Ploughshares

SPOTLIGHT

Hiroshima and Nagasaki: 80 Years of Nuclear Reckoning

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Cover image shows a photo of what later became the Hiroshima Peace Memorial among the ruins of buildings in Hiroshima, in early October 1945. Public Domain photo by Shigeo Hayashi.

1. Brief History of Bombing and its Human Consequences

At 8:15 a.m. on August 6, 1945, the US Boeing B-29 Superfortress known as the Enola Gay released a uranium-based bomb codenamed “Little Boy,” which detonated approximately 600 metres above Hiroshima, a Japanese city with a population of approximately 350,000. The first nuclear weapon had been dropped on human beings.

When Little Boy exploded, an intense flash of light and a searing heatwave engulfed Hiroshima. The explosion produced a massive shockwave and firestorm, reducing most of the city to ashes within seconds.

The fireball from the explosion rapidly expanded to a diameter of approximately 900 feet (274 metres), incinerating everything in its path. Within seconds, a towering mushroom cloud began to rise over the city. Temperatures at ground level soared to an unimaginable 7,000 degrees Fahrenheit (3,871 Celsius). Buildings were obliterated, fused into rubble by heat and pressure. Approximately 80,000 human lives were lost in an instant.

The Hiroshima Prefectural Industrial Promotion Hall, a government building constructed in 1915 to showcase and support local industry, commerce, and culture, is now preserved as the Hiroshima Peace Memorial (Genbaku Dome), a haunting reminder of the bomb’ s impact.

Three days later, at 3:47 a.m. on August 9, a US B-29 bomber departed from Tinian Island, initially bound for Kokura, a city known for its dense concentration of military factories and war-related infrastructure. When this target was obscured by heavy cloud cover, the crew diverted to their secondary objective — Nagasaki.

At 11:02 a.m., a plutonium-based bomb, known as "Fat Man," was dropped over the Urakami valley in northern Nagasaki, exploding at an altitude of approximately 1,650 feet (503 metres). Possessing a destructive power of about 21 kilotons, roughly 40 percent greater than the uranium bomb that devastated Hiroshima, Fat Man unleashed immense devastation. Between 40,000 and 75,000 people were killed instantly.

Today, Hiroshima and Nagasaki stand as enduring global testaments to the catastrophic human cost of nuclear warfare.

2. The Suffering Never Ends, But Justice Is Still Possible

Hibakusha, survivors of the atomic bombings of Hiroshima and Nagasaki, have had to live with charred skin, effects from the inhalation of radioactive dust, and injuries caused by collapsing buildings. Acute radiation sickness, which produced vomiting, hair loss, and internal bleeding, eventually killed many who survived the initial bombing. Since those early years, hibakusha have experienced elevated rates of leukemia, solid cancers, cataracts, and other chronic illnesses. They have also endured ongoing emotional pain and social stigma. Survivors in postwar Japan have often faced discrimination in the workplace and in social settings due to public fears about radiation sickness.

This photograph, autographed by the pilot of the Enola Gay, Paul Tibbets, shows the aftermath of the bombing of Hiroshima on August 6, 1945. *U.S. Navy Public Affairs Resources Website / Public Domain Photo*

The Atomic Bomb Casualty Commission (ABCC) was established in Hiroshima in 1947 and in Nagasaki in 1948 to investigate the long-term health effects of the bombs. In 1975, the Radiation Effects Research Foundation (RERF) was founded to succeed the ABCC and continue epidemiological and genetic research on these nuclear survivors.

The ABCC has been criticized for the methods employed in early investigations. Hibakusha were often studied without having given consent or not provided with adequate medical treatment, as the ABCC prioritized data collection over care. Many hibakusha recalled feeling like "experimental subjects"; a deep mistrust persists in survivor communities today.

This extensive, ongoing human suffering is a living testament to the moral and ethical imperatives of disarmament. Hibakusha testimony provides a moral compass in a time when geopolitical tensions are not only reigniting discussions of nuclear weapons use but playing out on new battlefields. As the war in Ukraine revives nuclear threats in Europe and new domains like outer space become sites of military competition, the need to secure disarmament grows more urgent. At the same time, with hibakusha aging and dying, the need to preserve their voices also intensifies. Remembering the victims of atomic weapons is not an act of nostalgia but of global conscience.

True remembrance demands moral responsibility and political engagement. It requires that we carry forward the lived testimonies of hibakusha as catalysts for change both within our societies and on the global stage. Their suffering is not confined to history; it reverberates through current debates on deterrence, disarmament, and nuclear modernization.

