near Cape Town, the fuel consists of enriched uranium dioxide powder compressed into cylindrical pellets and stacked inside fuel pins.

They constitute most of the currently produced high-level radioactive waste (HLW) that must eventually be disposed of. Future systems may use different technologies, with different input and end products.

'Enriched' here means that the natural isotope concentration of the mined uranium has been artificially increased in an enrichment plant from seven atoms in every thousand to around fifty. In other words, the enrichment level has been increased from 0.7% to 5%.

There are three options which South Africa will have to consider for disposal of spent nuclear fuel:

- **Reuse:** the process of extracting the 1% of plutonium and reusable uranium from the intensely radioactive spent fuel is expensive. Currently, the economic viability of the process is questionable especially in countries like South Africa with small nuclear programmes.

Several countries have, nevertheless, opted for it. Reprocessing plants are in operation in France, Britain, Russia, Japan and India and are under construction in China.

- **Direct Disposal:** Other nuclear countries, including South Africa, must one day decide whether to reprocess their spent nuclear fuel to extract the plutonium and reusable uranium from it or to deem it waste and, in due course, to dispose of it as such. Finland and Sweden have decided to take the latter route and to seal their encapsulated spent fuel into rock formations deep underground. Many smaller nuclear countries are postponing the decision because of the high costs associated with both reprocessing and direct disposal.
- **Postpone the decision:** Because of the plutonium it contains, spent nuclear fuel can well be considered a valuable resource for the future. Moreover, because the radiation levels due to the fission products within it will diminish with time, it will become progressively easier to process. The third option is therefore to store it indefinitely in shielded containers probably away from the power station sites. Future generations will then have the task of reprocessing it and/or disposing of the waste. However, it is noted that the spent nuclear waste will be with us for thousands of years and there needs to be responsible mechanisms in place to address the disposal or reuse..

Plutonium is potentially enormously valuable. It is theoretically possible to obtain four million times more energy from a kilogram of plutonium than by burning a kilogram of coal.

REFERENCES

Nuclear Industry Association of South Africa www.niasa.co.za
IRP 2010