Nuclear Talks with Iran: Diplomacy and Diminishing Time

by Olli Heinonen **(/experts/olli-heinonen)** , Simon Henderson **(/experts/simon-henderson)**

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ABOUT THE AUTHORS

Olli Heinonen (/experts/olli-heinonen)

Olli Heinonen is a senior fellow with the Belfer Center at Harvard University's Kennedy School and a former deputy director-general for safeguards at the IAEA.

Simon Henderson (/experts/simon-henderson)

Simon Henderson is the Baker fellow and director of the Bernstein Program on Gulf and Energy Policy at The Washington Institute, specializing in energy matters and the conservative Arab states of the Persian Gulf.

Brief Analysis

Stopping Iran's increasingly rapid progress toward becoming a de facto nuclear weapons state requires significant diplomatic progress, and quickly.

Efforts to resolve the long-running international crisis caused by Iran's failure to explain aspects of its nuclear program appear to be gaining momentum. President Hassan Rouhani will be in New York this week for a UN General Assembly meeting, and speculation is rife that he may meet with President Obama there. Supreme Leader Ali Khamenei has signaled support for Rouhani to make a deal in return for relief from economic and financial sanctions, stating last week that now is the time for "heroic leniency."

International perceptions of the nuclear program's purpose are completely at odds with Khamenei's claim on September 17: "We ourselves are definitely not trying to possess [nuclear weapons]." Rouhani's denial in a September 19 interview with NBC was even clearer: "[Iran has] never pursued or sought a nuclear bomb, and we are not going to do so." These comments are incompatible with those of International Atomic Energy Agency head Yukiya Amano, who told the IAEA board of governors on September 9 that "Iran is not providing the necessary cooperation to enable us to provide credible assurance about the absence of undeclared nuclear material and activities...Given the nature and extent of credible information available to the agency about possible military dimensions to Iran's nuclear program, it remains essential and urgent for Iran to engage with us on the substance of our concerns."

The IAEA's regular reports on Tehran's activities have raised four main concerns:

1. Iran continues to enrich uranium in quantities far in excess of its present and future requirements for a peaceful nuclear program.

2. Iran's ability to break out from its international commitments by producing sufficient amounts of weapons-grade uranium can now be measured in a few weeks -- perhaps less time than the international community would need to agree on an appropriate diplomatic or military response.
3. Iran is also making advances toward obtaining plutonium, another nuclear explosive.
4. Iran has apparently worked on aspects of nuclear weapon designs.

SPECIFIC CONCERNS

If Washington engages Iran via diplomatic contact or further negotiations, it should be mindful of several specific concerns about the nuclear program:

Iran's increasing number of IR-1 type centrifuges. The total figure is now close to 19,000 installed: 2,000 at the plant buried deep under a mountain at Fordow, and the rest at Natanz, where the main plant is covered with concrete and earth. More IR-1s are being installed at a rate of about 600 per month. These centrifuges enrich uranium in the form of uranium hexafluoride (UF6) gas. They are arranged in units of eighteen cascades, with each unit having around 3,000 centrifuges; Natanz will have six such units within the next couple months.

Currently, Iran is enriching uranium to 20 percent concentration of the fissile isotope U-235, which normally makes up just 0.7% of natural uranium. The usual scheme for enriching uranium is to raise the concentration from 0.7% to 3.5%, and then from 3.5% to 20%. To obtain weapons-grade uranium -- which contains 90% U-235 -- the usual scheme is to enrich from 20% to 60%, and then from 60% to 90%. Yet Iran's huge number of centrifuges enables it to enrich directly from 20% to 90% using "tandem cascades," where a second cascade processes the "tails" or waste product and reintroduces it into the first cascade, making for a more efficient enrichment process.

Using tandem cascades in just four of the units at Natanz, Iran could produce 45 kilograms of 90% enriched UF6 within two weeks. Converting the UF6 to metal uranium would reduce its weight to around 30 kg, or a couple kilograms more than the 28 kg that the IAEA regards as a "significant quantity," the amount needed for a nuclear explosive device. All told, Iran would need a month or two to complete the straightforward, well-known process of converting the UF6 gas to metal, manufacturing the components of an explosive device, and assembling a weapon. The last steps would likely take place outside of Natanz and Fordow in locations unknown to the IAEA. Although the agency inspects Iran's facilities every one to two weeks, it would need additional time to confirm and report to the international community if Tehran was breaking its safeguard agreements. And as the recent use of chemical weapons in Syria has shown, it takes yet more time for a response to be debated and agreed.

Iran's growing stockpile of 20% UF6. The latest IAEA report put Iran's stocks of 20% UF6 at about 180 kg. Since 2007, the regime has produced about 350 kg of this material -- around 40 kg has been made into fuel plates for a research reactor, while the rest is in UF6 form, oxide form, or waste form. Despite reports to the contrary, the oxide uranium could be reprocessed back into usable form within a couple weeks.

