NTI NUCLEAR SECURITY INDEX
Theft / Sabotage / Radiological

EIU Methodology: Theft and Sabotage

CONTENTS

SUMMARY

To gain a better understanding of current global nuclear security conditions, the Nuclear Threat Initiative (NTI) commissioned the Economist Intelligence Unit (EIU) to construct the latest edition of the NTI Nuclear Security Index (the 2020 NTI Index). The 2020 NTI Index provides a country-level assessment of nuclear security conditions in 175 countries plus Taiwan. It follows the release of four iterations of the NTI Index, in January 2012, January 2014, January 2016, and September 2018.

The 2020 NTI Index divides countries into three groups, each with independent rankings and assessments. The first group of countries assessed in the Index includes the 22 countries with 1 kilogram or more of weapons-usable nuclear materials (theft ranking for countries with materials). This ranking assesses actions related to securing materials against theft. The second group of countries includes the 153 countries and Taiwan that have less than 1 kilogram of or no weapons-usable nuclear materials but that could be used as safe havens, staging grounds, or transit points for illicit nuclear activities (theft ranking for countries without materials). This ranking assesses actions related to supporting global nuclear security efforts. These first two groups assess nuclear materials security conditions since 2012. The third and final group includes the 46 countries and Taiwan with certain types of nuclear facilities, the sabotage of which could result in a significant radiological release with serious off-site health consequences (sabotage ranking). This ranking assesses actions related to protecting nuclear facilities against sabotage. The first edition of the sabotage ranking was released in 2016.

Nuclear security is particularly difficult to observe, both because of the legacy of secrecy associated with the subject and because of the absence of quantitative performance indicators. To address the need for an objective, country-level assessment of nuclear 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 security conditions. Indices, in such cases, are effective in several ways: (a) they can aggregate a wide range of related data and evaluate them 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. Indices can therefore be a useful tool for stimulating public policy reforms. The goal of the NTI Index is not only to prompt improvements in national nuclear security policies and programs, but also to encourage international debate on the risks and other factors that affect the likelihood of a country losing control of its weapons-usable nuclear materials or a country's nuclear facilities being subject to an act of sabotage.

The 2020 NTI Index is again the result of collaboration between NTI and the EIU. The EIU researched the metrics captured in the NTI Index, paying particularly close attention to any changes to regulations or licensing conditions in a country. As a result of updates and revisions to the NTI Index framework since 2012, direct year-on-year comparisons would not have been possible. To allow for such comparisons, the EIU rescored countries in the previous editions of the NTI Index using the updated 2020 framework and the data that would have been available when research for those editions was conducted.

In addition, the results from previous editions of the NTI Index were thoroughly reviewed and researched again to ensure accuracy. In a limited number of cases, research indicated that more 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 previous scores to reflect the most accurate data. Rescoring those select data points was necessary for the 2020 NTI Index to capture accurate year-on-year comparisons. Most of the research was conducted between July 2019 and March 2020, although data were updated as new information became available until April 1, 2020.

NTI and the EIU once again drew on the expertise of highly respected nuclear security experts (the International Panel of Experts) from nuclear-weapon 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 2020 NTI Index.

The categories in the theft ranking for countries with materials, as well as in the sabotage ranking, are the following:

1. **Quantities and Sites**,[1] which captures the quantity of nuclear materials, the number of sites, the frequency of transport in a particular country, and whether quantities are increasing or decreasing;
2. **Security and Control Measures**, which encompasses the core activities related to the physical protection and accounting of weapons-usable nuclear materials, personnel and security infrastructure, cybersecurity, and security culture;
3. **Global Norms**, which includes actions that contribute to a strengthened global nuclear security architecture;
4. **Domestic Commitments and Capacity**, which indicates how well a country has implemented its international commitments and a country's capacity to do so; and
5. **Risk Environment**,[2] which examines issues that can undermine nuclear security at the national level, such as political instability, absence of effective governance, corruption, or illicit activities by non-state actors.

The theft ranking for countries without materials consists of Categories 3, 4, and 5 from the theft ranking for countries with materials.

The research for both the theft ranking for countries with materials and the sabotage ranking primarily considered regulatory requirements for security. Reviewing security at the facility or site level 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*).

To limit the degree of subjectivity in these indicators, the EIU created subindicators that were, whenever possible, framed as a binary choice (yes or no, 1 or 0). For example, the EIU asked if a country has domestic regulations or licensing conditions that require nuclear facilities to have protection from a cyber attack. 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 a qualitative scoring approach.

Despite the care taken in designing these measures, no index of this kind can be perfect. Some countries are particularly non-transparent in matters of nuclear 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, which was used to assess how well weapons-usable nuclear materials and nuclear facilities are protected in countries where the military is primarily responsible for that protection.

[1] Category 1 in the sabotage ranking does not include Quantities and is called Number of Sites.

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

The indicators in the 2020 NTI Index are embedded in an interactive data model (available as an Excel workbook at www.ntiindex.org) that offers a wide range of analytical tools, allowing a deeper investigation of measures of nuclear security globally. For example, users can filter countries by region or by membership in international organizations or multilateral initiatives. A user can compare directly two or more countries and can examine correlations between indicators. Individual country profiles are also included in the 2020 NTI Index model, permitting a deeper dive into the nuclear 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. Finally, the model allows scores to be benchmarked against external factors that may potentially influence nuclear security. For example, the results of the theft ranking for countries with materials correlate well with regulatory quality (as measured by the World Bank's Worldwide Governance Indicators) and with those that are most at peace (as measured by the 2019 Global Peace Index).

METHODOLOGY

General

The 2020 NTI Index includes three separate rankings. The first ranking assesses the nuclear materials security conditions in 22 countries that have 1 kilogram or more of weapons-usable nuclear materials (theft ranking for countries with materials). This ranking assesses actions related to securing materials against theft. The ranking has 73 subindicators used to construct 21 indicators across five categories. The scope of the theft ranking for countries with materials includes highly enriched uranium (HEU), including spent fuel; separated plutonium; and plutonium in unirradiated mixed oxide fuel (MOX). A second, separate ranking assesses the nuclear materials security conditions in 153 countries and Taiwan that have less than 1 kilogram of or no weapons-usable nuclear materials but that could be used as safe havens, staging grounds, or transit routes (theft ranking for countries without materials).[3] This ranking assesses actions related to supporting global nuclear security efforts. The number of countries in the theft ranking for countries without materials was initially determined by the scope of EIU's Risk Briefing service.[4] The ranking for countries without materials has 29 subindicators across nine indicators and three categories, which is a subset of those included in the ranking for countries with materials. Finally, the third ranking assesses nuclear security conditions in 46 countries and Taiwan[5] with certain types of nuclear facilities, the sabotage of which could lead to a significant radiological release with serious off-site health consequences (sabotage ranking).[6] This ranking assesses actions related to protecting nuclear facilities against sabotage. The sabotage ranking has 18 indicators and 66 subindicators across five categories.

The overall score (0–100) for each country in each ranking is a weighted sum of the categories included in that ranking. Each category is scored on a scale from 0 to 100, where 100 represents the most favorable nuclear security conditions and 0 represents the least favorable conditions. A score of 100 in the ranking does not indicate that a country has perfect nuclear security conditions, and likewise 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 score is normalized on the basis of the sums of underlying indicators and subindicators, and a weight is then applied. Weights are based on input from the

[3] 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 1 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.

[4] The EIU's Risk Briefing service provides forecasts, alerts, background studies, and data covering a wide range of risk factors across 180 countries. The service is updated regularly in response to events that affect the assessment of operating risk in a particular country.

[5] Taiwan is included in the theft ranking for countries without nuclear materials and the sabotage ranking. Given Taiwan's status, this Methodology describes the number of countries in the NTI Index as "153 countries and Taiwan" and "46 countries and Taiwan" in the theft ranking for countries without materials and the sabotage ranking, respectively. Further references to numbers of countries in this Methodology include Taiwan.

[6] These nuclear facilities are the following: operating nuclear power reactors or nuclear power reactors that have been shut down within the last five years; research reactors with a capacity of 2 megawatts or greater; reprocessing facilities; and spent fuel pools, only if the fuel has been discharged in the last five years and is not associated with an operating reactor.

International Panel of Experts and reflect the relative importance and relevance of each indicator and category. These weights differ across the three rankings to reflect how security priorities may be different in countries with or without weapons-usable nuclear materials and in countries with nuclear facilities. Although each model displays by default the weights selected by the International Panel of Experts, a user can manually change the weights to see how different priorities might affect the scores and ranks.

The framework and the number of countries in each of the three rankings have changed repeatedly since the Index's inception in 2012. For example, since 2012 the NTI Index theft ranking for countries with materials has assessed the following:

- 2012: 32 countries with weapons-usable nuclear materials across 18 indicators
- 2014: 25 countries with weapons-usable nuclear materials across 19 indicators
- 2016: 24 countries with weapons-usable nuclear materials across 20 indicators
- 2018: 22 countries with weapons-usable nuclear materials across 20 indicators
- 2020: 22 countries with weapons-usable nuclear materials across 21 indicators

The steady decline in the number of countries within the theft ranking for countries with materials between 2012 and 2018 reflects the removal of all or most of such materials from the territories of 10 countries.[7] The NTI Index sabotage ranking assesses 47 countries against 18 indicators in 2020. The number of countries increased by two since 2018 as a result of construction of nuclear facilities in Jordan and the United Arab Emirates.

Index Constraints and Other Important Factors

In producing the NTI Index, the EIU relied on publicly available sources, such as laws and regulations, to reach initial scoring conclusions. The research team gathered data from the following types of 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
- EIU country rankings and reports (specifically Risk Briefing and the Business Environment Ranking)
- Local and international news media reports

See *Selected Bibliography* for more information on central sources.

The emphasis on publicly available sources has the benefit of creating a transparent and repeatable methodology, but it also presents some challenges. For example, regulations and other requirements for nuclear security are sometimes classified. In cases where no public information was available, those countries were queried about the status of their regulations or licensing conditions as part of the data confirmation process. These countries could then choose whether to provide additional insight into their regulatory requirements, which could then be considered in making a final scoring decision.

[7] Austria, the Czech Republic, Hungary, Mexico, Sweden, Ukraine, and Vietnam removed all or most of their materials between the release of the 2012 NTI Index and the release of the 2014 NTI Index. Uzbekistan eliminated its stock of weapons-usable nuclear materials between the release of the 2014 NTI Index and the release of the 2016 Index. Argentina and Poland removed all or most of their materials following the release of the 2016 Index.

In cases where countries are particularly non-transparent and chose not to respond to data confirmation queries, scores were assigned on the basis of a proxy indicator or the country was given a score of 0. The absence of information on nuclear security reduces public and international confidence in 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 nuclear facility than is a country without appropriate laws and regulations.

Additionally, the NTI Index includes "indicators" of security conditions and not the complete set of good security practices that nuclear faculties should employ to protect against theft of weapons-usable nuclear materials or sabotage of nuclear facilities. 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.

Finally, please note that the NTI Nuclear Security Index does not directly address proliferation risks, smuggling or illicit trafficking, disarmament, or nuclear safety.

International Panel of Experts

As in previous years, NTI and the EIU drew on the expertise of highly respected nuclear security experts (the International Panel of Experts) from nuclear-armed and non-nuclear armed states, from countries with and without materials, and from developed and developing nations, to provide input on options for strengthening the 2020 NTI Index. The first meeting of the panel included discussions around the addition and removal of several subindicators, the development of a new Security Culture indicator, and the best method to promote progress on nuclear security in the absence of the Nuclear Security Summit process. The second meeting of the panel was to provide input on weighting.

In addition to convening the meetings of the International Panel of Experts, NTI and EIU also convened another group of experts to develop a new approach to measuring the threat of terrorism. The EIU also received expert guidance from technical advisors on the panel throughout the research process. These technical advisors helped the EIU modify and refine indicators to capture key elements of nuclear security and provided insights into the more technical parts of the research.

Country Scope

By reviewing recent reports pertaining to quantities of nuclear materials and taking into account recent developments, the EIU identified the following 22 countries (listed in alphabetical order) as having 1 kilogram or more of HEU (including spent fuel), separated plutonium, or plutonium content in unirradiated MOX:

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

The 2020 NTI Index also assesses the following 154 countries (listed in alphabetical order) that have less than 1 kilogram of weapons-usable nuclear materials or no weapons-usable nuclear materials:

Afghanistan
Albania
Algeria
Angola
Argentina
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 (Brazzaville)
Congo (Democratic Republic of)
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
Poland
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
Uzbekistan
Vanuatu
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

The 2020 NTI Index also assesses the following 47 countries (listed in alphabetical order) with nuclear facilities, the sabotage of which could result in a significant radiological release with serious off-site health consequences. Note that these 47 countries with nuclear facilities include 20 of the countries in the theft ranking for countries with materials and 26 countries and Taiwan that are in the theft ranking for countries without materials.

Algeria
Argentina
Armenia
Australia
Bangladesh
Belgium
Brazil
Bulgaria
Canada
Chile
China
Czech Republic
Egypt
Finland
France
Germany
Hungary
India
Indonesia
Iran
Israel
Japan
Jordan
Kazakhstan
Mexico
Morocco
Netherlands
North Korea
Norway
Pakistan
Peru
Poland
Romania
Russia
Slovakia
Slovenia
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Ukraine
United Arab Emirates
United Kingdom
United States
Uzbekistan

Data Review and Confirmation Process

After researching the indicators for each model, NTI and the EIU provided all 49 countries that are included in the theft ranking for countries with materials, in the sabotage ranking, or in both with an opportunity to review and comment on the EIU's preliminary results. The purpose of the data review and confirmation process was to ensure the accuracy of the 2020 NTI Index data. 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 documents that presented the preliminary scores for the 2020 NTI Index indicators. These forms allowed reviewers to either agree or disagree with the score selected for their country and, if disagreeing, to offer an alternative answer and justification. The EIU used the submitted responses to reevaluate and potentially change a country's scores. When the responses were unclear, the EIU contacted individuals for clarification. Country representatives had three and a half months—from mid-November 2019 to March 1, 2020—to respond to the data review and confirmation request.

Of the 49 countries, 27 officially responded to the data review and confirmation request. Those countries were Argentina, Australia, Belgium, Brazil, Canada, Chile, China, the Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Mexico, the Netherlands, Norway, Poland, Romania, Slovenia, South Korea, Sweden, Switzerland, Taiwan, the United Arab Emirates, the United Kingdom, and the United States.[8]

[8] Of the 27 countries that responded to the data confirmation, 12 are included in both the theft ranking for countries with materials and the sabotage ranking: Australia, Belgium, Canada, China, France, Germany, Japan, the Netherlands, Norway, Switzerland, the United Kingdom, and the United States. One response was from a country included only in the theft ranking for countries with materials: Italy. The remaining 14 responses were from countries that are included only in the sabotage ranking: Argentina, Brazil, Chile, the Czech Republic, Finland, Hungary, Mexico, Poland, Romania, Slovenia, South Korea, Sweden, Taiwan, and the United Arab Emirates.

Scoring

Subindicator scoring options range from binary observations (0, 1) to subindicators with eight possible scores. For each subindicator, a higher value is associated with more favorable nuclear security conditions. For example, for the subindicator number of sites in the theft ranking for countries with materials, 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 is divided by the total possible subindicator values, then converted to a 0–100 scale to determine the indicator score. The sole exception to this scoring scheme is Indicator 3.2, Voluntary Commitments. Although this indicator has nine subindicators, each with a possible score of 1, the total indicator score is capped at 6.

Theft ranking for countries with materials

The five categories of the theft ranking for countries with materials are as follows:

1. **Quantities and Sites.** This category comprises three indicators: Quantities of Nuclear Materials, Sites and Transportation, and Material Production and Elimination Trends.
2. **Security and Control Measures.** This category comprises seven indicators: On-Site Physical Protection, Control and Accounting Procedures, Insider Threat Prevention, Physical Security during Transport, Response Capabilities, Cybersecurity, and Security Culture.
3. **Global Norms.** This category comprises four indicators: International Legal Commitments, Voluntary Commitments, International Assurances, and IAEA [International Atomic Energy Agency] Nuclear Security Information Circulars (INFCIRCs).
4. **Domestic Commitments and Capacity.** This category comprises three indicators: United Nations Security Council Resolution (UNSCR) 1540 Implementation, Domestic Nuclear Security Legislation, and Independent Regulatory Agency.
5. **Risk Environment.** This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Illicit Activities by Non-State Actors.

Each indicator within the five categories contains up to nine underlying subindicators. The categories, indicators, and subindicators are as follows:

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 (where 8 = most favorable nuclear materials security conditions)
1.2	**Sites and Transportation**	**Scored 0–8 (where 8 = most favorable nuclear materials security conditions)**
1.2.1	Number of sites	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
1.2.2*	Bulk processing facilities	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

1.2.3	Frequency of materials transport	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
1.3	**Material Production/Elimination Trends**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
1.3.1	Material production/elimination trends	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
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 (where 1 = most favorable nuclear materials security conditions)
2.1.2	On-site reviews of security	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.1.3	Design Basis Threat (DBT)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.1.4*	Tests and assessments	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.2	**Control and Accounting Procedures**	**Scored 0–10 (where 10 = most favorable nuclear materials security conditions)**
2.2.1*	Legal and regulatory basis for material control and accounting (MC&A)	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
2.2.2*	Measurement methods	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.2.3	Inventory record	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.2.4*	Material balance area(s)	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.2.5	Control measures	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.3	**Insider Threat Prevention**	**Scored 0–11 (where 11 = most favorable nuclear materials security conditions)**
2.3.1	Personnel vetting	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
2.3.2	Frequency of personnel vetting	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
2.3.3	Reporting	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.3.4	Surveillance	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.3.5*	Insider threat awareness program	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

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 (where 2 = most favorable nuclear materials security conditions)
2.5	Response Capabilities	Scored 0–8 (where 8 = most favorable nuclear materials security conditions)
2.5.1	Emergency response capabilities	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
2.5.2	Armed response capabilities	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.5.3	Law enforcement response training	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.5.4*	Nuclear infrastructure protection plan	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.5.5*	Response coordination capabilities	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.6	**Cybersecurity**	**Scored 0–8 (where 8 = most favorable nuclear materials security conditions)**
2.6.1	Mandatory cybersecurity	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.6.2*	Sensitive digital asset management	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.6.3	Cybersecurity DBT	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.6.4*	Cybersecurity assessments	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
2.6.5	Cyber incident response plan	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.6.6*	Mandatory cybersecurity awareness program	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.7*	**Security Culture**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
2.7.1*	Security culture	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.7.2*	Security culture assessments	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
2.7.3*	Security responsibilities and accountabilities	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

3	GLOBAL NORMS	Scored 0–100 (where 100 = most favorable nuclear materials security conditions)
3.1	**International Legal Commitments**	**Scored 0–7 (where 7 = most favorable nuclear materials security conditions)**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.1.2	2005 Amendment to the CPPNM	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.1.4*	International Atomic Energy Agency (IAEA) safeguards agreement	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.2	**Voluntary Commitments**	**Scored 0–6 (where 6 = most favorable nuclear materials security conditions)**
3.2.1	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.2	Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.3	World Institute for Nuclear Security (WINS) contributions	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.4	IAEA Nuclear Security Fund contributions	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.5	Bilateral/multilateral assistance	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.6	Centers of Excellence	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.7*	Ministerial participation in the IAEA International Conference on Nuclear Security (ICONS)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.8*	Incident and Trafficking Database (ITDB)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.9*	Nuclear Security Guidance Committee (NSGC)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.3	**International Assurances**	**Scored 0–13 (where 13 = most favorable nuclear materials security conditions)**
3.3.1*	Published regulations	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.3.2*	Published nuclear security annual reports	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.3.3*	Published nuclear security progress reports	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.3.4*	Public declarations/reports about civilian nuclear materials	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

3.3.5*	Public declarations/reports about military nuclear materials	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.3.6*	Review of security arrangements	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.3.7*	International Physical Protection Advisory Service (IPPAS) mission	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
3.4*	**Nuclear Security Information Circulars (INFCIRCs)**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
3.4.1*	INFCIRC/869	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.4.2*	Other nuclear security INFCIRCs	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
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 (where 1 = most favorable nuclear materials security conditions)
4.1.2	Extent of UNSCR 1540 implementation	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
4.2	**Domestic Nuclear Security Legislation**	**Scored 0–3 (where 3 = most favorable nuclear materials security conditions)**
4.2.1	CPPNM implementation authority	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
4.2.2*	National legal framework for CPPNM Amendment	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
4.3*	**Independent Regulatory Agency**	**Scored 0–1 (where 1 = most favorable nuclear materials security conditions)**
4.3.1*	Independent regulatory agency	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
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 nuclear materials security conditions)**
5.1.1	Social unrest	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.2	Orderly transfers of power	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.3	International disputes/tensions	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.4	Armed conflict	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

5.1.5	Violent demonstrations or violent civil/labor unrest	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
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 (where 4 = most favorable nuclear materials security conditions)
5.2.2	Quality of the bureaucracy	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.3	**Pervasiveness of Corruption**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
5.3.1	Pervasiveness of corruption	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4*	**Illicit Activities by Non-State Actors**	**Scored 0–20 (where 20 = most favorable nuclear materials security conditions)**
5.4.1*	Likelihood of terrorist attacks	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4.2*	Firearms seized during interdiction of illicit weapons trafficking	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4.3*	Domestic terrorism threat	Scored 0–8 (where 8 = most favorable nuclear materials security conditions)
5.4.4*	Neighboring terror threat	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

Theft ranking for countries without materials

The three categories of the theft rankings for countries without materials are as follows:

- **Global Norms.** This category comprises three indicators: International Legal Commitments, Voluntary Commitments, and IAEA Nuclear Security Information Circulars (INFCIRCs).
- **Domestic Commitments and Capacity.** This category comprises two indicators: United Nations Security Council Resolution (UNSCR) 1540 Implementation and Domestic Nuclear Security Legislation.
- **Risk Environment.** This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Illicit Activities by Non-State Actors.

