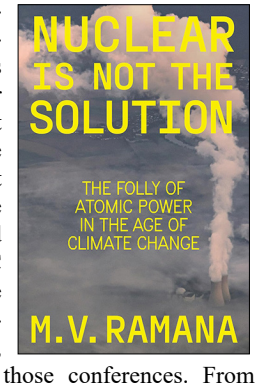
Conservation and Climate Change

COPOUT: How Governments Have Failed the People on Climate—an Insider's View of Climate Change Conferences, from Paris to Dubai

By Nick Breeze. 2024. Gemini Books. 240 pages, 22.99 CAD, Paper.

Nuclear is Not the Solution: the Folly of Atomic Power in the Age of Climate Change

By M.V. Ramana. 2024. Verso Books. 272 pages, 39.95 CAD, Hardcover, 11.99 CAD, E-book.



In two recent books addressing responses to climate change, readers learn about the unwieldly international policy process as well as technological options—in particular nuclear energy—that may or may not effectively mitigate the global crisis.

A COP, or Conference of the Parties, is an annual United Nations meeting on climate change with official and unofficial representatives from countries around the world. Author Nick Breeze attended eight COPs, beginning with the Paris Agreement event at COP 21 (in 2015) where 196 governments agreed on a baseline limit of 1.5°C global temperature rise above pre-industrial levels. His book, *COPOUT*, reviews the progress of those conferences. From COP to COP, there is a growing malaise as emissions increase faster than mitigation. An early focus on planting trees and carbon capture drawdown technologies was missing the mark (p. 248).

Breeze finds some courage among younger COP delegates. At COP 25 in Madrid, in 2019, he felt that the youth climate movement had won significant attention with projects like Fridays for Future and Extinction Rebellion. Yet, climate change as a conflict threat multiplier was being recognized by NATO (North Atlantic Treaty Organization) officials (pp. 190, 202). Breeze writes about double accounting by "dodgy" countries buying and selling authorized carbon offsets (pp. 107, 151–154). Indigenous peoples from the Marshall Islands and Samoa spoke about illnesses linked to climate change, but they were told that migration was the solution (p. 141).

The acceleration of planetary warming (Hansen *et al.* 2025) speeds the loss of both Greenland and Antarctic ice sheets and will result in a sea level rise of 65 m (Hansen *et al.* 2023). Just 10% of that rise would annually flood 630 million people, causing unthinkable levels of global conflict. But, despite a growing popular consensus, leaders are not behaving as if there is an emergency nor that tipping points are irreversible (pp. 172, 194).

Climate scientists like James Hansen are warning of biosphere collapse (p. 157). Breeze writes sparingly about biodiversity challenges. He mentions the Okavango Delta in northern Botswana, home to "elephant, lion, leopard, cheetah, buffalo, hippopotamus, crocodile and hundreds of species of birds", which is at-risk because of fossil fuel company deals with corrupt governments (p. 195). He also cites the destruction of the Great Barrier Reef (due to coral bleaching from ocean warming) on which a wide range of organisms depend (p. 245). The COP 28, where a record 100 000 participants gathered in the United Arab Emirates in 2023, was Breeze's last conference covered in *COPOUT*. That same year, 10 000 young Emperor Penguins perished in Antarctica because of melting sea ice, with the species expected to become extinct by the end of century (p. 242). Also in 2023, 150 000 km^2 of Canadian forests burned, releasing about 640 million tonnes of CO and CO_2, the equivalent of India's annual fossil fuel emissions (Byrne *et al.* 2024).

Breeze calls the Athabasca tar sands in northern Alberta (larger than the size of England) the "most destructive oil-extraction site on the planet", now producing over three million barrels of oil per day (p. 4). Breeze's prognosis is that until we halt supply, the COPs "will continue to be a charade" (p. 255).

He does a good job outlining the mitigation controversies. Solar Radiation Modification (SRM), or geoengineering, has critics and fans. Some critics demand continuing the "rapid, equitable transition to clean energy" and reject all SRM research (pp. 91–92), which they see as a conspiratorial diversion by fossil fuel interests. But the COP 27 Climate Overshoot Commission considered measures that address adaptation and CO_2 removal, including SRM. Breeze is skeptical about this "techno-optimism" pushed by what he calls a determined "geoclique" (pp. 230–231), and he worries whether SRM might change weather systems, disrupt the Indian monsoon, or thin the ozone layer (p. 236). Others are more optimistic.

