



Next Steps in Increasing Transparency of Nuclear Warhead and Fissile Material Stocks for Nuclear Disarmament

Zia Mian and Alexander Glaser

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Revision 6

IPFM
INTERNATIONAL PANEL
ON FISSILE MATERIALS

About the IPFM

MISSION

Providing the technical basis for policy initiatives to reduce global stocks of military and civilian fissile materials

- Established in 2006, IPFM has 29 members from 18 states
- Publications: annual Global Fissile Material Reports, research reports, and country studies
- www.fissilematerials.org and www.fissilematerials.org/blog

***Assessing Progress on the
Action Plan on Nuclear Disarmament***

2010 NPT Review Conference

“The nuclear-weapon States commit to undertake further efforts to reduce and ultimately eliminate all types of nuclear weapons, deployed and non-deployed, including through unilateral, bilateral, regional and multilateral measures.”

“Nuclear-weapon States are encouraged to agree as soon as possible on a standard reporting form and to determine appropriate reporting intervals for the purpose of voluntarily providing standard information.”

Progress reports have been submitted to 2014 NPT PrepCom

Structure of Submitted Reports

I. Reporting on National Measures Relating to Nuclear Disarmament

- I. National Security Policies, Doctrine, and Activities Associated with Nuclear Weapons*
- II. Nuclear Weapons, Nuclear Arms Control (including Nuclear Disarmament) and Verification*
- III. Transparency and Confidence-Building Measures*
- IV. Other Related Issues*

