NTI Paper

JUNE 2015

The Case for Highly Enriched Uranium-Free Zones

SUMMARY

Highly enriched uranium (HEU)—one of the key ingredients for nuclear weapons—is one of the most dangerous materials on the planet. Significant progress has been made over the past several years to eliminate all HEU from 26 countries and Taiwan. The creation of regional HEU-Free Zones would help cement a global norm against civilian HEU use in much the same way that Nuclear-Weapon-Free Zones have strengthened global non-proliferation and disarmament efforts. In many cases, only one or two countries in each proposed regional HEU-Free Zone have small amounts of remaining HEU, presenting an opportunity for countries to take action prior to the Nuclear Security Summit in 2016.

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FMWG fissile materials working group

This concept paper was developed by a working group on "The Elimination of Highly Enriched Uranium in Civilian Applications," which is a project of the Fissile Materials Working Group (FMWG). The FMWG is a coalition of 80 civil society organizations from around the world committed to improving fissile materials security. Some initial work on this concept was also funded by the Nuclear Threat Initiative (NTI).

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About the Nuclear Threat Initiative
The Nuclear Threat Initiative (NTI) is a non-profit, non-partisan organization with a mission to strengthen global security by reducing the risk of use and preventing the spread of nuclear, biological, and chemical weapons and to work to build the trust, transparency, and security that are preconditions to the ultimate fulfillment of the Non-Proliferation Treaty's goals and ambitions. Founded in 2001 by former U.S. Senator Sam Nunn and CNN founder Ted Turner, NTI is guided by a prestigious, international board of directors. Joan Rohlfing serves as president.

About the James Martin Center for Nonproliferation Studies
The James Martin Center for Nonproliferation Studies (CNS) strives to combat the spread of weapons of mass destruction (WMD) by training the next generation of non-proliferation specialists and disseminating timely information and analysis. CNS at the Middlebury Institute of International Studies at Monterey is the largest non-governmental organization in the United States devoted exclusively to research and training on non-proliferation issues.

The Concept

Securing commitments from countries around the globe to minimize civilian use of highly enriched uranium (HEU) has long been a global priority.[1] Significant progress has been made in this regard through international efforts and through the Nuclear Security Summit (NSS) process. **To date, all HEU has been removed from 26 countries plus Taiwan: Austria, Brazil, Bulgaria, Chile, Columbia, Czech Republic, Denmark, Georgia, Greece, Hungary, Iraq, Latvia, Libya, Mexico, Philippines, Portugal, Romania, Serbia, Slovenia, South Korea, Spain, Sweden, Taiwan, Thailand, Turkey, Ukraine, and Vietnam.**

Yet, as the final NSS approaches in 2016, there is a need for a more comprehensive strategy to eliminate HEU from the civilian sector. One part of this strategy could be the creation of HEU-Free Zones, analogous to Nuclear-Weapon-Free-Zones (NWFZs), where countries within the zone may not possess or allow for the transfer of HEU within their territory. Regions such as Latin America and Southeast Asia, which have essentially been cleared of such materials,[2] could pledge to establish such zones as "gift baskets" to the 2016 NSS. "Gift baskets" are pledges by a subset of countries in the NSS process that have a common interest in strengthening nuclear security in a particular area.

Leadership to establish HEU-Free Zones in Latin America and Southeast Asia might also help inspire similar action in other regions, such as Africa, Eastern and Central Europe, and the Middle East, thus providing leverage to encourage Belarus and South Africa—which retain large stocks of HEU—to part with them. HEU-Free Zones also may support other disarmament and non-proliferation efforts, particularly in Europe and the Middle East.

Countries that lead such efforts could serve as regional champions who could help drive the HEU elimination agenda after the 2016 NSS process ends. Creating HEU-Free Zones would provide a means of sustaining momentum in much the same way NWFZs have contributed to global non-proliferation and disarmament efforts and would help cement a global norm against civilian HEU use.