During his September 2012 speech at the UN, Israeli prime minister Binyamin Netanyahu stated that once Iran had 250 kg of 20% UF6, it would be able to swiftly produce enough weapons-grade material for a nuclear bomb. In principle, Iran has two ways of producing that amount: reconverting oxide to UF6, or using two cascade units to produce more 20% enriched uranium from 3.5% UF6, which it could do at a rate of 90 kg per month.

The perhaps-impregnable centrifuge plant at Fordow. This mountain facility is being used to enrich uranium to 20 percent. With tandem cascades of IR-1 centrifuges, Fordow could produce 20 kg of 90% UF6 per month, or more than a "significant quantity" every two months.

The use of more-advanced IR-2m centrifuges. More than 1,000 of these devices have been installed at Natanz, where a 3,000-centrifuge unit is planned. These centrifuges are better than IR-1s -- in theory around six times more

efficient, though in reality less than four times so due to problems in obtaining the best materials. In any case, the successful completion of a 3,000-centrifuge IR-2m unit would open up a new range of breakout scenarios.

The possibility that Iran has unreported centrifuge plants. The Fordow plant was secret until Iran revealed it had been under construction for several years. Tehran takes a different view from many in the international community about when its treaty obligations require it to announce the existence of nuclear facilities.

The Arak heavy-water reactor. If this reactor becomes operational, it could give Iran a source of plutonium, which is a superior nuclear explosive to uranium because less is required as a critical mass. Additionally, military action against an operational heavy-water reactor would risk catastrophic environmental consequences, which is not the case for bombing a uranium enrichment plant.

Weaponization work. Iran has failed to cooperate with the IAEA in resolving questions about whether it has performed design work on an implosion-type atomic bomb. This is key to judging the honesty of Tehran's claims that it has never intended to pursue nuclear weapons.

Stocks of uranium. Iran has massive amounts of feedstock, far in excess of what it might need to fuel its peaceful nuclear activities. Its uranium conversion plant at Isfahan has produced nearly 550 tonnes of 0.7% UF6, only 120 tonnes of which has been transferred to Natanz for enrichment. Moreover, Iran does not have to declare how much semiprocessed ore, known as yellowcake, it has, since IAEA safeguards do not apply to material mined in Iran. The mines at Saghand and Gchine will produce more than 50 tonnes annually when fully operational. Although this would not be enough to make the fuel needed for Iran's sole nuclear power reactor at Bushehr, which is coming onstream, Russia is already under contract to supply all of that facility's fuel.

DIPLOMACY AND BREAKOUT

One of the challenges in negotiating with Iran is achieving wide acceptance of a deal. In a September 17 interview with Telemundo, President Obama stated that for talks to succeed, Iran needs to "show the international community that it's not trying to weaponize nuclear power." But the term "weaponization" is ambiguous, with definitions ranging from a crude device to a sophisticated warhead. Observers are also debating how much time Iran would need to test a nuclear explosive device after obtaining a significant quantity of weapons-grade uranium, and how much longer after that it would take to make the device deliverable by missile, such as the Shahab-3 type currently in its inventory. This missile is a variant of the type that Pakistan -- from which Iran originally obtained centrifuge technology -- uses in its strategic nuclear force.

In addition to concerns about how quickly Iran can produce a significant quantity of nuclear explosive material, another clock is ticking: the diminishing interval in which Israel believes it could take effective military action against Iranian nuclear installations and delay the program. Like other countries, Israel feels directly threatened by the possibility of Iran fielding nuclear-tipped missiles and the advantages it would gain by being perceived as a nuclear weapons state. On September 17, in advance of his own trip to the UN meeting, Prime Minister Netanyahu stated that four steps are required of Tehran: "Halting all uranium enrichment, removing all enriched uranium, closing [the Fordow enrichment plant near] Qom, and stopping the plutonium track."

In short, the scene is set for diplomacy, but the time for agreement is quickly running out. Given their growing concerns about Washington's ability to operate effectively in the Middle East -- whether diplomatically or militarily -- U.S. allies will closely watch any contacts made in New York.

Olli Heinonen is a senior fellow at the Harvard Kennedy School's Belfer Center and a former deputy director-general for safeguards at the IAEA. Simon Henderson is the Baker Fellow and director of the Gulf and Energy Policy Program at The Washington Institute. Previously, they coauthored Nuclear Iran: A Glossary of Terms **(http://www.washingtoninstitute.org/policy-analysis/view/nuclear-iran-a-glossary-of-terms)** *, a joint*

publication of The Washington Institute and the Belfer Center. ❖

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