

Nuclear is the new black ... Talk of a supposed nuclear 'solution' to climate change is polluting the debate.

Desperately anti-nuclear and taken to using erroneous data about renewables.

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Just when we thought it was no longer de rigueur to talk of nuclear utopias where electricity would be 'too cheap to metre', the atom-smashing business is all the rage again. After the PR disasters of Three Mile Island and Chernobyl, lobby groups, think-tanks and public relations firms have been hard at it trying to revitalize the industry's battered image with limited success. But increasing concerns about the threat of climate chaos caused by our fossil fuel addiction has handed the industry a lifeline. And they've been getting a little help from an unexpected corner.

Gaia goes nuclear

I first began to take real notice in May 2004. That month a now infamous article by scientist James Lovelock, founder of the Gaia hypothesis (which postulates that the earth acts as one super organism), was splashed across the front page of the British newspaper, The Independent. It conjured up fears of impending doom from climate change, overpopulation and deforestation. Lovelock admonished critics of the nuclear industry and their 'irrational fear fed by Hollywood-style fiction, the Green lobbies and the media'. Their fears, he said, are unjustified, and 'nuclear energy from its start in 1952 has proved to be the safest of all energy sources'. The environmentalist icon concluded that, 'nuclear power is the only green solution'.

Hardly surprising from the always pro-nuclear Lovelock, but the article's release was well timed. A number of high-profile greenies followed Lovelock's lead with cautious, and in some cases enthusiastic, endorsement of this once reviled technology. The list of converts is startling.

Hugh Montefiore, former Bishop of Birmingham and longtime trustee of Friends of the Earth, publicly outed himself in October 2004. 'As a theologian I believe that we have a duty to play our full part in safeguarding the future of our planet... the graveness of the consequences of global warming for the planet [has led me] to the conclusion that the solution is to make more use of nuclear energy.'

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One of the founders of Greenpeace, Patrick Moore, joined the chorus going so far as to testify in defence of nukes before the US Congress. Even the Centre for Alternative Technology (CAT) in Wales - 'Europe's leading eco-centre' by their own reckoning - added their voice. CAT directors Paul Allen and Peter Harper (credited with coining the term 'alternative technology') reasoned that: 'The worst possible nuclear disasters are not as bad as the worst possible climate change disasters.'

In just one year, the once reviled nuclear industry has managed to shift its image dramatically. This dangerous, blunt and obsolete technology is now seen as a front-runner in the race to save our climate. Fission is back in fashion and the industry is exuberant to see nuclear once again sauntering down the catwalks of power.

There's something about climate change

'It's not that something new and important and good has happened with nuclear, it's that something new and important and bad has happened with climate change,' explains US environmentalist Stewart Brand. British author and climate activist Mark Lynas echoes this sentiment: 'If you ask me, anything is preferable to planetary climatic meltdown combined with a 1930s-style collapse into political darkness. Even nuclear power.' It is clear that most greens that favour nuclear power are motivated less by a genuine enthusiasm than by overwhelming terror of a looming climate catastrophe. Their convictions are rooted in a desperate pessimism.

After all, the arguments against nuclear are as valid today as they were 20 years ago at the peak of the anti-nuclear movement. The technology is still extremely dangerous; relies on dwindling supplies of uranium; and remains so costly that massive government subsidies are required. It is also vulnerable to terrorism; can feed weapons proliferation; and produces volumes of toxic waste with no satisfactory storage solution.

The wind that has shifted in the industry's favour is the desire of governments to be less reliant upon increasingly pricey oil imports from volatile regions of the world and concern over fossil-fuelled climate degradation. Many governments look set to fail to meet their meagre greenhouse-gas reduction commitments set out under the Kyoto Protocol. This shines a new and more flattering light on the nuclear power industry. Every pro-nuclear organization now touts the technology's carbon-free credentials. The visitors centre at the Sellafield reprocessing facility on Britain's West Cumbrian coastline, has almost as much exhibition space devoted to climate change as to nuclear science. Global warming has given the industry such a PR boost that if climate change didn't exist, the industry would want to invent it. As British columnist George Monbiot acridly observed: 'For 50 years, nuclear power has been a solution in search of a problem.'

Given all we know about the dangers of nuclear, how can any self-respecting greenie endorse it? The answer lies in the different ways people think about extreme threats such as climate change. Rising sea-levels leading to floods and landslides; increased storm activity damaging essential infrastructure; long and sustained droughts in parts of the globe stymying food production – the potential effects read like the Book of Revelations. It's no wonder climate campaigners sometimes perpetuate apocalyptic narratives.

This overwhelming sense of impending doom leads to a grasping at any solution no matter how harmful the consequences. For many pro-nuke greens, the threat of climate catastrophe trumps every other environmental or social concern – locking us into a state of permanent exceptionalism. Cue Lovelock: 'We have no time to experiment with visionary energy sources; civilization is in imminent danger and has to use nuclear – the one safe, available, energy source – now, or suffer the pain soon to be inflicted by our outraged planet.'