This ethos of remembrance and action is embodied by the organizations that have continued the advocacy of the hibakusha. In 2017, the Nobel Peace Prize was awarded to the International Campaign to Abolish Nuclear Weapons (ICAN), with Setsuko Thurlow, a Hiroshima survivor, one of its most powerful voices. Her testimony pierced through diplomatic discourse, reminding the world of the human costs behind legal frameworks and treaties. ICAN's work helped galvanize support for the Treaty on the Prohibition of Nuclear Weapons (TPNW), demonstrating how survivor voices can shape international law.

More recently, in 2024, the Nobel Peace Prize was awarded to Nihon Hidankyo, the Japan Confederation of A- and H-Bomb Sufferers Organizations. This recognition is not only a tribute to their decades of tireless advocacy but also an acknowledgement of their unwavering commitment to peace, justice, and global solidarity. Nihon Hidankyo has not merely preserved memory; it has transformed memory into mobilization, giving voice to the silenced and pressing governments toward accountability and abolition.

Hiroshima has taught generations of young people, the writer of this brief included, that the suffering of August 6 and 9 is much more than part of Japan's history. Those dates remain a call to cultivate the kind of critical thinking and moral courage needed to confront violence in all its forms. This commitment is not limited to disarmament but extends to building a world in which human dignity is protected and future generations are empowered to prevent atrocities before they begin.

Education is one of the most powerful tools we have, not just to preserve the testimonies of hibakusha, but to inspire action across borders. The lesson of Hiroshima and Nagasaki is ultimately a global one: that peace must be actively nurtured, sustained through dialogue, and defended through solidarity. The memory of Hiroshima and Nagasaki must not fade but live on to guide our political decisions, our institutions, and our aspirations for a more just and peaceful world.

Honours earned by survivors of atomic weapons and their supporters serve as global affirmations that remembrance alone is insufficient. We need solidarity, policy change, and moral courage to confront militarism in all its forms. As the generation of hibakusha moves off the stage, the responsibility of later generations grows. We must not only remember their stories but act on them. The future of disarmament will not be written in treaties alone, but in the choices, we make to honour their legacies.

3. Disarmament Not Achieved after 80 Years

In the 80 years since the atomic bombs were dropped, global disarmament efforts have sought to prevent the proliferation and use of nuclear weapons and to build a framework

Hiroshima survivor Setsuko Thurlow; Ray Acheson, Director of Reaching Critical Will; and then Ploughshares Executive Director Cesar Jaramillo hold a news conference in Toronto in October 2017 after it was announced that the International Campaign to Abolish Nuclear Weapons (ICAN), of which Project Ploughshares is a member, would receive the Nobel Peace Prize *ICAN photo*

for their eventual elimination. Early initiatives began at the United Nations, which was founded in 1945, with nuclear disarmament a core goal. In 1946, Resolution 1(I) was adopted by the UN General Assembly; it called for the elimination of atomic weapons and "all other major weapons adaptable to mass destruction."

The Cold War (1945-1991) saw an intense nuclear arms race between the United States and the Soviet Union (now Russia), which spurred both proliferation and disarmament initiatives. The United Kingdon conducted its first nuclear test in 1952, followed by France (1960), China (1964), Pakistan (1972), and India (1974). (Israel, which has not acknowledged its nuclear stockpile, likely began its nuclear program in 1948 or 1949. North Korea produced its first nuclear weapon after the Cold War had ended.) The number of nuclear warheads peaked at approximately 70,300 in 1986. This unprecedented buildup intensified global tensions.

The 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) became the cornerstone of global nuclear non-proliferation and disarmament architecture. The NPT was built on three pillars: preventing the spread of nuclear weapons, promoting useful uses of nuclear energy, and pursuing nuclear disarmament. Nearly every nation in the world has joined the treaty.

Even though the NPT is one of the most widely supported arms control agreements in history, little progress has been made on disarmament. It has been more successful in curbing the spread of nuclear weapons.

Subsequent treaties and agreements have sought to limit the testing, production, and deployment of nuclear weapons. The 1963 Partial Test Ban Treaty (PTBT) prohibited atmospheric, outer space, and underwater nuclear tests. The 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT), although not yet in force, aims to ban all nuclear explosions. Bilateral agreements, such as the Strategic Arms Reduction Treaty (START) between the United States and Russia, have led to significant reductions in deployed strategic nuclear arsenals.

