Nuclear Power, Uranium Mining, WATER & SCARCITY

A number of problems associated with the nuclear industry are much-discussed – the contribution of "peaceful" nuclear programs to the proliferation of nuclear weapons, the nuclear waste legacy, and the risk of catastrophic accidents or attacks. Less well understood are the serious impacts of the nuclear industry on water resources.

Water scarcity is already impacting on the power industry in Australia, largely because of our heavy reliance on water-guzzling coal-fired plants. Introducing nuclear power – the most water-intensive of all electricity sources – would exacerbate those problems.

Problems already evident in Australia's power sector because of water scarcity include:

- expensive long-distance water transportation to some power plants because of dwindling local water supplies;
- reduced electrical generating capacity and output at some coal and hydro plants;
- increased prices for water;
- higher and more volatile electricity prices;
- relaxation of laws and regulations concerning usage of river water and groundwater for some power plants;
- increased risks of blackouts; and
- intensified competition for scarce water resources between power plants, agriculture, residences, industries, environmental flows, etc.

The Commonwealth-State Ministerial Council on Energy met in early 2007 to discuss the impact of water shortages on electricity generation, and has requested regular updates from the National Electricity Market Management Company.

Current problems have led power utilities to explore alternatives such as the use of wastewater, groundwater or desalination. There is also an expectation that new plants are more likely to be built on the coast and use seawater. The use of dry (air) cooling systems may become more common but air-cooled plants are more expensive, less efficient and emit more greenhouse gases.

> "Coal-fired power plants have large water requirements for cooling and steam generation, but these are dwarfed by the water needs of nuclear power.
>
> Some nuclear power plants can use seawater for cooling, but problems emerge.
>
> When they are situated on bays and gulfs, the warm discharge water can accumulate and have a large impact on the local marine ecology."
>
> *Tim Flannery, 2007 Australian of the Year*

> "Australia is a water constrained continent and the issue of adequacy of water supplies for generator cooling purposes is already becoming problematic in some areas.
>
> There are restrictions on the volume of water that generators may draw.
>
> In some States this is beginning to present as a limitation on the amount of electricity that some baseload generators may be able to deliver in hot months."
>
> *Energy Supply Association of Australia*