Each indicator within the three categories contains one to nine underlying subindicators. The categories, indicators, and subindicators are as follows:

3	GLOBAL NORMS	Scored 0–100 (where 100 = most favorable nuclear materials security conditions)
3.1	**International Legal Commitments**	**Scored 0–7 (where 7 = most favorable nuclear materials security conditions)**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.1.2	2005 Amendment to the CPPNM	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.1.4*	International Atomic Energy Agency (IAEA) safeguards agreement	Scored 0–2 (where 2 = most favorable nuclear materials security conditions)
3.2	**Voluntary Commitments**	**Scored 0–6 (where 6 = most favorable nuclear materials security conditions)**
3.2.1	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.2	Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.3	World Institute for Nuclear Security (WINS) contributions	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.4	IAEA Nuclear Security Fund contributions	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.5	Bilateral/multilateral assistance	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.6	Centers of Excellence	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.7*	Ministerial participation in the IAEA International Conference on Nuclear Security (ICONS)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator/subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators/subindicators.

3.2.8*	Incident and Trafficking Database (ITDB)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.2.9*	Nuclear Security Guidance Committee (NSGC)	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.3*	**Nuclear Security Information Circulars (INFCIRCs)**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
3.3.1*	INFCIRC/869	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
3.3.2*	Other nuclear security INFCIRCs	Scored 0–3 (where 3 = most favorable nuclear materials security conditions)
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 (where 1 = most favorable nuclear materials security conditions)
4.1.2	Extent of UNSCR 1540 implementation	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
4.2	**Domestic Nuclear Security Legislation**	**Scored 0–1 (where 1 = most favorable nuclear materials security conditions)**
4.2.1	CPPNM implementation authority	Scored 0–1 (where 1 = most favorable nuclear materials security conditions)
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 nuclear materials security conditions)**
5.1.1	Social unrest	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.2	Orderly transfers of power	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.3	International disputes/tensions	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.4	Armed conflict	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.1.5	Violent demonstrations or violent civil/labor unrest	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator/subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators/subindicators.

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 (where 4 = most favorable nuclear materials security conditions)
5.2.2	Quality of the bureaucracy	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.3	**Pervasiveness of Corruption**	**Scored 0–4 (where 4 = most favorable nuclear materials security conditions)**
5.3.1	Pervasiveness of corruption	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4*	Illicit Activities by Non-State Actors	Scored 0–12 (where 12 = most favorable nuclear materials security conditions)
5.4.1*	Likelihood of terrorist attacks	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4.2*	Firearms seized during interdiction of illicit weapons trafficking	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)
5.4.3*	Pervasiveness of organized crime	Scored 0–4 (where 4 = most favorable nuclear materials security conditions)

* Indicates new or revised indicator/subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators/subindicators.

Sabotage ranking

The five categories of the sabotage rankings are as follows:

1. **Number of Sites.** This category comprises one indicator: Number of Sites.
2. **Security and Control Measures.** This category comprises six indicators: On-Site Physical Protection, Control and Accounting Procedures, Insider Threat Prevention, Response Capabilities, Cybersecurity, and Security Culture.
3. **Global Norms.** This category comprises four indicators: International Legal Commitments, Voluntary Commitments, International Assurances, and IAEA Nuclear Security Information Circulars (INFCIRCs).
4. **Domestic Commitments and Capacity.** This category comprises three indicators: United Nations Security Council Resolution (UNSCR) 1540 Implementation, Domestic Nuclear Security Legislation, and Independent Regulatory Agency.
5. **Risk Environment.** This category comprises four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Illicit Activities by Non-State Actors.

Each indicator within the five categories contains up to nine underlying subindicators. The categories, indicators, and subindicators are as follows:[9]

1	NUMBER OF SITES	Scored 0–100 (where 100 = most favorable nuclear security conditions)
1.1†	**Number of Sites**	**Scored 0–5 (where 5 = most favorable nuclear security conditions)**
1.1.1†	Number of sites	Scored 0–5 (where 5 = most favorable nuclear security conditions)
2	**SECURITY AND CONTROL MEASURES**	**Scored 0–100 (where 100 = most favorable nuclear security conditions)**
2.1	**On-Site Physical Protection**	**Scored 0–5 (where 5 = most favorable nuclear security conditions)**
2.1.1	Mandatory physical protection	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.1.2	On-site reviews of security	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.1.3	Design Basis Threat (DBT)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.1.4*	Tests and assessments	Scored 0–2 (where 2 = most favorable nuclear security conditions)

# Denotes indicators and subindicators that are unique to the sabotage ranking.

† Denotes indicators and subindicators that are also in the theft ranking but that have been altered.

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

[9] There are differences between the theft ranking for countries with materials framework and the sabotage ranking framework. In some cases, although indicators in both models have the same names, different aspects of nuclear security are being measured (e.g., the number of sites subindicator defines sites differently in the theft and sabotage rankings). Additionally, some indicators and subindicators have the same indicator question and the same scoring criteria but, owing to differences in the theft ranking framework and the sabotage ranking framework, have different indicator and subindicator numbers. For a more extensive discussion of the differences between the theft ranking and the sabotage ranking, please see the section titled *Comparison between the Theft Ranking for Countries with Materials and the Sabotage Ranking* and the indicator frameworks at the end of this EIU Methodology.

2.2	**Control and Accounting Procedures**	**Scored 0–8 (where 8 = most favorable nuclear security conditions)**
2.2.1*	Legal and regulatory basis for material control and accounting (MC&A)	Scored 0–3 (where 3 = most favorable nuclear security conditions)
2.2.2#	Radiological consequences (materials)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.2.3#	Radiological consequences (equipment, systems, and devices)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.2.4†	Control measures	Scored 0–2 (where 2 = most favorable nuclear security conditions)
2.2.5#	Access control	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.3	**Insider Threat Prevention**	**Scored 0–11 (where 11 = most favorable nuclear security conditions)**
2.3.1	Personnel vetting	Scored 0–3 (where 3 = most favorable nuclear security conditions)
2.3.2	Frequency of personnel vetting	Scored 0–3 (where 3 = most favorable nuclear security conditions)
2.3.3	Reporting	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.3.4†	Surveillance	Scored 0–2 (where 2 = most favorable nuclear security conditions)
2.3.5*	Insider threat awareness program	Scored 0–2 (where 2 = most favorable nuclear security conditions)
2.4	**Response Capabilities**	**Scored 0–8 (where 8 = most favorable nuclear security conditions)**
2.4.1	Emergency response capabilities	Scored 0–3 (where 3 = most favorable nuclear security conditions)
2.4.2†	Armed response capabilities	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.4.3†	Law enforcement response training	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.4.4*	Nuclear infrastructure protection plan	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.4.5*	Response coordination capabilities	Scored 0–2 (where 2 = most favorable nuclear security conditions)
2.5	**Cybersecurity**	**Scored 0–8 (where 8 = most favorable nuclear security conditions)**
2.5.1	Mandatory cybersecurity	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.5.2*	Sensitive digital asset management	Scored 0–2 (where 2 = most favorable nuclear security conditions)

# Denotes indicators and subindicators that are unique to the sabotage ranking.

† Denotes indicators and subindicators that are also in the theft ranking but that have been altered.

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

2.5.3	Cybersecurity DBT	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.5.4*	Cybersecurity assessments	Scored 0–2 (where 2 = most favorable nuclear security conditions)
2.5.5	Cyber incident response plan	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.5.6*	Mandatory cybersecurity awareness program	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.6*	**Security Culture**	**Scored 0–4 (where 4 = most favorable nuclear security conditions)**
2.6.1*	Security culture	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.6.2*	Security culture assessments	Scored 0–1 (where 1 = most favorable nuclear security conditions)
2.6.3*	Security responsibilities and accountabilities	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3	**GLOBAL NORMS**	**Scored 0–100 (where 100 = most favorable nuclear security conditions)**
3.1	**International Legal Commitments**	**Scored 0–7 (where 7 = most favorable nuclear security conditions)**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3.1.2	2005 Amendment to the CPPNM	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3.1.4#	Convention on Nuclear Safety	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3.2	**Voluntary Commitments**	**Scored 0–6 (where 6 = most favorable nuclear security conditions)**
3.2.1	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.2	Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.3	World Institute for Nuclear Security (WINS) contributions	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.4	IAEA Nuclear Security Fund contributions	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.5	Bilateral/multilateral assistance	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.6	Centers of Excellence	Scored 0–1 (where 1 = most favorable nuclear security conditions)

# Denotes indicators and subindicators that are unique to the sabotage ranking.

† Denotes indicators and subindicators that are also in the theft ranking but that have been altered.

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

3.2.7*	Ministerial participation in the IAEA International Conference on Nuclear Security (ICONS)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.8*	Incident and Trafficking Database (ITDB)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.2.9*	Nuclear Security Guidance Committee (NSCG)	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.3	**International Assurances**	**Scored 0–9 (where 9 = most favorable nuclear security conditions)**
3.3.1*	Published regulations	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.3.2*	Published nuclear security annual reports	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.3.3*	Published nuclear security progress reports	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3.3.4*	Review of security arrangements	Scored 0–2 (where 2 = most favorable nuclear security conditions)
3.3.5*	International Physical Protection Advisory Service (IPPAS) mission	Scored 0–3 (where 3 = most favorable nuclear security conditions)
3.4*	Nuclear Security Information Circulars (INFCIRCs)	Scored 0–4 (where 4 = most favorable nuclear security conditions)
3.4.1*	INFCIRC 869	Scored 0–1 (where 1 = most favorable nuclear security conditions)
3.4.2*	Other nuclear security INFCIRCs	Scored 0–3 (where 3 = most favorable nuclear security conditions)
4	**DOMESTIC COMMITMENTS AND CAPACITY**	**Scored 0–100 (where 100 = most favorable nuclear security conditions)**
4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**	**Scored 0–5 (where 5 = most favorable nuclear security conditions)**
4.1.1	UNSCR 1540 reporting	Scored 0–1 (where 1 = most favorable nuclear security conditions)
4.1.2†	Extent of UNSCR 1540 implementation	Scored 0–4 (where 4 = most favorable nuclear security conditions)
4.2	**Domestic Nuclear Security Legislation**	**Scored 0–3 (where 3 = most favorable nuclear security conditions)**
4.2.1	CPPNM implementation authority	Scored 0–1 (where 1 = most favorable nuclear security conditions)
4.2.2*	National legal framework for CPPNM Amendment	Scored 0–2 (where 2 = most favorable nuclear security conditions)
4.3*	**Independent Regulatory Agency**	**Scored 0–1 (where 1 = most favorable nuclear security conditions)**
4.3.1*	Independent regulatory agency	Scored 0–1 (where 1 = most favorable nuclear security conditions)

# Denotes indicators and subindicators that are unique to the sabotage ranking.

† Denotes indicators and subindicators that are also in the theft ranking but that have been altered.

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

5	RISK ENVIRONMENT	Scored 0–100 (where 100 = most favorable nuclear security conditions)
5.1	**Political Stability**	**Scored 0–20 (where 20 = most favorable nuclear security conditions)**
5.1.1	Social unrest	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.1.2	Orderly transfers of power	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.1.3	International disputes/tensions	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.1.4	Armed conflict	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.1.5	Violent demonstrations or violent civil/labor unrest	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.2	**Effective Governance**	**Scored 0–8 (where 8 = most favorable nuclear security conditions)**
5.2.1	Effectiveness of the political system	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.2.2	Quality of the bureaucracy	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.3	**Pervasiveness of Corruption**	**Scored 0–4 (where 4 = most favorable nuclear security conditions)**
5.3.1	Pervasiveness of corruption	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.4*	**Illicit Activities by Non-State Actors**	**Scored 0–20 (where 20 = most favorable nuclear security conditions)**
5.4.1*	Likelihood of terrorist attacks	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.4.2*	Firearms seized during interdiction of illicit weapons trafficking	Scored 0–4 (where 4 = most favorable nuclear security conditions)
5.4.3*	Domestic terrorism threat	Scored 0–8 (where 8 = most favorable nuclear security conditions)
5.4.4*	Neighboring terror threat	Scored 0–4 (where 4 = most favorable nuclear security conditions)

[#] Denotes indicators and subindicators that are unique to the sabotage ranking.

[†] Denotes indicators and subindicators that are also in the theft ranking but that have been altered.

* Indicates new or revised indicator or subindicator. See section on "Changes to the 2020 Nuclear Security Index Framework" for more detail on new and revised indicators and subindicators.

Outcomes-Based Regulations

Security at nuclear facilities should not be static and must undergo continuous improvement. The most common approach to nuclear security historically has been for countries to put in place prescriptive regulations with which nuclear operators must comply. Regulations are not updated frequently, however, and often lag behind developments in security practice or the types of threats against which nuclear operators need to protect.

Some countries are moving away from prescriptive regulations for nuclear security toward more outcomes- or results-based approaches, which might require a more flexible approach to scoring in the Index. Rather than using national-level regulations that are then implemented by operators at facilities, an outcomes-based regulatory approach sets parameters against which facilities must be protected (e.g., cyber attacks or armed attacks), but it puts the onus on the licensees or operators to design specific procedures tailored to their facilities to meet these overall security objectives. An outcomes-based approach provides licensees with a greater level of responsibility for shaping and implementing nuclear security at their nuclear facilities. This shift is designed to promote a more cooperative working relationship between the licensee and the regulator.

Advocates of outcomes-based regulation make a number of arguments to support this approach. First, in the absence of regulator-prescribed standards, licensees have to take greater responsibility for the design and implementation of their security arrangements. Second, the approach allows the regulator to foster an environment of innovation and continuous improvement in which licensees are encouraged to adopt novel security solutions that work in harmony with their business processes. Third, it gives licensees the flexibility to quickly review and optimize their arrangements in response to dynamic threat environments, something that regulations are not able to do.

Throughout the course of the research process, the EIU encountered a number of countries that are shifting toward an outcomes-based approach, particularly in the area of personnel vetting. For example, some countries are employing “continuous” vetting of personnel. Rather than requiring alcohol or drug tests at fixed intervals, all personnel at facilities are trained to monitor the behavior of their colleagues on a continuous basis and report any anomalies they observe. Reporting of these anomalies leads to a more formalized vetting procedure to identify the cause of aberrant behavior and to determine if the behavior presents risks to the facility.

When countries indicated they had outcome-based regulations, scores were adjudicated by the EIU on a case-by-case basis. As an increasing number of countries have adopted outcomes-based regulations since the NTI Index was first launched in 2012, the EIU expects this area to have a growing impact on both the methodology and the ranking of the Index in the future.

Calculating the 2020 NTI Nuclear Security Index

Subindicators listed are classified into indicators, and their values are summed then set on a 0–100 scale to determine the value of the indicator:

indicator score = (Σ individual subindicators / Σ maximum subindicator scores) * 100

The category values are a weighted total of the indicators in the category:

category score = Σ weighted individual indicators

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

x = (x − Min(x)) / (Max(x) − Min(x)),

where Min(x) and Max(x) represent, respectively, the lowest and highest values in the NTI Index (i.e., out of the 22 countries with materials, out of the 154 countries without materials, or out of the 47 countries with nuclear facilities at risk of sabotage) 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 1 score for Canada:

	Name	Raw score (0–100)	Weight	Weighted score	Normalized score (0–100)
1	Quantities and Sites	–	–	72	72
1.1	Quantities of Nuclear Materials	50	38%	19	–
1.2	Sites and Transportation	75	38%	28.5	–
1.3	Material Production/Elimination Trends	100	25%	25	–

In this example, the normalized Category 1 score was calculated using a Max(x) value of 100 and Min(x) value of 0, as reflected in the data.

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

Overall score = Σ weighted category scores

The following is an example of calculating the overall score for Canada:

	Category name	Normalized score (0–100)	Weight	Weighted score
	Overall	–	–	87
1	Quantities and Sites	72.5	19%	13.7
2	Security and Control Measures	88	27%	23.8
3	Global Norms	92	19%	17.5
4	Domestic Commitments and Capacity	100	19%	19
5	Risk Environment	83	16%	13.3

The countries with materials, countries without materials, and countries with nuclear facilities at risk of sabotage can then be ranked according to these parameters.

Model Weights

The weights assigned to each category and indicator can be changed in the NTI Index data models to reflect different assumptions about their relative importance. Three sets of weights are provided in all of the data models. The weights defined by NTI and the EIU are the default setting. They are based on extensive discussions between NTI, the EIU, and the International Panel of Experts 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.

A fourth weighting option, called Principal Component Analysis (PCA), is included in the theft ranking for countries with materials and sabotage ranking data models. PCA is detailed further below.

The first option, which is used as the default weights, uses expert judgment to assign weights to indicators, bringing a real-world perspective to an index, which is important if an index is to guide policy actions. The second and third options—in which all categories or indicators, respectively, are weighted equally—have the advantage of simplicity and do not involve subjective judgment. One disadvantage of these options is that they assume that all categories or indicators, respectively, are equally significant.

Weight Profile Defined by NTI and the EIU for the Theft Ranking for Countries with Materials

CATEGORY	WEIGHT
Quantities and Sites	19%
Security and Control Measures	27%
Global Norms	19%
Domestic Commitments and Capacity	19%
Risk Environment	16%

	INDICATOR	WEIGHT
1	**Quantities and Sites**	
1.1	Quantities of Nuclear Materials	38%
1.2	Sites and Transportation	38%
1.3	Material Production/Elimination Trends	25%
2	**Security and Control Measures**	
2.1	On-Site Physical Protection	20%
2.2	Control and Accounting Procedures	12%
2.3	Insider Threat Prevention	18%
2.4	Physical Security During Transport	12%
2.5	Response Capabilities	12%

	INDICATOR	WEIGHT
2.6	Cybersecurity	16%
2.7	Security Culture	10%
3	**Global Norms**	
3.1	International Legal Commitments	33%
3.2	Voluntary Commitments	22%
3.3	International Assurances	27%
3.4	IAEA Nuclear Security Information Circulars	18%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution 1540 Implementation	25%
4.2	Domestic Nuclear Security Legislation	33%
4.3	Independent Regulatory Agency	41%
5	**Risk Environment**	
5.1	Political Stability	25%
5.2	Effective Governance	25%
5.3	Pervasiveness of Corruption	25%
5.4	Illicit Activities by Non-State Actors	25%

Weight Profile Defined by NTI and the EIU for the Theft Ranking for Countries without Materials

CATEGORY	WEIGHT
Global Norms	45%
Domestic Commitments and Capacity	30%
Risk Environment	25%

	INDICATOR	WEIGHT
3	**Global Norms**	
3.1	International Legal Commitments	40%
3.2	Voluntary Commitments	34%
3.3	IAEA Nuclear Security Information Circulars	26%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution 1540 Implementation	43%
4.2	Domestic Nuclear Security Legislation	57%
5	**Risk Environment**	
5.1	Political Stability	25%
5.2	Effective Governance	25%
5.3	Pervasiveness of Corruption	25%
5.4	Illicit Activities by Non-State Actors	25%

Weight Profile Defined by NTI and the EIU for the Sabotage Ranking

CATEGORY	WEIGHT
Number of Sites	5%
Security and Control Measures	30%
Global Norms	23%
Domestic Commitments and Capacity	23%
Risk Environment	19%

	INDICATOR	WEIGHT
1	**Number of Sites**	
1.1	Number of Sites	100%
2	**Security and Control Measures**	
2.1	On-Site Physical Protection	22%
2.2	Control and Accounting Procedures	14%
2.3	Insider Threat Prevention	20%
2.4	Response Capabilities	14%
2.5	Cybersecurity	18%
2.6	Security Culture	12%
3	**Global Norms**	
3.1	International Legal Commitments	33%
3.2	Voluntary Commitments	22%
3.3	International Assurances	27%
3.4	IAEA Nuclear Security Information Circulars	18%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution 1540 Implementation	25%
4.2	Domestic Nuclear Security Legislation	33%
4.3	Independent Regulatory Agency	42%
5	**Risk Environment**	
5.1	Political Stability	25%
5.2	Effective Governance	25%
5.3	Pervasiveness of Corruption	25%
5.4	Illicit Activities by Non-State Actors	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 security. PCA is a method for removing redundant information shared across indicators by specifying a weighting that explains the most variance in the data.

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

Variation within indicator weights is a sign of redundancy in the elements or that some elements are not as relevant in explaining the variation in the overall index once all of the 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.

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

Weight Profile Defined by PCA for the Theft Ranking for Countries with Materials

CATEGORY	WEIGHT
Quantities and Sites	3%
Security and Control Measures	40%
Global Norms	23%
Domestic Commitments and Capacity	15%
Risk Environment	19%

	INDICATOR	WEIGHT
1	**Quantities and Sites**	
1.1	Quantities of Nuclear Materials	0%
1.2	Sites and Transportation	14%
1.3	Material Production/Elimination Trends	86%
2	**Security and Control Measures**	
2.1	On-Site Physical Protection	21%
2.2	Control and Accounting Procedures	13%
2.3	Insider Threat Prevention	15%

	INDICATOR	WEIGHT
2.4	Physical Security During Transport	9%
2.5	Response Capabilities	17%
2.6	Cybersecurity	14%
2.7	Security Culture	11%
3	**Global Norms**	
3.1	International Legal Commitments	29%
3.2	Voluntary Commitments	28%
3.3	International Assurances	27%
3.4	IAEA Nuclear Security Information Circulars	16%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution 1540 Implementation	39%
4.2	Domestic Nuclear Security Legislation	32%
4.3	Independent Regulatory Agency	29%
5	Risk Environment	
5.1	Political Stability	38%
5.2	Effective Governance	28%
5.3	Pervasiveness of Corruption	23%
5.4	Illicit Activities by Non-State Actors	11%

Weight Profile Defined by PCA for the Sabotage Ranking

CATEGORY	WEIGHT
Number of Sites	0%
Security and Control Measures	37%
Global Norms	24%
Domestic Commitments and Capacity	17%
Risk Environment	23%

	INDICATOR	WEIGHT
1	**Number of Sites**	
1.1	Number of Sites	100%
2	**Security and Control Measures**	
2.1	On-Site Physical Protection	22%
2.2	Control and Accounting Procedures	16%
2.3	Insider Threat Prevention	17%
2.4	Response Capabilities	17%
2.5	Cybersecurity	13%
2.6	Security Culture	14%
3	**Global Norms**	
3.1	International Legal Commitments	27%
3.2	Voluntary Commitments	30%
3.3	International Assurances	29%
3.4	IAEA Nuclear Security Information Circulars	14%
4	**Domestic Commitments and Capacity**	
4.1	United Nations Security Council Resolution 1540 Implementation	50%
4.2	Domestic Nuclear Security Legislation	32%
4.3	Independent Regulatory Agency	19%
5	**Risk Environment**	
5.1	Political Stability	36%
5.2	Effective Governance	28%
5.3	Pervasiveness of Corruption	22%
5.4	Illicit Activities by Non-State Actors	14%

Model Correlations

Correlating the 2020 theft ranking 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 "Correlation Scatter Plot" worksheet in all three rankings, show the correlations between the 2020 results and a number of variables. Correlation analysis for three of these variables can be found below:

1. **Global Peace Index.** The 2019 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, with countries that are most at peace receiving a score of 1 and countries with lower levels of peace receiving a higher value. In the 2020 theft ranking for countries with materials, the GPI scale is inverted so that countries that are most at peace receive a score of 5 and those that are less peaceful receive lower scores. The results indicate a high positive correlation (0.85) between a country's GPI score and its score in the 2020 theft ranking for countries with materials. The correlation is positive because, as the GPI score decreases (meaning a country is less at peace), the score in the 2020 theft ranking for countries with materials decreases (meaning nuclear materials security conditions are less favorable).

