

# The NTI Nuclear Materials Security Index

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## ABSTRACT

The Nuclear Threat Initiative (NTI) Nuclear Materials Security Index is a first-of-its-kind public benchmark assessment of nuclear materials security conditions on a country-by-country basis. The NTI Index, prepared with the Economist Intelligence Unit (EIU) and guided by an international panel of nuclear security experts, was created to catalyse an international discussion about nuclear materials security priorities, and to encourage governments to provide assurances and take actions to strengthen nuclear materials security. The project draws on NTI's nuclear expertise, the EIU's experience in constructing indices, and the reach of the EIU's global network of 900 analysts and contributors. The NTI Index can be accessed online at <[www.ntiindex.org](http://www.ntiindex.org)>.

## INTRODUCTION

The NTI Nuclear Materials Security Index is a unique public baseline assessment of the status of security conditions of weapons-usable nuclear materials around the world.<sup>1</sup> The NTI Index assesses and scores each state across a broad range of publicly available indicators of a state's nuclear materials security practices and conditions, and is a first-of-its-kind analysis because of its approach and scope. The Index is not a facility-by-facility review of "guns, guards and gates" or an on-the-ground review of materials control and accounting practices. Information about the security measures in place at specific facilities is understandably sensitive and should remain so.

Such an assessment is needed to measure risk, track progress and hold states accountable. It is also important for building international confidence in the security of the world's most dangerous materials. To that end, the Index should be considered more than simply a scorecard: it provides a foundation for the urgent and ongoing work of strengthening security. It also offers a path forward through recommendations for individual states and for the international community to keep the materials needed to build a nuclear bomb out of dangerous hands.

Weapons-usable nuclear materials today are stored at hundreds of sites in approximately 30 countries around the globe. Many of those sites are well secured. Some are not, leaving weapons-usable nuclear materials vulnerable to

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1 This inaugural NTI Index has greatly benefited from the rich analytic work provided by Matthew Bunn in his *Securing the Bomb* series, funded by NTI. The work of the International Panel on Fissile Materials has also been an indispensable resource.

theft and sale on the black market to terrorist organizations that have publicly stated their desire to use nuclear weapons.

A nuclear blast at the hands of terrorists or a rogue state would be catastrophic, and the consequences would reverberate around the globe, with tens or hundreds of thousands of casualties, disruptions to markets and commerce, long-term implications for public health and the environment, and risks to civil liberties—not to mention the cost of any response.

That is why all states with weapons-usable nuclear materials have a responsibility to account for them, to take steps to secure them, and to provide continued assurances to the rest of the world that those materials are not at risk for theft or diversion. As long as weapons-usable nuclear materials exist on this planet, securing them will require constant vigilance.

There has been progress on mitigating the threat over the past two decades, including at the innovative and ground-breaking Nuclear Security Summits. The first Summit took place in 2010, at which leaders from 47 states gathered in Washington DC and committed to take new steps to strengthen nuclear materials security. Political momentum built at the first summit was reinforced by a second summit in March 2012 in Seoul.

Although an important foundation for international dialogue on nuclear materials security was laid at the 2010 and 2012 Nuclear Security Summits, states have yet to reach a consensus on what steps matter most when it comes to securing vulnerable weapons-usable nuclear materials. Today, there is no common international system for regulating how weapons-usable nuclear materials are produced, tracked, protected and controlled, and there is no way to measure the actions states are taking to build assurance and accountability around nuclear materials security. There is also no global institution or authority with the mandate to help create and monitor such a comprehensive security system.

Although the NTI Index scores and ranks countries, it is not meant to serve merely as a rating system. It highlights how all countries can do more to improve security, and it should be used as a resource and a tool that provides a foundation for setting priorities. It also offers actionable recommendations for all states and for individual states through 176 country summaries.

