

CLIMATE-NUCLEAR NEXUS

Exposing the interplay between two key threats of our time:
climate change and nuclear risks

Nuclear winter

Recent scientific studies suggest that even a "limited regional nuclear exchange", in which two opposing nations would each use 50 Hiroshima-sized nuclear weapons (about 15 kiloton each) on major populated centres, could result in a drastic cooling on a global scale ("nuclear winter"). Huge fires caused by nuclear explosions, in particular from burning urban areas, would lift massive amounts of dark smoke and aerosol particles into the stratosphere. Here the smoke could persist for years and block out much of the sun's light from reaching the earth's surface, causing surface temperatures to drop drastically. This would have disastrous implications for agriculture, and threaten the food supply for most of the planet. It has been estimated that between one and two billion people could die of starvation as a result ("nuclear famine").

Figure: Projected Canadian wheat production loss after global drops in average surface temperature caused by nuclear weapons use.

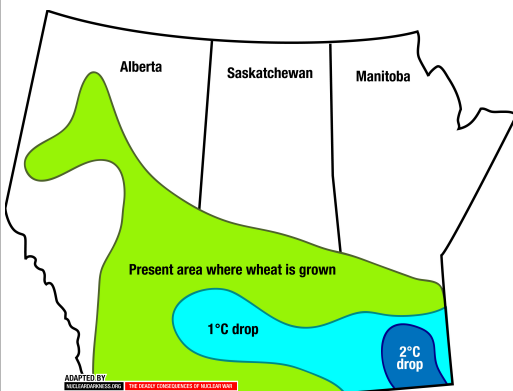
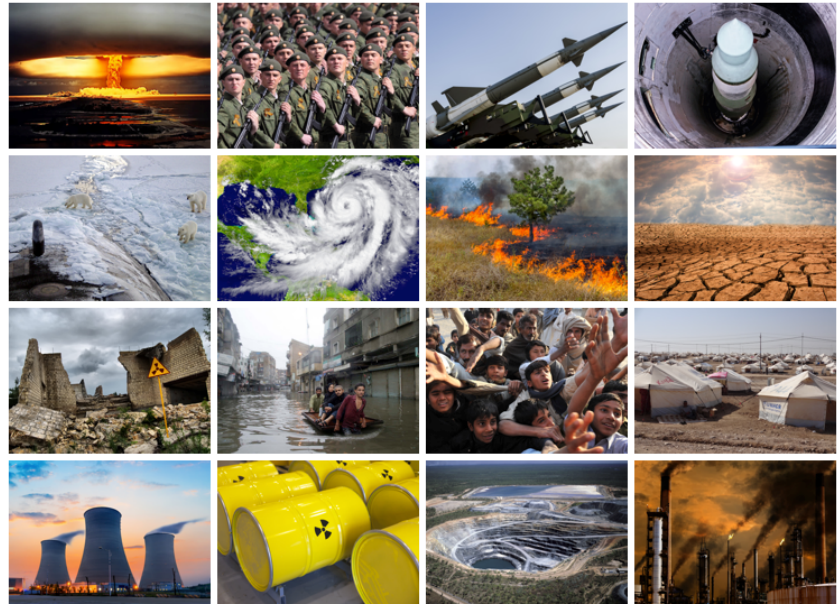


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Two key threats of our time

The World Future Council's Climate-Nuclear Nexus project highlights the interplay between climate change and risks associated with nuclear weapons, facilities and materials, with the aim of forging solutions to these two principal threats to human survival. Since publishing a groundbreaking study by Prof. Dr. Jürgen Scheffran in 2012, the WFC has organised workshops and prepared briefings for policy-makers, academics and civil society organisations on this theme.

The climate-nuclear nexus manifests itself in a number of ways.

Climate change-induced weather events impact on nuclear security

The nuclear disaster in Fukushima in March 2011 has drawn attention to the possible effects of extreme weather events, environmental degradation and seismic activity on the security and safety of nuclear facilities. Although the tsunami was caused by an earthquake, not by climate change, the impact of the tsunami on nuclear reactors provides a timely warning of the potential for rising seas and storms to impact on nuclear reactors around the world, many of which are situated on low-lying land close to the ocean.

Three minutes to midnight



In January 2015, the Bulletin of Atomic Scientists moved their symbolic "Doomsday Clock" to three minutes to midnight, because of the gathering dangers of climate change and nuclear proliferation, signalling the gravest threat to humanity since the throes of the Cold War.

Equally, the 2010, 2012 and 2014 floods in Pakistan, which have been attributed to a combination of climate change and other environmental degradation, has heightened anxieties about the safety and security of Pakistan's nuclear power plants as well as nuclear weapons sites and military installations. So far, nuclear sites in this extreme weather-prone country have remained safe, yet there is concern about possible damage from future environmental disasters. These events reveal how the steady increase in extreme weather events and environmental degradation can adversely impact the safety and security of nuclear installations.

Climatic and ecological consequences of nuclear war

Research carried out in the 1980s on the climatic effects of an all-out nuclear exchange between the US and Russia played an important part in the decision of both countries to reduce their nuclear stockpiles. Recent research has revealed that even a limited regional nuclear exchange would eject so much debris into the atmosphere that it could cool down the planet to temperatures not felt since the ice ages ("nuclear winter") and significantly disrupt the global climate for years to come. This would have disastrous implications for agriculture, and threaten the food supply for most of the planet. It has been estimated that as a result up to one billion people could die from starvation ("nuclear famine").

Conflicts due to climate change and nuclear weapons use

The UN Security Council and the European Commission have warned that climate change is a threat multiplier which exacerbates existing tensions and instability, and that climate change overburdens states and regions which are already fragile and conflict prone. Nuclear weapons represent a particularly worrying element in this volatile equation. International destabilisation resulting from climate change could provoke conflicts, which, in turn, could enhance the chance of a nuclear weapon being used, could create more fertile breeding grounds for terrorism, including the nuclear kind, and could feed the ambitions among some states to acquire nuclear arms.

Nuclear weapons budgets are needed to combat climate change

Replacement of fossil fuels with renewable energies requires investments in renewable energy research and development and in infrastructure and financing adjustments to suit renewable energy sources. 20-30% of the US\$100 billion global nuclear weapons budget would be sufficient to support such renewable energy investment needs.

Nuclear deterrence prevents the global cooperation required to address climate change

Global cooperation is vital to the implementation of core measures to address climate change, including the development of global emission standards and goals, ensuring the use of appropriate renewable energy technologies, maximising the effectiveness and sharing of research, and ensuring effective grid development and energy 'sharing' to minimise wastage. Such cooperation is difficult, if not impossible, when countries continue to threaten each other with retaliation by nuclear weapons.



Problems with nuclear energy

While sometimes labelled as a solution to climate change, nuclear energy cannot credibly replace the huge amounts of fossil energy sources. In addition, the 'nuclear fuel cycle' contains a series of problems and risks. First, radioactive materials are released and accumulated at each stage of the cycle with the risk of such materials being released into the environment. Second, at various stages of the cycle, transitions to nuclear weapons development are possible, thus increasing the risk of nuclear weapons proliferation.

Third, as nuclear power is heavily subsidised and external costs are not internalised in its market price, it is not commercially competitive compared to advanced renewable energies that receive similar financial support. Fourth, after decades of nuclear energy production there is still no solution to dealing with the ever-growing pile of nuclear waste—some elements of which stay radioactive for thousands of years.