

WHY NUCLEAR POWER IS NOT THE ANSWER

The question is: what kind of South Africa (and what kind of world) do we want to live in by 2030, and what energy technologies and strategies will get us there? The issues that need to be addressed are:

- How much is it going to cost and what are the externalised costs to the environment and to future generations?
- Who is going to benefit in terms of jobs and skills?
- What energy path is the safest and simplest?
- What is the most effective way to address climate change?

1. Nuclear power costs too much

- No private investors anywhere in the world will take on the capital costs of nuclear power without government loan guarantees or similar public underwriting. The capital costs of nuclear power are so high and so uncertain that "...it is completely impossible to produce definitive estimates for new nuclear costs at this time"¹
- No nuclear plant operators anywhere in the world today carry full liability in case of accident. The cost of insurance and regulation is subsidised by the tax payer. Without such an insurance subsidy there would no nuclear power.²
- No private investor can pay for long-term waste management, because the long-term cost is uncertain. We cannot work out the cost because no technology for long-term waste management has been shown to work anywhere in the world. The time-frame also covers tens of thousands of years, which is beyond the scope of financial accounting.

2. Nuclear power provides the least jobs for the money

- Renewable energy and energy efficiency installations such as solar water heaters will create more jobs more quickly and more suited to the job market than nuclear power. These will be more spread out around the country and not only to be found in one or two places.³
- Even if we chose nuclear over renewables, we do not have enough highly-trained engineers to design and safely monitor the nuclear power plants through their working life, unless we pay them a huge salary. South Africa would still have to compete for these skills with all the other nuclear-powered countries around the world, most of them with much deeper pockets than us.

3. Nuclear power is neither safe nor simple

The nuclear fuel cycle consists of mining, fuel enrichment, plant operation, evacuation plan,

¹ Steve Kidd, Director of Strategy and Research at the World Nuclear Association. Escalating costs of new build: what does it mean? Nuclear Engineering International. Aug 22 2008.
<http://www.neimagazine.com/story.asp?storyCode=2050690>

² International Institute for Sustainable Development: Global Subsidies Initiative. Gambling on nuclear power: how public money fuels the industry.
<http://www.globalsubsidies.org/en/subsidy-watch/commentary/gambling-nuclear-power-how-public-money-fuels-industry>

³ For more information: Renewable Energy Briefing Paper. March 2008. Holm, Banks, Schaffler, Worthington, Afrane-Okese.

waste management and transportation and a direct link with nuclear weapons. All of these stages present a hazardous risk, some more than others.

1. Uranium mining brings up huge masses of radioactive rocks from underground, to be crushed and carried to local people by the wind. It also takes masses of fresh water and leaks radio-active and acidic waste-water into the local water supply, both above and below ground. This acid mine drainage has been described as "second only to global warming...in terms of ecological risk".⁴
 2. Uranium enrichment and fuel fabrication plants release significant quantities of radioactivity and toxic chemicals into the environment.
 3. Nuclear power plants release radioactive fission products such as cesium and strontium in the normal course of their operation. These products, which are radioactive and chemically similar to elements essential for life, accumulate in plants and animals which we eat, causing premature cancers.
 4. If nuclear plants were inherently safe they would not need any evacuation zone or evacuation plan. In the event of an accident, the worst-case scenario is uninsurable and radiation damage is excluded from your home-owners insurance policy. If nuclear power was safe, insurance companies (who understand risk) would insure you.
 5. Nuclear power plants have to be run for a very long time if they are to recoup the capital investment and as the plants get older they become more fragile and more susceptible to failure.
 6. The transportation of nuclear fuel and radioactive waste has a risk of accident and is susceptible to terrorist attack.
 7. Nuclear bombs require tritium and plutonium or uranium. Tritium and plutonium come only from nuclear power plants, so to make nuclear bombs, nuclear states require nuclear power plants and nuclear re-processing plants. Without nuclear power plants, there would be no nuclear weapons.
 - These countries have both civil nuclear plants and nuclear weapons: USA, Russia, UK, France, China, India, Pakistan, Israel. South Africa did have nuclear weapons but has dismantled them.
 - North Korea started to build 2 civil nuclear power plants in 1994, but the construction was stopped in 2002 due to international sanctions. They nevertheless went on to build and explode 2 nuclear bombs. The transfer of technology began with the civil nuclear reactors.
 - Iran has civil nuclear plants and is suspected of trying to build nuclear weapons.
4. Nuclear power is not the answer to climate change
- The "tipping point" for climate change is the point after which global warming will not be reversed. Scientists say that this point will be reached when the amount of carbon dioxide (CO₂) in a volume of air goes past 450 parts per million (ppm). They also say that this point would see the average global temperature rising by two degrees Centigrade, enough to cause havoc.
 - Right now, the amount of CO₂ in the atmosphere is 380 ppm and is rising every year by three ppm. By this measure, we can say that the 450 ppm tipping point will be reached within 23 years, probably by 2020 —unless we do something NOW!
 - Nuclear power does not release much CO₂, but it is too expensive, too slow and takes

⁴ Dept of Environment and Tourism. Emerging Issues Paper: Mine Water Pollution. March 2008.

away from cheaper and quicker options. If we ordered one today, it would not be ready 2020⁵, and that is TOO LATE to stop global warming.

- Energy efficiency is by far the most effective and quickest method of reducing CO2 emissions. Highly effective efficiency measures can be put in place for buildings, lighting, motors, transport, electronics and power generation and transmission.⁶ What is needed is for government to have an efficiency policy and a practical strategy to carry it out, and not be bamboozled by nuclear power.
- A solar water heating installation can be completed in ONE DAY. 1 million solar water heaters with timers installed by 2020 would save 3000 MW of generational capacity⁷ and avoid 26 million tons of CO2 per year.⁸ Using direct sunlight to heat water is much more efficient than using electricity.
- South Africa could save more electricity by installing passive solar water heaters with every house, commercial building, and factory for free, instead of paying the same size power station for all the electricity required.
- Wind farms can be planned and built in 2 years and the capital and running costs are very certain. The wind, as an energy source, is free and wind farms consume virtually no water. South Africa could have up to 12% of carbon-free wind-generated electricity by 2020.⁹ This equates to the output of one large coal-fired power station. Wind could supply up to 20% of our electricity needs by 2030.
- South Africa has the best solar resources in the world. Solar thermal plants are coming down in price as fast as the price for nuclear power plants is going up. By 2020 there is little doubt that solar thermal power will be the most cost-effective source of bulk electricity and usable heat – and the electricity will be close to carbon-free. With hot salt storage, and possibly with gas back-up from the Kudu gas fields, this power supply would be available 24 hours a day.
- We would need 50 years to have enough power plants to really reduce carbon emissions slow down global warming. WE DO NOT HAVE ENOUGH TIME.

5 . The planning, design and construction of a nuclear power plant takes at least 10 years from inception.

6 McKinsey Global Energy + Materials. Unlocking Energy Efficiency in the US Economy. July 2009. http://www.mckinsey.com/client-service/electric-power-natural-gas/downloads/US_energy_efficiency_exc_summary.pdf

7 Eskom: Solar water heating FAQ's. http://www.eskomdsm.co.za/?q=Solar_water_heating_FAQs#crisis

8 A coal-fired power station produces 1 ton CO2 per MWh, so 3000MW x 365 days x 24 hours x 1 ton CO2 = 26 000 000 tons CO2/year.

9 Energy Research Centre, UCT. Costing a 2020 Target of 15% Renewable Electricity for South Africa. October 2008. The availability factor is taken into account and wind farms are presumed to be dispersed over a wide geographic area.