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FOR SCIENCE AND INTERNATIONAL AFFAIRS

Managing the Atom Project

Nuclear dangers and challenges

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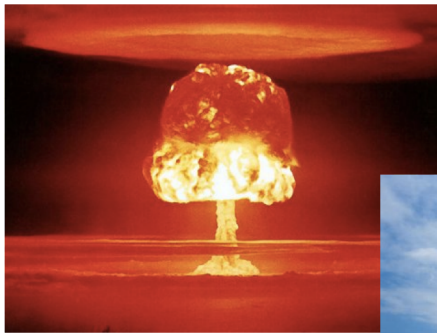
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belfercenter.org/mta

A peril and a promise...

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Effect of a single nuclear weapon

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Source: Time-Life

Dateline: North Korea

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- ❑ Unpredictable dictator armed with ~15-45 nuclear weapons, ballistic missiles
 - Regularly threatens to rain “nuclear fire” on ROK, United States
- ❑ Producing more HEU, plutonium, testing longer-range missiles
- ❑ Repeated provocations against ROK – could lead to conflict
- ❑ Agreements, sanctions, threats have all failed to stop DPRK program



Source: KCNA

Dateline: North Korea (II)

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□ Key dangers

- Nuclear use – e.g., DPRK might use in conflict, under “use them or lose them” pressure or to scare off its enemies
- Nuclear transfer -- to other states (e.g., al Kibar reactor in Syria), less likely to terrorist groups
- Pressures on others in region to match DPRK capability
- “Loose nukes” if regime collapses

□ Options

- Squeeze until DPRK collapses or capitulates (How feasible?)
- Seek to negotiate at least an interim freeze and no-transfer pact (What price? What risk reduction?)
- Military action (What risks? What could realistically be struck?)
- Do nothing (What risks?)

Dateline: Iran

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- Nuclear agreement reduces risk during Trump’s term (if all sides stick with it)
- But key restraints on Iran’s program end at 8, 10, and 15 years after implementation
- Iran continues to support terrorist groups, undermine countries in the region, threaten Israel, test longer-range ballistic missiles – and has never given an honest declaration of its past nuclear weapons efforts



Source: khamenei.ir

Dateline: Iran (II)

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□ Key dangers

- Nuclear proliferation – especially as key restraints expire, and Iran is permitted to build up enrichment capacity, develop more advanced (and easier to hide) centrifuges...
- Pressures on others in region to try to match Iran's capabilities

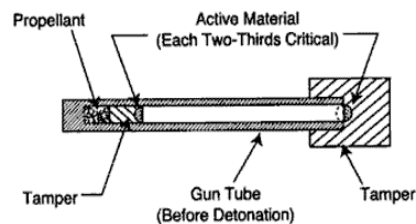
□ Options

- Build more cooperative relationship? (How feasible? What risks?)
- Contain and deter, strengthen allies? (What risks and costs?)
- Seek to convince Iran it is not in its interest to greatly expand its nuclear capabilities when restraints phase out? (How feasible?)
- Rebuild sanctions regime? (How feasible?)
- Military action? (How plausible? What risks?)
- Do nothing? (What risks?)

Dateline: Unknown Nuclear and Radiological Terrorism

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- Numerous gov't studies: terrorist group *could* plausibly make a crude bomb if it got material
- ~20 cases of seizure of stolen HEU or plutonium
- Aum Shinrikyo, al Qaeda both pursued nuclear weapons
- ISIS intent unclear, but has more money, people, territory under control, ability to recruit globally than al Qaeda ever had – for now



Source: NATO

Dateline: Unknown

Nuclear and Radiological Terrorism (II)

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- ❑ Terrorists could also sabotage nuclear facilities (potentially cause Fukushima-scale accident), use radioactive material in “dirty bomb”
- ❑ Options
 - Improve security for nuclear and radiological materials, facilities (How to sustain momentum after the summit process is over?)
 - Block nuclear smuggling (How to find the needles in the haystacks?)
 - Counter high-capability terrorist groups (How can we do better?)
 - Prepare to respond (How much can this mitigate the harm?)