Building on the 2014 Joint Statement on Countries Free of HEU

States could pledge to establish regional HEU-Free Zones in their national commitment, as well as in gift baskets to the 2016 NSS. Such pledges would serve as an appropriate follow-on to the 2014 NSS Joint Statement by the 12 countries that recently removed all HEU from their territory. That statement lauded these countries for playing a "leadership role in a global trend away from highly enriched uranium in civilian uses."[3] The 12 countries that signed the Joint Statement were Chile, the Czech Republic, Denmark, Georgia, Hungary, Mexico, Republic of Korea, Romania, Sweden, Turkey, Ukraine, and Vietnam.

The 2014 Joint Statement also noted that the signatories:

> Applaud other countries that have similarly eliminated HEU and encourage all countries to support HEU minimization efforts to the greatest extent feasible, including those in a position to do so to eliminate all HEU from their territories in advance of the fourth Nuclear Security Summit to be held in 2016.[4]

[1] HEU is uranium containing 20 percent or more of the isotope U-235.

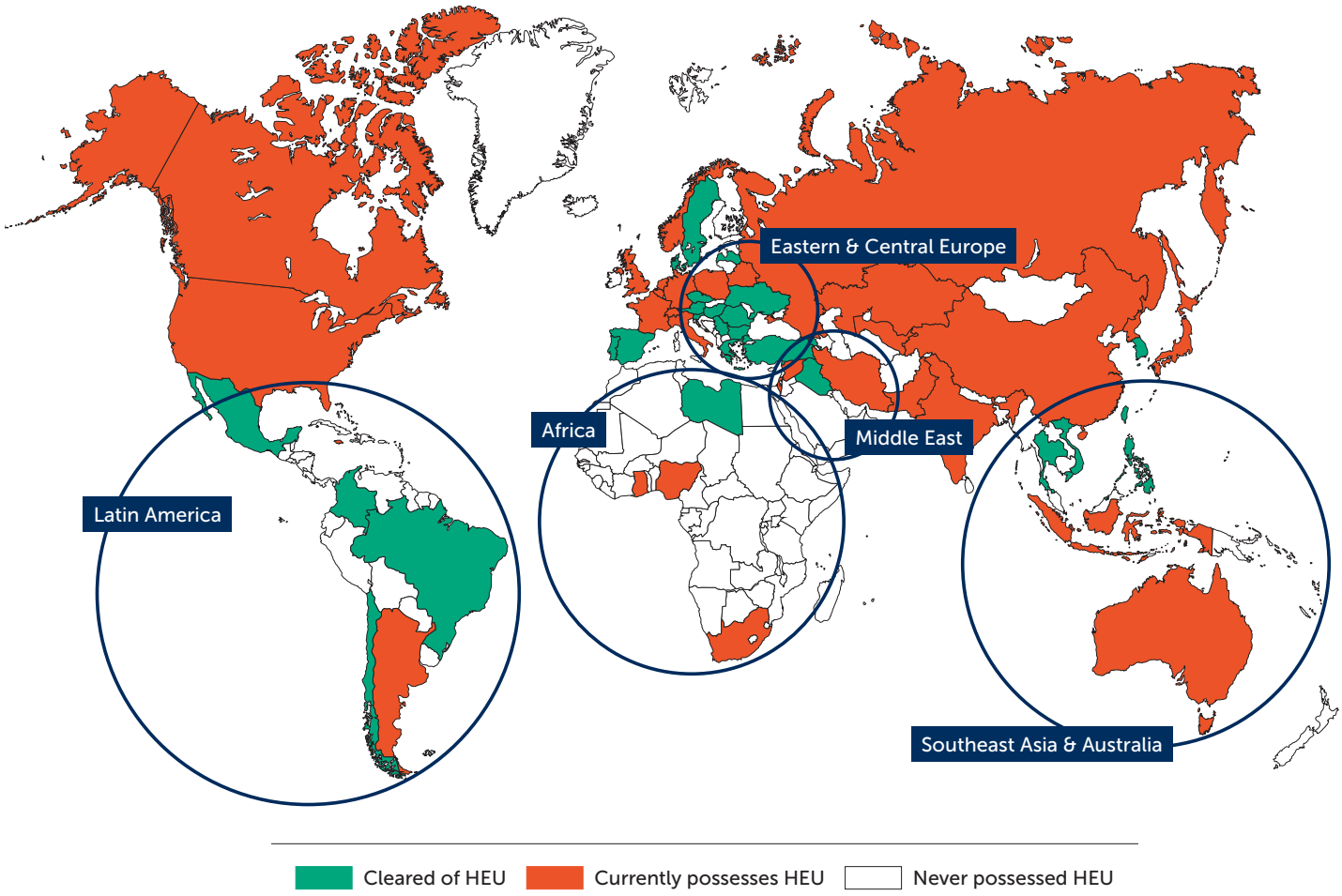
[2] Graham Allison, "The Easiest Way We Could Stop the Prospect of Nuclear Terrorism," The Atlantic, March 24, 2014, http://www.defenseone.com/threats/2014/03/easiest-way-we-could-stop-prospect-nuclear-terrorism/81157/. Allison notes that HEU has been cleared from the countries involved in the Association of Southeast Asian Nations (ASEAN). In Latin America, Allison notes that the lone holdout, Argentina, has 17 kilograms of HEU. However, IAEA officials have told CNS that they expect that material to be cleared soon.

