

*Note: As part of their contributions to the RECLAIM POWER global days of action in October 2016 for energy transformation, several Reclaim Power organizations collaborated on these series of briefing papers on dirty, harmful energy sources and false energy solutions that contribute to climate change and endanger people's lives and welfare.*

### RESIST DIRTY HARMFUL ENERGY AND FALSE ENERGY SOLUTIONS

# NUCLEAR POWER

## What is nuclear power? How is it used to generate electricity?

A nuclear power plant is a thermal power station in which the heat source is a nuclear reactor. As is typical in all conventional thermal power stations, the heat is used to generate steam which drives a steam turbine connected to an electric generator which produces electricity.

## What is the global situation regarding the use of nuclear energy?

As of May 2016, 444 nuclear reactors operate in 30 countries worldwide for electricity generation<sup>1</sup>. Nuclear energy accounts for 9.8% of the world total primary energy supply in 2015.

The use of nuclear energy for electricity generation is predominant in developed Western economies. In 2014, 78.1% of the 2,535 terrawatt-hour (TWh) globally produced from nuclear power are found in OECD countries<sup>2</sup>.

The nuclear industry has latched onto the climate crisis in a last ditch attempt to survive in the face of long-term public opposition. Nuclear power is presented as clean energy because carbon dioxide is not emitted during nuclear fission. As of September 2016, 63 new nuclear power plants are under construction in 15 countries<sup>3</sup>.



## Why should we oppose nuclear power plants?

Public outcry against nuclear power plants have reached and remain on a global scale – especially with widespread information on accidents that threaten the lives of people who live near nuclear reactors. The latest of these nuclear power-related incidents was the Fukushima Daiichi nuclear disaster which occurred after Japan suffered its strongest earthquake in recorded history in March 2011.

Huge amounts of fossil fuels are used in every other stage of the process, including mining, milling, conversion, the enrichment and fabrication of uranium, the construction and decommissioning of power plants, long-term storage and disposal of nuclear waste, and transportation between these stages. Overall, life cycle greenhouse gas emissions of nuclear power are comparable to those of natural gas<sup>4</sup>.

<sup>1</sup> Nuclear Energy Institute 2016, <http://www.nei.org/Knowledge-Center/Nuclear-Statistics/World-Statistics>

<sup>2</sup> 2016 Key World Energy Statistics, International Energy Agency (IEA)

<sup>3</sup> Nuclear Energy Institute 2016, <http://www.nei.org/Knowledge-Center/Nuclear-Statistics/World-Statistics>

<sup>4</sup> [https://risingtidenorthamerica.org/wp-content/uploads/2014/11/FS-BOOKLETT\\_FINAL.pdf](https://risingtidenorthamerica.org/wp-content/uploads/2014/11/FS-BOOKLETT_FINAL.pdf)

In 2006, Brice Smith - author of "Insurmountable Risks: The Dangers of Using Nuclear Power to Combat Climate Change" – listed three arguments against nuclear power plants<sup>5</sup>:

**The inevitable link between the nuclear fuel cycle and nuclear weapons proliferation.** The nuclear relationship between Russia and Iran is a prescient example of corporate or governmental greed running roughshod over nonproliferation concerns. By building a \$1 billion reactor in Iran's port of Bushehr, Russia opened a Pandora's box of nuclear technology for Iran, which has developed uranium enrichment to a level that puts it, by IAEA estimates, within two to 10 years of building a nuclear weapon. For its part, France is underwriting the construction of a nuclear power plant in Libya, and actively encourages nuclear development in the Middle East.

The relationship between the basic infrastructure of the fuel cycle and the eventual development of nuclear weapons technology is a well-worn path. Quite simply, any nuclear fuel cycle facility such as a uranium enrichment facility or a reprocessing facility can be used, if built in sufficient sizes, to produce nuclear weapons. Were the worldwide nuclear fuel cycle to expand to the dimensions needed to even begin cutting CO2 emissions and meet energy needs, the development of nuclear weapons – the world's single geopolitical doomsday devices – would be possible virtually everywhere.

**The issue of reactor accidents.** Fifty accidents at a solar power production facility could never equal the consequences of one Chernobyl. More than 20 years after the Chernobyl plant disaster in the Ukraine in 1986, birth defects continue to be recorded from as far away as Sweden. And the site continues to leak radioactivity. Only recently have strategies been financed to build a more permanent solution for trapping radioactivity than the now-crumbling cement "sarcophagus" that was poured onto the smoldering shell Chernobyl's No. 4 reactor.

In 1979, the meltdown at the Three Mile Island nuclear power plant in the US state of Pennsylvania nearly resulted in a Chernobyl-level accident, but was contained before an explosion occurred. Yet, releases of radiation affected some 2 million people. An earthquake in Japan in July 2007 resulted in radiation waste leaks and spills at the world's largest nuclear power that are still being tallied by the International Atomic Energy Agency.

**The disposal of nuclear waste.** Most nuclear power plants keep their waste onsite in temporary storage for eventual shipment to other temporary storage. The Yucca Mountain project, approved by the United States in 2002, was initially feted as the final solution in geologic storage of radwaste. But engineering flaws, cost overruns and documented leak possibilities have stalled the project so severely that, even if the facility does open, it is already booked to capacity and another Yucca will have to be dug immediately.

In countries that reprocess nuclear fuel, like Russia, France, the United Kingdom and Japan, the environmental stakes are even higher. Russia's single operable reprocessing facility, the Mayak Chemical combine, runs at less than half of its 400 ton per year engineered capacity, leading to backlogs of spent nuclear fuel sitting at plants and naval shipyards awaiting transport. Yet, reprocessing at Mayak has turned its neighborhood into the most radioactively contaminated region in the world, as the plant for decades dumped waste into the local river system. In April 2005, Britain's Thorp reprocessing plant experienced a leak of some 20 tons of plutonium and uranium dissolved in nitric acid. Though the leak was contained, it had progressed for eight months before detection.

**Money spent on nuclear is better spent on alternatives.** Nuclear energy is a deceptively inviting alternative – nuclear power plants are expensive to build, but cheap to run, where the opposite is true for traditional coal fired plants. Nuclear power plant builders in merchant states are either branches of the government, like Russia's Atomstroiproekt or France's Areva, or have close government ties, like America's Westinghouse, General Electric and Bechtel. Corporate and governmental elites to promote nuclear power for a short-term financial bonanza in as many markets as possible, while ignoring the widely acknowledged problems of nuclear proliferation and the unresolved issue of storing waste, and which no country has effectively addressed.

It is clear that nuclear merchants have the money and the technical know-how to divert the incredible resources they are willing to spend on nuclear power development into developing clean alternative energy that leaves no environmental footprint at all.

<sup>5</sup> <http://bellona.org/news/ccs/2008-01-bellona-position-paper-nuclear-energy-not-an-alternative-for-fight-on-climate-change>

