

## **Nuclear arms control**

*This document has been re-drafted to respond to the objections and concerns raised by the Nationale Akademie der Wissenschaften Leopoldina (Germany), the Royal Society (United Kingdom) and the National Academy of Sciences (USA) regarding the problematic political references. We thank the Academies that had provided feedback and considerations to the previous version and hope this version also meets approval and consensus from all.*

---

### **Draft 3**

After a sustained period of declining numbers of nuclear warheads, there is a risk this trend could now reverse.

The decrease in the number of warheads was the combined effect of numerous treaties. Following the 1970 Non-Proliferation Treaty (NPT), the United States and Russia established a set of bilateral arms reduction and verification treaties, which greatly reduced the risk of a nuclear confrontation. These treaties significantly reduced the stocks of nuclear weapons in the USA and Russia and helped increase confidence and stability in international relations.

Recent years have seen an inversion of this trend, associated with increased international tensions which led to the withdrawal from several treaties

The increase in geopolitical crises and new wars being fought involving countries possessing nuclear weapons threaten regional and global stability. New threats have been made to use tactical nuclear weapons. These are designed to be used on the ground against military targets. However, in addition to their large destructive power, the use of such weapons is associated with severe and widespread effects from radioactive fallout. Most importantly, the use of such weapons could lead to the escalation and the use of strategic nuclear weapons.

Efforts have also been made against the use of nuclear weapons. On 3 January 2022, the five NPT nuclear-weapon states declared that “*A nuclear war cannot be won and must never be fought*”. Later that year, G20 leaders declared at the Bali Summit on 16 November 2022, that “*The threat of use or use of nuclear weapons is inadmissible*”. At the Hiroshima Summit in 2023, G7 leaders declared, for the first time ever, their commitment to achieving a world without nuclear weapons.

In the context of the current global instability, it is imperative to highlight the known consequences of nuclear warfare. There is a strong scientific basis for the following points.

The speed of any war can be rapid. Hundreds of multi-warhead missiles can be launched over a short period of time.

The multifaceted damages resulting from a nuclear conflict have been the object of intensive scrutiny by the scientific community in thousands of technical publications.

- Survivors of the blasts and fires who are exposed to high radiation doses would face acute radiation sickness and most would die within hours or weeks. Those exposed to lower but still substantial doses would have an increased risk of developing radiation-related diseases in the future;
- Among the long-term effects on survivors are the increased rates of cancer and other diseases, including cardiovascular diseases and immune dysfunction as shown by epidemiological studies of the Hiroshima and Nagasaki survivors and other exposed populations;
- A full-scale nuclear war between the nations with the largest arsenals would result in devastation to those nations and would cause harm worldwide. In addition, several recent scientific studies conclude that also nuclear wars between nations with smaller arsenals could have substantial effects beyond the early fatalities, which themselves could range up to hundreds of millions of people;
- Nuclear explosions and the fires they cause are likely to inject soot into the stratosphere, reducing sunlight and temperatures on Earth. While there is uncertainty about how much soot reaches the stratosphere and how long it remains there, these effects could significantly reduce agricultural output and fish catch following a nuclear war, exacerbating food insecurity globally beyond the direct disruption from the war;
- Depending on the scale of use of nuclear weapons, there is the potential for the destruction of entire ecosystems and extinction of species, due to the direct impact of explosions and fires and altered climatic conditions. In the worst cases this could be on the scale of a mass extinction.

Historical evidence suggests that the primary way to shift from growth to reduction of nuclear weapons, to reduce the risks of nuclear use, and to reduce the proliferation of nuclear weapons is by means of international agreements that limit numbers and types of weapons, establish means of monitoring and verification, establish means of communication and conflict resolution, and verifiably restrict uses of nuclear materials and technologies, all to implement the renewed commitments against the use of nuclear weapons.

Among the roles of the scientific community are to continue to develop and communicate the scientific evidence base that shows the catastrophic effects of nuclear warfare on human populations and on the other species with which we share our planet, to develop means to monitor, detect, and verify agreements, and to support the governments as they seek to fulfil the commitments described above.

The science academies of the G7 countries, in light of the rise in international tensions and wars, call on the G7 leaders to once more reaffirm their commitment to achieving a world without nuclear weapons and to take the necessary steps to help the world to realise this goal safely and securely.