II. Reporting on National Measures Relating to Nonproliferation

III. Reporting on National Measures Relating to the Peaceful Uses of Nuclear Energy

Key Actions

Concerning Reductions of Nuclear Weapons and Fissile Materials

Action 2: Irreversibility, Verifiability, Transparency

Action 5: Rapid Irreversible Reductions

Action 16: Declaration of Excess Fissile Material and Safeguards

Action 18: Dismantling or Converting Fissile Material Production Facilities

Action 19: Transparency and Verification for Nuclear Disarmament

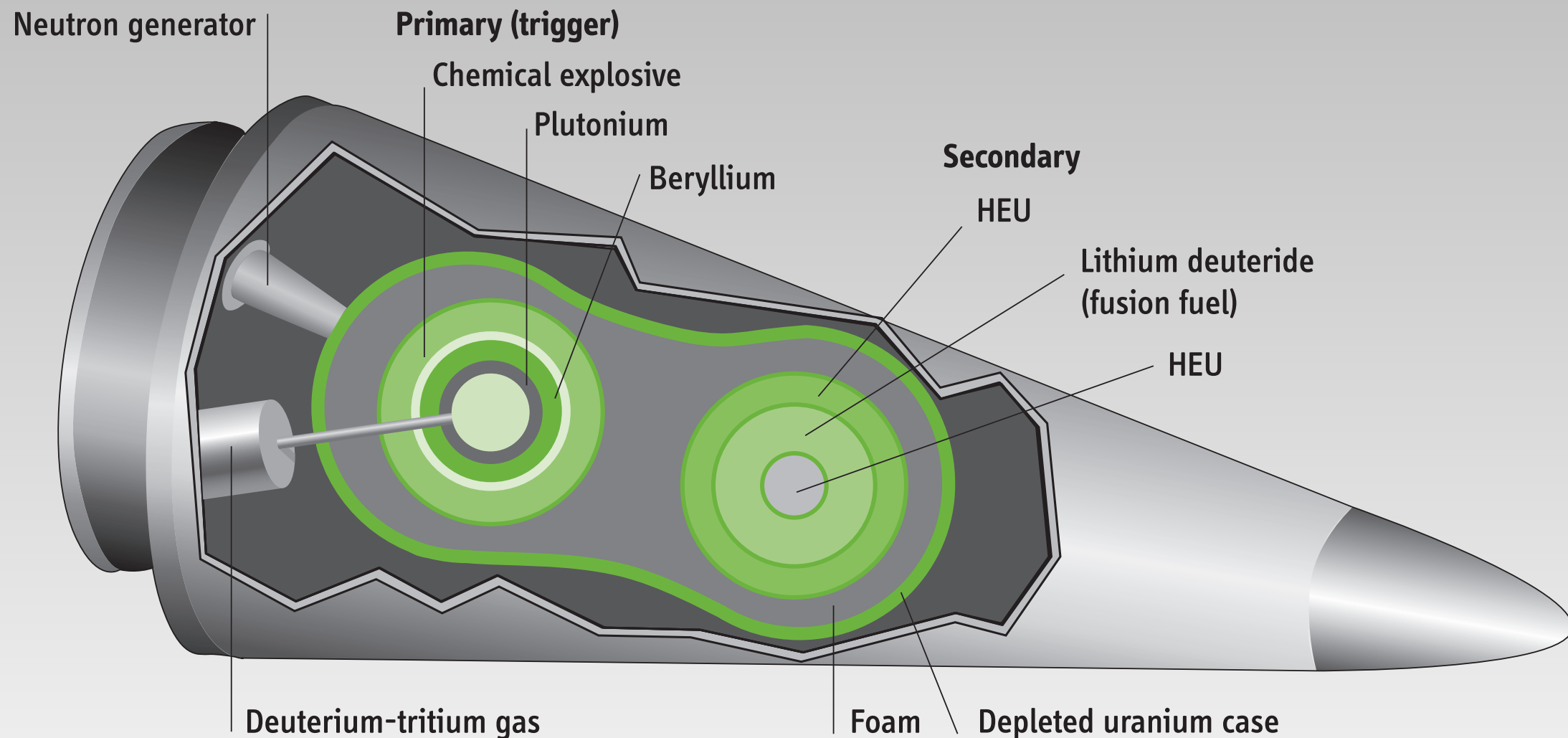
Action 21: Standard Reporting Form

Action 2

Irreversibility, Verifiability, Transparency

“All States parties commit to apply the principles of irreversibility, verifiability and transparency in relation to the implementation of their treaty obligations.”

Verifiably and irreversibly reducing and eliminating nuclear weapons will require openness about national stockpiles of nuclear weapons and fissile materials



A modern thermonuclear warhead contains on average 3–4 kg of plutonium and 25 kg highly enriched uranium

Adapted from Final Report of the Select Committee on U.S. National Security and Military/Commercial Concerns with the Peoples Republic of China ("Cox Report"), U.S. House of Representatives, 3 January 1999

All NPT Nuclear Weapon States Have Released Some Information About Their Nuclear Arsenals

(but with very different levels of detail)

United States declared history of size of its stock of operational warheads, plus “several thousand ... retired and awaiting dismantlement” (2013)

Britain re-declared planned upper limits on total and operational warheads (2013)

France declared upper limit on total warheads, all of which are operational and deployed (2013)

China indicated its warhead stockpile was smaller than those of the other NPT weapon states (2004), but has not updated

Next Steps on Action 2

To establish “irreversibility, verifiability, and transparency,”
need robust baseline declarations for nuclear warheads and warhead components

Inventory	
Total number of warheads as of (DATE)
Operationally deployed warheads (strategic)
Operationally deployed warheads (tactical)
Warheads in active reserve
Warheads in inactive reserve (no tritium)
Retired warheads in dismantlement queue
Warhead components in storage, primaries
Warhead components in storage, secondaries

Global Fissile Material Report 2013, Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament
International Panel on Fissile Materials, Princeton, NJ, October 2013

