NTI
BUILDING A SAFER WORLD

JANUARY 2014

NTI Nuclear Materials SECURITY INDEX

Building a Framework for Assurance, Accountability, and Action

SECOND EDITION

Index developed with
The Economist Intelligence Unit

THE 2014 NTI NUCLEAR MATERIALS SECURITY INDEX

The 2014 Nuclear Threat Initiative (NTI) Nuclear Materials Security Index is the second edition of a first-of-its-kind public assessment of nuclear materials security conditions around the world. Developed with the Economist Intelligence Unit (EIU), the NTI Index was created (a) to assess the security of weapons-usable nuclear materials around the world and (b) to encourage governments to take actions and provide assurances about the security of the world's deadliest materials. It has sparked international discussions about priorities required to strengthen security.

The NTI Index draws on NTI's nuclear expertise, the EIU's experience in constructing indices, and the reach of the EIU's global network of hundreds of analysts and contributors. NTI—together with an international panel of nuclear security experts and a number of technical advisors—developed the framework and priorities that define effective nuclear materials security conditions. The EIU was responsible for developing the analytic model and gathering the data.

The NTI Index assesses the contributions of 25 states with one kilogram or more of weapons-usable nuclear materials toward improved global nuclear materials security conditions. It assesses states in five categories: (a) Quantities and Sites, (b) Security and Control Measures, (c) Global Norms, (d) Domestic Commitments and Capacity, and (e) Risk Environment. An additional 151 states, with less than one kilogram of weapons-usable nuclear materials or none at all, are assessed on the final three of these categories. The NTI Index is presented in three ways:

- The **print report**, which contains NTI observations and recommendations, a complete discussion of the EIU methodology, selected data, and country profiles
- The website, **www.ntiindex.org**, which shows high-level results in an easily accessible format, including all country summaries
- A **downloadable version of the 2014 NTI Index**, which is available through the website and shows detailed results and data and provides extended interactive features in an Excel format

This initiative is led by Page Stoutland, NTI Vice President, and Samantha Pitts-Kiefer, Senior Program Officer, Nuclear Materials Security Program.

NTI Nuclear Materials
SECURITY INDEX

Building a Framework for Assurance, Accountability, and Action

SECOND EDITION

JANUARY 2014

Index developed with

Photo Credits

On the cover (large, then left to right):
National flags © teekid/Getty Images
Removal of fresh HEU from Ukraine, 2010 © NNSA
2012 Nuclear Security Summit © Associated Press
Radioactive sign © Ralph Lee Hopkins/Getty Images
Soldiers in protective suits © Stocktrek Images/Getty Images
Ukraine HEU removal, 2012 © NNSA

Inside:
page 3: Barrels from nuclear research reactor, Vinca © IAEA
page 4: Kaveh Sardari
page 6: Radioactive sign © Ralph Lee Hopkins/Getty Images
page 8: © NNSA
page 14 (left and middle): 2010 Nuclear Security Summit © iStock; 2012 Nuclear Security Summit © IAEA
page 17: Globe © Tetra Images/Getty Images
page 32: 2010 Nuclear Security Summit © Associated Press
page 35: Kaveh Sardari
page 38: Kaveh Sardari
page 40: © NNSA
page 41 (left to right): Belgian parliament © Jan Kranendonk/Dreamstime.com;
Chalk River, Ontario © Associated Press; Sign © Yuriko Nakao/Reuters
page 48: National flags © teekid/Getty Images
page 54: Sunrise © iStock
page 55: Kaveh Sardari

Print Report Design

HDN Studio, Alexandria, VA

CONTENTS

Acknowledgments 2

Foreword 3

Executive Summary 6

Maps and Results Tables 17

Why an Index 32

Developing the Index 35

Observations 40

Recommendations 48

Looking Ahead 54

APPENDICES

Economist Intelligence Unit Methodology 56

Summary 56

Scoring Criteria and Categories 58

Index Constraints and Other Important Factors 62

Methodology 63

Comparison between the 2012 NTI Index and the 2014 NTI Index 75

Research behind Selected Indicators 79

Sources and Definitions of Indicators 85

Select Bibliography 106

About the International Panel of Experts 108

About NTI and the EIU 110

Selected Country Summaries 111

Resources for Countries 137

Glossary 139

ACKNOWLEDGMENTS

With the release of the inaugural edition of the Nuclear Threat Initiative's Nuclear Materials Security Index (NTI Index) in January 2012, NTI committed to updating and improving the NTI Index as a tool for governments and experts. Developing a second edition that continues to provide robust objective analysis was challenging in many ways, and the 2014 NTI Index could not have been successfully completed without the contributions of many.

We are grateful to NTI Co-Chairman and Chief Executive Officer Sam Nunn for his thought leadership on the need for a global assessment of and accountability for nuclear materials security conditions and to NTI President Joan Rohlfing for her strategic vision on how best to meet that need. As with the first edition of the NTI Index, NTI partnered with the Economist Intelligence Unit (EIU), and we are grateful for that organization's analytic support. Leo Abruzzese, EIU Director of Global Forecasting and Executive Editor, Americas; Hilary Ewing, EIU Research Manager; and Katherine Stewart, EIU Research Associate, were indispensable as the EIU's team and network of analysts researched this challenging topic.

Achieving the central aims of this project—initiating an international dialogue on priorities, tracking progress, and holding states accountable for their security—as well as our commitment to continually improving the NTI Index would not have been possible without our international panel. Those highly respected experts have been extremely generous with their time, and we have done our best to ensure that this project reflects their collective wisdom.

We also appreciate the many officials and experts from around the world who participated in briefings and provided critical insights that resulted in many important improvements to this second edition. They included government officials who reviewed and commented on the data gathered by the EIU, as well as many others with whom we consulted.

We would like to thank members of the NTI Board of Directors for their ongoing support and especially convey our thanks to NTI's generous funders, including Warren Buffett, George Russell, NTI Co-Chairman Ted Turner, the John D. and Catherine T. MacArthur Foundation, the Peter G. Peterson Foundation, and the Carnegie Corporation of New York.

Finally, we are indebted to our colleagues at NTI. In particular, we thank Deepti Choubey, Mimi Hall, Corey Hinderstein, Carmen MacDougall, and Deborah Rosenblum. We also are grateful to NTI's Michelle Nalabandian, Catherine Crary, Elise Rowan, and Jessica Bufford, Herbert Scoville Jr. Peace Fellow, for their overall support of the project.

Page Stoutland, Ph.D.
Vice President, Nuclear Materials Security Program
Nuclear Threat Initiative

Samantha Pitts-Kiefer
Senior Program Officer, Nuclear Materials Security Program
Nuclear Threat Initiative

FOREWORD

By Sam Nunn, NTI Co-Chairman

World leaders at the third Nuclear Security Summit in the Netherlands in March 2014 can point to measurable progress toward the goal of reducing and securing the materials needed to build a nuclear bomb. Seven more states have removed all or most of these dangerous materials from their territories since the beginning of 2012; more than a dozen others have taken important new steps to reduce quantities and to better secure the materials they hold.

That progress in securing weapons-usable nuclear materials is measured here in the second edition of the NTI Nuclear Materials Security Index.

The good news, however, is tempered by the challenges ahead. The past two Nuclear Security Summits have put an essential spotlight on the issue of nuclear materials security, but the steps that governments have taken are not yet enough in the face of a threat that has changed fundamentally from the days of the Cold War.

Today, nearly 2,000 metric tons of weapons-usable nuclear materials remain spread across hundreds of sites around the globe—some of it poorly secured. We know that to get the materials needed to build a bomb, terrorists will not necessarily go where there is the most material; they will go where the material is most vulnerable. We also know that nation–states no longer have a monopoly on the knowledge and ability to build and use nuclear bombs, so the path to a terrorist bomb is not hard to imagine.

Today, nearly 2,000 metric tons of weapons-usable nuclear materials remain spread across hundreds of sites around the globe—some of it poorly secured.

Meanwhile, the international community is still not effectively organized to protect the world from catastrophic terrorism—despite grave concerns about the spread of these materials and the knowledge that groups such as al Qaeda are seeking weapons of mass destruction. In the face of this evolving threat, leaders must ask: What's to

New Study Ranks Countries on Security of Materials That Fuel Nuclear

The inaugural edition of the NTI Index, released in January 2012, helped spark international discussions about priorities required to strengthen nuclear security. Pulitzer Prize-winning journalist David Hoffman called it "a very open attempt to hold all countries up to the same yardstick. … The value of such an index is that it can serve as a public early warning system."

stop terrorists from using a nuclear weapon if they get the material to make one? Where is the deterrence when there is no return address?

The strengths and shortfalls in global nuclear materials security are catalogued in this new edition of the NTI Index, and NTI recommends actions that governments should take both individually and collectively to improve that security.

The need for urgent action is clear. Today's threats are dynamic. The response must be as well.

The positive steps taken so far do help make the world safer. At the same time, global nuclear security is only as strong as the weakest link in the chain—and that makes it imperative that sovereign states exercise their own responsibility in the context of global cooperation.

One of the unmet challenges for preventing nuclear terrorism is the development of an effective global system for how nuclear materials should be secured. In the absence of such a system, states use a wide variety of practices. Some are strong and others are weak, but overall security practices are uneven, and there is no effective process to assess nuclear security globally, to recommend course corrections, or to hold states accountable—even though one weak link in the chain can harm us all.

This disturbing lack of an effective system for security standards and practices around the world's most dangerous materials stands in contrast to the strict standards in place in other high-risk global enterprises, such as aviation, where public safety and security are at stake. To protect their citizens' safety and security, states can deny landing rights to airlines that don't follow international aviation standards and recommended best practices. Yet with weapons-usable nuclear materials, where poor security can lead to a nuclear catastrophe with global consequences, there is no shared system of standards, assurance, or accountability.

The world must develop a nuclear materials security system that will cover all materials, that will employ international standards and best practices, and that will reduce risks by reducing weapons-usable nuclear material stocks and the number of locations where they are found.

Global nuclear security is only as strong as the weakest link in the chain—and that makes it imperative that sovereign states exercise their own responsibility in the context of global cooperation.

The system must also encourage and help states provide assurances to one another, such as inviting peer reviews using outside experts, to demonstrate that effective security is in place.

As the United States and Russia have understood for more than 20 years—since the Cooperative Threat Reduction program was developed after the breakup of the Soviet Union—securing and eliminating materials of mass destruction requires cooperation. It is a security win–win for all nations.

As governments work to protect the world from those who seek to inflict unthinkable suffering and havoc, we hope the 2014 NTI Index will be a valuable resource. Following the release of the first edition in 2012, we sought feedback from countries about what we got right and how we could make improvements. We took that feedback seriously and made changes to this year's edition. We look forward to receiving feedback once more. This Index should be looked on as a tool for improvement, not a perfect scorecard.

The Netherlands summit will create an excellent opportunity for leaders to think anew about these challenges and to provide critical guidance that can lead to significant improvements in how we secure these dangerous materials. We are optimistic that it can be done. We must not let inertia or the scale of the challenge prevent progress. Events in Syria demonstrate vividly the threats posed by weapons of mass destruction and the importance of nations cooperating to minimize the threat.

If the world is serious about preventing nuclear terrorism, it must also become serious about giving the International Atomic Energy Agency the funding and authority to do the job—or leaders must find effective alternative approaches to fill the large gaps in global security.

It is the duty of governments to reduce the risks that pose a threat to humanity and to God's universe. Citizens must demand it, and leaders must answer the call.

The day after a nuclear catastrophe, citizens and leaders alike would be asking what we should have done to prevent it. I continue to ask the question: Why aren't we doing it now?

Sam Nunn
Co-Chairman and Chief Executive Officer
Nuclear Threat Initiative

EXECUTIVE SUMMARY

"Over a hundred incidents of thefts and other unauthorized activities involving nuclear and radioactive material are reported to the [IAEA] every year."

—Director General Yukiya Amano of the International Atomic Energy Agency

When Director General Yukiya Amano of the International Atomic Energy Agency (IAEA) made that chilling disclosure in July 2013, he highlighted one of the most important challenges facing governments today: securing the materials that can be used to build a nuclear bomb against those who are seeking weapons of mass destruction.

Today, nearly 2,000 metric tons of weapons-usable nuclear materials (highly enriched uranium, separated plutonium, and the plutonium content in mixed oxide fuel) are stored at hundreds of sites around the world; some of those materials are poorly secured and are vulnerable to theft or sale on the black market. Couple those facts with the knowledge that terrorist organizations have plainly stated their desire to use nuclear weapons, and the situation is very dangerous. It doesn't take much material—enough highly enriched uranium to fill a five-pound bag of sugar or a quantity of plutonium the size of a grapefruit—to build a nuclear weapon. The result of a nuclear blast at the hands of terrorists or a rogue state would be catastrophic—with dire consequences that would stretch across the globe for economies, commerce, militaries, public health, the environment, civil liberties, and the stability of governments.

Solutions are being discussed at the head-of-state level through a series of biennial Nuclear Security Summits. On the eve of the 2014 Nuclear Security Summit in the Netherlands, world leaders can claim significant progress in addressing the threat. Since the beginning of 2012, seven states have removed all or most of the weapons-usable nuclear materials from their territories, bringing the number of states with one kilogram or more of weapons-usable nuclear materials down to 25, an impressive 22 percent reduction.[1]

[1] The one-kilogram threshold was selected taking into account IAEA INFCIRC 225, Rev. 5, which states that quantities greater than one kilogram of highly enriched uranium should be afforded higher levels of protection.

That progress is captured here in the 2014 NTI Nuclear Materials Security Index (NTI Index), the second edition of a first-of-its-kind public assessment of nuclear materials security conditions around the world.

The NTI Index reveals positive developments in a host of countries, reflected in their improved scores, when it comes (a) to decreasing quantities of materials; (b) to strengthening physical protection measures; and (c) to passing new domestic laws and regulations aimed at better securing materials at facilities and during transport, which is when materials are most vulnerable to theft. Those are all solid moves in the right direction, but the third summit in the Netherlands should do more than just incrementally build on that progress.

Much work remains to be done. Despite progress since 2012, there is still no effective global system for how nuclear materials should be secured. For example, there are no common international standards and practices for nuclear materials security, no governing body with the necessary mandate and the resources to provide sufficient oversight, and no mechanism for holding states accountable for lax security procedures. Importantly, the IAEA, which has a crucial role through its "safeguards" program in verifying that nuclear materials are not diverted from peaceful use to nuclear weapons, is limited by both the scope of its mandate and the size of its budget.

In the absence of an effective global system, approaches to nuclear security vary widely among states, thereby creating dangerous weak links in a world where terrorists are seeking the easiest path to weapons-usable nuclear materials. The following are two examples of such varying approaches:

- Most states with weapons-usable nuclear materials require facilities to have their own armed guards on site to protect against attack, but others would have to call local police or military units if they came under attack—and then wait and hope.
- Some countries require operators of facilities with weapons-usable nuclear materials to address the risk of insider threats when they design their security systems. Others do not.

ABOUT THE NTI INDEX

The 2014 NTI Nuclear Materials Security Index is the second edition of a first-of-its-kind public assessment of nuclear materials security conditions around the world. Built on robust data, the NTI Index serves as a framework for setting priorities for nuclear materials security, and it highlights what all countries can do to continuously improve security.

To develop the NTI Index, NTI and the Economist Intelligence Unit worked with an International Panel of Experts and other technical advisors to develop a broad framework for nuclear materials security. (The role and members of the International Panel of Experts are fully detailed in the appendix.) Using publicly available information, the NTI Index assesses two sets of states—those with one kilogram or more of weapons-usable nuclear materials and those with less than one kilogram of or no weapons-usable nuclear materials—across a range of indicators of a state's nuclear materials security practices and conditions. Countries without weapons-usable nuclear materials are included in the NTI Index because they, too, have a responsibility not to become safe havens, staging grounds, or transit points for illicit nuclear activities.

The NTI Index covers only measures related to the potential theft of weapons-usable nuclear materials while in use, storage, or transport. For purposes of the NTI Index, the term "weapons-usable nuclear materials" includes highly enriched uranium (HEU), separated plutonium, and the plutonium content in fresh mixed oxide fuel. The NTI Index does not assess security for low-enriched uranium or the radiological materials needed to build a "dirty bomb," the threat of sabotage of nuclear facilities, proliferation risks, or disarmament. All of those areas are critical and must also be addressed by governments.

NOTES: NTI recognizes that some states may have gram quantities of weapons-usable nuclear materials in multiple locations which, added together, may bring totals to more than one kilogram. For the purposes of the NTI Index and the need to rely on publicly available information, those states are grouped with states that have no weapons-usable nuclear materials.

Seven countries have removed all or most of their weapons-usable nuclear materials from their territories since the beginning of 2012. More than a dozen others have taken important new steps to reduce quantities and to better secure the materials they hold. Clean-out operations in Hungary, Vietnam, and the Czech Republic are shown above.

Although several important elements for guiding states' nuclear security practices do exist, those elements fall far short of what is needed. In particular, the international legal agreement for securing nuclear materials—the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment[2]—does not define standards or best practices. Nor do guidelines for nuclear materials security issued by the International Atomic Energy Agency.[3] Standards imply obligations, but most states take the IAEA guidelines as mere suggestions, not as requirements. In addition, the legal agreements and the guidelines cover only 15 percent of weapons-usable nuclear materials: those used in civilian programs. The remaining 85 percent of materials are categorized as military or non-civilian and are not subject even to those limited practices.

This disturbing lack of an effective global system for nuclear materials security—one in which states would take reassuring actions to inspire confidence in the security of their materials and would hold each other accountable for their actions—stands in stark contrast to other high-risk global enterprises. In aviation, states set standards for airline safety and security through the International Civil Aviation Organization, which then audits state implementation of the standards and shares security concerns with member states. If airlines don't meet the civil aviation standards, states can act in the interest of the security and safety of their citizens by prohibiting those airlines from landing at their airports. Given the devastating global consequences of a nuclear catastrophe, states should adopt a similarly cooperative and stringent system for nuclear materials security.

The world needs a global nuclear materials security system that will cover all materials, that will employ international standards and best practices, and that will reduce risks by reducing weapons-usable nuclear material stocks and the number of locations where they are found. The system must also encourage and help states provide one another assurances, such as by inviting peer reviews using outside experts, to demonstrate that effective security is in place.

Leaders should use the opportunity of the 2014 Nuclear Security Summit in the Netherlands to work toward consensus on the key principles of a global nuclear security system.

In addition to tracking progress about nuclear materials security conditions, the 2014 NTI Index offers both country-specific recommendations and actions for governments to take to build a truly global system to secure all weapons-usable nuclear materials.

[2] The CPPNM requires states to apply physical protection measures to nuclear materials in international transit. The 2005 Amendment to the CPPNM significantly expands the convention's scope to include material in use, in storage, and in domestic as well as international transit. Because not enough parties to the CPPNM have become parties to the 2005 Amendment, it has not yet entered into force.

[3] In addition, United Nations Security Council Resolution (UNSCR) 1540 obligates states to maintain "appropriate effective measures" to account for, secure, and provide physical protection for nuclear weapons and related material. However, it does not provide specific guidance or define standards or practices detailing how states must implement those obligations.

HOW THE NTI INDEX MEASURES NUCLEAR SECURITY CONDITIONS

The NTI Index assessed countries with weapons-usable nuclear materials based on five categories. Countries without materials were assessed on three categories.

KEY

Countries with weapons-usable nuclear materials

Countries without weapons-usable nuclear materials

* This indicator does not apply to countries without nuclear materials.

Note: For information about data sources used for scoring, see the EIU methodology in the appendix.

VAST MAJORITY OF WEAPONS-USABLE NUCLEAR MATERIALS ARE OUTSIDE INTERNATIONAL NUCLEAR SECURITY MECHANISMS

About 85 percent of the global stocks of weapons-usable nuclear materials are outside civilian programs.

Those weapons-usable nuclear materials include the vast majority of highly enriched uranium and about half the total amount of separated plutonium in the world, and are located in nine nuclear-armed states. Because the materials are categorized as military or non-civilian, they are not subject to the International Atomic Energy Agency's guidelines or to the Convention on the Physical Protection of Nuclear Material and its 2005 Amendment, which apply only to civilian materials. If the world is to gain confidence in the security of such materials, they must be subject to best-practice exchanges, information sharing, peer review, or other voluntary mechanisms.

A truly comprehensive global nuclear security system would include all weapons-usable nuclear materials, not just the 15 percent in civilian programs.

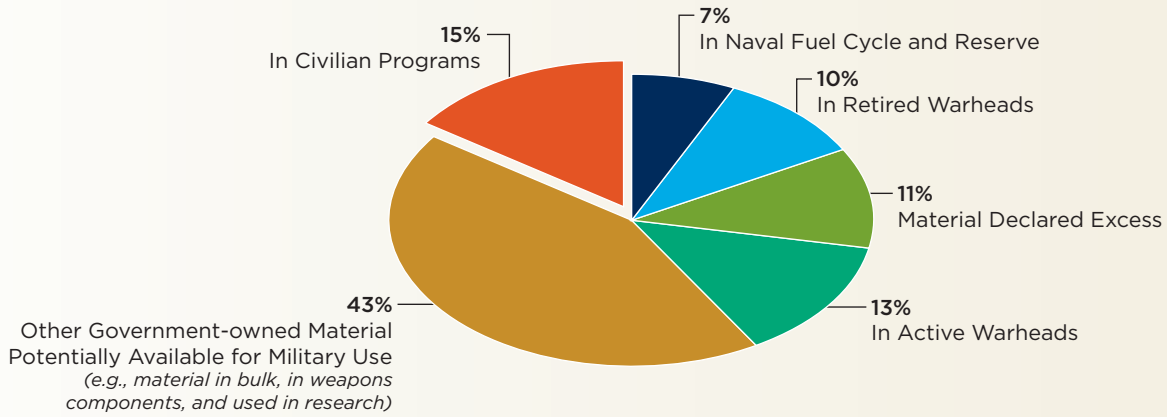
What Is Military or Other Non-Civilian Material?

Material categorized as military or non-civilian is diverse and can be found in different forms, at different facilities, and for different uses. Most is located in the United States and Russia.

Many believe that military and other non-civilian materials are under military protection, and they assume that such materials are better protected than are those in civilian programs. However, that assumption is not necessarily the case. For example, in the United States, some of that material is in the custody of the U.S. Department of Energy and is protected by civilian security contractors. Even material under military control is not perfectly secured, and measures can be improved.

Certain incidents—such as the serious security breach at the HEU storage facility at the Y-12 National Security Complex in Oak Ridge, Tennessee, and the removal of the deputy commander of the U.S. Strategic Command, which oversees all U.S. nuclear weapons, because of gambling-related allegations that called into question his reliability—

WEAPONS-USABLE NUCLEAR MATERIALS GLOBALLY



In 2011, the total weapons-usable nuclear material inventory was estimated at 1,440 metric tons of HEU and 495 metric tons of separated plutonium (IPFM). Of this, 1,400 metric tons of HEU and 240 metric tons of plutonium were estimated to be outside of civilian programs. The estimated range of uncertainty regarding the total quantity of materials was ±140 metric tons.

suggest that it is dangerous and inappropriate to take the security of those materials for granted. Insider and outsider threats are real for those material inventories.

The Summit Process

The 2010 and 2012 Nuclear Security Summits reaffirmed the "fundamental responsibility of states … to maintain effective security of all nuclear materials, which includes nuclear materials used in nuclear weapons, and nuclear facilities under their control." This NTI Index report recommends that leaders at the 2014 summit act on this statement and begin to explore mechanisms to provide greater confidence about the security of military or non-civilian materials. There is clearly a need to protect sensitive information about such material. The United States and Russia have developed some limited but important models for assurances that could provide a template for how other nuclear-armed states could provide confidence in the security of their military or other non-civilian materials.

How the NTI Index Accounts for Those Materials

The NTI Index includes all weapons-usable nuclear materials and does not distinguish the 85 percent in military or other non-civilian use from the 15 percent of material in civilian use. However, the Economist Intelligence Unit (EIU) uses different measures, proxies, or assumptions when assessing the security of military or non-civilian material because of the lack of public information about this category. For more information on such assumptions, see the EIU Methodology appendix.

SOURCES: International Panel on Fissile Materials, *Global Fissile Material Report 2011: Nuclear Weapon and Fissile Material Stockpiles and Production*, 6th ed. (Princeton, NJ: IPFM, 2012), 2-3; *Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament*, 7th ed. (Princeton, NJ: IPFM), 2013, 2-3, 8-18.

OBSERVATIONS

Key Trends

States are making progress in securing materials and strengthening global security. Since the beginning of 2012, 7 states—Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam—have removed all or most of their weapons-usable nuclear materials, according to the U.S. National Nuclear Security Administration. In addition, 13 other states have decreased their quantities of materials over the most recent four-year period measured by the NTI Index; 6 states have strengthened physical protection measures and the ability to mitigate the insider threat (i.e., the risk that personnel with authorized access to materials could perform acts of theft and potentially aid terrorists or criminals); 3 states have updated regulations for transporting materials; 7 states have signed or ratified key international legal agreements; and 4 states have made new voluntary commitments that support global efforts to improve security.

Nuclear Security Summits are having an impact. At the 2010 and 2012 summits, many states with weapons-usable nuclear materials committed to decreasing their quantities, to ratifying relevant treaties, or to taking other actions. Twelve specific score improvements in eight states captured in the NTI Index were a direct result of those summit commitments.

Global stocks of weapons-usable nuclear materials are decreasing overall, but some states are still increasing their stocks. Despite the reduction of nuclear materials in 13 states, 4 states have increased their stocks of weapons-usable nuclear materials during the most recent four-year period measured by the NTI Index. Japan and the United Kingdom have increased quantities in their civilian sectors; India and Pakistan have increased quantities for both civilian and military purposes. North Korea has also taken new steps necessary to produce new weapons-usable nuclear materials, which may increase its quantities in future editions of the NTI Index.

Eight states improved their physical protection, control, and accounting measures, including through regulations on on-site physical protection, control and accounting procedures, insider threat prevention, and physical security during transport when materials are most vulnerable.

States with no weapons-usable nuclear materials or with less than one kilogram are supporting global norms and implementing international commitments. For example, 22 more of these states became parties to key international legal agreements on nuclear security since research for the 2012 NTI Index ended in September 2011, and 18 states made new voluntary commitments, including opening Centers of Excellence or Nuclear Security Training and Support Centers that provide nuclear security training.

Country Highlights

Australia again ranks first among 25 states with weapons-usable nuclear materials, scoring well across all five categories and demonstrating that all states can do more to improve. Australia increased its score from 2012 by reducing its quantities of materials and ratifying a key international legal agreement that commits states to criminalize acts of nuclear terrorism and promotes information sharing and cooperation among countries on investigations and extraditions (the International Convention for the Suppression of Acts of Nuclear Terrorism, ICSANT).

Belgium, Canada, and Japan are the most improved states. Belgium passed new nuclear security legislation, became party to an international legal agreement, and began decreasing its nuclear materials as a result of its decision to phase out nuclear energy production. Canada incorporated into its national regulations the new IAEA guidelines regarding the transport of nuclear materials, and it ratified two international legal agreements. After the Fukushima disaster, Japan took a host of important steps that addressed both safety and security. Most significantly, the country formed a new independent regulatory agency to address nuclear safety and security, and it improved measures to address the insider threat.

Among nuclear-armed states, Pakistan is most improved through a series of steps to update nuclear security regulations and to implement best practices, though it ranks 22nd overall. France, the United Kingdom, and the United States lead the nuclear-armed states in scoring, with France tied for 7th with the Netherlands, and the United Kingdom and the United States tied for 11th.

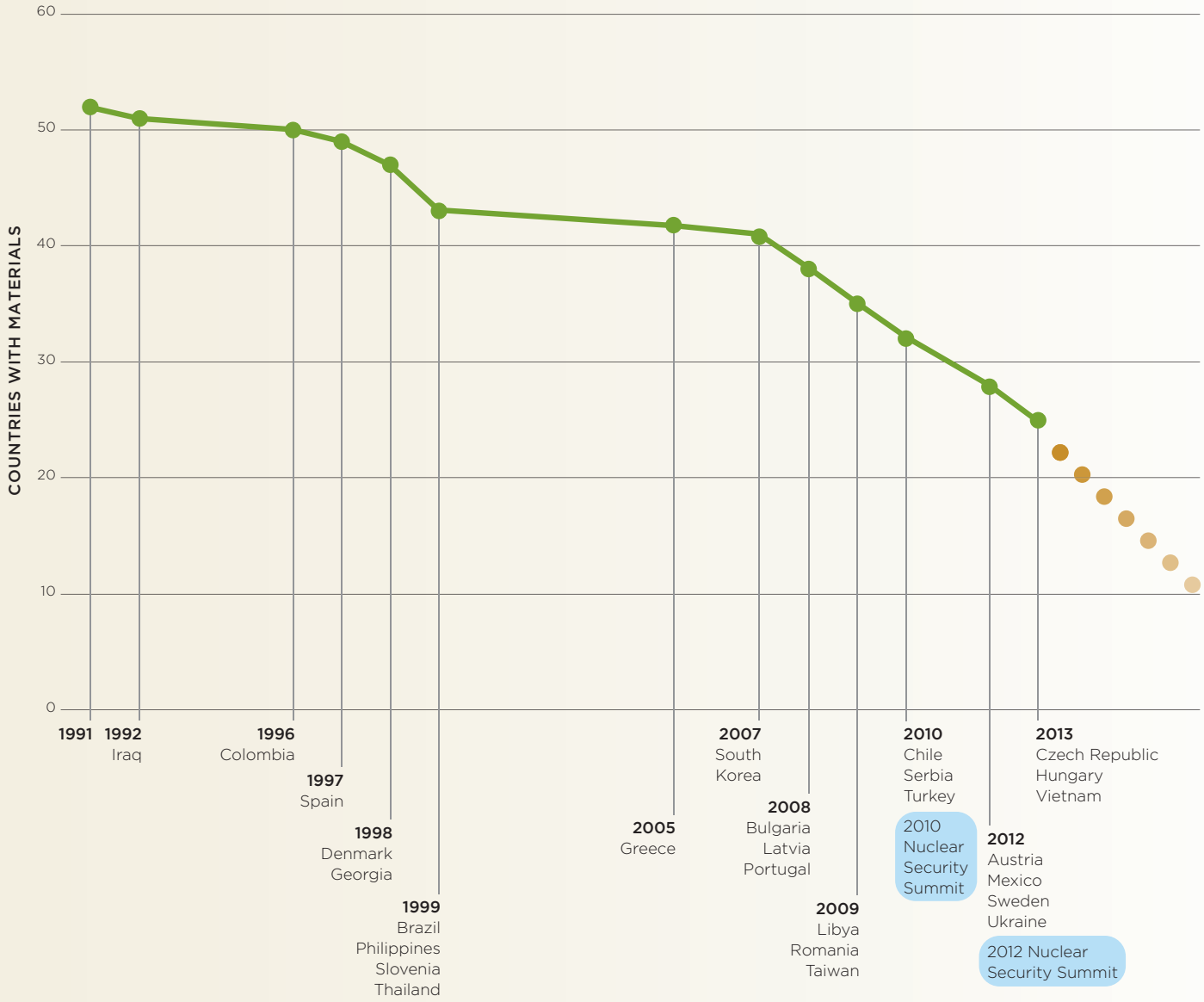
SEVEN STATES REMOVE WEAPONS-USABLE NUCLEAR MATERIALS

Since the release of the 2012 NTI Index, seven states—Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam—have removed all or most of the stocks of weapons-usable nuclear materials from their territories, according to the U.S. National Nuclear Security Administration. In doing so, they have taken the most important step a state can take toward ensuring that terrorists cannot gain access to the materials needed to build a nuclear bomb. As a result, the number of states with one kilogram or more of weapons-usable nuclear materials is now 25, down from 32 when the 2012 NTI Index was released.

In addition, the 2014 NTI Index shows that 13 states that still have one kilogram or more of weapons-usable nuclear materials decreased their stocks in the most recent four-year period measured by the NTI Index. Three of them are nuclear-weapons states: France, Russia, and the United States. Italy has also committed to removing all weapons-usable nuclear materials from its territory by the 2014 Nuclear Security Summit, although it had not yet done so when data gathering was completed for the 2014 NTI Index on November 1, 2013.

Such positive developments are part of a larger story of progress going back more than two decades. Since 1992, a total of 26 states plus Taiwan have removed all or most of their stocks of weapons-usable nuclear materials. Even more states, as noted earlier, are reducing their stocks. Several past and ongoing initiatives have assisted and continue to assist states in reducing or eliminating this material from their territories. Those efforts include one or more of the following activities: converting research reactors from the use of HEU to low-enriched uranium (LEU), shutting down HEU-fueled research reactors, “downblending” (or transforming) HEU to LEU, removing weapons-usable nuclear materials, or otherwise minimizing the use of HEU for civilian purposes. The weapons-usable nuclear materials that are removed from states are sent to the United States or Russia.

HISTORY OF STATES ELIMINATING WEAPONS-USABLE NUCLEAR MATERIALS



Efforts to eliminate all weapons-usable nuclear material began in 1992 when the United Nations Special Commission removed all HEU from Iraq after the Gulf War.

Much of the recent progress is the result of high-level attention to nuclear security brought about by the Nuclear Security Summits. Scientific and technological developments over many years have also made such choices more available to more states.

The graph above illustrates how the number of states with weapons-usable nuclear materials has decreased.

SOURCES: *Global Fissile Material Report 2013*; Michelle Cann, Kelsey Davenport, and Margaret Balza, *The Nuclear Security Summit: Assessment of National Commitments* (Washington, DC: Arms Control Association and Partnership for Global Security, March 2012); *Global Fissile Material Report 2011*; International Panel on Fissile Materials, *Global Fissile Material Report 2010: Balancing the Books—Production and Stocks*, 5th ed. (Princeton, NJ: IPFM, 2010); Robert Golan-Viella, Michelle Marchesano, and Sarah Williams, *The 2010 Nuclear Security Summit: A Status Update*, (Washington, DC: Arms Control Association, April 2011); National Nuclear Security Administration press releases (assorted).

The Nuclear Security Summits gathered record-breaking numbers of heads of state in Washington, D.C., (2010) and Seoul (2012). The third summit will be in the Netherlands in 2014. The events have resulted in meaningful action to improve security and to enhance cooperation, but more needs to be accomplished.

Remaining Challenges

The lack of an effective global system for securing weapons-usable nuclear materials is a major challenge. Despite progress since 2012, there is still no effective global system for how nuclear materials should be secured. Because each state considers materials security an exclusively sovereign, not shared, responsibility, approaches to nuclear security vary widely with little sense of accountability, even though poor security in any one state can affect all other states. Several factors addressed by the NTI Index underscore this fundamental deficit:

- **The existing legal foundation for global nuclear security remains weak.** A key legal agreement related to nuclear security—the CPPNM and its 2005 Amendment—provides an important initial foundation for nuclear materials security. However, the 2005 Amendment still has not entered into force because it has not yet been ratified by the minimum number of states required (two-thirds of all states party to the CPPNM), including, notably, the United States. A separate agreement, the International Convention for the Suppression of Acts of Nuclear Terrorism, commits states to criminalize acts of nuclear terrorism. However, each of those agreements has limitations: they are not universally implemented (as stated earlier, the 2005 Amendment is not yet in force); they have no enforcement or accountability mechanisms; and the CPPNM and its 2005 Amendment cover only civilian materials, which make up only 15 percent of global stocks of weapons-usable nuclear materials.

- **Participation in international peer review is still limited.** Of the 25 states with weapons-usable nuclear materials, only 18 have invited a peer review in the past five years, and 6 have never invited a peer review, even though it is a critical tool for strengthening a state's security practices and assuring others about the effectiveness of an individual state's security.

- **The vast majority of global stocks of weapons-usable nuclear materials—approximately 85 percent—is military or other non-civilian material and remains outside any of the existing international nuclear security mechanisms.** Military and other non-civilian materials are not covered by IAEA nuclear security guidelines or the CPPNM and its 2005 Amendment. Nor is it clear that they are subject to best-practice exchanges, information sharing, peer review, or other voluntary mechanisms to build confidence in the effectiveness of their security, except in a few limited cases where some bilateral cooperation has occurred. For example, the United States and Russia have developed some creative transparency and assurance measures around a small percentage of those materials in an effort to build confidence about their security.

RECOMMENDATIONS

To Develop a Global Nuclear Security System for Lasting Security, States Should:

Reach consensus on the key principles of a global system. Although states have begun to recognize the need for an effective global nuclear materials security system, many continue to view nuclear security as primarily a sovereign, and not a shared, responsibility. As the Nuclear Security Summit process winds down—2016 may be the last summit—world leaders should commit to working toward consensus on the key principles of a global system and to establishing the architecture for implementing them. This system (a) should cover all weapons-usable nuclear materials—whether in the civilian or non-civilian and military sector, (b) should be based on international standards and best practices, and (c) should enable all states to gain confidence in the effectiveness of each other's security practices.

Build confidence in the effectiveness of their security practices. States should take reassuring steps, such as participating in international peer reviews; publishing nuclear security regulations and other information that will provide broad outlines of security arrangements; and declaring inventories for HEU and plutonium. Such practices are essential for building global confidence in nuclear materials security, for assessing effectiveness, and for holding states accountable.

Become parties to nuclear security treaties. States should become parties to treaties that govern nuclear terrorism and the physical protection of nuclear materials, such as the CPPNM, along with its 2005 Amendment, and ICSANT.

Strengthen voluntary mechanisms. States should participate in voluntary mechanisms by, for example, contributing to the IAEA's Nuclear Security Fund and the World Institute for Nuclear Security or by joining the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction.

Secure military and other non-civilian materials to the same or higher standards as civilian materials. About 85 percent of global stocks of weapons-usable nuclear materials are outside civilian programs in various forms and are not covered by IAEA nuclear security guidelines or the CPPNM and its 2005 Amendment, nor are they subject to voluntary confidence-building mechanisms. States should secure and hold those materials to at least the same or higher standards as the 15 percent of materials in civilian programs and should think creatively about how to build confidence in those efforts—work that can be done while protecting sensitive information.

To Improve State Stewardship of Nuclear Materials, States Should:

Commit to further decreasing stocks of weapons-usable nuclear materials. Such commitment should include (a) eliminating HEU use for civilian purposes, (b) expanding programs to convert research reactors using HEU to low-enriched uranium, and (c) not increasing plutonium inventories above what can be used for civilian power production in any given year.

Improve measures to protect weapons-usable nuclear materials from theft. Such protection should be achieved by enhancing physical security, strengthening laws and regulations, building a culture of security excellence, and exchanging best practices.

Establish independent regulatory agencies, and strengthen existing ones. India, Iran, and North Korea should work to establish independent regulatory agencies. They are the only states with weapons-usable nuclear materials that currently lack such agencies. Other states should ensure that their agencies are free from political pressures and the influence of those being regulated.

As the Nuclear Security Summit process winds down—2016 may be the last summit—world leaders should commit to working toward consensus on the key principles of a global system and to establishing the architecture for implementing them.

Deliver on Nuclear Security Summit commitments. States that have not yet fulfilled commitments made at the 2010 and 2012 summits should accelerate efforts to do so and should provide information about their progress.

The NTI Index can be used as a tool to assist states in improving nuclear materials security by addressing gaps in their own systems and by working to build an effective global nuclear security system that will enable states to measure progress, assess other states' performance, and hold each other accountable. The threat is dynamic. Work toward protecting the world from catastrophe must be dynamic as well.

NTI intends to continue to track progress and, as part of that process, will continue to provide opportunities for governments to review, confirm, and correct data collected. As in the previous edition of the NTI Index, NTI will also seek input from governments, experts, and other stakeholders that will help improve future editions.

MAPS AND RESULTS TABLES

The maps and tables on the following pages provide high-level results for the NTI Index. The tables provide country rankings and scores, overall and by each category, as well as changes from 2012.