Dateline: Russia

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- ❑ Aggressive nuclear modernization, exercises, rhetoric; cyberattacks; disinformation...
- ❑ Heightened U.S.-Russian tensions – Ukraine, and other issues
 - Potential for conflict, e.g., in Baltics
- ❑ Russian forces, command and control vulnerable; no space-based early warning; potential for launch on false alarm

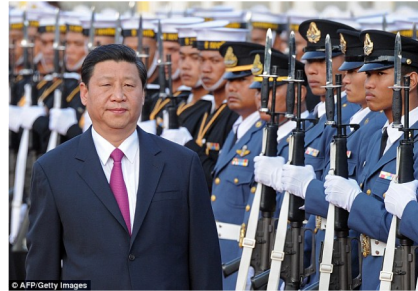


Source: ITAR-TASS

Dateline: China

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- ❑ Much smaller nuclear force, but major modernization underway
- ❑ Some U.S.-China tensions – South and East China seas, cyber, other issues
- ❑ No arms control, verification, dialogue on strategic issues in place
 - China (and Russia) concerned over U.S. missile defenses, conventional strike capabilities, nuclear modernization



Source: ITAR-TASS

Dateline: South Asia

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- ❑ Ongoing nuclear arms race between Pakistan and India – who have fought 4 wars
- ❑ Military doctrines with unclear redlines; terrorists might provoke conflict; could lead to blundering into war
- ❑ Pakistan has world's fastest-growing nuclear arsenal, and some of the world's most capable terrorists
- ❑ Some modeling suggests even Indo-Pakistani nuclear war could cause "nuclear fall"

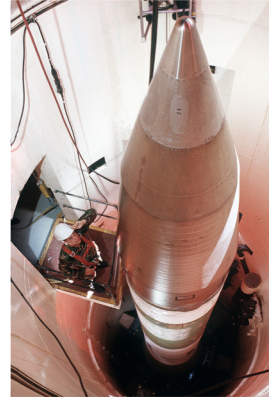


Source: Wikimedia Commons

Dateline: United States Strategic modernization

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- ❑ Existing U.S. strategic weapons are aging
- ❑ Obama administration has laid out a plan for new ICBMs, SLBMs, submarines, bombers, and cruise missiles, with “life extended” (upgraded) warheads
- ❑ \$1 trillion cost over 30 years
- ❑ Likely to be unsustainable in the face of conventional needs, other priorities
- ❑ Need broader debate over what is needed for deterrence, how to achieve it cost-effectively, integration with arms control



Source: DOD

Dateline: Global Strengthening the global regime

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- ❑ Many states unhappy with Nonproliferation Treaty – failed treaty review in 2015, another coming in 2020
- ❑ Ongoing challenges controlling sensitive technologies – new tech. such as additive manufacturing makes more difficult
- ❑ Possible spread of ostensibly civilian enrichment and reprocessing as nuclear energy grows and spreads – steps needed to reduce risks



Source: AFP

Dateline: Global Strengthening the global regime (II)

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- ❑ States threatened by powerful neighbors or major powers may still seek nuclear weapons – or “hedging” capability that would allow them to build weapons quickly
 - Much to do reduce “demand” for nuclear weapons, especially in Middle East and East Asia
- ❑ IAEA needs more resources and authority
- ❑ Given U.S.-Russian tensions, accusations of violations, little near-term prospect for further arms reductions – means more political tension in nonproliferation regime
 - Little near-term prospect for bringing Comprehensive Test Ban Treaty into force or negotiating fissile cutoff
 - Little near-term prospect of real progress toward Middle East Weapons of Mass Destruction Free Zone
 - All nuclear powers modernizing their forces