Operating on a parallel track, members of civil society and humanitarian-focused disarmament groups, aided by hibakusha and other survivors, have become increasingly influential. Recent efforts resulted in the adoption of the Treaty on the Prohibition of Nuclear Weapons (TPNW) in 2017. The TPNW is the first legally binding international agreement to comprehensively prohibit nuclear weapons. Entering into force in 2021, it now has 94 signatories and more than 73 States Parties.

Unfortunately, none of the nine nuclear-armed states have signed or participated in the TPNW to date, nor have most of their allies. This reluctance to engage highlights their adherence to nuclear deterrence doctrines.

Today's global disarmament landscape remains fragile. Some nuclear-armed states, including the United States, Russia, and China, are investing heavily in the modernization and expansion of their nuclear arsenals. These efforts include the development of new warhead designs, hypersonic delivery systems, and lower yield "tactical" nuclear weapons that blur the line between conventional and nuclear warfare. Such modernization programs undermine disarmament commitments under the NPT and heighten the risk of a new arms race.

But even small powers can raise fears about nuclear proliferation. North Korea continues to advance its nuclear weapons and missile programs in defiance of international sanctions. The ability of Iran to create a nuclear weapon remains uncertain, despite military efforts by the United States to disable Iran's nuclear capability. Such uncertainties raise fears of further proliferation in already volatile regions.

Meanwhile, multilateral diplomacy struggles to keep pace with new security threats. The Conference on Disarmament (CD), the world's sole permanent multilateral disarmament negotiating forum, was established in 1979 and has been deadlocked for decades. Although it successfully negotiated landmark treaties in its early years, including the Chemical Weapons Conventions (1992) and the Comprehensive Nuclear-Test-Ban Treaty (1996), it has failed to agree on a work program since 1996. One of the key casualties has been the Fissile Material Cut-Off Treaty, a proposed international agreement to prohibit the further production of fissile material for nuclear weapons or other explosive devices.

4. Today's New Nuclear Dangers

Today, the nine nuclear-armed states collectively possess more than 12,500 nuclear warheads. Of these, nearly 3,900 are deployed with operational forces, and approximately

2,000 are kept on high alert, ready to launch within minutes. Although these states have agreed to global disarmament commitments, they are not reducing but modernizing and expanding their nuclear forces. The United States plans to spend an estimated $756 billion between 2023 and 2032 in nuclear upgrades. Russia continues to invest in new intercontinental ballistic missiles (ICBMs) and tactical nuclear capabilities, while China is rapidly expanding its nuclear arsenal, which is projected to exceed 1,000 warheads by 2030, up from approximately 500 now.

This nuclear buildup is taking place in an international environment in which arms control treaties are weakening. The US withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty in 2019, Russia's suspension of New START in 2023, and the continued failure of the CTBT to enter into force have created dangerous gaps in mutual verification and transparency. Furthermore, nuclear weapons are now increasingly viewed as usable in scenarios of regional or tactical conflict, dangerously lowering the threshold for use.

At the same time, as Ploughshares Senior Researcher Branka Marijan explains in "Can AI be governed?" emerging technologies such as artificial intelligence (AI), cyber warfare, and hypersonic delivery systems are introducing new layers of instability and unpredictability into already difficult strategic calculations. While proponents argue that AI can enhance accuracy and reduce human error, AI-integrated systems, including early warning, target identification, and even decision support, introduce significant risks of miscalculation under crisis conditions. Machine-learning algorithms trained on historical data may fail to accurately interpret novel or ambiguous scenarios, especially in the "fog of war," as Ploughshares Senior Researcher Jessica West notes in "Outer Space: Cloaked by a fog of peace." As Branka notes in "Agentic warfare and the role of the human," the speed at which AI operates could produce automated responses that precede any human evaluation, raising the chilling prospect of inadvertent conflict escalation.

Cyber threats further undermine nuclear stability by targeting the digital infrastructure of nuclear command, control, and communication (NC3) systems. As Jessica shows in "Bringing peace and security in outer space back down to Earth," sophisticated cyberattacks can disrupt internal military networks, corrupt targeting data, spoof satellite signals, or disable early warning systems. A cyber intrusion that is mistaken for a conventional attack or signal preparation for a first strike could prompt a pre-emptive launch. The 2021 SolarWinds cyberattack and the use of cyberattacks in the current Russia-Ukraine conflict illustrate how state and non-state actors can access and exploit vulnerabilities in critical government and defence systems.