To develop the Index, NTI and the EIU worked with an international panel of experts and other technical advisors to develop a broad framework for nuclear materials security. The NTI Index includes five categories comprising 18 indicators to assess the nuclear materials security conditions in 176 countries (32 with one kilogram or more of weapons-usable nuclear materials and 144 with less than one kilogram or no weapons-usable nuclear materials). Countries without weapons-usable nuclear materials are included in the Index because they too have a responsibility to not become safe havens, staging grounds or transit points for illicit nuclear activities. For the purposes of this Index, the term *weapons-usable nuclear materials* includes high-enriched uranium (HEU), separated plutonium and the plutonium content in fresh mixed-oxide fuel.<sup>2</sup> The Index does not assess security

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2 These are the materials considered to be weapons-usable for IAEA safeguards purposes.

for low-enriched uranium or the radiological materials needed to build a “dirty bomb”, although many of the improvements proposed in this report also could help prevent such an attack.

The five key factors the Index evaluated are:

- **Quantities and sites.** How much material does the state have and at how many locations?
- **Security and control measures.** What kind of protection measures are in place?
- **Global norms.** What international commitments related to materials security has the state made?
- **Domestic commitments and capacity.** What is the domestic capacity of the state to fulfil those international commitments?
- **Societal factors.** Could a given country’s societal factors—such as corruption or government instability—undermine its security commitments and practices?

Countries with weapons-usable nuclear materials were evaluated across all five categories. Countries without weapons-usable nuclear materials were evaluated across the last three. An international panel of experts convened by NTI and the EIU assigned weights to the categories and indicators to reflect the relative importance of these measures.

NTI offered briefings to all countries with weapons-usable nuclear materials (as well as the Republic of Korea, as host of the 2012 Nuclear Security Summit) and asked them to review and, if necessary, correct data drawn primarily from public and open-source information. More than half the countries engaged in the process by reviewing and validating the data in the Index as part of a process that resulted in important confirmations and corrections.

## FINDINGS

Findings developed through the process of creating the NTI Index include the following:

- **Governments are becoming more aware of the threat** posed by vulnerable weapons-usable nuclear materials and the urgent need to strengthen security.
- **There is no global consensus about what steps matter most** to achieve security and no agreed international system or globally accepted practices for regulating the production of, use of, and security requirements for weapons-usable nuclear materials.
- **A deliberate lack of transparency makes it impossible to hold states accountable** for their security responsibilities. Many details around site security are—and should be—protected. But other information, such as general approaches to providing security and broad descriptions of security regulations for nuclear facilities and materials holdings, could be made public.
- **Australia ranks first among states with weapons-usable nuclear materials** because it has reduced holdings to a small amount of materials and does well across all other categories.

- **The United Kingdom is the leader among nuclear-armed states**, with high scores on security and control measures as well as on its commitment to and follow-through on international obligations. Like most nuclear-armed states, its score is lowered because of its large inventory of weapons-usable materials held at numerous sites, both for military and civilian programmes.
- **Nearly a quarter of the states with weapons-usable nuclear materials scored poorly on Societal Factors** because of very high levels of corruption. Of those countries, several also scored poorly on the prospect of political instability over the next two years. The combination of those factors significantly increases the risk that nuclear materials might be stolen, with help from corrupt insiders or in the midst of government distraction or political chaos.
- **Stocks of weapons-usable materials continue to increase in a few countries**, making global security a difficult and moving target.
- **More states with weapons-usable materials could join those countries that already have completely eliminated their weapons-usable nuclear materials.** A large number of countries have only small amounts of materials at one or two sites, which might be converted to use non-weapons-usable fuels or shut down.
- **Many states lag on joining international agreements** aimed at tighter security; many that do join fail to implement their commitments.

## TAKING ACTION

Ensuring the security of all weapons-usable nuclear materials is a huge challenge, but it is not impossible. Because no single state can address this threat alone, all states have a responsibility to work both individually and collectively to reduce the threat. The necessary tools, technology and know-how exist. Leaders should seize the opportunity to improve stewardship of the world's most dangerous materials.