A young Honduran insisted that research "might help save lives and infrastructure at home" and therefore must be scaled up. Failing to do so would be "nothing short of a human-rights violation" (p. 252). Paul Beckwith, a Canadian climate scientist who supports SRM research, thinks we must buy time because we will face abrupt change soon (p. 39). This will require authority and planning at the level of the United Nations Security Council (pp. 237–238). In a recent article, Hansen argues that "Humanmade climate forcings are already geoengineering the planet at an unprecedented, dangerous, rate" (Hansen *et al.* 2025).

The other controversial technology Breeze discusses is nuclear energy. Engineers like Mark Jacobson at Stanford University believe that 100% renewable energy will be ready in 25 years (Jacobson and Delucci 2009). For Breeze, this is a key argument for switching entirely to renewables, without nuclear. The claim, however, is much contested (p. 46). At COP 21 in Paris, a group of scientists, including Hansen, argued that no energy, transportation, and industrial transition was possible by 2050 without nuclear energy. Hansen believes we "now know how to burn the nuclear fuel in ways which are much safer, in ways where you cannot have the kinds of accidents you had at Fukushima" (p. 133).

In *Nuclear is Not the Solution*, M.V. Ramana would beg to differ. He makes four core arguments against nuclear power: high cost and slow build time, weapons proliferation risk, contamination risk, and the spent fuel disposal problem. Early in the book, he says: "Although climate change scares me, I am even more scared of a future with more nuclear plants" (p. 2). While his book reiterates the standard complaints about nuclear power, it is framed in the context of addressing the climate crisis. Nuclear power plants emit almost no greenhouse gases while operating, and through their full life cycle they currently emit a third of the CO_2 as does solar energy (Jawerth 2020).

Accidents

A familiar quarrel with nuclear power is the possibility of Chernobyl-type reactor accidents. As *Nuclear is Not the Solution* makes clear, there continue to be disagreements over the number of casualties caused by severe radiation contamination and exposure. Japanese officials dispute whether increased cases of thyroid cancers can be attributed to the nuclear accident in Fukushima, claiming that overdiagnosis would explain them (p. 19). The immensity of the disaster—an earthquake and then a tsunami wiping out reactors, the release of radioactive contaminants, and the evacuation of 150 000 people—is not at issue (pp. 21–23). About 22 000 people died, almost all from the tsunami, but also some from suicide, stress, and medical care disruptions. Ramana mocks the International Atomic Energy Agency (IAEA) claim that "no one died from radiation at Fukushima" (p. 40).

The debate is mostly over future deaths from low-level radiation exposure. Ramana defends the widely supported Linear-Non-Threshold (LNT) hypothesis that asserts there is no level of exposure below which radiation is harmless (let alone beneficial). Using official estimates from the Committee on the Biological Effects of Ionizing Radiation (BEIR), 'up to' 1800 people could eventually die from Fukushima radiation effects (p. 42). However, there are credible challenges to the LNT hypothesis (Tubiana *et al.* 2009; Cardarelli and Ulsh 2018; Calabrese 2022; Calabrese *et al.* 2022). According to the Canadian Nuclear Safety Commission, "there is little scientific evidence of adverse health effects from radiation doses below 100 millisieverts (mSv)" (CNSC 2013). For comparison, the global average dose from natural background radiation is ~2.4 mSv a year; a computed tomography (CT) scan dose is about 7 mSv (CNSC 2023). This contest within the scientific literature is not mentioned by Ramana. With apparent certainty he writes that "since radiation, even at very low levels, is harmful to people, the expansion of nuclear energy will necessarily result in increased risk to public health and the environment" (p. 20).

The effects of the explosion or meltdown of a nuclear power reactor need to be compared to failings of other technologies, such as fossil fuel pollution or hydroelectric dam destruction. For example, the destruction of the Kakhovka Dam in Ukraine in 2023 caused the deaths of 59 people, thousands were evacuated, and widespread flooding occurred (BBC 2023; EOS Data Analytics 2024).

The worst nuclear power contamination accident was at the Chernobyl plant in Ukraine in 1986, and Ramana spends significant time on this subject. Experts generally agree that the frequency of childhood thyroid cancers increased, but Ramana challenges those who defend the lower casualty estimates, what he sees as a "mismatch between reality and wishful thinking—or perhaps even deliberate lying" (p. 20; IAEA 2006). The Chernobyl Forum "soberly" listed 50 emergency workers as having died at the accident scene, 4000 young people contracting thyroid cancer (15 of whom died), and that 4000 probable deaths may "eventually be attributable to the Chernobyl accident", although there is uncertainty (IAEA 2008: 4, 134–140). Ramana claims that "nuclear energy advocates assert that future accidents are impossible" (p. 20), but this seems like a generalization.