Climate change seems to attract the kind of apocalyptic millennialists who once stood on street corners in London or New York proclaiming 'the end of the world is nigh'. Let's be clear, if we do nothing about climate change, the end may indeed be nigh for many by the end of this century. But to advance nuclear power as the solution is tragically shortsighted and ultimately misguided. Such a reaction seems almost inevitable if you believe that we've got 20–30 years before the planet is torn asunder by vicious climatic feedbacks. If the end of the world is coming to a theatre near you, you're liable to do anything to stop it. For some greens this involves the unthinkable – going nuclear.

But take that finger off the panic button for a moment. Is nuclear power really a solution to climate change? Nuclear power plants may not directly emit climate-damaging carbon dioxide, but if you look at the whole lifecycle of a nuclear power station its environmental credentials are pretty shaky.

The nuclear process employs energy-intensive industries dependent on vast quantities of fossil fuels. Uranium mining, enrichment and transport across the globe; the construction and decommissioning of facilities; and the processing, transport and storage of radioactive wastes. All these consume huge amounts of carbon-based energy such as oil and coal. Nuclear power simply can't hold a candle to renewable energy technologies such as windmills and photovoltaic panels with their minimal reliance on fossil fuel use.

The Öko Institut in Germany released a 10-year study back in 1997 that found that in a full lifecycle comparison of various energy technologies, nuclear had nearly twice the carbon dioxide equivalent of wind power – even factoring-in the phenomenal difference in power output (kilowatts per hour). A more recent study factored-in the declining ratio of uranium to mined ore in rapidly dwindling uranium sources and found emissions increase as more mining, refining and transport is needed to compensate for poorer quality ore. The report concludes that overall emissions needed for nuclear power are five times higher than even the Öko Institut estimate. Every new nuclear power station creates a further demand for uranium and its attendant infrastructure, which in turn spirals energy demand upwards.

For the sake of argument, let's look at nuclear power plants per se and ignore the lifecycle analysis (though nuclear power plants themselves release unknown quantities of greenhouse gases more powerful than carbon dioxide – such as the ozone-depleting chloro- and hydro-fluorocarbons as well as sulphur hexafluoride). How many new nuclear plants would we need to stop the worst excesses of climate change?

According to a 2002 report by Arjun Makhijani of the US-based Institute for Energy and Environmental Research (IEER), to produce a noticeable reduction in global carbon dioxide emissions, it would be necessary to build approximately 2,000 large new nuclear reactors each with 1,000-megawatt capacity. The UN's Intergovernmental Panel on Climate Change outlines a scenario whereby 3,000 nuclear reactors would be needed by the year 2100. This would mean an average of 75 new nuclear reactor-builds each year for 100 years. The US National Commission on Energy estimates that its domestic nuclear-power capacity alone would need to double and possibly triple over the next 30-50 years. This would bring the US total to about 300-400 new reactors, including replacements for those reaching retirement age. And this isn't the end of the problems.

A growing number of studies (see pages 12-13) tell us that, if we were to replace outright all fossil-fuel generated electricity with nuclear, there would be enough economically viable uranium to fuel the reactors for only three to four years. After that the nuclear revolution would grind to a sudden and catastrophic halt. The long-promised and much-hyped fast-breeder plutonium reactors that eschew dependency on continuous supplies of uranium have proven both technological and economic failures. Without uranium, conventional reactors stop reacting.

Assuming all these challenges were overcome, what difference would a nuclear renaissance make to global greenhouse gas emissions? Very little it seems. Nuclear power stations serve one major useful purpose and that is to produce electricity. The percentage of global greenhouse gas emissions from world electricity production is only a small proportion of all polluting sources – about 16 per cent. This is therefore the

maximum theoretical contribution that nuclear could make to our global emissions footprint assuming a total embrace of the atom. Transport, mining and manufacturing with heavy reliance on fossil fuels would continue to make up the lion's share of the global economy's climate-damaging emissions. Nuclear power would make no difference to nearly 85 per cent of the world's climate-spoiling emissions. And there are other problems which will manifest as the earth gets hotter.

Too hot to handle

France has long been seen as the model nuclear nation – deriving over 70 per cent of its electricity supply from nearly 60 nuclear power reactors. However, in the past few years, brutal heatwaves have brought a number of stations near to closure. According to government regulations, reactors must be shut down if the ambient temperature inside rises above 50 degrees centigrade, or if the waterflow fed from local sources such as rivers and streams falls below certain limits. Facilities are also not permitted to release water back into the environment if it is above 25 degrees in order to protect local ecosystems that might be adversely affected by the heated water. In the past few years the French Government has temporarily allowed plants to breach these safety rules rather than force costly closures. As Stephane Lhomme of the anti-nuclear group *Sortir du Nucléaire* observes, 'France finds itself in a situation of pre-nuclear accident.' The irony is that with global warming expected to bring hotter summers and more prolonged droughts, the nuclear industry seems unlikely to be able to cope in such overheated conditions.