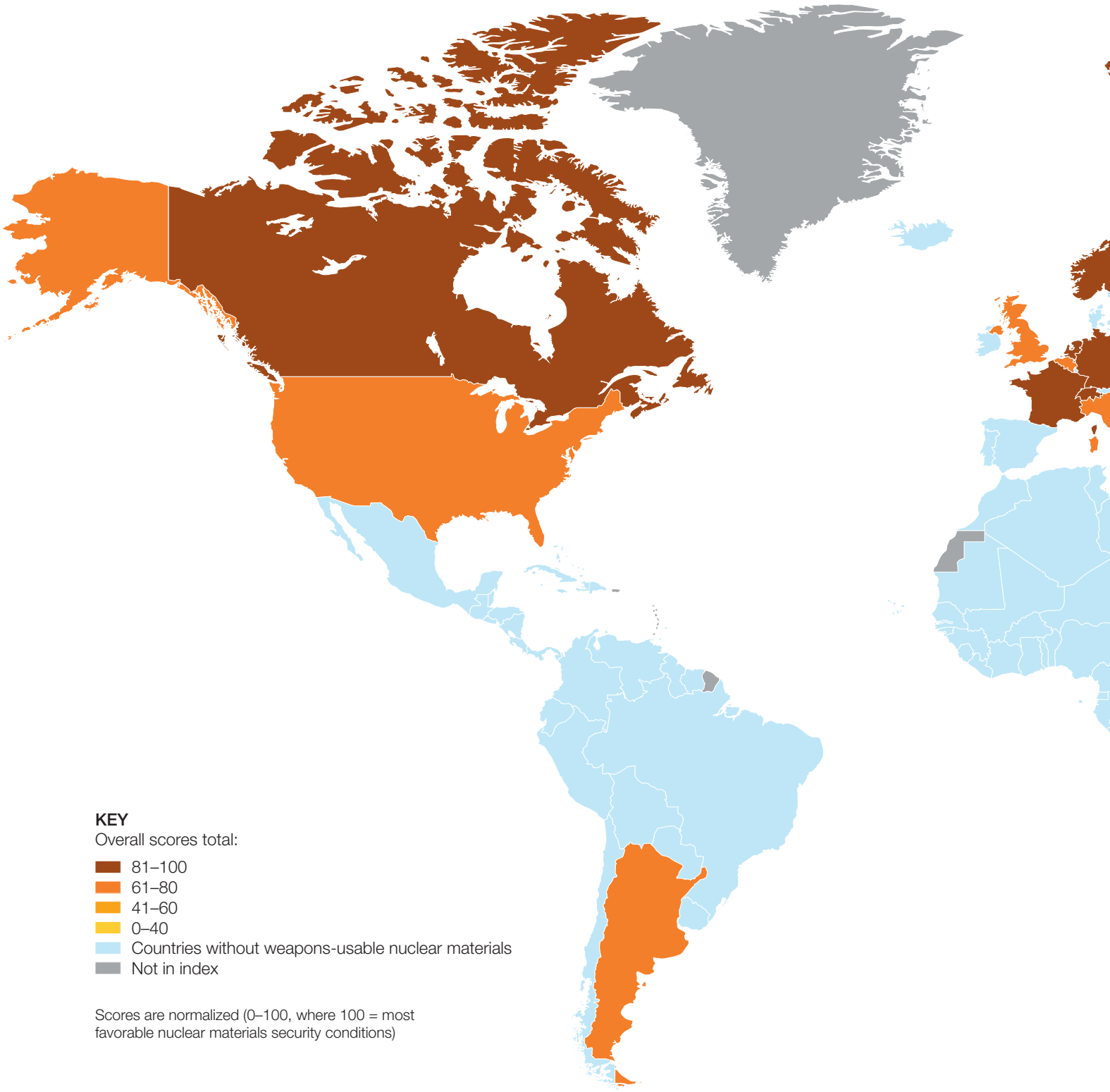
Overall scores are calculated using a weighted sum of category and indicator scores. A full discussion of categories, indicators, and their weighting is included in the EIU Methodology appendix.

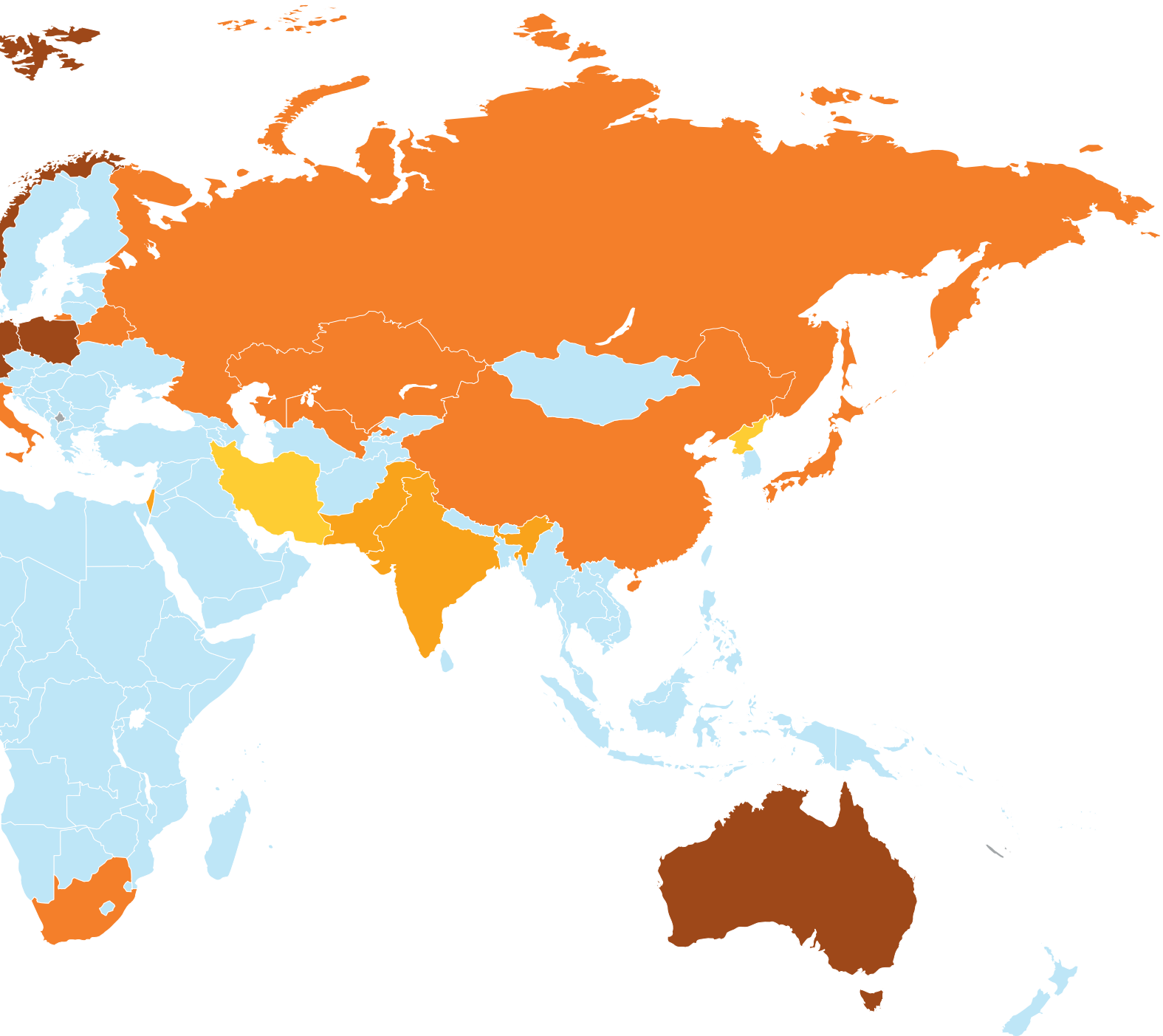
Country rankings preceded by an equal sign (=) indicate a tie with other countries.

Overall and category scores range from 0–100, where 100 equals the most favorable nuclear materials security conditions. In the NTI Index, scores of 0 and 100 represent the lowest or highest possible score, respectively, as measured by the NTI Index criteria.

The number of countries in the NTI Index was determined by the scope of the Economist Intelligence Unit's Risk Briefing service, which includes almost all countries in the world.

COUNTRIES WITH WEAPONS-USABLE NUCLEAR MATERIALS





SUMMARY RESULTS: COUNTRIES WITH WEAPONS-USABLE NUCLEAR MATERIALS

OVERALL SCORE

Rank / 25		Score / 100	Δ
1	Australia	92	+2
2	Canada	88	+6
3	Switzerland	87	–
4	Germany	85	+3
5	Norway	83	+1
6	Poland	82	+1
=7	France	81	+2
=7	Netherlands	81	–
9	Belarus	80	+5
10	Belgium	79	+7
=11	United Kingdom	77	-1
=11	United States	77	-1
=13	Argentina	76	+4
=13	Japan	76	+6
15	Kazakhstan	73	–
16	South Africa	71	-1
17	Italy	70	-1
=18	Russia	66	–
=18	Uzbekistan	66	+5
20	China	64	+1
21	Israel	57	+2
22	Pakistan	46	+3
23	India	41	+1
24	Iran	39	–
25	North Korea	30	–

1. QUANTITIES AND SITES

Rank / 25		Score / 100	Δ
=1	Argentina	100	+5
=1	Australia	100	+5
3	Uzbekistan	95	+5
4	Iran	89	–
=5	Belarus	84	–
=5	Poland	84	+6
7	Norway	83	-5
8	South Africa	79	+6
9	Italy	73	–
10	Switzerland	72	–
11	Canada	67	–
=12	Belgium	62	+6
=12	Germany	62	–
=12	Netherlands	62	-5
15	North Korea	60	–
16	Kazakhstan	57	-6
17	Israel	44	–
=18	China	34	–
=18	France	34	–
=20	Russia	23	–
=20	United States	23	–
=22	India	22	–
=22	Japan	22	–
=22	Pakistan	22	–
25	United Kingdom	11	–

2. SECURITY AND CONTROL MEASURES

Rank / 25		Score / 100	Δ
1	United States	98	–
=2	Canada	93	+10
=2	United Kingdom	93	–
=4	Belarus	90	+12
=4	France	90	–
=6	Germany	88	+10
=6	Switzerland	88	–
8	Australia	86	–
=9	Kazakhstan	80	–
=9	Russia	80	–
11	Japan	79	+3
12	Netherlands	78	+5
13	Poland	74	–
14	Belgium	73	+17
15	China	72	–
16	Italy	68	–
17	Norway	67	–
18	South Africa	64	–
=19	Argentina	59	–
=19	Israel	59	–
21	Uzbekistan	51	+4
22	North Korea	43	–
=23	Iran	40	–
=23	Pakistan	40	+9
25	India	37	–

Overall and category scores and ranks for 2014 are shown.
All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.
= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITH WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

3. GLOBAL NORMS

Rank / 25		Score / 100	Δ
=1	Australia	100	+8
=1	France	100	+17
=1	Russia	100	–
=1	United Kingdom	100	–
=5	Canada	94	+17
=5	Germany	94	–
=7	Belgium	88	+9
=7	China	88	+5
=7	Kazakhstan	88	+6
=7	Netherlands	88	–
=7	Switzerland	88	–
12	Japan	85	–
13	United States	83	–
=14	Poland	82	–
=14	Uzbekistan	82	+14
16	Argentina	80	+22
17	Norway	73	–
18	India	71	+6
19	Belarus	68	–
20	Pakistan	63	–
21	Italy	58	–
22	South Africa	57	-5
23	Israel	55	+8
24	Iran	18	–
25	North Korea	0	–

4. DOMESTIC COMMITMENTS AND CAPACITY

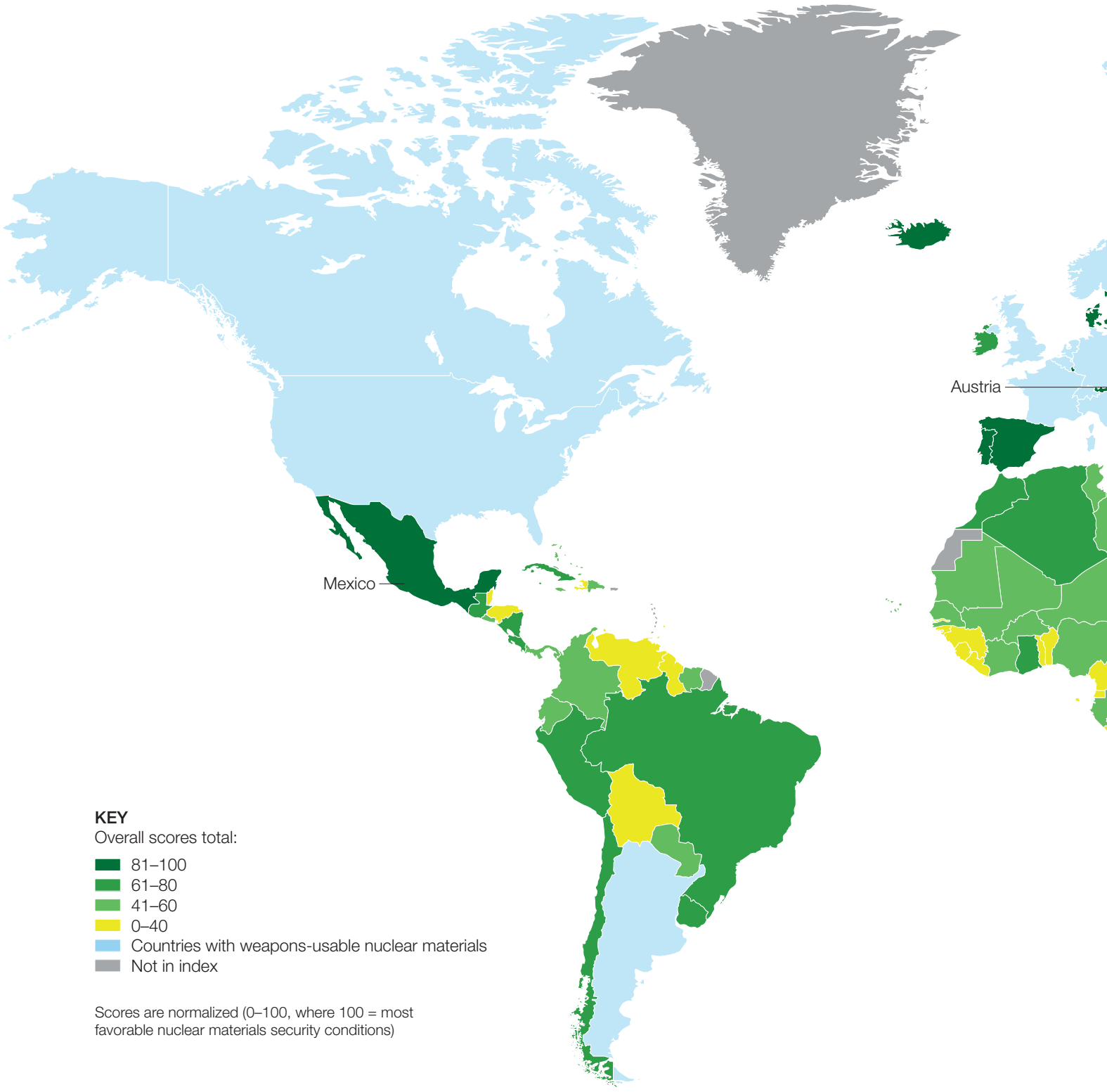
Rank / 25		Score / 100	Δ
=1	Australia	100	–
=1	Belgium	100	–
=1	Germany	100	–
=1	Italy	100	–
=1	Japan	100	+27
=1	Netherlands	100	–
=1	Norway	100	–
=1	Poland	100	–
=1	South Africa	100	–
=1	Switzerland	100	–
=11	Canada	96	–
=11	France	96	–
=11	Kazakhstan	96	–
=11	United Kingdom	96	–
=15	Argentina	92	–
=15	Belarus	92	–
=17	Russia	89	–
=17	United States	89	-3
19	Uzbekistan	88	–
20	Pakistan	85	–
21	China	81	–
22	Israel	66	–
23	India	47	–
24	Iran	19	–
25	North Korea	4	–

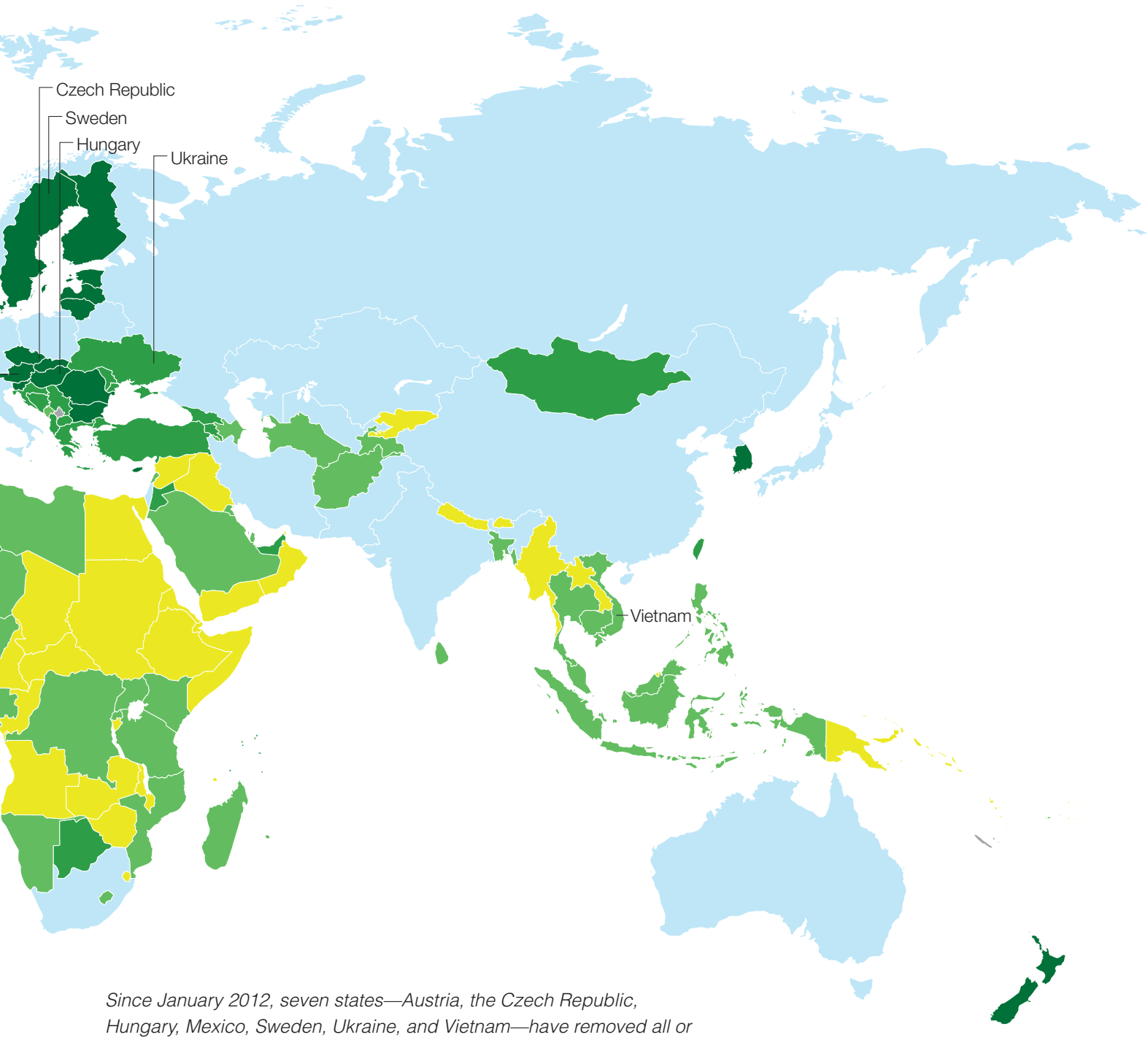
5. RISK ENVIRONMENT

Rank / 25		Score / 100	Δ
1	Norway	100	+13
2	Japan	86	-1
3	Canada	83	–
4	Switzerland	82	+1
5	Australia	79	–
6	Netherlands	78	–
7	Germany	77	+1
=8	Belgium	75	–
=8	France	75	-1
=10	Poland	74	–
=10	United States	74	–
12	United Kingdom	69	-2
13	Argentina	61	–
=14	Belarus	58	+6
=14	South Africa	58	-2
16	Israel	55	–
17	Italy	51	-1
18	North Korea	42	–
19	China	38	+2
20	Kazakhstan	37	–
21	Iran	35	+1
22	India	32	–
23	Uzbekistan	24	–
24	Russia	21	–
25	Pakistan	19	+6

Overall and category scores and ranks for 2014 are shown.
All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.
= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS





Since January 2012, seven states—Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam—have removed all or most of their stocks of weapons-usable nuclear materials. This is one of the most important steps a state can take toward ensuring that terrorists cannot gain access to the materials needed to build a nuclear bomb.

SUMMARY RESULTS: COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS

OVERALL SCORE

Rank / 151		Score / 100	Δ
1	Denmark	99	–
=2	Finland	96	–
=2	Sweden	96	+4
4	Spain	93	–
5	Slovenia	91	–
=6	Lithuania	90	+2
=6	Slovakia	90	+4
=8	Czech Republic	88	-1
=8	Latvia	88	–
=10	Austria	87	-1
=10	Hungary	87	+2
12	New Zealand	86	+1
=13	Mexico	85	+7
=13	Portugal	85	+8
15	Malta	84	+8
=16	Estonia	83	–
=16	Romania	83	–
=18	Iceland	82	–
=18	South Korea	82	–
=20	Bulgaria	81	–
=20	Cyprus	81	+3
=20	Luxembourg	81	–
=23	Ukraine	79	–
=23	United Arab Emirates	79	-2
25	Armenia	75	–
=26	Chile	74	–
=26	Croatia	74	–
=26	Cuba	74	+4
=26	Serbia	74	–
=30	Ireland	73	-3
=30	Macedonia	73	+4
32	Greece	72	+1
=33	Peru	70	–
=33	Turkey	70	+3
=33	Uruguay	70	–
=36	Albania	69	–
=36	Jordan	69	–
=36	Mongolia	69	–

3. GLOBAL NORMS

Rank / 151		Score / 100	Δ
=1	Denmark	100	–
=1	Finland	100	–
=1	Lithuania	100	+7
=1	Spain	100	–
=1	Ukraine	100	–
=6	Armenia	93	+13
=6	Czech Republic	93	–
=6	Georgia	93	+13
=6	Latvia	93	–
=6	Malta	93	+26
=6	Mexico	93	+20
=6	Romania	93	–
=6	Slovakia	93	+13
=6	Slovenia	93	–
=6	United Arab Emirates	93	–7
16	Sweden	87	+12
=17	Austria	85	–
=17	Bahrain	85	–
=17	Chile	85	–
=17	Croatia	85	–
=17	Cyprus	85	+12
=17	Hungary	85	–
=17	Libya	85	–
=17	Luxembourg	85	+12
=17	Macedonia	85	+12
=17	Moldova	85	–
=17	Saudi Arabia	85	–
=17	Turkmenistan	85	–
=29	Azerbaijan	80	+7
=29	Bulgaria	80	–
=29	Estonia	80	–
=29	Greece	80	+5
=29	Jordan	80	-7
=29	Morocco	80	–
=29	Panama	80	–
=29	Portugal	80	–
=37	Algeria	78	+7
=37	Fiji	78	+7

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.

Δ denotes change in score between 2012 and 2014.

– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

4. DOMESTIC COMMITMENTS AND CAPACITY

Rank / 151		Score / 100	Δ
=1	Albania	100	–
=1	Austria	100	–
=1	Bulgaria	100	–
=1	Czech Republic	100	–
=1	Denmark	100	–
=1	Estonia	100	–
=1	Finland	100	–
=1	Hungary	100	+4
=1	Latvia	100	–
=1	Lithuania	100	–
=1	Mexico	100	–
=1	Portugal	100	+21
=1	Romania	100	–
=1	Slovakia	100	–
=1	Slovenia	100	–
=1	South Korea	100	–
=1	Spain	100	–
=1	Sweden	100	–
=19	Iceland	96	–
=19	Serbia	96	–
=21	Armenia	93	–
=21	Bosnia and Herzegovina	93	+4
=21	Peru	93	–
=21	Turkey	93	–
=21	Ukraine	93	–
=26	Guatemala	89	–
=26	Nicaragua	89	–
28	Uruguay	87	–
=29	New Zealand	85	–
=29	United Arab Emirates	85	–
=31	Algeria	83	–
=31	Macedonia	83	–
=31	Tajikistan	83	–
=34	Ghana	80	–
=34	Indonesia	80	–
=34	Malta	80	–
=34	Morocco	80	–
=34	Taiwan	80	+13

5. RISK ENVIRONMENT

Rank / 151		Score / 100	Δ
1	Sweden	99	–
2	New Zealand	98	+2
3	Denmark	96	–
=4	Finland	87	-1
=4	Iceland	87	–
=6	Barbados	85	–
=6	Singapore	85	–
8	Chile	81	–
=9	Cyprus	80	-1
=9	Luxembourg	80	-13
=9	Malta	80	–
=12	Slovenia	78	–
=12	Spain	78	-1
=14	Bahamas	77	–
=14	Botswana	77	–
=14	Costa Rica	77	–
17	Taiwan	76	–
=18	Brunei	75	–
=18	Cape Verde	75	–
=18	Uruguay	75	–
=21	Austria	74	–
=21	Slovakia	74	–
23	Hungary	72	–
=24	Bhutan	71	–
=24	Portugal	71	–
=24	Seychelles	71	–
=27	Cuba	70	–
=27	Czech Republic	70	-1
=27	Mauritius	70	–
30	Namibia	69	+2
31	South Korea	68	–
=32	Latvia	67	–
=32	Samoa	67	–
=34	Estonia	66	–
=34	Lithuania	66	-1
=36	Ghana	63	–
=36	Ireland	63	-10
=38	Croatia	60	–

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.

Δ denotes change in score between 2012 and 2014.

– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

OVERALL SCORE

Rank / 151		Score / 100	Δ
=39	Georgia	68	–
=39	Ghana	68	+4
=41	Algeria	67	+3
=41	Bosnia and Herzegovina	67	-3
=41	Brazil	67	+2
=41	Morocco	67	–
45	Costa Rica	66	+4
46	Nicaragua	64	+1
=47	Moldova	63	+3
=47	Seychelles	63	–
=47	Taiwan	63	+5
=50	Botswana	62	–
=50	Guatemala	62	–
52	Singapore	60	–
=53	Montenegro	59	–
=53	Qatar	59	-5
=53	Tajikistan	59	+2
=56	Azerbaijan	58	+2
=56	Niger	58	+1
=56	Rwanda	58	+1
=56	Tunisia	58	+1
=60	Bahrain	57	-1
=60	Congo (Democratic Republic of)	57	-1
=60	Jamaica	57	+2
=63	Mali	56	-1
=63	Nigeria	56	+4
=63	Panama	56	–
=66	Dominican Republic	55	+6
=66	Gabon	55	–
=66	Indonesia	55	–
=66	Paraguay	55	–
=66	Philippines	55	+2
=66	Turkmenistan	55	–
72	Bangladesh	54	–
=73	Colombia	53	+1
=73	Côte d'Ivoire	53	+25
=73	El Salvador	53	–
=73	Fiji	53	+3

3. GLOBAL NORMS

Rank / 151		Score / 100	Δ
=37	Kenya	78	–
=37	Tunisia	78	–
=41	Ireland	75	–
=41	New Zealand	75	–
=41	Philippines	75	+8
=41	South Korea	75	–
=45	Afghanistan	73	+13
=45	Albania	73	+13
=45	Bosnia and Herzegovina	73	–
=45	Dominican Republic	73	+8
=45	Mongolia	73	–
=45	Serbia	73	–
=45	Turkey	73	+13
=52	Cuba	71	+13
=52	Gabon	71	–
=52	Lesotho	71	+13
=52	Mali	71	–
=52	Mauritania	71	–
=52	Niger	71	–
=52	Nigeria	71	+26
=59	Cambodia	67	–
=59	Tajikistan	67	+7
=61	Bangladesh	65	–
=61	Brazil	65	+7
=61	Congo (Democratic Republic of)	65	–
=61	Côte d'Ivoire	65	+50
=61	El Salvador	65	–
=61	Kuwait	65	+12
=61	Lebanon	65	–
=61	Paraguay	65	–
=61	Seychelles	65	–
=70	Colombia	60	–
=70	Iceland	60	–
=70	Montenegro	60	–
=70	Vietnam	60	+38
=74	Central African Republic	58	–
=74	Costa Rica	58	+13
=74	Ghana	58	+13

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

4. DOMESTIC COMMITMENTS AND CAPACITY

Rank / 151		Score / 100	Δ
=39	Cuba	79	–
=39	Cyprus	79	–
=39	Greece	79	–
=39	Ireland	79	–
=39	Luxembourg	79	–
=44	Jordan	78	–
=44	Mongolia	78	–
=46	Croatia	76	–
=46	Moldova	76	+21
=46	Tanzania	76	–
=46	Uganda	76	–
50	Brazil	75	–
=51	Botswana	74	–
=51	Nigeria	74	–
=53	Congo (Democratic Republic of)	73	–
=53	Georgia	73	–
55	Rwanda	72	–
56	Azerbaijan	69	–
=57	Qatar	67	–
=57	Suriname	67	–
59	Bangladesh	66	–
60	Montenegro	64	–
61	Costa Rica	62	–
=62	Chile	60	–
=62	Jamaica	60	–
=62	Niger	60	–
=62	Philippines	60	–
66	Namibia	58	+5
=67	Burkina Faso	55	–
=67	Ecuador	55	–
=67	Mali	55	–
=67	Seychelles	55	–
=67	Singapore	55	–
=67	Tunisia	55	–
73	Colombia	52	–
=74	Afghanistan	51	–
=74	Kenya	51	–
=74	Lebanon	51	–

5. RISK ENVIRONMENT

Rank / 151		Score / 100	Δ
=38	Lesotho	60	+3
=40	Belize	59	–
=40	Brazil	59	–
=40	United Arab Emirates	59	+1
=43	Bulgaria	58	-1
=43	Jamaica	58	+5
=43	Senegal	58	+8
46	Mexico	57	–
=47	El Salvador	56	–
=47	Zambia	56	–
=49	Mongolia	55	+2
=49	Rwanda	55	-2
=49	Tonga	55	-1
=49	Trinidad and Tobago	55	–
=49	Vanuatu	55	+2
=49	Vietnam	55	–
=55	Greece	54	-1
=55	Peru	54	+1
=55	Qatar	54	-17
=58	Dominican Republic	53	+10
=58	Madagascar	53	+8
=58	Romania	53	–
=58	Suriname	53	–
=58	Swaziland	53	+2
=63	Gabon	52	–
=63	Kuwait	52	+1
=63	Mozambique	52	–
=66	Malaysia	51	–
=66	Montenegro	51	–
=66	Oman	51	-2
=66	Panama	51	–
=70	Guyana	50	–
=70	Macedonia	50	–
=70	Paraguay	50	–
=70	Sri Lanka	50	-2
=70	Timor-Leste	50	+11
=75	Djibouti	49	–
=75	Malawi	49	+3

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

OVERALL SCORE

Rank / 151		Score / 100	Δ
=73	Namibia	53	+2
78	Kenya	52	-4
=79	Tanzania	51	–
=79	Vietnam	51	+14
=81	Lebanon	50	–
=81	Uganda	50	–
=83	Ecuador	49	+1
=83	Lesotho	49	+5
=85	Burkina Faso	48	-3
=85	Libya	48	+3
=85	Sri Lanka	48	-1
=88	Cape Verde	47	–
=88	Kuwait	47	+6
=90	Madagascar	46	+3
=90	Saudi Arabia	46	+1
=92	Bahamas	45	–
=92	Mozambique	45	–
=94	Afghanistan	43	+4
=94	Mauritius	43	–
=94	Senegal	43	+2
=97	Malaysia	42	+2
=97	Suriname	42	–
=99	Cambodia	41	–
=99	Mauritania	41	+1
=99	Thailand	41	+2
=102	Cameroon	40	-2
=102	Oman	40	-1
=104	Kyrgyz Republic	39	-2
=104	Swaziland	39	+3
=104	Trinidad and Tobago	39	+2
107	Honduras	38	–
=108	Bolivia	37	–
=108	Central African Republic	37	-1
=108	Djibouti	37	–
=108	Tonga	37	-1
=112	Barbados	36	–
=112	Togo	36	+3
=114	Brunei	35	–

3. GLOBAL NORMS

Rank / 151		Score / 100	Δ
=74	Nicaragua	58	–
=74	Peru	58	–
=79	Kyrgyz Republic	55	–
=79	Sri Lanka	55	–
=81	Djibouti	53	–
=81	Jamaica	53	–
=81	Madagascar	53	–
=81	Qatar	53	–
=85	Comoros	51	–
=85	Guinea-Bissau	51	–
=87	Honduras	47	–
=87	Oman	47	–
=89	Burkina Faso	45	–
=89	Ecuador	45	–
=89	Guatemala	45	–
=89	Indonesia	45	–
=89	Mozambique	45	–
=89	Rwanda	45	+7
=89	Senegal	45	–
=89	Swaziland	45	+7
=89	Togo	45	+7
=89	Uruguay	45	–
=99	Malaysia	42	+7
=99	Singapore	42	–
=99	Thailand	42	+7
=102	Bahamas	40	–
=102	Iraq	40	+25
=102	Yemen	40	–
=105	Guinea	38	–
=105	Guyana	38	–
=107	Bolivia	33	–
=107	Botswana	33	–
=107	Burundi	33	–
=107	Cameroon	33	–
=107	Cape Verde	33	–
=107	Laos	33	+8
=107	Malawi	33	–
=107	Namibia	33	–

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

4. DOMESTIC COMMITMENTS AND CAPACITY

Rank / 151		Score / 100	Δ
=74	Paraguay	51	–
78	Côte d'Ivoire	49	+21
79	Venezuela	48	–
80	Cameroon	47	–
81	Turkmenistan	46	–
=82	Bahrain	44	–
=82	Gabon	44	–
=84	Dominican Republic	41	–
=84	El Salvador	41	–
=84	Panama	41	–
=84	Sri Lanka	41	–
=88	Iraq	39	+4
=88	Libya	39	–
=88	Vietnam	39	+4
91	Mozambique	38	–
=92	Fiji	37	–
=92	Kyrgyz Republic	37	+4
=92	Vanuatu	37	+9
95	Cape Verde	36	–
=96	Egypt	35	–
=96	Madagascar	35	–
=96	Malaysia	35	–
=96	Mauritius	35	–
=96	Thailand	35	–
=101	Bolivia	33	–
=101	Tonga	33	–
=101	Trinidad and Tobago	33	–
=104	Honduras	30	–
=104	Senegal	30	–
=104	Togo	30	+4
=107	Gambia	28	–
=107	Kuwait	28	+4
=109	Barbados	26	–
=109	Belize	26	–
=109	Bhutan	26	–
=109	Brunei	26	–
=109	Cambodia	26	–
=109	Ethiopia	26	–

5. RISK ENVIRONMENT

Rank / 151		Score / 100	Δ
=75	Solomon Islands	49	+7
=75	Thailand	49	+1
79	Ethiopia	48	+1
=80	Benin	47	–
=80	Côte d'Ivoire	47	+4
=80	Fiji	47	+2
=80	Serbia	47	–
=84	Bolivia	46	-1
=84	Colombia	46	+1
=84	Jordan	46	+8
=84	Laos	46	–
=88	Bahrain	45	-1
=88	Liberia	45	+1
=88	São Tomé and Príncipe	45	+1
=91	Angola	44	–
=91	Congo (Brazzaville)	44	-3
=91	Gambia	44	-1
=91	Guatemala	44	–
=91	Niger	44	+6
96	Ecuador	43	+1
=97	Mali	42	-3
=97	Zimbabwe	42	+2
=99	Burkina Faso	41	-9
=99	Nepal	41	–
=99	Papua New Guinea	41	+1
=99	Tunisia	41	+3
=103	Cameroon	40	-5
=103	Ukraine	40	-1
=103	Venezuela	40	+2
106	Turkey	39	-1
=107	Saudi Arabia	38	+3
=107	Tanzania	38	–
=107	Turkmenistan	38	–
=110	Burundi	37	-4
=110	Eritrea	37	–
=110	Georgia	37	-13
=110	Honduras	37	–
=110	Nicaragua	37	+1

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

OVERALL SCORE

Rank / 151		Score / 100	Δ
=114	Comoros	35	–
=114	Guyana	35	–
=117	Iraq	34	+11
=117	Laos	34	+2
=119	Belize	33	–
=119	Malawi	33	–
=119	Samoa	33	–
=119	Solomon Islands	33	+2
=119	Vanuatu	33	+3
=119	Venezuela	33	+1
=125	Bhutan	32	–
=125	Egypt	32	+2
=127	Guinea-Bissau	29	–
=127	Zambia	29	–
=129	Burundi	28	-1
=129	Sierra Leone	28	+1
=131	Angola	27	–
=131	Ethiopia	27	–
=131	Nepal	27	–
=131	Papua New Guinea	27	+2
=135	Benin	26	–
=135	Haiti	26	+1
=137	Liberia	25	–
=137	Timor-Leste	25	+3
=137	Yemen	25	+1
=140	Gambia	24	-1
=140	Guinea	24	–
=142	Myanmar	23	+2
=142	Sudan	23	–
=144	Congo (Brazzaville)	22	+2
=144	Equatorial Guinea	22	–
=144	Zimbabwe	22	+1
=147	São Tomé and Príncipe	21	–
=147	Syria	21	-3
149	Chad	20	–
150	Eritrea	19	–
151	Somalia	7	–

3. GLOBAL NORMS

Rank / 151		Score / 100	Δ
=107	Sudan	33	–
=107	Tanzania	33	–
=107	Trinidad and Tobago	33	+8
=107	Uganda	33	–
=119	Egypt	27	+7
=119	Liberia	27	–
=119	Mauritius	27	–
=119	Taiwan	27	–
=123	Equatorial Guinea	25	–
=123	Solomon Islands	25	–
=123	Tonga	25	–
=126	Benin	20	–
=126	Haiti	20	–
=126	Sierra Leone	20	–
=126	Syria	20	–
=130	Angola	15	–
=130	Belize	15	–
=130	Nepal	15	–
=130	Papua New Guinea	15	+8
=130	Zambia	15	–
=135	São Tomé and Príncipe	13	–
=135	Timor-Leste	13	–
=137	Brunei	7	–
=137	Chad	7	–
=137	Congo (Brazzaville)	7	–
=137	Eritrea	7	–
=137	Ethiopia	7	–
=137	Myanmar	7	–
=137	Samoa	7	–
=137	Vanuatu	7	–
=137	Venezuela	7	–
=137	Zimbabwe	7	–
=147	Barbados	0	–
=147	Bhutan	0	–
=147	Gambia	0	–
=147	Somalia	0	–
=147	Suriname	0	–

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

COUNTRIES WITHOUT WEAPONS-USABLE NUCLEAR MATERIALS *(continued)*

4. DOMESTIC COMMITMENTS AND CAPACITY

Rank / 151		Score / 100	Δ
=109	Laos	26	–
=109	Myanmar	26	–
=109	Nepal	26	–
=109	Oman	26	–
=109	Papua New Guinea	26	–
=109	Samoa	26	–
=109	Sierra Leone	26	–
=109	Solomon Islands	26	–
=109	Syria	26	–
=124	Angola	24	–
=124	Bahamas	24	–
=124	Central African Republic	24	–
=124	Comoros	24	–
=124	Haiti	24	–
=129	Lesotho	22	–
=129	Malawi	22	–
=129	Mauritania	22	+5
=129	Swaziland	22	–
=133	Guyana	20	–
=133	Saudi Arabia	20	–
=133	Sudan	20	–
=133	Yemen	20	–
=133	Zambia	20	–
=138	Burundi	17	–
=138	Chad	17	–
=138	Congo (Brazzaville)	17	+8
=138	Zimbabwe	17	–
=142	Benin	15	–
=142	Djibouti	15	–
=142	Eritrea	15	–
=142	Timor-Leste	15	–
=146	Equatorial Guinea	9	–
=146	Guinea	9	–
=146	Guinea-Bissau	9	–
=146	Liberia	9	–
=146	São Tomé and Príncipe	9	–
=146	Somalia	9	–

5. RISK ENVIRONMENT

Rank / 151		Score / 100	Δ
=110	Sierra Leone	37	+1
=116	Equatorial Guinea	36	–
=116	Mauritania	36	–
=116	Morocco	36	–
=116	Uganda	36	+1
=120	Algeria	35	–
=120	Chad	35	–
=120	Haiti	35	+4
=123	Armenia	34	-12
=123	Myanmar	34	+4
=125	Cambodia	33	+1
=125	Central African Republic	33	-3
=125	Comoros	33	–
=125	Indonesia	33	–
=129	Egypt	32	-4
=129	Lebanon	32	-1
=129	Togo	32	-5
132	Guinea-Bissau	31	–
133	Guinea	30	–
=134	Bosnia and Herzegovina	29	-16
=134	Congo (Democratic Republic of)	29	-3
=134	Philippines	29	–
137	Albania	27	-13
=138	Bangladesh	26	-2
=138	Kenya	26	-13
=138	Kyrgyz Republic	26	-12
141	Moldova	25	-14
142	Azerbaijan	23	–
=143	Iraq	22	+5
=143	Tajikistan	22	–1
145	Libya	21	+8
146	Nigeria	19	-13
147	Sudan	18	–
=148	Syria	16	-9
=148	Yemen	16	+3
150	Somalia	13	–
151	Afghanistan	2	–

Overall and category scores and ranks for 2014 are shown. All countries are scored 0–100, where 100 = most favorable nuclear materials security conditions.

= denotes tie in rank.
Δ denotes change in score between 2012 and 2014.
– denotes no change between 2012 and 2014.

WHY AN INDEX

On July 28, 2012, three peace activists gained access to the Y-12 National Security Complex, home to the largest storage facility for highly enriched uranium (HEU) in the United States. Despite being considered one of the most secure facilities in the country, the activists severed three layers of fencing with bolt cutters and splashed human blood and spray paint on a uranium storage building before they were apprehended. An investigation highlighted multiple failures in the system.

The incident serves as a powerful reminder of the need to remain vigilant when it comes to securing weapons-usable nuclear materials and to question assumptions about those materials' security. Today, the approximately 1,400 metric tons of HEU and almost 500 metric tons of separated plutonium that make up global stocks of weapons-usable nuclear materials (both the civilian and the non-civilian or military), which are the key ingredients for a nuclear weapon, are stored at hundreds of sites in 25 countries. The risk they pose is real.