[3] *Joint Statement on Countries Free of Highly Enriched Uranium (HEU)*, March 24, 2014, www.nss2014.com/sites/default/files/documents/joint_statement_on_countries_free_of_highly_enriched_uranium_heu_final_version_24_march.pdf.

[4] Ibid.

One or more members of the 2014 Joint Statement from each region could lead the establishment of an HEU-Free Zone in their respective regions. In addition, countries such as Belarus and South Africa, which continue to hold large stocks of HEU, could be encouraged to participate in such an initiative as a means of receiving additional political benefit for taking this step.

Proposed HEU-Free Zones



Source: Data collected from various sources including *NTI Nuclear Materials Security Index, Building a Framework for Assurance, Accountability, and Action*, Second Edition (Washington, D.C.: NTI, January 2014), http://ntiindex.org/; International Panel on Fissile Materials, *Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step Toward Disarmament* (Princeton, N.J.: 2013); and documents from the 2010, 2012, and 2014 NSS.

Proposed Regional HEU-Free Zones

Latin America

With only a small amount of HEU left in Argentina, Latin America has largely been cleared of this material. The current plan is to downblend the small remaining quantity of HEU to LEU in **Argentina** by the end of 2015. As a result, numerous government and non-government experts have proposed establishing either an HEU- or Nuclear-Weapons-Usable-Material Free Zone in the region.[5]