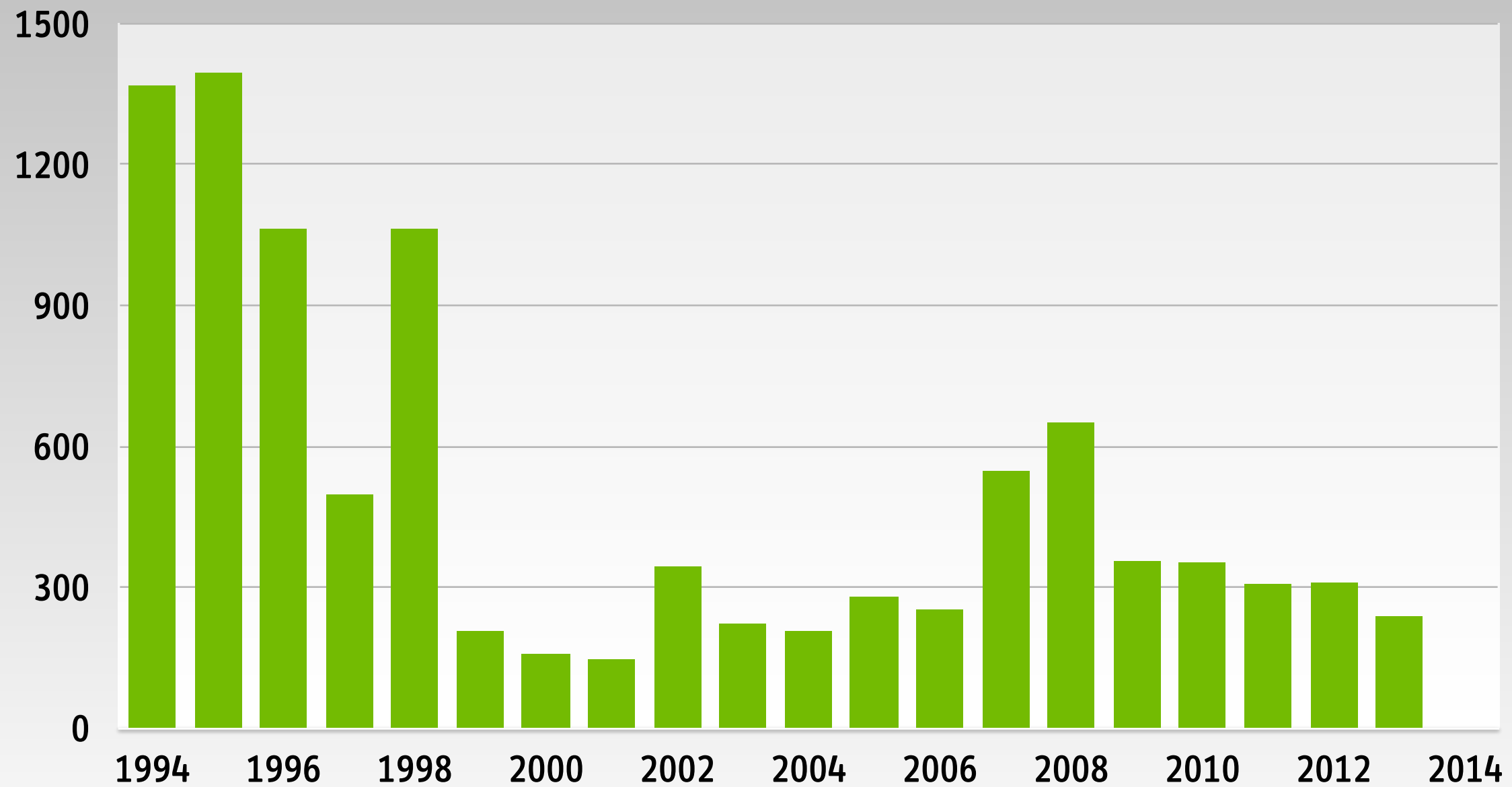
Action 5

Rapid Irreversible Reductions

“The nuclear-weapon States commit to accelerate concrete progress on the steps leading to nuclear disarmament. To that end, they are called upon to promptly engage with a view to, inter alia: (a) Rapidly moving towards an overall reduction in the global stockpile of all types of nuclear weapons ...”

Warhead Dismantlement

United States, declared, but still has warheads awaiting dismantlement that were retired in the 1970–1990s (W71 Spartan and W69 Poseidon)



Transparency in the U.S. Nuclear Weapons Stockpile, Fact Sheet, U.S. Department of State, Washington, DC, April 29, 2014

Warhead Dismantlement

Russia, Britain, France, and China

Russia and China

No official information

Russia: Estimated 3500 warheads awaiting dismantlement and 200–300 dismantled per year

Britain and France

Britain: plan is to cut stockpile by 45 warheads by mid 2020s

Estimated dismantlement rate about 3 warheads per year

France: no warheads in the queue for dismantlement

Next Steps on Action 5

Declare dismantlements with regular updates

Declare historical dismantlements

Commit to timely dismantlement

Apply principle of irreversibility to warhead dismantlement

(Britain has already adopted this policy)

“The main components from warheads disassembled as part of the stockpile reduction programme have been processed in various ways according to their composition and in such a way that prevents the warhead from being reassembled.”