Terrorist organizations such as al Qaeda have publicly declared their desire to acquire and use nuclear weapons.[4] Given the vast quantity of nuclear materials that exists worldwide, the path to a terrorist bomb is not hard to imagine. A team of terrorists could overwhelm guards at an understaffed nuclear materials facility or could attack a convoy moving materials from one place to another. A terrorist or criminal network could corrupt insiders or use a cyberattack to defeat security and secretly access materials for an improvised weapon that could destroy the heart of a city.[5]

The threat is dynamic and will continue to evolve. Just in the past year, al Qaeda has expanded to new geographic areas and has established dangerous affiliates, such as al Qaeda in the Arabian Peninsula and al Qaeda in the Islamic Maghreb, and has loosely affiliated with other terrorist organizations such as al-Shabab in Somalia. The threats they pose, though they will evolve over time, will endure. Equally durable and flexible mechanisms are needed to prevent nuclear terrorism from becoming a reality.

[4] Rolf Mowatt-Larssen, "Al Qaeda's Religious Justification of Nuclear Terrorism" (working paper, Belfer Center for Science and International Affairs, Harvard Kennedy School, Cambridge, MA, November 12, 2010).

[5] David Albright, Kathryn Buehler, and Holly Higgins, "Bin Laden and the Bomb," *Bulletin of Atomic Scientists* 58, no. 1 (2002): 23–24.

There is no question that securing nuclear materials is a grave, sovereign responsibility. At the same time, the threat is global, and all countries must work to reduce that threat.

Director General Yukiya Amano of the International Atomic Energy Agency (IAEA) disclosed in July 2013 that "over a hundred incidents of thefts and other unauthorized activities involving nuclear and radioactive material are reported to the [IAEA] every year." Even more worrisome, "some material goes missing and is never found."[6]

ADDRESSING A SHARED GLOBAL THREAT

Because any catastrophe involving a nuclear weapon would be global in scope, countries with weapons-usable nuclear materials have a responsibility to secure all those materials and to provide assurances to others that build confidence in the effectiveness of their security. The threat, however, is not restricted to countries with nuclear weapons or weapons-usable nuclear materials. "Even states without nuclear or other radioactive material should not think that this issue does not affect them," Director General Amano said. "Terrorists and criminals will try to exploit any vulnerability in the global security system. Any country, in any part of the world, could find itself used as a transit point. And any country could become the target of an attack."[7]

There is no question that securing nuclear materials is a grave, sovereign responsibility for countries with such materials. At the same time, the threat is global, and all countries must work to reduce that threat. A failure of nuclear security in one state could result in a nuclear detonation in another with consequences that would reverberate around the globe—with tens, or hundreds, of thousands of casualties; with disruptions to markets and commerce; with long-term implications for public health, energy, and the environment; and with risks to civil liberties—not to mention the staggering cost of any response. In the end, because the consequences of a nuclear detonation will be shared, so too must be the responsibility for security.

THE POWER OF AN INDEX TO BUILD MOMENTUM FOR POLICY REFORM

The 2012 Nuclear Threat Initiative's Nuclear Materials Security Index (NTI Index) highlighted several critical limitations in nuclear materials security: (a) no agreed set of priorities or international standards, (b) no way for states to track progress and hold each other accountable for securing their materials, and (c) no official or public database of how much nuclear material even exists. To address those limitations, NTI offered a framework for discussion and decisions—a framework grounded with data that could inform priorities for nuclear materials security.

After the release of the 2012 NTI Index in January 2012, NTI and the Economist Intelligence Unit (EIU) briefed a large number of government officials and experts globally about the project and the results, including at the IAEA and at the Seoul Nuclear Security Symposium, which was held concurrently with the Seoul Nuclear Security Summit in 2012. Through this outreach and media coverage, the NTI Index received global attention. A number of countries reached out to NTI for greater understanding and advice in setting priorities in nuclear security. And NTI developed a separate process—the *Global Dialogue on Nuclear Security Priorities*—to facilitate the development of greater international consensus on the steps that all states must take to build an effective global nuclear security system.

The many consultations confirmed that the NTI Index has become a valuable resource and has produced feedback that resulted in changes to this 2014 NTI Index. The EIU Methodology appendix provides full information about the changes. They range from strengthening the Security and Control Measures category to refining indicators related to preventing the insider threat to reevaluating the concept of "transparency" when applied to nuclear materials security.

[6] Yukiya Amano, "Statement at the Opening of International Conference on Nuclear Security: Enhancing Global Efforts" (statement at the International Conference on Nuclear Security: Enhancing Global Efforts, Vienna, July 1, 2013).

[7] Ibid.

Some have also used the NTI Index to guide actions to enhance nuclear materials security. For example, Japan has implemented specific reforms to address its nuclear security weaknesses, taking into account the NTI Index, and approached NTI for further discussions on how to improve its performance. Canada accelerated efforts to ratify the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material as well as the International Convention for the Suppression of Acts of Nuclear Terrorism—two key nuclear security-related agreements. Other countries have used the NTI Index data to inform official dialogue with other governments or in training activities.

NTI hopes that this edition of the NTI Index will continue to support and complement the momentum begun by the Nuclear Security Summits on improvements to nuclear materials security globally and to stimulate and support further efforts to agree on nuclear security priorities.

DOESN'T THE IAEA OVERSEE ALL NUCLEAR MATERIALS GLOBALLY?

Many people assume that a comprehensive global system exists for managing nuclear materials from cradle to grave and that the International Atomic Energy Agency (IAEA) is responsible for administering the system. Although the IAEA, through its safeguards system, has a crucial role in verifying that nuclear materials are not diverted by states from peaceful use to nuclear weapons, its role in ensuring the security of nuclear materials is limited by both the scope of its mandate and the size of its budget.

At its founding in 1956, the IAEA was charged with the responsibility, among other things, for administering a safeguards system for civilian facilities to detect whether civilian nuclear materials have been diverted for military purposes. Safeguards, however, are not—nor have they ever been—designed to provide physical security measures for the "safeguarded" facilities. IAEA safeguards inspections are designed for the specific purpose of detecting—after the fact—whether material is missing from a facility or whether nuclear material has not been declared. They also help determine whether the inspected state may have diverted the material to a weapons program. Such inspections do not prevent material from being stolen.

In addition, safeguards are not applied at all civilian sites that have weapons-usable nuclear materials, because nuclear-weapon states—where the majority of the world's highly enriched uranium and separated plutonium are located—are not subject to IAEA "comprehensive" safeguards (i.e., safeguards applied at all facilities in a state). Nuclear-weapon states have "voluntary offer" safeguards agreements, under which they may designate facilities as being eligible for IAEA safeguards. Although the United Kingdom has designated all civilian facilities, the other nuclear-weapon states have designated only some facilities. Because of resource constraints, however, the IAEA chooses to inspect only a small proportion of the facilities that are eligible for inspection in the nuclear-weapon states. In addition, all UK and French facilities, including plutonium-reprocessing plants, are inspected by the European safeguards authority, Euratom.

Beyond safeguards inspections, the IAEA provides a number of important services to help states strengthen their nuclear security to combat the risk of nuclear terrorism; however, use of those services is strictly voluntary and is not binding. In addition, the overall nuclear security budget of the agency is insufficient to meet the challenge of the global task of materials security.

In sum, although it is the closest thing the world has to a global nuclear watchdog, the IAEA does not have the authority or resources to develop a comprehensive picture of the security status of weapons-usable nuclear materials around the world. Given the significant foundation of expertise and experience of the IAEA and consistent with the "Report of the Commission of Eminent Persons on the Future of the Agency," the authority and resources of the agency should be significantly strengthened so that it can play a much more robust role in a future global nuclear materials security system.

SOURCE: IAEA, "Report of the Commission of Eminent Persons on the Future of the Agency" (report, IAEA, Vienna, 2008).

DEVELOPING THE INDEX
An International Collaborative Process

As with the 2012 NTI Index, the Nuclear Threat Initiative (NTI) and the Economist Intelligence Unit (EIU) collaborated to develop the 2014 NTI Index while using an open and inclusive process grounded in a robust analytical approach and input from experts across the globe.

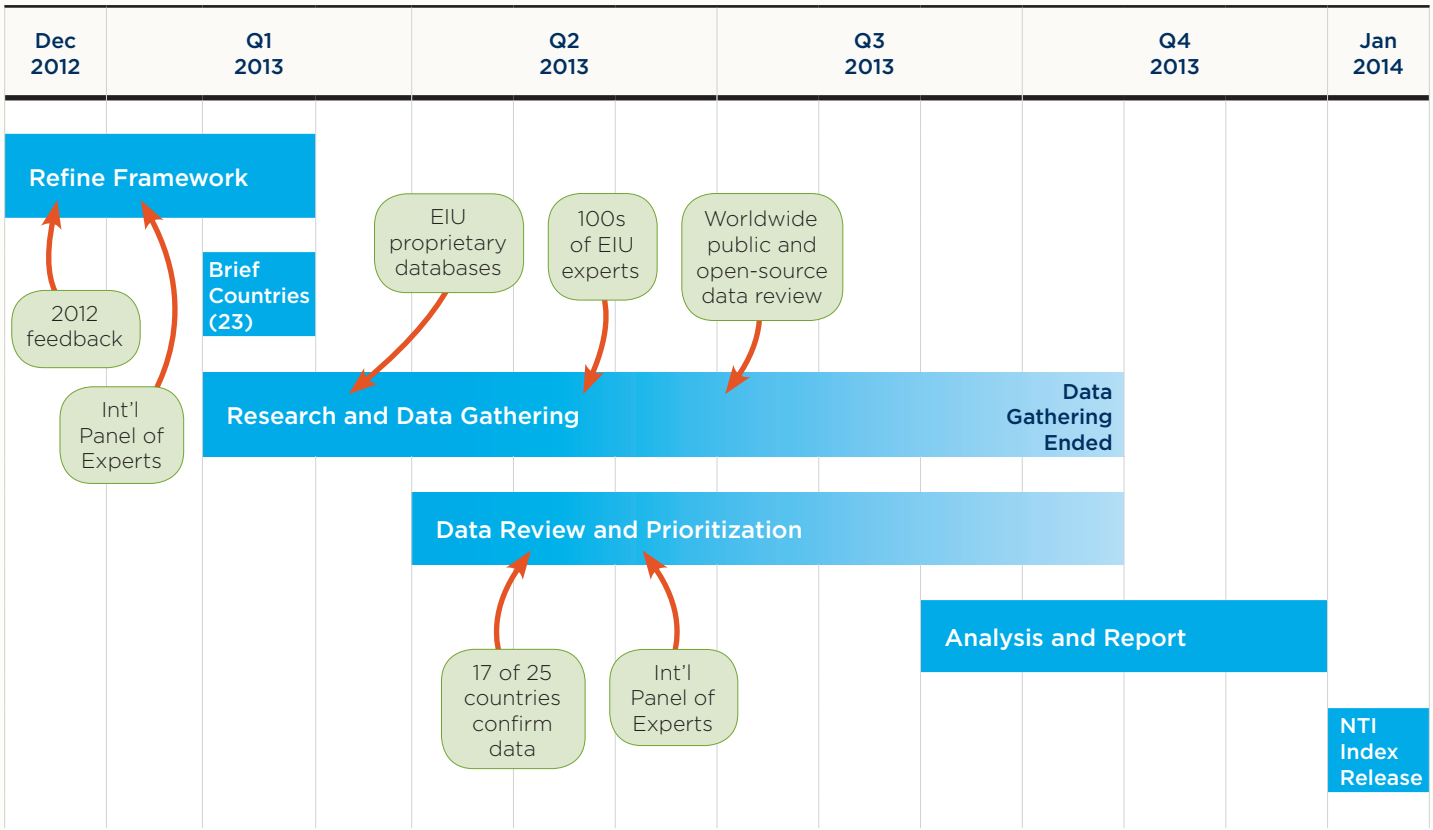
The process to develop the 2014 NTI Index was consistent with the 2012 NTI Index and included the following steps:[8]

- **Framework Definition.** The NTI Index framework comprises categories and indicators that reflect policies, actions, and other conditions that shape a state's overall nuclear materials security. For the 2014 NTI Index, NTI and the EIU—consulting with an International Panel of Experts (roles and members are fully detailed in the appendix)—reviewed the 2012 NTI Index framework, considered the feedback received, and made changes in an effort to strengthen the NTI Index. (Those changes are highlighted next and are discussed in more detail in the EIU Methodology appendix.)

- **Government Outreach.** It was important that the NTI Index development process be as transparent as possible. Therefore, the 25 governments with weapons-usable nuclear materials were offered briefings about the NTI Index. Those briefings were intended to provide background on the NTI Index and an overview of the NTI Index framework, to seek feedback on the NTI Index, and to inform governments of the opportunity later in the process to review and confirm the data gathered. Of the 25 governments, NTI briefed 23.

- **Research and Data Gathering.** Once the NTI Index framework was agreed upon, the EIU then led research and data gathering. The NTI Index relies on public and open-source information and does not provide a facility-by-facility assessment of security practices. Sources include national laws and regulations, government reports and public statements, and reports from non-governmental organizations and

[8] More details about the process of creating the 2014 NTI Index—including changes to the NTI Index, the approach to scoring indicators, numeric issues, and the weighting of categories and indicators—are discussed in the EIU Methodology appendix.



The process to develop the 2014 NTI Index began in December 2012. Throughout, NTI and the EIU sought input from the International Panel of Experts and individual governments. Index development tapped public and open-source data as well as the EIU's proprietary databases and country experts worldwide.

international organizations such as the International Atomic Energy Agency (IAEA). For indicators in the Risk Environment category—namely the Political Stability, Effective Governance, and Pervasiveness of Corruption indicators—the EIU drew from its existing proprietary databases, which are compiled quarterly by its team of hundreds of analysts and contributors worldwide.

- **Data Review and Confirmation.** In addition to review of the research and data by NTI and the EIU, the 25 governments with weapons-usable nuclear materials were offered the opportunity to review and comment on the preliminary results. This critical step ensures that the NTI Index reflects the most accurate and up-to-date information possible. Of the 25 states, 17 (more than two-thirds) took advantage of this opportunity.[9]

Data gathering ended on November 1, 2013. The final 2014 NTI Index and relevant materials are accessible as a print report and as an interactive web resource and an Excel spread sheet that can be downloaded at www.ntiindex.org.

[9] Those countries were Argentina, Australia, Belarus, Belgium, Canada, France, Germany, Italy, Japan, Kazakhstan, the Netherlands, Norway, Poland, South Africa, Switzerland, the United Kingdom, and the United States.

Responding to feedback from the 2012 NTI Index as well as the availability of new data, NTI and the EIU made a number of changes to the 2014 NTI Index framework.

DEFINING WHAT MATTERS

The NTI Index assesses states across five broad categories, with 19 indicators and 56 subindicators, some of which were weighted more heavily than others. The 25 states with one kilogram or more of weapons-usable nuclear materials were assessed across five categories of indicators (described next), and an additional 151 states with less than one kilogram of or no weapons-usable nuclear materials were assessed across three of the categories.[10]

Responding to feedback following release of the 2012 NTI Index as well as the availability of new data, NTI and the EIU made a number of changes to the NTI Index framework for the 2014 edition, including adding new indicators and subindicators in several categories. The five categories developed to assess nuclear materials security conditions, as well as the most significant changes from the 2012 NTI Index, are as follows:

1. **Quantities and Sites.** This category examines the total amount of weapons-usable nuclear materials and the number of sites within a state on the premise that the vulnerability and threat increase with having (a) higher quantities of materials, (b) more sites where materials are located, and (c) more frequent transport of materials.[11] This category also assesses whether a state's total stocks of weapons-usable nuclear materials are increasing, are decreasing, or remain unchanged. Over time, actions that decrease quantities of materials and the number of sites will reduce risks.

   The 2014 NTI Index better enables NTI to track long-term trends in materials quantities and accounts for short periods where quantities might remain unchanged despite a policy of elimination or removal of material. It does so by measuring increases and decreases in quantities over a four-year period rather than the two-year period assessed in the 2012 NTI Index.

2. **Security and Control Measures.** This category assesses five specific measures: (a) physical protection, (b) control and accounting procedures, (c) insider threat prevention, (d) security related to materials in transport, and (e) response capabilities. Because detailed information about site security and other specific protection measures are not—and should not be—publicly available, the EIU reviewed each state's legal and regulatory system as an alternative way to assess the state's commitment to those measures. This approach is based on the assumption that if states have stringent legal and regulatory requirements for nuclear materials security in place, they are more likely to also have robust physical security, accounting systems, and personnel reliability measures. For some states (Iran, Israel, and North Korea), even those proxy data were not available on some or all key indicators. In those cases, because the military has a major role in securing those states' stocks of weapons-usable nuclear materials,[12] a separate proxy based on estimates of the military's capabilities was used.

   NTI strengthened this category by making changes at the indicator and subindicator level. One additional subindicator was added to the evaluation of control and accounting procedures; three new subindicators were added that reflect measures to prevent the insider threat (i.e., the risk that personnel with authorized access to materials could perform acts of theft and could potentially aid terrorists or criminals);

[10] The threshold of one kilogram was selected and takes into account IAEA INFCIRC 225, Rev. 5, which states that quantities greater than one kilogram of HEU should be afforded higher levels of protection. NTI recognizes that some states may have gram quantities of weapons-usable nuclear materials in multiple locations which, added together, may bring totals to more than one kilogram. For the purposes of the NTI Index and the need to rely on publicly available information, those states are grouped with states that have no weapons-usable nuclear materials.

[11] By grouping countries, the NTI Index accommodates the large variation among states in the quantities of materials (from one kilogram to 1,000 tons or more) and in the number of sites (from 1 to 100 or more).

[12] In the case of Israel, the nuclear program is thought to be under the control of the civil defense force.



NTI and the EIU relied on the International Panel of Experts to shape the NTI Index. The group included experts from Argentina, Australia, China, France, India, Japan, Kazakhstan, Pakistan, Russia, South Africa, Sweden, the United Kingdom, the United States, and Vietnam; one is a representative from the World Institute for Nuclear Security, and one is a former IAEA official.

and one subindicator was added to the Response Capabilities indicator. Those additions are discussed in more detail in the EIU Methodology appendix.

3. **Global Norms.** This category examines the extent to which states participate in international legal agreements, take on voluntary commitments to improve materials security, and provide assurances about material inventories and security measures. One international legal agreement is especially important for assessing a state's commitment to nuclear materials security: the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment. A separate agreement, the International Convention for the Suppression of Acts of Nuclear Terrorism, commits states to criminalize acts of nuclear terrorism and to cooperate with other states to bring to justice those who commit such crimes. This category also assesses participation in voluntary initiatives, such as cooperation with other states or international organizations by giving or receiving financial or security-related assistance. Because appropriate assurances by a state about its security practices contribute to international confidence in nuclear materials security, countries with weapons-usable nuclear materials received credit for (a) reporting their quantities of materials, (b) publishing broad outlines of materials security arrangements, and (c) inviting security reviews from outside experts.

   In 2014, the Voluntary Commitments indicator gives credit to states with Centers of Excellence or Nuclear Security Training and Support Centers that provide nuclear security training, which had not been included in 2012. NTI renamed the "Transparency" indicator "International Assurances" to better reflect the actions being measured: for example, publishing nuclear security regulations or annual reports, declaring materials quantities, and issuing invitations for peer review.

4. **Domestic Commitments and Capacity.** This category evaluates how well a state meets its international obligations. In particular, it assesses the domestic implementation of United Nations Security Council Resolution 1540 and the CPPNM. It also examines the presence of and adherence to IAEA safeguards agreements and looks at whether a state has an independent regulatory agency responsible for nuclear security.

   There are no major changes from the 2012 NTI Index in this category.

5. **Risk Environment.** This category examines underlying conditions that contribute to or detract from the risk of nuclear theft within a state. Indicators include prospects for political instability over the next two years, effective governance, levels of corruption among public officials,[13] and the presence of groups interested in and capable of illicitly acquiring nuclear materials. The indicators addressing political stability, effective governance, and corruption are based on

[13] Although corruption may vary across different parts of society, NTI believes it is an important factor in a government's ability to secure its nuclear materials.

existing data contained in the EIU's "Risk Briefing" and "Business Environment Ranking" reports.[14] NTI and the International Panel of Experts continue to believe that the factors in this category can and do have an effect on a state's ability to secure its weapons-usable nuclear materials.

NTI received notable feedback on this category (called "Societal Factors" in the 2012 NTI Index), with some arguing that its indicators (e.g., political stability and corruption) are unrelated to nuclear security. The criticism prompted a robust dialogue among members of the International Panel of Experts, which underscores the relevance of this category in determining a state's ability to effectively secure its nuclear materials. On the basis of the international panel's recommendation, NTI decided to retain the category and to add an additional indicator on effective governance.

States with less than one kilogram of or no weapons-usable nuclear materials were assessed across three of the five categories (Global Norms, Domestic Commitments and Capacity, and Risk Environment). The weights assigned to the categories and indicators for each of the two NTI Index models reflect the judgment of NTI, with input from the International Panel of Experts, about the relative importance of the categories and indicators.[15]

As a result of changes to the NTI Index, direct year-on-year comparisons between the 2014 NTI Index and the original 2012 NTI Index would not have been possible. To allow for such comparisons, the EIU rescored states using the new framework and the data that would have been available to fit into that framework in 2011, when research for the 2012 NTI Index was conducted. Thus, the 2012 and 2014 scoring can be accurately compared, and the comparisons contained in this report reflect that new scoring. The complete 2012 report with original data and rankings is still available on the website, www.ntiindex.org.

It was important that the NTI Index development process be as transparent as possible. The 25 governments with weapons-usable nuclear materials were offered briefings, and NTI briefed 23. Seventeen also reviewed data.

SCOPE OF THE NTI INDEX

For this project, weapons-usable nuclear materials include HEU, which is uranium enriched to 20 percent or more in the isotope U-235; separated plutonium, which is plutonium separated from irradiated nuclear fuel by reprocessing; and the plutonium content in fresh mixed oxide fuel (MOX), which consists of blended uranium and plutonium used to fuel nuclear power plants.[16]

The NTI Index covers only measures related to the potential theft of weapons-usable nuclear materials. It is important to note that the NTI Index does not assess security for low-enriched uranium (LEU) used at nuclear power plants or radiological materials needed for a "dirty bomb." The security of such materials is important, and many of the security measures in place are the same for both, but the potential consequence of a terrorist attack using LEU or radiological materials would be on a vastly different (and smaller) scale from one using weapons-usable nuclear materials. In addition, the NTI Index does not address the threat of sabotage of nuclear facilities, proliferation risks, or disarmament. They are all important security issues that governments must address, but they require a different analytical approach and represent different challenges.

NTI and the EIU continue to welcome feedback at ntiindex@nti.org.

[14] For further details about the sources used by the EIU to research each indicator in the Risk Environment category, see the EIU Methodology appendix.

[15] For more about the weighting process and the weights assigned to each category and indicator, see the EIU Methodology appendix. Users of the Excel-based NTI Index model, which is available on the NTI Index website at www.ntiindex.org, can change the weights to reflect their own priorities and to see how that change affects the overall results.

[16] The materials listed constitute the vast majority of weapons-usable nuclear materials. The NTI Index does not consider other weapons-usable nuclear materials such as U-233. Those other materials are typically present in small quantities in nuclear-armed states with significantly larger quantities of HEU and plutonium and would not affect the NTI Index scores.

OBSERVATIONS
The Status of Nuclear Materials Security

Two years after the inaugural edition of the NTI Index offered a baseline assessment of nuclear materials security conditions around the globe, the 2014 NTI Index reveals a number of positive developments. Since 2012, several states have removed all or most of the weapons-usable nuclear materials from their territories, leaving fewer states from which this dangerous material can be stolen. Other states are adopting stricter regulations for physical protection and material control and accounting to ensure that the materials they hold are protected against theft. Still others are now participating in multilateral initiatives, are providing financial or in-kind contributions to international organizations, or are signing and ratifying relevant international legal agreements governing nuclear security. Those trends are encouraging.

However, despite this progress, the 2014 NTI Index shows that considerable work is needed to address the threat posed by weapons-usable nuclear materials, both at the individual state level and collectively at the global level.

Following are observations about key overall trends, country highlights, and challenges that remain ahead.

KEY TRENDS

Considerable Progress in Securing Materials and Strengthening Global Security

When the 2012 NTI Index was released, 32 states had at least one kilogram of weapons-usable nuclear materials. Since then, 7 states—Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam—have removed all or most of their weapons-usable nuclear materials, according to the U.S. National Nuclear Security Administration, moving these states to the list of states with less than one kilogram of or no weapons-usable nuclear materials. The number of states with one kilogram or more of such material now stands at 25, an impressive 22 percent reduction in the number of states with such materials since the 2012 NTI Index was released.[17]

[17] Italy has committed to removing all weapons-usable nuclear materials from its territory before the 2014 Nuclear Security Summit, but it had not yet done so when data gathering was completed for the 2014 NTI Index on November 1, 2013.

Belgium, Canada, and Japan showed the greatest improvement in the 2014 NTI Index. Belgium passed new legislation, became party to the 2005 Amendment to the CPPNM, and decreased its quantities of materials. Canada improved transportation regulations and ratified ICSANT and the 2005 Amendment. Japan's most significant step was to form a new independent nuclear regulatory agency.

An additional 15 of the remaining 25 states, or approximately 60 percent of states with weapons-usable nuclear materials, improved their overall scores in the 2014 NTI Index.[18] Examples of tangible progress captured in the 2014 NTI Index include the following:

- Thirteen states have decreased their quantities of materials over the most recent four-year period measured by the NTI Index, thereby reducing opportunities for theft.[19]
- Six states passed new laws and regulations or updated existing ones to strengthen physical protection measures and the ability to mitigate the insider threat (i.e., the risk that personnel with authorized access to materials could perform acts of theft and potentially aid terrorists or criminals), thus decreasing the risk of theft of weapons-usable nuclear materials.[20]
- Three states' regulations on physical security during transport[21] were updated to reflect the most recent revisions to the International Atomic Energy Agency (IAEA) nuclear security guidelines,[22] thereby improving protection of materials when they are most vulnerable.
- Seven states became parties to key international legal agreements related to nuclear materials security, thus moving the world closer to a more robust legal foundation for global nuclear security.[23]
- Four states made new voluntary commitments that support global efforts to improve security by (a) contributing to the IAEA's Nuclear Security Fund; (b) joining the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (G-8 Global Partnership); or (c) providing or receiving bilateral or multilateral security assistance, which demonstrates the importance of cooperative action.[24]

[18] Listed in order of improvement from most to least: Belgium, Canada, Japan, Belarus, Uzbekistan, Argentina, Germany, Pakistan, Australia, France, Israel, China, India, Norway, and Poland.

[19] Argentina, Australia, Belarus, Belgium, France, Germany, Italy, Kazakhstan, Poland, Russia, South Africa, the United States, and Uzbekistan.

[20] Belarus, Belgium, Japan, the Netherlands, Pakistan, and Uzbekistan.

[21] Belarus, Canada, and Germany.

[22] The IAEA publishes a series of guidelines and recommendations covering various aspects of nuclear security, the most prominent of which is INFCIRC 225, currently in its fifth revision. States can choose whether and how to apply the recommended security measures contained therein, including those based on older versions of the guidelines. As such, although the nuclear security guidelines are useful tools, they are inconsistently applied or not applied at all because they are voluntary.

[23] Argentina, Australia, Belgium, Canada, France, Israel, and Uzbekistan.

[24] China, India, Kazakhstan, and Uzbekistan.

CHANGES FROM THE 2012 NTI INDEX

The second edition of the NTI Index assesses progress that states have made in improving nuclear materials security conditions. Following the launch of the 2012 NTI Index, NTI and the Economist Intelligence Unit (EIU) sought feedback from experts, practitioners, and officials on the index framework and overall approach.

As a result, there are a number of changes to the NTI Index framework for the 2014 edition, including adding new indicators and subindicators in several categories. As a result of those changes, direct year-on-year comparisons between the 2014 NTI Index and the original 2012 NTI Index would not have been possible.

To allow such comparisons, the EIU rescored states in the 2012 NTI Index, using the new framework and the data that would have been available to fit into that framework in 2011, when research for the 2012 NTI Index was conducted. This means the 2012 and 2014 scoring can be accurately compared, and the comparisons contained in this report reflect that new scoring. Full details about changes to the NTI Index are provided in the EIU Methodology appendix.

Five states improved their overall scores by taking only one action.[25] Although only one action may seem insignificant, even small steps, collectively with others states' actions, can contribute to improvements in global security.

Nuclear Security Summits Are Having an Impact

The 2010 and 2012 Nuclear Security Summits have played a vital role in raising attention to the urgency of securing all nuclear materials and elevating the issue to the head-of-government level in a broad group of states with and without weapons-usable nuclear materials. With the Netherlands hosting the third summit, a fourth—and perhaps final—summit has been announced for 2016 in the United States.

The summits have resulted in meaningful action by many states to improve security and to enhance cooperation and have had a direct effect on nuclear security globally. At the 2010 and 2012 Nuclear Security Summits, many states with weapons-usable nuclear materials committed to (a) reduce or eliminate their quantities of materials, (b) sign and ratify key international legal agreements, (c) support global efforts to improve nuclear security (e.g., by contributing to the IAEA or the World Institute for Nuclear Security), or (d) take other actions in an effort to secure all vulnerable nuclear material around the world. The NTI Index captures 12 specific score improvements in eight states that were a direct result of fulfilling summit commitments, from decreasing quantities of materials, to ratifying key international legal agreements, to providing financial or in-kind contributions to the IAEA and the World Institute for Nuclear Security.

However, a number of summit commitments, including some made in 2010, have not yet been implemented, including the United States' commitment to ratify the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM) and the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT). Moreover, the summit process has so far taken a more narrow approach to strengthening global nuclear security. Instead of engaging leaders in a dialogue about steps that all states must take to build an effective global nuclear security system, it has until now served primarily as a platform for states to offer voluntary, ad hoc, security improvements. The summits in 2014 and 2016 present an opportunity for leaders to determine what steps states need to take together to create an effective global nuclear materials security system.

Global Stocks of Weapons-Usable Nuclear Materials Are Decreasing Overall, but Some States Are Still Increasing Their Individual Stocks

The NTI Index gives states with lower quantities of materials and fewer sites that house them higher scores because those factors reduce opportunities for theft.

Since the 2012 NTI Index, global stocks of weapons-usable nuclear materials have decreased, led by the 7 states that no longer have one kilogram or more of weapons-usable nuclear materials and the 13 other states

[25] China, Germany, India, Israel, and Poland.

that the 2014 NTI Index shows decreased their stocks of weapons-usable nuclear materials, including 3 nuclear-armed states—France, Russia, and the United States. This decrease was made possible, in part, by several ongoing initiatives, such as the U.S. Department of Energy's Global Threat Reduction Initiative and its predecessors, which assist states in reducing or eliminating weapons-usable nuclear materials.

Those initiatives reflect a growing trend toward minimizing the use of highly enriched uranium (HEU) for civilian purposes. There is also widespread agreement against further production of plutonium and HEU for nuclear-weapons purposes. China, France, Russia, the United Kingdom, and the United States observe a moratorium on production of those materials for nuclear weapons. Unfortunately, global negotiation of a Fissile Material Cutoff Treaty to prohibit the further production of plutonium and HEU for nuclear-weapons purposes has stalled within the Conference on Disarmament in Geneva. Although there is general support for the negotiations, the United Nations body operates on the principle of consensus, which has not yet been reached. Unlike materials for weapons purposes, there is no corresponding agreement about the need to end increases in stocks of weapons-usable plutonium in the civilian sector.

Despite the reduction of nuclear materials in 13 states, 4 states have increased their stocks of weapons-usable nuclear materials over the most recent four-year period measured by the NTI Index. Japan and the United Kingdom increased quantities for their civilian nuclear energy sectors. Those two countries, as well as others, continue to use plutonium as fuel for civil reactors. Unlike other states, for the period measured by the NTI Index, Japan and the United Kingdom produced or received the plutonium faster than it was consumed by reactors, resulting in a net increase of materials over the measurement period. Two other states—India and Pakistan—have increased materials, for both civilian and military purposes. In addition, North Korea has taken new steps to produce new weapons-usable nuclear materials that—absent a political agreement to limit such activities—may increase its quantities of weapons-usable nuclear materials, which would be reflected in future editions of the NTI Index.

All states—even those without weapons-usable nuclear materials—must be alert to and must guard against the possibility that their territories could be used as a safe haven, staging ground, or transit point for terrorist operations.

Improvements in Physical Protection, Control, and Accounting Measures Enhance Global Security

One of the most important measures a state can take to secure its weapons-usable nuclear materials is to ensure that it employs effective standards or practices for the physical protection, control, and accounting of those materials. Eight states improved their scores in this crucial Security and Control Measures category.[26] Notably, Belgium passed important new laws that strengthen measures (a) for physically securing nuclear materials and sites, (b) for accounting for and controlling access to materials, and (c) for mitigating the risk that personnel with authorized access to materials could perform acts of theft and potentially aid terrorists or criminals.

Belarus, Canada, and Germany improved their scores by updating their regulations on physical security of materials during transport in line with the most recent version of the IAEA's nuclear security guidelines. Because materials are extremely vulnerable during transport, ensuring that they are protected to the highest possible standards during transport is critical.

States without Materials Are Supporting Global Norms and Implementing International Commitments

All states—even those without weapons-usable nuclear materials—must be alert to and must guard against the possibility that their territories could be used as a safe haven, staging ground, or transit point for terrorist

[26] Listed in order from most improved to least: Belgium, Belarus, Canada, Germany, Pakistan, the Netherlands, Uzbekistan, and Japan.

operations. And just as states with weapons-usable nuclear materials have a role to play in improving global nuclear security, so do those states without such materials.

The following are some notable improvements in states with less than one kilogram of or no weapons-usable nuclear materials since 2012, as well as other observations:

- Twenty-two states with less than one kilogram of or no weapons-usable nuclear materials became parties to key international legal agreements related to nuclear materials security. Two acceded to the CPPNM; 15 became parties to the 2005 Amendment to the CPPNM; and 8 ratified ICSANT.[27] However, acceptance of those three international legal agreements is far from universal among the 151 states with less than one kilogram of or no weapons-usable nuclear materials: 39 have not yet ratified the CPPNM, 101 have not yet become party to the 2005 Amendment to the CPPNM, and 85 have not yet ratified ICSANT.[28]
- Eighteen states with less than one kilogram of or no weapons-usable nuclear materials made new voluntary commitments that support global efforts to improve security by joining the Proliferation Security Initiative, the Global Initiative to Combat Nuclear Terrorism, or the G-8 Global Partnership; by providing or receiving bilateral or multilateral assistance; or by opening Centers of Excellence or Nuclear Security Training and Support Centers that provide nuclear security training.
- Of the 151 states, Côte d'Ivoire and Vietnam were the most improved, increasing their scores by 25 and 14 points, respectively. The improvements were driven largely by the countries' becoming parties to international legal agreements.
- Seven states that in 2012 were included as countries with one kilogram or more of weapons-usable nuclear materials have removed most or all of their materials and are now included as countries with less than one kilogram of or no weapons-usable nuclear materials. As might be expected, six of those seven scored in the top 25 in this second group, given that sophisticated civilian nuclear infrastructures were already in place.

COUNTRY HIGHLIGHTS

Australia Again Ranks First Among States with Weapons-Usable Nuclear Materials

Once again, Australia ranks first among the 25 states with weapons-usable nuclear materials. In particular, Australia scores well because of its small quantities of material and low number of sites and its strong commitment to strengthening global norms, as demonstrated through its ratification of relevant treaties, its participation in international initiatives, and its contribution to international organizations.

Even after ranking first in 2012, Australia improved its score in the 2014 NTI Index by two points. Actions included further decreasing quantities of materials and ratifying ICSANT. Australia sets an example for other states, demonstrating that all states can do more to continuously improve long-term nuclear security.

Belgium, Canada, and Japan Are the Most-Improved States

Belgium, Canada, and Japan showed the greatest improvement in the 2014 NTI Index and increased their scores by seven, six, and six points, respectively.

Belgium improved its score by passing new nuclear security legislation, in particular, by strengthening several measures to address the insider threat. Belgium also became party to the 2005 Amendment to the CPPNM.

[27] The CPPNM requires states to apply physical protection measures to nuclear materials in international transit. The 2005 Amendment to the CPPNM significantly expands the agreement's scope to include material in use, in storage, and in domestic as well as international transit. Because not enough parties to the CPPNM have become party to the 2005 Amendment, it has not yet entered into force. ICSANT commits states to criminalize acts of nuclear terrorism and promotes cooperation among countries on investigations and extraditions. Although ICSANT is in force, it is not yet universal.

[28] The full list of states that have become party to these agreements since data gathering for the 2012 NTI Index was completed at the end of September 2011, including both states with one kilogram or more of weapons-usable nuclear materials and states with less than one kilogram of or no weapons-usable nuclear materials, is as follows: Côte d'Ivoire and Vietnam acceded to the CPPNM; Albania, Argentina, Armenia, Belgium, Canada, Cuba, Cyprus, France, Georgia, Ghana, Greece, Israel, Lesotho, Luxembourg, Macedonia, Malta, Mexico, Slovakia, Sweden, Uzbekistan, and Vietnam became parties to the 2005 Amendment; and Afghanistan, Australia, Canada, Costa Rica, Côte d'Ivoire, France, Iraq, Kuwait, Malta, Nigeria, and Turkey ratified ICSANT. Canada's implementing legislation went into effect on November 1, 2013, thus allowing ratification of the 2005 Amendment to the CPPNM and ICSANT to be completed shortly thereafter.

Finally, Belgium is now decreasing its quantities of nuclear materials as a result of its decision to phase out nuclear energy and any related production technologies.

Canada increased its score by incorporating new IAEA guidelines regarding the transport of nuclear materials into its national regulations and by ratifying both the 2005 Amendment to the CPPNM and ICSANT.

Following the Fukushima accident, Japan took important steps to strengthen nuclear safety that had positive implications for nuclear security. Most significantly, Japan formed a new independent regulatory agency that addresses both nuclear safety and security. Both establishing and maintaining a regulatory agency that is independent of influence from those being regulated are necessary to ensure that those with nuclear security responsibilities have meaningful and unbiased oversight. Japan also strengthened measures to address the insider threat, which is crucial to preventing insiders with authorized access to materials from performing acts of theft and potentially aiding terrorists or criminals. Japan provides a critical lesson for other states: states should be proactive in putting in place measures to prevent disasters before they occur.

Among Nuclear-Armed States, Pakistan Is Most Improved

Global stocks of weapons-usable nuclear materials are made up of approximately 1,400 metric tons of HEU and almost 500 metric tons of separated plutonium. The nine nuclear-armed states—China, France, India, Israel, North Korea, Pakistan, Russia, the United Kingdom, and the United States—possess more than 95 percent of those materials, which are in both military and civilian use. These states have a special responsibility to ensure that the materials are effectively secured and to build confidence among others that that is the case.

That responsibility applies even to materials outside of civilian programs, which many assume are under military protection and therefore are better protected than civilian materials. Several recent incidents demonstrate that such assumptions are not necessarily the case and that challenges exist in securing even the highly sensitive military or other non-civilian facilities and materials. Among those incidents are the security lapse at the Oak Ridge Y-12 National Security Complex in the United States in 2012 and the 2013 removal of the deputy commander of U.S. Strategic Command, which oversees all U.S. nuclear weapons, when his judgment and reliability were called into question amid allegations that he used counterfeit gambling chips at a casino.

In the 2014 NTI Index, the scores of the nine nuclear-armed states remained mostly static, with some states' scores increasing or decreasing by a single point. Pakistan was a notable exception, with its score increasing by three points. France's and Israel's scores increased by two points.

Pakistan, which improved its score by three points compared with 2012, demonstrated the largest improvement of any nuclear-armed state. Pakistan is taking steps to update its nuclear security regulations and to implement nuclear security best practices. In particular, new regulations have improved its scores in the On-Site Physical Protection indicator. Pakistan also participated in new bilateral and multilateral assistance, although its score for Voluntary Commitments was already high. Despite those positive developments, Pakistan ranked 22nd overall and must still improve its regulations for physical protection, control and accounting, and insider threat prevention.

Notable Highlights from Other Nuclear-Armed States

Following are some of the other notable highlights:

- **France**, the **United Kingdom**, and the **United States** scored the highest among the nuclear-armed states, with France tied for 7th with the Netherlands, and the United Kingdom and the United States tied for 11th.
- **France** ratified the 2005 Amendment to the CPPNM and ICSANT, and **Israel** ratified the 2005 Amendment, both improving their scores in the Global Norms category. Although the **United States** committed to ratify both the 2005 Amendment to the CPPNM and ICSANT at the 2010 Nuclear Security Summit, the U.S. Congress has failed to pass the implementing legislation necessary to complete ratification of the two agreements.

The lack of global standards, information sharing, or accountability mechanisms in nuclear security is in stark contrast to other fields, such as nuclear safety and aviation.

- **China** and **India** contributed for the first time to the IAEA's Nuclear Security Fund, a voluntary fund established to support, among other things, the implementation of nuclear security activities to prevent, detect, and respond to nuclear terrorism. Doing so increased both states' scores in the Global Norms category. Nonetheless, both India and China continue to score poorly because their regulatory structures lack key requirements for securing materials.[29]

REMAINING CHALLENGES

The Lack of an Effective Global System for Securing Weapons-Usable Nuclear Materials Is a Major Challenge

Despite progress since 2012, there is still no effective global system for how nuclear materials should be secured. No organization oversees how states secure their weapons-usable nuclear materials. And the CPPNM, its 2005 Amendment, and the IAEA nuclear security guidelines—the only mechanisms that provide anything close to nuclear security standards—fall short of what is needed because they do not apply to all weapons-usable nuclear materials and do not define standards or best practices for all states to follow. Many states consider materials security an exclusively sovereign responsibility, rather than a shared one, and approaches to nuclear security vary widely.[30] For example, although the majority of states with weapons-usable nuclear materials require facilities with such material to have armed personnel to protect those facilities and the materials contained within against an attack, several states have no such requirement and rely instead on external forces, such as local police, to come to the aid of the facility's security personnel in the event of an attack. There is also no expectation that states should share information about their security practices, and there is little sense of accountability, even though poor security in any one state can affect all other states.