2. **Regulatory quality.** The regulatory quality indicator, a qualitative assessment to capture perceptions of the ability of the government to formulate and implement sound policies and regulations, is taken from the World Bank's Worldwide Governance Indicators. 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 0.90 between the regulatory quality variable and the 2020 theft ranking for countries with materials. The correlation shows that countries with higher regulatory quality tend to have better nuclear materials security conditions.

3. **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 head and the 2020 theft ranking for countries with materials score is 0.85. The correlation shows that, as GDP per head increases, a country's overall NTI Index score is likely to increase as well.

Changes to the 2020 Nuclear Security Index Framework

NTI and the EIU made a number of changes to the NTI Index framework between 2018 and 2020 to raise the bar for nuclear security while still maintaining the integrity of the 2018 framework for comparability. These changes are summarized in the following table:

Ranking	2018		2020		Indicators		Subindicators	
	Indicators	Subindicators	Indicators	Subindicators	+	–	+	–
Theft with material	20	61	21	73	+2	–1	+18	–5
Theft without materials	9	27	9	29	+1	–1	+8	–6
Sabotage	16	52	18	66	+2	–0	+17	–3

In light of these changes, the weights used in all three rankings (the theft ranking for countries with materials, the theft ranking for countries without materials, and the sabotage ranking) in the 2018 Index were refined for the 2020 Index with input from the International Panel of Experts.

The following sections provide greater detail on these changes, as well as on how countries were compared and the methodology used to facilitate the comparison between the 2018 and the 2020 theft rankings.

New Indicators

In the 2020 edition of the Nuclear Security Index, NTI and EIU added two new indicators. Indicator 2.7 Security Culture was added to the Security and Control Measures category in both the theft ranking for countries with materials and the sabotage ranking. Indicator 3.4 Nuclear Security INFCIRCs was added to the Global Norms category in all three rankings.

2.7 Security Culture

The Security Culture indicator comprises three subindicators, two of which are new and one of which was modified.

2.7.1 (Theft)/2.6.1 (Sabotage) Security culture

Effective security culture ensures organizations remain committed to following through on security requirements and responsibilities at all levels of the organizational structure. This new subindicator assesses whether a country's nuclear security regulator references "security culture" in its annual report(s) or regulations. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.7.2 (Theft)/2.6.2 (Sabotage) Security culture assessments

This new subindicator assesses whether domestic regulations or licensing conditions require that licensees or operators conduct security culture assessments. A security culture assessment is a self-assessment tool that senior management of a nuclear facility use to regularly assess the attitudes and behaviors of the facility's personnel toward security, and to compare those attitudes and behaviors with best practices. An organization with a strong security culture has staff who are committed to security, strive for excellence, and look for ways to make their security systems stronger. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.7.3 (Theft)/2.6.3 (Sabotage) Security responsibilities and accountabilities

In 2018, this subindicator assessed whether domestic regulations or licensing conditions require that licensees or operators define an individual or individuals responsible for at least one aspect of nuclear security. In 2020, this subindicator similarly assesses whether domestic regulations or licensing conditions require that licensees or operators define an individual or individuals responsible for at least one aspect of nuclear security, as well as whether such individuals are required to undergo additional training, certification, or both for their role. Requiring licensees to hold particular individuals accountable for security increases the likelihood that physical protection measures will be implemented, and additional training ensures those individuals are adequately prepared to assume responsibility. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

3.4 Nuclear Security Information Circulars

The Nuclear Security INFCIRCs indicator comprises two subindicators, both of which are new. This indicator is included in all three rankings.

3.4.1 INFCIRC/869

This new subindicator assesses whether the country has subscribed to IAEA INFCIRC/869. Subscribing states commit to abide by the Nuclear Security Fundamentals set forth in IAEA Nuclear Security Series 20, strengthen their national nuclear security regimes by implementing IAEA nuclear security recommendations, pursue continuous improvement, and ensure that management and personnel are demonstrably competent.

3.4.2 Other nuclear security INFCIRCs

This new subindicator assesses whether the country has subscribed to three or more of IAEA INFCIRCs 899,[10] 901,[11] 904,[12] 905,[13] 908,[14] 909,[15] 912,[16] 917,[17] and 918.[18] Subscribing states commit to strengthening their national nuclear security regimes and supporting global norms.

Modified and Deleted Indicators

1.2 Sites and Transportation

The Sites and Transportation indicator comprises three subindicators, one of which has been modified:

1.2.2 Bulk processing facilities

In 2018, this subindicator assessed whether or not the state has at least one bulk processing facility handling HEU, separated plutonium, or unirradiated MOX. In 2020, it has been modified to assess how many bulk processing facilities handling HEU, separated plutonium, or unirradiated MOX exist in the country. Countries were assigned scores using a banded scoring scheme. This subindicator is included only in the theft ranking for countries with materials.

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[10] INFCIRC 899 commits states to commit to designate an appropriately authorized and informed senior official to participate in a Nuclear Security Contact Group.

[11] INFCIRC 901 commits states to undertake to further support the World Institute for Nuclear Security (WINS) Academy in its efforts to expand its international certification program and cooperation with the IAEA.

[12] INFCIRC 904 commits states to ensure adequate domestic nuclear terrorism preparedness and response capabilities domestically, as well as support nuclear terrorism preparedness and cooperation efforts internationally.

[13] INFCIRC 905 commits states to improve national illicit trafficking and sabotage detection architectures.

[14] INFCIRC 908 commits states to support IAEA insider threat awareness and training efforts, as well as to implement measures to address the threat of insider risks domestically.

[15] INFCIRC 909 commits states to improve security in the transport of nuclear materials, support GICNT advocacy and training efforts, and cooperate with the IAEA on initiatives to combat international threats to nuclear material.

[16] INFCIRC 912 commits states to minimize or eliminate the use of HEU in civilian applications.

[17] INFCIRC 917 commits states to advance the use of nuclear forensics as an element of nuclear security by supporting international training efforts and adapting domestic national response frameworks.

[18] INFCIRC 918 commits states to build and sustain national entities to counter nuclear terrorism and the smuggling of nuclear materials.

2.1 On-Site Physical Protection

The On-Site Physical Protection indicator comprises four subindicators, one of which has been modified.

2.1.4 Tests and assessments

In 2018, this subindicator assessed whether the regulator required a performance-based program. Performance-based programs included tests and assessments of security systems and measures, and a demonstration of performance by security personnel at nuclear sites. In 2020, this subindicator has been modified to assess whether domestic regulations or licensing conditions require evaluations of security systems' effectiveness (including security personnel) that include realistic threat considerations and regular force-on-force exercises using realistic scenarios. One point was awarded for each of these requirements. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.2 Control and Accounting Procedures

The Control and Accounting Procedures indicator comprises five subindicators, three of which have been modified.

2.2.1 Legal and regulatory basis for material control and accounting

In 2018, this subindicator assessed whether a country has a domestic legal and regulatory basis for nuclear material control and accounting (MC&A). One point was awarded if such a legal or regulatory basis existed, and two points were awarded if the legal or regulatory basis reflected international MC&A guidelines set forth by the IAEA in INFCIRC 153. In 2020, to hold countries to a higher standard, an additional third point was awarded if domestic laws or regulatory guidelines included compliance enforcement mechanisms in the event of non-compliance with MC&A regulations. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.2.2 Measurement methods

In 2018, this subindicator assessed whether domestic regulations or licensing conditions require measurement methods that provide for accurate and precise quantification of nuclear materials, and the scoring scheme was binary. In 2020, to hold countries to a higher standard, the question was revised to award a second point to countries with regulations that include a requirement for certification and calibration of measurement equipment using traceable and controlled standards. This subindicator is included only in the theft ranking for countries with materials.

2.2.4 Material balance area(s)

In 2018, this subindicator assessed whether domestic regulations or licensing conditions require that nuclear materials be in well-defined and controlled geographical locations within the state, and the scoring scheme was binary. In 2020, a second point was awarded to countries with regulations that include a requirement that each material balance area be overseen by a single custodian with a designated alternate custodian. This additional requirement ensures that authority over the material balance area is explicitly delegated, providing for clear oversight responsibilities. This subindicator is included only in the theft ranking for countries with materials.

2.3 Insider Threat Prevention

The Insider Threat Prevention indicator comprises five subindicators, one of which is new to the 2020 Index.

2.3.5 Insider threat awareness program

This subindicator assesses whether domestic regulations or licensing conditions require a nuclear-specific insider threat awareness program for all personnel involved in the operation and management of nuclear facilities. These programs are defined as personnel training that helps employees identify warning signs that may indicate a colleague is considering unauthorized removal of nuclear materials or sabotage of a nuclear facility. Programs can take the form of specific training classes or site-wide awareness-building initiatives. Insider threat awareness programs prepare nuclear workforces to preemptively identify internal threats to nuclear materials. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.5 (Theft)/2.4 (Sabotage) Response Capabilities

The Response Capabilities indicator comprises five subindicators, one of which has been modified and one of which is new to the 2020 Index.

2.5.4 (Theft)/2.4.4 (Sabotage) Nuclear infrastructure protection plan

In 2018, this subindicator assessed whether the country's regulatory framework requires plans to physically protect nuclear infrastructure in the event of a natural disaster. In 2020, the scoring options were revised to broaden the scope to include both man-made and natural disasters. The scoring scheme was reduced from a three-tiered scheme to a binary one. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.5.5 (Theft)/2.4.5 (Sabotage) Response coordination capabilities

This new subindicator assesses whether domestic regulations or licensing conditions require that on-site and off-site emergency response teams conduct joint exercises in the event of a security emergency. Joint on- and off-site exercises ensure local response forces are properly integrated into facility security. To qualify as requiring a joint security exercise, regulations must explicitly state that these exercises are security-focused, and mandate the participation of one or more on- and off-site organizations. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.6 (Theft)/2.5 (Sabotage) Cybersecurity

The Cybersecurity indicator comprises six subindicators, two of which have been modified and one of which is new to the 2020 Index.

2.6.2 (Theft)/2.5.2 (Sabotage) Sensitive digital asset management

In 2018, this indicator assessed whether domestic regulations or licensing conditions require nuclear facilities to protect critical digital assets from cyber attack, and the scoring scheme was binary. In 2020, this question was revised to assess whether domestic regulations or licensing conditions require nuclear facilities to protect from cyber attack sensitive digital assets that impact safety, security, emergency preparedness functions, and their support systems. Sensitive digital assets encompass a wider range of digital devices that are integrated into nuclear facilities, thereby broadening the scope of cybersecurity requirements in this subindicator. A second point was also added for countries that require the routine or periodic cataloging of sensitive digital assets so they are accounted for and protected. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.6.4 (Theft)/2.5.4 (Sabotage) Cybersecurity assessments

In 2018, this subindicator assessed whether domestic laws or regulations require a performance-based program, which includes tests and assessments of cybersecurity at nuclear facilities, using a binary scoring scheme. In 2020, this question was revised to assess whether domestic regulations or licensing conditions require tests and assessments of cybersecurity at nuclear facilities. A second point was also added for

countries that require tests and assessments to be conducted at least annually. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

2.6.6 (Theft)/2.5.6 (Sabotage) Mandatory cybersecurity awareness program

This new subindicator assesses whether domestic regulations or licensing conditions require that licensees or operators have a cybersecurity awareness program that reaches all personnel with access to digital systems. Requiring a cybersecurity awareness program increases the likelihood that all employees with access to computer networks understand basic cybersecurity protocols and practices. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

3.1 International Legal Commitments

The International Legal Commitments indicator comprises four subindicators in the theft ranking for countries with materials and theft ranking for countries without materials, one of which was modified. This indicator comprises four subindicators in the sabotage ranking, which were not modified.

3.1.4 International Atomic Energy Agency safeguards agreement

In 2018, IAEA safeguards were captured by four subindicators in indicator 4.3. In 2020, two of the subindicators (4.3.3 Facility exclusion from safeguards and 4.3.4 Safeguards violations) were deleted and the other two (4.3.1 IAEA safeguards agreement, excluding additional protocol, and 4.3.2 IAEA additional protocol) were combined and modified. In addition, the combined subindicator was moved from the Domestic Commitments and Capacity category to 3.1 International Legal Commitments in the Global Norms category. The revised subindicator assesses whether the state has concluded an IAEA safeguards agreement using a three-tiered scoring scheme: No, or a Small Quantities Protocol or otherwise incomplete coverage of peaceful nuclear facilities; Yes, a Modified Small Quantities Protocol, an INFCIRC 153, or complete coverage of peaceful nuclear facilities under an equivalent arrangement; and Yes, the Additional Protocol. This question is included only in the theft ranking for countries with materials and the theft ranking for countries without materials.

3.2 Voluntary Commitments

The Voluntary Commitments indicator comprises nine subindicators, three of which have been added to the 2020 Index. Two subindicators—IAEA membership and Proliferation Security Initiative (PSI) membership—that were included in 2018 were deleted in 2020.

3.2.7 Ministerial participation in the IAEA International Conference on Nuclear Security

This new subindicator assesses whether the country participated in the latest International Conference on Nuclear Security (ICONS) at the ministerial level, as defined by ICONS. Ministerial-level participation signals commitment to global norms and support for ICONS as a forum to sustain political attention on nuclear security. This subindicator is included in all three rankings.

3.2.8 Incident and Trafficking Database

This new subindicator assesses whether the country participates in the IAEA Incident and Trafficking Database (ITDB). Participation in the ITDB demonstrates political support for the IAEA's efforts to track incidents of theft, loss, or misuse of nuclear and radiological materials. This subindicator is included in all three rankings.

3.2.9 Nuclear Security Guidance Committee

This new subindicator assesses whether the country participates in the IAEA Nuclear Security Guidance Committee. The Nuclear Security Guidance Committee, established by the Director General of the IAEA in 2012, makes recommendations to the IAEA on what nuclear security guidance to develop and approves guidance publications. Participation in the Nuclear Security Guidance Committee demonstrates support for the IAEA's role developing guidance for countries to update their nuclear security laws and regulations and

plays a critical role in raising global standards for nuclear security. This subindicator is included in all three rankings.

3.3 International Assurances

The International Assurances indicator comprises seven subindicators, three of which have been modified and four of which have been added to the 2020 Index.

3.3.1 Published regulations and 3.3.2 Published nuclear security reports

In 2018, Indicator 3.3 included a subindicator that assessed whether the state publicly releases broad outlines of its nuclear security regulations, annual reports, or both on nuclear security issues. A three-tiered scoring scheme was used to assess countries: the state does not publish regulations or annual reports, the state publishes regulations or an annual report, and the state publishes both regulations and an annual report. In 2020, this subindicator has been divided into two subindicators: 3.3.1 Published regulations and 3.3.2 Published nuclear security reports.

Subindicator 3.3.1 now assesses, using binary scoring, whether the state publicly releases its nuclear security regulations. Indicator 3.3.2 now assesses, also using binary scoring, whether the state publishes annual reports on nuclear security issues. These subindicators are included in both the theft ranking for countries with materials and the sabotage ranking.

3.3.3 Published nuclear security progress reports

This new subindicator assesses whether the state has made public declarations on nuclear security progress. Public declarations about nuclear security progress promote improvement, build international confidence, and increase public accountability. To be considered a public declaration on nuclear security progress, the declaration, statement, or report must include a substantial description of nuclear security practices. A declaration, statement, or report meets the criteria if it (a) is delivered in conjunction with an international, multilateral, or regional conference on nuclear security (e.g., one of the four Nuclear Security Summits, the IAEA ICONS, the IAEA General Conference, GICNT meetings, Global Partnership meetings, or a nuclear security treaty conference such as the CPPNM Amendment) and (b) provides information about actions the country has taken to strengthen its own nuclear security (e.g., passing new legislation or regulations; reducing, eliminating, or consolidating nuclear materials; converting reactors that use HEU to low-enriched uranium [LEU]; hosting a peer review; or other specific actions) or to strengthen the global nuclear security architecture (e.g., providing funds to the IAEA's Nuclear Security Fund, supporting the IAEA's nuclear security work, providing assistance to another country, or other specific actions). Reporting on treaty ratification does not meet the criteria for a progress report unless other actions are also reported. The specific action must have been taken within two years of the date of the report. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

3.3.4 Public declarations/reports about civilian nuclear materials and 3.3.5 Public declarations/reports about military nuclear materials

In 2018, the NTI Index assessed whether the state made any public declarations or reports about quantities of nuclear materials (civilian or military). This subindicator was binary and did not distinguish between reports on civilian nuclear materials and reports on military nuclear materials. In 2020, this subindicator has been divided into two subindicators: 3.3.4 Published declarations/reports about civilian nuclear materials and 3.3.5 Published declarations/reports about military nuclear materials.

Subindicator 3.3.4 now assesses whether the state makes any public declarations or reports about quantities of nuclear materials used for civilian purposes. Three scoring options are available: No; Yes; and Yes, and the most recent report has been released since January 1, 2019. Subindicator 3.3.5 now assesses whether the state makes any public declarations or reports about quantities of nuclear materials used for

military purposes. Three scoring options are available: No; Yes; and Yes, and the most recent report has been released since January 1, 2015, or the country does not have any military nuclear materials. These subindicators are included only in the theft ranking for countries with materials.

3.3.6 (Theft)/3.3.4 (Sabotage) Review of security arrangements and 3.3.7 (Theft)/3.3.5 (Sabotage) International Physical Protection Advisory Service mission

In 2018, the NTI Index included a subindicator that assessed whether the state hosted a review of its security arrangements. This subindicator had three available scoring options: No; Yes; and Yes, within the past five years. To qualify as a review of nuclear security arrangements, a country had to host an IAEA IPPAS mission, International Nuclear Security Advisory Service (INSServ) mission, State System for Accountancy and Control (SSAC) Advisory Service mission, or Integrated Regulatory Review Service (IRRS) mission with a security component, or a non-IAEA official bilateral/multilateral security review. In 2020, this subindicator has been divided into two: 3.3.6 Review of security arrangements and 3.3.7 IPPAS mission.

Subindicator 3.3.6 now assesses whether the state has hosted an IAEA review (excluding IPPAS missions) or a bilateral/multilateral review of its security arrangements. The three scoring options remain unchanged, but the qualifying reviews are now limited to IAEA INSServ or SSAC Advisory Service missions, or an official bilateral/multilateral security review. Subindicator 3.3.7 assesses whether the state has hosted an IAEA IPPAS mission and includes four scoring options: No; Yes; Yes, within the past five years; and Yes, within the past five years and the state has publicly released at least a summary of the results. These two subindicators are included in both the theft ranking for countries with materials and the sabotage ranking.

4.2 Domestic Nuclear Security Legislation

The Domestic Nuclear Security Legislation indicator comprises two subindicators, one of which has been modified. In addition, 4.2.3 Convention on Nuclear Safety report was deleted.

4.2.2 National legal framework for Convention on the Physical Protection of Nuclear Material

In 2018, the NTI Index included a subindicator that assessed whether the state had fulfilled all obligations for a national legal framework for the Convention on the Physical Protection of Nuclear Material (CPPNM). The subindicator was scored on a binary scheme. To promote universalization of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (2005 Amendment), this subindicator has been revised to assess whether the state has fulfilled all obligations for a national legal framework for the 2005 Amendment, not the original CPPNM.

Article 14.1 of the 2005 Amendment requires countries to submit information on the laws and regulations giving effect to the CPPNM Amendment to the IAEA. To reflect the importance of full compliance with this obligation, this subindicator awards an extra point to countries that have made an article 14.1 submission to the IAEA. This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking. It was removed from the theft ranking for countries without materials to reflect the fact that the NTI Index does not review the laws and regulations of countries without materials.

4.3 Independent Regulatory Agency

The Independent Regulatory Agency indicator comprises one subindicator, which has been modified.

4.3.1 Independent regulatory agency

In 2018, this subindicator assessed whether the state had an independent regulatory agency responsible for regulating security. To qualify as independent, an agency had to meet the requirement included in the IAEA definition of having "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." In 2020, the question and scoring remained unchanged, but the guidelines for assessing independence were modified to reduce subjectivity in scoring. Independence is now defined and assessed as follows: "The agency is

authorized and able to make regulatory decisions within the field of nuclear security in both routine work situations and crisis situations, effectively free from control or pressure from other state political bodies." This subindicator is included in both the theft ranking for countries with materials and the sabotage ranking.

5.4 Illicit Activities by Non-State Actors

The Illicit Activities by Non-State Actors indicator comprises four subindicators in both the theft ranking for countries with materials and the sabotage ranking, all of which have been added to the 2020 Index. The theft ranking for countries without materials includes two of the new subindicators, as well as an additional third subindicator unique to that ranking. The indicator name has also been changed from Group(s) Interested in Illicitly Acquiring Nuclear Materials/Committing Acts of Nuclear Terrorism.