Friends of the Earth Australia

Produced by Friends of the Earth, Australia and the Medical Association for the Prevention of War
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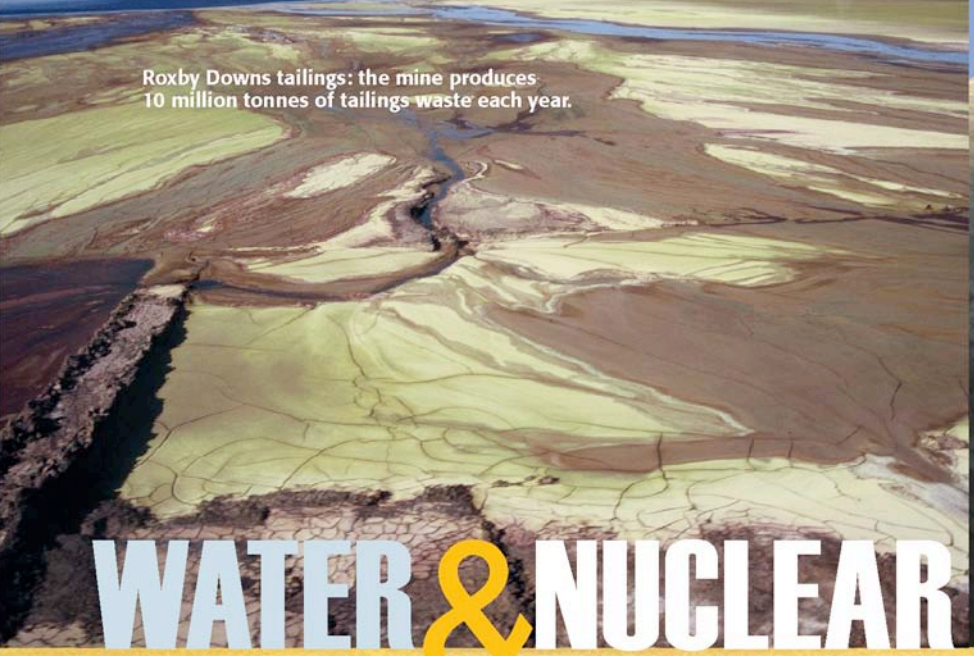
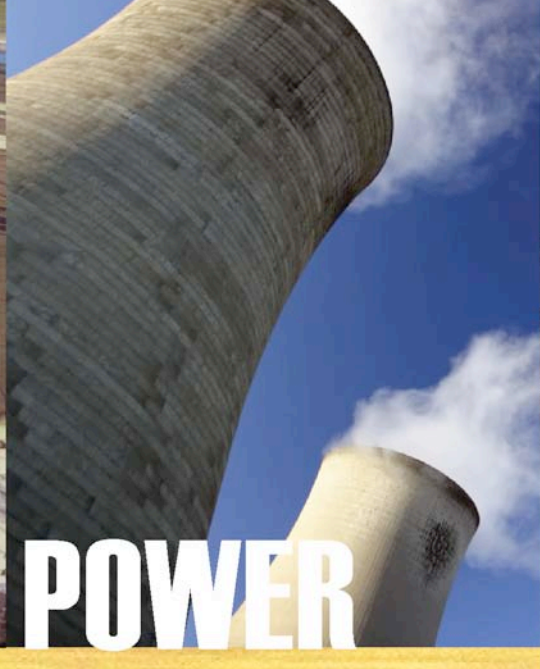


Roxby Downs tailings: the mine produces 10 million tonnes of tailings waste each year.



WATER & NUCLEAR POWER

Water for a nuclear power plant can be sourced from a river, lake, dam, or the ocean.

The water has two uses - it is converted to steam to drive a turbine, and cooling water then converts the steam back to water.

Nuclear power plants consume large amounts of water –typically 13-24 billion litres per year, or 35-65 million litres per day.

A December 2006 by the Commonwealth Department of Parliamentary Services states:

"Per megawatt existing nuclear power stations use and consume more water than power stations using other fuel sources.

Depending on the cooling technology utilised, the water requirements for a nuclear power station can vary between 20 to 83 per cent more than for other power stations."

Water outflows from nuclear plants expel relatively warm water which can have adverse local impacts in bays and gulfs, as can heavy metal and salt pollutants.

The US Environmental Protection Agency states:

"Nuclear power plants use large quantities of water for steam production and for cooling.

When nuclear power plants remove water from a lake or river for steam production and cooling, fish and other aquatic life can be affected.

Water pollutants, such as heavy metals and salts, build up in the water used in the nuclear power plant systems.

These water pollutants, as well as the higher temperature of the water discharged from the power plant, can negatively affect water quality and aquatic life."

A US report, 'Licensed to Kill: How the Nuclear Power Industry Destroys Endangered Marine Wildlife and Ocean Habitat to Save Money', details the nuclear industry's destruction of delicate marine ecosystems and large numbers of animals, including endangered species.

Most of the damage is done by water inflow pipes, while there are further adverse impacts from the expulsion of heated water. (See the report and video at: <www.nirs.org/reactorwatch/licensedtokill>.)

Reactors in numerous European countries have been periodically taken off-line or operated at reduced output because of water shortages driven by climate change, drought and heat waves.

Nuclear utilities have also sought and secured exemptions from operating conditions in order to discharge overheated water.

The water consumption of renewable energy sources and energy efficiency and conservation measures is negligible compared to nuclear or coal.

