

# Nuclear Policy Challenges Revisited: The Governmental and Industrial Dimensions

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## Nuclear Power: The Overall Picture

- Nuclear energy is free fall in all but parts of Asia and the Mid East?
  - Little new construction of NPPs
  - Serious delays and cost overruns in many projects underway
  - Existing fleets in Europe and the US are ageing and shrinking. Functional NPPs retire due to poor economic/political outlook
  - NPPs cannot compete with other sources of energy without some form of state subsidies from the sellers and/or customers
  - And the political appeal of extending such subsidies to nuclear energy are weak to non existent, notwithstanding Paris accord
  - Private sector financing for nuclear energy is practically non existent due to risks, size, long time lag for payoff, and image
- The European exceptions (Finland, FR, UK) reinforce the trend

# Why I Was A Believer in Nuclear Power

- Ubiquity of fuel available
- Exceptional base loader
- Environmental benefits of energy generation
- Proliferation risks seemed manageable
- Operational performance records appeared to be getting better all the time with experience and maturation
- Safety standards and performance were improving following the Chernobyl and TMI
- Alternative sources of energy were not without their own risks and limitations

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# Why I Have Grown to be a Skeptic

- Lack of standardization of products/production
- Absence of harmony in core regulatory requirements and their upgrade/update
- Cost management and financing challenges
- Enduring challenges of handling spent fuel and proliferation, in addition to safety and security
- Decommissioning overhang
- Industry siege mentality and corporate myopia (the NuPOC process ([www.nuclearprinciples.org](http://www.nuclearprinciples.org))

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# What Has Further Dampened My Enthusiasm in Nuclear Power

- Abundance of alternative energy supplies (shale, wind, solar) and above all gas
- The rapidly declining costs of the renewables (especially wind turbines and solar panels), all having better political appeal
- Significant improvements in storage capacity and affordability
- The nuclear decommissioning overhang is daunting
- Political paralysis in confronting the storage challenge
- The meltdown in US nuclear leadership
- The two new industry solutions (SMR, HTR) are not without real challenges. These and the time of availability make them marginal

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## The Vendors

- Are struggling to survive the harsh economic realities
- Almost all lack economies of scale and standardization
- The supply chain is very thin; cannot ramp up/adjust quickly
- Most remaining vendors are pinning their survival hopes on:
  - Large governmental subsidies in some form (because of their appeal for energy security, prestige , and carbon footprint)
  - Integrated construction and operation model
  - Fuel services, decommissioning, subcontracting work
  - Hunkering down (myopia, writing off skepticism and concerns)
  - Undertaking risky contracts (core provisions, challenging infrastructure, financing arrangements), lobbying for lower standards
- The remaining traditional players: Russia, China, RoK, France, Japan?
- Emergence of new (and existing) SMR vendors

# Several Illustrative Cases

- Most telling:
  - India (liability, safety-regulatory)
  - Iran (safety, security, liability, non proliferation)
  - Turkey (safety-regulatory, security)
  - Bangladesh (infrastructure)
  - Saudi Arabia (motivation, standards, infrastructure)
  - Egypt (motivation, standards, infrastructure)
  - RSA (motivation, standards)
  - IAEA (post Fukushima nuclear ambivalence)
- Bear in mind the traumatic incidents have occurred in advanced experienced nuclear states (Japan, RF, USA)
- And serious recent setbacks have taken place in similarly mature nuclear states (ROK, France; Finland)
- Russia and China NPP export drive is driven by uncertain rationale

## Nuclear Weapons Proliferation

- The overall picture
  - Two main challenges stand out: Iran and the DPRK
  - Both have an immediate bearing on their neighborhood (Saudi Arabia, Turkey and Israel; Japan and the RoK)
  - India-Pakistan issue continues to fester. Pakistan is especially worrisome
  - US leadership is fraying, US-RF traditional partnership in NP has dissipated, US-EU partnership is endangered, US-PRC collaboration with the PRC is tested
  - Overall emphasis on nuclear weapons and their arsenals is on the rise again. Ever greater global polarization

# The Iranian Nuclear Program

The three phases in the evolution of the Iranian program:

- Until 2002: full fledged covert nuclear weapons program (Manhattan program style)
- 2003-2014: cautious nuclear hedging posture coupled with massive buildup of nuclear and missile delivery infrastructure
- 2015-: sustained nuclear hedging program, temporarily trading off material nuclear gains for eventual full rehabilitation and immediate economic normalization

**The Iranian nuclear program has never been fundamentally peaceful, and it has yet to be transformed**

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## US Strategy Toward the Iranian Program Prior to the JCPOA

- Slowing down the Iranian program and gaining time
- Exacting a price from Iran for making progress
- Building/sustaining an international coalition
- Holding the hand of its regional allies (while actively monitoring their pulse)
- Containing (while occasionally leveraging) Congressional action
- Extending the hand to Iran and demonstrating its eagerness for diplomatic negotiations (and flexibility)

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# How did the US Aim to Gain Time

- Impress on Iran that its nuclear activities are transparent
- Lay obstacles on the Iranian path toward progress
- Stoke the Iranian anxiety that moving to make weapons would yield neither certain nor quick results
- Drive home the message that the US has red lines & resolve
- Exact a price from Iran for intransigence (targeted sanctions)
- Demonstrate the US capability to act decisively if need be
- Foster an internal debate in Iran over the desirability and necessity of a weapons program
- Reassure Israel yet try undermine its capacity to act alone

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## 4 Tradeoffs in Seeking the JCPOA

- Rolling back (or at least downsizing to realistic civilian requirements) vs leaving behind residual capabilities and insisting on stringent benchmarking, monitoring and access instead
- Encouraging Iran to accept the package vs incentivizing Iran to honor it over time
- Nuclear specific deal vs one that addresses other (regional) concerns over Iran's conduct
- Addressing Iran specific nuclear concerns vs setting a broader non proliferation template (hedging cascade?)