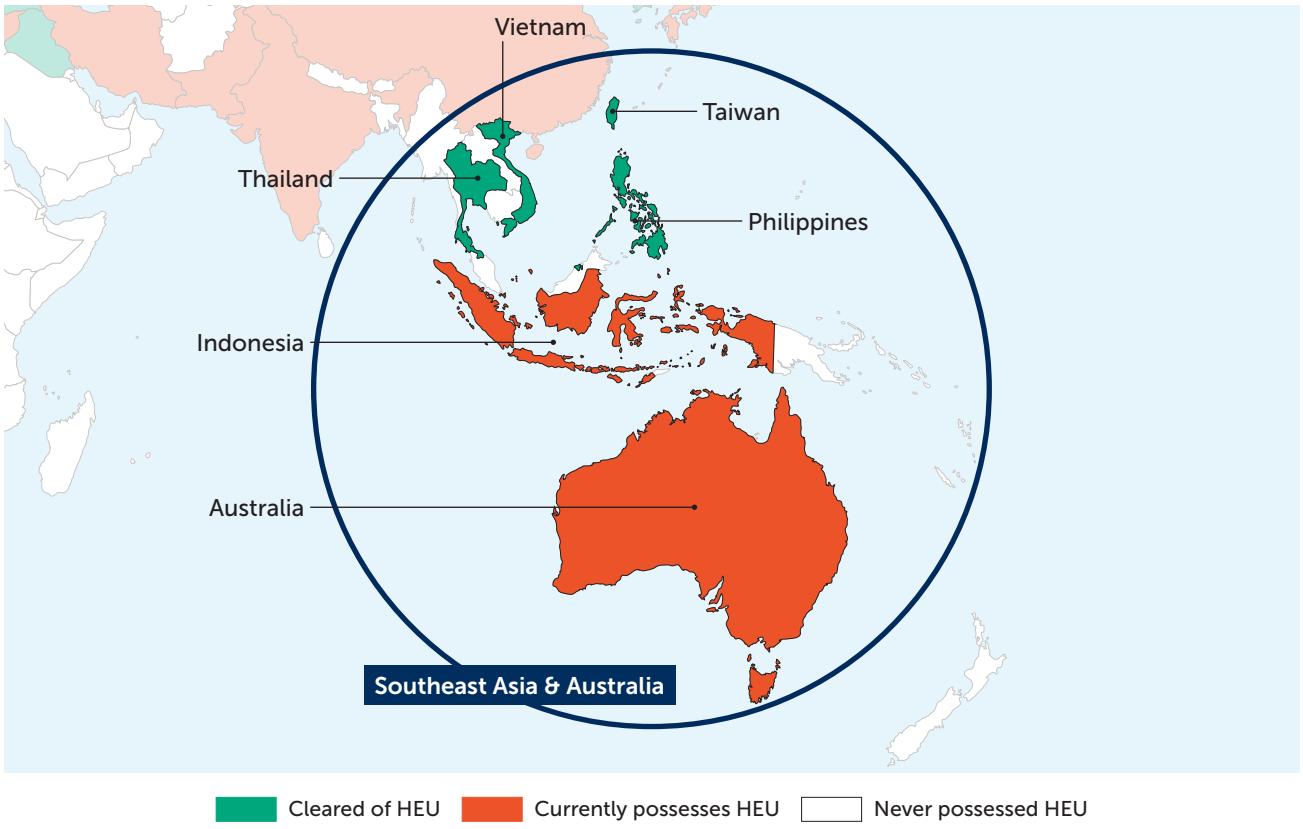
Latin America was a leader in establishing NWFZs. The Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) was the first such treaty, and its 1967 entry into force predated the Nuclear Non-Proliferation Treaty (NPT). With an HEU-Free Zone, the region could be encouraged to play a similar leadership role on HEU issues.

Mexico, as the home of the original NWFZ and a participant in the 2014 gift basket, might be a natural leader. **Chile**, which also signed the 2014 NSS Joint Statement by HEU-free countries, might be another country to lead this initiative or pursue it jointly with Mexico. Both Mexico and Chile are members of the Non-Proliferation and Disarmament Initiative (NPDI), a coalition of countries that support transparency and the negotiation of the Fissile Material Cut-Off Treaty. HEU-Free Zones are a natural fit for the NPDI agenda.

Proposed Latin America HEU-Free Zone

[5] See for example, Carlos Feu Alvim, "ABACC System Can Originate a Weapons-Usable Nuclear Material Free Zone" (presentation, 2nd International Symposium on HEU Minimization, Nuclear Threat Initiative, Vienna, Austria, January 23–25, 2012), https://www.nti.org/media/pdfs/Carlos_Feu_Alvim_-_HEU_Symposium_-_Vienna_25_jan_2012.pdf?_=1328045487.