Energy choices must be made by evaluating which options will provide the required baseload and stored

power capacity, in time, given our pressing climate obligations. Here Ramana reveals his preference for continued use of oil and gas-fired power plants over nuclear to cover peak electricity demand (p. 237). The nuclear energy renaissance, the existence of which he appears to doubt (pp. 62–67), may not need to be part of the energy mix in the future. But Ramana also thinks it "inappropriate" to keep existing plants running (pp. 15, 74–80).

Economics

In two of his five chapters, Ramana delves into the political economy of nuclear power. He usefully outlines the significant institutional connectedness between various nuclear streams (power, weapons, research, and medicine; pp. 170–193). The book doesn't explore whether energy nationalization could address the private profit and public subsidy problems raised by Ramana (pp. 143–149), who sees nuclear energy subsidies as "corporate welfare" (p. 144). He doesn't dwell on similar subsidies going to competing sustainable energy companies, a concern raised by Hansen *et al.* (2025). Left-libertarian Noam Chomsky is quoted twice, including regarding the problem of "socialization of cost and risk, privatization of profits" (p. 154). Chomsky is not speaking specifically of nuclear power where he is mentioned. When Chomsky has reflected on it (elsewhere), he has deferred to Hansen or offered tentative support for nuclear energy in the context of climate change until renewable substitutes can be depended on. Chomsky is clear he doesn't think the nuclear option can be foreclosed just yet (McNeill 2014; YouTube 2015: 25:59 min; Chomsky and Pollin 2020; Roberts 2020).

Weapons Proliferation

"Nuclear energy does have one virtue … its innate and inseparable connection to nuclear weapons" (p. 7). As a member of the Canadian Pugwash Group (as is the author of this review), Ramana's credentials in support of nuclear weapon abolition are not in question (Ramana 2024). But *Nuclear is Not the Solution* highlights only interdependence between power generation and weapons production. It also portrays as disingenuous those who emphasize their dissimilarities (p. 168). What is missed is that states wishing to produce a nuclear weapon do not require power generating reactors to do it. There are two sources of weapons-usable fissile material: plutonium produced in any reactor (there currently exist 227 operational non-power research reactors in 54 countries; IAEA 2025); or highly enriched uranium (HEU), which can be produced using (most commonly) centrifuges. Both plutonium and HEU production facilities can be concealed, but by engaging with IAEA oversight and safeguards, it becomes more difficult to build nuclear weapons clandestinely (Rockwood 2013). This important argument is not addressed in Ramana's book. It should also be acknowledged that a government determined to build bombs will likely find a way, with or without a nuclear power plant, as history has shown.

Nuclear Waste

Nuclear is Not the Solution is skeptical of deep burial of radioactive waste—material that needs to be sequestered for hundreds of thousands of years, long after current governments and states have come and gone. Even the most stable geological formations are potentially subject to distant-future seismic disruptions, vessel corrosion, and leakage, although burial sites are engineered to sit far below the water table. As Ramana points out, the other options available (securing spent fuel at the surface, reprocessing, or burning plutonium in reactors) also have risks. While discounting deep burial projects in progress in Finland, Sweden, and Canada (pp. 54–55), he does not appear to have an alternative proposal, even if all nuclear power plants were shut down. This seems a case of the perfect solution being the enemy of a good one.

Ramana is right that advocates of nuclear power want to settle the burial question, make nuclear cost-effective, and disentangle the technology from the legacy of the 1945 atomic bombs. This is particularly the case now, given the revival of power plant construction. As Hansen and co-authors have written:

> The world is finally beginning to realize that nuclear power is needed to address climate change. At the United Nations COP 29 meeting in Baku, 31 nations, including the United States, pledged to work together toward tripling nuclear power capacity by 2050. (Hansen *et al.* 2025: 39)

There may have been a time when non-nuclear sustainable energy options alone could have entirely displaced fossil fuels. But because we sit a scant few years from climate tipping points, this position is now less compelling (Hansen *et al.* 2023, 2025). *Nuclear is Not the Solution* provides a strong and polemical judgement against nuclear power. My caveats above notwithstanding, it is a concise primer, uses non-technical language, and is worth reading together with other viewpoints. The question remains though: if nuclear energy is not the (ultimate) solution to the climate crisis, might it still be a necessary part of it?

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Robin Collins
Ottawa, ON, Canada