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# The JCPOA and Hedging

- Key feature of the JCPOA is to turn Iran from a de facto nuclear hedger (12-24 months to a crude bomb) into a legitimate one--meeting the top Iranian goal
- Even more remarkably, the JCPOA envisages an Iran that could become (if it so chooses) a far more advanced nuclear hedger (weeks away from a bomb and months from an arsenal) after a decade
- The JCPOA de facto establishes a generic modern template for diplomatic anchoring of nuclear hedging

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## The JCPOA Precedent for Hedging

- *Positive:*
  - Probation period for non proliferation offenses
  - Open ended ban on weaponization (TBD)
  - Temporary redress for the disconnect between civilian requirements and infrastructure/material accumulation
  - A procurement monitoring and approval channel (but...)
  - Restrictions for 8 years on nuclear capable missiles
- *Negative:*
  - Missile restrictions are separate- weakly anchored in a UNSCR
  - Harmonization of the nuclear program with peaceful benchmarks and viability benchmarks was hardly pursued
  - IAEA autonomy and access rights have been compromised
  - The solutions found to redress the PMD concerns are troubling
  - AP ratification and BC were delayed and made uncertain

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# Balance Sheet

- Implementation of the JCPOA is thus far *largely* on track
- But Iran has been given huge concessions to stay the course
- While Iran is violating with impunity related UNSCR
- And the leverage on Iran has been fraying with normalization
- And the US capacity to act unilaterally is dramatically curtailed
- Iran's regional behavior is ever more worrisome and gruesome
- Iran's domestic orientation is still largely unchanged
- Its future nuclear intentions are not (yet?) reassuring

*Three major challenges lie ahead: sustaining, and tightening the JCPOA UNSCR implementation, checking Iran's regional behavior, and curtailing its freedom to become a legitimized advanced nuclear hedger within a few years*

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## JCPOA Scenarios Moving Forward

- There are several possible scenarios on the way ahead
- We may not know which one ultimately pans out
- There is a possibility will move through several of them
- All of the scenarios entail serious risks and few opportunities
- In July 2016 I painted 4 possible (not mutually exclusive) scenarios going ahead:
  - Routinization
  - Renegotiation
  - Death Spiral
  - Time bomb (running down the clock)
- All but the first option remain possible

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## The DPRK Challenge

- Already has a nuclear arsenal
- Has serious indigenous capabilities to advance it
- Is on the cusp of a breakthrough in enhancing its capacity for long range thermonuclear bomb delivery
- Is also making progress in the militarization of the arsenal
- Its elite is largely cushioned from the impact of sanctions
- Is highly secretive and expert at deceit
- Has a track record of walking back on accords
- Insists on a sequential, reciprocal process whereupon denuclearization only follows peace accords, US withdrawal

# US Cards Versus the DPRK

- International pressure and sanctions: real but bounded: no one wants the DPRK to collapse
- DPRK has a conventional might capable of wreaking havoc on the RoK and especially Seoul
- China is unhappy about the DPRK program and behavior and fears escalation toward a confrontation
- RoK is divided in its attitude and at present led by a President who seeks accommodation at almost all cost
- Japan is highly anxious about the DPRK threat but politically wrapped around the abductee issue
- Russia is complicating the diplomatic scene

**No common vision of the end state**

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## What Should the US Aim For?

- A three phased approach, each one standing on its own feet:
  - **De-escalation:** commitment to refrain from provocations. In practice: halting production of Pu and tritium, consolidating production of HEU, no tests.... Verification to rely exclusively on NTMs. IAEA to engage in TC mode
  - **Stabilization:** a process culminating in an Comprehensive Verifiable Cap on all arsenal and related capabilities. Maintenance and peaceful work allowed subject to comprehensive transparency measures. Verification to include IAEA Safeguards plus export/import regime, and other on site monitoring arrangements. CTR programs
  - **Denuclearization:** rollback to peaceful only status (firewall)

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# Key Premises for the Process

- No meaningful negotiations on phase 1. Yet commitments undertaken then should remain in place throughout the negotiations
- Phase 2 would be a process. Flow of benefits to DPRK to be closely tied to tight implementation of its components
- Phase 2 would have to involve steps that are difficult/painful/costly/time consuming to reverse. But also offer harmless substitutes to DPRK technical cadres
- Obligations in every phase have to be closely tied to US verification capacity and modalities
- DPRK should be offered throughout the tradeoff between greater transparency and more comprehensive capping