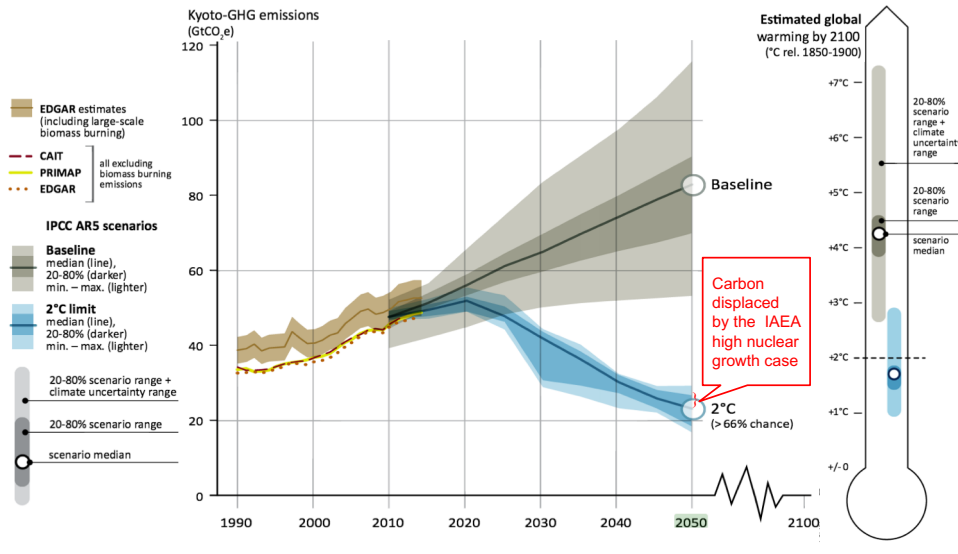
Nuclear weapons: some good news

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- ❑ Global nuclear weapons stockpiles down ~85%
- ❑ Only 9 states with nuclear weapons – same as a quarter century ago
- ❑ More states have started nuclear weapons programs and given them up than have nuclear weapons – our efforts to talk countries out of it succeed more often than they fail
- ❑ >50% of the states that once had potential nuclear bomb material on their soil have eliminated it
- ❑ Nuclear material around the world far more secure than it was 25 years ago

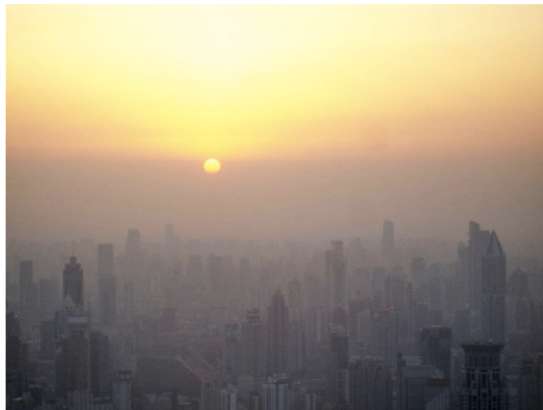
Huge, transformational nuclear growth needed for substantial climate role

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Particulates may be even more important than climate in driving clean energy

18



Smog in Beijing. Source: inhabitat.com

❑ **>3 million deaths/yr globally from fine particulates**

Key constraints on large-scale nuclear energy growth – can they be loosened?

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- ❑ Economics
- ❑ Safety risks – real and perceived
- ❑ Security risks – real and perceived
- ❑ Nuclear waste management – mostly politics
- ❑ Siting and public acceptance
- ❑ Limited government and industry capacity
- ❑ Stringent regulation
- ❑ Proliferation risks – mainly from the nuclear fuel cycle
- ❑ U supply: Not likely to be a constraint this century

In each area, both new policies and new technologies have the potential to loosen past constraints on growth

Maintaining U.S. nuclear influence

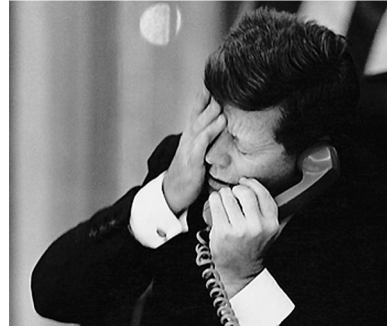
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- ❑ U.S. role in the nuclear market is now greatly reduced
- ❑ But the United States offers world-leading innovation, and approaches to safety, security, and nonproliferation
- ❑ Both economic and security benefits to maintaining a significant U.S. position in nuclear markets
 - Important to U.S. influence over other countries' nuclear choices
- ❑ Next president will have to grapple with:
 - How to avoid losing nuclear's domestic low-carbon contribution
 - How to ease the path to commercializing new technologies
 - How to help U.S. firms compete against state-owned (or assisted) firms from other countries
 - How best to advance U.S. nuclear safety, security, nonproliferation objectives

The importance of presidential judgment

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- ❑ Cuban Missile Crisis:
 - Initially, Kennedy's advisors called for air strikes followed by an invasion
 - Kennedy pushed back, asking for another option
 - The recommended course might well have led to nuclear war
- ❑ Kennedy: Key lesson was always to offer the adversary a face-saving way to back down
- ❑ The world relies on sober judgment by the leaders of nuclear states



Source: JFK Library