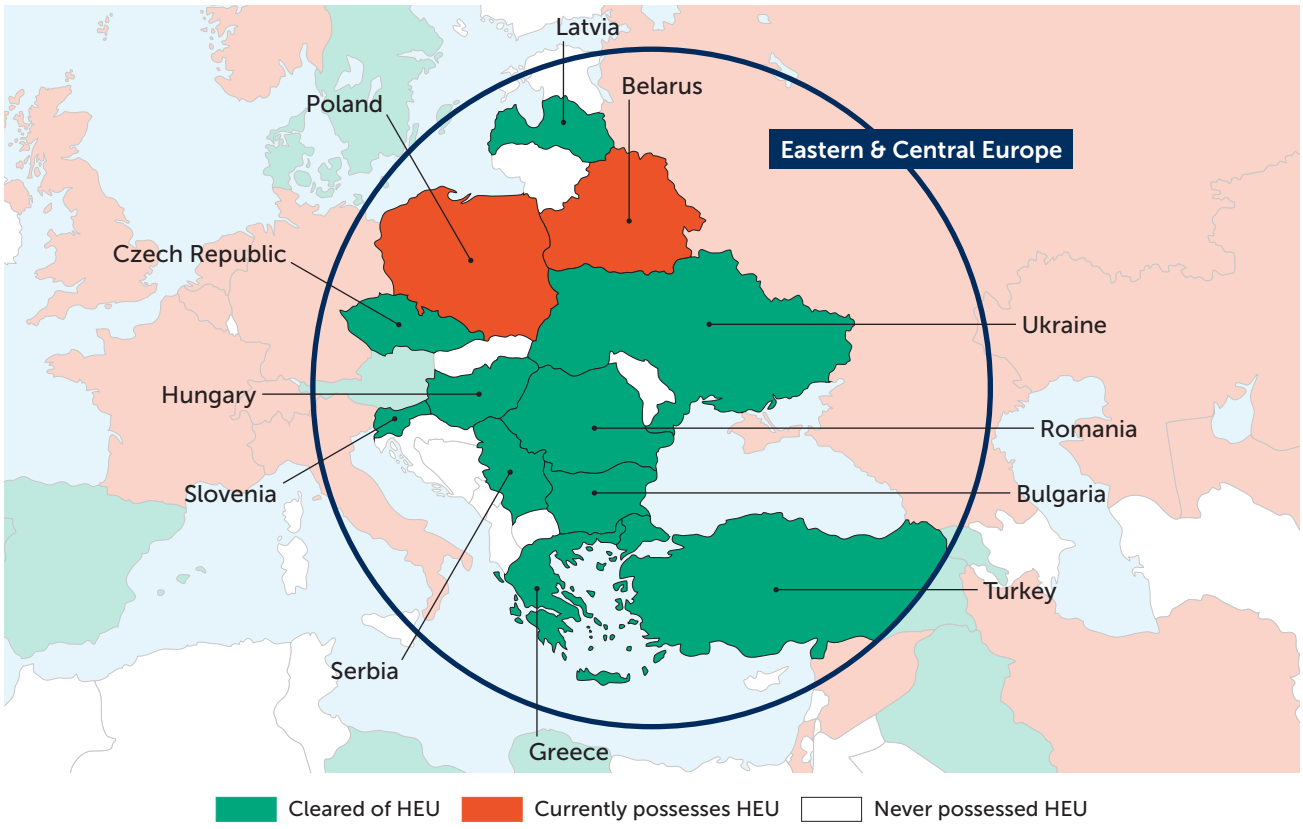
Proposed Southeast Asian & Australian HEU-Free Zone



Southeast Asia and Australia

Southeast Asia, a NWFZ and a region with very small amounts of remaining HEU in Australia and Indonesia, would also be an excellent near-term candidate for an HEU-Free Zone. **Australia** has already taken significant steps toward HEU minimization and elimination, including successfully completing numerous shipments of U.S.-origin spent HEU fuel back to the United States, but a small amount of HEU remains in Australia. **Indonesia**, although it also still possesses small quantities of HEU, has demonstrated a commitment to regional unity on non-proliferation issues and recently convened the Third International NWFZ conference in April 2015 on the margins of the 2015 NPT Review Conference. **Vietnam**, a country that recently eliminated HEU from its territory and whose nuclear cooperation agreement with the United States recently entered into force, might be encouraged to champion the initiative to boost its non-proliferation bona fides and reinforce its commitment to HEU elimination.