Letter to Rob Edwards, UK Ministry of Defence, 25-03-2013-173601-014, 25 July 2013

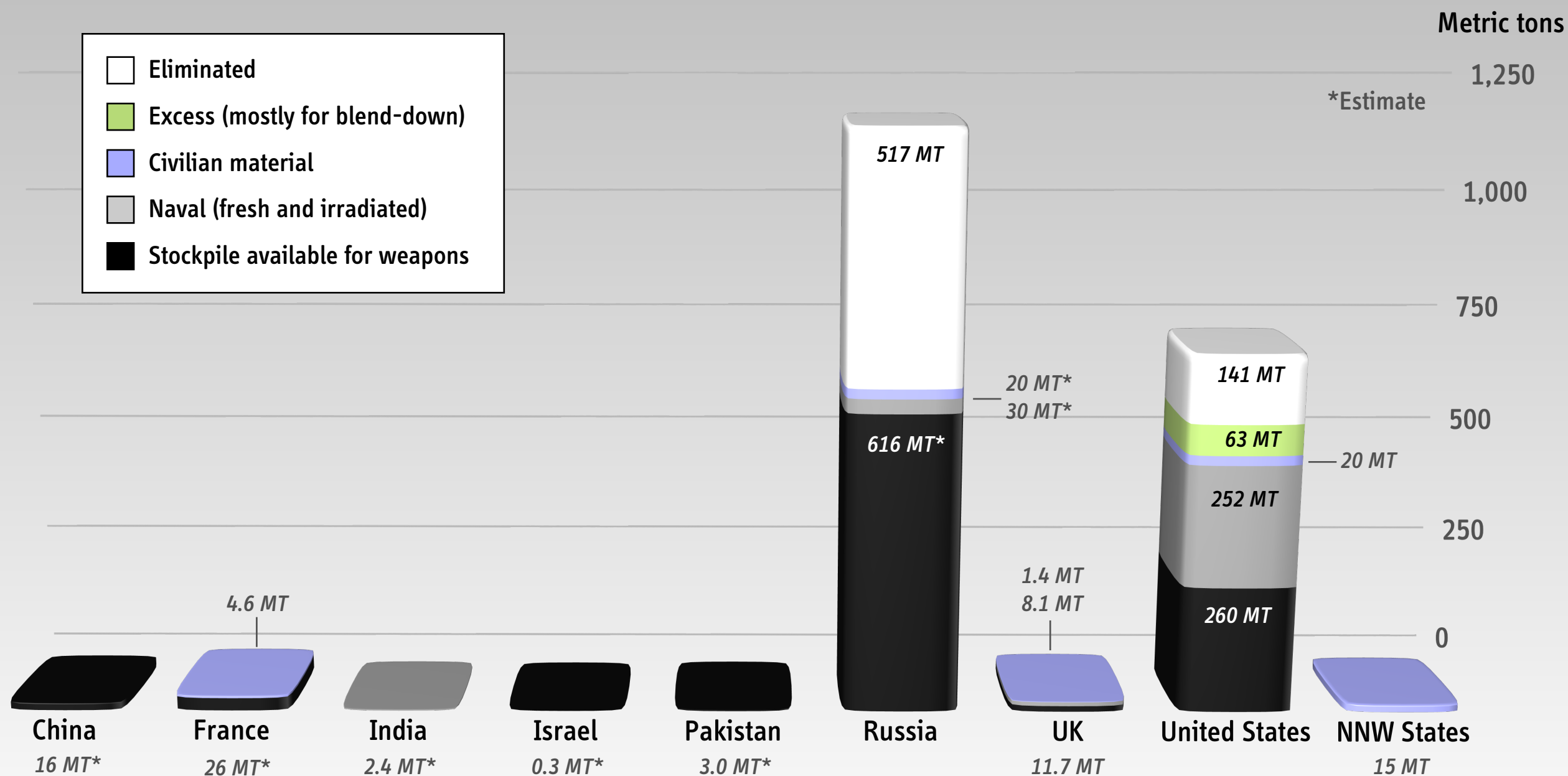
Action 16

Declare Fissile Material Excess and Place under International Safeguards

“The nuclear-weapon States are encouraged to commit to declare, as appropriate, to the International Atomic Energy Agency (IAEA) all fissile material designated by each of them as no longer required for military purposes and to place such material as soon as practicable under IAEA or other relevant international verification and arrangements for the disposition of such material for peaceful purposes, to ensure that such material remains permanently outside military programmes.”