5.4.1 Likelihood of terrorist attacks

This new subindicator, drawing from the EIU's Risk Briefing, assesses the likelihood that domestic or foreign terrorists will attack with a frequency or severity that causes substantial disruption to business operations. It is scored on a five-tiered scale, ranging from a very high likelihood to a very low likelihood. The overall threat of terrorism provides context for the security threat posed by non-state groups. This subindicator is included in all three rankings.

5.4.2 Firearms seized during interdiction of illicit weapons trafficking

This new subindicator assesses how many firearms have been seized by law enforcement in a country over the past five years. The data collected by the UN Office on Drugs and Crime are banded into quintiles and scored on a five-tiered scale. The availability of illicit arms affects the ability of non-state groups to commit armed attacks and provides a proxy measurement for the availability of illicit smuggling networks. This subindicator is included in all three rankings.

5.4.3 Pervasiveness of organized crime (Theft ranking for countries without materials)

This new subindicator, which is included only in the theft ranking for countries without materials, assesses how high the risk of organized criminal activity to the government or businesses is in a country. These data are drawn from the EIU's Risk Briefing using a five-tiered scale, ranging from very high risk to very low risk. Pervasive organized criminal activity in a country can increase opportunities for trafficking or smuggling illicit materials, including nuclear and radiological materials.

5.4.3 Domestic terrorism threat (Theft ranking for countries with materials/Sabotage ranking)

This new subindicator assesses whether a terrorist group with the capability to seize nuclear materials or sabotage nuclear facilities is presently operating in a given country. The domestic presence of terrorist groups with the capability to seize nuclear materials or sabotage a nuclear facility greatly increases the risk of nuclear terrorism. Capability is defined as those groups who have previously conducted an attack with three or more attackers using firearms or explosives. Terrorist groups are identified through either START's Global Terrorism Database or Stanford University's Mapping Militants Project. This indicator is scored as a binary yes or no response. This subindicator is included in the ranking for countries with materials and the sabotage ranking.

5.4.4 Neighboring terror threat (Theft ranking for countries with materials/Sabotage ranking)

This new subindicator assesses the extent to which terrorist groups with the capability to seize nuclear materials or sabotage nuclear facilities are presently operating in neighboring or nearby countries. The presence of non-state groups in neighboring countries with the capability to seize nuclear materials or sabotage a nuclear facility undermines the security of domestic nuclear facilities and materials. Capability is defined as those groups that have previously conducted an attack with three or more attackers using firearms or explosives. Terrorist groups are identified through either START's Global Terrorism Database or Stanford University's Mapping Militants Project, while regional groupings rely upon UN regional groups.

This indicator is scored as an average of all neighboring country binary responses, weighted at 75%, and an average of all regional country binary responses, weighted at 25%. Countries with shared land borders are weighted at a higher level because their proximity increases the threat of spillover effects. Countries that do not share borders but are in the same UN-defined regional grouping are included in this calculation, however, because terrorist groups can operate across borders. The nearby presence of terrorist groups is relevant to countries with or without nuclear materials and countries with nuclear facilities that may be subject to an act of sabotage. This subindicator is included in the ranking for countries with materials and the sabotage ranking.

Comparability between 2018 and 2020

To ensure an accurate year-on-year comparison, the EIU required identical data sets for each model for all years of the Index.[19] Modifying the Index framework prevents a direct comparison between the 2020 and previous indices. To allow for comparisons, the EIU undertook research to rescore the previous indices using the revised 2020 NTI Index framework. To do so, the EIU considered the information that would have been available during the period when the initial research was conducted (e.g., September 2017 to June 2018 for the 2018 index). In some cases, the scores that would have been assigned for previous indices were obvious on the basis of the date of the relevant regulatory document. For example, if the regulation describing cyber incident response plans was published in 2007, then the EIU would assign scores based on that document for each index published after 2007 (all indices). When the EIU could not confirm whether a requirement had been in place during the previous research period, it either queried the governments during data confirmation or, when that was not possible, made reasonable assumptions based on whether regulatory changes relevant to nuclear cybersecurity had been instituted in recent years.

In addition to rescoring data for the new indicators, in a limited number of cases, the EIU adjusted previous scores on the basis of new evidence. In all cases, if a previous score was deemed to be inaccurate, the EIU corrected the score to reflect the most up-to-date information available. Those adjustments help to ensure that no artificial improvements or declines in scores are captured in the 2020 NTI Index.

In a few instances, the response to the 2020 data review and confirmation request contradicted responses from previous years. 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, reasonable assumptions were made on the basis of available sources.

Once the EIU had comparable data sets across the five NTI Index iterations, 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 indices were calculated using the same framework, methodology, and weights as described in *Calculating the 2020 NTI Nuclear Security Index*. Owing to the methodological change and updated scores described above, the normalized scores and ranks in the originally published 2012, 2014, 2016, and 2018 NTI Index models and reports are not comparable to the normalized scores and ranks in the newly rescored data for those years or to the scores and ranks in the 2020 model and report. To understand changes in scores between previous indices and 2020 resulting from actions taken by countries, users should use the 2020 models and their comparison tools, rather than previous models.

COMPARISON BETWEEN THE THEFT RANKING FOR COUNTRIES WITH MATERIALS AND THE SABOTAGE RANKING

[19] The Nuclear Security Index was previously published in 2012, 2014, 2016, and 2018.

Given the widespread danger of the threat of sabotage and the serious consequences that could result from a large radiological release, NTI and the EIU developed the sabotage assessment in the 2016 NTI Index. Countries are selected for inclusion in the sabotage ranking if they have the following: operating nuclear power reactors or nuclear power reactors that have been shut down within the last five years; research reactors with a capacity of 2 megawatts or greater; reprocessing facilities; and spent fuel pools, only if the fuel has been discharged in the last five years and is not associated with an operating reactor. In 2020, NTI and the EIU identified 47 countries with such facilities. Twenty of these countries are in the theft ranking for countries with materials and 27 of the countries are in the theft ranking for countries without materials.

Although many of the indicators in the theft ranking framework and the sabotage ranking framework are the same, the sabotage ranking framework is designed specifically to address protection of nuclear facilities against sabotage. Several of the subindicators in the sabotage ranking are slightly different from their equivalent in the theft ranking to reflect differences in how nuclear facilities are protected against theft versus against sabotage. In such cases, this difference will mean that a country's score for the same subindicator in the theft ranking and the sabotage ranking may differ. Additionally, eight sabotage-specific subindicators are included in the sabotage ranking framework, and 15 subindicators that are included in the theft ranking for countries with materials are not included in the sabotage ranking framework.[20]

The chart below shows the differences between the theft and sabotage rankings. Those indicators that are marked "n/a" have not been included in their respective ranking framework; categories, indicators, and subindicators with asterisks have been altered in the sabotage ranking framework.

THEFT RANKING FOR COUNTRIES WITH MATERIALS		SABOTAGE RANKING	
1	**QUANTITIES AND SITES**	**1**	**NUMBER OF SITES**
1.1	Quantities of Nuclear Materials	n/a	n/a
1.1.1	Quantities of nuclear materials	n/a	n/a
1.2	**Sites and Transportation**	**1.1***	**Number of Sites***
1.2.1	Number of sites	1.1.1*	Number of sites*
1.2.2	Bulk processing facilities	n/a	n/a
1.2.3	Frequency of materials transport	n/a	n/a
1.3	**Material Production/Elimination Trends**	n/a	n/a
1.3.1	Material production/elimination trends	n/a	n/a
2	**SECURITY AND CONTROL MEASURES**	**2**	**SECURITY AND CONTROL MEASURES**
2.1	**On-Site Physical Protection**	**2.1**	**On-Site Physical Protection**
2.1.1	Mandatory physical protection	2.1.1	Mandatory physical protection
2.1.2	On-site reviews of security	2.1.2	On-site reviews of security
2.1.3	Design Basis Threat (DBT)	2.1.3	Design Basis Threat (DBT)

* Denotes indicators and subindicators that are included in the theft ranking, but that have been altered in the sabotage ranking framework.

[20] It is important to note that indicator and subindicator numbers are different in the theft ranking model than they are in the sabotage ranking model. Despite different indicator and subindicator numbers, the questions asked and the scoring criteria often remain consistent between the theft ranking model and the sabotage ranking model. Any inconsistencies are explained in the indicator frameworks laid out in the Scoring section of this Methodology.

THEFT RANKING FOR COUNTRIES WITH MATERIALS		SABOTAGE RANKING	
2.1.4	Tests and assessments	2.1.4	Tests and assessments
2.2	**Control and Accounting Procedures**	**2.2**	**Control and Accounting Procedures**
2.2.1	Legal and regulatory basis for material control and accounting (MC&A)	2.2.1	Legal and regulatory basis for material control and accounting (MC&A)
2.2.2	Measurement methods	n/a	n/a
2.2.3	Inventory record	n/a	n/a
2.2.4	Material balance area(s)	n/a	n/a
n/a	n/a	2.2.2	Radiological consequences (materials)
n/a	n/a	2.2.3	Radiological consequences (equipment, systems, and devices)
2.2.5	Control measures	2.2.4	Control measures*
n/a	n/a	2.2.5	Access control
2.3	**Insider Threat Prevention**	**2.3**	**Insider Threat Prevention**
2.3.1	Personnel vetting	2.3.1	Personnel vetting
2.3.2	Frequency of personnel vetting	2.3.2	Frequency of personnel vetting
2.3.3	Reporting	2.3.3	Reporting
2.3.4	Surveillance	2.3.4*	Surveillance*
2.3.5	Insider threat awareness program	2.3.5	Insider threat awareness program
2.4	**Physical Security During Transport**	**n/a**	**n/a**
2.4.1	Physical security during transport	n/a	n/a
2.5	**Response Capabilities**	**2.4**	**Response Capabilities**
2.5.1	Emergency response capabilities	2.4.1	Emergency response capabilities
2.5.2	Armed response capabilities	2.4.2*	Armed response capabilities*
2.5.3	Law enforcement response training	2.4.3*	Law enforcement response training*
2.5.4	Nuclear infrastructure protection plan	2.4.4	Nuclear infrastructure protection plan
2.5.5	Response coordination capabilities	2.4.5	Response coordination capabilities
2.6	**Cybersecurity**	**2.5**	**Cybersecurity**
2.6.1	Mandatory cybersecurity	2.5.1	Mandatory cybersecurity
2.6.2	Sensitive digital asset management	2.5.2	Sensitive digital asset management
2.6.3	Cybersecurity DBT	2.5.3	Cybersecurity DBT
2.6.4	Cybersecurity assessments	2.5.4	Cybersecurity assessments
2.6.5	Cyber incident response plan	2.5.5	Cyber incident response plan
2.6.6	Mandatory cybersecurity awareness program	2.5.6	Mandatory cybersecurity awareness program

* Denotes indicators and subindicators that are included in the theft ranking, but that have been altered in the sabotage ranking framework.

THEFT RANKING FOR COUNTRIES WITH MATERIALS		SABOTAGE RANKING	
2.7	**Security Culture**	**2.6**	**Security Culture**
2.7.1	Security culture	2.6.1	Security culture
2.7.2	Security culture assessments	2.6.2	Security culture assessments
2.7.3	Security responsibilities and accountabilities	2.6.3	Security responsibilities and accountabilities
3	**GLOBAL NORMS**	**3**	**GLOBAL NORMS**
3.1	**International Legal Commitments**	**3.1**	**International Legal Commitments**
3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)	3.1.1	Convention on the Physical Protection of Nuclear Material (CPPNM)
3.1.2	2005 Amendment to the CPPNM	3.1.2	2005 Amendment to the CPPNM
3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)	3.1.3	International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)
3.1.4	International Atomic Energy Agency (IAEA) safeguards agreement	n/a	n/a
n/a	n/a	3.1.4	Convention on Nuclear Safety
3.2	**Voluntary Commitments**	**3.2**	**Voluntary Commitments**
3.2.1	Global Initiative to Combat Nuclear Terrorism (GICNT) membership	3.2.1	Global Initiative to Combat Nuclear Terrorism (GICNT) membership
3.2.2	Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership	3.2.2	Global Partnership Against the Spread of Weapons and Materials of Mass Destruction membership
3.2.3	World Institute for Nuclear Security (WINS) contributions	3.2.3	World Institute for Nuclear Security (WINS) contributions
3.2.4	IAEA Nuclear Security Fund contributions	3.2.4	IAEA Nuclear Security Fund contributions
3.2.5	Bilateral/multilateral assistance	3.2.5	Bilateral/multilateral assistance
3.2.6	Centers of Excellence	3.2.6	Centers of Excellence
3.2.7	Ministerial participation in the International Conference on Nuclear Security (ICONS)	3.2.7	Ministerial participation in the International Conference on Nuclear Security (ICONS)
3.2.8	Incident and Trafficking Database	3.2.8	Incident and Trafficking Database
3.2.9	Nuclear Security Guidance Committee	3.2.9	Nuclear Security Guidance Committee
3.3	**International Assurances**	**3.3**	**International Assurances**
3.3.1	Published regulations	3.3.1	Published regulations
3.3.2	Published nuclear security annual reports	3.3.2	Published nuclear security annual reports
3.3.3	Published nuclear security progress reports	3.3.3	Published nuclear security progress reports
3.3.4	Public declarations/reports about civilian nuclear materials	n/a	n/a

* Denotes indicators and subindicators that are included in the theft ranking, but that have been altered in the sabotage ranking framework.

THEFT RANKING FOR COUNTRIES WITH MATERIALS		SABOTAGE RANKING	
3.3.5	Public declarations/reports about military nuclear materials	n/a	n/a
3.3.6	Review of security arrangements	3.3.4	Review of security arrangements
3.3.7	International Physical Protection Advisory Service (IPPAS) mission	3.3.5	International Physical Protection Advisory Service (IPPAS) mission
3.4	**Nuclear Security Information Circulars (INFCIRCs)**	**3.4**	**Nuclear Security Information Circulars (INFCIRCs)**
3.4.1	INFCIRC 869	3.4.1	INFCIRC 869
3.4.2	Other nuclear security INFCIRCs	3.4.2	Other nuclear security INFCIRCs
4	**DOMESTIC COMMITMENTS AND CAPACITY**	**4**	**DOMESTIC COMMITMENTS AND CAPACITY**
4.1	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**	**4.1**	**United Nations Security Council Resolution (UNSCR) 1540 Implementation**
4.1.1	UNSCR 1540 reporting	4.1.1	UNSCR 1540 reporting
4.1.2	Extent of UNSCR 1540 implementation	4.1.2	Extent of UNSCR 1540 implementation
4.2	**Domestic Nuclear Security Legislation**	**4.2**	**Domestic Nuclear Security Legislation**
4.2.1	CPPNM implementation authority	4.2.1	CPPNM implementation authority
4.2.2	National legal framework for CPPNM Amendment	4.2.2	National legal framework for CPPNM Amendment
4.3	Independent Regulatory Agency	4.3	Independent Regulatory Agency
4.3.1	Independent regulatory agency	4.3.1	Independent regulatory agency
5	**RISK ENVIRONMENT**	**5**	**RISK ENVIRONMENT**
5.1	**Political Stability**	**5.1**	**Political Stability**
5.1.1	Social unrest	5.1.1	Social unrest
5.1.2	Orderly transfers of power	5.1.2	Orderly transfers of power
5.1.3	International disputes/tensions	5.1.3	International disputes/tensions
5.1.4	Armed conflict	5.1.4	Armed conflict
5.1.5	Violent demonstrations or violent civil/labor unrest	5.1.5	Violent demonstrations or violent civil/labor unrest
5.2	**Effective Governance**	**5.2**	**Effective Governance**
5.2.1	Effectiveness of the political system	5.2.1	Effectiveness of the political system
5.2.2	Quality of the bureaucracy	5.2.2	Quality of the bureaucracy
5.3	**Pervasiveness of Corruption**	**5.3**	**Pervasiveness of Corruption**
5.3.1	Pervasiveness of corruption	5.3.1	Pervasiveness of corruption
5.4	**Illicit Activities by Non-State Actors**	**5.4**	**Illicit Activities by Non-State Actors**

* Denotes indicators and subindicators that are included in the theft ranking, but that have been altered in the sabotage ranking framework.

THEFT RANKING FOR COUNTRIES WITH MATERIALS		SABOTAGE RANKING	
5.4.1	Likelihood of terrorist attacks	5.4.1	Likelihood of terrorist attacks
5.4.2	Firearms seized during interdiction of illicit weapons trafficking	5.4.2	Firearms seized during interdiction of illicit weapons trafficking
5.4.3	Domestic terrorism threat	5.4.3	Domestic terrorism threat
5.4.4	Neighboring terror threat	5.4.4	Neighboring terror threat

* Denotes indicators and subindicators that are included in the theft ranking, but that have been altered in the sabotage ranking framework.

RESEARCH BEHIND SELECTED INDICATORS

This section focuses on the research behind selected indicators, and 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 entitled *Scoring*.

Approach

The EIU used its network of more than 900 country experts and regional specialists, many with local language skills, to undertake the research. Given the reliance of this Index on publicly available sources, however, in certain areas this research faced constraints caused by the opaque nature of certain aspects of nuclear security. To address this lack of publicly available information and reduce the subjectivity of our researchers, the EIU implemented specific scoring schemes and instituted strict scoring guidelines. These steps to address the lack of information or reduce subjectivity are detailed below.

Challenging Indicators

1.1 Quantities of Nuclear Materials (Theft ranking for countries with materials)

This indicator seeks to capture each country's combined total quantity of highly enriched uranium (HEU), including spent fuel; separated plutonium; and plutonium content in 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 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 weapon components). The EIU primarily relied on three sources for data (in addition to consulting national sources, where available): the Institute for Science and International Security; the IAEA and its INFCIRC 549 declarations (civilian plutonium, civilian MOX, civilian HEU); and the International Panel on Fissile Materials (IPFM) and its *Global Fissile Material Report 2015* (military HEU and plutonium). In many cases, the 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 (e.g., a range of 5–10 kilograms would be reported by the EIU as 7.5 kilograms).

Owing to the uncertainties associated with quantities,[21] the EIU banded the data into eight groups. This banding allows for slight variances in accounting for quantities without affecting scoring outcomes.

1.2 Sites and Transportation (Theft ranking for countries with materials)

This indicator seeks to capture how many sites (both military and civilian) with 1 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. Unsurprisingly, many states do not publish the number or location of facilities with weapons-usable nuclear materials. There are sound national security reasons for not publicizing specific information on quantities and sites. Nevertheless, the lack of transparency in this area meant that 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 these estimates, the EIU again banded the number of sites.

2.2.2–2.2.3 Radiological consequences (Sabotage ranking)

These two subindicators assess whether states require the use of a graded approach to security for nuclear materials and equipment, systems, and devices, the sabotage of which could result in significant radiological consequences. The EIU encountered many challenges when scoring this indicator. These challenges primarily centered on the distinction between safety and security. The subindicators in the NTI Index are designed to address security measures at nuclear facilities. Radiological consequences, however, are relevant to both safety and security concerns. The intersection between safety and security made the research challenging, particularly with regard to the protection of nuclear materials. In many cases, the regulations referenced protection against theft on the basis of common categories of nuclear materials that are used by the IAEA (e.g., Category I, Category II). These categories are not applied by the IAEA in the context of sabotage, although some countries appear to do so. Ultimately, the EIU gave credit for these two subindicators only when the regulations specifically mentioned a graded approach to physical protection or increased levels of security for nuclear materials and/or equipment, systems, and devices taking into account the radiological consequences.

2.6/2.5 Cybersecurity (Theft ranking for countries with materials and sabotage ranking)

The Cybersecurity indicator includes six subindicators on mandatory cyber protection, protection of sensitive digital assets against cyber attacks, cybersecurity DBT, tests and assessments, cyber incident response plans, and mandatory cybersecurity awareness programs. Cybersecurity's relatively recent inclusion in national nuclear regulations means that there is very little publicly available information. Some countries address cybersecurity comprehensively in their national regulations, and others are working to update their legislation to include cybersecurity; yet many countries with weapons-usable nuclear materials or nuclear facilities at risk of sabotage do not have regulations that require cybersecurity at nuclear facilities. To receive credit for these subindicators, countries must specifically include nuclear facilities in their cybersecurity plans. Credit is not given for laws and policies related to cybersecurity of general critical infrastructure.

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[21] The uncertainties associated with quantities of nuclear materials also impact indicator 1.3 Material Production/Elimination Trends. Scores for 1.3 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, the following were evaluated:

- 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 unneeded research reactors decommissioned?
- Are military vessels that are fueled by HEU being converted to LEU?
- Is the country returning or giving nuclear materials to another country?
- Is a change the result of normal fluctuations due to the use of MOX fuel in power reactors?

In cases where changes in quantities of nuclear materials could potentially be explained by natural fluctuations in the fuel cycle, the EIU conducted an analysis of quantities in a country to determine if the fluctuations were cyclical or if long-term trends show a clear increase or decrease in quantities. The EIU considered HEU and separated plutonium cycles separately. In cases where fluctuations were cyclical, a country received a score of "no change."

3.3.3 Published nuclear security progress reports (Theft ranking for countries with materials and sabotage ranking)

This subindicator seeks to assess whether countries have made public declarations about nuclear security progress. To apply consistent scoring criteria to this indicator, the EIU and NTI worked together to develop a strict scoring rubric. To be considered a public declaration on nuclear security progress, the declaration, statement, or report must include a substantial description of nuclear security practices. A declaration, statement, or report meets the criteria if it (a) is delivered in conjunction with an international, multilateral, or regional conference on nuclear security (e.g., one of the four Nuclear Security Summits, ICONS, the IAEA General Conference, GICNT meetings, Global Partnership meetings, or a nuclear security treaty conference such as the CPPNM Amendment or ICSANT) and (b) provides information about actions the country has taken to strengthen its own nuclear security (e.g., passing new legislation or regulations; reducing, eliminating, or consolidating nuclear materials; converting HEU to low-enriched uranium; hosting a peer review; or other specific actions) or to strengthen the global nuclear security architecture (e.g., providing funds to the IAEA's Nuclear Security Fund, supporting the IAEA's nuclear security work, providing assistance to another country, or other specific actions). Reporting on treaty ratification only would not be considered a progress report. Furthermore, steps toward improving nuclear security must have been taken within two years of the report to qualify.