Proposed Eastern & Central European HEU-Free Zone



Eastern and Central Europe

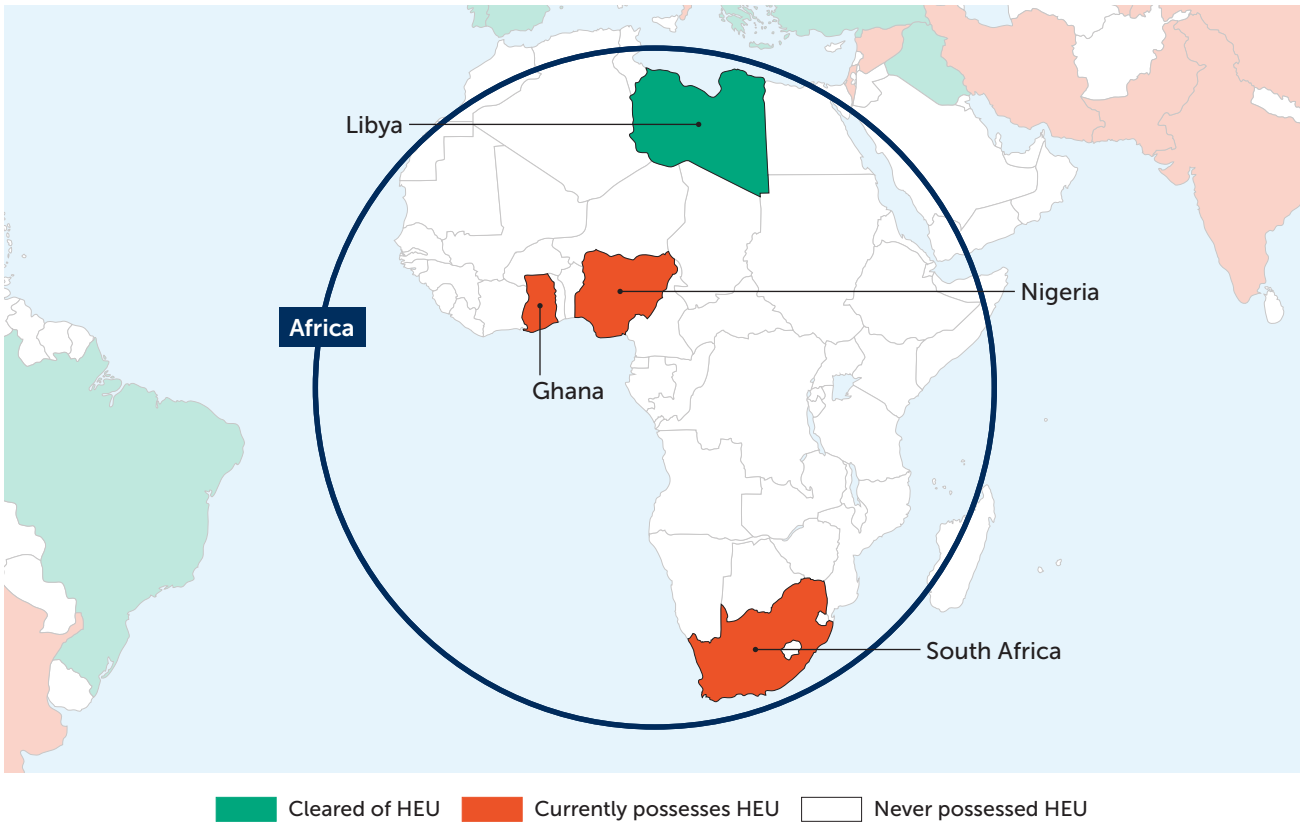
With nine countries cleared of HEU—more than any other region—Eastern and Central Europe has repeatedly demonstrated a commitment to HEU elimination. Although Poland still possesses some HEU, Belarus remains the biggest hurdle to an HEU-Free Zone in Eastern and Central Europe.

As is well known, **Belarus** continues to retain a large stockpile of HEU at Sosny, and to date has not indicated its readiness to meet conditions for participation in the NSS process. What is perhaps less well known is a long-standing Belarusian interest in NWFZs, a concept that was promoted by Minsk in both Soviet and post-Soviet times, most recently at the 2000 NPT Review Conference. Indeed, Belarus regards itself as a leading advocate of what it prefers to call a "nuclear-free belt" in Eastern Europe and the Baltics. Approximately four years ago, a Belarusian diplomat based in New York broached the idea of Belarus championing an HEU-Free Zone in the region. Although the Ministry of Foreign Affairs ultimately decided not to embrace this idea at that time, it might be more receptive to the idea today, especially because Ukraine has now parted with all of its HEU and because Belarus seeks to normalize its relationship with the West.