Highly Enriched Uranium, mid 2013

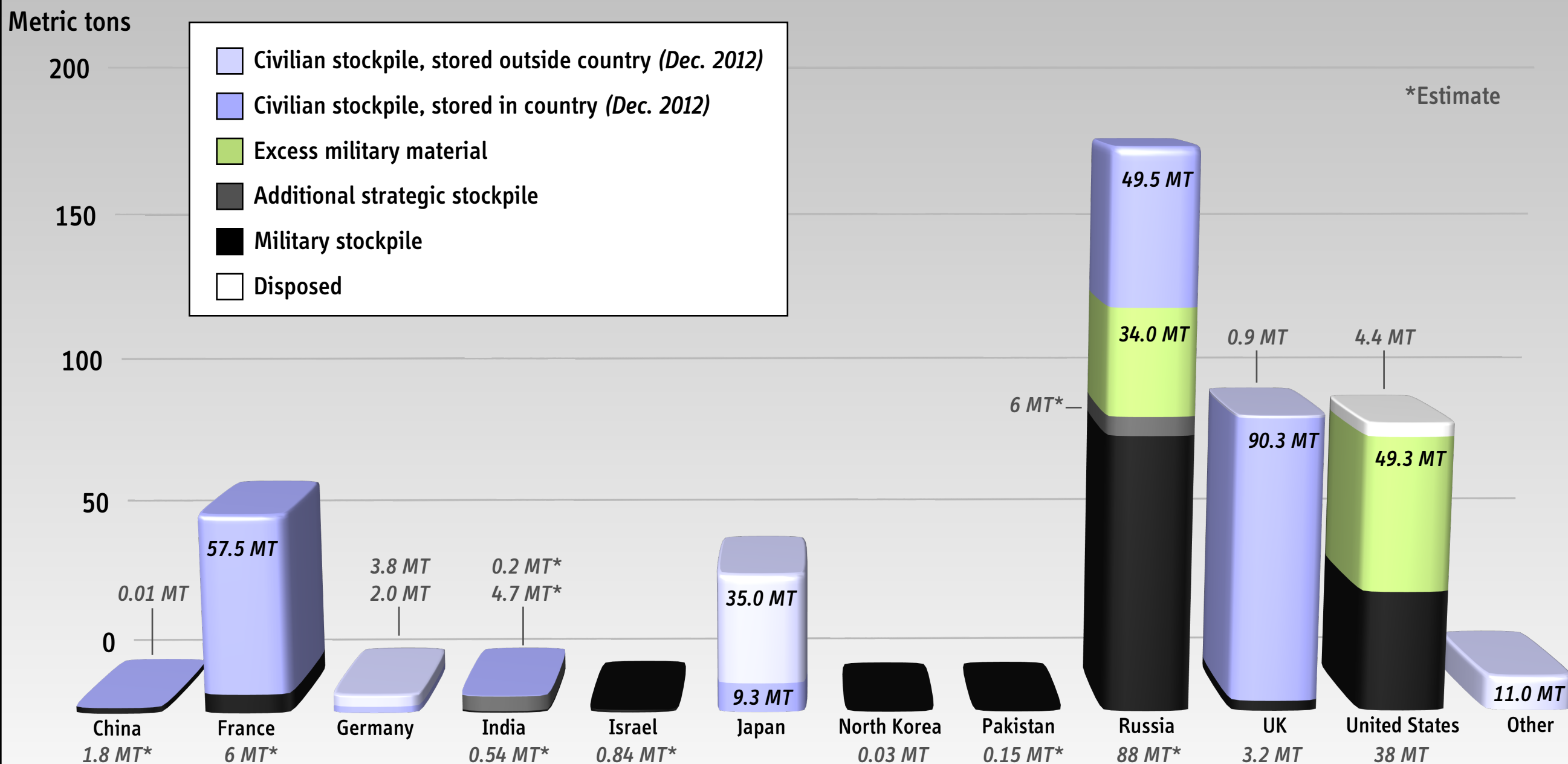
Global stockpile is about 1350 tons, almost 99% is in weapon states



(25 MT of HEU are equivalent to 1,000–2,000 nuclear weapons)

Separated Plutonium, mid 2013

Global stockpile is about 500 tons, more than half is civilian and this stock is growing



(5 MT of plutonium are equivalent to 1,000–1,500 nuclear weapons)