5.1–5.3 Political Stability, Effective Governance, and Pervasiveness of Corruption (Theft rankings and sabotage ranking)

The Risk Environment category comprises four indicators, three of which are described in this section. 5.4 Illicit Activities by Non-State Actors is described separately below. 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 its Business Environment Rankings.

5	RISK ENVIRONMENT	
5.1	**Political Stability**	**Source**
5.1.1	Social unrest	The Economist Intelligence Unit (EIU) Risk Briefing
5.1.2	Orderly transfers of power	EIU Risk Briefing
5.1.3	International disputes/tensions	EIU Risk Briefing
5.1.4	Armed conflict	EIU Risk Briefing
5.1.5	Violent demonstrations or violent civil/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

The EIU Risk Briefing assessment, which is updated once per quarter, takes into account present conditions and the EIU's expectations for the future. The EIU forecasts future risk 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 900 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. 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 900 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, as well as open sources. International open sources include publications from the UN, Central Intelligence Agency (CIA), International Monetary Fund, World Bank, International Institute for Management Development, International Labor Organization, and Interpol.

Business Environment Ranking Sources: The main sources used for the historical period scores include CIA, *World Factbook*; EIU, *Country Risk Service*; Freedom House, *Annual Survey of Political Rights and Civil Liberties*; Heritage Foundation, *Index of Economic Freedom*; UN 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 Illicit Activities by Non-State Actors (All rankings)

As detailed in the *Modified and Deleted Indicators* section above, this indicator seeks to understand whether any terrorist or criminal groups that may be interested in illicitly acquiring weapons-usable nuclear materials or interested in committing acts of nuclear terrorism more generally are present in a country and capable of carrying out their goals. Details as to the extent of a group's presence in a given country could not be easily ascertained. Owing to the nature of this topic, which has serious national security implications for states, publicly available information is limited. Nonetheless, the EIU and NTI worked with a group of technical advisors to craft four subindicators to approximate the general level of the terrorism threat in each country, taking into account capabilities of groups, their cross-border nature, and the impact of non-terrorist illicit activities.

Because of the indicator-level weighting scheme of this index, scores for individual subindicators are not adjusted by weight but still carry implicit weighting of their own. For instance, a country receiving the maximum score on a binary 0/1 subindicator and the minimum score on a 0–4 banded subindicator would receive an indicator score of 1 out of a possible 5 points. If the country scores the converse, however, earning a minimum score on a binary 0/1 subindicator and the maximum score on a 0–4 banded subindicator, the country would receive a total indicator score of 4 out of a possible 5 points. The use of a broad range of scoring options within a single subindicator can therefore unintentionally under- or overvalue subindicators solely as a result of the scoring options selected.

Subindicators 5.4.1 Likelihood of terrorist attacks, 5.4.2 Firearms seized during interdiction of illicit weapons trafficking, and 5.4.4 Neighboring terror threat are all scored from 0 to 4, whereas 5.4.3 Domestic terrorism threat has a binary score. NTI and the EIU decided to adjust the scoring option for subindicator 5.4.3 to ensure that its impact on the overall indicator score was not disproportionate to the other three subindicators within 5.4. To counteract this possible effect, the numeric value attached to 5.4.3's binary scores is 0/8 instead of 0/1. By increasing the numeric value of 5.4.3's positive binary scoring option, the NTI and EIU teams are able to provide additional weight to the subindicator commensurate with its importance.

Challenging Countries

Though each country posed unique research challenges, China, Iran, Israel, North Korea, and Russia were particularly complicated. China and Iran make regulations publicly available, but several regulatory areas in these countries remain confidential. Israel does not publicly acknowledge its nuclear program and, therefore, does not publish any regulations on nuclear security. Despite some historical insight into the internal workings of nuclear facilities and sites in North Korea, knowledge is minimal at best. In the interest of ensuring the NTI Index is as accurate as possible, the EIU scored several indicators across these five countries using proxy scoring and expert input.

The following scoring methods were applied to these five countries to score the theft ranking for countries with materials and the sabotage ranking.

Use of Military Proxy

Iran, Israel, and North Korea were particularly difficult to score for the On-Site Physical Protection indicator (2.1). These countries are distinct among those 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 these countries. The military capability or sophistication indicator is scored as follows:

- A score of 0 means "very low": no investment in military research and development (R&D). Principal equipment is very old or obsolete.
- A score of 1 means "low": minimal investment in military R&D. A high percentage of equipment is old and unsophisticated.
- A score of 2 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 3 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 4 means "very high": huge investment in military R&D and armament production projects. Principal equipment is new and highly sophisticated.

Although the maximum score for 2.1 is 5, the maximum scores these three countries could receive for indicator 2.1 was 4, where 4 represented the most favorable nuclear security conditions. The absence of information on nuclear security reduces public and international understanding of the security measures countries are taking. Therefore, receiving the highest possible score of 5 for indicator 2.1 was not appropriate for states that were scored using a proxy. Because a proxy indicator was used for these countries, they did not receive separate scores for each of the subindicators in 2.1. Instead, these countries received an overall score for the indicator.

Assumptions Based on Military Control of Materials

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

- 2.3.1 Personnel vetting (Israel and North Korea only)
- 2.4.1 Physical security during transport
- 2.5.1 Emergency response capabilities

- 2.5.2 Armed response capabilities
- 2.5.3 Law enforcement response training
- 2.6.1 Mandatory cybersecurity (Israel only)

The unique approaches used for each country reflect the relative level of regulations available. For example, while Iran makes publicly available regulations around personnel vetting, it does not publish regulations around response capabilities. Because Iran's state security and intelligence forces are responsible for security at the country's nuclear sites, however, it can be inferred that internal, non-public regulations mandate the existence of such response capabilities. Similar assumptions are made across these other countries where regulations are not publicly available, and the military imposes a strict regime around nuclear security conditions.

Expert Input Used

Expert input or secondary sources were used to assign scores for the following indicators and subindicators:

- 2.1.4 Tests and assessments (China only)
- 2.2 Control and accounting procedures (North Korea only)
- 2.2.5 Control measures (China only)
- 2.3.1 Personnel vetting (China, North Korea, Russia)
- 2.3.3 Reporting (China only)
- 2.3.5 Insider threat awareness program (Russia only)
- 2.4.1 Physical security during transport (North Korea only)
- 2.7.1 Security culture (China only)
- 4.3.1 (China and Russia only)

China makes most of its nuclear security regulations publicly available and, for the first time in 2020, China participated in the data confirmation process, though some areas are ambiguous or remain confidential altogether. In these instances, the EIU has relied on expert input or secondary evidence to provide appropriate scores. For example, while China's regulations around personnel vetting do not clearly specify the required screening mechanisms (e.g., drug tests, background checks, mental fitness checks) for personnel, experts on Chinese nuclear policy have confirmed that personnel vetting mechanisms are applied across nuclear facilities.

Israel

Israel maintains a policy of opacity with 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 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). Material 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. Israel has, however, an unusual lack of transparency regarding nuclear materials; 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.

In cases where security-related concerns are typically the responsibility of military or other trained personnel, the EIU did use proxies based on Israel's military sophistication. For example, while Israel's cybersecurity regulations are not publicly available, it has a military cyber unit within the Israel Defense Forces (IDF) that defends the country's critical cyber infrastructure. The EIU was able to make a confident assumption that Israel's nuclear facilities are protected against cyber attacks. The EIU therefore provided partial credit to Israel on the Cybersecurity indicator.

Treatment of Taiwan in the NTI Index

Taiwan is included in the theft ranking for countries without nuclear materials and the sabotage ranking. Taiwan posed a unique research challenge, as it is not currently a member of the IAEA or party to most international conventions because of its status in the international community. It does have, however, well-established and publicly available regulations. Therefore, for the Security and Control Measures category, the EIU reviewed Taiwan's publicly available nuclear regulations and Atomic Energy Council (AEC) legislation. The EIU also determined that for select indicators it was appropriate to score Taiwan on the basis of relevant domestic regulations and other considerations, as detailed below:

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

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

3.1.2 2005 Amendment to the CPPNM

Taiwan is not party to the 2005 Amendment to the CPPNM. The EIU has given Taiwan credit on this subindicator on the basis of its domestic regulations and the U.S.–Taiwan 123 Agreement for Peaceful Cooperation, which legally binds Taiwan to follow the CPPNM and the 2005 Amendment. The U.S.–Taiwan 123 Agreement came into force on June 22, 2014. Taiwan, therefore, receives credit for the 2005 CPPNM Amendment in the 2016, 2018, and 2020 editions of the NTI Index, but not in the 2012 or 2014 editions, as there is no evidence that the provisions of the 2005 CPPNM Amendment were legally binding before the 123 Agreement.

4.1.1 United Nations Security Council Resolution (UNSCR) 1540 reporting and 4.1.2 Extent of UNSCR 1540 implementation

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, the EIU assigned credit to Taiwan for a report and matrix it has drafted, modeled on 1540 reports, which are publicly available on Taiwan's Atomic Energy Council's website. The EIU also reviewed and scored this matrix against the same criteria used to assess other 1540 reports. Treating Taiwan's matrix like other countries' matrices, the EIU has assigned credit on the basis of the number of elements of UNSCR 1540 that have been implemented as reflected in the matrix.

4.2.1 CPPNM implementation authority

The EIU assigned credit to Taiwan on the basis of having a national authority for the implementation of nuclear security regulations.

4.2.2 National legal framework for CPPNM Amendment

The EIU assigned credit to Taiwan on the basis of provisions in its domestic regulations.

SOURCES AND DEFINITIONS OF INDICATORS

Theft Ranking

The theft ranking assesses countries with weapons-usable nuclear materials on the basis of five categories. Countries without materials are assessed on three of those categories.

Quantities and Sites

The Quantities and Sites 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. This category comprises the total quantities of highly enriched uranium (HEU), including spent fuel, separated plutonium (Pu) and the Pu content in unirradiated mixed oxide fuel (MOX), and the number of sites and frequency of transport of these materials. In addition, it includes a leading indicator as to whether the country is increasing or decreasing its overall material quantities.

Indicator or Subindicator	Source	Indicator Definitions and Construction
1.1 Quantities of Nuclear Materials	**Calculated from subindicator**	**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	Institute for Science and International Security; James Martin Center for Nonproliferation Studies; IAEA INFCIRC/549 declarations; International Panel on Fissile Materials, *Global Fissile Material Report 2013*	What is the country's combined total quantity of highly enriched uranium (HEU); separated plutonium (Pu); 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 = 500kg–1.99 tonnes 5 = 100–499 kg 6 = 21–99 kg 7 = 5–20 kg 8 = Less than 5 kg Totals are reported in tonnes and kilograms. 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. Pu content in MOX either is reported as such by a state or is calculated as 5%–8% of total MOX quantities. Analysis also includes materials in weapon components.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
1.2 Sites and Transportation	**Calculated from subindicators**	**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	Economist Intelligence Unit (EIU) analyst qualitative assessment	How many sites (both military and civilian) with 1 kilogram or greater quantities of HEU (including spent fuel), separated Pu, or unirradiated mixed oxide fuel (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 Pu; and/or unirradiated MOX material(s) quantities that are equal to or greater than 1 kilogram. A military base with such nuclear material(s) (including quantities contained in nuclear weapons) is counted as a single site, even if material(s) 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 material(s) are counted as a single site. The following types of sites are considered, but are counted only if they contain 1 kilogram or greater quantities of HEU, separated Pu, 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 facilities	EIU analyst qualitative assessment	How many bulk processing facilities handling HEU, separated Pu, or unirradiated MOX does the country have? 0 = 5 or more facilities 1 = 2–4 facilities 2 = 1 facility 3 = 0 facilities Bulk processing facilities include enrichment, reprocessing, and national fuel cycle facilities.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
1.2.3 Frequency of materials transport	EIU analyst qualitative assessment.	Are nuclear materials (HEU, separated Pu, 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 repatriation Countries receive scores depending on whether nuclear materials are transported either domestically and/or internationally.
1.3 Material Production/ Elimination Trends	**Calculated from subindicator**	**Increasing or decreasing the quantities of nuclear material in a state changes the potential risk of materials being stolen.**
1.3.1 Material production/ elimination trends	EIU analyst qualitative assessment	The country is doing the following in regard to its 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, the following were evaluated: • 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? • Is a change the result of normal fluctuations due to the use of MOX fuel in power reactors?

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Security and Control Measures

The Security and Control Measures 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, response capabilities, cybersecurity, and security culture.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.1 On-Site Physical Protection	**Calculated from subindicators**	**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	Is physical protection a condition for licensing? 0 = No or information not publicly available 1 = Yes Countries receive scores depending on whether physical protection is a condition for licensing.
2.1.2 On-site reviews of security	EIU analyst qualitative assessment based on official national sources, which vary by country	Are on-site reviews of security done in order to keep a license? 0 = No or information not publicly available 1 = Yes Countries receive scores depending on whether on-site reviews of security are done in order to keep a license.
2.1.3 Design Basis Threat (DBT)	EIU analyst qualitative assessment based on official national sources, which vary by country	Do the country's regulations require the use of a Design Basis Threat that is required to be updated? 0 = No or information not publicly available 1 = Yes A Design Basis Threat (DBT) means the attributes and characteristics of potential insider and/or external adversaries who might attempt unauthorized removal of nuclear material or sabotage against which a physical protection system is designed and evaluated.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.1.4 Tests and assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require evaluations of security systems' effectiveness (including security personnel) that a. include a requirement for evaluations that reflect realistic threat considerations? b. include a requirement to conduct regular force-on-force exercises using realistic scenarios? 0 = No or information not publicly available 1 = Yes, regulations require effectiveness evaluations that include one of these requirements 2 = Yes, regulations require effectiveness evaluations that include two of these requirements Timely security response: Assessment programs must mandate that security forces respond in a timely manner, but a time frame does not need to be included in the regulations. Realistic threat considerations: Assessments must be measured against a realistic threat possibility, such as a DBT or comparable security standard. Assessment programs could include force-on-force exercises, tabletop exercises, computer simulations, or pathway analysis to ensure security programs are able to defeat these threats.
2.2 Control and Accounting Procedures	**Calculated from subindicators**	**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	Is there a domestic legal and regulatory basis for nuclear material control and accounting (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 3 = There is a legal and regulatory basis for MC&A, international guidelines are reflected in the legal and regulatory system, and regulations include compliance enforcement requirements
2.2.2 Measurement methods	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require measurement methods that provide for accurate and precise quantification of nuclear materials? 0 = No or information not publicly available 1 = Yes 2 = Yes, and regulations include a requirement for certification and calibration of measurement equipment using traceable and controlled standards

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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	Do domestic regulations or license conditions require a complete, accurate, and timely record of the nuclear material 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	Do domestic regulations or license conditions require that nuclear materials be in well-defined and controlled geographical locations within the state? 0 = No or information not publicly available 1 = Yes 2 = Yes, and regulations include a requirement that each material balance area be overseen by a single custodian with an alternate custodian to provide coverage whenever the custodian is not available 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 b. the use of containment and surveillance measures c. the requirement that material balance areas are overseen by a single custodian with an alternate custodian to provide coverage whenever the custodian is not available The state body should also approve the facility material balance area(s).

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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	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/or 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	**Calculated from subindicators**	**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	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 Countries receive the following scores depending on whether national guidelines specify that security personnel are subject to the following checks: drug testing, background checks, and psychological or mental fitness checks. Israel and North Korea are unique among those 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. The EIU relied on expert input to score these countries on this subindicator
2.3.2 Frequency of personnel vetting	EIU analyst qualitative assessment based on official national sources, which vary by country	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 (5) years 2 = Such personnel are subject to vetting at periods greater than two (2), but not more than five (5) years 3 = Such personnel are subject to vetting at periods of two (2) years or less

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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	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	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 in order to detect access or actions that are unauthorized. Technological surveillance: Technological surveillance includes devices such as CCTV and audio surveillance equipment.
2.3.5 Insider threat awareness program	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require a nuclear-specific insider threat awareness program for all personnel involved in the operation and management of nuclear facilities? 0 = No or information not publicly available 1 = Yes, a nuclear-specific insider threat awareness program is in place for all personnel involved in the operation and management of nuclear facilities 2 = Yes, a nuclear-specific insider threat awareness program is in place for all personnel involved in the operation and management of nuclear facilities and it is regularly updated Insider threat awareness program: Training for personnel that helps employees identify warning signs that may indicate a colleague is considering unauthorized removal of nuclear material or sabotage of a nuclear facility. This can take the form of specific training classes or site-wide awareness-building initiatives. Specific to nuclear facilities: A program that is organized and run by a nuclear authority or nuclear licensee for all personnel involved in the operation of nuclear facilities. Regularly updated: Insider threat training and awareness programs should include a re-assessment and training requirement. This can take the example of rolling or continuous awareness programs, or refresher courses at mandated intervals.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.4 Physical Security During Transport	**Calculated from subindicator**	**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 Countries receive scores depending on whether the IAEA guidelines regarding transport of nuclear materials encompassed in INFCIRC/225/Rev. 4 or Rev. 5 are translated into the national regulatory regime.
2.5 Response Capabilities	**Calculated from subindicators**	**Response capabilities are part of a layered security system and may enable materials to be recovered should they be stolen from a site.**
2.5.1 Emergency response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	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. Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5.2 Armed response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	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, an on-site armed response team is required or the state does not have Category I quantities of nuclear material Regulations or licensing conditions must state that the response force is on site AND armed to receive a score of 1. The IAEA classifies 2 kg or more of plutonium and 5 kg or more of HEU as Category I materials, and less than 2 kg but more than 500 g of plutonium and less than 5 kg but more than 1 kg of HEU as Category II materials. This categorization enables the IAEA to use a graded approach in recommending physical protection measures. Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.
2.5.3 Law enforcement response training	EIU analyst qualitative assessment based on official national sources, which vary by country	Are law enforcement trained to respond in the event of a security incident at a nuclear facility? 0 = No, law enforcement are not trained to respond in the event of a security incident at a nuclear facility 1 = Yes, law enforcement are trained to respond in the event of a security incident at a nuclear facility Countries receive scores depending on whether law enforcement officers are trained to respond in the event of the theft of nuclear materials. Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.
2.5.4 Nuclear infrastructure protection plan	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the country's regulatory framework state that, in the event of a man-made or natural disaster, plans are in place to physically protect the nuclear infrastructure? 0 = No or information not publicly available 1 = Yes

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5.5 Response coordination capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that on-site and off-site emergency response teams conduct joint exercises? 0 = No or information not publicly available 1 = Yes 2 = Yes, and regulations require joint exercises to be conducted at least annually
2.6 Cybersecurity	**Calculated from subindicators**	**Nuclear materials and facilities are vulnerable to cyber attacks as well as physical attacks. Therefore, cybersecurity is a critical component of protecting against theft.**
2.6.1 Mandatory cybersecurity	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require nuclear facilities to protect against cyber attacks? 0 = No or information not publicly available 1 = Yes, domestic regulations or licensing conditions require nuclear facilities to protect against cyber attacks Cyber attack: A criminal or intentional unauthorized act directed at or affecting computer-based systems with the intention of achieving or facilitating the theft, alteration, prevention of access to, or destruction of sensitive information or sensitive information assets. Protection measures: Any system or process by which the nuclear operator protects digital networks.
2.6.2 Sensitive digital asset management	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require nuclear facilities to protect sensitive digital assets that impact safety, security, emergency preparedness functions, and their support systems from a cyber attack? 0 = No or information not publicly available 1 = Yes 2 = Yes, and sensitive digital assets are required to be routinely or periodically catalogued Cyber attack: A criminal or intentional unauthorized act directed at or affecting computer-based systems with the intention of achieving or facilitating the theft, alteration, prevention of access to, or destruction of sensitive information or sensitive information assets.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.6.3 Cybersecurity DBT	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state consider cyber threats in its threat assessment or Design Basis Threat (DBT) for nuclear facilities? 0 = No or information not publicly available 1 = Yes The responsible state authority should periodically issue a threat evaluation including threats to the security of computer systems and information on current attack vectors related to the security of computer systems used at nuclear facilities. A typical tool used to determine threat levels and as a basis for developing a security posture is the Design Basis Threat. Countries also refer to "threat assessment," "vulnerability baseline assessment," and "threat analysis." The terminology around systems that might be compromised by a cyber attack, as well as the consequent need for a cyber DBT, varies substantially across countries. In addition to "computer systems," countries also use the following language to refer to the systems at nuclear facilities that might be threatened by cyber attacks: • IT systems • Information system security plans • Computer security • Software-based systems • Point of vital importance • Computer-based systems • Information, communications, and I&C systems
2.6.4 Cybersecurity assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the regulator require tests and assessments of cybersecurity at nuclear facilities? 0 = No or information not publicly available 1 = Yes 2 = Yes, and tests and assessments are conducted at least annually
2.6.5 Cyber incident response plan	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require a cyber-incident response plan for nuclear facilities? 0 = No or information not publicly available 1 = Yes

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.6.6 Mandatory cybersecurity awareness program	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators have a cybersecurity awareness program that reaches all personnel with access to digital systems? 0 = No or information not publicly available 1 = Yes Cybersecurity awareness program: This would encompass any discrete training program that addresses cybersecurity procedures among the broader workforce to mitigate the threat of employee-borne cyber intrusions or would establish protocols for employees to notice and report suspicious digital events or activities.
2.7 Security Culture	**Calculated from subindicators**	**Effective security culture ensures organizations remain committed to following through on security requirements and responsibilities at all levels of the organizational structure.**
2.7.1 Security culture	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state's nuclear security regulator reference "security culture" in its annual report(s) and/or in its regulations? 0 = No or information not publicly available 1 = Yes Security culture is the assembly of characteristics, attitudes, and behavior of individuals, organizations, and institutions that serves as a means to support and enhance nuclear security. States should encourage corporate governance and other structures that engender security culture at the organizational level at all nuclear facilities. A state receives a "yes" only if the applicable report or regulation uses the term "security culture" or "culture of security." If the report or regulation is published in a language that distinguishes between "security culture" and "safety culture," a discussion of "safety culture" is not sufficient to receive a "yes," even if the nuclear regulator stipulates that the concept of "security culture" is subsumed within the concept of "safety culture."
2.7.2 Security culture assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators conduct security culture assessments? 0 = No or information not publicly available 1 = Yes A "security culture assessment" is a self-assessment tool that senior management of a nuclear facility use to regularly assess the attitudes and behaviors of the facility's personnel toward security, and to compare those attitudes and behaviors with best practices.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
2.7.3 Security responsibilities and accountabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security and that such an individual[s] undergoes additional training and/or certification? 0 = No or information not publicly available 1 = Yes, regulations require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security 2 = Yes, regulations require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security and require that such an individual[s] undergoes additional training and/or certification This subindicator seeks to answer whether the regulator (1) requires that licensees or operators define who is responsible and/or accountable for at least one aspect of nuclear security, and (2) requires the responsible individual to undergo additional training and/or certification as part of the role. 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 an individual(s) with security responsibilities or accountabilities in at least one area of security.