If Belarus was given the opportunity to be a regional leader on nuclear materials security, such an effort might provide credible justification for Minsk to part with its HEU and an opportunity to reset its relationship with its European partners. Leadership on an HEU-Free Zone could also serve as a means to re-launch its NWFZ proposal, something Belarus might find attractive as Europe looks for solutions to resolve the Ukraine crisis and Minsk seeks opportunities to play the role of facilitator.

Poland is scheduled to become HEU-free in late 2016. All parties involved with the removal operation could work to accelerate the final shipment of HEU from Poland to take place prior to the 2016 NSS. By moving up the operation, Poland's leadership on HEU elimination could be highlighted at the 2016 NSS.

Proposed African HEU-Free Zone



Africa

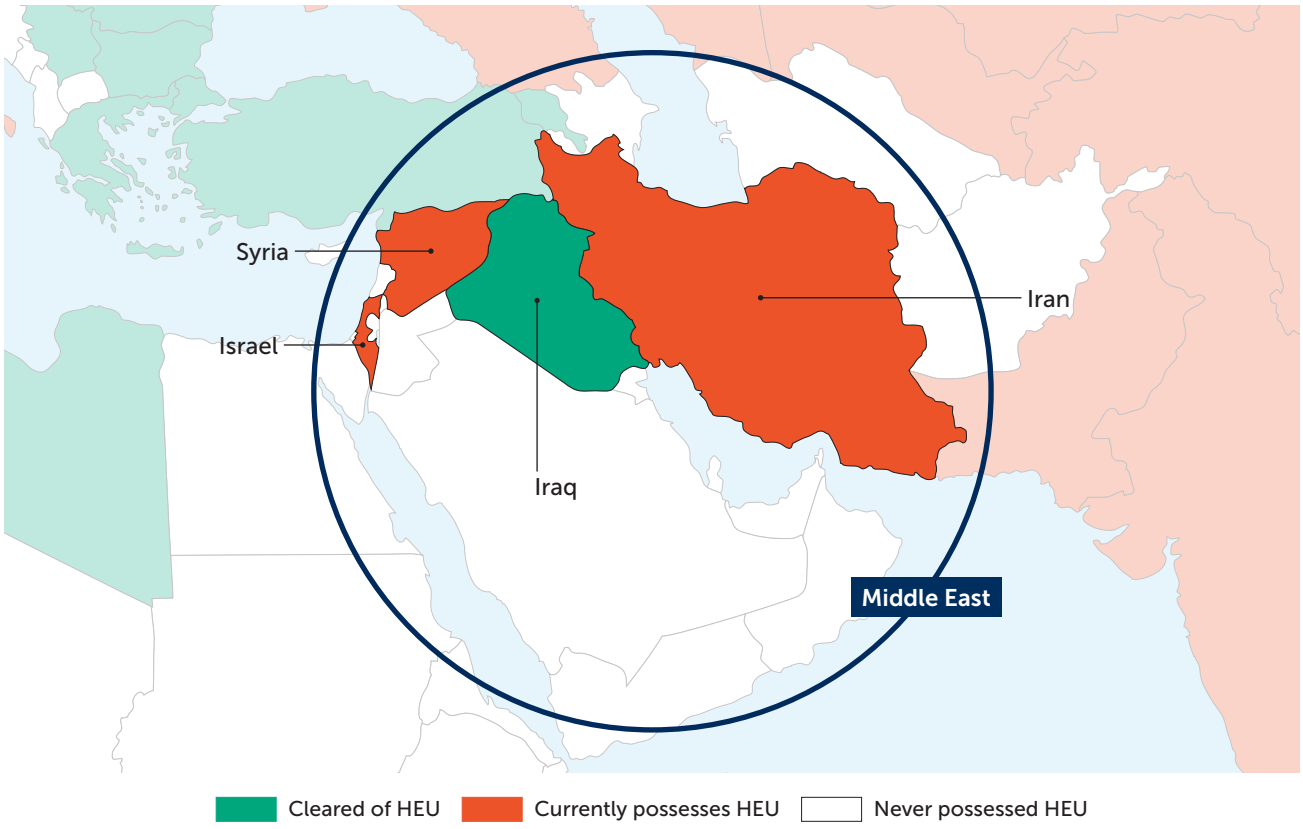
Today, only a few countries in Africa have HEU. Since **Libya's** cleanout in 2009, only three countries continue to possess HEU, and both **Ghana** and **Nigeria** each possess less than 1 kilogram. **South Africa**, however, still retains significant stocks of HEU and is the biggest hurdle to an HEU-Free Zone in Africa.