Among NTI's recommendations for the global community are the following:

### **Build the Foundation for a Global Nuclear Materials Security System**

All states must work together to build a system for tracking, protecting and managing nuclear materials in a way that builds confidence that each state is fulfilling its obligations in a responsible manner. A necessary part of developing such a system will be establishing an international entity or significantly strengthening an existing entity, such as the International Atomic Energy Agency (IAEA), to play a stronger role in developing standards, promoting best practices and conducting peer reviews.<sup>3</sup> Specific recommendations include:

- **Establish an international dialogue on priorities for materials security.** A global consensus on the highest-priority actions for robust nuclear materials security

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<sup>3</sup> Strengthening the authority and capacity of the IAEA to play a greater role in global nuclear materials security is addressed in detail in Board of Governors/General Conference, "Report of the Commission of Eminent Persons on the Future of the Agency", IAEA document GOV/2008/22-GC(52)/INF/4, 23 May 2008; see especially pp. 21–23 for recommendation on the IAEA's role in preventing nuclear terrorism.

does not yet exist. States should begin at the Nuclear Security Summit process, or some other high-level intergovernmental meeting process, to create a forum for establishing a common framework for action for securing nuclear materials globally. Establishing and prioritizing the actions needed to strengthen nuclear materials security are essential, particularly for states with limited capacity and resources.

- **Benchmark progress and hold states accountable for security.** Over the past 20 years, significant progress has been made in securing and eliminating weapons-usable nuclear materials. To track progress over time and for future accountability, however, it is critical that governments provide official and accurate inventory declarations of weapons-usable nuclear materials as well as the current status, or baseline, of their nuclear materials security conditions. The NTI Index offers an initial baseline assessment of the security conditions in countries both with and without weapons-usable nuclear materials and provides steps for improvement.
- **Build appropriate transparency to increase international confidence.** This is not a call for states to reveal so much information that they compromise national and global security interests; rather, it is a call for states to build essential international confidence in their materials security practices by providing greater access to relevant security practices. States could provide information that they are not willing to make public to the IAEA or even to other states. Without sufficient openness, it is impossible to gain confidence in how weapons-usable nuclear materials are secured globally or to track progress. Specifically:
  - **Publish nuclear security regulations and other “framework” information that provide general descriptions of security arrangements.** Currently 13 of 32 countries with weapons-usable nuclear materials publish both their regulations and an annual report.<sup>4</sup> Countries can do much better, however, and should regularly publish their security frameworks and provide access to relevant regulations.
  - **Declare inventory quantities for both HEU and plutonium.** Today, there is no requirement for a state to publicly declare its weapons-usable nuclear materials holdings for either military or civilian applications, and for those states that have done so, there is no mechanism for verifying those declarations. Nine states, however, voluntarily declare their civilian plutonium holdings to the IAEA.<sup>5</sup> In addition, the United States and the United Kingdom have declared their nuclear-weapon holdings; both also have released the production history for the HEU and plutonium in their military programmes. These examples show that governments can do more to report their inventories without compromising their national security interests. Such declarations are needed to confidently assess and track inventory trends and monitor whether inventories are growing or declining.

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4 The following states publish both regulations and an annual report: Australia, Belgium, the Czech Republic, France, India, the Netherlands, Pakistan, the Russian Federation, Sweden, Switzerland, Ukraine, the United Kingdom and the United States.

5 In keeping with the IAEA’s guidelines for the management of plutonium (Information Circular 549), the following states voluntarily declare their civilian plutonium holdings to the IAEA: Belgium, China, France, Germany, Japan, the Russian Federation, Switzerland, the United Kingdom and the United States.

- **Make regular “peer reviews” the norm for sites holding HEU and plutonium.** International peer review is a powerful mechanism for ensuring good security performance. As has been done with safety, peer reviews for security should be established as a regular process, with each state committed to inviting peer reviews commensurate with the nature and scale of its nuclear activities. To the extent compatible with protecting sensitive information, the peer review process should be transparent, with states reporting on what reviews were undertaken and whether recommendations were followed.

