

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

3

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))

4

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

5

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

9

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)

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

11

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?)

12

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

13

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

14

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

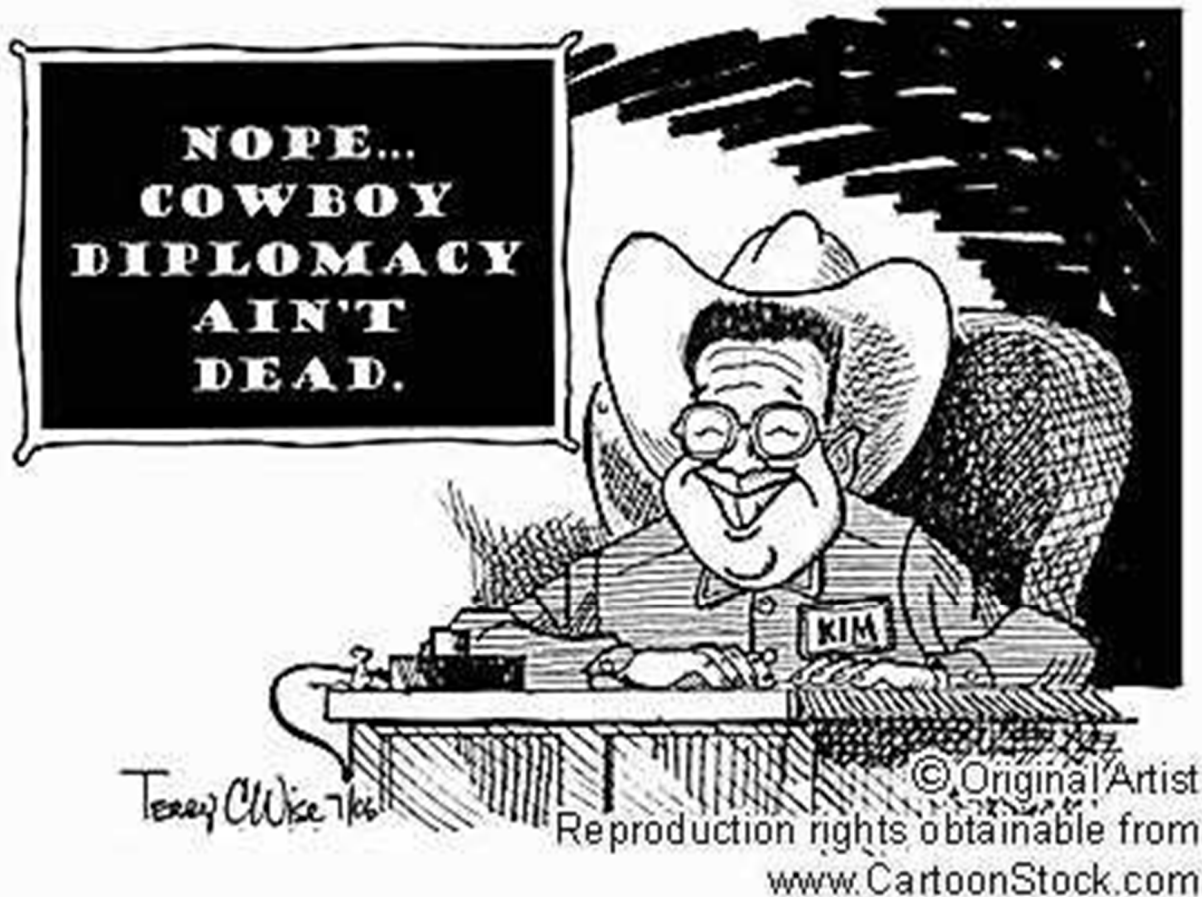
Three major challenges lie ahead: sustaining, and tightening the JCPOA UNSCR implementation, checking Iran's regional behavior, and curtailing its freedom to become a legitimized advanced nuclear hedger within a few years

15

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

16



17

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

18

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

19

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)

20

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