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Global Norms

The Global Norms 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, international assurances, and nuclear security INFCIRCs.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.1 International Legal Commitments*	**Calculated from subindicators**	**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)*	International Atomic Energy Agency (IAEA)	Is the state a party to the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = Non-compliant or not a party 1 = Signed 2 = Signed and ratified (or action having the same legal effect)

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Indicator or Subindicator	Source	Indicator Definitions and Construction
3.1.2 2005 Amendment to the CPPNM*	IAEA	Is the state a party to the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (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 (UN)	Is the state a party to the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)? 0 = Non-compliant or not a party 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.1.4 IAEA safeguards agreement*	IAEA	Has the state concluded an IAEA safeguards agreement? 0 = No, or a Small Quantities Protocol or otherwise incomplete coverage of peaceful nuclear facilities 1 = Yes, a Modified Small Quantities Protocol, an INFCIRC/153, or complete coverage of peaceful nuclear facilities under an equivalent arrangement 2 = Yes, the Additional Protocol
3.2 Voluntary Commitments*	**Calculated from subindicators**	**Voluntary commitments demonstrate a state's support for nuclear materials security.**
3.2.1 Global Initiative to Combat Nuclear Terrorism (GICNT) membership*	U.S. Department of State	Is the country a member of the Global Initiative to Combat Nuclear Terrorism (GICNT)? 0 = No 1 = Yes
3.2.2 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 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction? 0 = No 1 = Yes
3.2.3 World Institute for Nuclear Security (WINS) contributions*	World Institute for Nuclear Security Annual Report 2013 and 2014	Has the country provided financial or in-kind contributions to the World Institute for Nuclear Security (WINS) within the previous two years? 0 = No 1 = Yes
3.2.4 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

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Indicator or Subindicator	Source	Indicator Definitions and Construction
3.2.5 Bilateral/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
3.2.6 Centers of Excellence*	EIU analyst qualitative assessment	Does the country have a Center of Excellence or Nuclear Security Training and Support Center that offers training in nuclear security? 0 = No 1 = Yes To receive credit, a Center of Excellence or Nuclear Security Training and Support Center should have the following characteristics: (a) serve as a centralized organization to facilitate broad cross-industry engagement in education and training; (b) focus on nuclear security, even if safeguards, safety, or nuclear energy are also addressed; (c) provide practical training courses; (d) provide education in the form of lectures or seminars; and (e) have government support. Centers that are not yet operational are excluded.
3.2.7 Ministerial participation in the IAEA International Conference on Nuclear Security (ICONS)*	EIU analyst research	Did the country participate in the latest IAEA International Conference on Nuclear Security (ICONS) at the ministerial level? 0 = No 1 = Yes Data are not available for this subindicator for 2012. All countries score 0 (zero) for this indicator in 2012.
3.2.8 Incident and Trafficking Database (ITDB)*	IAEA	Does the country participate in the IAEA Incident and Trafficking Database (ITDB)? 0 = No 1 = Yes
3.2.9 Nuclear Security Guidance Committee (NSGC)*	IAEA	Does the country participate in the IAEA Nuclear Security Guidance Committee (NSGC)? 0 = No 1 = Yes
3.3 International Assurances	**Calculated from subindicators**	**International assurances enhance international confidence in the effectiveness of a country's nuclear security.**
3.3.1 Published regulations	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state publicly release its nuclear security regulations? 0 = No 1 = Yes

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Indicator or Subindicator	Source	Indicator Definitions and Construction
3.3.2 Published nuclear security annual reports	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state publicly release annual reports on nuclear security issues? 0 = No 1 = Yes
3.3.3 Published nuclear security progress reports	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state made public declarations about nuclear security progress? 0 = No 1 = Yes, the state has made public declarations on nuclear security progress 2 = Yes, the state has made public declarations on nuclear security progress within the past two years To be considered a public declaration on nuclear security progress, the declaration, statement, or report must include a substantial description of nuclear security practices. A declaration, statement, or report meets the criteria if it (a) is delivered in conjunction with an international, multilateral, or regional conference on nuclear security (e.g., the 2012, 2014, 2016, or 2018 Nuclear Security Summit; the 2013, 2016, or 2020 IAEA International Conference on Nuclear Security [ICONS]; IAEA General Conferences; GICNT meetings; Global Partnership meetings; or a nuclear security treaty conference such as the CPPNM Amendment or ICSANT) and (b) provides information about actions the country has taken to strengthen its own nuclear security (e.g., passing new legislation or regulations; reducing, eliminating, or consolidating nuclear materials; converting reactors that use HEU to LEU; hosting a peer review; or other specific actions) or to strengthen the global nuclear security architecture (e.g., providing funds to the IAEA's Nuclear Security Fund; supporting the IAEA's nuclear security work; providing assistance to another country; or other specific actions). Reporting on treaty ratification does not meet the criteria for a progress report unless other actions are also reported. The specific action must have been taken within two years of the date of the report.
3.3.4 Public declarations/ reports about civilian nuclear materials	EIU analyst qualitative assessment	Does the state make any public declarations or reports about nuclear materials used for civilian purposes? 0 = No 1 = Yes 2 = Yes, and the most recent report has been released since January 1, 2019 A state receives a "yes" if it has made declarations regarding its civilian plutonium or HEU or if it publishes the IAEA's safeguards conclusions for the state. Scores for previous editions of the Index give credit to declarations made since the beginning of the previous calendar year.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
3.3.5 Public declarations/ reports about military nuclear materials	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state make any public declarations or reports about nuclear materials used for military purposes? 0 = No 1 = Yes 2 = Yes, and the most recent report has been released since January 1, 2015 A state receives a "yes" if it has made any quantitative declarations about its nuclear materials used for military purposes or its nuclear weapons. Scores for previous editions of the Index give credit to declarations made since the beginning of the calendar year five years prior. States without military materials receive a score of 2.
3.3.6 Review of security arrangements	EIU analyst qualitative assessment	Has the state hosted an IAEA review or a bilateral/multilateral review of its security arrangements (excluding IPPAS missions)? 0 = No 1 = Yes 2 = Yes, within the past five years A state receives credit if it has hosted any of the following IAEA missions, including follow-up missions: an International Nuclear Security Advisory Service (INSServ) mission or a State System for Accountancy and Control (SSAC) Advisory Service mission. A state also receives a "yes" if it has received bilateral or multilateral assistance (outside an international organization) to review security arrangements.
3.3.7 International Physical Protection Advisory Service (IPPAS) mission	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state hosted an International Physical Protection Advisory Service (IPPAS) mission (including follow-up missions)? 0 = No 1 = Yes 2 = Yes, within the past five years 3 = Yes, within the past five years, and the state has publicly released at least a summary of the results A press release or announcement that an IPPAS mission has taken place will not receive credit. The summary must contain a more substantial description of the scope of the IPPAS mission, a summary of the outcome, and proposed follow-on steps.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
3.4 Nuclear Security INFCIRCs*	**Calculated from subindicators**	**Countries that have subscribed to nuclear security IAEA Information Circulars (INFCIRCs) demonstrate a commitment to international best practices in nuclear security.**
3.4.1 INFCIRC/869*	IAEA	Has the state subscribed to INFCIRC/869? 0 = No 1 = Yes Data are not available for this subindicator for 2012 or 2014. All countries score 0 (zero) for this indicator in 2012 and 2014.
3.4.2 Other nuclear security INFCIRCs*	IAEA	Has the state subscribed to the following INFCIRCs: 899, 901, 904, 905, 908, 909, 912, 917, and 918? 0 = No, the state has not subscribed to any of these INFCIRCs 1 = Yes, the state has subscribed to one of these INFCIRCs 2 = Yes, the state has subscribed to two of these INFCIRCs 3 = Yes, the state has subscribed to three or more of these INFCIRCs Data are not available for this subindicator for 2012, 2014, or 2016. All countries score 0 (zero) for this indicator in 2012, 2014, and 2016.

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Domestic Commitments and Capacity

The Domestic Commitments and Capacity category includes actions that indicate how well a country has implemented its international commitments and a country's capacity to do so. This category includes the extent of UN Security Council Resolution 1540 implementation, the status of legislation to implement the CPPNM Amendment, and the presence of an independent regulatory agency.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.1 UN Security Council Resolution (UNSCR) 1540 Implementation*	**Calculated from subindicators**	**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)	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 produced a 1540 report 1 = The state has produced a 1540 report

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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 EIU, based on documents from the UN 1540 Committee	Extent of implementation is identified through the measures taken by a state and reflected in its UNSCR 1540 matrix. 0 = Very weak (0–24 points) 1 = Weak (25–49 points), or matrix exists but is not publicly available 2 = Moderate (50–74 points) 3 = Good (75–99 points) 4 = Very good (100+ points) 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 117) with an "X" designation, providing a numerical score for implementation. The resulting numerical score is banded into five categories scored from 0 points to 4 points. For countries without weapons-usable nuclear materials, 87 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 that have not made it public, were assigned the second-lowest score to give credit for estimated levels of implementation.
4.2 Domestic Nuclear Security Legislation*	**Calculated from subindicators**	**The implementation of security measures is rooted in domestic nuclear security legislation.**
4.2.1 CPPNM implementation authority*	EIU analyst qualitative assessment based on official national sources, which vary by country	Is there a national authority for the implementation of the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = No 1 = Yes This subindicator considers whether or not there is a national authority (state body) that is responsible for implementing the CPPNM. The convention requires states to establish or designate a competent authority responsible for the implementation of the legislative and regulatory framework.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
4.2.2 National legal framework for CPPNM Amendment	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state fulfilled all obligations for a national legal framework for the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = No 1 = Yes 2 = Yes, and the country has submitted information to the IAEA as required by article 14.1 Countries are assumed to have in place a national legal framework for the CPPNM Amendment if they have submitted information to the IAEA as required by article 14.1 of the CPPNM Amendment.
4.3 Independent Regulatory Agency	**Calculated from subindicator**	**A robust and independent regulatory structure helps to ensure compliance with nuclear security-related regulations.**
4.3.1 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 An agency is deemed "independent" if it is politically independent. Political independence means that the agency is authorized and able to make regulatory decisions within the field of nuclear security in both routine work situations and crisis situations, effectively free from control or pressure from other state political bodies.

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Risk Environment

The Risk Environment can affect the nuclear security conditions in a country. Factors include political stability, effective governance, pervasiveness of corruption, and the illicit activities of non-state actors.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1 Political Stability*	**Calculated from subindicators**	**A lack of political stability may enable lapses in nuclear security.**
5.1.1 Social unrest*	EIU, Risk Briefing	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	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.
5.1.3 International disputes/ tensions*	EIU, Risk Briefing	Is there a risk that international disputes/tensions will negatively affect the country 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 and/or other barriers to trade, could have destabilizing implications for the polity and, hence, for nuclear materials security.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1.4 Armed conflict*	EIU, Risk Briefing	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 subindicator covers armed conflict either within the territory of the state or directly threatening the state. Forms of conflict may range from sporadic or incursive conflict with non-state actors to conventional conflict with secessionist entities or other states.
5.1.5 Violent demonstrations or violent civil/labor unrest*	EIU, Risk Briefing	Are violent demonstrations or violent civil/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/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*	**Calculated from subindicators**	**A lack of effective governance can compromise a country's ability to establish and sustain policies to secure nuclear facilities.**
5.2.1 Effectiveness of the political system*	EIU, Business Environment Ranking	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 subindicator assesses tensions between the legislative and executive branches of government, instability in government formation, and cohesion of the legislature.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
5.2.2 Quality of the bureaucracy*	EIU, Risk Briefing	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 subindicator assesses the quality of the bureaucracy across the following criteria: overall competency/training, morale/dedication, and compensation/status.
5.3 Pervasiveness of Corruption*	**Calculated from subindicator**	**Corruption affects the potential for theft of nuclear materials and the rigor with which nuclear 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 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 (e.g., misuse of public office for private benefit, accepting bribes, dispensing favors and patronage for private gain).
5.4 Illicit Activities by Non-State Actors*	**Calculated from subindicators**	**The presence and capabilities of terrorist groups and prevalence of other illicit activities raise the risk of theft of nuclear materials.**
5.4.1 Likelihood of terrorist attacks*	EIU, Risk Briefing	How likely is it that domestic or foreign terrorists will attack with a frequency or severity that causes substantial disruption to business operations? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses the risk of a destabilizing terrorist attack, and therefore takes into account the country's current security outlook, political and economic stability, and resilience to such attacks.

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Indicator or Subindicator	Source	Indicator Definitions and Construction
5.4.2 Firearms seized during interdiction of illicit weapons trafficking*	UN Office on Drugs and Crime	How many firearms have been seized by law enforcement over the past 5 years? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses the number of weapons seized during interdiction of illicit weapons trafficking, as reported to the UN Office on Drugs and Crime. These values are then distributed into quintiles, with 0 representing the highest quintile of weapon seizures and 4 representing the lowest. Data are not available for this subindicator for 2012. To enable time-series comparability across the Index, the score achieved in 2014 is used as a proxy for the 2012 score.
5.4.3 Domestic terrorism threat	EIU analyst qualitative assessment based on START GTD and Mapping Militants Project	Is there a terrorist group(s), as identified in START's Global Terrorism Database and/or Stanford's Mapping Militants Project operating in the country that demonstrates the capability to seize nuclear materials or sabotage a nuclear facility? 0 = Yes 8 = No This subindicator assesses whether or not an armed group, as identified by either START's Global Terrorism Database or Stanford University's Mapping Militants Project, exists within the country that has committed an attack involving three or more attackers using automatic weapons and/or explosives. The Nuclear Security Index is weighted at the indicator level. 5.4.4, Neighboring Terror Threat, is scored from 0 to 4. To maintain relative risk of each subindicator, 5.4.3, Domestic Terrorism Threat, is scored as a binary 0/8. This ensures countries with domestic terror risks receive a lower overall score for 5.4, Illicit Activities by Non-State Actors.
5.4.3 Pervasiveness of organized crime+	EIU, Risk Briefing	How high is the risk of organized criminal activity to the government or businesses in the country? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low

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Indicator or Subindicator	Source	Indicator Definitions and Construction
5.4.4 Neighboring terror threat	EIU analyst qualitative assessment based on official national sources, which vary by country	How high is the risk that terrorist groups in neighboring countries have the capability to seize nuclear materials? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses whether an armed group, as identified by either START's Global Terrorism Database or Stanford University's Mapping Militants Project, exists within nearby countries that has committed an attack involving three or more attackers using automatic weapons and/or explosives. Each neighboring country is assigned a "Yes" or "No". A country's score is the combination of the average of the binary "Yes" or "No" scores for all neighboring countries and the average of the binary "Yes" or "No" scores for all countries within the region. A weighting scheme is applied so that the average score for neighboring countries represents 75% of the overall score and the average score for regional countries represents 25% of the overall score.

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Sabotage Ranking

The sabotage ranking assesses countries on the basis of five categories.

Number of Sites

The Number of Sites category captures the number of sites in a country that, if subject to an act of sabotage, could pose the risk of a radiological release with significant off-site health consequences.

Indicator or Subindicator	Source	Indicator Definitions and Construction
1.1 Number of Sites	**Calculated from subindicator**	**The greater the number of nuclear facilities, the greater the potential risk of acts of sabotage.**
1.1.1 Number of sites	Economist Intelligence Unit (EIU) analyst qualitative assessment	How many sites with nuclear facilities does the country maintain that, if subject to an act of sabotage, could pose the risk of a radiological release with significant off-site health consequences? 0 = 30 sites or greater 1 = 20–29 sites 2 = 10–19 sites 3 = 4–9 sites 4 = 2–3 sites 5 = One site The following types of nuclear facilities are considered: • Operating nuclear power reactors or nuclear power reactors that have been shut down within the last five years • Research reactors with a capacity of 2 MW or greater • Reprocessing facilities • Spent fuel pools, only if the fuel has been discharged in the last five years and is not associated with an operating reactor • A location with multiple facilities on site is counted as a single site

Security and Control Measures

The Security and Control Measures category encompasses the core activities directly related to protection and of nuclear facilities. It includes indicators of physical protection, control and accounting, insider threat prevention, response capabilities, cybersecurity and security culture.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.1 On-Site Physical Protection	**Calculated from subindicators**	**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	Is physical protection a condition for licensing? 0 = No or information not publicly available 1 = Yes Countries receive scores depending on whether physical protection is a condition for licensing.
2.1.2 On-site reviews of security	EIU analyst qualitative assessment based on official national sources, which vary by country	Are on-site reviews of security done in order to keep a license? 0 = No or information not publicly available 1 = Yes Countries receive scores depending on whether on-site reviews of security are done in order to keep a license.
2.1.3 Design Basis Threat (DBT)	EIU analyst qualitative assessment based on official national sources, which vary by country	Do the country's regulations require the use of a Design Basis Threat that is required to be updated? 0 = No or information not publicly available 1 = Yes A Design Basis Threat (DBT) means the attributes and characteristics of potential insider and/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 Tests and assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require evaluations of security systems' effectiveness (including security personnel) that a. include a requirement for evaluations that reflect realistic threat considerations? b. include a requirement to conduct regular force-on-force exercises using realistic scenarios? 0 = No or information not publicly available 1 = Yes, regulations require effectiveness evaluations that include one of these requirements 2 = Yes, regulations require effectiveness evaluations that include two of these requirements Timely security response: Assessment programs must mandate that security forces respond in a timely manner, but a time frame does not need to be included in the regulations. Realistic threat considerations: Assessments must be measured against a realistic threat possibility, such as a DBT or comparable security standard. Assessment programs could include force-on-force exercises, tabletop exercises, computer simulations, or pathway analysis to ensure security programs are able to defeat these threats.
2.2 Control and Accounting Procedures	**Calculated from subindicators**	**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	Is there a domestic legal and regulatory basis for nuclear material control and accounting (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 3 = There is a legal and regulatory basis for MC&A, international guidelines are reflected in the legal and regulatory system, and regulations include compliance enforcement requirements
2.2.2 Radiological consequences (materials)	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that the potential levels of radiological consequences of sabotage be used to determine physical protection of nuclear facilities? 0 = No or information not publicly available 1 = Yes
2.2.3 Radiological consequences (equipment, systems, and devices)	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that potential levels of radiological consequences of sabotage be used to determine physical protection of equipment, systems, and devices? 0 = No or information not publicly available 1 = Yes

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.2.4 Control measures	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require the following nuclear facilities control measures? a. The identity of persons entering areas with nuclear material, and/or areas with equipment, systems, and devices the sabotage of which could lead to high radiological consequences (the equivalent of a "vital area" as defined by the IAEA), must be verified. b. Records must be kept of all persons who access areas with nuclear material, and/or areas with equipment, systems, and devices the sabotage of which could lead to high radiological consequences (the equivalent of a "vital area" as defined by the IAEA), and of all persons who have access to or possession of keys, keycards, and other systems—including computer systems—that control access to such 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
2.2.5 Access control	EIU analyst qualitative assessment based on official national sources, which vary by country	Is access to areas with nuclear material, and/or areas with equipment, systems, and devices the sabotage of which could lead to high radiological consequences (the equivalent of a "vital area" as defined by the IAEA), limited to persons with authorized access? 0 = No or information not publicly available 1 = Yes
2.3 Insider Threat Prevention	**Calculated from subindicators**	**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	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 Countries receive the following scores depending on whether national guidelines specify that security personnel are subject to the following checks: drug testing, background checks, and psychological or mental fitness checks. Israel and North Korea are unique among those 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. The EIU relied on expert input to score these countries on this subindicator.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.3.2 Frequency of personnel vetting	EIU analyst qualitative assessment based on official national sources, which vary by country	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 (5) years 2 = Such personnel are subject to vetting at periods greater than two (2), but not more than five (5) years 3 = Such personnel are subject to vetting at periods of two (2) years or less
2.3.3 Reporting	EIU analyst qualitative assessment based on official national sources, which vary by country	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	Do domestic regulations or license conditions require constant surveillance of areas with nuclear material; and/or areas with equipment, systems, and devices the sabotage of which could lead to high radiological consequences (the equivalent of a "vital area" as defined by the IAEA), 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 in order to detect access or actions that are unauthorized. Technological surveillance: Technological surveillance includes devices such as CCTV and audio surveillance equipment.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.3.5 Insider threat awareness program	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require a nuclear-specific insider threat awareness program for all personnel involved in the operation and management of nuclear facilities? 0 = No or information not publicly available 1 = Yes, a nuclear-specific insider threat awareness program is in place for all personnel involved in the operation and management of nuclear facilities 2 = Yes, a nuclear-specific insider threat awareness program is in place for all personnel involved in the operation and management of nuclear facilities and it is regularly updated Insider threat awareness program: Training for personnel that helps employees identify warning signs that may indicate a colleague is considering unauthorized removal of nuclear material or sabotage of a nuclear facility. This can take the form of specific training classes or site-wide awareness-building initiatives. Specific to nuclear facilities: A program that is organized and run by a nuclear authority or nuclear licensee for all personnel involved in the operation of nuclear facilities. Regularly updated: Insider threat training and awareness programs should include a re-assessment and training requirement. This can take the example of rolling or continuous awareness programs, or refresher courses at mandated intervals.
2.4 Response Capabilities	**Calculated from subindicators**	**Response capabilities are part of a layered security system and may enable materials to be recovered should they be stolen from a site.**
2.4.1 Emergency response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	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 a 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. Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.4.2 Armed response capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Do the state's licensing requirements for civilian nuclear facilities require that each nuclear power reactor and reprocessing facility 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 a nuclear power reactor or reprocessing facility Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.
2.4.3 Law enforcement response training	EIU analyst qualitative assessment based on official national sources, which vary by country	Are law enforcement trained to respond in the event of a security incident at a nuclear facility? 0 = No, law enforcement are not trained to respond in the event of a security incident at a nuclear facility 1 = Yes, law enforcement are trained to respond in the event of a security incident at a nuclear facility Countries receive scores depending on whether law enforcement officers are trained to respond in the event of the sabotage of nuclear facilities or materials. Iran, Israel, and North Korea are unique among those 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. The scores for these countries are based on the assumption that the military imposes a strict regime under the direct control of the state.
2.4.4 Nuclear infrastructure protection plan	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the country's regulatory framework state that, in the event of a man-made or natural disaster, plans are in place to physically protect the nuclear infrastructure? 0 = No or information not publicly available 1 = Yes
2.4.5 Response coordination capabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that on-site and off-site emergency response teams conduct joint exercises? 0 = No or information not publicly available 1 = Yes 2 = Yes, and regulations require joint exercises to be conducted at least annually

