The Key Issues for the Negotiators

Uranium Enrichment Limits & “Practical Needs”
The Arak Reactor and the Plutonium Path
Enhanced IAEA Inspections Regime
IAEA Investigation On Weapons Experiments
Issues Referenced in UNSC Resolutions
Sanctions Relief
Duration of the Agreement and Phasing
Limits on Uranium Enrichment Capacity

Competing negotiating goals:

• Increase the time necessary for Iran to produce enough weapons-grade uranium for nuclear weapons

• Iran’s "practical" civilian nuclear fuel needs, which may (or may not) grow
Solving the Uranium Enrichment Challenge

Possible options available include:

- Limits on enrichment levels – 5 percent
- Limits on stockpile size
- Limits on overall capacity over time
- More efficient centrifuges
- Repurpose Fordow for centrifuge research and development
- Extend firm fuel supply assurances to reduce “need” for indigenous Iranian enrichment’
- Multinational enrichment center options
A Win-Win Solution on Arak

The Proliferation Risk

• Planned reactor would produce plutonium for 2 bombs/year
• Would require a new separation plant

Realistic Options

• Reduce from 40 MW to 10 MW output
• Use 3.5% enriched uranium fuel (instead of natural uranium)
• Ship out the spent fuel
Monitoring, Inspections, PMDs

More Extensive IAEA Inspections

- Existing safeguards agreement is not comprehensive
- Code 3.1
- Additional Protocol

Resolving IAEA Investigation of PMD Concerns

- Full cooperation with the IAEA investigation on these experiments
- IAEA investigation will likely extend beyond the negotiating deadline for Iran-P5+1 talks
- Goal is to ensure Iran’s nuclear program is entirely peaceful
Understanding “Breakout” Timelines

Since 2007, U.S. Intelligence Community has assessed that “Iran has the scientific, technical, and industrial capacity eventually to produce nuclear weapons if it decides to do so.”

IC assesses that if Iran were to make decision to build nuclear weapons, its more likely it would seek to do by means of undeclared, secret facilities (a.k.a. “sneak-out”).

Iran’s nuclear capacity can be reduced and limited, but not entirely eliminated.

Most calculations of “breakout” start with the time required for producing enough weapons-grade uranium (enriched to 90%) for one bomb (25kg).

Fissile material production is a key hurdle, but not the only technical hurdle to nuclear weapons:

- Designing & constructing a nuclear device
- Integrating warhead into a delivery system
- Possibly conducting several nuclear explosive tests, which would require more HEU

These as well as political and legal barriers would extend real-world timelines further.
Options for Iran’s Enrichment Program

Frank von Hippel
Program on Science and Global Security, Princeton University

Briefing Sponsored by the Arms Control Association
Carnegie Endowment for Peace, Washington, DC, 26 June 2014
Scenarios for Iran’s “Practical Needs” for Enrichment

(5000 SWU = 1 bomb from natural, 3 bombs from 3.5% enriched U)

- Zero if all fuel imported
- Research reactors only
- Fuel contract w. Russia not renewed
- Contract renewed for 5 years

Stage I

Stage II

Iran's enrichment capacity (SWUs/yr)

2014 2019 2024 2029

+ Bushehr

Research reactors only

Zero if all fuel imported
Stage I: Rationalizing the Current Situation

Iran currently has *installed* 18,000 IR-1 centrifuges (~13,000 SWU/yr)
Plus 1000 IR-2Ms installed. (~3500 SWU/yr?). Working on IR-4…8
IR-1s are obsolete and could be retired and replaced by IR-2ms to support research-reactor LEU needs.

Compromise for Stage I

1. Installed capacity in low thousands of SWUs/yr until it is time to build up capacity for Bushehr.
2. Enhanced transparency for Iran’s centrifuge production and stocks.
3. Minimized stocks of low enriched UF$_6$ that could be further enriched.

*For at least 5 years. Longer if Iran is willing to extend its fuel contract with Russia.*

*Provides time for negotiations on Stage 2.*
Stage I provides time to cool down inflamed situation

_ Iran’s “right” to industrial-capacity enrichment has been made a national cause._

Behind this probably is an interest within Iran’s security establishment – as in Japan’s – in having a nuclear-weapon _option._

_Some see Iran’s option as an intention and have established the imperative to zero out Iran’s program at all costs._

Stage I would provide Iran and the West an opportunity for a cooler assessment of the costs and benefits of different possible paths forward.

In Stage II, it may be possible for the negotiators to agree on a solution that may be beyond reach this summer and that may lay the basis for a new international regime for enrichment.
Stage II. National or Multinational Enrichment?

**National** -- Every state has a right to enrich fuel for power reactors.

*That gives every country with an enrichment plant the option of a quick breakout to produce weapon-quantities of HEU.*

– Acheson-Lilienthal Report, 1946

Today only Brazil, Iran and Japan among non-weapon states have national enrichment plants.

**Multinational** -- *Urenco* (Germany, Netherlands, UK).

Germany made Urenco’s first commercial centrifuges but, because of residual distrust of Germany, operation of a German enrichment plant was delayed till 1985 - ten years after Netherlands & UK. *Today, Urenco owns the only operating enrichment plant in the U.S.*

In 1977, the U.S. adopted the policy: “We don’t reprocess spent power reactor fuel (to separate out plutonium). You don’t need to either.”

Can the U.S. adopt a similar position with regard to enrichment: *“We don’t have a national enrichment plant. You don’t need one either.”*
Tails assay adjusted to consume all available 3.5% LEU feed, down to a minimum of 0.7%. If insufficient LEU feed is available, natural U is used as feed with tails assay of 0.4%. Separation time only assuming an ideal cascade; does not include time required to chemically convert feed or product.