It is cruelly ironic that this reinvigorated debate about nuclear technology takes place at a time when we approach the 20-year anniversary of the Chernobyl disaster. Thousands died, hundreds of thousands more have or will develop cancer, and an area covering much of Belarus and parts of Ukraine and Russia remains heavily contaminated. The Chernobyl catastrophe was 400 times more potent than the Hiroshima bomb. Today children are still being born with genetic defects and higher incidences of thyroid cancer and leukemia (see page 16). And the Chernobyl threat is far from over. Few realize that the majority of the reactor's fuel is still intact and active. The concrete and steel sarcophagus covering it was never meant to be permanent. Cracks have already begun to emerge and radioactive seepage has been detected in groundwater. Alexei Yablokov, a leading Russian scientist and president of the Centre for Russian Environmental Policy, warns that a second Chernobyl disaster could be in the making without urgent repairs. 'If it collapses, there will be no explosion, as this is not a bomb, but a pillar of dust containing irradiated (cancer-causing) particles will shoot 1.5 kilometers into the air and be spread by the wind.' Yablokov reports that already small luminescent chain reactions have been observed as rain and snow mix with the reactor's fuel exposed through cracks in the casing. Chernobyl stands as a stark reminder of the dangers of this arrogant technology.

The nuclear industry assures us that the disaster was a one-off event and lessons have been learned. But numerous instances of mishaps, accidents and radiation releases continue to occur all over the world.

The Brookhaven National Laboratory in Long Island, New York in 1997 was discovered to have been leaking plumes of radioactive tritium and cobalt-60 for nearly 12 years, unbeknownst to engineers or the local community.

The Davis-Besse plant in Ohio came close to disaster when, in 2002, boric acid ate a 16.5cm hole through a 17cm reactor-vessel head. According to the US-based Nuclear Information and Resource Service (NIRS) and the Union of Concerned Scientists: 'If it had

gotten through the remaining half-centimetre of steel that contained the coolant, a meltdown could have occurred.'

In April of this year, enough nuclear waste to 'half-fill an Olympic-size swimming pool' leaked from a cracked pipe at the UK Sellafield plant in Cumbria. The leak remained undetected for nearly nine months.

Just a few weeks ago in late June 2005, it came to light that radioactive waste has leaked into the Baltic Sea from corroded barrels stored at the Forsmark nuclear power plant in Sweden.

And the list goes on. The industry is mired in incompetence and disregard for safety at every stage from uranium mining to the still unresolved waste problem. Nuclear mishaps are much more commonplace than people think. A new nuclear renaissance, such as that already being seen in Asia, only introduces more risks of future accidents.

In contrast to the obsessive pursuit of some ultimate techno-fix, be it fission or fusion (see page 14), the real solutions are already here. While detractors will say that renewable energy technologies based on solar, wave and wind resources can never meet demand sufficiently, the truth is that they've never really been given a chance. While the nuclear and fossil-fuel industries have benefited from decades of exceedingly generous levels of government (read taxpayer) subsidies, renewables have barely had a look-in.

Take Europe, for example. Last year an estimated \$18 billion in direct subsidies were dished out to energy companies. Of this a mere \$300 million went to renewable energy technologies. Approximately \$1.3 billion went to nuclear, and the rest went to fossil fuels. This does not include the generous indirect subsidies such as regulatory concessions, tax breaks and liability insurance write-offs (particularly important to the nuclear industry). Just recently the UK spent an additional \$1 billion in order to prop up the bankrupt nuclear-power firm British Energy. If, however, we were to stop subsidizing fossil fuels and nuclear and shift resources into renewables, the prospects of meeting demand become far more achievable. Cut the cord on the billions likely to be spent on the internationally funded experimental fusion reactor in Cadarache, France (see page 14) and yet more resources would be freed up to spend on proven technologies that work now.

Despite the odds, renewables have already beat nukes in the energy game. According to the US-based Rocky Mountain Institute, in 2004 alone, small-scale renewables added 5.9 times as much net generating capacity and 2.9 times as much electricity production as nuclear power did. By 2010, renewable energy is projected to outstrip nuclear power's energy output by 43 per cent globally.

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But cutting subsidies for fossil fuels and boosting renewables is only part of the answer. Larger and more fundamental questions about the way we live, the nature of our economic system, and how we build meaningful movements for change remain. Tweaking the system to shift resources and make efficiency improvements can be beneficial, but we need to cast the net wider. It's not enough simply to shout from the rooftops for renewables and then have them installed by the same corporations that fill our petrol tanks. Oil giants such as BP and Shell are already gaining significant market

share in the solar and wind sectors respectively. By gobbling up patents on innovative technologies and sucking up research and development monies from the taxpayer, they are putting themselves in a position to influence the pace and direction of such technologies.

The drive to supplant nuclear and fossil fuels must be seen in the wider context of social justice and democracy. Corporate renewables may be great for climate change but do little to contain the threats posed by corporate power. A more radical prescription is needed.

Residents of the Scottish isle of Gigha are certainly pointing the way. Rather than rely on the central grid and the big power companies to provide their energy, the islanders have banded together to buy three wind turbines that are now being used to provide power for the island and even generate revenue by selling the excess to the grid. Gigha residents, who recently bought the island from the landlord, control the whole project and profits are reinvested into the community. Rather than relying on some polluting behemoth hundreds of miles away, the people are literally empowered. And after all, that's what it's all about, isn't it?