The lack of global standards, information sharing, or accountability mechanisms in nuclear security is in stark contrast to other fields, such as nuclear safety and aviation (as mentioned earlier), where states understand and accept that all parties have an interest in the performance of others. In the case of aviation, states set standards for airline safety and security through the International Civil Aviation Organization (ICAO), an international body created within the framework of the United Nations. The ICAO then conducts audits and shares unresolved security concerns with member states. In addition, the European Aviation Safety Agency publishes an annual report on airline safety. Those standards and practices, as well as the sharing of information, enable states to decide whether to grant certain airlines landing rights at their airports. States should adopt a similarly cooperative and stringent system to secure some of the most dangerous materials on the planet.

[29] China's personnel vetting requirements are not as stringent as other states. For example, China requires only background checks—not drug tests or mental fitness checks—for its personnel, and it does not require those checks to be repeated at specified intervals. In addition, its transport security regulations have not been updated to reflect the recently revised IAEA guidelines on transport security. India's regulatory structure is missing key provisions on security; in some cases, security measures are recommended but not required. Weaknesses are particularly apparent in the areas of transport security, material control and accounting, and measures to protect against the insider threat, such as personnel vetting and mandatory reporting of suspicious behavior.

[30] That no common standards exist for securing weapons-usable nuclear materials is evidenced by the research undertaken to create the 2014 NTI Index, the results of which confirm that states have disparate approaches to nuclear security. The following are several examples: Some states require only routine checks of criminal history in their vetting of personnel whose position would allow access to sensitive areas of nuclear facilities. Others require additional drug testing and mental fitness checks. Some states require annual rescreening of existing personnel, whereas others require rescreening only every five years or require no further vetting. Some states' regulations require operators of nuclear facilities to incorporate the risk posed by insiders with authorized access to nuclear materials when they design their security systems, and others do not. Finally, some states take a prescriptive approach to nuclear security, whereas others simply suggest measures but give licensees discretion about how to secure materials.

Several data findings underscore weaknesses in the current global framework for nuclear security:

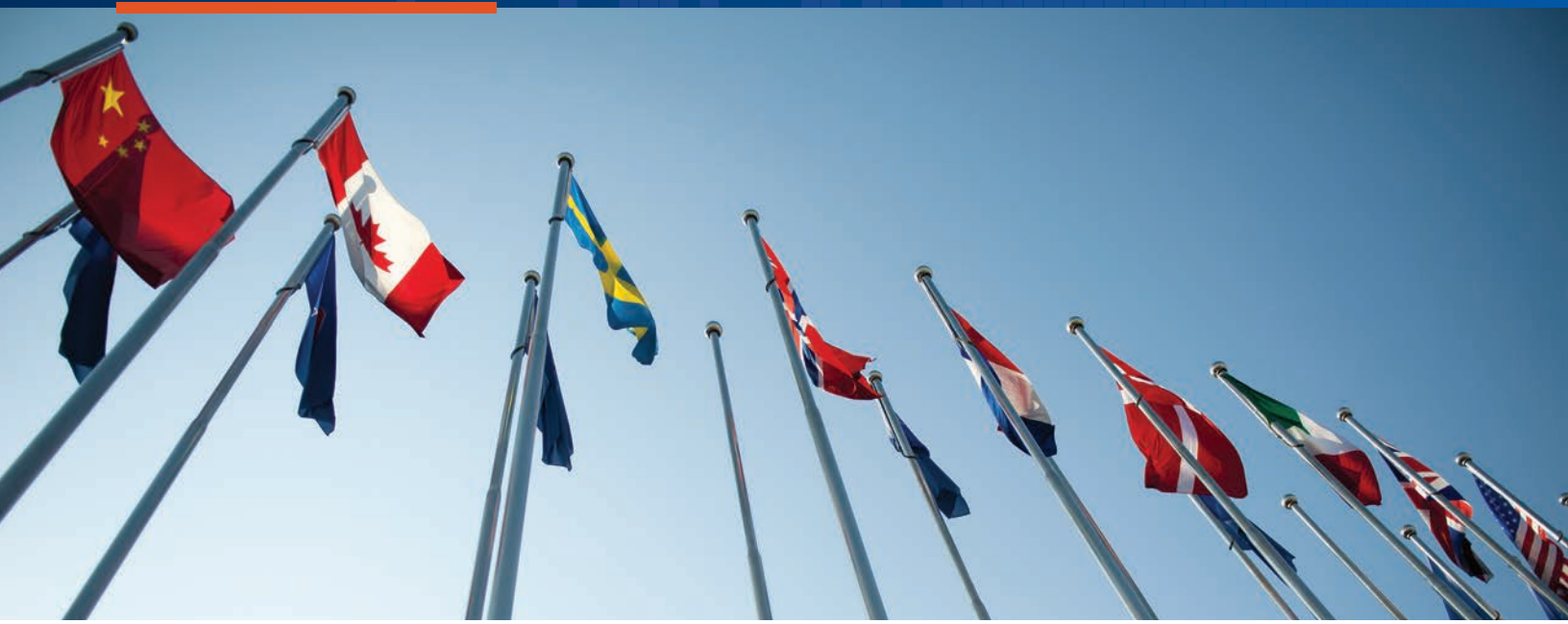
- **The Existing Legal Foundation of the International System Remains Weak.** There is one key international legal agreement related to nuclear security: the CPPNM and its 2005 Amendment.[31] A separate agreement, ICSANT, commits states to criminalize acts of nuclear terrorism and to cooperate in bringing those who commit such crimes to justice. However, each of the agreements has limitations: they are not universally implemented (in fact, the 2005 Amendment is not yet in force), they have no enforcement or accountability mechanisms, and the CPPNM and its 2005 Amendment cover only civilian materials, which make up only 15 percent of the global stocks of weapons-usable nuclear materials. Despite those limitations, they are important building blocks for the foundation of an international nuclear security system and could be more valuable if they were universal. The 2005 Amendment to the CPPNM will not enter into force until two-thirds of states that are party to the CPPNM ratify it. There are 148 parties to the CPPNM as of November 1, 2013; therefore, 27 more states must become parties to the 2005 Amendment for it to enter into force. Since research for the 2012 NTI Index ended, 7 more states with weapons-usable nuclear materials have become parties to these international legal agreements: Argentina, Belgium, Canada, France, Israel, and Uzbekistan became parties to the 2005 Amendment to the CPPNM, and Australia, Canada, and France ratified ICSANT. The United States pledged in 2010 to accelerate ratification of the 2005 Amendment and ICSANT, but it has not yet done so. Norway has pledged to ratify ICSANT but has also not yet done so.

- **Participation in International Peer Review Is Still Limited.** International peer review is an evaluation of security processes or practices that uses independent, qualified reviewers from international organizations and other states to make an impartial assessment and to provide recommendations for improvement. As such, it is an important tool for improving security performance and for providing assurance to others about the effectiveness of a state's security. Though the 2012 Nuclear Security Summit urged states to participate in international peer reviews as a means to strengthen security and share best practices, this resource and tool is still not the norm. Of the 25 states with weapons-usable nuclear materials, only 18 have invited a peer review in the past five years.[32] An additional state has invited a peer review before that time, and 6 have never invited one. Unless all states participate in peer review, confidence that all states with weapons-usable nuclear materials have effective nuclear security will remain lacking.

- **The Vast Majority of Global Stocks of Weapons-Usable Nuclear Materials—Approximately 85 Percent—Remain Outside Existing International Nuclear Security Mechanisms.** Approximately 85 percent of global stockpiles of weapons-usable nuclear materials are in military or other non-civilian use (e.g., in weapons programs or in government research facilities). Those materials are not subject to the CPPNM and the 2005 Amendment (which apply only to civilian materials) or to IAEA guidelines. They are also not subject to assurance mechanisms—such as best-practice exchanges, information sharing, and peer review—that would be important for building confidence in the effectiveness of its security. A truly effective global nuclear security system must encompass all weapons-usable nuclear materials, including those in military and other non-civilian programs. Recent security incidents underscore the danger of assuming that those materials are already effectively secured. Among those incidents are the security breach at Y-12 and the removal of the deputy commander of U.S. Strategic Command. (For a further breakdown of global stocks of weapons-usable nuclear materials, see the chart on page 10.)

[31] In addition, United Nations Security Council Resolution 1540 obligates states to maintain "appropriate effective measures" to account for, secure, and provide physical protection for nuclear weapons and related material. However, it does not provide specific guidance or define standards or practices detailing how states must implement those obligations.

[32] However, the overwhelming majority of reviews conducted by the IAEA evaluated the security and regulatory frameworks in place in those states, rather than the implementation of security at sites holding weapons-usable nuclear materials.



RECOMMENDATIONS
An Agenda for Assurance, Accountability, and Action

Urgent action is needed by states and the global community to prevent the unauthorized access and theft of weapons-usable nuclear materials that could be used to build a nuclear bomb. The threat is global: each state's security is only as strong as the weakest link in the chain, and no single state can address this threat alone. Thus, all states have a responsibility to work both individually and cooperatively to help reduce this threat.

The challenge is considerable but not insurmountable, and there are solutions to address and reduce the threat. The principal hurdle is the need to build and maintain the political will for action. The 2014 Nuclear Security Summit represents a valuable near-term opportunity for moving the global nuclear security agenda forward. Next are recommendations for advancing that agenda at the next summit and beyond.

BUILDING AN EFFECTIVE GLOBAL NUCLEAR SECURITY SYSTEM

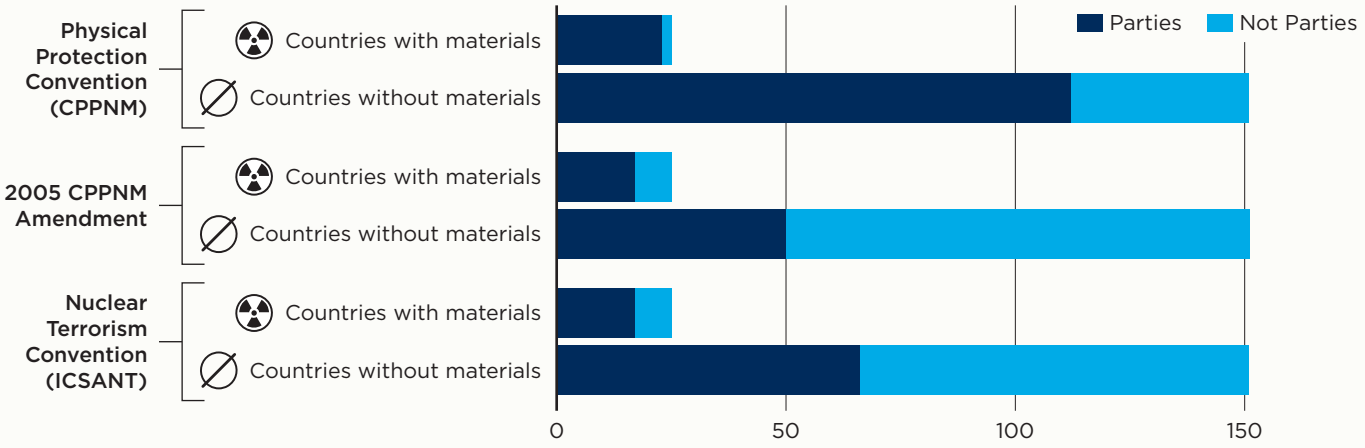
The top recommendation in the 2012 NTI Index was to build the foundation for an effective global nuclear materials security system and to establish a dialogue on priorities. This recommendation remains the number one priority for 2014. (See "Global Dialogue on Nuclear Security Priorities," on page 50 for details on an NTI initiative to promote such a dialogue.)

To build an effective global nuclear security system, states should do the following:

Reach Consensus on the Key Principles of a Global System

Although states have begun to recognize the need for an effective global nuclear materials security system, many continue to view nuclear security as only a sovereign, and not a shared, responsibility. As a result, there is not yet a

EXISTING LEGAL FOUNDATION OF THE INTERNATIONAL SYSTEM REMAINS WEAK



One key international legal agreement relates to nuclear security, the CPPNM and its 2005 Amendment, and a separate agreement, ICSANT, commits states to criminalize acts of nuclear terrorism and to cooperate in bringing those who commit such crimes to justice. Although they have limitations, the agreements are important building blocks for the foundation of an international nuclear security system and could be more valuable if they were universal.

system for securing all weapons-usable nuclear materials that builds confidence that each state is effectively securing its materials and that holds states accountable to each other. Because the threat is global and because the consequences of a nuclear attack would reverberate around the world, nuclear security must be viewed as a shared responsibility, with each state having an equity in how others fulfill their security responsibilities.

The Nuclear Security Summit process is playing an important role in highlighting the threat and providing support for—and accelerating—national efforts to secure nuclear materials, but it will not continue indefinitely. In June 2013, President Barack Obama announced that the United States would host what is presumed to be a final summit in 2016—and currently no other institution or process is in place for leaders to reach consensus on priorities for strengthening the global system beyond 2016.

As the summit process nears an end, states should commit to working toward consensus on the key principles of a global nuclear security system and to establishing the architecture for implementing them. The 2014 and 2016 summits will offer moments of accountability for states to demonstrate progress on their own nuclear materials security as well as their commitment to addressing the threat and to working toward a robust global nuclear security system.

Build Confidence in the Effectiveness of Security Practices through Reassuring Steps

In an effective global system for securing nuclear materials, words alone are not enough for states to have confidence in each other's security practices. States must instead take reassuring actions to build the confidence of others in their security measures and to be held accountable for their commitments. States can do so by taking the following actions:

- **Make regular international peer reviews the norm.** International peer review is a powerful mechanism for improving security performance and for building the confidence of others in a state's commitment to continued improvement. States can further build the confidence of other governments and stakeholders in their nuclear security practices by publishing the results of the review (redacted for sensitive information). All states with weapons-usable nuclear materials should participate in regular international peer reviews.

GLOBAL DIALOGUE ON NUCLEAR SECURITY PRIORITIES

A top recommendation of the 2012 NTI Index was a call for governments to establish a dialogue on priorities and to build the foundation for an effective global nuclear materials security system that would provide confidence in states' security and that would hold states accountable. In response to that recommendation, in July 2012, the Nuclear Threat Initiative initiated a Global Dialogue on Nuclear Security Priorities involving senior government officials, representatives from international organizations such as the International Atomic Energy Agency, leading experts, and nuclear industry representatives to work toward consensus on the principles of an effective global nuclear security system for securing all weapons-usable nuclear materials. Four overarching principles emerged from a series of meetings to date:

- All weapons-usable nuclear materials and facilities should be covered by the system.
- All states and facilities with those materials should adhere to international standards and best practices.
- States should help build confidence in the effectiveness of their security practices, both domestically and internationally, and should take reassuring actions to demonstrate that all nuclear materials and facilities are secure.
- States should work to reduce risk through minimizing or, where feasible, eliminating weapons-usable nuclear materials stocks and the number of locations where they are found.

These principles are now under discussion within the Nuclear Security Summit process.

For more details on the Global Dialogue on Nuclear Security Priorities, please see www.nti.org/globaldialogue.

- **Publish nuclear security regulations and other information that provide broad outlines of security arrangements.** Only 11 of 25 states with weapons-usable nuclear materials now publish both their regulations and an annual report.[33] Public release of official documents increases confidence that the basic legal and regulatory framework for nuclear security is in place. Such information can be published without revealing details about specific security measures while protecting sensitive information, as evidenced by states that publish both types of information.
- **Declare inventory quantities for both highly enriched uranium (HEU) and plutonium.** Declarations of overall quantities of materials are needed to assess and track inventory trends and to monitor whether inventories are growing or declining. They also reassure others that material is properly accounted for without compromising national security interests. Nine states voluntarily declare their civilian plutonium holdings to the International Atomic Energy Agency (IAEA). In addition, the United States and the United Kingdom have declared their nuclear-weapons holdings; both have released the production history for the HEU and plutonium in their military programs.

Although progress on the three actions in the preceding bullets was assessed in the NTI Index, states can undertake many other actions that build confidence and can reassure others about the effectiveness of their security practices. For a more comprehensive discussion of this concept, see the paper, "Next Steps on International Assurances," at www.nti.org/globaldialogue.

Become Parties to Relevant Nuclear Security Treaties

With the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) and the Convention on the Physical Protection of Nuclear Material (CPPNM) not yet universal, with the 2005 Amendment to the CPPNM not yet in force, and with no set of universally accepted or applied security standards, the foundation for a global nuclear security system is weak. That the 2005 Amendment to the CPPNM has not yet entered into force leaves a

[33] The 11 states are Argentina, Australia, Belgium, Canada, France, India, Pakistan, Russia, South Africa, the United Kingdom, and the United States.

particularly large gap in the international system, as the CPPNM in its original form requires only physical protection measures for nuclear materials in international transit. The 2005 Amendment requires physical protection measures for nuclear material in use, in storage, and during domestic or international transit, as well as for nuclear facilities.

Several states, including the United States, have pledged to accelerate efforts to ratify ICSANT and the 2005 Amendment to the CPPNM but have not yet done so. The effect of the United States' failure to act is particularly negative as other states block efforts to strengthen nuclear security, arguing that they will consider new initiatives only after the United States becomes party to the agreements.

All states must become parties to these international legal agreements and, in particular, must work to bring the 2005 Amendment to the CPPNM into force.

Strengthen Voluntary Mechanisms

States should take other measures to support global efforts to strengthen nuclear security and to assure others of the effectiveness of their security. States can implement actions required by international legal agreements without signing or ratifying them and can announce publicly their intention to do so.

States can also make voluntary commitments, such as contributing to the IAEA's Nuclear Security Fund or the World Institute for Nuclear Security, or joining the G-8 Global Partnership, the Proliferation Security Initiative, or the Global Initiative to Combat Nuclear Terrorism. Participating in training and workshops to share best practices, hosting a Center of Excellence or Nuclear Security Training and Support Center for nuclear security training, or providing or accepting bilateral or multilateral assistance further demonstrates a commitment to improving security and participating in a strengthened global system.

States with military or other non-civilian materials should secure those materials at least to the same or higher standards as the 15 percent of materials in civilian programs.

Secure Military and Other Non-Civilian Materials to the Same or Higher Standards as Civilian Materials

Approximately 85 percent of all global stocks of weapons-usable nuclear materials are outside civilian programs in various forms (e.g., in weapons programs or in government research facilities). Yet those materials are not covered by the IAEA nuclear security guidelines or the CPPNM and its 2005 Amendment (which apply only to materials in civilian use). If the world is to gain confidence in the security of such materials, they should be subject to best-practice exchanges, information sharing, peer review, or other voluntary mechanisms. The United States and Russia have cooperated on security of weapons and materials through a range of agreements and cooperative measures over the past two decades, including the Cooperative Threat Reduction program and the Material Protection, Control, and Accounting program. Though this cooperation has been limited in scope and has not covered all military or other non-civilian materials, it provides a possible template for how other nuclear-armed states could provide confidence in the security of their materials without compromising sensitive information. For instance, in 2004, a delegation from Russia's atomic energy ministry toured the Pantex plant, which is a U.S. nuclear-weapons assembly and disassembly facility, and visited other nuclear-weapons sites to review U.S. procedures for securing nuclear material.

States with military or other non-civilian materials should secure those materials at least to the same or higher standards as the 15 percent of materials in civilian programs, including through the application of best practices and, at a minimum, to those set out in the IAEA's nuclear security guidelines. States should also

think creatively about how to do that in a way that builds confidence in the effectiveness of those materials' security, particularly in the wake of security breaches such as that at Y-12. States should continue and expand efforts such as the Cooperative Threat Reduction program and initiate pilot programs to test this concept.

IMPROVING INDIVIDUAL STATE STEWARDSHIP OF NUCLEAR MATERIALS

To improve state stewardship, states should take the following actions:

Commit to Further Decreasing Stocks of Weapons-Usable Nuclear Materials

Because vulnerability and threats increase with higher quantities of materials, all states should do more, individually and collectively, to minimize their use of weapons-usable nuclear materials in civilian energy programs and should eliminate stockpiles of those materials where they already exist.

HEU use should be eliminated for civilian purposes, and production for such purposes should cease where it is still occurring. Technical developments have made it possible to replace HEU with low-enriched uranium (LEU) in nearly all current uses, thus rendering future new civil uses of HEU nearly obsolete. Existing programs to convert to LEU those research reactors that use HEU and to remove HEU from as many sites and states as possible should be supported and expanded. If supplies of HEU are still necessary in the interim, they should come from the excess stocks resulting from weapons reductions in nuclear-weapons states.

In the case of separated plutonium, existing plutonium inventories should be disposed of or consumed before new plutonium is separated.

States should commit to no net increase in weapons-usable nuclear materials and to the use of existing materials before production of new materials where there are conversion and consumption paths available.

Improve Measures to Protect Weapons-Usable Nuclear Materials from Theft

The foundation of robust nuclear materials security conditions are physical protection and control and accounting measures, and states should strengthen those measures in a way that is commensurate with the threat. On the critically important measures needed to prevent a malevolent insider from gaining access to nuclear materials, more than a third of the states with weapons-usable nuclear materials received half or fewer of the possible points for this indicator, suggesting serious shortfalls in many states.

Strengthening nuclear security laws and regulations is one way that states can improve their overall security and can demonstrate commitment to fulfilling their security obligations. However, laws and regulations are only a first step. States should also continually test whether security measures are adequate, should build a culture of security excellence among those who work at nuclear facilities, and should encourage those who are responsible for implementing security to participate in the exchange of best practices. This endeavor could be undertaken through the World Institute for Nuclear Security or through training and workshops offered by regional Centers of Excellence or Nuclear Security Training and Support Centers.

Establish Independent Regulatory Agencies, and Strengthen Existing Ones

One of the most important actions a state can take is to ensure that it has an independent authority to regulate nuclear security and to provide oversight and accountability for those with nuclear security responsibilities. Without such an authority, a state cannot reassure itself or others that its nuclear materials are secure and accounted for. Since release of the 2012 NTI Index, Japan established an independent regulatory agency as a result of the Fukushima disaster. Now all but three states with weapons-usable nuclear materials—India, Iran, and North Korea—have an independent regulatory agency to provide appropriate nuclear security oversight. Not only should those states endeavor to establish

THE ROLE OF NUCLEAR INDUSTRY

Effective nuclear materials security at the national and global levels requires efforts by many, including government agencies, regulators, and operators of nuclear facilities, among others. The organizations and individuals responsible for "on-the-ground" security at nuclear facilities or during transport have a key role because that is where security procedures are put into practice and where a failure could be catastrophic.

The nuclear industry operates nuclear reactors, research laboratories, enrichment and reprocessing facilities, fuel fabrication facilities, and transportation assets. Security at those sites and during transport requires the skill and training of many technical, operational, and security personnel and recognition that security is essential for the sustainability of continued peaceful use of nuclear energy.

Despite the broad array of organizations and people responsible for nuclear materials security, the NTI Index focuses primarily on actions at the national level. In particular, the NTI Index focuses on the regulatory environment and national policies affecting nuclear materials security. Although the NTI Index does not assess on-the-ground security procedures at particular facilities, effective implementation is essential for ensuring nuclear security. Therefore, nuclear industry plays a vital role in global nuclear materials security conditions.

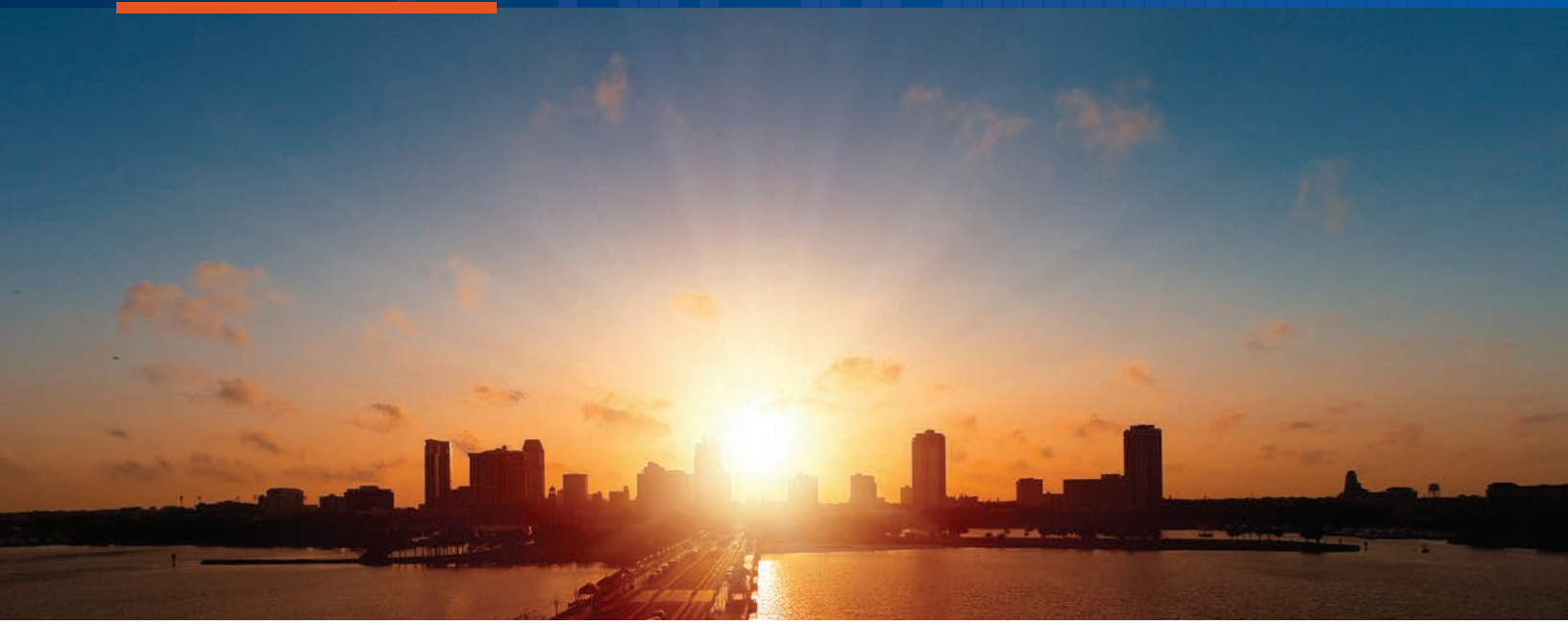
The nuclear industry can take several actions to contribute to an effective global nuclear security system. Organizations operating nuclear facilities must have governance practices that place a high priority on security. For example, security must have a prominent place in the management structure, all personnel with security responsibilities must be appropriately trained and certified, and a culture of excellence and continual improvement should be promoted through incentives and individual accountability mechanisms. Facility operators also can take additional actions to improve security by participating in best-practice exchanges and workshops with other operators and by requesting peer reviews of their security practices. Those kinds of actions demonstrate that a facility operator, whether governmental or private, is appropriately executing its stewardship responsibilities. Although the actions take place regularly in the field of nuclear safety, this is not the case in the field of nuclear security.

independent regulatory agencies,[34] but also states with independent regulatory agencies should strengthen such agencies to ensure that they are independent of influence from those being regulated and from other political pressures.

Deliver on Nuclear Security Summit Commitments

The Nuclear Security Summits have greatly contributed to security improvements and reshaping norms among states about what information can and should be shared for their own benefit and that of others. However, many commitments from the 2010 and 2012 summits have yet to be fulfilled, and governments must still do more to share appropriate information to enable accurate tracking over time, a path many states have taken without compromising security. States should accelerate efforts to deliver on existing summit commitments and to provide information on progress of outstanding commitments.

[34] India has pledged to establish an independent regulatory agency for nuclear security, but legislation aimed at doing so has been stalled. On April 1, 2013, North Korea's official news agency released the "Law on Consolidating Position of Nuclear Weapons State Adopted," in which the North Korean government clarified its position on international regulations and noted the important role of internal oversight over its civil nuclear activity, although the independence of any regulator in North Korea cannot be assured.



LOOKING AHEAD

The 2014 Nuclear Threat Initiative Index (NTI Index) builds on the efforts of the 2012 NTI Index to identify priorities for securing nuclear materials, to track progress, and to hold states accountable for securing their weapons-usable nuclear materials and for fulfilling international commitments.

USING THE NTI INDEX

The NTI Index can be used to assist individual states in identifying areas for improvement so they can appropriately target their national efforts and resources to address gaps in their own systems that require urgent attention. It can also serve as a resource for states that are eager to provide assistance to others but are unsure of where their assistance would provide the most added value. Finally, it highlights areas of weakness at the global level, such as the need to universalize international legal agreements and for more states to build the confidence of others in the effectiveness of their nuclear security.

By offering this practical information, NTI hopes that the NTI Index can continue to be a tool to support the 2014 and 2016 Nuclear Security Summit process, thereby providing data and recommendations to help reduce global nuclear threats.

As we look forward, new threats, such as cybersecurity and information security, are emerging that will affect the security of nuclear materials. Governments must be vigilant in the face of such threats, and NTI will consider their inclusion in a future edition of the NTI Index.

ENCOURAGING DIALOGUE

NTI intends to continue to track progress. As part of that process, it will seek opportunities for governments to review, confirm, and correct data collected. As in the first edition of the NTI Index, NTI encourages input from governments, experts, and other stakeholders that will help improve future editions.

Please e-mail comments and suggestions to ntiindex@nti.org.

APPENDICES

Economist Intelligence Unit Methodology 56
Summary 56
Scoring Criteria and Categories 58
Index Constraints and Other Important Factors 62
Methodology 63
Comparison between the 2012 NTI Index and the 2014 NTI Index 75
Research behind Selected Indicators 79
Sources and Definitions of Indicators 85
Select Bibliography 106

About the International Panel of Experts 108

About NTI and the EIU 110

Selected Country Summaries 111

Resources for Countries 137

Glossary 139

ECONOMIST INTELLIGENCE UNIT METHODOLOGY

1. SUMMARY

The first edition of the Nuclear Threat Initiative (NTI) Nuclear Materials Security Index (NTI Index) was released in January 2012. To gain a better understanding of current global nuclear security conditions and the changes that have occurred since that initial publication, NTI commissioned the Economist Intelligence Unit (EIU) to construct the 2014 NTI Index. The updated NTI Index provides a country-by-country assessment of nuclear materials security conditions in 25 countries that have one kilogram or more of weapons-usable nuclear materials, as well as a comparison of each country's nuclear materials security conditions between 2012 and 2014. A second model in the NTI Index assesses nuclear materials security conditions in 151 countries that have less than one kilogram of or no weapons-usable nuclear materials but that could serve as safe havens, staging grounds, or transit points for illicit nuclear activities.

To address the need for an objective, country-level benchmarking of nuclear materials security, the EIU developed a multidimensional analytical framework, commonly known as a benchmarking index. A multidimensional framework is a useful way of measuring performance that cannot be directly observed (for example, a country's economic competitiveness or, in this case, a country's nuclear materials security conditions). Nuclear materials security is particularly difficult to observe because of both the legacy of secrecy associated with the subject and the absence of quantitative performance indicators. Indices, in such cases, have been shown to be effective in several ways: (a) they can aggregate a wide range of related data and evaluate it in a consistent manner; (b) they can track outcomes over time; and (c) they can spur countries to improve performance, especially relative to other countries in the index. Because of those attributes, indices can be a useful tool for public policy reforms. The goal of the NTI Index, then, is not only to prompt improvements in national nuclear materials security policies and programs but also to encourage international debate on factors that affect the likelihood of a country losing control of its weapons-usable nuclear materials.

The 2014 NTI Index is the result of collaboration again between NTI and the EIU. The 2012 NTI Index assessed 32 countries that have weapons-usable nuclear materials across 18 indicators. The 2014 NTI Index assesses 25 countries that have weapons-usable nuclear materials—reflecting the removal of all or most of such materials from the territories of 7 countries[35]—across 19 indicators.[36] The EIU again researched every metric captured in the NTI Index, paying particularly close attention to any changes to regulations or licensing conditions in a country. As a result of changes to the NTI Index framework, direct year-on-year comparisons between the 2014 NTI Index and the original 2012 NTI Index would not have been possible. To allow for such comparisons, the EIU rescored countries in the 2012 NTI Index using the new framework and the data that would have been available in 2011, when research for the 2012 NTI Index was conducted.

[35] The seven states that have removed all or most of the stocks of weapons-usable nuclear materials from their territories since the release of the 2012 Index are: Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam.

[36] Each of these 19 indicators comprises a number of subindicators; therefore, although only one new indicator was added to the second edition of the NTI Index, eight new subindicators, spread across the new indicator and three other indicators, were added, three subindicators from the first edition of the NTI Index were removed, two of which were combined with existing subindicators, and eight subindicators were revised.

In addition, the results from the original 2012 NTI Index were thoroughly reviewed and researched again to ensure accuracy. In a few cases, research or responses to the data review and confirmation process indicated that new information had become available, a relevant law or regulation had not been captured, or researchers disagreed on a score. In those instances, the EIU revised the 2012 scores to reflect the most accurate data. Rescoring the 2012 data was necessary for the 2014 NTI Index to capture an accurate year-on-year comparison. Most of the research was conducted between January and June 2013, although data were updated as new information became available until November 1, 2013.

NTI and the EIU once again drew on the expertise of highly respected nuclear materials security experts—hereafter referred to as the International Panel of Experts—from nuclear- and non–nuclear-weapon states, from countries with and without materials, and from developed and developing nations to provide input on options for strengthening the 2014 NTI Index. As a result of a comprehensive review of the 2012 NTI Index framework, a number of changes were made to the framework for the second edition.

The categories in the NTI Index are (a) Quantities and Sites, which captures the quantity of nuclear materials, the number of sites, and the frequency of transport in a particular country, all related to the risk that materials could be stolen; (b) Security and Control Measures, which encompasses the core activities related to the physical protection and accounting of weapons-usable nuclear materials, as well as personnel and security infrastructure; (c) Global Norms, which includes actions that contribute to an international consensus on improved security; (d) Domestic Commitments and Capacity, which indicates how well a country has implemented its international commitments and its capacity to do so; and (e) Risk Environment,[37] which examines issues that can undermine nuclear materials security at the national level, such as political instability, absence of effective governance, corruption, or the presence of groups interested in illicitly acquiring nuclear materials.

Within each of these categories is a set of quantitative or qualitative indicators or both. The research team was acutely aware of the lack of quantitative data for measuring nuclear materials security conditions. Only one category of indicators, Quantities and Sites, lends itself to numerical assessment: it is, in theory, possible to count the quantities of highly enriched uranium (HEU), separated plutonium, and unirradiated mixed oxide fuel (MOX) within a country's borders, as well as the number of sites where those materials are located. In practice, this information often is incomplete or comes with high levels of uncertainty. Where necessary, researchers relied on the public estimates of credible experts. Because quantitative assessment was less feasible for the other categories in the NTI Index, the majority of indicators consider nuclear materials security from a qualitative framework. They examine such issues as the quality of the physical security environment, the level of compliance with nuclear materials security obligations, and the rigor of the regulatory system.

The research looks primarily at regulatory requirements for security. Taking a so-called bottom-up approach and measuring security at sites within each country was impossible, not least because of national security concerns. Researching domestic regulations also posed a challenge: some countries do not make public the majority of their nuclear security regulations, and two countries in particular, Israel and North Korea, do not make any regulations public. Owing to these research challenges, the EIU used a variety of techniques to score certain countries (see *Research behind Selected Indicators* in this appendix).

To limit the degree of subjectivity in those indicators, the EIU created subindicators that were, whenever possible, framed as a binary choice (yes or no; 1 or 0). The EIU asked, for example, if a country has a national authority for implementing the Convention on the Physical Protection of Nuclear Material (CPPNM). If a country does, it is awarded one point; if it does not, it scores a zero. A binary approach limits the risk of subjectivity and increases the likelihood that the same scores would be obtained by another set of researchers, a key measure of objectivity and analytical rigor. If a binary approach was not appropriate, the research team provided specific scoring options that were based on publicly available information.

[37] This category was named Societal Factors in the 2012 NTI Index.

Despite the care taken in designing the measures, no index of this kind can ever be perfect. Some countries are particularly non-transparent in matters of nuclear materials security; in those cases, the EIU scored indicators using expert judgment or relied on proxy measures, such as the sophistication of a country's military operations (in cases in which the EIU was confident that weapons-usable nuclear materials were protected by the armed forces).

The indicators in the NTI Index are embedded in a model (available as an Excel workbook at www.ntiindex.org) that offers a wide range of analytical tools, thereby allowing a deeper investigation of measures of nuclear materials security globally. Users can filter countries by region, for example, or by membership of international organizations or multilateral initiatives. A user can compare directly any two countries and can examine correlations between indicators. Individual country profiles are also included in the NTI Index model, thus permitting a deeper dive into the nuclear materials security conditions in a given country.

The weights assigned to each indicator can be changed to reflect different assumptions about the importance of categories and indicators. A user can also change individual subindicator scores to see how a country's overall scores would have been different if it had, for example, ratified a treaty or taken some other action captured in the NTI Index. Finally, the model allows the final scores to be benchmarked against external factors that may potentially influence nuclear materials security; for example, the results of the 2014 NTI Index correlate well with a country's regulatory quality (as measured by the World Bank's Worldwide Governance Indicators) and with countries that are deemed most at peace (as measured by the 2013 Global Peace Index).

2. SCORING CRITERIA AND CATEGORIES

The 2014 NTI Index is a dynamic scoring model of 56 subindicators used to construct 19 indicators across five categories. The 2014 NTI Index assesses the nuclear materials security conditions in 25 countries that have one kilogram or more of weapons-usable nuclear materials ("countries with materials"). The scope of the NTI Index includes only highly enriched uranium (HEU), including spent fuel; separated plutonium; and plutonium content in unirradiated mixed oxide fuel (MOX). A second, separate model in the 2014 NTI Index assesses the nuclear materials security conditions in 151 countries that have less than one kilogram of or no weapons-usable nuclear materials ("countries without materials") but that could serve as safe havens, staging grounds, or transit routes.[38] The number of countries without materials included in the 2014 NTI Index was determined by the scope of the EIU's Risk Briefing service. Countries without materials are evaluated across a smaller subset of categories and indicators.

Note that the NTI Index does not address proliferation risks, disarmament, nuclear safety, or the threat of sabotage of nuclear facilities.

Index for Countries with Weapons-Usable Nuclear Materials

The overall score for each country in the NTI Index for countries with materials is a weighted sum of the five categories. Each category is scored on a scale of 0–100, in which 100 represents the most favorable nuclear materials security conditions and 0 represents the least favorable conditions possible in the NTI Index. A score of 100 in the NTI Index does not indicate that a country has perfect nuclear materials security conditions, and a score of 0 does not mean that a country has no security; instead, the scores of 100 and 0 represent the highest or lowest possible score, respectively, as measured by the NTI Index criteria. Each category is normalized on the basis of the sums of underlying indicator scores, and a weight is then applied. Weights are based on input of the International Panel of Experts and reflect the relative importance and relevance of each indicator and category. Weights in the model, however, are dynamic and can be changed by users.

[38] NTI recognizes that some states may have gram quantities of weapons-usable nuclear materials in multiple locations which, added together, may bring totals to more than one kilogram. For the purposes of the NTI Index and the need to rely on publicly available information, those states are grouped with states that have no weapons-usable nuclear materials.

The five categories of the NTI Index are as follows:

- **Quantities and Sites.** This category comprises three indicators: Quantities of Nuclear Materials, Sites and Transportation, and Materials Production and Elimination Trends.
- **Security and Control Measures.** This category comprises five indicators: On-site Physical Protection, Control and Accounting Procedures, Insider Threat Prevention, Physical Security during Transport, and Response Capabilities.
- **Global Norms.** This category comprises three indicators: International Legal Commitments, Voluntary Commitments, and International Assurances.
- **Domestic Commitments and Capacity.** This category comprises four indicators: UN Security Council Resolution (UNSCR) 1540 Implementation, Domestic Nuclear Materials Security Legislation, Safeguards Adherence and Compliance, and Independent Regulatory Agency.
- **Risk Environment.** This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Groups Interested in Illicitly Acquiring Materials.

Each indicator within the five categories contains up to eight underlying subindicators. Principal components analysis (PCA) was also conducted on the model to ensure relevance and robustness of the chosen indicators and categories. The use of PCA is described on page 73.

The categories, indicators, and subindicators are as follows.

1	**QUANTITIES AND SITES**	
	1.1	**Quantities of Nuclear Materials**
	1.1.1	Quantities of nuclear materials
	1.2	**Sites and Transportation**
	1.2.1	Number of sites
	1.2.2	Bulk processing facility
	1.2.3	Frequency of materials transport
	1.3*	**Material Production and Elimination Trends**
	1.3.1*	Material production and elimination trends
2	**SECURITY AND CONTROL MEASURES**	
	2.1	**On-site Physical Protection**
	2.1.1	Mandatory physical protection
	2.1.2	On-site reviews of security
	2.1.3*	Design basis threat
	2.1.4	Security responsibilities and accountabilities
	2.1.5*	Performance-based program
	2.2	**Control and Accounting Procedures**
	2.2.1	Legal and regulatory basis for material control and accounting (MC&A)
	2.2.2	Measurement methods
	2.2.3	Inventory record
	2.2.4	Material balance area(s)
	2.2.5*	Control measures
	2.3*	**Insider Threat Prevention**
	2.3.1*	Personnel vetting
	2.3.2*	Frequency of personnel vetting
	2.3.3*	Reporting
	2.3.4*	Surveillance
	2.4*	**Physical Security During Transport**
	2.4.1*	Physical security during transport

*Indicates new or revised indicator/subindicator. See section on *Comparison between the 2012 NTI Index and the 2014 NTI Index* for more detail on new and revised indicators/subindicators.