Next Steps on Action 16

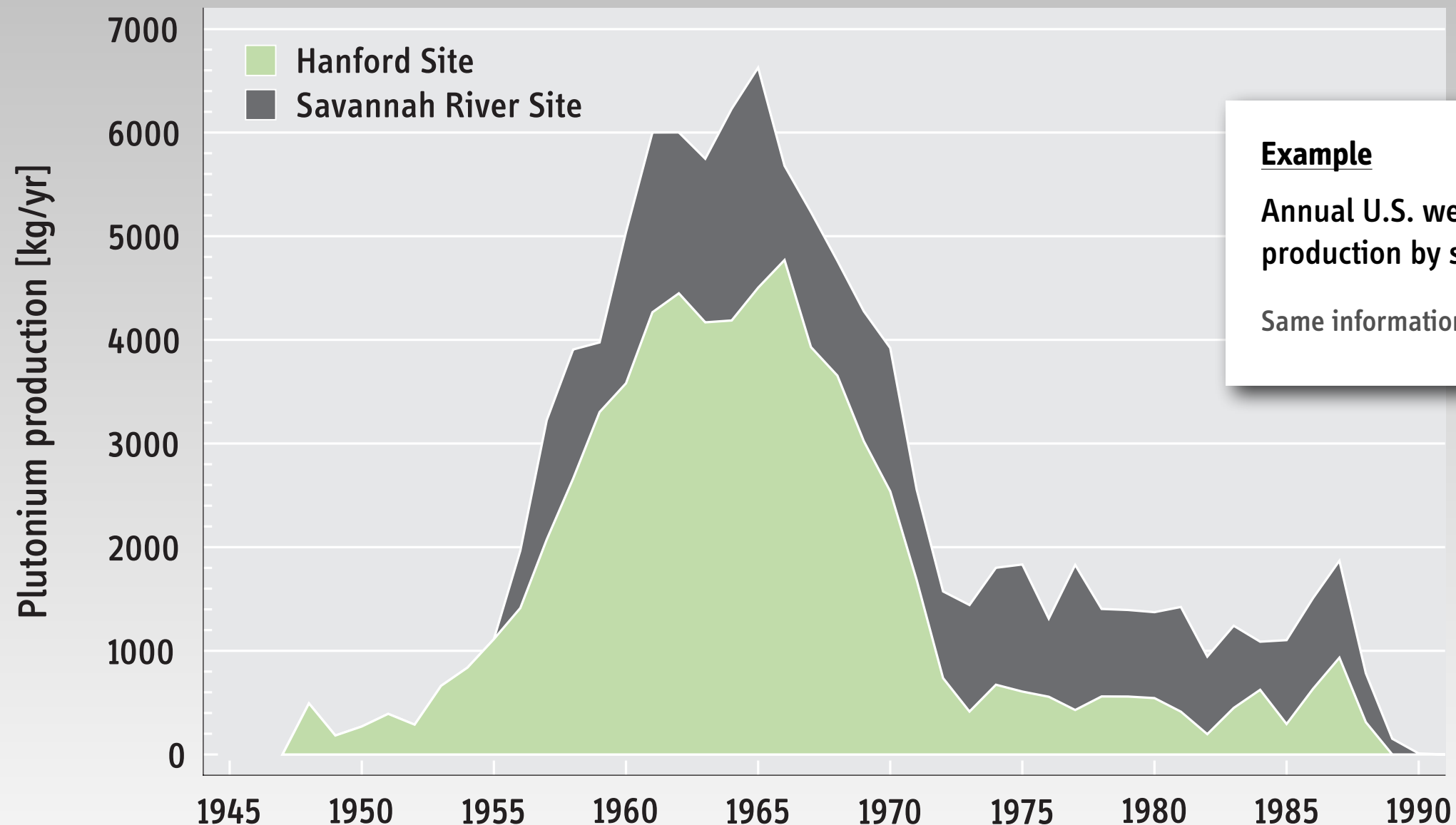
A Two-Step Process

1. Baseline declarations of fissile material stocks (US/UK have set examples)
2. Identify and offer for safeguards: excess stocks and civilian material

	HEU	Plutonium
Inventory as of (DATE)	-----	-----
Military, available for weapons	-----	-----
Military, reserved for non-weapon purposes	-----	-----
Military, in irradiated fuel	-----	-----
Excess military, not available for IAEA safeguards	-----	-----
Civilian, not available for IAEA safeguards	-----	-----
Civilian, available for IAEA safeguards	-----	-----
Excess military, available for IAEA safeguards	-----	-----

Detailed Fissile Material Production Declarations

NPT weapon states should prepare to declare the histories of their HEU and plutonium production, use, and disposition



Plutonium: The First 50 Years: United States Plutonium Production, Acquisition and Utilization from 1944 Through 1994
U.S. Department of Energy, DOE/DP-0137, 1996, www.ipfmlibrary.org/doe96.pdf

Action 18

Dismantling or Converting Fissile Material Production Facilities

“All States that have not yet done so are encouraged to initiate a process towards the dismantling or conversion for peaceful uses of facilities for the production of fissile material for use in nuclear weapons or other nuclear explosive devices.”

