



TURNING UP THE HEAT

Can the atom save us from climate change?

Photo: Cattenoom Nuclear Power station, France

Climate change poses a huge threat to human society in coming decades. The scientific consensus is that greenhouse gas emissions need to fall to less than 40% of the current total, requiring a large scale transition in the way we produce and consume energy.



60 million tonnes of tailings at Roxby Downs uranium mine: the world's largest low-grade uranium deposit.

After two decades of ignoring the climate crisis, the Australian government has decided that nuclear energy could be the solution. Nuclear power stations emit almost no greenhouse gasses, leading some people to wonder whether the nuclear industry might not be the lesser of two evils. "The worst possible nuclear disasters are not as bad as the worst possible climate change disasters," noted the directors of the Centre for Alternative Technology in Wales.

Life cycle emissions

While nuclear power stations produce no greenhouse gasses, we need to take a close look at the life cycle greenhouse emissions of nuclear power – not just what a power station emits, but the combined impacts of mining, enrichment, fuel fabrication, decommissioning and waste storage.

The mining phase is the most important. The greenhouse emissions of nuclear power depend largely on the quality of uranium ore.

At a uranium grade of around 0.01% or lower, more energy is expended in mining and processing the fuel than is ever produced by the power station. This is hardly surprising. At this grade, ten thousand tonnes of rock will need to be crushed and treated with chemicals to produce a single tonne of uranium. It takes a hundred and fifty tonnes of uranium to power a single reactor for one year. The other one and a half million tonnes of tailings will be dumped.

So while high grade deposits last, nuclear power stations produce more energy than they consume. But as soon as we get down to these low grades, nuclear power stations will become a net consumer of energy, all of it from rapidly depleting fossil fuels.

So how long will the high grade uranium last?

The world's nuclear power stations today consume around 67,000 tonnes of uranium per year. At this rate, the high grade material will be depleted within 28 years, and the energy costs of nuclear power will begin to rise steeply. Within 60 years, nuclear power stations will be consuming more energy than they produce.

If industry plans for a threefold expansion are allowed, this limit will be reached much sooner: within 40 years if an aggressive power station construction programme is undertaken.

Assuming world nuclear generating capacity remains at 2005 levels, after about 2016 the mean grade of uranium ore will fall significantly from today's levels, and even more so after 2034.

After about 60 years the world nuclear power system will fall off the 'Energy Cliff' – meaning that the nuclear system will consume as much energy as can be generated from the uranium fuel.

Jan Willem Storm van Leeuwen

It's not a choice between climate chaos and the nuclear nightmare, because the Australian Government appears intent on giving us both.

Even if we ignore nuclear weapons proliferation, accidents, waste hazards, and the continuing curse of low-level radiation exposure, nuclear energy will only hasten climate disaster.

You just can't fool the atmosphere.

Too slow

Nuclear power stations take anywhere from 10 to 15 years to build. We can't wait this long to address climate change.

Too expensive

The Rocky Mountain Institute estimates that a dollar spent on energy efficiency is seven times more effective at reducing greenhouse emissions than nuclear power. Nuclear is still the most expensive means of boiling water ever devised.

Too dirty

Routine emissions, high level waste and millions of tonnes of radioactive tailings as well as inevitable greenhouse pollution: nuclear power has never been clean and green.

Too dangerous

As reactors age and more are built in unstable parts of the world, the risk of a catastrophic meltdown is increasing. The world can not afford more Chernobyls.

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Every stage of the nuclear fuel chain is heavily dependent on cheap fossil fuels. The process of uranium enrichment is a large source of chloro- and fluorohydrocarbons (CFCs) with heat trapping properties many thousands times stronger than carbon dioxide. The nuclear industry refuses to publish its emissions of these chemicals.

Power to the people

According to the Rocky Mountain Institute, 2006 is the year in which the rapidly expanding micro-energy sector will overtake the global output from nuclear power for the first time.

Micro energy is everything nuclear energy is not – small scale, localised, green energy in the hands of householders and businesses. Micro hydro, wind, solar, biomass and 'combined heat & power (CHP) systems are revolutionising energy in the way that micro-computers revolutionised communications. These, combined with with profitable innovations in household and business energy efficiency, will ensure that nuclear power stations will soon be as extinct as the dinosaurs.

In a 2003 report, the Australian Ministerial Council on Energy identified ways to reduce energy consumption and greenhouse emissions in the manufacturing, commercial and residential sectors by 20-30% with the adoption of commercially-available technologies and with an average payback time of four years.

To achieve a comparable reduction of greenhouse emissions through the introduction of nuclear power would be far more expensive, much slower, and would generate large volumes of high-level nuclear waste and plutonium.

Numerous scientific studies show that clean energy solutions, comprising renewable energy sources and a wide array of energy conservation and efficiency measures, can meet energy demand and reduce greenhouse emissions and do so at modest cost. The 'Clean Energy Future' study (website below) is the best known of these.

Take action

Far from being the solution to climate change, nuclear energy is part of the problem. If our politicians are seriously offering us no more than a false choice between climate collapse and nuclear power, we need to start electing people with more imagination. The last two decades have shown that leadership must come from below, with politicians of both major parties too beholden to the mining industry to initiate serious change. That means community action on all levels is needed now!

Further reading

ACF report: Nuclear energy - no solution to climate change

http://www.acfonline.org.au/uploads/res_NuclearNoSolMay06.pdf

The Clean Energy Future (How Australia can reduce greenhouse gas emissions)

<http://wwf.org.au/ourwork/climatechange/cleanenergyfuture>

Rocky Mountain Institute - efficiency gurus

Rocky Mountain Institute: <http://www.rmi.org>

National Framework for Energy Efficiency (Potentials for efficiency savings in Australia)

<http://www.nfee.gov.au/>

Nuclear Power: the Energy Balance (Detailed examination of nuclear greenhouse gas emissions)

<http://www.stormsmith.nl/>

Energy from Uranium (Updated study on uranium depletion and greenhouse emissions)

<http://www.oxfordresearchgroup.org.uk/publications/briefings.htm>