## **Improve Individual State Stewardship of Nuclear Materials**

Although all states should cooperate in the types of activities proposed above, a number of key measures can and should be taken on an urgent basis by individual states as applicable. Listed here are those additional measures:

- **Stop increasing stocks of weapons-usable materials.** All states that produce these materials should stop increasing their overall stocks and, over time, all states that hold weapons-usable nuclear materials should reduce their stocks to the lowest possible levels commensurate with civilian energy or scientific needs.
- **Eliminate weapons-usable nuclear materials completely in as many states as possible.** Currently more than a third of the 32 states with weapons-usable materials have less than 100kg, and many may be good candidates to eliminate their stocks over the next few years.
- **Strengthen security and control measures,** including physical protection, control and accounting, and personnel measures at facilities and during transport of nuclear materials. Today there is no agreed global baseline defining what minimum security and control measures should be put in place at all sites with HEU and plutonium. All sites with these materials should be protected to a defined minimum level. States also should routinely test their security arrangements, particularly if there are challenging societal factors that could undermine security.
- **Bring all civil uranium enrichment and reprocessing facilities under IAEA safeguards.** The international community should work to establish that the system of safeguards for enrichment and reprocessing facilities and weapons-usable nuclear materials also applies to such facilities and materials in civilian use in all nuclear-armed states. It would also build international confidence in the security conditions of those facilities and establish the principle that civilian facilities, whether in nuclear-weapon states or non-nuclear-weapon states, need to play by the same rules.
- **Target assistance to states with urgent needs.** Matching countries with urgent needs with those countries able to provide assistance is critical to strengthen nuclear materials worldwide. For those and other countries wishing to provide assistance, the NTI Index should be used to more effectively target financial and other forms of assistance.

- **Ratify and implement negotiated treaties**, including the International Convention on the Suppression of Acts of Nuclear Terrorism and the Convention on the Physical Protection of Nuclear Material, as well as its 2005 Amendment. All countries should redouble their efforts not only to join international agreements, but also to realize full implementation.

## LOOKING AHEAD

Poorly secured weapons-usable nuclear materials pose a risk to everyone, everywhere, with potential consequences that can best be described as catastrophic: a crude nuclear bomb, assembled by terrorists, could destroy the heart of a city and significantly undermine markets and commerce, public health and the environment, and civil liberties around the globe.

No single state can address this threat alone—all states have a responsibility to work both individually and collectively to help reduce this threat.

Although the challenge of ensuring the security of all weapons-usable nuclear materials is great, it is not impossible. The tools, technology and know-how needed to address these dangers exist. As with most truly global challenges, building the political will for action is paramount.

Since the release of the Index in January 2012, governments have started to use the Index as a resource. For example, shortly after the official launch of the Index, one government shared with NTI the reforms it is undertaking to address deficits captured by the Index. Other governments are keen to use the Index as a tool to inform others about what they do, how best to help others and how to move towards a consensus on priorities. The Index has also prompted important debate on the role of transparency and societal factors in materials security.

Discussions with governments and experts have reinforced the importance of publishing a second version of the Index so that progress can be assessed. NTI currently plans to do this in early 2014, in advance of the 2014 Nuclear Security Summit. The second assessment will incorporate feedback to refine the framework for the Index and update the Index data to reflect recent improvements in materials security.

Progress has been made on nuclear materials security, but the threat remains. The NTI Index identifies steps all states can take to improve security and provide greater assurances to their neighbours and to the international community that their materials are not at risk and that their territory cannot be used for illicit activities that endanger us all.

Most importantly, states must work together to build the foundation for a global system for tracking, protecting and managing nuclear materials in a way that builds confidence that each state is fulfilling its obligations.

# UNIDIR RESOURCES

## About UNIDIR

The United Nations Institute for Disarmament Research (UNIDIR)—an autonomous institute within the United Nations—conducts research on disarmament and security. UNIDIR is based in Geneva, Switzerland, the centre for bilateral and multilateral disarmament and non-proliferation negotiations, and home of the Conference on Disarmament. The Institute explores current issues pertaining to the variety of existing and future armaments, as well as global diplomacy and local tensions and conflicts. Working with researchers, diplomats, government officials, NGOs and other institutions since 1980, UNIDIR acts as a bridge between the research community and governments. UNIDIR's activities are funded by contributions from governments and donor foundations.