All NPT Weapon States Have Stopped Production of Fissile Materials for Weapons

Country	HEU production	Plutonium production for weapons
China	stopped 1987 (unofficial)	stopped 1991 (unofficial)
France	stopped 1996	stopped 1992
Russia	stopped 1989	stopped 1994
United Kingdom	stopped 1962 (but imports from United States)	stopped 1995
United States	stopped 1992	stopped 1988

Production Facilities Have Been Shut Down and Are Being Decommissioned



Shutdown of the last Russian plutonium production reactor ADE-2 in Zheleznogorsk, 2010
Source: U.S. Department of Energy



Tourists look around the reactor control room of the underground Project 816 (halted in 1982), 2010
Source: www.chinadaily.com.cn

“The Clock is Ticking”

Several former production facilities are being dismantled and demolished



Equipment in storage from the gaseous diffusion plant in Pierrelatte, June 2009

Source: www.francetnp.fr



Demolition of the K-25 uranium enrichment plant began in December 2008 and has been completed in 2012

Source: Bechtel Jacobs

Next Steps on Action 18

**NPT nuclear-weapon states should declare
the status of and plans for all their fissile material production facilities**

(Some nuclear weapon states have done so already)

**Initiate efforts to preserve facilities, materials, and historic production records
in a condition that would ultimately facilitate verification**

(No formal efforts currently underway)

Action 19

Cooperation on Transparency and Verification for Nuclear Disarmament

“All States agree on the importance of supporting cooperation among Governments, the United Nations, other international and regional organizations and civil society aimed at increasing confidence, improving transparency and developing efficient verification capabilities related to nuclear disarmament.”

Warhead Dismantlement Verification

Some Precedents Exist and Future Work Can Build on Them



Inspection System developed as part of the 1996–2002 Trilateral Initiative during a demonstration at Sarov
Source: Tom Shea



Visual contact with a mockup nuclear weapon during a UK-Norway Initiative Dismantlement Exercise
Source: UK Norway Initiative, David Keir

Warhead Dismantlement Verification

The United States has recently re-vitalized research in this area

and considers declassifying information, which could significantly simplify disarmament verification

“The resulting data will support assessment of sensitive information that could be revealed as a result of future treaty verification activities”

Report of the United States of America Pursuant to Actions 5, 20, 21 of the 2010 Nuclear Non-Proliferation Treaty Review Conference Final Document, NPT/CONF.2015/PC.III/16, U.S. Department of State, Washington, DC, April 2014

China has also launched research program

“China's research covers verification technologies of nuclear warheads dismantling and authentication, and the storage and disposition of nuclear components and nuclear material ...”

Implementation of the Treaty on the Non-Proliferation of Nuclear Weapons,
Report submitted by the People's Republic of China, NPT/CONF.2015/PC.III/13, April 2014

Next Steps on Action 19

Verified Warhead Dismantlement

Engage in efforts to jointly develop and demonstrate practical inspection systems

Further demonstrate viability of cooperation between
nuclear and non-nuclear weapon states

Verifying Historic Fissile Material Production

Agree on the most important types of operating records to be preserved

Catalogue, characterize, and preserve waste materials

Demonstrate nuclear archaeological methods for all relevant production plants

Offer Test Beds for Nuclear Archaeology

To begin countries could offer single sites or facilities as test beds and invite partners with similar production facilities to engage in “site-to-site exercises” to jointly demonstrate verification approaches and measurement techniques



Left: Windscale Piles, www.sellafieldsites.com

Right: G2/G3, Marcoule, www.francetnp.fr

Even in Many Non-nuclear Weapon States, Candidate Facilities Would be Available to Demonstrate Methods Required for Nuclear Archaeology