	2.5	**Response Capabilities**
	2.5.1	Emergency response capabilities
	2.5.2*	Armed response capabilities
	2.5.3	Law enforcement response training
	2.5.4	Nuclear infrastructure protection plan
3	**GLOBAL NORMS**	
	3.1	**International Legal Commitments**
	3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)
	3.1.2	2005 Amendment to the CPPNM
	3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)
	3.2	**Voluntary Commitments**
	3.2.1	International Atomic Energy Agency (IAEA) membership
	3.2.2	Proliferation Security Initiative (PSI) membership
	3.2.3	Global Initiative to Combat Nuclear Terrorism (GICNT) membership
	3.2.4	G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership
	3.2.5	World Institute for Nuclear Security (WINS) contributions
	3.2.6	IAEA Nuclear Security Fund contributions
	3.2.7*	Bilateral or multilateral assistance
	3.2.8*	Centers of Excellence
	3.3	**International Assurances**
	3.3.1	Published regulations and reports
	3.3.2	Public declarations and reports about nuclear materials
	3.3.3*	Invitation(s) for review of security arrangements
4	**DOMESTIC COMMITMENTS AND CAPACITY**	
	4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**
	4.1.1	UNSCR 1540 reporting
	4.1.2	Extent of UNSCR 1540 implementation
	4.2	**Domestic Nuclear Materials Security Legislation**
	4.2.1	CPPNM implementation authority
	4.2.2	National legal framework for CPPNM
	4.3	**Safeguards Adherence and Compliance**
	4.3.1	IAEA safeguards agreement (excluding Additional Protocol)
	4.3.2	IAEA Additional Protocol
	4.3.3	Facility exclusion from safeguards
	4.3.4*	Safeguards violations
	4.4	**Independent Regulatory Agency**
	4.4.1	Independent regulatory agency
5	**RISK ENVIRONMENT**	
	5.1	**Political Stability**
	5.1.1	Social unrest
	5.1.2	Orderly transfers of power
	5.1.3	International disputes or tensions
	5.1.4	Armed conflict
	5.1.5	Violent demonstrations or violent civil or labor unrest
	5.2*	**Effective Governance**
	5.2.1*	Effectiveness of the political system
	5.2.2*	Quality of the bureaucracy
	5.3	**Pervasiveness of Corruption**
	5.3.1	Pervasiveness of corruption
	5.4	**Groups Interested in Illicitly Acquiring Materials**
	5.4.1	Groups interested in illicitly acquiring materials

*Indicates new or revised indicator/subindicator. See section on *Comparison between the 2012 NTI Index and the 2014 NTI Index* for more detail on new and revised indicators/subindicators.

Index for Countries without Weapons-Usable Nuclear Materials

Countries without weapons-usable nuclear materials are assessed against a subset of the categories, indicators, and subindicators used for research on countries that possess such materials. The overall score (0–100) for countries in this second index is a weighted sum of the three categories, where each is scored on a scale of 0–100, in which 100 represents the most favorable and 0 represents the least favorable nuclear materials security conditions possible as measured by the NTI Index criteria. Each category is normalized on the basis of sums of underlying indicator scores, and a weight is then applied. Weights reflect the relative importance and relevance of each indicator and category on the basis of input from the International Panel of Experts. Weights in the model are dynamic and can be changed by users.

The three categories of this NTI Index are as follows:

- **Global Norms.** This category comprises two indicators: International Legal Commitments and Voluntary Commitments.
- **Domestic Commitments and Capacity.** This category comprises three indicators: United Nations Security Council Resolution (UNSCR) 1540 Implementation, Domestic Nuclear Materials Security Legislation, and Safeguards Adherence and Compliance.
- **Risk Environment.** This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Groups Interested in Illicitly Acquiring Materials.

Each indicator within the three categories contains one to eight underlying subindicators.

The categories, indicators, and subindicators are as follows.

3	**GLOBAL NORMS**	
	3.1	**International Legal Commitments**
	3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)
	3.1.2	2005 Amendment to the CPPNM
	3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)
	3.2	**Voluntary Commitments**
	3.2.1	International Atomic Energy Agency (IAEA) membership
	3.2.2	Proliferation Security Initiative (PSI) membership
	3.2.3	Global Initiative to Combat Nuclear Terrorism (GICNT) membership
	3.2.4	G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership
	3.2.5	World Institute for Nuclear Security (WINS) contributions
	3.2.6	IAEA Nuclear Security Fund contributions
	3.2.7*	Bilateral or multilateral assistance
	3.2.8*	Centers of Excellence
4	**DOMESTIC COMMITMENTS AND CAPACITY**	
	4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**
	4.1.1	UNSCR 1540 reporting
	4.1.2	Extent of UNSCR 1540 implementation
	4.2	**Domestic Nuclear Materials Security Legislation**
	4.2.1	CPPNM implementation authority
	4.2.2	National legal framework for CPPNM
	4.3	**Safeguards Adherence and Compliance**
	4.3.1	IAEA safeguards agreement (excluding Additional Protocol)
	4.3.2	IAEA Additional Protocol
	4.3.3*	Safeguards violations

*Indicates new or revised indicator. See *Comparison between the 2012 NTI Index and the 2014 NTI Index* in this appendix for more detail on new and revised indicators.

5	RISK ENVIRONMENT	
5.1	**Political Stability**	
	5.1.1	Social unrest
	5.1.2	Orderly transfers of power
	5.1.3	International disputes or tensions
	5.1.4	Armed conflict
	5.1.5	Violent demonstrations or violent civil or labor unrest
5.2*	**Effective Governance**	
	5.2.1*	Effectiveness of the political system
	5.2.2*	Quality of the bureaucracy
5.3	**Pervasiveness of Corruption**	
	5.3.1	Pervasiveness of corruption
5.4	**Groups Interested in Illicitly Acquiring Materials**	
	5.4.1	Groups interested in illicitly acquiring materials

*Indicates new or revised indicator. See *Comparison between the 2012 NTI Index and the 2014 NTI Index* in this appendix for more detail on new and revised indicators.

3. INDEX CONSTRAINTS AND OTHER IMPORTANT FACTORS

In creating the NTI Index, the EIU relied on publicly available sources, such as laws and regulations. This research approach has the benefit of creating a fully transparent and repeatable methodology, but it also presents some challenges. For example, regulations and codes of practice for nuclear security are sometimes classified. In cases in which a country was particularly non-transparent, scores were assigned on the basis of a proxy indicator. The absence of information about nuclear materials security reduces public and international understanding of the security measures countries are taking; thus, it is appropriate for those countries that do not make their regulations publicly available to receive low scores.

Although facility-level assessments would provide important "ground-truth" information, this level of granularity is not currently possible because of the sensitive nature of specific security arrangements. As a result, the NTI Index relies instead on the assumption that a country with the appropriate laws and regulations in place is more likely to have sound security procedures at each facility with weapons-usable nuclear materials than does a country without appropriate laws and regulations.

Finally, it should be noted that the NTI Index includes "indicators" of security conditions and not the complete set of good security practices that sites with weapons-usable nuclear materials should use. For example, information regarding the types of locking mechanisms, surveillance systems, thickness of walls, and so forth is not publicly available for security reasons. The exclusion of specific security practices from the NTI Index does not reflect their lack of importance, but instead reflects the research constraints of the NTI Index. As it looks forward, NTI hopes to include important, emerging issues such as cyber and information security.

4. METHODOLOGY

General

The NTI Index comprises categories that are related to the nuclear materials security conditions for each country. The NTI Index differentiates between countries that have one kilogram or more of weapons-usable nuclear materials ("countries with materials") and those with less than one kilogram of or no weapons-usable nuclear materials ("countries without materials"). The scope of the NTI Index is limited to highly enriched uranium (HEU), including spent fuel, separated plutonium, and plutonium content in unirradiated mixed oxide fuel (MOX). Countries with materials are assessed across all five categories; countries without materials are assessed across three categories.

To score the indicators for the 2014 NTI Index, the research team gathered data from the following sources:

- Primary legal texts and legal reports
- Government publications and reports
- Academic publications and reports
- Websites of government authorities, international organizations, and non-governmental organizations
- Interviews with experts
- EIU proprietary country rankings and reports (specifically, "Risk Briefing" and the "Business Environment Ranking")
- Local and international news media reports

See *Select Bibliography* in this appendix for more information on central sources.

By reviewing recent reports pertaining to quantities of nuclear materials, and taking into account recent developments, the EIU identified the following 25 countries (listed in alphabetical order) as having one kilogram or more of HEU (including spent fuel), separated plutonium, or plutonium content in unirradiated MOX:

Argentina
Australia
Belarus
Belgium
Canada
China
France
Germany
India
Iran
Israel
Italy
Japan
Kazakhstan
Netherlands
North Korea
Norway
Pakistan
Poland
Russia
South Africa
Switzerland
United Kingdom
United States
Uzbekistan

The 2014 NTI Index also assesses the following 151 countries (listed in alphabetical order) as having less than one kilogram of or no weapons-usable nuclear materials.

Afghanistan
Albania
Algeria
Angola
Armenia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African Republic
Chad
Chile
Colombia
Comoros
Congo (Democratic Republic of)
Congo (Brazzaville)
Costa Rica
Côte d'Ivoire
Croatia
Cuba
Cyprus
Czech Republic
Denmark
Djibouti
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Estonia

Ethiopia
Fiji
Finland
Gabon
Gambia
Georgia
Ghana
Greece
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hungary
Iceland
Indonesia
Iraq
Ireland
Jamaica
Jordan
Kenya
Kuwait
Kyrgyz Republic
Laos
Latvia
Lebanon
Lesotho
Liberia
Libya
Lithuania
Luxembourg
Macedonia
Madagascar
Malawi
Malaysia
Mali
Malta
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Montenegro
Morocco
Mozambique
Myanmar
Namibia
Nepal
New Zealand
Nicaragua
Niger
Nigeria
Oman
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Portugal
Qatar
Romania
Rwanda
Samoa
São Tomé and Príncipe
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Solomon Islands
Somalia
South Korea
Spain
Sri Lanka
Sudan
Suriname
Swaziland
Sweden
Syria
Taiwan
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
Uruguay
Vanuatu
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

Data Review and Confirmation Process

After researching the 19 indicators and gathering all relevant information, NTI and the EIU provided to the 25 countries[39] that possess weapons-usable nuclear materials an opportunity to review and comment on the EIU's preliminary results. The purpose of the data review and confirmation process was to ensure accuracy of the 2014 NTI Index data, given that much of the research involved subjects for which information is not always publicly available. The research team also recognized that some countries might be willing, upon request, to provide the EIU with more detailed information than is readily available to the public.

To make this process as simple as possible, the EIU developed a document that presented the data for most of the 2014 NTI Index indicators. Not all indicators, however, were subjected to this confirmation process. For instance, the EIU did not include data that were easily verifiable from publicly available sources (for example, treaty ratification status) or that were drawn from proprietary EIU databases assessing political stability, effective governance, and corruption. The data review and confirmation form displayed 33 of the 56 subindicators. It also listed the range of possible answers for each subindicator and identified the answer the EIU assigned for the country. The form allowed the reviewer to either agree or disagree with the answer and provided a comment box in which the reviewer could offer an alternative answer and justification. The EIU used the submitted responses to reevaluate its scores. In some cases, respondents provided information that resulted in the EIU lowering a country's score, whereas in other cases, scores were raised. When the responses were unclear, the EIU contacted individuals for clarification. Country representatives had four months—from mid April

[39] The 2014 research initially included the Czech Republic, Hungary, and Vietnam, all of which received data review and confirmation requests. After the preliminary research was completed and the data review and confirmation requests were sent to each government, it was announced that those three countries had removed all or most of the weapons-usable nuclear materials from their territories.

to mid August 2013—to respond to the data review and confirmation request.

Of the 25 countries, 17 (more than two-thirds) responded to the data review and confirmation request. Those countries were Argentina, Australia, Belarus, Belgium, Canada, France, Germany, Italy, Japan, Kazakhstan, the Netherlands, Norway, Poland, South Africa, Switzerland, the United Kingdom, and the United States.

Technical Advisors

In addition to the International Panel of Experts, the EIU received expert guidance from technical advisors throughout the research process. Those advisors helped the EIU modify and refine indicators to capture key elements of nuclear materials security and provided explanations and insights into the more technical parts of the research. The following technical advisors were consulted throughout the research process:

- **Dmitry Kovchegin**, independent consultant with experience in nuclear industry and related security issues
- **Victoria Longmire**, CEO and a managing member of Rendja Research LLC (a consulting firm with expertise in nuclear, chemical, and biological activities); former Safeguards Manager for the Los Alamos Plutonium Facility, with extensive hands-on experience in nuclear accountability, nuclear material measurement, and nuclear safeguards system design
- **Lonnie Moore**, Senior Security Specialist, Gregg Protection Services; former manager at the Lawrence Livermore National Laboratory (LLNL); and project leader for several U.S. Department of Energy Materials Protection, Control, and Accounting program and Global Threat Reduction Initiative program teams

Data Modeling

Data were collected across 56 subindicators for countries with materials and 27 subindicators for countries without materials. The subindicators range from binomial observations (0,1) to subindicators with nine possible scoring options. Each subindicator is constructed such that a higher value is associated with more favorable nuclear materials security conditions. For example, for the subindicator "Number of sites," a country with 100 or more sites with nuclear materials is assigned a value of 0, whereas a country with one site is assigned a value of 3. The sum of the subindicator values determines the value of the indicator. Countries with materials are assessed across 19 indicators, and countries without materials are assessed across 9 indicators.

Countries with Weapons-Usable Nuclear Materials

The scoring scheme for each component of the NTI Index for countries with weapons-usable nuclear materials is listed in the following table:

1 QUANTITIES AND SITES	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
1.1 Quantities of Nuclear Materials	**Scored 0–8 (where 8 = most favorable nuclear materials security conditions)**
1.1.1 Quantities of nuclear materials	Scored 0–8
1.2 Sites and Transportation	**Scored 0–6 (where 6 = most favorable nuclear materials security conditions)**
1.2.1 Number of sites	Scored 0–3
1.2.2 Bulk processing facility	Scored 0–1
1.2.3 Frequency of materials transport	Scored 0–2
1.3 Material Production and Elimination Trends	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
1.3.1 Material production and elimination trends	Scored 0–4
2 SECURITY AND CONTROL MEASURES	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
2.1 On-site Physical Protection	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
2.1.1 Mandatory physical protection	Scored 0–1
2.1.2 On-site reviews of security	Scored 0–1
2.1.3 Design basis threat	Scored 0–1
2.1.4 Security responsibilities and accountabilities	Scored 0–1
2.1.5 Performance-based program	Scored 0–1
2.2 Control and Accounting Procedures	**Scored 0–7 (where 7 = most favorable nuclear materials security conditions)**
2.2.1 Legal and regulatory basis for material control and accounting (MC&A)	Scored 0–2
2.2.2 Measurement methods	Scored 0–1
2.2.3 Inventory record	Scored 0–1
2.2.4 Material balance area(s)	Scored 0–1
2.2.5 Control measures	Scored 0–2

2.3	**Insider Threat Prevention**	**Scored 0–9 (where 9 = most favorable nuclear materials security conditions)**
2.3.1	Personnel vetting	Scored 0–3
2.3.2	Frequency of personnel vetting	Scored 0–3
2.3.3	Reporting	Scored 0–1
2.3.4	Surveillance	Scored 0–2
2.4	**Physical Security During Transport**	**Scored 0–2 (where 2 = most favorable nuclear materials security conditions)**
2.4.1	Physical security during transport	Scored 0–2
2.5	**Response Capabilities**	**Scored 0–7 (where 7 = most favorable nuclear materials security conditions)**
2.5.1	Emergency response capabilities	Scored 0–3
2.5.2	Armed response capabilities	Scored 0–1
2.5.3	Law enforcement response training	Scored 0–1
2.5.4	Nuclear infrastructure protection plan	Scored 0–2
3	**GLOBAL NORMS**	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
3.1	**International Legal Commitments**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	Scored 0–2
3.1.2	2005 Amendment to the CPPNM	Scored 0–1
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	Scored 0–2
3.2	**Voluntary Commitments**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
3.2.1	International Atomic Energy Agency (IAEA) membership	Scored 0–1
3.2.2	Proliferation Security Initiative (PSI) membership	Scored 0–1
3.2.3	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	Scored 0–1
3.2.4	G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	Scored 0–1
3.2.5	World Institute for Nuclear Security (WINS) contributions	Scored 0–1
3.2.6	IAEA Nuclear Security Fund contributions	Scored 0–1
3.2.7	Bilateral or multilateral assistance	Scored 0–1
3.2.8	Centers of Excellence	Scored 0–1

3.3	**International Assurances**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
3.3.1	Published regulations and reports	Scored 0–2
3.3.2	Public declarations and reports about nuclear materials	Scored 0–1
3.3.3	Invitation(s) for review of security arrangements	Scored 0–2
4	**DOMESTIC COMMITMENTS AND CAPACITY**	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
4.1.1	UNSCR 1540 reporting	Scored 0–1
4.1.2	Extent of UNSCR 1540 implementation	Scored 0–4
4.2	**Domestic Nuclear Materials Security Legislation**	**Scored 0–2 (where 2 = most favorable nuclear materials security conditions)**
4.2.1	CPPNM implementation authority	Scored 0–1
4.2.2	National legal framework for CPPNM	Scored 0–1
4.3	**Safeguards Adherence and Compliance**	**Scored 0–6 (where 6 = most favorable nuclear materials security conditions)**
4.3.1	IAEA safeguards agreement (excluding Additional Protocol)	Scored 0–2
4.3.2	IAEA Additional Protocol	Scored 0–1
4.3.3	Facility exclusion from safeguards	Scored 0–1
4.3.4	Safeguards violations	Scored 0–2
4.4	**Independent Regulatory Agency**	**Scored 0–1 (where 1 = most favorable nuclear materials security conditions)**
4.4.1	Independent regulatory agency	Scored 0–1
5	**RISK ENVIRONMENT**	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
5.1	**Political Stability**	**Scored 0–20 (where 20 = most favorable security conditions)**
5.1.1	Social unrest	Scored 0–4
5.1.2	Orderly transfers of power	Scored 0–4
5.1.3	International disputes or tensions	Scored 0–4
5.1.4	Armed conflict	Scored 0–4
5.1.5	Violent demonstrations or violent civil or labor unrest	Scored 0–4
5.2	**Effective Governance**	**Scored 0–8 (where 8 = most favorable nuclear materials security conditions)**
5.2.1	Effectiveness of the political system	Scored 0–4
5.2.2	Quality of the bureaucracy	Scored 0–4

5.3	**Pervasiveness of Corruption**	**Scored 0–4 (where 4 = most favorable security conditions)**
5.3.1	Pervasiveness of corruption	Scored 0–4
5.4	**Groups Interested in Illicitly Acquiring Materials**	**Scored 0–2 (where 2 = most favorable security conditions)**
5.4.1	Groups interested in illicitly acquiring materials	Scored 0–2

Countries without Weapons-Usable Nuclear Materials

The scoring scheme for each component of the NTI Index for countries without weapons-usable nuclear materials is listed in the following table:

3	**GLOBAL NORMS**	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
3.1	**International Legal Commitments**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	Scored 0–2
3.1.2	2005 Amendment to the CPPNM	Scored 0–1
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	Scored 0–2
3.2	**Voluntary Commitments**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
3.2.1	International Atomic Energy Agency (IAEA) membership	Scored 0–1
3.2.2	Proliferation Security Initiative (PSI) membership	Scored 0–1
3.2.3	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	Scored 0–1
3.2.4	G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	Scored 0–1
3.2.5	World Institute for Nuclear Security (WINS) contributions	Scored 0–1
3.2.6	IAEA Nuclear Security Fund contributions	Scored 0–1
3.2.7	Bilateral or multilateral assistance	Scored 0–1
3.2.8	Centers of Excellence	Scored 0–1
4	**DOMESTIC COMMITMENTS AND CAPACITY**	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**	**Scored 0–5 (where 5 = most favorable nuclear materials security conditions)**
4.1.1	UNSCR 1540 reporting	Scored 0–1
4.1.2	Extent of UNSCR 1540 implementation	Scored 0–4

4.2 Domestic Nuclear Materials Security Legislation	**Scored 0–2 (where 2 = most favorable nuclear materials security conditions)**
4.2.1 CPPNM implementation authority	Scored 0–1
4.2.2 National legal framework for CPPNM	Scored 0–1
4.3 Safeguards Adherence and Compliance	**Scored 0–6 (where 6 = most favorable nuclear materials security conditions)**
4.3.1 IAEA safeguards agreement (excluding Additional Protocol)	Scored 0–3
4.3.2 IAEA Additional Protocol	Scored 0–1
4.3.3 Safeguards violations	Scored 0–2
5 RISK ENVIRONMENT	**Scored 0–100 (where 100 = most favorable nuclear materials security conditions)**
5.1 Political Stability	**Scored 0–20 (where 20 = most favorable security conditions)**
5.1.1 Social unrest	Scored 0–4
5.1.2 Orderly transfers of power	Scored 0–4
5.1.3 International disputes or tensions	Scored 0–4
5.1.4 Armed conflict	Scored 0–4
5.1.5 Violent demonstrations or violent civil or labor unrest	Scored 0–4
5.2 Effective Governance	**Scored 0–8 (where 8 = most favorable nuclear materials security conditions)**
5.2.1 Effectiveness of the political system	Scored 0–4
5.2.2 Quality of the bureaucracy	Scored 0–4
5.3 Pervasiveness of Corruption	**Scored 0–4 (where 4 = most favorable security conditions)**
5.3.1 Pervasiveness of corruption	Scored 0–4
5.4 Groups Interested in Illicitly Acquiring Materials	**Scored 0–2 (where 2 = most favorable security conditions)**
5.4.1 Groups interested in illicitly acquiring materials	Scored 0–2

Calculating the 2014 NTI Nuclear Materials Security Index

Modeling the subindicators, indicators, and categories in the NTI Index results in overall scores of 0–100 for each country, in which 100 represents the most favorable and 0 the least favorable nuclear materials security conditions possible. A score of 100 in the NTI Index does not indicate that a country has perfect nuclear materials security, and a score of 0 does not mean that a country has no security; instead, scores of 100 and 0 represent the highest or lowest possible scores, respectively, as measured by the NTI Index criteria. The subindicators listed are classified into indicators, and their values are summed to determine the value of the indicator:

$$\text{indicator score} = \sum \text{individual subindicators}$$

For countries with materials, the indicators are classified into five categories: Quantities and Sites (3 indicators), Security and Control Measures (5 indicators), Global Norms (3 indicators), Domestic Commitments and Capacity (4 indicators), and Risk Environment (4 indicators). For countries without materials, the indicators are classified into three categories: Global Norms (2 indicators), Domestic Commitments and Capacity (3 indicators), and Risk Environment (4 indicators). The category values are a weighted total of the indicators in the category:

$$\text{category score} = \sum \text{weighted individual indicators}$$

The category values have been normalized on the basis of the following equation:

$$x = (x - \text{Min}(x)) / (\text{Max}(x) - \text{Min}(x)),$$

where Min(x) and Max(x) are, respectively, the lowest and highest values in the NTI Index (i.e., out of the 25 countries with weapons-usable nuclear materials or out of the 151 countries without weapons-usable nuclear materials) for any given indicator. The normalized value (i.e., a score of 0–100) makes it directly comparable with other normalized indicator scores.

The following is an example of calculating the category score:

		Normalized score (0–100)	Weight	Weighted score	
1.1	Quantities of Nuclear Materials	100	42%	42% of 100	42
1.2	Sites and Transportation	50	35%	35% of 50	18
1.3	Material Production and Elimination Trends	100	23%	23% of 100	23

The overall score for each country is the weighted sum of the category scores, as determined by the weighting profile:

$$\text{Overall score} = \sum \text{weighted category scores}$$

The following is an example of calculating the overall score:

		Normalized score (0–100)	Weight	Weighted score	
1	Quantities and Sites	55	16%	16% of 55	9
2	Security and Control Measures	38	29%	29% of 38	11
3	Global Norms	88	17%	17% of 88	15
4	Domestic Commitments and Capacity	44	20%	20% of 44	9
5	Risk Environment	58	18%	18% of 58	10

The countries with weapons-usable nuclear materials and countries without weapons-usable nuclear materials can then be ranked according to those parameters.

Model Weights

The weights assigned to each category and indicator can be changed in the data model to reflect different assumptions about their relative importance. Three sets of weights are provided in the NTI Index data model. The weights defined by NTI and the EIU are the default setting; they are based on extensive discussions between NTI, the EIU, the International Panel of Experts, and others on the relative value of each category and indicator. The second weighting option, called neutral weights, assumes equal importance of all categories and evenly distributes weights on that basis. The third option, equal weights, assigns an identical weight to each indicator rather than to each category.

Weight Profile Defined by NTI and the EIU for Countries with Weapons-Usable Nuclear Materials

CATEGORY	WEIGHT
Quantities and Sites	16%
Security and Control Measures	29%
Global Norms	17%
Domestic Commitments and Capacity	20%
Risk Environment	18%

	INDICATOR	WEIGHT
1	**Quantities and Sites**	
1.1	Quantities of Nulcear Materials	42%
1.2	Sites and Transportation	35%
1.3	Material Production and Elimination Trends	23%
2	**Security and Control Measures**	
2.1	On-site Physical Protection	22%
2.2	Control and Accounting Procedures	17%
2.3	Insider Threat Prevention	21%
2.4	Physical Security During Transport	20%
2.5	Response Capabilities	20%
3	**Global Norms**	
3.1	International Legal Commitments	42%
3.2	Voluntary Commitments	27%
3.3	International Assurances	31%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution (UNSCR) 1540 Implementation	20%
4.2	Domestic Nuclear Materials Security Legislation	31%
4.3	Safeguards Adherence and Compliance	22%
4.4	Independent Regulatory Agency	27%
5	**Risk Environment**	
5.1	Political Stability	26%
5.2	Effective Governance	25%
5.3	Pervasiveness of Corruption	22%
5.4	Groups Interested in Illicitly Acquiring Materials	27%

Weight Profile Defined by NTI and the EIU for Countries without Weapons-Usable Nuclear Materials

CATEGORY	WEIGHT
Global Norms	31%
Domestic Commitments and Capacity	38%
Risk Environment	31%

	INDICATOR	WEIGHT
3	**Global Norms**	
3.1	International Legal Commitments	64%
3.2	Voluntary Commitments	36%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution (UNSCR) 1540 Implementation	33%
4.2	Domestic Nuclear Materials Security Legislation	41%
4.3	Safeguards Adherence and Compliance	26%
5	**Risk Environment**	
5.1	Political Stability	24%
5.2	Effective Governance	25%
5.3	Pervasiveness of Corruption	26%
5.4	Groups Interested in Illicitly Acquiring Materials	25%

Principal Components Analysis

The goal of principal components analysis (PCA) is to define quantitatively a weighting scheme for the indicators that are used to create a composite index or ranking of overall nuclear materials security. PCA is a method for removing redundant information shared across indicators by specifying a weighting that explains the most variance in the data.

There are at least four approaches to weighting indicators in an index: (a) equal weighting of all indicators (equal weights), (b) equal weighting of all categories (neutral weights), (c) expert-assigned weights, and (d) PCA weights.

The first and second approaches—in which all indicators or categories, respectively, are weighted equally—have the advantage of simplicity and do not involve subjective judgment. A disadvantage of those approaches is that they assume that all indicators or categories, respectively, are equally significant. A third approach, which is used for the NTI and EIU default weights, uses expert judgment to assign weights to indicators, thereby determining their relative importance in the overall index. This determination brings a real-world perspective to an index, which is important if an index is to guide policy actions. The final approach is to use PCA weights, which are derived through a mathematical process that takes into account the covariance between indicators and the importance of a particular element in maximizing the variation in the index scores. This approach aims to minimize redundancy between variables and to maximize the variance within the index, but it does not consider indicators' perceived importance.

The PCA-weights feature within the NTI Index model has been provided for those experts who may wish to explore the behavior of the model in more depth. They should not be considered (a) an alternative to the NTI and EIU weights or (b) a means of understanding country rankings and scores, because they do not consider the intrinsic significance of an indicator in the context of the NTI Index.

PCA assigns each element in an index a weight that takes into account the covariance between indicators and the importance of a particular element in maximizing the variation in the index outcome (nuclear materials security conditions); in other words, it aims to minimize redundancy between variables and to maximize the variance with respect to the outcome. The weight is calculated by taking the principal component (eigenvector) associated with the highest explained variance (eigenvalue).

This is a way of decomposing the data into independent components ordered by informational content and, according to Ram (1982),[40] is a natural choice for an index weighting. Important assumptions for valid PCA are (a) that variance is meaningful and not the result of data with large measurement error and (b) that the dynamics of interest

[40] Rati Ram, "Composite Indices of Physical Quality of Life, Basic Needs Fulfillment, and Income: A 'Principal Component' Representation," *Journal of Development Economics*, 11, no. 2 (October 1982): 227–47.

(nuclear materials security conditions) are along the direction with the largest variance.

A one-stage analysis can solve for the weights, in which the data are combined irrespective of category:

1. Perform PCA analysis on all of the indicators at once, ignoring category membership.
2. Take the principal component associated with the highest eigenvalue.
3. Set negative components to zero.
4. Normalize within indicator weights so that the sum of the weights is 1.
5. Normalize the category weights so that the sum across categories is 1.
   - Take the sum of the non-normalized subindicator weights and use this as the indicator weight for that category.
   - Then renormalize top-level indicator weights across indicators so that those also sum to 1.
6. Renormalize the data so that it is scaled between 0 and 100 by subtracting the min and dividing by the range.
7. Apply the weights to the rescaled data, create a score per country, and rank the countries.

Variation within indicator weights is a sign of redundancy in the elements or that some elements are less relevant in explaining variation in the overall index once all other variables are considered. Finding equal weights across indicators is a sign of very little redundancy across subgroups and similar relevance in explaining variation in the index, which suggests that the index was appropriately divided into subgroups.

CATEGORY	WEIGHT
Quantities and Sites	2%
Security and Control Measures	27%
Global Norms	22%
Domestic Commitments and Capacity	30%
Risk Environment	19%

	INDICATOR	WEIGHT
1	**Quantities and Sites**	
1.1	Quantities of Nuclear Materials	0%
1.2	Sites and Transportation	12%
1.3	Material Production and Elimination Trends	88%
2	**Security and Control Measures**	
2.1	On-site Physical Protection	25%
2.2	Control and Accounting Procedures	26%
2.3	Insider Threat Prevention	21%
2.4	Physical Security During Transport	12%
2.5	Response Capabilities	17%
3	**Global Norms**	
3.1	International Legal Commitments	33%
3.2	Voluntary Commitments	39%
3.3	International Assurances	28%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution (UNSCR) 1540 Implementation	26%
4.2	Domestic Nuclear Materials Security Legislation	26%
4.3	Safeguards Adherence and Compliance	26%
4.4	Independent Regulatory Agency	22%
5	**Risk Environment**	
5.1	Political Stability	40%
5.2	Effective Governance	32%
5.3	Pervasiveness of Corruption	26%
5.4	Groups Interested in Illicitly Acquiring Materials	3%

Model Correlations

Correlating the 2014 NTI Index for countries with materials to other data sets reveals some potentially interesting associations. Correlations measure the strength of a relationship between two variables. Scatter plots, which can be found on the "ScatterPlot" worksheet in the NTI Index data model, show the correlations between the 2014

NTI Index and a number of variables. Correlation analysis for three of those variables can be found next:

- **Global Peace Index.** The 2013 Global Peace Index (GPI) gauges ongoing domestic and international conflict, safety and security in society, and levels of militarization. GPI is scored from 1 to 5, where countries that are most at peace receive a score of 1 and countries with lower levels of peace receive a higher value. The results indicate a high negative correlation (–0.83) between a country's GPI and the overall 2014 NTI Index score. This result has a certain logic because a low GPI score corresponds to a higher level of peace and implies a higher level of nuclear materials security. The correlation is negative because as GPI increases (meaning a country is less at peace), then the 2014 NTI Index decreases (meaning nuclear materials security conditions are less favorable).
- **Regulatory quality.** The regulatory quality indicator is a qualitative assessment capturing perceptions of the ability of the government to formulate and implement sound policies and regulations and is taken from the World Bank's Worldwide Governance Indicators (WGI). Countries are ranked from –2.50 to 2.50, where –2.50 is "very low" and 2.50 is "very high." There is a strong positive correlation of 0.75 between the regulatory quality variable and the overall 2014 NTI Index. The correlation shows that countries with higher regulatory quality tend to have better nuclear materials security conditions.
- **Gross domestic product (GDP) per head.** This quantitative indicator is a measure of GDP per head in nominal U.S. dollar terms and allows for a basic comparison of countries in terms of standard of living. For countries with weapons-usable nuclear materials, the correlation between GDP per capita and the overall 2014 NTI Index score is 0.63. The correlation shows that as GDP per capita increases, a country's overall NTI Index score is likely to increase as well.

5. COMPARISON BETWEEN THE 2012 NTI INDEX AND THE 2014 NTI INDEX

NTI and the EIU made a number of changes to the NTI Index between 2012 and 2014. The goal of the changes was to refine the 2014 NTI Index framework to capture a country's nuclear materials security conditions more rigorously, while still maintaining the integrity of the 2012 NTI Index framework for comparability. The 2012 NTI Index was made up of 18 indicators and 51 subindicators. One indicator and eight subindicators were added to the 2014 NTI Index, two subindicators were deleted and combined with other subindicators, and one subindicator was deleted, leading to a total of 19 indicators and 56 subindicators. The scoring criteria for a number of other subindicators were revised. In addition, the weights used in the 2012 NTI Index were refined for the 2014 NTI Index with input from the International Panel of Experts. This section provides greater detail about those changes, as well as about how countries were compared and the methodology used to facilitate the comparison between the 2012 and 2014 indices.

New Indicators and Revised Methodology for Measuring Indicators

The Material Production and Elimination trends indicator comprises one subindicator, which was modified in the 2014 NTI Index. Next is a summary of the revised subindicator:

1.3.1 Material production and elimination trends

In the 2012 NTI Index, this subindicator measured whether a country's quantities of materials had increased, decreased, or remained constant in the previous two years. For the 2014 NTI Index, this time period increased from two years to four years. This change accounts for short periods during which quantities remain unchanged despite a policy of elimination or removal of material. A change to the scoring framework was also made to reflect the judgment that decreasing quantities and maintaining quantities at unchanged levels are both preferable to increasing quantities.

The new scoring framework is as follows:

2012 NTI Index	2014 NTI Index
0 = The total stock of materials is increasing.	0 = The total stock of materials is increasing.
1 = The total stock of materials remains unchanged.	3 = The total stock of materials remains unchanged.
2 = The total stock of materials is decreasing.	4 = The total stock of materials is decreasing.

The "On-site Physical Protection" indicator comprises five subindicators, two of which were modified in the 2014 NTI Index. Next is a summary of the changes:

2.1.3 Design basis threat (DBT)

In the 2012 NTI Index, this binary subindicator assessed whether or not countries with materials had a DBT. Of the 28 countries in the 2012 NTI Index scored for this indicator,[41] 24 received credit for having a DBT. This lack of differentiation between country scores does not allow for insightful analysis or comparisons. The EIU initially conducted extensive research into various criteria. Once this research was complete, NTI, the EIU, and the technical experts agreed to revise the indicator to assess whether or not a country has a DBT that is required to be updated.

2.1.5 Performance-based program

In the 2012 NTI Index, the performance-based program was assessed through two separate subindicators: "Performance-based program" and "Security personnel performance demonstration." Together with the technical experts, NTI and the EIU determined that merging these two subindicators into a single subindicator that assesses both system and personnel performance would capture the intent of the performance-based program indicator more effectively.

The "Control and Accounting Procedures" indicator in the 2012 NTI Index comprised four indicators relating to materials control and accounting. In the 2014 NTI Index, a new subindicator was added to specifically address control measures. Next is a summary of the new subindicator:

2.2.5 Control measures

The 2012 NTI Index had an indicator named "Control and Accounting Procedures" and, although control measures were assessed as part of the "Material balance areas" subindicator, the indicator focused almost exclusively on accounting. The addition of a control measures subindicator in the 2014 NTI Index filled this gap.

Significant changes were made to "Security Personnel Measures" (Indicator 2.3) for the 2014 NTI Index, including a name change to "Insider Threat Prevention." In the 2012 NTI Index, indicator 2.3 specifically addressed security personnel vetting and performance. The 2014 NTI Index expands upon the original indicator and addresses the risk posed by "insiders," or all personnel who have authorized access to nuclear material areas. This change was made based on the assumption that any individual with access to these areas could attempt theft. In addition to expanding the personnel vetting subindicator to capture insiders, three new subindicators were added to create a more complete assessment of a country's protection against the insider threat. Below is a summary of these changes:

2.3.1 Personnel vetting

In the 2012 NTI Index, the "Security personnel vetting" subindicator captured whether or not security personnel underwent drug testing, background checks, and psychological or mental fitness checks. For the 2014 NTI Index, this subindicator was renamed and expanded to include vetting of all personnel with access to nuclear material areas under the assumption that all personnel with access to nuclear material areas—not just security personnel—potentially pose an insider threat.

2.3.2 Frequency of personnel vetting

This subindicator was added to the 2014 NTI Index because personnel vetting at frequent intervals is essential to identifying new insider threats.

2.3.3 Reporting

This subindicator was added to the 2014 NTI Index because requiring personnel to report suspicious behavior increases the likelihood that insider threats will be detected early.

2.3.4 Surveillance

This subindicator was added to the 2014 NTI Index. To counter the insider threat, whenever an "inner area" is occupied, constant surveillance (for instance, a two-person surveillance system or a technological surveillance system) should be used to detect any unauthorized action.

[41] For On-Site Physical Protection (indicator 2.1), the EIU used a proxy indicator—military capability or sophistication—to score Iran, Israel, North Korea, and Pakistan in the 2012 NTI Index. A proxy indicator was not used to score Pakistan for indicator 2.1 in the 2014 NTI Index. The military capability or sophistication indicator is taken from the 2012 Global Peace Index (this indicator was discontinued in the 2013 Global Peace Index).

The Physical Security during Transport indicator comprises one subindicator, which was modified in the 2014 NTI Index. Next is a summary of the change:

2.4.1 Physical security during transport

In the 2012 NTI Index, countries received scores based on whether or not their domestic regulations met or exceeded the provisions laid out by the International Atomic Energy Agency (IAEA) in its Information Circular (INFCIRC) 225, Rev. 4, relevant to the protection of materials in transport. An updated version of the guidelines, INFCIRC 225, Rev. 5, was released in January 2011, just prior to the beginning of the research phase for the 2012 NTI Index. NTI and the EIU agreed at the time to allow significant time for states to incorporate the changes in Rev. 5 into their regulatory regimes before assessing transport security that would be based on the new standard. This subindicator was revised for the 2014 NTI Index to give maximum credit to countries following Rev. 5—in essence, setting the bar higher—while at the same time acknowledging that Rev. 4 is still relevant. Unlike other revised indicators and subindicators, the 2012 scores for subindicator 2.4.1 were not rescored using the revised framework, and the original 2012 scores for this subindicator (subject to any rescoring for errors or new information) were preserved. Thus, a direct year-on-year comparison is not possible. However, the changes in scores between 2012 and 2014 capture states' progress toward incorporating the changes in Rev. 5 into their regulatory regimes.

The "Response Capabilities" indicator comprises four subindicators, one of which was added in the 2014 NTI Index. Next is a summary of the new subindicator:

2.5.2 Armed response capabilities

This subindicator was added under the assumption that adversaries are likely to be armed; thus, requiring on-site armed response capabilities increases the chance of successfully countering an armed attack on nuclear facilities.

The "Voluntary Commitments" indicator comprises eight subindicators, of which one was revised and one was added in the 2014 NTI Index. Next is a summary of the changes:

3.2.7 Bilateral or multilateral assistance

The 2012 NTI Index gave credit to countries that had provided financial or practical bilateral or multilateral assistance to other states in the area of nuclear security during the past two years. During the indicator review process, NTI and the EIU decided to revise this subindicator to include countries that had either provided or received assistance during the past two years, under the assumption that openness to receiving assistance shows a commitment to improved nuclear materials security. Additionally, participation in the National Nuclear Security Administration (NNSA) Second Line of Defense program (Megaports or Core program) was included in a separate subindicator in the 2012 NTI Index. In the 2014 NTI Index, participation in this program was merged with this subindicator.

3.2.8 Centers of Excellence

A Center of Excellence for nuclear security, or Nuclear Security Training and Support Center, is a centralized location where a country or region can send professionals for training in various aspects of nuclear security. Countries that have established such centers show a commitment to strengthening global nuclear security.