Emerging delivery systems and defensive technologies are also amplifying instability. Hypersonic weapons, capable of traveling at speeds exceeding Mach 5 and manoeuvring mid-flight, pose yet another strategic challenge. Unlike traditional ICBMs, which follow predictable trajectories, hypersonic glide vehicles are difficult to track and intercept. Their speed drastically reduces the time — sometimes to less than five minutes — that commanders have to determine if an incoming object is conventional or nuclear.

The United States, Russia, and China are all investing heavily in hypersonic capabilities. This new high tech, coupled with the development of missile defence systems such as the US-led Golden Dome initiative, is driving a destabilizing cycle in which modernization, expanding arsenals, and technological innovation in both offensive and defensive capabilities erode established deterrence frameworks.

As nuclear risks evolve, so do the technologies proposed to address them. The Golden Dome is an ambitious hypersonic and nuclear missile defence project that includes space-based interceptors and sensors. But critics, including Ploughshares's Jessica West, warn that it could escalate an arms race in orbit, destabilize long-established mutual deterrence strategies, and divert attention from disarmament.

5. Why We Must Rid the World of Nuclear Weapons

Today's world faces a convergence of crises. A fractured international order is shaped by nuclear modernization, colonial legacies, global inequality, and a growing disregard for humanitarian law.

While progress in nuclear disarmament has stalled, nuclear-charged rhetoric has re-entered mainstream political discourse in ways not seen since the Cold War. In 2022, Russian President Vladimir Putin threatened the use of nuclear weapons during the invasion of Ukraine, a grave breach of the 1994 Budapest Memorandum, which had guaranteed Ukraine's security in exchange for Ukraine's giving up the nuclear weapons it inherited from the Soviet regime. Putin's threat triggered renewed international debates about the credibility of disarmament frameworks like the NPT. NPT Review Conferences have failed to produce a consensus final document for two consecutive cycles (2015 and 2022), exposing deep rifts between nuclear-weapon states and non-nuclear-weapon states.

Since its invasion of Ukraine in 2022, Russia has escalated nuclear rhetoric in an attempt to limit NATO involvement in the conflict. Russian officials have repeatedly warned NATO that their country is prepared to use tactical nuclear weapons. These warnings have indeed shaped NATO's calibrated response to Ukraine's requests for military aid, including the decision to avoid direct troop deployment. Instead, NATO has strengthened eastern flank defences and extended nuclear consultation mechanisms.

The memory of the atomic bombs dropped on Hiroshima and Nagasaki is increasingly invoked in new disarmament movements led by the Global South, which often focus on climate vulnerability and nuclear testing. The TPNW emerged from a coming together of civil society, humanitarian experts, and historically vulnerable communities.

In this geopolitical moment, reminders of what happened 80 years ago raise profound questions about the ethical response to security and technology. The accelerated development of AI in military command structures, the proliferation of hypersonic missiles, and cyber vulnerabilities in nuclear command-and-control systems highlight how states are embracing technological complexity without a corresponding investment in transparency,

governance, and public accountability. Meanwhile, international institutions like the CD and the UN Security Council remain gridlocked and unable to resolve crises such as those in Ukraine and Gaza.

6. Canada's Nuclear Legacy

Canada has direct and significant connections to the atomic bombs dropped on Hiroshima and Nagasaki. During the Second World War, the Manhattan Project used uranium extracted from the Northwest Territories. Much of this uranium came from the Eldorado Mine at Great Bear Lake, where members of the Déljnę Dene First Nation, unaware of the purpose or dangers of radioactive ore, carried sacks of it on their backs to canoes and sleds for transport south. They were not informed of the health risks or given any protection. For decades, the community suffered in silence. Only in 1998 did the Canadian government formally acknowledge the harm after sending a delegation to meet with Déljnę Elders. Never, however, has there been a formal apology or compensation.

Canada's uranium was refined in Port Hope, Ontario, a town that has endured long-term radioactive contamination from nuclear processing. The federal government's cleanup efforts through the Low-Level Radioactive Waste Management Office continue, but residents are still raising concerns about environmental health, intergenerational exposure, and transparency.

Canada's nuclear history is marked by both complicity and contradiction. During the Cold War, Canada hosted US nuclear weapons on its soil as agreed to in bilateral and NATO accords. Between 1964 and 1984, US tactical nuclear arms, including air-to-air rockets and gravity bombs, were stationed at Canadian military bases. These deployments were part of broader deterrence strategies tied to NORAD and NATO, but they were also deeply contested at home. By 1984, amid mounting public pressure and shifting policy priorities, all nuclear weapons had been removed from Canadian territory.