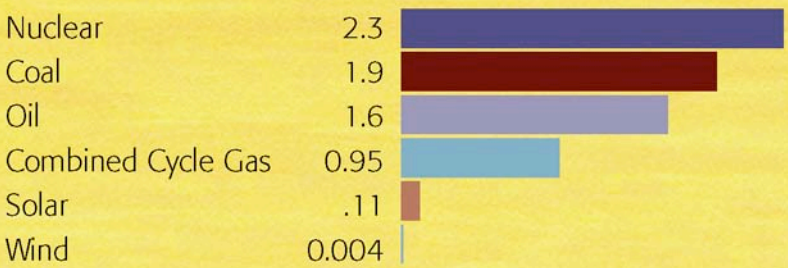
Tim Flannery, the 2007 Australian of the Year, notes that hastening the uptake of renewable energy sources such as wind, solar, and geothermal 'hot rocks' will help ease the water crisis as well as reducing greenhouse gas emissions.

Roxby Downs Mine Site

Mound Spring

Water Consumption of Different Energy Sources:

(litres per kilowatt-hour of electrical output)



Comparing Energy Sources

Operating a 2,400 Watt heater for one hour consumes 0.01 litres of water if wind is the energy source, 0.26 litres if solar is the energy source, 4.5 litres if coal is the energy source, or 5.5 litres if nuclear power is the energy source.

Mound Spring, Arabunna land, South Australia.

Photography by Jessie Boylan

More Information

- The detailed, referenced version of this paper is posted at: <www.foe.org.au/campaigns/anti-nuclear/issues>
- National Generators Forum <www.ngf.com.au>
- National Electricity Market Management Company, April 2007, "Potential drought impact on electricity supplies", <www.nemmco.com.au>
- Greenpeace, 2007, "The Impact of Coal-Fired Electricity Generation and Australia's Freshwater Resources", <www.greenpeace.org/australia>.
- Dr. Ian Rose, October 2006, Nuclear Power Station, <www.thepremier.qld.gov.au/library/office/NuclearPowerStation261006.doc>

WATER & URANIUM MINING

Mound Spring

Uranium mining uses massive amounts of water, and some mining methods use poisons to extract the uranium from the ore.

Roxby Downs Uranium/Copper Mine

The daily extraction of 35 million litres of Great Artesian Basin water for the Roxby Downs uranium/copper mine in South Australia has destroyed some of the precious Mound Springs and adversely impacted on others.

These unique habitats support rare and delicate flora and fauna, some species of which are unique to a particular Spring. Also controversial is the arrangement whereby BHP Billiton pays nothing for this massive water extraction despite its record $17 billion profit in 2006-07.

Another problem at Roxby Downs concerns the liquid tailings ponds. In 2005 it was revealed that over 100 bird deaths were recorded in a four-day period. The birds had drunk liquid tailings waste from the mine.

Beverley Uranium Mine

Since 2001 an in-situ leach (ISL) mine has been operating at Beverley in the northern Flinders Ranges in South Australia. ISL involves pumping acid into an aquifer. This dissolves the uranium ore and other heavy metals and the solution is then pumped back to the surface. The uranium is separated at the surface.

The liquid radioactive waste – containing radioactive particles, heavy metals and acid – is simply dumped in groundwater.

From being inert and immobile in the ore body, the radionuclides and heavy metals are now bioavailable and mobile in the aquifer.

Another feature of ISL mining is surface contamination from spills and leaks of radioactive solutions. There have been several dozen spills at Beverley.

Ranger Uranium Mine

There have been over 120 leaks, spills and licence breaches since the Ranger mine in the Northern Territory opened in 1981.

Ageing infrastructure and a deficient safety/management culture have seen the frequency and severity of these incidents increase in recent years.

Contaminated water directly threatens humans as well as its environmental impacts. Mining company ERA was fined $150,000 after a March 2004 incident when 150 workers were exposed to drinking water containing uranium levels 400 times greater than the maximum Australian safety standard.

Photography by Jessie Boylan