The "International Assurances" indicator, which was named "Nuclear Security and Materials Transparency" in the 2012 NTI Index, now comprises three subindicators, one of which was revised. One subindicator from the 2012 NTI Index was deleted. Next is a summary of the changes:

3.3.3 Invitation(s) for review of security arrangements

In the 2012 NTI Index, this subindicator was scored as a binary subindicator. Countries received credit if they had invited an IAEA or a bilateral or multilateral review of security arrangements in the past five years. In the 2014 NTI Index, this approach was revised to differentiate between countries that have invited a review within the past five years, those that have invited a review outside of the five-year period, and those that have never invited a review. Countries no longer receive credit for (a) having had an IAEA

International Team of Experts (ITE) review because ITE reviews are no longer available or (b) having in place an Integrated Nuclear Security Support Plan, which does not include a review of security arrangements.

3.3.4 Confidence level of estimate of nuclear materials quantity

This subindicator was excluded from the 2014 NTI Index. NTI and the EIU agreed that this subindicator was not entirely distinct from the "Public declarations and reports about nuclear materials" subindicator and also had technical shortcomings caused by relying on data that were not updated regularly.

The "Safeguards Adherence and Compliance" indicator, which was named "Safeguards Adoption and Compliance" in the 2012 NTI Index, comprises four subindicators. One of those subindicators was revised in the 2014 NTI Index. Next is a summary of the changes:

4.3.4 Safeguards violations

In the 2012 NTI Index, this subindicator assessed whether or not a country had been reported to the UN Security Council or the IAEA Board of Governors in the past two years. In the 2014 NTI Index, NTI and the EIU revised the scoring criteria to acknowledge that issues pertaining to safeguards violations might remain unresolved for several years despite the absence of further reports. This subindicator now measures not only whether a country has been reported to the UN Security Council or the IAEA Board of Governors but also whether the issues reported therein remain outstanding. As such, it no longer uses a two-year timeframe for those reports.

The "Effective Governance" indicator is new to the 2014 NTI Index. It comprises two subindicators: "Effectiveness of the political system" and "Quality of the bureaucracy." An ineffective government hampers the implementation of policies that will protect nuclear materials and enhance their security conditions and, thus, is an important measure for the 2014 NTI Index.

5.2.1 Effectiveness of the political system

This subindicator measures how effective a country's political system is in formulating and executing policy. It assesses the tension between the legislative and executive branches of government, the instability in government formation, and the cohesion of the legislature. This subindicator was added because an ineffective political system can negatively affect a country's ability to establish and sustain policies that secure weapons-usable nuclear materials.

5.2.2 Quality of the bureaucracy

In addition to measuring the effectiveness of the political system in formulating and executing policy, the ability to implement policies that protect weapons-usable nuclear materials is dependent on the quality of a country's bureaucracy and its ability to carry out government policy. This subindicator measures the bureaucracy's overall competency and training, its morale and dedication, and its compensation and status.

Comparability between the 2012 NTI Index and the 2014 NTI Index

To ensure an accurate year-on-year comparison, the EIU required an identical data set for 2012 and 2014. The new and revised indicators described earlier posed a challenge, because those indicators were not scored for 2012. The EIU undertook research to rescore the 2012 NTI Index—using the revised NTI Index framework—as if it were 2011 (when research for the 2012 NTI Index was conducted). In some cases, the score that would have been assigned for 2012 was obvious and was based on the date of the relevant regulatory document. For example, if the regulation describing control measures was published in 2007, then the researcher would assign the appropriate score for the 2012 NTI Index on the basis of that document, because it would have been available when the research was undertaken in 2011. When it could not confirm whether a requirement had been in place during the 2011 research, the EIU either queried the governments or, when that was not possible, made measured assumptions that were based on whether any regulatory changes relevant to nuclear materials security had been instituted in recent years.

In addition to rescoring the 2012 data for the new and revised indicators, in a limited number of cases, the EIU adjusted 2012 scores on the basis of new evidence. In all cases, if a 2012 score was deemed to be inaccurate, the EIU corrected the score to reflect the most up-to-date

information available. Those adjustments helped to ensure that no artificial improvements or declines in scores are captured in the 2014 NTI Index model.

In a few instances, the response to the 2014 data review and confirmation request contradicted the 2012 response. In those cases, the EIU first queried the government about the discrepancy; if the EIU did not receive a response to the query, additional research was undertaken and, in some cases, reasoned assumptions were made on the basis of available sources. In some cases, a 2012 score was adjusted on the basis of (a) the more recent 2014 data review and confirmation responses and (b) the evidence provided by a government.

Once the EIU had two comparable data sets, a year-on-year comparison could highlight where scores had improved, remained the same, or declined on the basis of actions taken by countries. The scores and rankings for the rescored 2012 NTI data and 2014 NTI Index were calculated using the same framework, methodology, and weights, as described in *Calculating the 2014 NTI Nuclear Materials Security Index*. Owing to the methodological changes described, the normalized scores and ranks in the originally published 2012 NTI Index model and 2012 NTI Index report are comparable neither to the normalized scores and ranks in the newly rescored 2012 data nor to those in the 2014 NTI Index. To understand changes in scores between the 2012 and 2014 indices resulting from actions taken by countries since the end of September 2011 (when research for the 2012 NTI Index was completed), people should use the 2014 NTI Index model and its comparison tools rather than the original 2012 NTI Index model.

The 2014 NTI Index model includes a new summary of the scores and ranks for the rescored 2012 data. Note that the seven countries that have removed all or most of their stocks of weapons-usable nuclear materials (Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam) have been moved to the second model for countries without weapons-usable nuclear materials and are not included in the rescored 2012 data for countries with materials. The original 2012 NTI Index model has been archived for reference only.

6. RESEARCH BEHIND SELECTED INDICATORS

This section focuses on the research behind selected indicators, and it includes an explanation for the scoring framework behind several of the more complex variables created by the EIU. Scoring criteria for all of the indicators are included in the section titled "Sources and Definitions of Indicators."

Approach

The EIU employed country experts and regional specialists with a wide variety of the necessary linguistic skills to undertake the research from its global network of hundreds of analysts and contributors. Researchers were asked to gather data from primary legal texts; government and academic publications; and websites of government authorities, international organizations, and non-governmental organizations. Researchers also contacted government officials and subject-matter specialists and reviewed local and international news and media reports. The EIU research was constrained by a lack of publicly available information in some cases and a general lack of openness in the area of nuclear security. The research process proved challenging, both because of the difficulty in sourcing data and official information related to nuclear materials security and, in some cases, because of a lack of publicly available information.

Challenging Indicators

1.1 Quantities of Nuclear Materials

This indicator seeks to capture each country's combined total quantity of highly enriched uranium (HEU), separated plutonium, and unirradiated mixed oxide fuel (MOX). Materials that are owned by one state but are present in another state are accounted for under the latter's total. Plutonium content in MOX is either reported as such by a state or calculated as 5 percent to 8 percent of total MOX quantities. Quantities include materials in weapons components.

The key challenge in researching quantities of weapons-usable nuclear materials is the general lack of publicly available information in this area, particularly for nuclear-armed states. The majority of states do not declare all of

their nuclear materials (including materials in weapons components). The EIU relied primarily on three sources for data: the International Atomic Energy Agency (IAEA) and its Information Circular (INFCIRC) 549 declarations (civilian plutonium, civilian MOX, and civilian HEU); the James Martin Center for Nonproliferation Studies, or CNS (civilian HEU); and the International Panel on Fissile Materials (IPFM) and its *Global Fissile Material Report* for 2010, 2011, and 2013 (military HEU and plutonium). In many cases, the latter two sources use estimates or ranges of quantities that are based on the latest available information. Where quantities were provided in a range, the EIU used the midpoint (for example, a range of 5.0 to 10.0 kilograms would be reported by the EIU as 7.5 kilograms).

In some cases, data review and confirmation responses by countries provided the EIU with significantly different figures from those reported by other key sources.

One additional challenge arose. Nuclear materials frequently are transported, sometimes internationally. Materials are shipped to nuclear fuel cycle facilities for further processing, often in other countries. Shipments of this nature are not consistently reported. In some cases, the purpose of international transport is removal—the state is returning some or all of its material to the country of origin, usually the United States or Russia. The removal of nuclear materials is generally reported, although typically not for some time after the event. Of the data sources on which the EIU relied for data on quantities of materials, only CNS updates its data more than once per year. Because of this fact, the NTI Index data may lag behind actual changes.

Owing to the uncertainties associated with quantities, the EIU banded the data into eight groups. Banding the data implies that precise figures could not be ascertained and should increase confidence in the accuracy of scores.

1.2 Number of Sites

This indicator seeks to capture how many sites (both military and civilian) with one kilogram or more of HEU, including spent fuel; separated plutonium; or unirradiated MOX fuel are present in a country. Significant challenges arose in researching this indicator. Not surprisingly, many states do not publish the number or location of facilities with weapons-usable nuclear materials, or their location. There are sound national security reasons for not publicizing specific information on quantities and sites. Nevertheless, the lack of transparency in this area meant the EIU had to estimate the number of sites on the basis of the limited information that was publicly available. Owing to the uncertainty associated with those estimates, the EIU again determined that banding the number of sites was advisable, thus implying that precise figures could not be ascertained.

1.3 Material Production and Elimination Trends

This indicator looks at whether a country's total stock of weapons-usable nuclear materials has increased, remains unchanged, or has decreased in the past four years. This measurement was increased from two years in the 2012 NTI Index to four years in the 2014 NTI Index. Owing in large part to the challenges associated with estimating quantities of weapons-usable nuclear materials, understanding the changes in materials stocks was not straightforward. The EIU took a three-pronged approach. First, secondary research was undertaken to establish which countries are or have been producing materials. A limited number of countries are producing materials, and information about those activities is discussed in the public realm, including in the IPFM *Global Fissile Material Report* for 2010, 2011, and 2013. Second, the EIU researched which countries are in the process of, or have recently, repatriated weapons-usable nuclear materials or are in the process of downblending materials. Such activities are generally reported, particularly as they are considered positive actions that a country can take. Finally, for those countries that were not understood to be in the process of either eliminating or producing materials, the EIU conducted extensive secondary research to determine whether stocks had increased or decreased in the previous four years. Secondary research included comparing data from INFCIRC 549 declarations (when available) and from other reliable data sources on weapons-usable nuclear materials stocks. In some cases, countries were willing to provide additional information about their activities relevant to this indicator.

2.4 Physical Security during Transport

This indicator looks at whether the IAEA guidelines regarding transport of nuclear materials—guidelines encompassed in IAEA INFCIRC 225, Rev. 4 or Rev. 5—are translated into the national regulatory regime. This indicator was revised for the 2014 NTI Index to incorporate Rev. 5

(the 2012 NTI Index focused only on Rev. 4) into its scoring scheme. Countries with regulations reflecting Rev. 4 receive one point, and countries with regulations reflecting Rev. 5 receive two points. This approach differentiates between countries that have transport security requirements reflecting Rev. 4 and countries with few or no transport regulations, while also acknowledging that Rev. 5 contains more stringent requirements. This approach also recognizes that countries are still transitioning from Rev. 4 to Rev. 5.

5.1–5.3 Risk Environment: Political Stability, Effective Governance, Pervasiveness of Corruption

The "Risk Environment" category comprises four indicators, and three are discussed in this section. The "Political Stability," "Effective Governance," and "Pervasiveness of Corruption" indicators are scored on the basis of proprietary information contained in the EIU's Risk Briefing and Business Environment Rankings.

5	RISK ENVIRONMENT	
5.1	**Political Stability**	**Source**
5.1.1	Social unrest	Economist Intelligence Unit (EIU) Risk Briefing.
5.1.2	Orderly transfers of power	EIU Risk Briefing
5.1.3	International disputes or tensions	EIU Risk Briefing
5.1.4	Armed conflict	EIU Risk Briefing
5.1.5	Violent demonstrations or violent civil or labor unrest	EIU Risk Briefing
5.2	**Effective Governance**	
5.2.1	Effectiveness of the political system	EIU Business Environment Ranking
5.2.2	Quality of the bureaucracy	EIU Risk Briefing
5.3	**Pervasiveness of Corruption**	
5.3.1	Pervasiveness of corruption	EIU Risk Briefing
5.4	**Groups Interested in Illicitly Acquiring Materials**	
5.4.1	Groups interested in illicitly acquiring materials	EIU and expert assessment based on various sources

In the Risk Briefing and Business Environment Ranking assessments, which are updated once per quarter, the EIU takes into account present conditions and the EIU's expectations for the future. The EIU forecasts future risk and business environment conditions rather than simply extrapolating present trends into the future. The comparability of the qualitative assessments is made more rigorous by the extensive guidance provided to the EIU's team of 130 country analysts, who undertake the research for each indicator. Analysts are able to constantly view the scoring for other countries, which enables consistency across countries, and additional oversight is provided by the editorial team, which includes risk heads for every region. The EIU also conducts an annual global audit of all the scores. Ultimately, the ratings and scores rely on the expert opinion of the EIU's analysts working in regional teams that have extensive knowledge of events and conditions in both the countries and the region. Those analysts have a wide range of open and closed sources at their disposal, as discussed in the next paragraph.

Risk Briefing Sources: One of the main closed sources is the EIU's extensive network of more than 250 in-country expert contributors, who are based in virtually every country throughout the world. The EIU's contributors analyze recent market developments and forecast political, economic, and business trends in addition to providing detailed, regular information on conditions within a country. The analysts also draw on the existing analytic work already developed at the EIU.

The use of open sources is extensive. International open sources include publications from the Central Intelligence Agency (CIA), Heritage Foundation, International Institute for Management Development, International Labor Organization, International Monetary Fund, Interpol, World Bank, and United Nations.

Business Environment Ranking Sources: The main sources used for the historical period scores include CIA, *World Factbook*; Economist Intelligence Unit, *Country Risk Service*; Freedom House, *Annual Survey of Political Rights and Civil Liberties*; Heritage Foundation, *Index of Economic Freedom*; United Nations Development Program, *Human Development Report*; World Bank, *World Development Report, World Development Indicators*, and *Doing Business*; and World Economic Forum, *Global Competitiveness Report.*

5.4 Groups Interested in Illicitly Acquiring Materials

This indicator seeks to understand whether any terrorist or criminal groups interested in illicitly acquiring weapons-usable nuclear materials are present in a country and are capable of carrying out their goals. First, the EIU accessed various databases (see the *Select Bibliography* for more information) and other secondary sources to ascertain which terrorist groups or criminal organizations have a stated interest in acquiring nuclear materials. The EIU then undertook research to determine the countries in which those groups have either members present or a base of operations. Details as to the extent of a group's presence in a given country could not be ascertained. Owing to the nature of this topic, which has serious national security implications for states, the publicly available information is limited.

Once a list of countries with such groups present was established, the EIU used a gradient scale that assessed the relative capabilities and intent of groups in each country to make a distinction between the following two scores:

- A score of 0 means that such groups exist and are thought to have the capabilities to carry out their goals when acting alone or with the assistance of a capable third party.
- A score of 1 means that such groups exist but are likely incapable of carrying out their aims.

Challenging Countries

Each country posed unique research challenges; Iran, Israel, North Korea, and Pakistan were particularly complicated.

Use of Military Proxy

Iran, Israel, and North Korea were particularly difficult to score for the "On-site Physical Protection" indicator (2.1) in the 2014 NTI Index. Those countries are distinct among the countries for which the EIU could not find publicly available information in that they rely primarily on military (or, in the case of Israel, civil defense force) protection for nuclear sites. For indicator 2.1, therefore, the EIU used a proxy indicator—military capability or sophistication—to score the countries. The military capability or sophistication indicator is taken from the 2012 Global Peace Index.[42] It is scored as follows:

- A score of 1 means "very low": no investment in military research and development (R&D). Principal equipment is very old or obsolete.
- A score of 2 means "low": minimal investment in military R&D. A high percentage of equipment is old and unsophisticated.
- A score of 3 means "moderate": investment of a small part of military expenditure in R&D. Principal equipment is a mixture of new and old and is moderately sophisticated.
- A score of 4 means "high": substantial investment in military R&D and in maintenance. Principal equipment is relatively modern and sophisticated and is well maintained.
- A score of 5 means "very high": huge investment in military R&D and armament production projects. Principal equipment is new and highly sophisticated.

The EIU rescaled the indicator scoring to reflect the 0–4 scale used throughout this research. The maximum score the four countries could receive for indicator 2.1 was 4, where 4 represented the most favorable nuclear materials security conditions. The absence of information on nuclear materials security reduces public and international understanding of the security measures that the countries are taking. Therefore, receiving the highest possible score of 5 for this indicator was not appropriate for states that were scored using a proxy. Because a proxy indicator was used for those countries, they did not receive separate scores for each of the subindicators in 2.1; instead, the countries received an overall score for the indicator.

Assumptions Based on Military Control of Materials

For the following subindicators, the scores for Iran, Israel, North Korea, and Pakistan are based on the assumption that the military imposes a strict regime under direct control of the state:

- 2.4.1 Physical security during transport (Iran and Israel only)
- 2.5.1 Emergency response capabilities

[42] This indicator was discontinued in the 2013 Global Peace Index.

- 2.5.2 Armed response capabilities
- 2.5.3 Law enforcement response training

Expert Input Used

For the following indicators and subindicators, expert input or other secondary expert sources were used to score a country:

- 2.3.1 Personnel vetting (Israel only)
- 2.2 Control and accounting procedures, 2.3.1 Personnel vetting, and 2.4.1 Physical security during transport (North Korea only)

Pakistan

When the research for the 2012 NTI Index was undertaken, it was not possible to score Pakistan on the "On-site Physical Protection" indicator (2.1) on the basis of its publicly available laws and regulations. Given the lack of available information and the need to provide an accurate representation of the nuclear materials security conditions in the country, Pakistan was scored using the military proxy indicator for indicator 2.1, just as Iran, Israel, and North Korea were in both 2012 and 2014. With the introduction of the Pakistan Nuclear Regulatory Authority's *Regulation for Licensing of Nuclear Installation(s) in Pakistan* (PAK/909) Revision 1 in June 2012 and the publication of additional secondary sources since the 2012 NTI Index, it is now possible to score Pakistan on indicator 2.1 on the basis of its publicly available regulations. However, challenges remained. Section 10(2) of PAK/909[43] states that in areas where Pakistan Nuclear Regulatory Authority regulations are not available, the most recent U.S. Nuclear Regulatory Commission regulations shall be considered applicable. Because U.S. regulations are unenforceable in Pakistan, however, and because the PAK/909 provision does not specify which U.S. Nuclear Regulatory Commission regulations are being referenced, Pakistan did not receive credit for U.S. regulations that may provide more detail than is available in Pakistan's regulations.

Israel

Israel also posed a unique research challenge because it maintains a policy of opacity in regard to its nuclear program. Israel does not publish any nuclear security–related laws or regulations that could be used in this research. Moreover, the EIU was unable to elicit expert opinion on Israel's nuclear materials security conditions, as it was for the other challenging countries. As already noted, owing to the lack of publicly available information, the EIU used proxies as a scoring technique for some indicators.

The EIU did not use a proxy (military sophistication) or an assumption based on military (or similar body) protection of nuclear sites to score the "Control and Accounting Procedures" indicator (2.2). Materials control and accounting (MC&A) is typically not in the purview of security personnel responsible for protecting nuclear materials. The EIU and its experts acknowledge that it is more than likely that Israel has regulations regarding MC&A. However, there is an unusual lack of transparency regarding nuclear materials in Israel; thus, the EIU erred on the conservative side in its scoring. The burden of proof is on Israel to demonstrate that it has systems in place. The absence of information is not a positive; it is a negative.

Recognizing the challenges in scoring Iran, Israel, and North Korea in the "Security and Control Measures" category, the EIU examined the sensitivity of the overall scores and ranking to changes in scores for the "Security and Control Measures" indicators. The results are telling: if Iran, Israel, and North Korea received the highest possible scores for indicators 2.1 and 2.2, each country's category score and ranking would see the following changes:

Security and Control Measures				
	Current score	Potential score	Current rank	Potential rank
Iran	40	68 (+28)	23	17 (+6)
Israel	59	80 (+21)	19	9 (+10)
North Korea	43	68 (+25)	22	17 (+5)

[43] *Regulation for Licensing of Nuclear Installation(s) in Pakistan* (PAK/909), http://pnra.org/legal_basis/PAK-909-rev-29-jun-12.pdf.

Nevertheless, each country's overall index ranking and score would see only a minor change:

Overall				
	Current score	Potential score	Current rank	Potential rank
Iran	39	47 (+9)	24	22 (+2)
Israel	57	63 (+6)	21	21 (no change)
North Korea	30	38 (+8)	25	25 (no change)

Treatment of Taiwan in the NTI Index

Taiwan is included in the NTI Index for countries without weapons-usable nuclear materials. Taiwan posed a unique research challenge, as it is not currently a member of the IAEA or a party to most international conventions owing to its status in the international community. However, it has well-established and publicly available regulations. The EIU determined that for select indicators, Taiwan could appropriately be scored on the basis of relevant domestic regulations and other considerations, as detailed next:

3.1.1 Convention on the Physical Protection of Nuclear Material (CPPNM)

Taiwan is not a party to the CPPNM. The EIU assessed Taiwan on the basis of provisions in its domestic regulations.

3.2.1 IAEA membership

Taiwan is not currently a member of the IAEA. The EIU has scored Taiwan a 1 on this subindicator on the basis of its previous membership status.

4.1.1 United Nations Security Council Resolution (UNSCR) 1540 Reporting

Because Taiwan is not a member of the United Nations, it is not obliged to—and, in fact, cannot—provide a UNSCR 1540 Report to the 1540 Committee. Despite this situation, Taiwan has drafted and distributed a report modeled on 1540 reports and has provided it to NTI.

4.1.2 Extent of UNSCR 1540 Implementation

Although it cannot submit a 1540 matrix to the 1540 Committee, Taiwan has created a 1540 matrix modeled on published 1540 matrices and has provided it to NTI. If Taiwan's matrix were to be treated like other countries' matrices, the number of elements of UNSCR 1540 that have been implemented (as reflected in the matrix) would result in a score of 4. Given that Taiwan's matrix, unlike other country matrices, has not been reviewed and approved by the 1540 Committee, however, a score of 1—for countries with weak implementation or where a matrix exists but is not publicly available—was deemed appropriate.

4.2.1 CPPNM implementation authority

The EIU assessed Taiwan on the basis of its having a national authority for the implementation of nuclear security regulations.

4.2.2 National legal framework for CPPNM

The EIU assessed Taiwan on the basis of provisions in its domestic regulations.

7. SOURCES AND DEFINITIONS OF INDICATORS

Quantities and Sites

This category comprises three indicators: Quantities of Nuclear Materials, Sites and Transportation, and Material Production and Elimination Trends. The category captures the quantity of nuclear materials, the number of sites, and the frequency of transport in a particular country, all related to the risk that materials could be stolen.

Indicator or Subindicator	Source	Indicator Definitions and Construction
1.1 Quantities of Nuclear Materials		**The larger the quantity of nuclear material held, the greater the materials management requirements and potential risk that materials could be stolen.**
1.1.1 Quantities of nuclear materials	James Martin Center for Nonproliferation Studies; International Panel on Fissile Materials, *Global Fissile Material Report 2010, Global Fissile Material Report 2011, and Global Fissile Material Report 2013*; International Atomic Energy Agency, INFCIRC 549 declarations	What is the country's combined total quantity of highly enriched uranium (HEU), separated plutonium, and unirradiated mixed oxide fuel (MOX)? 0 = 500 tonnes or greater 1 = 100–499 tonnes 2 = 10–99.99 tonnes 3 = 2–9.99 tonnes 4 = 500 kg–1.99 tonnes 5 = 100–499 kg 6 = 21–99 kg 7 = 5–20 kg 8 = Less than 5 kg Totals are reported in kilograms and tonnes. 1 tonne = 1,000 kg. Total HEU quantities include spent fuel. Materials owned by one state but that are present in another state are accounted for under the latter's total. Plutonium content in MOX is either reported as such by a state or is calculated as 5–8% of total MOX quantities. Analysis also includes materials in weapon components.

Indicator or Subindicator	Source	Indicator Definitions and Construction
1.2 Sites and Transportation		**The greater the number of sites with nuclear materials and the frequency of transport of those materials, the greater the potential risk of security breaches.**
1.2.1 Number of sites	EIU analyst qualitative assessment	The greater the number of sites with nuclear materials, the greater the potential risk of security breaches. How many sites (both military and civilian) with one kilogram or greater quantities of HEU (including spent fuel), separated plutonium, or unirradiated MOX does the country maintain? 0 = 100 sites or greater 1 = 11–99 sites 2 = 2–10 sites 3 = One site A site is defined as a military or civilian location that maintains HEU (including spent fuel), separated plutonium, and/or unirradiated MOX material(s) quantities that are equal to or greater than one kilogram. A military base with such nuclear materials (including quantities contained in nuclear weapons) is counted as a single site, even if materials within the site are contained in two or more buildings. Likewise, a civilian location that maintains materials, either in storage or in use, within multiple buildings is counted as a single site. Military ships that contain nuclear materials are counted as a single site. The following types of sites are considered but are counted only if they contain one kilogram or greater quantities of HEU, separated plutonium, or unirradiated MOX: • Dismantlement • Enrichment • Fuel Fabrication • Medical Isotope Production • Plutonium Production Reactor • Power Reactor • Reprocessing • Research and Development • Research Reactors • Storage • Testing • Waste Management
1.2.2 Bulk processing facility	EIU analyst qualitative assessment	Production of nuclear materials in bulk increases the potential for undetected gradual theft of small quantities. Does the country have at least one bulk processing facility handling HEU, separated plutonium, or unirradiated MOX? 0 = Yes 1 = No Bulk processing facilities include enrichment, reprocessing, and national fuel cycle facilities.

Indicator or Subindicator	Source	Indicator Definitions and Construction
1.2.3 Frequency of materials transport	EIU analyst qualitative assessment	Because nuclear material is particularly vulnerable during transport, the lower the frequency of transfer of material, the lower the potential risk of security breaches. Are nuclear materials (HEU, separated plutonium, or unirradiated MOX) transported either domestically or internationally? 0 = Yes, transported domestically or internationally, and the country is one of nine nuclear-armed states 1 = Yes, domestically or internationally 2 = No *or* only for removal
1.3 Material Production and Elimination Trends		**Increasing or decreasing the quantities of nuclear material in a state changes the potential risk of materials being stolen.**
1.3.1 Material production and elimination trends	EIU analyst qualitative assessment	Countries receive the following scores based on trends in their total stock of nuclear materials: 0 = The total stock of nuclear materials is increasing 3 = The total stock of nuclear materials remains unchanged 4 = The total stock of nuclear materials is decreasing Scores are based on the actions of a state within the past four years. When considering whether a country's total stock of nuclear materials is decreasing, analysts evaluated the following: • Is the country reducing its stock of nuclear weapons? • Is reprocessing being discontinued? • Are HEU-fueled research reactors being converted to low-enriched uranium (LEU), and are unneeded research reactors being decommissioned? • Are military vessels that are fueled by HEU being converted to LEU? • Is the country returning or giving nuclear materials to another country?

Security and Control Measures

This category comprises five indicators: On-site Physical Protection, Control and Accounting Procedures, Insider Threat Prevention, Physical Security during Transport, and Response Capabilities. The category encompasses the core activities directly related to protection and accounting of nuclear materials. It includes indicators of physical protection, control and accounting, insider threat prevention, security during transport, and response capabilities.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.1 On-site Physical Protection		**Essential measures for securing sites and facilities.**
2.1.1 Mandatory physical protection	EIU analyst qualitative assessment based on official national sources, which vary by country	Requiring licensees to provide physical protection increases the likelihood that nuclear materials facilities will meet strict standards. Is physical protection a condition for licensing? 0 = No *or* information not publicly available 1 = Yes
2.1.2 On-site reviews of security	EIU analyst qualitative assessment based on official national sources, which vary by country	On-site reviews of security increase the likelihood that physical protection measures meet prescribed standards and will be maintained. Are on-site reviews of security done in order to keep a license? 0 = No *or* information not publicly available 1 = Yes
2.1.3 Design basis threat (DBT)	EIU analyst qualitative assessment based on official national sources, which vary by country	A DBT that is based on strong assumptions and that is regularly updated leads to a more rigorous security system. Do the country's regulations require the use of a DBT that is required to be updated? 0 = No *or* information not publicly available 1 = Yes A DBT means the attributes and characteristics of potential insider or external adversaries who might attempt unauthorized removal of nuclear material or sabotage against which a physical protection system is designed and evaluated.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.1.4 Security responsibilities and accountabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Requiring licensees to hold particular individuals accountable for security increases the likelihood that physical protection measures will be implemented. Does the nuclear regulator define nuclear materials security responsibilities and accountabilities? 0 = No *or* information not publicly available 1 = Yes This subindicator seeks to answer whether or not the regulator requires that licensees define who is responsible and accountable for at least one aspect of nuclear materials security. It is not enough to note that the responsibility for materials security will fall to the licensee. The regulator should require that the licensee have individuals with security responsibilities or accountabilities in at least one area of security.
2.1.5 Performance-based program	EIU analyst qualitative assessment based on official national sources, which vary by country	Required demonstration of performance, along with tests and assessments, improves effectiveness of and identifies weaknesses in physical protection measures. Does the regulator require a performance-based program, which includes tests and assessments of security systems and measures, and a demonstration of performance by security personnel at nuclear sites? 0 = No *or* information not publicly available 1 = Yes
2.2 Control and Accounting Procedures		**Materials control and accounting is a necessary element of a comprehensive security system.**
2.2.1 Legal and regulatory basis for material control and accounting (MC&A)	EIU analyst qualitative assessment based on official national sources, which vary by country	A legal and regulatory basis for MC&A is part of the foundation of a strong system and culture of materials security. Is there a domestic legal and regulatory basis for nuclear MC&A? 0 = There is no domestic legal or regulatory basis for MC&A *or* information not publicly available 1 = There is a legal and regulatory basis for MC&A 2 = There is a legal and regulatory basis for MC&A and international guidelines are reflected in the legal and regulatory system
2.2.2 Measurement methods	EIU analyst qualitative assessment based on official national sources, which vary by country	The quality of measurement methods corresponds to the ability to detect the diversion or theft of nuclear materials. Do domestic regulations or license conditions require measurement methods that provide for accurate and precise quantification of nuclear materials? 0 = No *or* information not publicly available 1 = Yes

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.2.3 Inventory record	EIU analyst qualitative assessment based on official national sources, which vary by country	Maintaining complete, accurate, and timely records of the nuclear material inventory is necessary to detect the diversion or theft of nuclear materials. Do domestic regulations or license conditions require a complete, accurate, and timely record of the nuclear materials inventory that is reported at defined intervals? 0 = No *or* information not publicly available 1 = Yes
2.2.4 Material balance area(s)	EIU analyst qualitative assessment based on official national sources, which vary by country	Well-defined and well-controlled geographical locations for nuclear materials enable more accurate accounting and increase the likelihood of detection of diversion or theft of nuclear materials. Do domestic regulations or license conditions require that nuclear materials should be in well-defined and controlled geographical locations within the state? 0 = No *or* information not publicly available 1 = Yes The state body should establish the factors to be taken into account and the criteria to be met in determining material balance area(s) for each nuclear facility. Those areas are established for material accounting purposes, so that (1) the quantity of nuclear material in each transfer into or out of each material balance area can be determined, and (2) the physical inventory of nuclear material in each material balance area can be determined when necessary in accordance with specified procedures. The factors to be taken into account should include a. the existence and location of key measurement points and b. the use of containment and surveillance measures. The state body should also approve the facility material balance area(s).

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.2.5 Control measures	EIU analyst qualitative assessment based on official national sources, which vary by country	Nuclear materials control measures aid in the assurance that unauthorized access to restricted areas is detected in a timely manner. Do domestic regulations or licensing conditions require the following nuclear materials control measures? a. The identity of persons entering the protected area must be verified. b. Records must be kept of all persons who access inner areas and of all persons who have access to or possession of keys, keycards, and other systems—including computer systems—that control access to inner areas. 0 = Regulations do not require control measures *or* information not publicly available 1 = Regulations require one of these control measures 2 = Regulations require two of these control measures
2.3 Insider Threat Prevention		**The qualifications of personnel, the strength of the security culture, and the use of certain surveillance measures are critical to how well security procedures are followed and decrease vulnerability to insider threats.**
2.3.1 Personnel vetting	EIU analyst qualitative assessment based on official national sources, which vary by country	Clear guidelines for the qualification and fitness of personnel increases the likelihood that security and other personnel with access to nuclear material areas will effectively discharge their responsibilities and decreases vulnerability to insider threats. Do domestic regulations or license conditions specify that security and other personnel with access to nuclear material areas are subject to the following checks: drug testing, background checks, and psychological or mental fitness checks? 0 = Personnel are not subject to any of these checks 1 = Personnel are subject to one of these checks 2 = Personnel are subject to two of these checks 3 = Personnel are subject to all three of these checks
2.3.2 Frequency of personnel vetting	EIU analyst qualitative assessment based on official national sources, which vary by country	Personnel vetting at frequent intervals is essential to identifying new and changing insider threats. Do domestic regulations or licensing conditions specify that security and other personnel with access to nuclear material areas are vetted at specified intervals? 0 = Frequency of vetting is not specified *or* information not publicly available 1 = Such personnel are subject to vetting at periods greater than five years 2 = Such personnel are subject to vetting at periods greater than two but not more than five years 3= Such personnel are subject to vetting at periods of two years or less

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.3.3 Reporting	EIU analyst qualitative assessment based on official national sources, which vary by country	Requiring personnel to report suspicious behavior increases the likelihood that insider threats will be detected early. Do domestic regulations or licensing conditions specify that personnel must report suspicious behavior to an official authority? 0 = No *or* information not publicly available 1 = Yes
2.3.4 Surveillance	EIU analyst qualitative assessment based on official national sources, which vary by country	To counter the insider threat, whenever an inner area is occupied, constant surveillance should be used to achieve detection of unauthorized action. Do domestic regulations or license conditions require constant surveillance of inner areas when they are occupied, using either a two-person surveillance system or a technological surveillance system? 0 = No *or* information not publicly available 1 = Yes, a two-person surveillance system or a technological surveillance system is required 2 = Yes, both a two-person surveillance system and a technological surveillance system are required *Two-person surveillance system:* Requires at least two knowledgeable persons to be present to verify that activities involving nuclear material and nuclear facilities are authorized, allowing detection of access or actions that are unauthorized *Technological surveillance:* Technological surveillance includes devices such as closed-circuit television (CCTV) and audio surveillance equipment
2.4 Physical Security during Transport		**Materials in transit are particularly vulnerable to theft.**
2.4.1 Physical security during transport	EIU analyst qualitative assessment based on official national sources, which vary by country	Are the IAEA guidelines regarding transport of nuclear materials encompassed in INFCIRC 225, Rev. 4 or Rev. 5, translated into the national regulatory regime? 0 = No *or* information not publicly available 1 = Appropriate guidelines encompassed in INFCIRC 225, Rev. 4 (based on quantities of materials in country), are met 2 = Appropriate guidelines encompassed in INFCIRC 225, Rev. 5 (based on quantities of materials in country), are met
2.5 Response Capabilities		**Response capabilities are part of a layered security system and may enable materials to be recovered should they be stolen from a site.**

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5.1 Emergency response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Requiring on-site emergency response capabilities, including trained response teams and required incident reports (i.e., notification), increases the level of preparedness for potential nuclear theft incidents. Do the state's licensing requirements for civilian nuclear facilities require that each facility have on-site nuclear security emergency response capabilities? 0 = Licensing does not require an on-site trained response team or incident reports to appropriate law enforcement authority 1 = Licensing requires incident reports to appropriate law enforcement authority 2 = Licensing requires an on-site trained response team 3 = Licensing requires *both* an on-site trained response team and incident reports to appropriate law enforcement authority Capabilities should include a trained response team and a requirement to report an incident to appropriate law enforcement authorities.
2.5.2 Armed response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Requiring on-site armed response capabilities increases the chance of success in responding to armed attacks. Do the state's licensing requirements for civilian nuclear facilities require that each facility with Category I quantities of nuclear material have an on-site armed response team? 0 = No *or* information not publicly available 1 = Yes, on-site armed response team is required *or* state does not have Category I quantities of nuclear material The IAEA classifies (a) 2 kilograms or more of plutonium and 5 kilograms or more of HEU as Category I materials and (b) less than 2 kilograms but more than 500 grams of plutonium and less than 5 kilograms but more than 1 kilogram of HEU as Category II materials. This categorization enables the IAEA to use a graded approach in recommending physical protection measures.
2.5.3 Law enforcement response training	EIU analyst qualitative assessment based on official national sources, which vary by country	Law enforcement officers who are trained to respond to nuclear materials theft have a greater chance of success responding to theft incidents than those who are untrained. Are law enforcement officers trained to respond in the event of the theft of nuclear materials? 0 = No 1 = Yes

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5.4 Nuclear infrastructure protection plan	EIU analyst qualitative assessment based on official national sources, which vary by country	Natural disasters may increase vulnerability of nuclear materials as a result of physical damage to facilities and additional pressures placed upon government and personnel. Does the country's regulatory framework state that, in the event of a natural disaster, plans are in place to physically protect the nuclear infrastructure? 0 = No mention 1 = Partially mentioned 2 = Fully described Emergency preparedness regulations must mention nuclear facilities specifically.

Global Norms

This category comprises three indicators: International Legal Commitments, Voluntary Commitments, and International Assurances. The category includes actions that contribute to the establishment of global norms for nuclear materials security. It includes important international legal commitments, voluntary participation in a number of global initiatives, and an international assurances indicator.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.1 International Legal Commitments		**International legal commitments are the basis for domestic legislation, regulations, and security capacity.**
3.1.1 Convention on the Physical Protection of Nuclear Material (CPPNM)*	IAEA	Parties to the CPPNM commit to provide certain levels of physical protection during international transport of nuclear materials; cooperate in the protection, recovery, and return of stolen nuclear material; and criminalize offenses involving nuclear material. Is the state a party to the CPPNM? 0 = Non-compliant *or* not a member 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.1.2 2005 Amendment to the CPPNM*	IAEA	Parties to the 2005 Amendment to the CPPNM commit to expand the scope of their responsibilities under the CPPNM to include protection of nuclear material in domestic use, in storage, and during transport, as well as protection of nuclear facilities. Is the state a party to the 2005 Amendment to the CPPNM? 0 = Not ratified, accepted, or approved 1 = Ratified, accepted, or approved (or action having the same legal effect)
3.1.3 International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)*	United Nations	Parties to the ICSANT commit to criminalize acts of nuclear terrorism and to promote cooperation with other states to prevent, investigate, and punish those acts. Is the state a party to the ICSANT? 0 = Non-compliant *or* not a member 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.2 Voluntary Commitments		**Voluntary commitments demonstrate a state's support for nuclear materials security as a global agenda.**
3.2.1 International Atomic Energy Agency (IAEA) membership*	IAEA	Is the country a member of the IAEA? 0 = No 1 = Yes

* Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.2.2 Proliferation Security Initiative (PSI) membership*	U.S. Department of State	Is the country a member of the PSI? 0 = No 1 = Yes
3.2.3 Global Initiative to Combat Nuclear Terrorism (GICNT) membership*	U.S. Department of State	Is the country a member of the GICNT? 0 = No 1 = Yes
3.2.4 G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership*	U.S. Department of State	Is the country a member of the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction? 0 = No 1 = Yes
3.2.5 World Institute for Nuclear Security (WINS) contributions*	Arms Control Association Nuclear Security Summit Reports 2012 and 2013	Has the country provided financial or in-kind contributions to WINS within the previous two years? 0 = No 1 = Yes
3.2.6 IAEA Nuclear Security Fund contributions*	IAEA	Has the country provided financial or in-kind contributions to the IAEA Nuclear Security Fund within the previous two years? 0 = No 1 = Yes
3.2.7 Bilateral or multilateral assistance*	EIU analyst qualitative assessment	Has the country provided financial and/or practical bilateral or multilateral assistance for other states or received such assistance in the field of nuclear security (exclusive of contributions captured elsewhere in this indicator) within the previous two years? 0 = No 1 = Yes Examples of bilateral programs include the National Nuclear Security Administration (NNSA) Second Line of Defense (SLD) program.
3.2.8 Centers of Excellence*	EIU analyst qualitative assessment	Does the state have a Center of Excellence or Nuclear Security Training and Support Center that offers training in nuclear security? 0 = No 1 = Yes Centers or academies that offer only classroom-based courses or that are not yet operational are excluded.

* Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.3 International Assurances		**International assurances enhance international confidence in the effectiveness of a country's nuclear security conditions.**
3.3.1 Published regulations and reports	EIU analyst qualitative assessment based on official national sources, which vary by country	Public release of broad outlines of nuclear security regulations and nuclear security issues increases confidence in a country's commitment to nuclear material security. Does the state publicly release broad outlines of its nuclear security regulations and/or annual reports on nuclear security issues? 0 = The state does not publish regulations or annual reports 1 = The state publishes regulations *or* an annual report 2 = The state publishes regulations *and* an annual report
3.3.2 Public declarations and reports about nuclear materials	EIU analyst qualitative assessment	Public declarations or reports about nuclear material help build international confidence. Does the state make any public declarations or reports about nuclear materials (civilian or military)? 0 = No 1 = Yes A state receives a "yes" if it has made civilian plutonium declarations, if it has made any quantitative declarations about inventories of fissile materials or nuclear weapons, or if it publishes the IAEA's safeguards conclusions for the state.
3.3.3 Invitation(s) for review of security arrangements	EIU analyst qualitative assessment	Invitations for review demonstrate the importance a country places on its security obligations and creates international confidence in levels of security. Does the state issue invitations for review of its security arrangements? 0 = No 1 = Yes 2 = Yes, within the past five years A state receives credit if it has invited any of the following IAEA missions, including follow-up missions: International Physical Protection Advisory Service (IPPAS) mission, International Nuclear Security Advisory Service (INSServ) mission, State System for Accountancy and Control (SSAC) Advisory Service, or Integrated Regulatory Review Service (IRRS). A state receives a "yes" if it has received bilateral or multilateral assistance (outside an international organization) to review security arrangements.