At the same time, Ottawa occasionally allowed US nuclear-powered submarines to enter Canadian Arctic waters, often under a veil of secrecy. While nuclear vessels such as the USS Seadragon navigated the Northwest Passage with tacit Canadian consent, the government stopped short of allowing permanent nuclear weapon deployment or formal oversight. This dual posture — strategic cooperation with the United States alongside public declarations of non-nuclear status — underscored Canada's attempt to balance alliance commitments with sovereignty and public opposition.

In 1987, Canada unveiled an ambitious project to build its own fleet of 10 nuclear-powered submarines, citing the need for Arctic security and independent naval capability. However, by 1989 the project had collapsed under ballooning costs, questions around nuclear stewardship, Indigenous opposition, and political hesitancy. The United States also discouraged the plan. Washington was reluctant to share sensitive nuclear propulsion technology, citing proliferation risks and the need to maintain strategic control over such capabilities. Additionally, US officials were apprehensive about Canada's asserting greater autonomy over

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Arctic waters, particularly the Northwest Passage, which the United States has long considered an international strait. In the end, the cancellation of the nuclear submarine program reflected not only fiscal concerns but a national unwillingness to engage more closely with nuclear arms.

It remains true, however, that Canada belongs to NATO and supports the option of first use of nuclear weapons by nuclear-armed NATO members. Canada has yet to sign or ratify the TPNW, claiming a need to maintain solidarity with other NATO members. However, a 2022 national poll found that 74 percent of Canadians support joining the TPNW, with especially strong support among Indigenous communities and youth.

Canadian nuclear tensions are easily seen in debates about missile-defence initiatives like the Golden Dome. While Canadian officials are weighing participation, citing benefits for Arctic security and continental protection, critics, including Ploughshares's Jessica West, point to ballooning costs and concerns that such systems may work against disarmament commitments and undermine a stable mutual deterrence environment.

Ottawa's credibility in the future will hinge on Canada's ability to integrate moral responsibility, strategic alignment, and public values into coherent nuclear policy. Required will be proactive public diplomacy, a coherent explanation of strategic nuance that satisfies Canadians, and a sustained investment in humanitarian and verification initiatives. Active participation in reshaping a NATO posture that de-emphasizes nuclear dependency might also be called for. At the same time, the Canadian government must strive to deepen ties with frontline civil society groups and survivor networks worldwide.

In this time of policy dissonance, Canadian civil society plays a critical role in connecting policy with values. Since its founding in 1976, Project Ploughshares has served as a cornerstone for Canadian nuclear disarmament advocacy. It actively fuels policy-shaping initiatives, including consultations, expert roundtables, and policy advocacy aimed at Canadian decision-makers and NATO allies.

For example, as part of the Canadian Network to Abolish Nuclear Weapons and in concert with Canadian Pugwash Group, Project Ploughshares organized a high-level "Nuclear Disarmament in Times of Unprecedented Risk" roundtable in October 2024, which generated a Five-Point Agenda for Renewed Canadian Action that explicitly urges Canada to reinvigorate its nuclear commitments, spearhead disarmament diplomacy, and work within NATO to modify security doctrines.

Moreover, Project Ploughshares has been a driving force in Canadian civil society promotion of the TPNW. It participated directly in negotiations, amplifying calls for the complete elimination of nuclear arms. Project Ploughshares continues to urge Ottawa to join the treaty and to use its leverage in NATO to press for a shift toward disarmament and away from a reliance on nuclear deterrence. In a global moment marked by rising nuclear risks and geopolitical instability, the work of Project Ploughshares remains not only relevant but essential.

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She was born and spent the first 24 years of her life in Hiroshima, where she attended Hiroshima City University, earning a master's degree in peace and conflict resolution.

She also holds a master's degree in political science from Simon Fraser University; her thesis explored nuclear waste management and safety in Canada and Japan, demonstrating how grassroots resistance can influence nuclear governance and expose the enduring threats of nuclear policy and infrastructure.

Yui supported research activities at the United Nations Institute for Training and Research (UNITAR) and has presented her research at several global forums, bringing a cross-cultural, justice-driven perspective to advancing nuclear disarmament and peace.

Project Ploughshares is a Canadian peace research institute with a focus on disarmament efforts and international security, specifically related to the arms trade, emerging military and security technologies, nuclear weapons, the protection of civilians, outer space, and the intersection of climate, peace, and security.

For more information please visit: www.ploughshares.ca.