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5 Cybersecurity	**Calculated from subindicators**	**Nuclear facilities are vulnerable to cyber attacks as well as physical attacks. Therefore, cybersecurity is a critical component of protecting against sabotage of nuclear materials.**
2.5.1 Mandatory cybersecurity	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require nuclear facilities to protect against cyber attacks? 0 = No or information not publicly available 1 = Yes, domestic regulations or licensing conditions require nuclear facilities to protect against cyber attacks Cyber attack: A criminal or intentional unauthorized act directed at or affecting computer-based systems with the intention of achieving or facilitating the theft, alteration, prevention of access to, or destruction of sensitive information or sensitive information assets. Protection measures: Any system or process by which the nuclear operator protects digital networks.
2.5.2 Sensitive digital asset management	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require nuclear facilities to protect sensitive digital assets that impact safety, security, emergency preparedness functions, and their support systems from a cyber attack? 0 = No or information not publicly available 1 = Yes 2 = Yes, and sensitive digital assets are required to be routinely or periodically catalogued Cyber attack: A criminal or intentional unauthorized act directed at or affecting computer-based systems with the intention of achieving or facilitating the theft, alteration, prevention of access to, or destruction of sensitive information or sensitive information assets.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.5.3 Cybersecurity DBT	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state consider cyber threats in its threat assessment or Design Basis Threat (DBT) for nuclear facilities? 0 = No or information not publicly available 1 = Yes The responsible state authority should periodically issue a threat evaluation including threats to the security of computer systems and information on current attack vectors related to the security of computer systems used at nuclear facilities. A typical tool used to determine threat levels and as a basis for developing a security posture is the DBT. Countries also refer to "threat assessment," "vulnerability baseline assessment," and "threat analysis." The terminology around systems that might be compromised by a cyber attack, as well as the consequent need for a cyber DBT, varies substantially across countries. In addition to "computer systems," countries also use the following language to refer to the systems at nuclear facilities that might be threatened by cyber attacks: • IT systems • Information system security plans • Computer security • Software-based systems • Point of vital importance • Computer-based systems • Information, communications, and I&C systems
2.5.4 Cybersecurity assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the regulator require tests and assessments of cybersecurity at nuclear facilities? 0 = No or information not publicly available 1 = Yes 2 = Yes, and tests and assessments are conducted at least annually
2.5.5 Cyber incident response plan	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require a cyber-incident response plan for nuclear facilities? 0 = No or information not publicly available 1 = Yes
2.5.6 Mandatory cybersecurity awareness program	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators have a cybersecurity awareness program that reaches all personnel with access to digital systems? 0 = No or information not publicly available 1 = Yes Cybersecurity awareness program: This would encompass any discrete training program that addresses cybersecurity procedures among the broader workforce to mitigate the threat of employee-borne cyber intrusions or would establish protocols for employees to notice and report suspicious digital events or activities.

Indicator or Subindicator	Source	Indicator Definitions and Construction
2.6 Security Culture	**Calculated from subindicators**	**Effective security culture ensures organizations remain committed to following through on security requirements and responsibilities at all levels of the organizational structure.**
2.6.1 Security culture	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state's nuclear security regulator reference "security culture" in its annual report(s) and/or in its regulations? 0 = No or information not publicly available 1 = Yes Security culture is the assembly of characteristics, attitudes, and behavior of individuals, organizations, and institutions that serves as a means to support and enhance nuclear security. States should encourage corporate governance and other structures that engender security culture at the organizational level at all nuclear facilities. A state receives a "yes" only if the applicable report or regulation uses the term "security culture" or "culture of security." If the report or regulation is published in a language that distinguishes between "security culture" and "safety culture," a discussion of "safety culture" is not sufficient to receive a "yes," even if the nuclear regulator stipulates that the concept of "security culture" is subsumed within the concept of "safety culture."
2.6.2 Security culture assessments	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators conduct security culture assessments? 0 = No or information not publicly available 1 = Yes A "security culture assessment" is a self-assessment tool that senior management of a nuclear facility use to regularly assess the attitudes and behaviors of the facility's personnel toward security, and to compare those attitudes and behaviors with best practices.
2.6.3 Security responsibilities and accountabilities	EIU analyst qualitative assessment based on official national sources, which vary by country	Do domestic regulations or licensing conditions require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security and that such an individual[s] undergoes additional training and/or certification? 0 = No or information not publicly available 1 = Yes, regulations require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security 2 = Yes, regulations require that licensees or operators define an individual[s] responsible for at least one aspect of nuclear security and require that such an individual[s] undergoes additional training and/or certification This subindicator seeks to answer whether the regulator (1) requires that licensees or operators define who is responsible and/or accountable for at least one aspect of nuclear security, and (2) requires the responsible individual to undergo additional training and/or certification as part of the role. 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 an individual(s) with security responsibilities or accountabilities in at least one area of security.

Global Norms

The Global Norms 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, international assurances, and nuclear security INFCIRCs.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.1 International Legal Commitments	**Calculated from subindicators**	**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)	International Atomic Energy Agency (IAEA)	Is the state a party to the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = Non-compliant or not a party 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.1.2 2005 Amendment to the CPPNM	IAEA	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 (UN)	Is the state a party to the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)? 0 = Non-compliant or not a party 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.1.4 Convention on Nuclear Safety	IAEA	Is the state a party to the Convention on Nuclear Safety? 0 = Non-compliant or not a party 1 = Signed 2 = Signed and ratified (or action having the same legal effect)
3.2 Voluntary Commitments	**Calculated from subindicators**	**Voluntary commitments demonstrate a state's support for nuclear security.**
3.2.1 Global Initiative to Combat Nuclear Terrorism (GICNT) membership	U.S. Department of State	Is the country a member of the Global Initiative to Combat Nuclear Terrorism (GICNT)? 0 = No 1 = Yes
3.2.2 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 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction? 0 = No 1 = Yes

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.2.3 World Institute for Nuclear Security (WINS) contributions	World Institute for Nuclear Security Annual Report 2013 and 2014	Has the country provided financial or in-kind contributions to the World Institute for Nuclear Security (WINS) within the previous two years? 0 = No 1 = Yes
3.2.4 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
3.2.5 Bilateral/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
3.2.6 Centers of Excellence	EIU analyst qualitative assessment	Does the country have a Center of Excellence or Nuclear Security Training and Support Center that offers training in nuclear security? 0 = No 1 = Yes To receive credit, a Center of Excellence or Nuclear Security Training and Support Center should have the following characteristics: (a) serve as a centralized organization to facilitate broad cross-industry engagement in education and training; (b) focus on nuclear security, even if safeguards, safety, or nuclear energy are also addressed; (c) provide practical training courses; (d) provide education in the form of lectures or seminars; and (e) have government support. Centers that are not yet operational are excluded.
3.2.7 Ministerial participation in the IAEA International Conference on Nuclear Security (ICONS)	EIU analyst research	Did the country participate in the latest IAEA International Conference on Nuclear Security (ICONS) at the ministerial level? 0 = No 1 = Yes
3.2.8 Incident and Trafficking Database (ITDB)	IAEA	Does the country participate in the IAEA Incident and Trafficking Database (ITDB)? 0 = No 1 = Yes
3.2.9 Nuclear Security Guidance Committee (NSGC)	IAEA	Does the country participate in the IAEA Nuclear Security Guidance Committee (NSGC)? 0 = No 1 = Yes

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.3 International Assurances	**Calculated from subindicators**	**International assurances enhance international confidence in the effectiveness of a country's nuclear security.**
3.3.1 Published regulations	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state publicly release its nuclear security regulations? 0 = No 1 = Yes
3.3.2 Published nuclear security annual reports	EIU analyst qualitative assessment based on official national sources, which vary by country	Does the state publicly release annual reports on nuclear security issues? 0 = No 1 = Yes
3.3.3 Published nuclear security progress reports	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state made public declarations about nuclear security progress? 0 = No 1 = Yes, the state has made public declarations on nuclear security progress 2 = Yes, the state has made public declarations on nuclear security progress within the past two years To be considered a public declaration on nuclear security progress, the declaration, statement, or report must include a substantial description of nuclear security practices. A declaration, statement, or report meets the criteria if it (a) is delivered in conjunction with an international, multilateral, or regional conference on nuclear security (e.g., the 2012, 2014, 2016, or 2018 Nuclear Security Summit; the 2013, 2016, or 2020 IAEA International Conference on Nuclear Security [ICONS]; IAEA General Conferences; GICNT meetings; Global Partnership meetings; or a nuclear security treaty conference such as the CPPNM Amendment or ICSANT) and (b) provides information about actions the country has taken to strengthen its own nuclear security (e.g., passing new legislation or regulations; reducing, eliminating, or consolidating nuclear materials; converting reactors that use HEU to LEU; hosting a peer review; or other specific actions) or to strengthen the global nuclear security architecture (e.g., providing funds to the IAEA's Nuclear Security Fund; supporting the IAEA's nuclear security work; providing assistance to another country; or other specific actions). Reporting on treaty ratification does not meet the criteria for a progress report unless other actions are also reported. The specific action must have been taken within two years of the date of the report.

Indicator or Subindicator	Source	Indicator Definitions and Construction
3.3.4 Review of security arrangements	EIU analyst qualitative assessment	Has the state hosted an IAEA review or a bilateral/multilateral review of its security arrangements (excluding IPPAS missions)? 0 = No 1 = Yes 2 = Yes, within the past five years A state receives credit if it has hosted any of the following IAEA missions, including follow-up missions: International Nuclear Security Advisory Service (INSServ) mission or a State System for Accountancy and Control (SSAC) Advisory Service mission. A state also receives a "yes" if it has received bilateral or multilateral assistance (outside an international organization) to review security arrangements.
3.3.5 International Physical Protection Advisory Service (IPPAS) mission	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state hosted an International Physical Protection Advisory Service (IPPAS) mission (including follow-up missions)? 0 = No 1 = Yes 2 = Yes, within the past five years 3 = Yes, within the past five years and the state has publicly released at least a summary of the results A press release or announcement that an IPPAS mission has taken place will not receive credit. The summary must contain a more substantial description of the scope of the IPPAS mission, a summary of the outcome, and proposed follow-on steps.
3.4 Nuclear Security INFCIRCs	**Calculated from subindicators**	**Countries that have subscribed to nuclear security IAEA Information Circulars (INFCIRCs) demonstrate a commitment to international best practices in nuclear security.**
3.4.1 INFCIRC/869	IAEA	Has the state subscribed to INFCIRC/869? 0 = No 1 = Yes
3.4.2 Other nuclear security INFCIRCs	IAEA	Has the state subscribed to the following INFCIRCs: 899, 901, 904, 905, 908, 909, 912, 917, and 918? 0 = No, the state has not subscribed to any of these INFCIRCs 1 = Yes, the state has subscribed to one of these INFCIRCs 2 = Yes, the state has subscribed to two of these INFCIRCs 3 = Yes, the state has subscribed to three or more of these INFCIRCs Data are not available for this subindicator for 2016. All countries score 0 (zero) for this indicator in 2016.

Domestic Commitments and Capacity

The Domestic Commitments and Capacity category includes actions that indicate how well a country has implemented its international commitments and a country's capacity to do so. This category includes the extent of UN Security Council Resolution 1540 implementation, the status of nuclear security legislation, and the presence of an independent regulatory agency.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.1 UN Security Council Resolution (UNSCR) 1540 Implementation	**Calculated from subindicators**	**UN Security Council Resolution (UNSCR) 1540 obliges action on nuclear 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)	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 produced a 1540 report 1 = The state has produced a 1540 report
4.1.2 Extent of UNSCR 1540 implementation	Creation of a coding and scoring scheme by the EIU, based on documents from the UN 1540 Committee	Extent of implementation is identified through the measures taken by a state and reflected in its UNSCR 1540 matrix. 0 = Very weak (0–5 points) 1 = Weak (6–10 points), or matrix exists but is not publicly available 2 = Moderate (11–15 points) 3 = Good (16–20 points) 4 = Very good (21+ points) 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 the security of nuclear facilities against sabotage (out of a maximum of 25) with an "X" designation, providing a numerical score for implementation. The resulting numerical score is banded into five categories scored from 0 points to 4 points: 0 = Very weak (0–5 points) 1 = Weak (6–10 points), or matrix exists but is not publicly available 2 = Moderate (11–15 points) 3 = Good (16–20 points) 4 = Very good (21+ points) Those states that do not have a matrix have been given the lowest possible score. Countries that have a matrix, but that have not made it public, were assigned the second-lowest score to give credit for estimated levels of implementation.

Indicator or Subindicator	Source	Indicator Definitions and Construction
4.2 Domestic Nuclear Security Legislation	**Calculated from subindicators**	**The implementation of security measures is rooted in domestic nuclear security legislation.**
4.2.1 CPPNM implementation authority	EIU analyst qualitative assessment based on official national sources, which vary by country	Is there a national authority for the implementation of the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = No 1 = Yes This subindicator considers whether or not there is a national authority (state body) that is responsible for implementing the CPPNM. The convention 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 Amendment	EIU analyst qualitative assessment based on official national sources, which vary by country	Has the state fulfilled all obligations for a national legal framework for the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM)? 0 = No 1 = Yes 2 = Yes, and the country has submitted information to the IAEA as required by article 14.1 Countries are assumed to have in place a national legal framework for the CPPNM Amendment if they have submitted information to the IAEA as required by article 14.1 of the CPPNM Amendment.
4.3 Independent Regulatory Agency	**Calculated from subindicator**	**A robust and independent regulatory structure helps to ensure compliance with nuclear security-related regulations.**
4.3.1 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 An agency is deemed "independent" if it is politically independent. Political independence means that the agency is authorized and able to make regulatory decisions within the field of nuclear security in both routine work situations and crisis situations, effectively free from control or pressure from other state political bodies.

Risk Environment

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1 Political Stability	**Calculated from subindicators**	**A lack of political stability may enable lapses in nuclear security.**
5.1.1 Social unrest	EIU, Risk Briefing	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	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.
5.1.3 International disputes/ tensions	EIU, Risk Briefing	Is there a risk that international disputes/tensions will negatively affect the country 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 and/or other barriers to trade, could have destabilizing implications for the polity and, hence, for nuclear security.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.1.4 Armed conflict	EIU, Risk Briefing	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 subindicator covers armed conflict either within the territory of the state or directly threatening the state. Forms of conflict may range from sporadic or incursive conflict with non-state actors to conventional conflict with secessionist entities or other states.
5.1.5 Violent demonstrations or violent civil/labor unrest	EIU, Risk Briefing	Are violent demonstrations or violent civil/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/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	**Calculated from subindicators**	**A lack of effective governance can compromise a country's ability to establish and sustain policies to secure nuclear facilities.**
5.2.1 Effectiveness of the political system	EIU, Business Environment Ranking	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 subindicator assesses tensions between the legislative and executive branches of government, instability in government formation, and cohesion of the legislature.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.2.2 Quality of the bureaucracy	EIU, Risk Briefing	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 subindicator assesses the quality of the bureaucracy across the following criteria: overall competency/training, morale/dedication, and compensation/status.
5.3 Pervasiveness of Corruption	**Calculated from subindicator**	**Corruption affects the potential for acts of sabotage and the rigor with which nuclear 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 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 (e.g., misuse of public office for private benefit, accepting bribes, dispensing favors and patronage for private gain).
5.4 Illicit Activities by Non-State Actors	**Calculated from subindicators**	**The presence and capabilities of terrorist groups and prevalence of other illicit activities raise the risk of sabotage of nuclear facilities.**
5.4.1 Likelihood of terrorist attacks	EIU, Risk Briefing	How likely is it that domestic or foreign terrorists will attack with a frequency or severity that causes substantial disruption to business operations? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses the risk of a destabilizing terrorist attack, and therefore takes into account the country's current security outlook, political and economic stability, and resilience to such attacks.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.4.2 Firearms seized during interdiction of illicit weapons trafficking	UN Office on Drugs and Crime	How many firearms have been seized by law enforcement over the past 5 years? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses the number of weapons seized during interdiction of illicit weapons trafficking, as reported to the UN Office on Drugs and Crime. These values are then distributed into quintiles, with 0 representing the highest quintile of weapon seizures and 4 representing the lowest.
5.4.3 Domestic terrorism threat	EIU analyst qualitative assessment based on START's Global Terrorism Database and Stanford's Mapping Militants Project	Is there a terrorist group(s), as identified in START's Global Terrorism Database and/or Stanford's Mapping Militants Project, operating in the country that demonstrates the capability to sabotage a nuclear facility? 0 = Yes 8 = No This subindicator assesses whether or not an armed group, as identified by either START's Global Terrorism Database or Stanford University's Mapping Militants Project, exists within the country that has committed an attack involving three or more attackers using automatic weapons and/or explosives. The Nuclear Security Index is weighted at the indicator level. 5.4.4, Neighboring Terror Threat, is scored from 0 to 4. To maintain relative risk of each subindicator, 5.4.3, Domestic Terrorism Threat, is scored as a binary 0/8. This ensures countries with domestic terror risks receive a lower overall score for 5.4, Illicit Activities by Non-State Actors.

Indicator or Subindicator	Source	Indicator Definitions and Construction
5.4.4 Neighboring terror threat	EIU analyst qualitative assessment based on official national sources, which vary by country	How high is the risk that terrorist groups in neighboring countries have the capability to sabotage nuclear facilities? 0 = Very high 1 = High 2 = Moderate 3 = Low 4 = Very low This subindicator assesses whether an armed group, as identified by either START's Global Terrorism Database or Stanford University's Mapping Militants Project, exists within nearby countries that has committed an attack involving three or more attackers using automatic weapons and/or explosives. Each neighboring country is assigned a "Yes" or "No." A country's score is the combination of the average of the binary "Yes" or "No" scores for all neighboring countries and the average of the binary "Yes" or "No" scores for all countries within the region. A weighting scheme is applied so that the average score for neighboring countries represents 75% of the overall score and the average score for regional countries represents 25% of the overall score.

SELECTED BIBLIOGRAPHY

Note: EIU qualitative assessments are based on official national sources, which vary by country.

Common Primary and Secondary Sources

Cann, Michelle, Kelsey Davenport, and Jenna Parker. *The Nuclear Security Summit: Progress Report on Joint Statements*. March 2015. See www.armscontrol.org/files/ACA_NSS_Report_2015.pdf.

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

IAEA (International Atomic Energy Agency). Nuclear Fuel Cycle Information System. See infcis.iaea.org/NFCIS/Facilities.

IAEA (International Atomic Energy Agency). Research Reactor Database. See nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx.

Institute for Science and International Security. Homepage. See www.isis-online.org/.

IPFM (International Panel on Fissile Materials). *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. See fissilematerials.org/library/gfmr13.pdf.

James Martin Center for Nonproliferation Studies. Homepage. See cns.miis.edu/.

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

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

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

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

World Nuclear Association. Reactor Database. See world-nuclear.org/NuclearDatabase/Default.aspx?id=27232.

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." See www.eiu.com.

Sources for Illicit Activities by Non-State Actors (5.4)

Global Terrorism Database. National Consortium for the Study of Terrorism and Responses to Terrorism, College Park, MD, 2011. See www.start.umd.edu/data-tools/global-terrorism-database-gtd.

Stanford University. Mapping Militants Project. See web.stanford.edu/group/mappingmilitants/cgi-bin/.

Sources for Filter and Highlight Groups in NTI Index Models

Nuclear Power Programs
IAEA (International Atomic Energy Agency). "Number of Power Reactors by Country and Status." See pris.iaea.org/PRIS/CountryStatistics/CountryStatisticsLandingPage.aspx.

Planned or Proposed Nuclear Power Programs
World Nuclear Association. "Emerging Nuclear Energy Countries." World Nuclear Association, London, 2019. See www.world-nuclear.org/information-library/country-profiles/others/emerging-nuclear-energy-countries.aspx.

Countries with Only Research Reactors
World Nuclear Association. "World Nuclear Power Reactors and Uranium Requirements." World Nuclear Association, London, 2019. www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/.

EIU Methodology: Radiological

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SUMMARY

To better understand global trends on radioactive source security, the Nuclear Threat Initiative (NTI) commissioned The Economist Intelligence Unit (EIU) to construct a Radioactive Source Security Assessment that measures national policies, commitments, and actions governing radioactive sources, as well as the risks associated with radioactive sources, across 175 countries and Taiwan.[22]

The Radioactive Source Security Assessment groups policies, commitments, and actions, as well as factors that affect the overall risk environment, into a four-part framework:

1. **National Measures:** The national measures in place to manage and secure radioactive sources
2. **Global Norms:** The country's international commitments and support for global norms around radioactive source security
3. **Commitment and Capacity to Adopt Alternative Technologies:** The country's capacity for introducing alternative technologies to replace high-activity radioactive source applications
4. **Risk Environment:** The risk environment and its potential effect on the security of radioactive sources

Given that radioactive sources are present around the world, indicators within each of these four categories were selected for their application on a global scale. They represent data points that are relevant and important to radioactive sources and their security, are readily available for all or most countries, and do not require in-depth country-by-country research into laws and regulations. As a result, indicators may not independently paint a complete picture of the radiological security environment.