Domestic Commitments and Capacity

This category comprises four indicators: UNSCR 1540 Implementation, Domestic Nuclear Materials Security Legislation, Safeguards Adherence and Compliance, and Independent Regulatory Agency. The category includes actions that indicate how well a country has implemented its international commitments and its capacity to do so. It includes the extent of United Nations Security Council Resolution 1540 implementation, the status of nuclear materials security legislation, the extent of safeguards adherence and compliance, and the presence of an independent regulatory agency.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.1 UNSCR 1540 Implementation		**UN Security Council Resolution (UNSCR) 1540 obliges action on nuclear materials security, and its implementation demonstrates a state's commitment level.**
4.1.1 UNSCR 1540 reporting*	Security Council Committee established pursuant to resolution 1540 (1540 Committee)	Compliance with UNSCR 1540 reporting requirements demonstrates commitment to UNSCR 1540's security objectives. Has the state provided the required UNSCR 1540 report to the Security Council Committee established pursuant to resolution 1540 (1540 Committee)? 0 = The state has not provided a UNSCR 1540 report 1 = The state has provided a UNSCR 1540 report

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.1.2 Extent of UNSCR 1540 implementation°	Creation of a coding and scoring scheme by the Economist Intelligence Unit (EIU) based on documents from the 1540 Committee	Implementation of UNSCR 1540 demonstrates commitment to UNSCR 1540's security objectives and improves security procedures and culture. Extent of implementation is identified through the measures taken by a state and reflected in its UNSCR 1540 matrix. Scoring is based on an evaluation of the total number of elements of UNSCR 1540 that have been implemented, as reflected in the individual country matrices. Elements related to nuclear security in the matrix that have been implemented are indicated by an "X." The EIU summed the number of elements related to nuclear security (out of a maximum of 121) with an "X" designation, providing a numerical score for implementation. The resulting numerical score is banded into five categories scored from 0 to 4 points: 0 = Very weak (0–24 points) 1 = Weak (25–49 points) 2 = Moderate (50–74 points) 3 = Good (75–99 points) 4 = Very good (100+ points) For countries without weapons-usable nuclear materials, 91 elements in the matrix were evaluated, and the following scoring scheme was used: 0 = Very weak (0–14 points) 1 = Weak (15–29 points), *or* matrix exists but is not publicly available 2 = Moderate (30–44 points) 3 = Good (45–59 points) 4 = Very good (60+ points) Those states that do not have a matrix have been given the lowest possible score. Countries that have a matrix but have not made it public were assigned the second lowest score to give credit for estimated levels of implementation.

° Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without, but that the scoring scheme for the latter differed.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.2 Domestic Nuclear Materials Security Legislation		**The implementation of security measures is rooted in domestic nuclear materials security legislation.**
4.2.1 Convention on the Physical Protection of Nuclear Material (CPPNM) implementation authority*	EIU analyst qualitative assessment based on official national sources, which vary by country	Existence of a national authority (state body) to implement the CPPNM increases the likelihood of implementation and demonstrates commitment to the CPPNM's objectives. Is there a national authority for implementation of the CPPNM? 0 = No 1 = Yes The CPPNM requires states to establish or designate a competent authority responsible for the implementation of the legislative and regulatory framework.
4.2.2 National legal framework for CPPNM*	EIU analyst qualitative assessment based on official national sources, which vary by country	A national legal framework is part of the foundation of a strong system and culture of nuclear materials security. Has the state fulfilled all obligations for a national legal framework for the CPPNM? 0 = No 1 = Yes This indicator assesses whether the legal elements specified by the CPPNM are enshrined in domestic legislation.
4.3 Safeguards Adherence and Compliance		**States compliant with safeguards measures take seriously responsibilities related to their stewardship of nuclear materials.**
4.3.1 IAEA safeguards agreement (excluding Additional Protocol)°	IAEA	Conclusion of a safeguards agreement demonstrates a state's commitment to its stewardship of nuclear materials. Has the state concluded an IAEA safeguards agreement (excluding the Additional Protocol)? 0 = No 1 = Yes, INFCIRC 66 or Voluntary Offer Agreement (VOA) 2 = Yes, Comprehensive Safeguards Agreement (CSA) The following is the scoring scheme for countries without materials: 0 = No 1 = Has a Small Quantities Protocol 2 = Has a modified Small Quantities Protocol 3 = Has a Comprehensive Safeguards Agreement

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

°Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without, but that the scoring scheme for the latter differed.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.3.2 IAEA Additional Protocol*	IAEA	Ratification of the Additional Protocol demonstrates a high level of commitment to a state's stewardship of nuclear materials. Has the state ratified the Additional Protocol? 0 = No 1 = Yes
4.3.3 Facility exclusion from safeguards	EIU analyst qualitative assessment	Exclusion of facilities from safeguards shows a weakening of a state's commitment to its stewardship of nuclear materials. Does the state exclude any enrichment or reprocessing facilities from international or European Atomic Energy Community (Euratom) safeguards? 0 = Yes, the state excludes some or all of its enrichment or reprocessing facilities 1 = No, the state does not exclude any of its enrichment or reprocessing facilities *or* the state does not have an enrichment or reprocessing facility
4.3.4 Safeguards violations*	IAEA	Safeguards violations undermine a state's commitment to its stewardship of nuclear materials. Has the state been reported to the IAEA Board of Governors or the UN Security Council for a violation of its safeguards agreement, and do the issues reported therein remain outstanding? 0 = The state has been reported to both the IAEA Board of Governors and the UN Security Council, and issues reported therein remain outstanding 1 = The state has been reported to the IAEA Board of Governors and issues reported therein remain outstanding 2 = The state has never been reported to either the IAEA Board of Governors *or* the UN Security Council or has been previously reported but no issues remain outstanding
4.4 Independent Regulatory Agency		**A robust and independent regulatory structure helps to ensure compliance with nuclear materials–related regulations.**
4.4.1 Independent regulatory agency	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state have an independent regulatory agency responsible for regulating security? 0 = No 1 = Yes According to the IAEA, this requires "an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy."

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Risk Environment

This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Groups Interested in Illicitly Acquiring Materials. Risk environment can affect the nuclear materials security conditions in a country. These factors include the level of political stability, whether there is effective governance, the pervasiveness of corruption, and the presence of groups interested in illicitly acquiring nuclear materials.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1 Political Stability		**A lack of political stability may enable lapses in nuclear materials security.**
5.1.1 Social unrest*	EIU Risk Briefing	Significant social unrest can affect the government's ability to secure nuclear materials, or the upheaval created by the unrest may provide opportunities for groups seeking to acquire nuclear materials. What is the risk of significant social unrest during the next two years? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low Social unrest can include large-scale demonstrations; political strikes; and inter-ethnic, racial, or religious clashes.
5.1.2 Orderly transfers of power*	EIU Risk Briefing	Instability and conflict surrounding changes of power may provide opportunities for groups seeking to acquire nuclear materials. How clear, established, and accepted are constitutional mechanisms for the orderly transfer of power from one government to another? 0 = Not clear, established, or accepted 1 = Two of the three criteria are absent 2 = One of the three criteria is absent 3 = Clear, established, and accepted 4 = Very clear, established, and accepted Unclear, poorly established, or weakly accepted constitutional mechanisms for the transfer of power are a particular concern for succession in autocracies, but can also prove an issue in more democratic systems (for example, if election results are not accepted by all sides).

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1.3 International disputes and tensions*	EIU Risk Briefing	Tensions with important trade or strategic partners and armed regional conflicts could have destabilizing implications for the polity and, hence, for nuclear materials security. Is there a risk that international disputes or tensions will negatively affect the polity during the next two years? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = No threat In addition to armed regional conflicts, tensions with important trade or strategic partners, resulting in economic sanctions or other barriers to trade, could have destabilizing implications for the polity and, hence, for nuclear materials security.
5.1.4 Armed conflict*	EIU Risk Briefing	Armed conflict in areas where nuclear materials are stored could seriously compromise site security. Is this country presently subject to armed conflict, or is there at least a moderate risk of such conflict during the next two years? 0 = Territorial conflict; opposition has effective control over a region or regions 1 = Sporadic and incursive conflict 2 = Incursive conflict; government remains in control, but opposition engages in frequent armed incursions 3 = Sporadic conflict; government control is firm, but opposition engages in isolated incidents of violence 4 = No armed conflict exists This indicator covers armed conflict either within the territory of the state or directly threatening it. Forms of conflict may range from sporadic or incursive conflict with non-state actors to conventional conflict with secessionist entities or other states.

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1.5 Violent demonstrations or violent civil or labor unrest*	EIU Risk Briefing	Violent demonstrations or civil or labor unrest may compromise government control, providing opportunities for groups seeking to acquire nuclear materials. Are violent demonstrations or violent civil or labor unrest likely to occur during the next two years? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low Violent demonstrations or civil or labor unrest may arise from socioeconomic factors such as unemployment or fiscal austerity; ethnic, religious, or political divisions; labor disputes; and refugee or migrant flows.
5.2 **Effective Governance**		**A lack of effective governance can compromise a country's ability to establish and sustain policies to secure nuclear materials.**
5.2.1 Effectiveness of the political system*	EIU Business Environment Ranking	An ineffective political system can compromise a country's ability to establish and sustain policies to secure nuclear materials. How effective is the country's political system in formulating and executing policy? 0 = Very low 1 = Low 2 = Moderate 3 = High 4 = Very high This indicator assesses tensions between the legislative and executive branches of government, instability in government formation, and cohesion of the legislature.
5.2.2 Quality of the bureaucracy*	EIU Risk Briefing	An ineffective bureaucracy can compromise a country's ability to establish and sustain policies to secure nuclear materials. What is the quality of the country's bureaucracy and its ability to carry out government policy? 0= Very low 1= Low 2= Moderate 3= High 4= Very high This indicator assesses the quality of the bureaucracy across the following criteria: overall competency and training, morale and dedication, and compensation and status.

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.3 Pervasiveness of Corruption		**Corruption affects the potential for theft of nuclear materials and the rigor with which nuclear material security measures are implemented.**
5.3.1 Pervasiveness of corruption*	EIU Risk Briefing	How pervasive is corruption among public officials? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low The following factors are considered in this assessment: length of time that the regime or government has been in power; number of officials appointed rather than elected; frequency of reports or rumors of bribery; and perception of the degree to which public officials are involved in corrupt practices (for example, misuse of public office for private benefit, accepting bribes, dispensing favors, and patronage for private gain).
5.4 Groups Interested in Illicitly Acquiring Materials		**The presence and capabilities of terrorist or criminal groups, particularly those with the goal of illicitly acquiring nuclear materials, raises the risk of theft of nuclear materials.**
5.4.1 Groups interested in illicitly acquiring materials*	See Select Bibliography for details	Are there terrorist or criminal groups interested in illicitly acquiring nuclear materials? 0 = Such groups are present and are thought to have the capabilities to carry out their goals acting alone or with the assistance of a capable third party 1 = Such groups are present, but are likely incapable of carrying out their aims 2 = No such groups are known to be present

*Denotes that the indicator or subindicator was scored for both countries with weapons-usable nuclear materials and countries without.

8. SELECT BIBLIOGRAPHY

Common Primary and Secondary Sources

Cann, Michelle, Kelsey Davenport, and Margaret Balza. *The Nuclear Security Summit: Assessment of National Commitments*. Washington, DC: Arms Control Association and Partnership for Global Security, March 20, 2012. www.armscontrol.org/files/ACA_NSS_Report_2012.pdf.

———. *The Nuclear Security Summit: Progress Report.* July 2013. www.armscontrol.org/files/Nuclear_Security_Summit_Report_2013.pdf.

Global Partnership Working Group. "Consolidated Report Data 2012: Annex." In *GPWG Annual Report 2012*. Camp David, MD: Global Partnership Working Group, 2012. www.state.gov/documents/organization/208032.pdf.

IAEA (International Atomic Energy Agency). Homepage. www.iaea.org.

IPFM (International Panel on Fissile Materials). *Global Fissile Material Report 2010: Balancing the Books—Production and Stocks.* 5th ed. Princeton, NJ: IPFM, 2010. www.fissilematerials.org/ipfm/site_down/gfmr10.pdf.

———. *Global Fissile Material Report 2011: Nuclear Weapon and Fissile Material Stockpiles and Production*. 6th ed. Princeton, NJ: IPFM, 2011. www.fissilematerials.org/library/gfmr11.pdf.

———. *Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament.* 7th ed. Princeton, NJ: IPFM, 2013. www.fissilematerials.org/library/gfmr13.pdf.

James Martin Center for Nonproliferation Studies. "Civil Highly Enriched Uranium: Who Has What?" Nuclear Threat Initiative, Washington, DC, July 2013. www.nti.org/heu-map.

United Nations Treaty Collection. Homepage. treaties.un.org.

U.S. Department of State. Homepage. www.state.gov.

U.S. National Nuclear Security Administration. Homepage. nnsa.energy.gov.

WINS (World Institute for Nuclear Security). Homepage. www.wins.org.

Sources for "Political Stability" (5.1), "Effective Governance" (5.2) and "Pervasiveness of Corruption" (5.3)

EIU (Economist Intelligence Unit). "Risk Briefing" and "Business Environment Rankings." June 2013. www.eiu.com.

Sources for "Groups Interested in Illicitly Acquiring Materials" (5.4)

Ackerman, Gary, Charles Blair, and Maranda Sorrells. "Radiological and Nuclear Non-State Adversaries Database (RANNSAD)." National Consortium for the Study of Terrorism and Responses to Terrorism, College Park, MD, 2011. hdl.handle.net/1902.1/16258.

Ackerman, Gary, Lauren Pinson, and John Sawyer. "Profiles of Incidents Involving CBRN Use by Non-State Actors (POICN) Database." National Consortium for the Study of Terrorism and Responses to Terrorism, College Park, MD, 2011.

Ackerman, Gary, and Jeremy Tamsett, eds. *Jihadists and Weapons of Mass Destruction*. Boca Raton, FL: CRC Press, 2009.

Memorial Institute for the Prevention of Terrorism and Detica. "Terrorist Organization Profiles (database)." National Consortium for the Study of Terrorism and Responses to Terrorism, College Park, MD, 2008. www.start.umd.edu/start/data_collections/tops.

Monterey Terrorism Research and Education Program. "Monterey WMD Terrorism Database." Monterey Institute of International Studies, Monterey, CA, 2013. montrep.miis.edu/databases.html.

Sources for Filter and Highlight Groups in NTI Index Models

Nuclear Power Programs

IAEA. "Nuclear Power Reactors in the World." Reference Data Series No. 2, 2013 Edition. www-pub.iaea.org/MTCD/publications/pdf/rds2-33_web.pdf.

Planned or Proposed Nuclear Power Programs

World Nuclear Association. "World Nuclear Power Reactors and Uranium Requirements." World Nuclear Association, London, July 2013. www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/.

Potential Interest in Nuclear Power Programs

International Security Advisory Board, U.S. Department of State. "Proliferation Implications of Global Expansion of Civilian Nuclear Power," April 2008. The State Department report also included Australia in this category; however, since the report's publication in 2008, Australia has stated that it has no plans for nuclear power.

Sources for EIU Qualitative Assessments

These are based on official national sources, which vary by country.

ABOUT THE INTERNATIONAL PANEL OF EXPERTS

In developing the Nuclear Threat Initiative (NTI) Index, the Economist Intelligence Unit (EIU) and NTI convened highly respected nuclear materials security experts from around the world. This group included experts who were from nuclear- and non-nuclear-weapon states and from developed and developing nations and who have a broad range of expertise. The panel was changed and slightly expanded from the 2012 NTI Index and included experts from Argentina, Australia, China, France, India, Japan, Kazakhstan, Pakistan, Russia, South Africa, Sweden, the United Kingdom, the United States, and Vietnam, one of whom is a representative from the World Institute for Nuclear Security (WINS) and one of whom is a former International Atomic Energy Agency (IAEA) official.

The panel advised NTI and the EIU on the selection of indicators and their relative importance. Panel members were instrumental in considering options (for example, new or modified indicators) for strengthening the NTI Index, many of which were subsequently incorporated into this edition. Input from the panel helps to ensure that the NTI Index has an international point of view and reflects the ongoing international discussion on nuclear security priorities.

Panel members do not represent their country's interests or score individual countries. Instead, they play an advisory role in their personal, not professional, capacities. Participation in the panel does not imply endorsement of every aspect of the NTI Index or its findings and recommendations. On the contrary, panel meetings demonstrated a range of views and the need for a continuing dialogue on priorities.

Dauren Aben
Senior Research Fellow, Kazakhstan Institute for Strategic Studies, under the President of the Republic of Kazakhstan

Matthew Bunn
Professor of Practice, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University

John Carlson
Counselor, NTI; former Director General of the Australian Safeguards and Non-Proliferation Office

Philippe Denier
Advisor, Nuclear Affairs, French Delegation for Strategic Affairs

Anatoly S. Diakov
Professor of Physics, Moscow Institute of Physics and Technology

Roger Howsley
Executive Director, World Institute for Nuclear Security

Feroz Khan
Lecturer, U.S. Naval Postgraduate School; Retired Brigadier-General in the Pakistani Army

Frans Mashilo
Senior Manager, Security Services, South African Nuclear Energy Corporation

Anita Nilsson
Executive Director, AN & Associates; Advisor, Federation of American Scientists; Senior Fellow of the CITS, University of Georgia; former Director of IAEA Office of Nuclear Security; former Deputy Director, Swedish Nuclear Power Inspectorate

Raúl Racana
Professor, Nonproliferation for Global Security Foundation; former President of the Board of Directors, Nuclear Regulatory Authority of Argentina

Scott D. Sagan
The Caroline S. G. Munro Professor of Political Science and Senior Fellow, Center for International Security and Cooperation, Stanford University

Sheel Kant Sharma
Distinguished Fellow, Centre for Air Power Studies, former Ambassador of India to Austria, and Permanent Representative of India to the United Nations and the IAEA

Tatsu Suzuki
Vice Chairman of Japan Atomic Energy Commission; former Council Member of Pugwash Conferences on Science and World Affairs

Tuan Ta Minh
Associate Professor of Political Science, Diplomatic Academy of Vietnam

Hui Zhang
Senior Research Associate, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University

ABOUT NTI AND THE EIU

NUCLEAR THREAT INITIATIVE
www.nti.org

The Nuclear Threat Initiative (NTI) is a nonprofit, nonpartisan organization with a mission to strengthen global security by reducing the risk of use and preventing the spread of nuclear, biological, and chemical weapons. Founded in 2001 by former U.S. Senator Sam Nunn and CNN founder Ted Turner, NTI is guided by an international board of directors.

NTI works on closing the gap between the global threats from nuclear, biological, and chemical weapons and the global response to those threats. Recognizing that governments have most of the resources and authority in the large-scale work of threat reduction, NTI emphasizes leverage—our success depends not only on what we do, but also on what we can persuade others to do.

That's why, since our founding in 2001, NTI has set out to lead the way in threat reduction, not simply point the way. By designing and implementing our own projects to directly reduce threats, NTI demonstrates how governments can reduce threats faster, smarter, and on a large scale.

The organization's activities are directed by Co-Chairman and Chief Executive Officer Sam Nunn and President Joan Rohlfing and informed by leading figures in science, business, and international security, who serve as advisors and members of NTI's board of directors.

ECONOMIST INTELLIGENCE UNIT
www.eiu.com

The Economist Intelligence Unit (EIU) is the business information arm of The Economist Group, publisher of *The Economist*. Through a global network of hundreds of analysts and contributors, the EIU continuously assesses and forecasts political, economic, and business conditions in more than 200 countries. As the world's leading provider of country intelligence, the EIU helps executives, governments, and institutions by providing timely, reliable, and impartial analysis.

SELECTED COUNTRY SUMMARIES

This section includes country summaries for the 25 countries with weapons-usable nuclear materials. All country summaries, including those for the 151 countries with less than one kilogram of or no weapons-usable nuclear materials, can be easily accessed online at www.ntiindex.org.

Each summary provides a snapshot of a country's scores and rankings overall and in each of the major index categories, as well as changes in scores since the 2012 NTI Index. Rankings preceded with an equal sign (=) indicate a tie with another country. In the NTI Index, scores of 0 and 100 represent the lowest or highest possible score, respectively, as measured by the NTI Index criteria.

For each country, indicators are placed into one of three categories: green, indicating an above-average score; yellow, indicating an average score; and red, indicating a below-average score. Countries seeking to improve their nuclear materials security conditions can focus their efforts on those indicators that are in the yellow and red categories.

Argentina
Australia
Belarus
Belgium
Canada
China
France
Germany
India
Iran
Israel
Italy
Japan
Kazakhstan
Netherlands
North Korea
Norway
Pakistan
Poland
Russia
South Africa
Switzerland
United Kingdom
United States
Uzbekistan

ARGENTINA

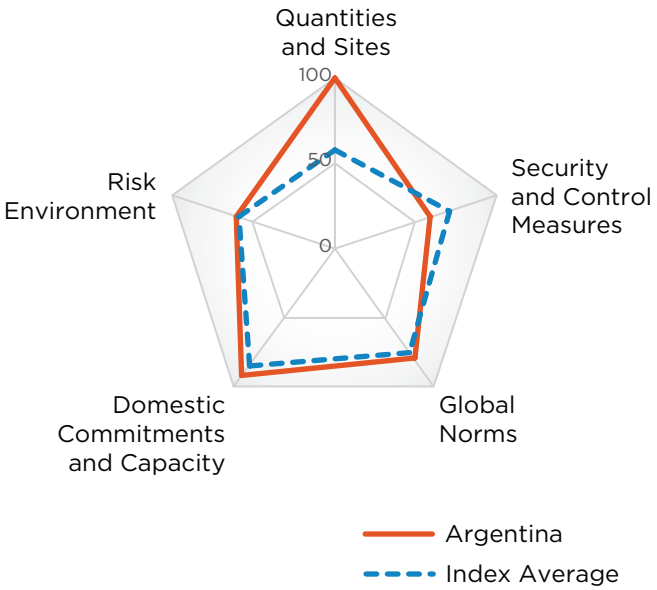
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**76**	**+4**	**=13**
Quantities and Sites	100	+5	=1
Security and Control Measures	59	–	=19
Global Norms	80	+22	16
Domestic Commitments and Capacity	92	–	=15
Risk Environment	61	–	13

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Insider Threat Prevention

Risk Environment
- Political Stability
- Effective Governance

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Physical Security During Transport

Risk Environment
- Pervasiveness of Corruption

AUSTRALIA

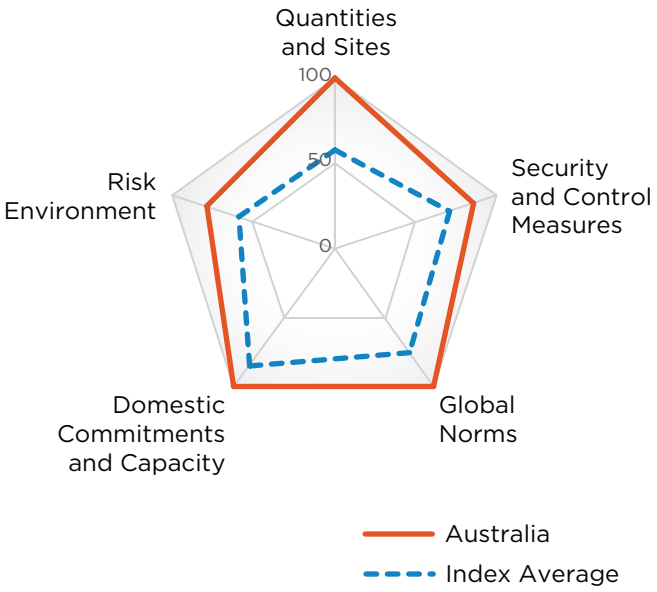
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**92**	**+2**	**1**
Quantities and Sites	100	+5	=1
Security and Control Measures	86	–	8
Global Norms	100	+8	=1
Domestic Commitments and Capacity	100	–	=1
Risk Environment	79	–	5

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Insider Threat Prevention

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

BELARUS

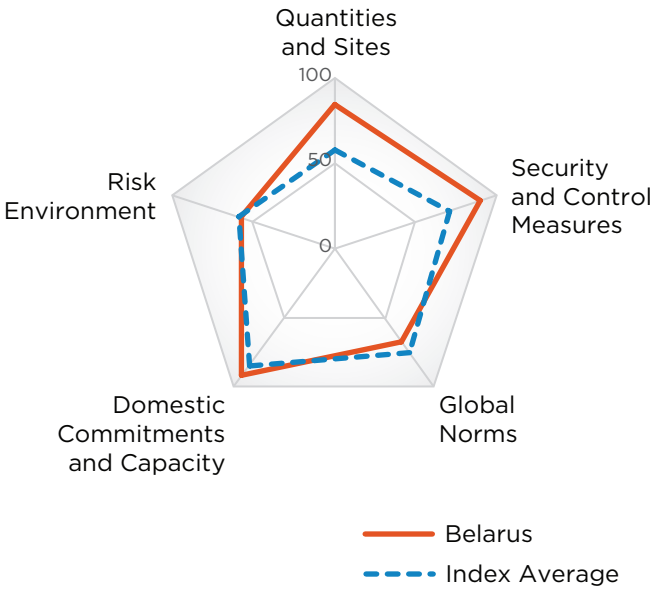
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**80**	**+5**	**9**
Quantities and Sites	84	–	=5
Security and Control Measures	90	+12	=4
Global Norms	68	–	19
Domestic Commitments and Capacity	92	–	=15
Risk Environment	58	+6	=14

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Global Norms
- Voluntary Commitments
- International Assurances

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

BELOW AVERAGE (Indicator scores less than 34)

BELGIUM

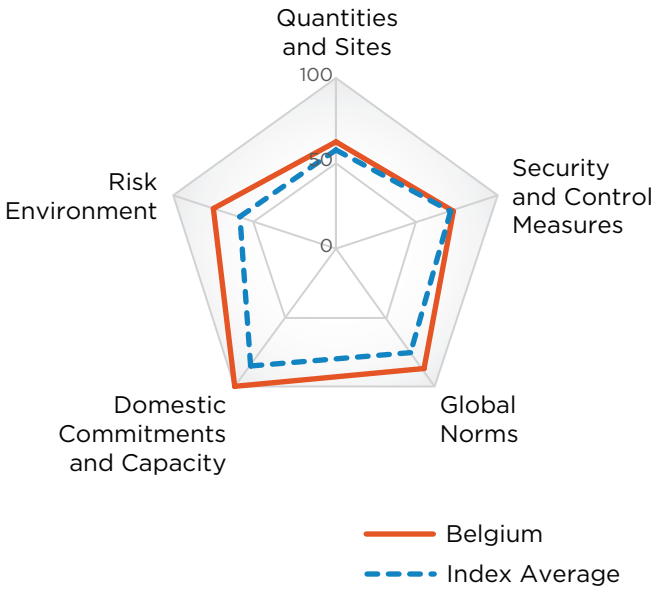
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**79**	**+7**	**10**
Quantities and Sites	62	+6	=12
Security and Control Measures	73	+17	14
Global Norms	88	+9	=7
Domestic Commitments and Capacity	100	–	=1
Risk Environment	75	–	=8

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation

Security and Control Measures
- Insider Threat Prevention
- Physical Security During Transport

Global Norms
- International Assurances

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

CANADA

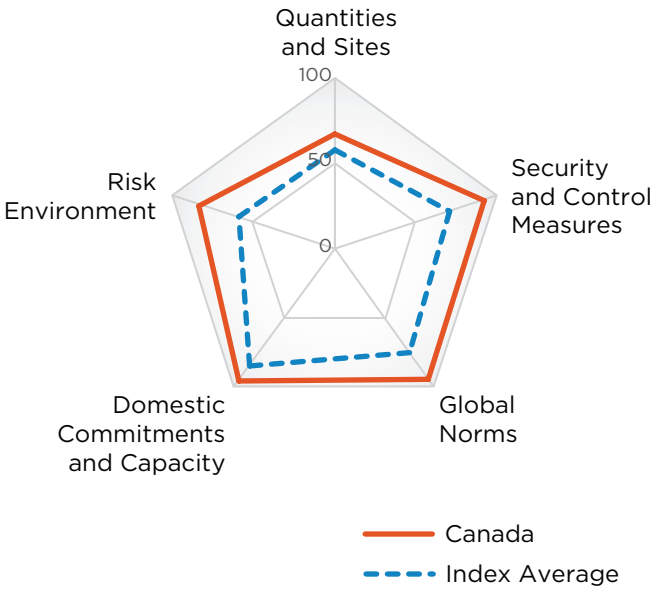
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**88**	**+6**	**2**
Quantities and Sites	67	–	11
Security and Control Measures	93	+10	=2
Global Norms	94	+17	=5
Domestic Commitments and Capacity	96	–	=11
Risk Environment	83	–	3

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

CHINA

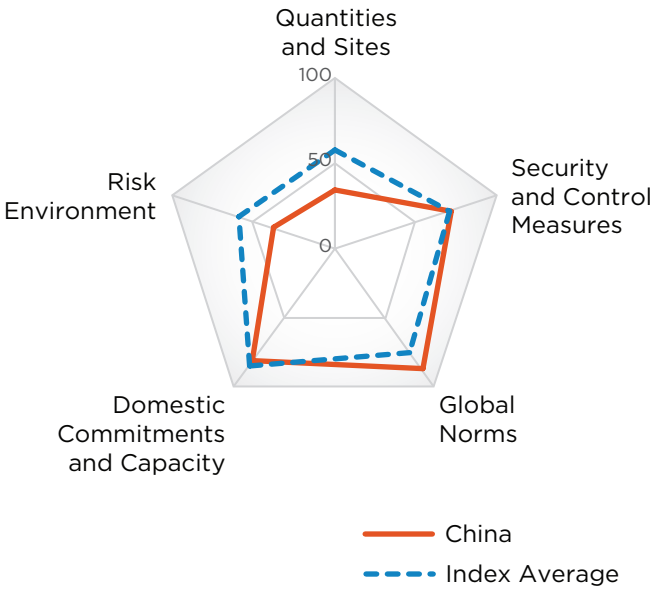
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**64**	**+1**	**20**
Quantities and Sites	34	–	=18
Security and Control Measures	72	–	15
Global Norms	88	+5	=7
Domestic Commitments and Capacity	81	–	21
Risk Environment	38	+2	19

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Physical Security During Transport

Domestic Commitments and Capacity
- UNSCR 1540 Implementation

Risk Environment
- Political Stability
- Effective Governance
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation

Security and Control Measures
- Insider Threat Prevention

Risk Environment
- Pervasiveness of Corruption

FRANCE

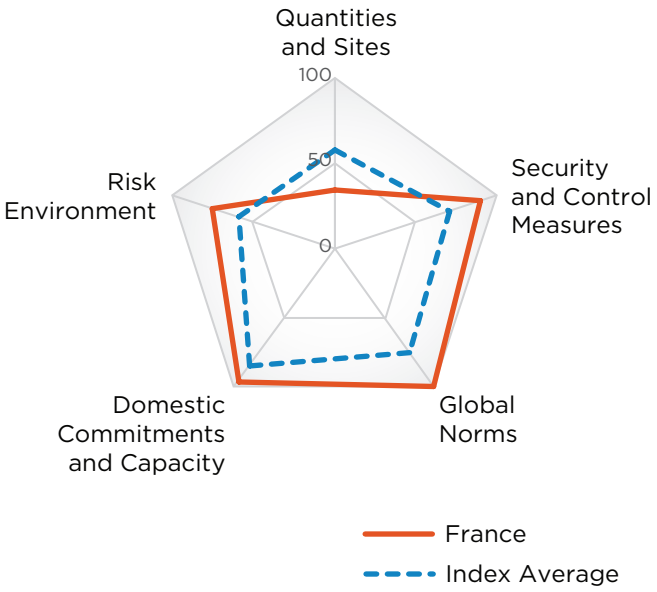
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**81**	**+2**	**=7**
Quantities and Sites	34	–	=18
Security and Control Measures	90	–	=4
Global Norms	100	+17	=1
Domestic Commitments and Capacity	96	–	=11
Risk Environment	75	-1	=8

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation

GERMANY

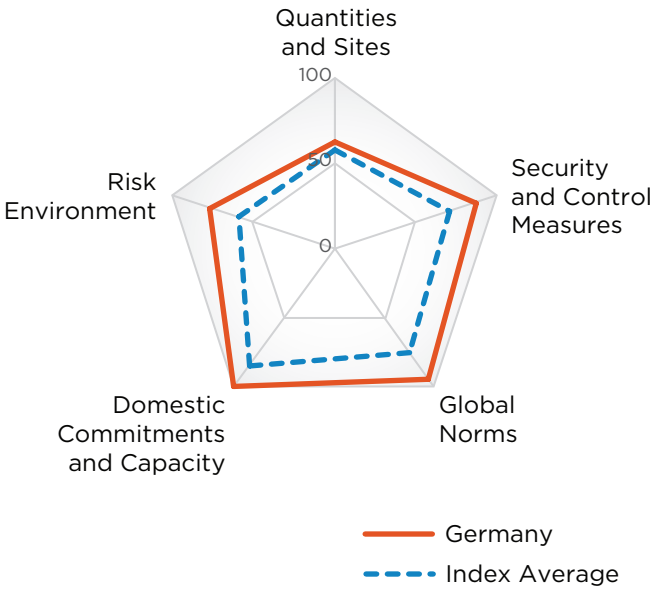
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**85**	**+3**	**4**
Quantities and Sites	62	–	=12
Security and Control Measures	88	+10	=6
Global Norms	94	–	=5
Domestic Commitments and Capacity	100	–	=1
Risk Environment	77	+1	7

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- Insider Threat Prevention

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

INDIA

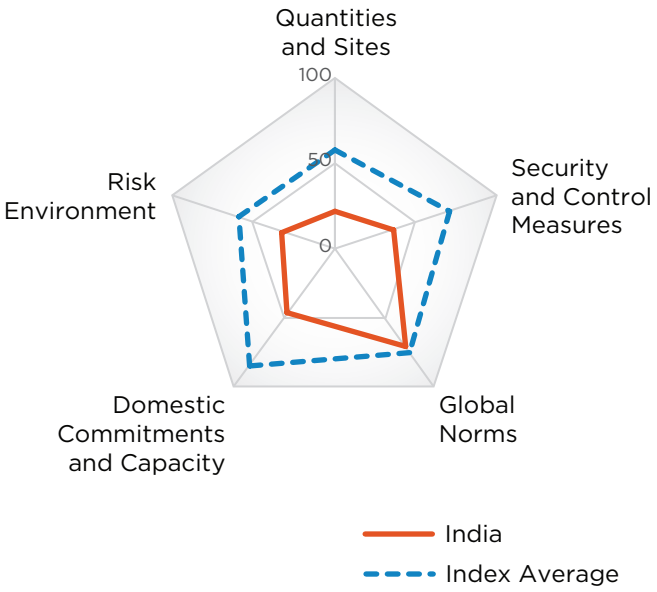
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**41**	**+1**	**23**
Quantities and Sites	22	–	=22
Security and Control Measures	37	–	25
Global Norms	71	+6	18
Domestic Commitments and Capacity	47	–	23
Risk Environment	32	–	22

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Security and Control Measures
- Response Capabilities

Global Norms
- International Legal Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- On-site Physical Protection

Global Norms
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance

AVERAGE *(continued)*

Risk Environment
- Political Stability
- Effective Governance

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport

Domestic Commitments and Capacity
- Independent Regulatory Agency

Risk Environment
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

IRAN

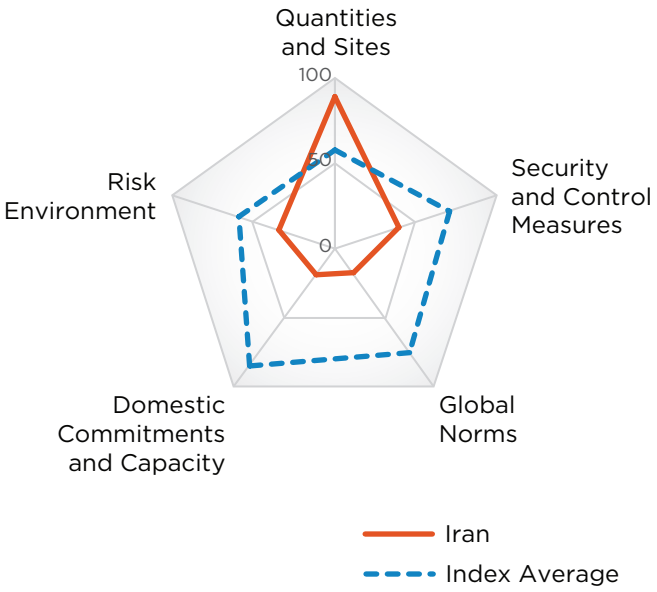
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**39**	**–**	**24**
Quantities and Sites	89	–	4
Security and Control Measures	40	–	=23
Global Norms	18	–	24
Domestic Commitments and Capacity	19	–	24
Risk Environment	35	+1	21

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- Response Capabilities

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- On-site Physical Protection
- Physical Security During Transport

Global Norms
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Safeguards Adherence and Compliance

Risk Environment
- Political Stability
- Effective Governance
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Control and Accounting Procedures
- Insider Threat Prevention

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- Domestic Nuclear Materials Security Legislation
- Independent Regulatory Agency

Risk Environment
- Pervasiveness of Corruption

ISRAEL

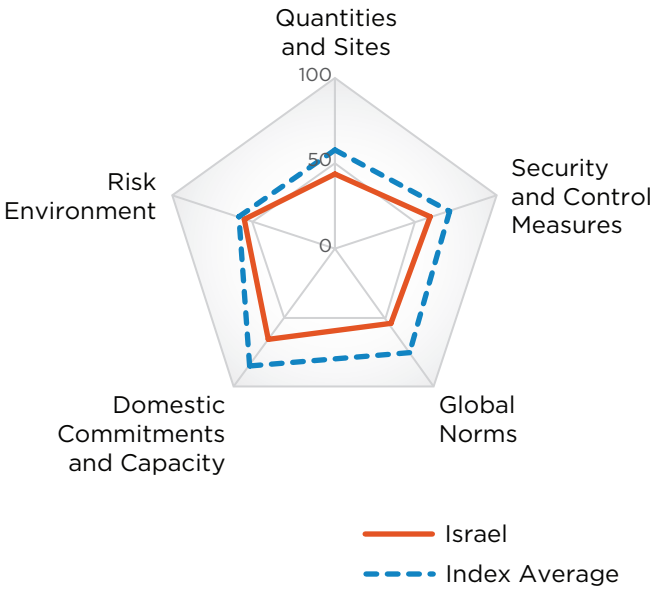
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**57**	**+2**	**21**
Quantities and Sites	44	–	17
Security and Control Measures	59	–	=19
Global Norms	55	+8	23
Domestic Commitments and Capacity	66	–	22
Risk Environment	55	–	16

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- Independent Regulatory Agency

Risk Environment
- Effective Governance

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance

Risk Environment
- Political Stability
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Sites and Transportation

Security and Control Measures
- Control and Accounting Procedures
- Insider Threat Prevention

Global Norms
- International Assurances

ITALY

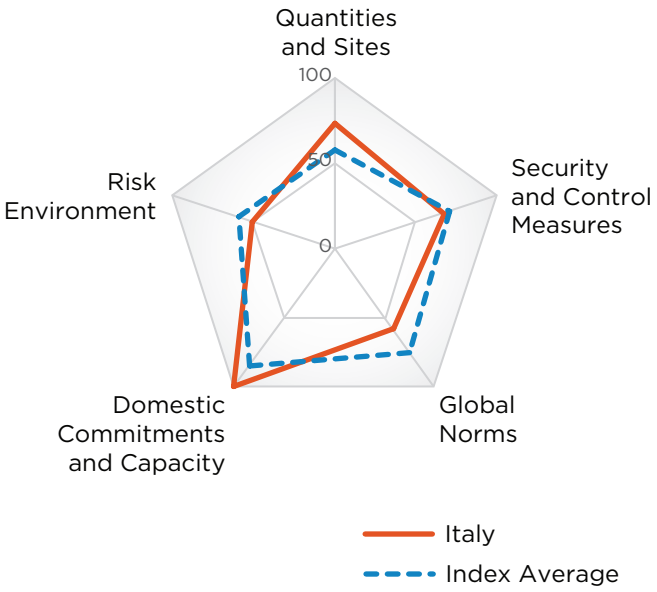
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**70**	**-1**	**17**
Quantities and Sites	73	–	9
Security and Control Measures	68	–	16
Global Norms	58	–	21
Domestic Commitments and Capacity	100	–	=1
Risk Environment	51	-1	17

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- Control and Accounting Procedures
- Physical Security During Transport

Global Norms
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- On-site Physical Protection
- Insider Threat Prevention