There was some discussion during the negotiation of the African Nuclear-Weapon-Free Zone Treaty (the Pelindaba Treaty) in the 1990s to include a ban on HEU and separated plutonium, but the effort was ultimately rejected because of objections from South Africa. Given the absence of African countries from the 2014 NSS Joint Statement, steps to establish an HEU-Free Zone in Africa might encourage pledges from Ghana and Nigeria—both of whom have expressed an interest in converting their research reactors to LEU fuel—to eliminate their small HEU stocks more quickly. Pledges from Ghana and Nigeria could encourage South Africa to downblend its remaining HEU stocks and support global HEU minimization initiatives.

An African HEU-Free Zone might also be proposed as part of a series of measures to address South Africa's concerns and reasons for keeping HEU. For example, the United States could respond to South Africa's demand for concrete disarmament measures by declaring additional U.S. HEU as excess to weapons use in the amount equivalent to that which South Africa downblends to LEU.[6]

[6] Miles A. Pomper and Philippe Mauger, "Crossing the Finish Line: Ending the Civilian Use of Highly Enriched Uranium," *Policy Analysis Brief*, Stanley Foundation, May 2014, http://www.stanleyfoundation.org/publications/PomperPAB514.pdf.

Proposed Middle Eastern HEU-Free Zone



Middle East

Only three countries in the Middle East—Iran, Syria, and Israel—have small amounts of civilian HEU, none of which will be necessary after reactor conversions take place. **Iran** and **Syria** both have Chinese-built Miniature Neutron Source Reactors (MNSRs), and China is launching an effort to convert such reactors to LEU. Indeed, in February 2015, Syria informed the International Atomic Energy Agency (IAEA) that it is willing to have its MNSR at the Der al-Hadjar Nuclear Research Center near Damascus converted to LEU.[7] **Israel**, meanwhile, is planning to phase out its Soreq reactor in 2018 and replace it with an accelerator. An HEU-Free Zone in the Middle East could support efforts to ensure that Iran's enrichment activities are limited to peaceful purposes and could improve the prospects for the creation of a WMD-free zone in the region. **The United Arab Emirates**, which already pledged not to pursue uranium enrichment in its nuclear cooperation agreement with the United States, is also a member of the NPDI and could help promote an HEU-Free Zone in the Middle East within the NSS process, NPT Review Conference process, and within the consultations and eventual negotiation of a WMD-free zone in the Middle East.

[7] Christopher Landers, National Nuclear Security Administration (presentation, RRFM European Research Reactor Conference, Bucharest, Romania, April 20, 2015); Barbara Slavin, "Syria Agrees to Return Highly Enriched Uranium to China," *Al Monitor*, April 22, 2015, http://www.al-monitor.com/pulse/originals/2015/04/syria-give-up-highly-enriched-uranium.html.

Summary

With the final NSS taking place in 2016, the establishment of HEU-Free Zones could make a significant and lasting contribution to global HEU elimination efforts—and to global nuclear materials security. In particular, regions such as Latin America and Southeast Asia, which have essentially been cleared of HEU, could announce the establishment of such zones as gift baskets to the 2016 NSS.

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