NRX, Canada



Ågesta Reactor (105 MWt), near Stockholm, Sweden

Summary

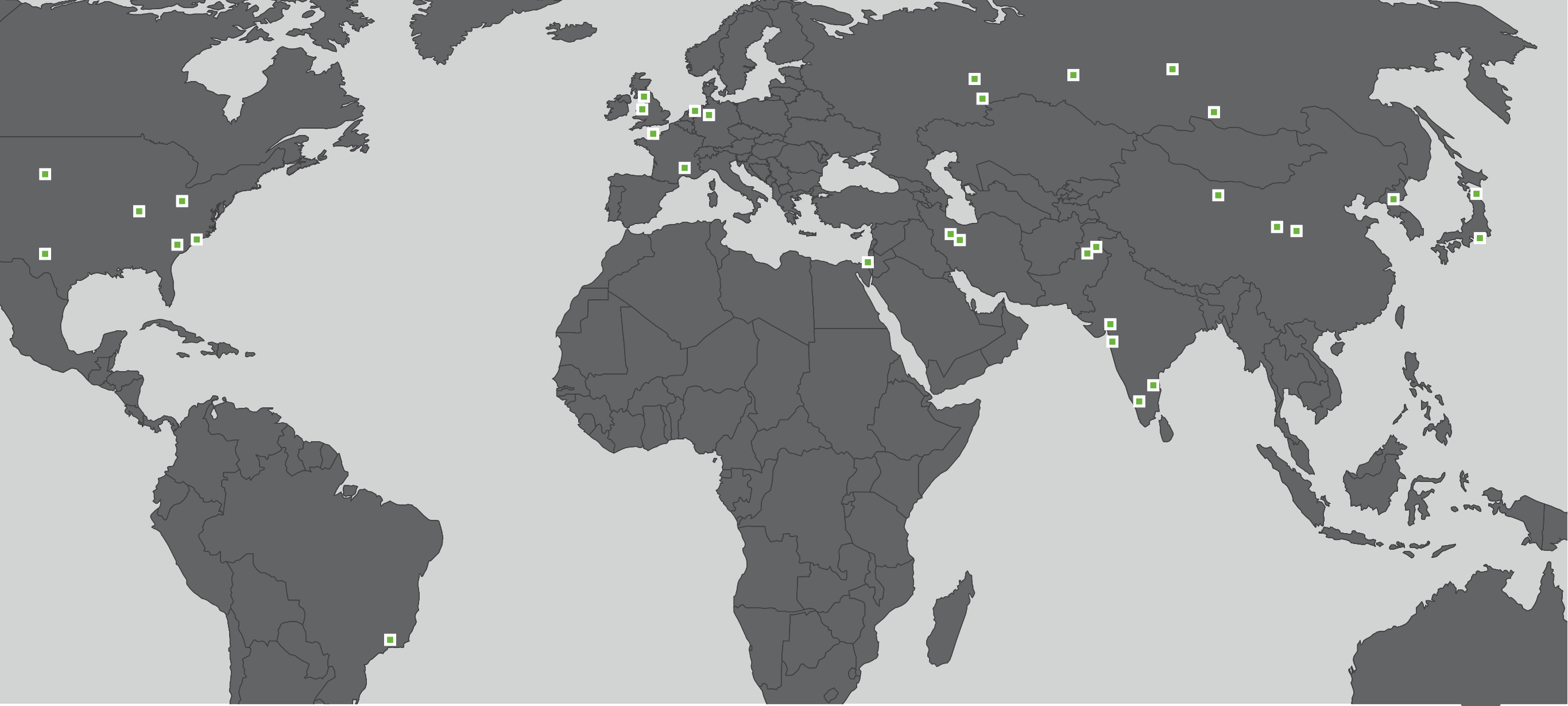
and Next Steps on Action 21 (Reporting Form)

“As a confidence-building measure, all the nuclear-weapon States are encouraged to agree as soon as possible on a standard reporting form and to determine appropriate reporting intervals for the purpose of voluntarily providing standard information ...”

Transparency Matrix, 2014

Information on nuclear warhead and fissile material inventories and status

	United States	Russia	Britain	France	China
Number of total warheads	Approximate	No	Yes (upper limit)	Yes (upper limit)	Relative (out of date)
Number of deployed warheads	Yes (strategic only)	Yes (strategic only)	Yes (planned)	Yes	No
Dismantlements	Yes	No	Yes (no details)	Yes (no details)	No
Verification	Partial	Partial	No	No	No
Fissile material stockpiles	Yes	No	Yes (no details)	No	No
Production histories	Yes	No	No	No	No
Excess/Disposal	Yes (nothing new)	Yes (nothing new)	Yes (nothing new)	No	No
Verification	Partial	Partial (but no longer)	Partial (some plutonium)	No	No



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