Global Norms
- International Legal Commitments

Risk Environment
- Effective Governance
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Response Capabilities

Global Norms
- International Assurances

Risk Environment
- Pervasiveness of Corruption

JAPAN

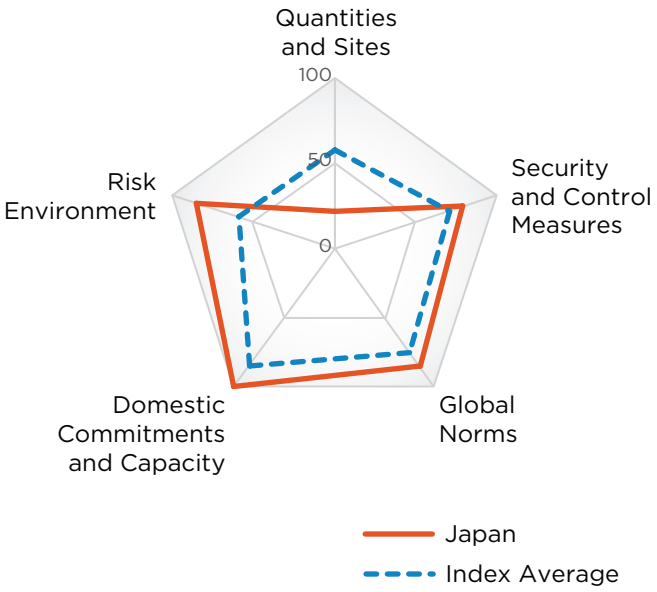
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**76**	**+6**	**=13**
Quantities and Sites	22	–	=22
Security and Control Measures	79	+3	11
Global Norms	85	–	12
Domestic Commitments and Capacity	100	+27	=1
Risk Environment	86	-1	2

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Physical Security During Transport

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

KAZAKHSTAN

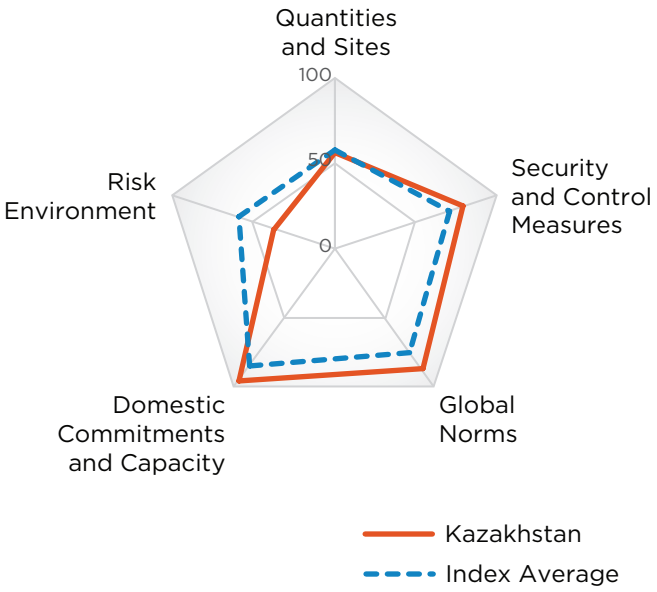
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**73**	**–**	**15**
Quantities and Sites	57	-6	16
Security and Control Measures	80	–	=9
Global Norms	88	+6	=7
Domestic Commitments and Capacity	96	–	=11
Risk Environment	37	–	20

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Physical Security During Transport

Global Norms
- International Assurances

Risk Environment
- Political Stability
- Effective Governance
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials

Risk Environment
- Pervasiveness of Corruption

NETHERLANDS

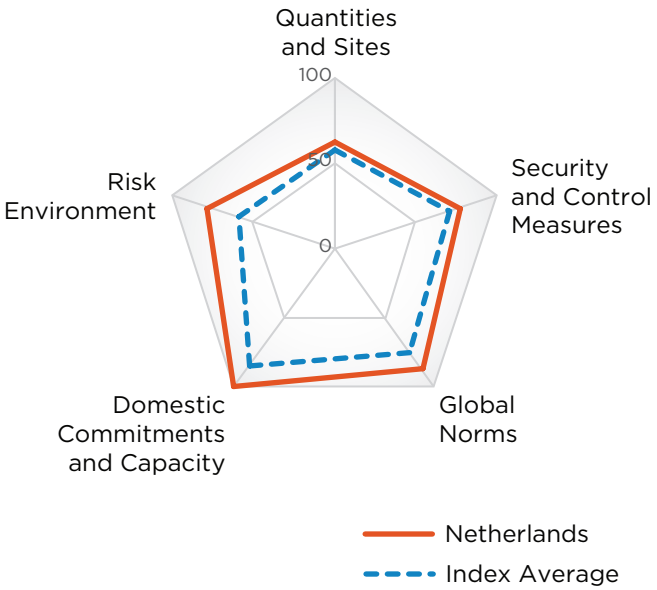
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**81**	**–**	**=7**
Quantities and Sites	62	-5	=12
Security and Control Measures	78	+5	12
Global Norms	88	–	=7
Domestic Commitments and Capacity	100	–	=1
Risk Environment	78	–	6

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- Insider Threat Prevention
- Physical Security During Transport

Global Norms
- International Assurances

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

NORTH KOREA

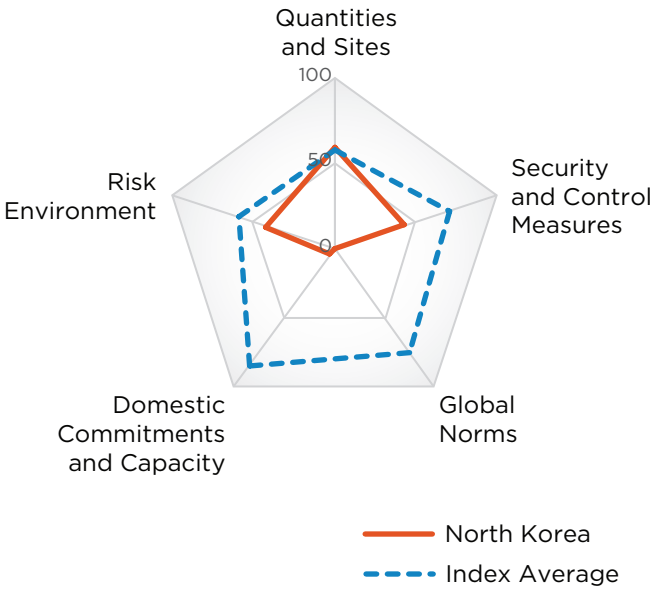
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**30**	**–**	**25**
Quantities and Sites	60	–	15
Security and Control Measures	43	–	22
Global Norms	0	–	25
Domestic Commitments and Capacity	4	–	25
Risk Environment	42	–	18

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Material Production / Elimination Trends

Security and Control Measures
- Response Capabilities

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- On-site Physical Protection
- Physical Security During Transport

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Sites and Transportation

Security and Control Measures
- Control and Accounting Procedures
- Insider Threat Prevention

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

NORWAY

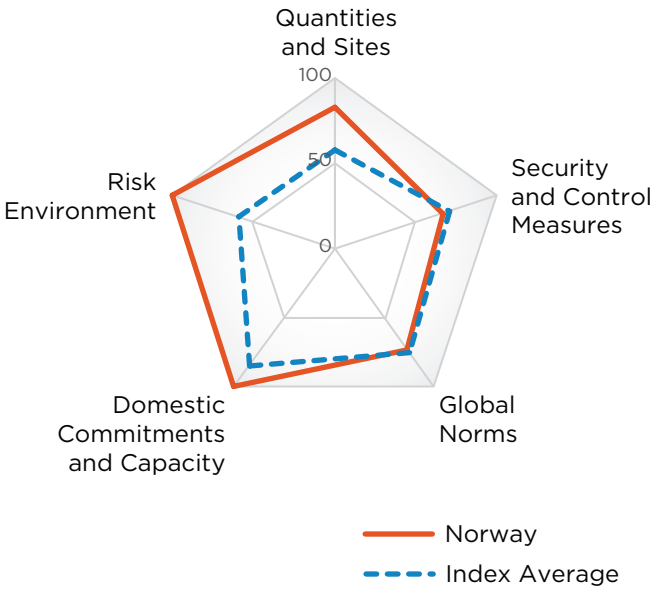
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**83**	**+1**	**5**
Quantities and Sites	83	-5	7
Security and Control Measures	67	–	17
Global Norms	73	–	17
Domestic Commitments and Capacity	100	–	=1
Risk Environment	100	+13	1

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Assurances

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Insider Threat Prevention

PAKISTAN

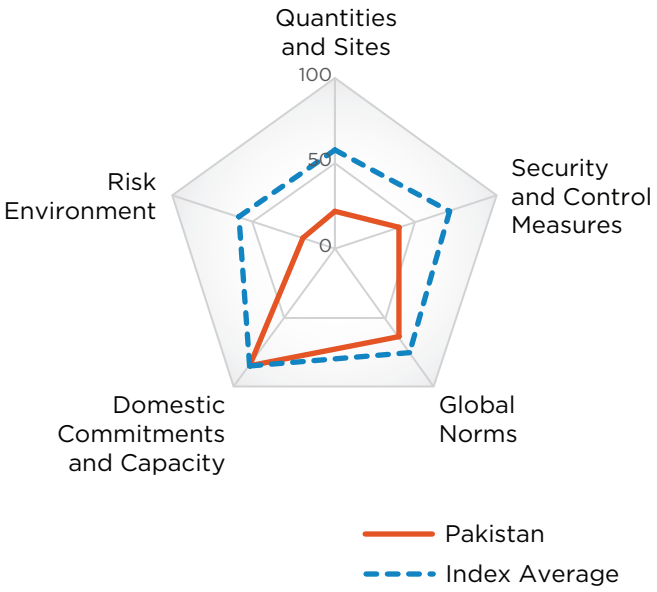
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**46**	**+3**	**22**
Quantities and Sites	22	–	=22
Security and Control Measures	40	+9	=23
Global Norms	63	–	20
Domestic Commitments and Capacity	85	–	20
Risk Environment	19	+6	25

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Security and Control Measures
- Response Capabilities

Global Norms
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Independent Regulatory Agency

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- On-site Physical Protection
- Insider Threat Prevention

Global Norms
- International Legal Commitments

AVERAGE *(continued)*

Domestic Commitments and Capacity
- Safeguards Adherence and Compliance

Risk Environment
- Effective Governance

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- Control and Accounting Procedures
- Physical Security During Transport

Risk Environment
- Political Stability
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

POLAND

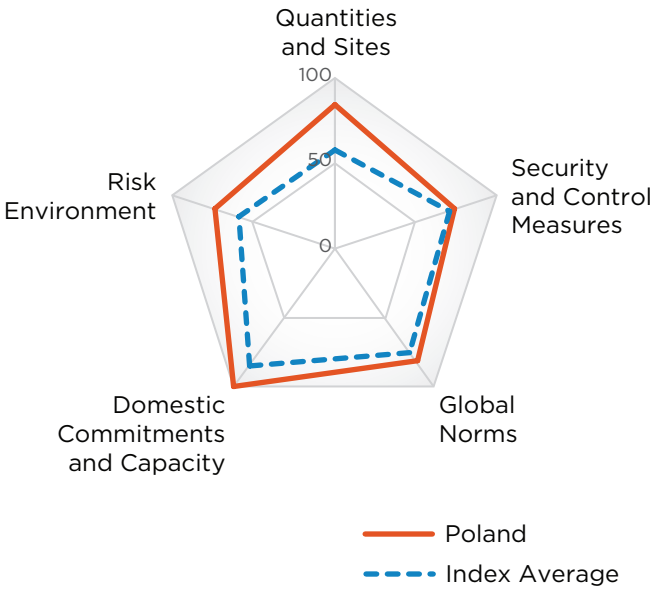
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**82**	**+1**	**6**
Quantities and Sites	84	+6	=5
Security and Control Measures	74	–	13
Global Norms	82	–	=14
Domestic Commitments and Capacity	100	–	=1
Risk Environment	74	–	=10

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Groups Interested in Illicitly Acquiring Materials

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- Insider Threat Prevention
- Physical Security During Transport

Global Norms
- International Assurances

Risk Environment
- Effective Governance
- Pervasiveness of Corruption

BELOW AVERAGE (Indicator scores less than 34)

RUSSIA

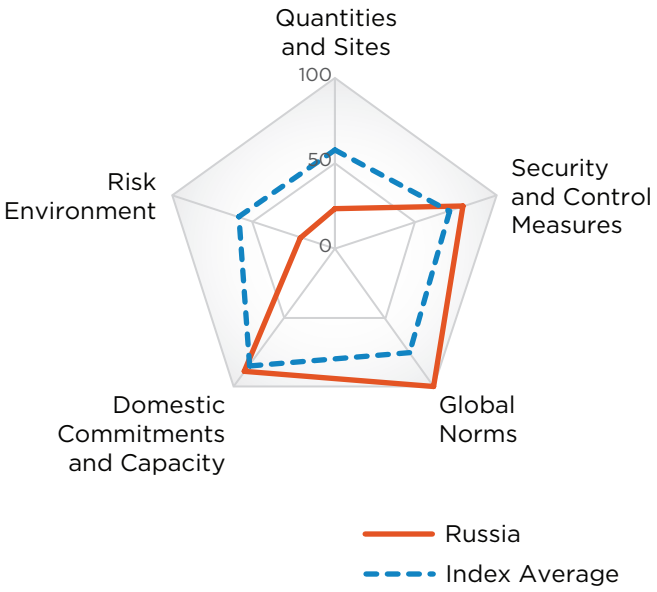
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**66**	**–**	**=18**
Quantities and Sites	23	–	=20
Security and Control Measures	80	–	=9
Global Norms	100	–	=1
Domestic Commitments and Capacity	89	–	=17
Risk Environment	21	–	24

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

AVERAGE (Indicator scores between 34 and 66)

Security and Control Measures
- Physical Security During Transport

Risk Environment
- Political Stability
- Effective Governance

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation

Risk Environment
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

SOUTH AFRICA

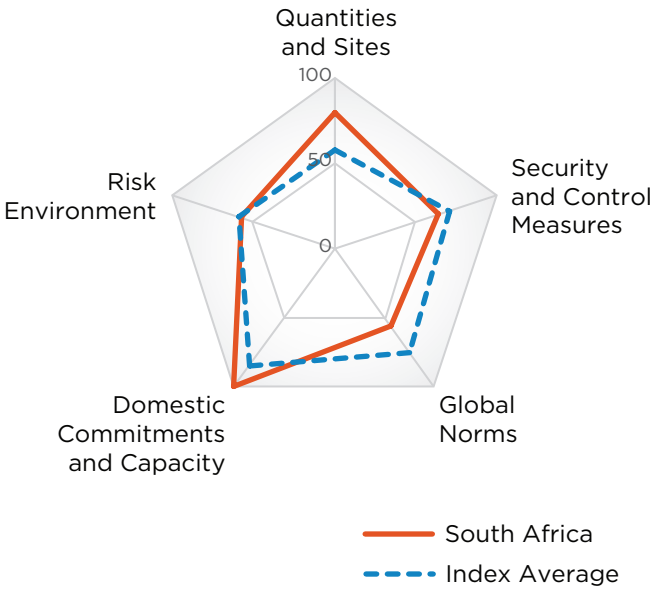
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**71**	**-1**	**16**
Quantities and Sites	79	+6	8
Security and Control Measures	64	–	18
Global Norms	57	-5	22
Domestic Commitments and Capacity	100	–	=1
Risk Environment	58	-2	=14

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- Control and Accounting Procedures
- Insider Threat Prevention
- Response Capabilities

Global Norms
- International Legal Commitments

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability

AVERAGE (Indicator scores between 34 and 66)

Quantities and Sites
- Quantities of Nuclear Materials

Security and Control Measures
- On-site Physical Protection

Global Norms
- Voluntary Commitments
- International Assurances

Risk Environment
- Effective Governance
- Pervasiveness of Corruption
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Physical Security During Transport

SWITZERLAND

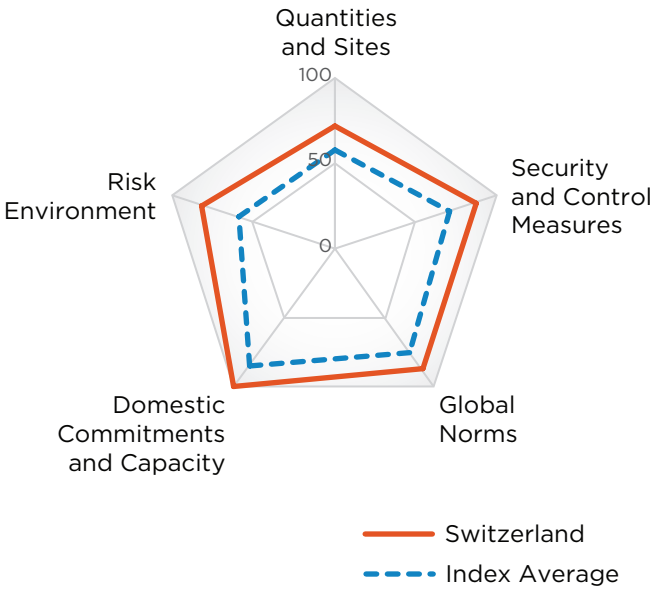
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**87**	**–**	**3**
Quantities and Sites	72	–	10
Security and Control Measures	88	–	=6
Global Norms	88	–	=7
Domestic Commitments and Capacity	100	–	=1
Risk Environment	82	+1	4

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

ABOVE AVERAGE *(continued)*

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

UNITED KINGDOM

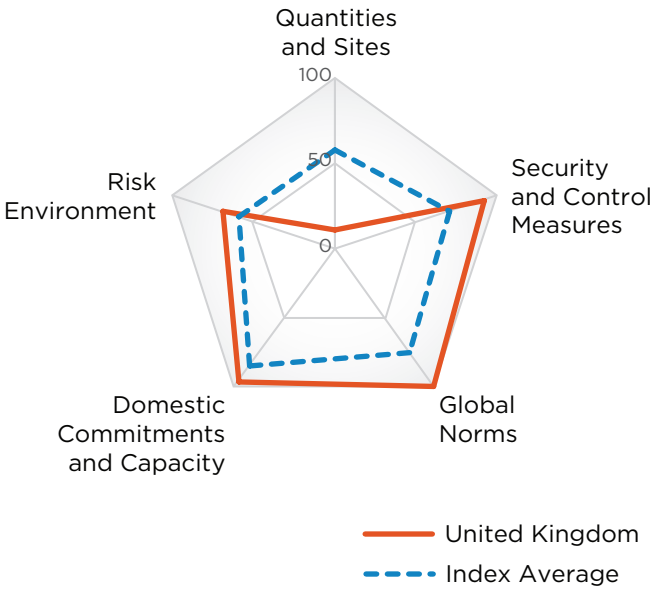
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**77**	**-1**	**=11**
Quantities and Sites	11	–	25
Security and Control Measures	93	–	=2
Global Norms	100	–	=1
Domestic Commitments and Capacity	96	–	=11
Risk Environment	69	-2	12

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Risk Environment
- Political Stability
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

UNITED STATES

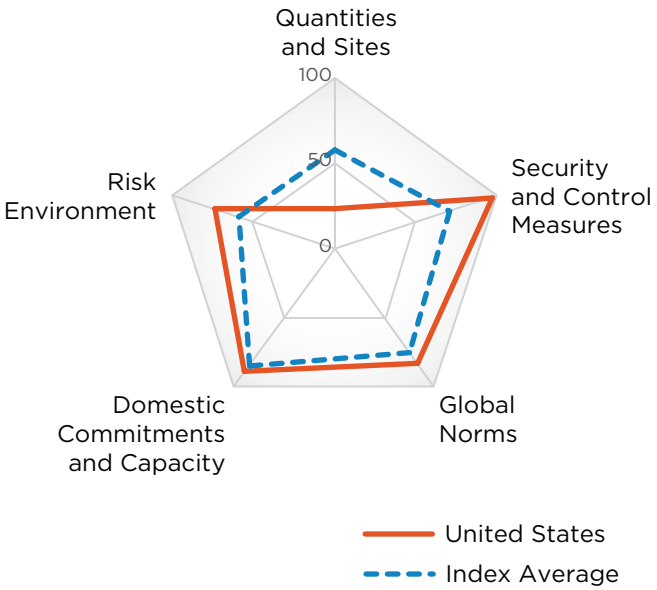
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**77**	**-1**	**=11**
Quantities and Sites	23	–	=20
Security and Control Measures	98	–	1
Global Norms	83	–	13
Domestic Commitments and Capacity	89	-3	=17
Risk Environment	74	–	=10

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Insider Threat Prevention
- Physical Security During Transport
- Response Capabilities

Global Norms
- Voluntary Commitments
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

AVERAGE (Indicator scores between 34 and 66)

Global Norms
- International Legal Commitments

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation

UZBEKISTAN

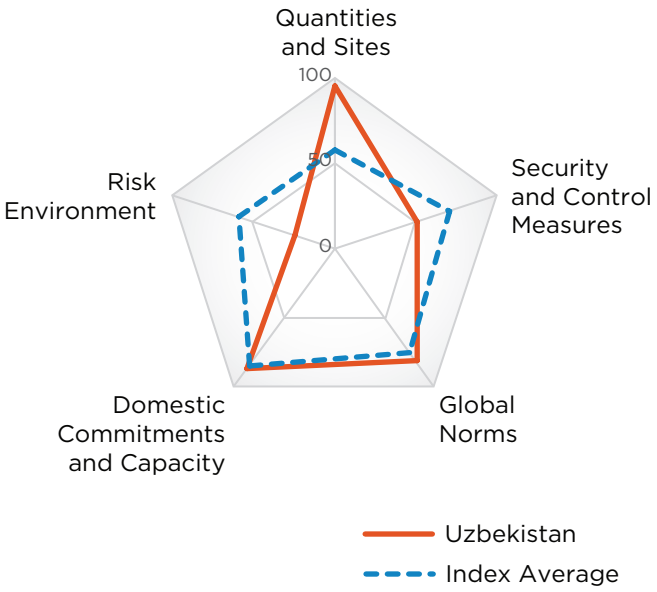
	Score / 100	Δ Score	Rank / 25
OVERALL SCORE	**66**	**+5**	**=18**
Quantities and Sites	95	+5	3
Security and Control Measures	51	+4	21
Global Norms	82	+14	=14
Domestic Commitments and Capacity	88	–	19
Risk Environment	24	–	23

= denotes tie in rank

Δ denotes change in score between 2012 and 2014

– denotes no change between 2012 and 2014

Scores are normalized (0–100, where 100 = most favorable nuclear materials security conditions)



ABOVE AVERAGE (Indicator scores greater than 66)

Quantities and Sites
- Quantities of Nuclear Materials
- Sites and Transportation
- Material Production / Elimination Trends

Security and Control Measures
- On-site Physical Protection
- Control and Accounting Procedures
- Response Capabilities

Global Norms
- International Legal Commitments
- Voluntary Commitments

Domestic Commitments and Capacity
- Domestic Nuclear Materials Security Legislation
- Safeguards Adherence and Compliance
- Independent Regulatory Agency

AVERAGE (Indicator scores between 34 and 66)

Global Norms
- International Assurances

Domestic Commitments and Capacity
- UNSCR 1540 Implementation

Risk Environment
- Groups Interested in Illicitly Acquiring Materials

BELOW AVERAGE (Indicator scores less than 34)

Security and Control Measures
- Insider Threat Prevention
- Physical Security During Transport

Risk Environment
- Political Stability
- Effective Governance
- Pervasiveness of Corruption

RESOURCES FOR COUNTRIES

Background on organizations that offer information or services to national governments, corporations, and individuals interested in nuclear materials security is provided in this appendix. A table of resources that includes references and links to IAEA recommendations and guidelines, the WINS best practice guides, and other sources of information relevant to specific Index subindicators are available on the NTI Index website: www.ntiindex.org.

INTERNATIONAL ATOMIC ENERGY AGENCY
www.iaea.org

The International Atomic Energy Agency (IAEA) was founded in 1957, as part of the United Nations, to advance the international interest in nuclear energy. To that end, the IAEA promotes safe, secure, and peaceful uses of nuclear science and technology. This mission is undertaken through three main areas of work: (a) safety and security, (b) science and technology, and (c) safeguards and verification.

As part of its safeguards and verification work, the IAEA applies a system of safeguards to verify that civilian nuclear material is not diverted to nuclear weapons. International safeguards provide regular inspections of civil nuclear facilities for purposes of detecting whether a participating country has diverted materials to a nuclear weapons program. The inspections are not, nor have they ever been, designed to assess physical security measures for the safeguarded facilities. Many civilian enrichment and reprocessing facilities are subject to safeguards administered either by the IAEA or by Euratom (which inspects all civilian nuclear material in European Union member states, including the large stocks of separated plutonium at UK and French reprocessing plants, that represent the majority of weapons-usable nuclear materials in the world that are under safeguards).

Most of the highly enriched uranium (HEU) and separated plutonium in the world is not subject to IAEA safeguards because those materials are located in states with nuclear weapons (nuclear-weapon states, or states that are not parties to the NPT [Nuclear Non-Proliferation Treaty]). States that are not party to the NPT are not subject to any commitment that the materials will not be used for nuclear weapons. Most such material is in military programs. In the case of civilian facilities and materials, IAEA safeguards are accepted only on a voluntary basis.

Separately, as part of its safety and security work, the IAEA also helps states strengthen nuclear security to combat the risk of nuclear terrorism. The agency has developed widely accepted guidelines and procedures for dealing effectively with nuclear and radiological threats, and it disseminates them through security guidance publications, advisory services, training courses, seminars and workshops, and international conferences.

The IAEA's security recommendations are developed through a consensus process that sometimes leads to non-specific security guidelines with voluntary implementation.

The IAEA offers the following specific services to help enhance individual states' nuclear materials security:

- The **International Nuclear Security Advisory Service** (INSServ) helps to identify a nation's broad nuclear security requirements and the measures needed to meet them.
- The **International Physical Protection Advisory Service** (IPPAS) evaluates existing physical protection in member states, including legal and regulatory reviews and compliance.
- The **IAEA SSAC Advisory Service** (ISSAS) provides recommendations and suggestions for improvements to systems for accountancy and control of nuclear material.

- The **Integrated Regulatory Review Service** (IRRS) improves the effectiveness of national regulatory bodies and domestic nuclear safety regulations.
- The **Integrated Nuclear Security Support Plan** (INSSP), tailored to each country, takes a holistic approach to nuclear security capacity building.

Even the IAEA, the closest thing to a global nuclear watchdog, does not have a comprehensive picture of nuclear material around the world. The information that the IAEA does have is subject to rules of confidentiality, thus impairing the IAEA's ability to publish any state-specific assessment of security conditions along the lines of this study. It is essential that the global community begin a dialogue about how to strengthen the IAEA's scope, authority, and budget to enable the agency to effectively oversee a comprehensive nuclear materials security and management system. For a discussion of strategic and programmatic recommendations for strengthening and reform of the IAEA, see Trevor Findlay, "Unleashing the Nuclear Watchdog: Strengthening and Reform of the IAEA," May 2012, and the IAEA's "Report of the Commission of Eminent Persons on the Future of the Agency," May 2008.

WORLD INSTITUTE FOR NUCLEAR SECURITY
www.wins.org

The World Institute for Nuclear Security (WINS) is an international organization that helps improve security of nuclear and high-hazard radioactive materials and facilities so that they are secure from unauthorized access, theft, and sabotage. WINS does this by providing an international forum for individuals who are accountable for nuclear security to share and promote the implementation of best security practices. Specific services include the following:

- Publishing a series of *Best Practice Guides* on nuclear security topics, including security culture, performance metrics for security, security by design, guard-force recruitment, training, deployment, and more
- Hosting workshops to provide a venue for experts and security practitioners to meet, discuss issues, and share their experiences and lessons learned

UNITED NATIONS SECURITY COUNCIL RESOLUTION 1540 COMMITTEE
www.un.org/sc/1540

The United Nations Security Council Resolution (UNSCR) 1540 Committee reports on implementation of UNSCR 1540 by United Nations member states. This resolution obliges member states to refrain from supporting—by any means—non-state parties from developing, acquiring, manufacturing, possessing, transporting, transferring, or using nuclear, chemical, or biological weapons and their delivery systems. The committee maintains a database of all domestic nuclear security legislation related to UNSCR 1540 in its member states.

GLOSSARY

Comprehensive safeguards agreements: Agreements made between the International Atomic Energy Agency (IAEA) and non-nuclear-weapon states to enable the application of safeguards on all source and special fissionable material in all peaceful nuclear activities, as required by the Nuclear Non-Proliferation Treaty. The model text for these agreements is published as IAEA document INFCIRC 153.

Convention on the Physical Protection of Nuclear Material (CPPNM): Convention that obliges parties to ensure that—during international transport across their territory or on ships or aircraft under their jurisdiction—civil nuclear materials are protected according to agreed standards. The CPPNM also provides a framework for international cooperation on the protection, recovery, and return of stolen nuclear material and on the application of criminal sanctions against persons who commit crimes involving nuclear material. The CPPNM opened for signature on March 3, 1980, and entered into force on February 8, 1987.

Enrichment: The process of producing uranium with an increased concentration of the isotope U-235, relative to natural uranium. Natural uranium contains 0.7 percent U-235, whereas nuclear weapons typically require uranium enriched to very high levels. Nuclear power plant fuel typically uses uranium enriched to 3 to 5 percent U-235, which is not sufficiently enriched to be used for nuclear weapons.

The European Atomic Energy Community (Euratom): Euratom was established through the Euratom treaty in 1957 to coordinate member states' research programs for the peaceful use of nuclear energy. Euratom helps to pool knowledge, infrastructure, and funding of nuclear energy and ensures the security of the atomic energy supply within the framework of a centralized monitoring system.

G-8 Global Partnership: See Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

Global Initiative to Combat Nuclear Terrorism (GICNT): Initiative that was announced by former U.S. president George W. Bush and former Russian president Vladimir Putin on July 15, 2006, in St. Petersburg, Russia. The GICNT's mission is to strengthen global capacity to prevent, detect, and respond to nuclear terrorism by conducting multilateral activities that strengthen the plans, policies, procedures, and interoperability of partner nations.

Global Partnership against the Spread of Weapons and Materials of Mass Destruction: Launched in 2002 at the G-8 Summit in Kananaskis, Canada, the Global Partnership against the Spread of Weapons and Materials of Mass Destruction (more commonly known as the G-8 Global Partnership) is a multilateral initiative for financial commitments to implement and coordinate chemical, biological, and nuclear threat-reduction activities on a global scale. The G-8 Global Partnership addresses nonproliferation, disarmament, counterterrorism, and nuclear safety issues through cooperative projects in such areas as the destruction of chemical weapons, the dismantlement of decommissioned nuclear submarines, the security and disposition of fissile materials, and the rechanneling of employment of former weapons scientists to peaceful civilian endeavors.

Highly enriched uranium (HEU): Uranium containing 20 percent or more of the isotope U-235.

Insider threat: The threat that personnel with authorized access to a nuclear facility, a transport operation, or sensitive information could take advantage of their access to perform acts of theft or sabotage and potentially to aid terrorists or criminals.

International assurances: Activities undertaken, information shared, or measures implemented voluntarily by a state or other stakeholders that can build the confidence of others (other governments, a designated international organization, the public, etc.) about the effectiveness of nuclear security within a given state. International assurances can be provided while protecting sensitive information about materials and sites.

International Atomic Energy Agency (IAEA): An autonomous international organization in the United Nations system that was founded in 1957 and is based in Vienna, Austria. The IAEA's mandate is the promotion of peaceful uses of nuclear energy, technical assistance in this area, and verification that nuclear materials and technology stay in peaceful use. Article III of the Nuclear Non-Proliferation Treaty (NPT) requires non-nuclear-weapon states that are party to the NPT to accept safeguards administered by the IAEA. The IAEA consists of three principal organs: the General Conference (of member states), the Board of Governors, and the Secretariat.

IAEA Additional Protocol: Also known as Information Circular 540 (INFCIRC 540). The protocol was approved by the International Atomic Energy Agency (IAEA) in May 1997 and is called the "Model Protocol Additional to the Agreement(s) between States(s) and the International Atomic Energy Agency for the Application of Safeguards." The IAEA Additional Protocol supplements the INFCIRC 153. It is a legal document granting the IAEA complementary inspection authority to that provided in underlying safeguards agreements. The principal aim is to enable the IAEA inspectorate to provide assurance about both declared and possible undeclared activities. Under the Additional Protocol, the IAEA is granted expanded rights of access to information and sites, as well as additional authority to use the most advanced technologies during the verification process.

IAEA Nuclear Security Fund: A voluntary funding mechanism, created in March 2002, to which member states of the International Atomic Energy Agency were called on to contribute. The Nuclear Security Fund was established to support, among other things, the implementation of nuclear security activities that would prevent, detect, and respond to nuclear terrorism.

International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT): A convention adopted by the United Nations General Assembly in April 2005. The ICSANT opened for signature on September 14, 2005, and entered into force on July 7, 2007. It addresses the unlawful possession or use of nuclear devices or materials by non-state actors. The ICSANT calls on states to develop a legal framework for criminalizing offenses related to nuclear terrorism, as well as for international cooperation in nuclear terrorism investigations and prosecutions.

Mixed oxide (MOX) fuel: A type of nuclear fuel used in light water reactors that consists of plutonium blended with uranium (natural, depleted, or reprocessed).

Non-civilian nuclear material: Nuclear material that is not used for civilian purposes (for example, material in active warheads or retired warheads; material that has been declared excess to weapons needs; material associated with naval propulsion; other government-owned material, including material that is in bulk, is in weapons components, and is used in research).

Non-Proliferation Treaty: Signed in 1968, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is the most widely adhered-to international security agreement. The "three pillars" of the NPT are nuclear disarmament, non-proliferation, and peaceful uses of nuclear energy. Article VI of the NPT commits states possessing nuclear weapons to negotiate in good faith toward halting the arms race and completely eliminating nuclear weapons. The NPT stipulates that non-nuclear-weapon states will not seek to acquire nuclear weapons and will accept International Atomic Energy Agency safeguards on their nuclear activities, while nuclear–weapon states commit to not transfer nuclear weapons to other states. All states have a right to the peaceful use of nuclear energy and should assist one another in its development. Initially of 25-year duration, the NPT was extended indefinitely in 1995.

Nuclear safety: The achievement of proper operating conditions, prevention of accidents, or mitigation of accident consequences, thereby resulting in protection of workers, the public, and the environment from undue radiation hazards.

Nuclear security: The prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer, or other malicious acts involving nuclear material, other radioactive substances, or their associated facilities.

Peer review: An examination or review of commercial, professional, or academic efficiency, competence, etc., by others in the same occupation.

Plutonium: A transuranic element with atomic number 94 and symbol Pu. Plutonium is produced when uranium is irradiated in a reactor. It is used primarily in nuclear weapons and, along with uranium, in mixed-oxide (MOX) fuel. Plutonium-239, a fissile isotope, is the most suitable isotope for use in nuclear fuel and weapons.

Proliferation Security Initiative (PSI): A U.S.-led effort to prevent the proliferation of weapons of mass destruction, their delivery systems, and related materials through the use of information sharing and coordination of diplomatic and military efforts. The PSI was announced by former U.S. president George W. Bush in May 2003. Members of the initiative share 13 common principles, which guide PSI efforts.

Reprocessing: The chemical treatment of spent nuclear fuel to separate the remaining usable plutonium and uranium for refabrication into fuel or, alternatively, to extract the plutonium for use in nuclear weapons.

Safeguards: A system of accounting, containment, surveillance, and inspections aimed at verifying that states are in compliance with their treaty obligations concerning the supply, manufacture, and use of civil nuclear materials. The term frequently refers to the safeguards systems maintained by the International Atomic Energy Agency (IAEA) in all nuclear facilities in non-nuclear-weapon states that are parties to the Nuclear Non-Proliferation Treaty. IAEA safeguards aim to detect the diversion of a significant quantity of nuclear material in a timely manner.

Second Line of Defense: A program of the U.S. Department of Energy's National Nuclear Security Administration (NNSA) that works to prevent illicit trafficking in nuclear and radiological materials. The program aims to secure international land borders, seaports, and airports that may be used as smuggling routes for materials needed for a nuclear device or a radiological dispersal device. Second Line of Defense has two main parts: the Core Program and the Megaports Initiative.

Spent nuclear fuel: Also known as irradiated nuclear fuel. Once irradiated, nuclear fuel is highly radioactive and extremely physically hot, necessitating special remote handling. Fuel is considered self-protecting if it is sufficiently radioactive that those who might seek to divert it would not be able to handle it directly without suffering acute radiation exposure.

United Nations Security Council Resolution 1540: A resolution passed by the United Nations Security Council in April 2004 that called on all states to refrain from supporting, by any means, non-state actors who attempt to acquire, use, or transfer chemical, biological, or nuclear weapons or their delivery systems. The resolution also called for a committee (known as the 1540 Committee) to report on the progress of the resolution and asked states to submit reports on steps taken toward conforming to the resolution. In April 2011, the Security Council voted to extend the mandate of the 1540 Committee for an additional 10 years.

Uranium: A naturally occurring radioactive element with atomic number 92 and symbol U. Natural uranium contains isotopes 234, 235, and 238. Uranium for use in nuclear reactors and in nuclear weapons is enriched in U-235.

Voluntary Offer Safeguards Agreements: Safeguards agreements made with the International Atomic Energy Agency (IAEA) by the nuclear-weapon states. The Nuclear Non-Proliferation Treaty does not require the nuclear-weapon states to conclude safeguards agreements, but all have voluntarily offered parts or all of their civilian nuclear fuel cycle for the application of IAEA safeguards, to allay concerns expressed by non-nuclear-weapon states that their nuclear industry could otherwise be at a commercial disadvantage.

World Institute for Nuclear Security (WINS): An international organization that is based in Vienna and was founded in 2008 and that is aimed at providing an international forum for those individuals accountable for nuclear security to share and promote the implementation of best security practices.

2005 Amendment to the CPPNM: Amendment that extends the scope of the Convention on the Physical Protection of Nuclear Material (CPPNM) to cover the physical protection of nuclear material in domestic use, in storage, and during transport and of nuclear facilities used for peaceful purposes. It also provides for expanded cooperation between and among states with regard to implementing rapid measures to locate and recover stolen or smuggled nuclear material, mitigating any radiological consequences of sabotage, and preventing and combating related offenses. The 2005 Agreement has not yet entered into force.

Sources

Note that glossary terms and definitions were derived from glossaries produced independently by the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies, the International Atomic Energy Agency, and the British Health and Security Executive.

Center for Nonproliferation Studies. "NTI Glossary." Monterey Institute of International Studies, Monterey, CA. www.nti.org/glossary.

International Atomic Energy Agency (IAEA). "IAEA Recommendations for Physical Security." INFCIRC 225, Rev. 5, IAEA, Vienna, 2011. www-pub.iaea.org/MTCD/publications/PDF/Pub1481_web.pdf.

International Atomic Energy Agency (IAEA) Safeguards Office. *IAEA Safeguards Glossary*. Vienna: IAEA Safeguards Office, 2002. www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_scr.pdf.

Office for Nuclear Regulation. "Basic Safeguards Glossary." United Kingdom Health and Safety Executive, London. www.hse.gov.uk/nuclear/safeguards/glossary.htm.

www.ntiindex.org

Visit the NTI Index website at **www.ntiindex.org** for more information about the 2014 NTI Nuclear Materials Security Index. Fully updated from 2012, the site includes country summaries for all 176 countries with capabilities for side-by-side comparisons. The site also provides video and primers on nuclear materials security, the nuclear threat and more. Visitors interested in in-depth analysis can visit the site to download the data model, in an Excel format, which allows the deepest review of the results and data, as well as extended interactive features.

#ntiindex Tweet your reactions to the NTI Index and use the hashtag #ntiindex. Follow @NTI_WMD for ongoing updates about the NTI Index, nuclear security and other issues relating to nuclear, chemical, and biological weapons.

NTI NUCLEAR MATERIALS SECURITY INDEX

REACTIONS TO THE 2012 NTI INDEX

"First-ever scorecard on the security of nuclear materials"

~ The Washington Post ~

"Edgy ranking"

~ The New York Times ~

"Unprecedented"

~ Yonhap News Agency (South Korea) ~

"A very open attempt to hold all countries up to the same yardstick. ... The value of such an index is that it can serve as a public early warning system."

~ David Hoffman, Pulitzer Prize-winning journalist ~

The 2014 Nuclear Threat Initiative (NTI) Nuclear Materials Security Index is the second edition of a first-of-its-kind public assessment of nuclear materials security conditions around the world. Developed with the Economist Intelligence Unit (EIU), the NTI Index encourages governments to take actions to reduce risks and to provide assurances about the security of some of the world's deadliest materials.

The NTI Index and its broad framework for nuclear materials security was developed with guidance from an International Panel of Experts from nuclear- and non-nuclear-weapon states and from developed and developing nations, including Argentina, Australia, China, France, India, Japan, Kazakhstan, Pakistan, Russia, South Africa, Sweden, the United Kingdom, the United States, and Vietnam—among them a representative from the World Institute for Nuclear Security (WINS) and a former International Atomic Energy Agency (IAEA) official.

www.ntiindex.org

#ntiindex

NTI

BUILDING A SAFER WORLD

1747 Pennsylvania Avenue, NW | Seventh Floor | Washington, DC 20006 | **@NTI_WMD** | **www.nti.org**