Additionally, the framework does not produce scores or rankings of countries, unlike the rankings in the Nuclear Security Index. Together, however, the data points provide insight into priorities for improving the governance and security of radioactive sources, serve to reinforce global norms, and provide a foundation for future in-depth analysis.

A panel of radiological security experts informed the development of this framework and its associated indicators. The experts helped to identify priorities for radioactive source security and available data sources.

The indicators in the Radioactive Source Security Assessment are embedded in a model (available as an Excel workbook at www.ntiindex.org) that offers a wide range of analytical tools, allowing for a deeper investigation of measures of radiological security globally. For example, users can filter countries individually, by region, or by membership in international organizations or multilateral initiatives. This model shares many of the same features as the Nuclear Security Index models, providing easy access for users who are familiar with the Nuclear Security Index.

[22] Given Taiwan's status, this Methodology describes the number of countries in the Radioactive Source Security Assessment as "175 countries and Taiwan." Further references to numbers of countries in this Methodology include Taiwan.

ASSESSMENT CRITERIA AND CATEGORIES

The 2020 Radioactive Source Security Assessment has a four-part framework. Each of the four categories includes between three and six indicators. Details of these indicators are outlined below.

National Measures (Category A)

This category uses five indicators to assess a country's domestic policies, commitments, and actions for managing and securing radioactive sources. The first two indicators ask whether a country has an independent regulatory body to provide oversight over radioactive sources and whether a country's domestic laws and regulations explicitly require security (not just safety) measures to be in place to protect radioactive sources. The third indicator assesses whether the country maintains a national registry of radioactive sources, a key step in tracking and accounting for sources at the national level. The fourth indicator assesses whether the country has authority to inspect facilities with radioactive sources. The fifth indicator asks whether the country has licensing requirements for the export of International Atomic Energy Agency (IAEA) Category 1[23] radioactive sources.

Global Norms (Category B)

This category uses three indicators to assess a country's international commitments and support for global norms around radioactive sources. The first indicator examines the extent of each country's commitments within the context of the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, including a country's political commitment to the Code of Conduct; political commitment to the Supplemental Guidance on the Import and Export of Radioactive Sources and the related actions to nominate a point of contact and submit answers to the Import and Export Questionnaire; and political commitment to the Supplemental Guidance on the Management of Disused Radioactive Sources.

The second indicator assesses whether a country participates in international organizations or conferences related to the security of radioactive sources. It assesses whether a country participates in the Global Initiative to Combat Nuclear Terrorism (GICNT) and whether the country sent an official delegation to the IAEA's International Conference on the Security of Radioactive Material, held in 2018.[24]

The third indicator measures whether the country is party to three international legal agreements related to radiological security: the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, and the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency.

[23] Category 1 sources are radioactive materials that, according to the IAEA, "would be likely to cause permanent injury to a person who handled it, or were otherwise in contact with it, for more than a few minutes." IAEA Category 1 sources are radioisotope thermoelectric generators (RTGs); irradiators; teletherapy sources; and fixed, multibeam teletherapy (gamma knife) sources. www-pub.iaea.org/MTCD/publications/PDF/Pub1227_web.pdf.

[24] International Conference on the Security of Radioactive Material: The Way Forward for Prevention and Detection December 3–7, 2018, Vienna, Austria. www.iaea.org/events/security-of-radioactive-material-conference-2018.

Commitment and Capacity to Adopt Alternative Technologies (Category C)

The third category assesses a country's commitment to supporting the development and implementation of alternative technology to high-activity radioactive sources. This category captures each country's commitment through three proxy indicators: intent, implementation, and capacity.

The first indicator assesses intent by asking whether a country has subscribed to IAEA Information Circular 910 (INFCIRC/910), which was derived from the 2016 Nuclear Security Summit Joint Statement on Strengthening the Security of High Activity Sealed Radioactive Sources (HASS). INFCIRC/910 calls on countries to support, among other commitments, the development of non-HASS technologies (whether isotopic or not) through research and development and to promote them as far as technically and economically feasible.

The second indicator assesses implementation by asking whether a country has publicly declared a regulatory requirement, policy, or commitment to implementing alternative technology to high-activity radioactive sources. The primary sources for this indicator were national progress reports from the 2016 Nuclear Security Summit and national statements from the 2020 IAEA International Conference on Nuclear Security.

The third indicator comprises two subindicators to assess each country's capacity to sustainably implement alternative technologies to high-activity radioactive sources. The first of these subindicators measures the number of blackouts per month that local businesses face, under the assumption that a stable power supply is a precondition for adopting alternative technologies such as linear accelerators (LINACs) or X-ray-based technologies. The second subindicator measures the percentage of the country's population over the age of 25 with a tertiary degree or higher. This measure is a proxy for having a population with skilled workers, because a skilled workforce is required to implement new technologies. For example, replacing cobalt-60 teletherapy devices with LINACs requires highly qualified personnel (radiation therapists and medical physicists).

Risk Environment (Category D)

The final category assesses a country's risk environment through four indicators: Political Stability, Effective Governance, Pervasiveness of Corruption, and Illicit Activities by Non-State Actors. The first three of these indicators (Political Stability, Effective Governance, and Pervasiveness of Corruption) are directly incorporated from the Nuclear Security Index (denoted by asterisks in the chart below) and consist of several subindicators. These subindicators include, among other things, the presence of armed conflict, the effectiveness of a country's political system, and the extent of corruption in the country's public and private sectors.

The fourth indicator assesses illicit activities of non-state actors, including terrorist groups and criminal networks through three subindicators: the likelihood of terrorist attacks, the risk of organized crime, and the number of firearms seized as part of the interdiction of illicit arms trafficking.

The categories, indicators, and subindicators are as follows:

TITLE		SCORING	SOURCE
A	**National Measures**		
A.1	**Regulatory Oversight**		
A.1.1	Does the country maintain a radioactive source regulatory oversight body?	Binary (Yes/No or no data available)	International Atomic Energy Agency (IAEA)

* Denotes indicators that were directly incorporated from the Nuclear Security Index.

TITLE		SCORING	SOURCE
A.2	**Security Measures**		
A.2.1	Are there regulations that require security measures to be in place to protect radioactive sources?	Binary (Yes/No or no data available)	Stimson Center Radiological Sources Security Database
A.3	**State Registry**		
A.3.1	Does the state maintain a national registry of radioactive sources?	Binary (Yes/No or no data available)	Stimson Center Radiological Sources Security Database
A.4	**Inspection Authority**		
A.4.1	Does the state have authority to inspect facilities with radioactive sources?	Binary (Yes/No or no data available)	Stimson Center Radiological Sources Security Database
A.5	**Export Licenses**		
A.5.1	Are there licensing requirements for exporting IAEA Category 1 sources?	Binary (Yes/No or no data available)	Stimson Center Radiological Sources Security Database
B	**Global Norms**		
B.1	**IAEA Code of Conduct Status**		
B.1.1	Has the state made a political commitment and notified the IAEA of its intent to abide by the Code of Conduct on the Safety and Security of Radioactive Sources?	Binary (Yes/No or no data available)	IAEA
B.1.2	Has the state notified the IAEA of its intent to abide by the Guidance on the Import and Export of Radioactive Sources?	Binary (Yes/No or no data available)	IAEA
B.1.3	Has the state nominated a Point of Contact to facilitate imports and exports of radioactive source material?	Binary (Yes/No or no data available)	IAEA
B.1.4	Has the state made available its responses to the IAEA Importing and Exporting States Questionnaire?	Binary (Yes/No or no data available)	IAEA
B.1.5	Has the state notified the IAEA of its commitment to implement the Guidance on the Management of Disused Radioactive Sources?	Binary (Yes/No or no data available)	IAEA
B.2	**International Participation**		
B.2.1	Does the state participate in the Global Initiative to Combat Nuclear Terrorism (GICNT)?	Binary (Yes/No or no data available)	GICNT
B.2.2	Did the state send an official delegation to the 2018 International Conference on the Security of Radioactive Material?	Binary (Yes/No or no data available)	IAEA

* Denotes indicators that were directly incorporated from the Nuclear Security Index.

TITLE		SCORING	SOURCE
B.3	**International Conventions**		
B.3.1	Is the country a state party to the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)?	Binary (Yes/No or no data available)	IAEA
B.3.2	Is the country a state party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management?	Binary (Yes/No or no data available)	IAEA
B.3.3	Is the country a state party to the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency?	Binary (Yes/No or no data available)	IAEA
C	**Commitment and Capacity to Adopt Alternative Technologies**		
C.1	**Intent**		
C.1.1	Has the state subscribed to IAEA Information Circular 910 (INFCIRC/910)?	Binary (Yes/No or no data available)	IAEA
C.2	**Implementation**		
C.2.1	Has the country publicly declared a regulatory requirement, policy, or commitment to implementing alternative technology to replace high-activity radioactive sources?	Yes/No or no data available	Nuclear Threat Initiative research
C.3	**Capacity**		
C.3.1	What is the average percentage of businesses experiencing power outages each month?	Quantitative (%) X = No data available E = Frequent power outages (80th–99th percentile) D = 60th–79th percentile C = 40th–59th percentile B = 20th–39th percentile A = Infrequent power outages (0–19th percentile)	World Bank
C.3.2	What percentage of the population over 25 holds a tertiary degree or higher?	Quantitative (%) X = No data available E = Few people with degrees (0–19th percentile) D = 20th–39th percentile C = 40th–59th percentile B = 60th–79th percentile A = Many people with degrees (80th–99th percentile)	United Nations (UN)

* Denotes indicators that were directly incorporated from the Nuclear Security Index.

TITLE		SCORING	SOURCE
D	**Risk Environment**		
D.1	**Political Stability***		
D.1.1	Social unrest: What is the risk of significant social unrest during the next two years?	X = No data available E = Very high D = High C = Moderate B = Low A = Very low	The Economist Intelligence Unit (EIU) Risk Briefing
D.1.2	Orderly transfers of power: How clear, established, and accepted are constitutional mechanisms for the orderly transfer of power from one government to another?	X = No data available E = Not clear, established, or accepted D = Two of the three criteria are absent C = One of the three criteria is absent B = Clear, established, and accepted A = Very clear, established, and accepted	EIU Risk Briefing
D.1.3	International disputes/tensions: Is there a risk that international disputes or tensions will negatively affect the polity during the next two years?	X = No data available E = Very high D = High C = Moderate B = Low A = No threat	EIU Risk Briefing
D.1.4	Armed conflict: Is this country presently subject to armed conflict, or is there at least a moderate risk of such conflict during the next two years?	X = No data available E = Territorial conflict; opposition has effective control over a region or regions D = Sporadic and incursive conflict C = Incursive conflict; government remains in control, but opposition engages in frequent armed incursions B = Sporadic conflict; government control is firm, but opposition engages in isolated incidents of violence A = No armed conflict exists	EIU Risk Briefing
D.1.5	Violent demonstrations or violent civil/labor unrest: Are violent demonstrations or violent civil or labor unrest likely to occur during the next two years?	X = No data available E = Very high D = High C = Moderate B = Low A = Very low	EIU Risk Briefing

* Denotes indicators that were directly incorporated from the Nuclear Security Index.

TITLE		SCORING	SOURCE
D.2	**Effective Governance***		
D.2.1	Effectiveness of the political system: How effective is the country's political system in formulating and executing policy?	X = No data available E = Very low D = Low C = Moderate B = High A = Very high	EIU Business Environment Ranking
D.2.2	Quality of the bureaucracy: What is the quality of the country's bureaucracy and its ability to carry out government policy?	X = No data available E = Very low D = Low C = Moderate B = High A = Very high	EIU Risk Briefing
D.3	**Pervasiveness of Corruption***		
D.3.1	Pervasiveness of corruption: How pervasive is corruption among public officials?	X = No data available E = Very high D = High C = Moderate B = Low A = Very low	EIU Risk Briefing
D.4	**Illicit Activities by Non-State Actors**		
D.4.1	Likelihood of terrorist attacks: How likely is it that domestic or foreign terrorists will attack with a frequency or severity that causes substantial disruption to business operations?	X = No data available E = Very high D = High C = Moderate B = Low A = Very low	EIU Risk Briefing
D.4.2	Risk of organized crime: How likely is organized crime to be a problem for government and/or business?	X= No data available E = Very high D= High C = Moderate B = Low A = Very low	EIU Risk Briefing
D.4.3	Illicit weapons trafficking: How many firearms were seized during the interdiction of illicit weapons trafficking?	Banded quintiles X = No data available E = Very high D = High C = Moderate B = Low A = Very low	UN Office on Drugs and Crime

* Denotes indicators that were directly incorporated from the Nuclear Security Index.

ASSESSMENT CONSTRAINTS AND OTHER IMPORTANT FACTORS

The Radioactive Source Security Assessment is the first worldwide assessment of radiological security. As such, it not only provides interesting insights into the status of radiological security, but also serves as a feasibility study to determine the availability of information needed to assess radiological security around the world. The Radioactive Source Security Assessment relies on publicly available information, which means the methodology is transparent and repeatable. Unlike the research conducted for the Nuclear Security Index, for this initial Assessment The EIU did not conduct in-depth country research into laws and regulations and instead relied on publicly available information that is easily accessible from existing databases or other consolidated resources. As a result of these research constraints, certain factors relevant to radiological security, such as the number of IAEA Category 1–2 radioactive sources in each country (information that is not publicly available) or other regulatory requirements that might exist in some countries (requiring in-depth country research), were not included in the Assessment.

For a limited set of indicators, a result of "No" can represent either a negative response to the question or that no data are available. This option has been applied to indicators for which there is a clear lack of publicly accessible data. The Assessment's limited scope precluded in-depth research for each country to determine the availability of data; however, in places where trusted secondary sources have conducted country-by-country research, such as that found in the Stimson Center Radiological Sources Security Database, the Assessment relies upon the determination of those sources regarding the availability of public information for select indicators.

It should also be noted that the Radioactive Source Security Assessment represents a selection of indicators of security conditions and not a comprehensive set of actions that countries and their respective facilities should adopt to protect against the theft or sabotage of radioactive sources. For example, for security reasons information regarding the types of physical protection measures, such as locking mechanisms or surveillance systems mandated at facilities with radioactive sources, is not publicly available. The exclusion of specific security practices from the Radioactive Source Security Assessment does not reflect their lack of importance, but instead reflects the Assessment's goal of setting a baseline understanding of the status of radiological security worldwide, as well as of the research constraints.

METHODOLOGY

The Radioactive Source Security Assessment comprises categories that are related to the radiological security conditions for each country.

To collect data for the Radioactive Source Security Assessment, the EIU research team gathered data from the following sources:

- IAEA and international organization publications and reports
- National statements at multilateral events such as the 2016 Nuclear Security Summit and the 2020 IAEA International Conference on Nuclear Security
- Academic publications
- Data collected by government authorities, international organizations, and non-governmental organizations such as the Stimson Center
- EIU proprietary country rankings and reports (specifically "Risk Briefing" and the "Business Environment Ranking")
- Interviews with experts

See *Selected Bibliography* for more information on central sources.

Given the widespread use of radioactive sources in sectors as diverse as health care, agriculture, and industry, the Radioactive Source Security Assessment assumes that radioactive sources are present in or transported through each of the 176 countries included in the Assessment. These countries are listed below in alphabetical order.

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Canada
Cape Verde
Central African Republic
Chad
Chile
China
Colombia
Comoros
Congo (Brazzaville)
Congo (Democratic Republic of)
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
France
Gabon
Gambia
Georgia
Germany
Ghana
Greece
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
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
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
North Korea
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russia
Rwanda
Samoa
São Tomé and Príncipe
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Solomon Islands
Somalia
South Africa
South Korea
Spain
Sri Lanka
Sudan
Suriname
Swaziland
Sweden
Switzerland
Syria
Taiwan
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

RESEARCH BEHIND SELECTED INDICATORS

This section focuses on the research behind selected indicators, and it includes an explanation for the answer choices behind several of the more complex variables created by the EIU. Scoring criteria for all the indicators are included in the section titled *Assessment Criteria and Categories*.

A.1 National Measures: Regulatory Oversight

Indicator A.1 assesses whether or not the country maintains a regulatory body with oversight of radioactive sources. Data for this indicator are available through the IAEA Directory of National Regulatory Bodies for the Control of Radiation Sources, as well as the Stimson Center's Radiological Sources Security Measure Level and State Level Databases. In reviewing these sources, NTI and the EIU decided to use the IAEA's Directory of National Regulatory Bodies for the Control of Radiation Sources because it most closely aligned with the methodological direction of this Assessment. The Stimson Center captured only the existence of oversight bodies in countries where "security" was referenced in regulations, potentially excluding oversight bodies that deal only with safety. By using the IAEA Directory, the Assessment identifies countries that have a regulatory body with oversight of any aspect of radioactive sources, whereas A.2 assesses whether a country's regulatory body has oversight over security of radioactive sources, specifically.

C.1–C.2 Commitment and Capacity to Adopt Alternative Technology: Intent, Implementation

In evaluating a country's commitment and capacity to adopt alternative technologies, the EIU relied on publicly available information to evaluate intent, implementation, and capacity.

To measure intent in indicator C.1, the EIU used country support for IAEA INFCIRC/910, the Joint Statement on Strengthening the Security of High Activity Sealed Radioactive Sources (HASS), as a proxy. One of the commitments in INFCIRC/910 is to support the development of non-HASS technologies (whether isotopic or not) through research and development and to promote them as far as technically and economically feasible.

To measure implementation in indicator C.2, the EIU reviewed whether a country has publicly declared a regulatory requirement, policy, or commitment to implementing alternative technology to high-activity radioactive sources. National progress reports from the 2016 Nuclear Security Summit and national statements from the 2020 IAEA International Conference on Nuclear Security: Sustaining and Strengthening Efforts were used to evaluate specific actions or commitments by countries to minimize radioactive material use through non-radioisotopic alternative technologies. If the country made an affirmative statement, that country received an answer choice of "Yes." If it made no statement, the answer choice was "No."

D.1–D.4 Risk Environment: Political Stability, Effective Governance, Pervasiveness of Corruption, Illicit Activities by Non-State Actors

The Risk Environment category comprises four indicators. The Political Stability, Effective Governance, and Pervasiveness of Corruption indicators and two of the three subindicators in the Illicit Activities by Non-State Actors Indicator are scored on the basis of proprietary information contained in the EIU's Risk Briefing and its Business Environment Rankings.

D	RISK ENVIRONMENT	
D.1	**Political Stability**	**Source**
D.1.1	Social unrest	Economist Intelligence Unit (EIU) Risk Briefing
D.1.2	Orderly transfers of power	EIU Risk Briefing
D.1.3	International disputes/tensions	EIU Risk Briefing
D.1.4	Armed conflict	EIU Risk Briefing
D.1.5	Violent demonstrations or violent civil/labor unrest	EIU Risk Briefing
D.2	**Effective Governance**	
D.2.1	Effectiveness of the political system	EIU Business Environment Ranking
D.2.2	Quality of the bureaucracy	EIU Risk Briefing
D.3	**Pervasiveness of Corruption**	
D.3.1	Pervasiveness of corruption	EIU Risk Briefing
D.4	Illicit Activities by Non-State Actors	
D.4.1	Likelihood of terrorist attacks	EIU Risk Briefing
D.4.2	Risk of organized crime	EIU Risk Briefing

In the Risk Briefing and Business Environment Ranking assessments, which are updated once per quarter, the EIU considers present conditions and 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 more than 900 country analysts who undertake the research for each indicator. Analysts can view the scoring for other countries, which enables consistency across countries; the editorial team, which includes risk heads for every region, provides additional oversight.

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 900 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 United Nations (UN), Central Intelligence Agency (CIA), International Monetary Fund, World Bank, International Institute for Management Development, International Labor Organization, and Interpol.

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

D.4.3 Firearms seized during interdiction of illicit weapons trafficking

Unlike the rest of the Risk Environment category, D.4.3 does not rely upon EIU data. Instead, the indicator measures the number of weapons seized during interdiction of illicit weapons trafficking over the last five years. This indicator was included to approximate the prevalence of smuggling routes, which increase the chances that stolen or lost radioactive material ends up in the hands of non-state or terrorist networks. The data on gun seizures are collected and published by the UN Office on Drugs and Crime. The EIU collated these data, then banded each country into quintiles (A = Very low, B = Low, C = Moderate, D = High, E = Very high) according to the number of weapons seized. As a result, the countries with the highest number of seizures receive a rating of "E = Very high," whereas countries with few seizures receive a rating of "A = Very low." Data on weapons seizures were limited to approximately half of the 176 countries included in this Assessment. Countries for which no data on weapons seizures were available received a rating of "X = No data."

SELECTED BIBLIOGRAPHY

GICNT (Global Initiative to Combat Nuclear Terrorism). Homepage. See www.gicnt.org/.

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

IAEA (International Atomic Energy Agency). IAEA Code of Conduct Status List. See nucleus.iaea.org/sites/ns/code-of-conduct-radioactive-sources/Documents/Status_list 22 January 2020 .pdf.

IAEA (International Atomic Energy Agency). IAEA Convention on Nuclear Safety Status List. See www-legacy.iaea.org/Publications/Documents/Conventions/nuclearsafety_status.pdf.

IAEA (International Atomic Energy Agency). IAEA Directory of National Regulatory Bodies for the Control of Radiation Sources. See www.iaea.org/sites/default/files/18/02/coc-reg-auth-directory.pdf.

IAEA (International Atomic Energy Agency). IAEA INFCIRC/910. See www.iaea.org/sites/default/files/publications/documents/infcircs/2017/infcirc910.pdf.

Stimson Center. Radiological Sources Security Measure Level Database. See www.stimson.org/2019/radiological-sources-security-measures-level-database/.

Stimson Center. Radiological Sources Security State Level Database. See www.stimson.org/2019/radiological-sources-security-state-level-database/.

UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute of Statistics. Education & Literacy data. See uis.unesco.org/.

United Nations Office on Drugs and Crime. Illicit arms flow data. See dataunodc.un.org.

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

World Bank. Power Outages in Firms in a Typical Month. See https://data.worldbank.org/indicator/IC.ELC.OUTG.