"Iran's Nuclear Program and its Impact on the Region"

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It is an honor to testify before this hearing on a matter that I have been following for almost 12 years, both in and out of government. Iran today has reached a status I have long dreaded: It operates a semi-industrial-scale uranium enrichment facility and is building up a stockpile of enriched uranium that is of no current use to its civil nuclear energy program but that could be put to weapons purposes. Meanwhile Iran is also building a research reactor that will be ideal for producing plutonium – the other path to nuclear weapons. Whether or not Iran chooses to go down the weapons route, its persistence in developing such capabilities could have profoundly disturbing consequences, including by potentially sparking a proliferation cascade in the Middle East and beyond.

The danger is compounded by Iran's failure to cooperate with the International Atomic Energy Agency (IAEA)'s investigation of past Iranian nuclear activities and its verification of new undertakings. Iran refuses to answer questions about the strong evidence of past nuclear weapons development work, including, for example, evidence of foreign help with experiments on a detonator suitable for an implosion-type weapon. Iran has also unilaterally and illegally rejected its treaty obligation to provide advance declarations of new nuclear facilities and to allow inspectors regular access to facilities under construction, such as the research reactor. What Iran chooses not to disclose is difficult to discover.

According to the latest IAEA report, as of mid-February Iran was operating almost 4,000 centrifuges at its underground uranium-enrichment facility at Natanz and was getting ready to begin operating about 2,000 more. The piping is being installed for an additional 9,000 centrifuges, which would bring the total to 15,000, at some unspecified future date. All the centrifuges operating in the underground facility so far are of the P-1 model (Pakistan first generation), although Iran continues to experiment with more efficient later model centrifuges in an above-ground pilot plant at Natanz.

By the end of January, Iran had produced a metric ton of gasified uranium enriched to the 3.5% U_{235} isotope level needed to fuel most nuclear power plants. The IAEA estimates that Iran was adding about 100kg a month to its stockpile. If it is further enriched, the uranium content of the Natanz production to date is sufficient in principle to provide the fissile material for one nuclear weapon. Iran thus has a latent break-out capability.

The accumulation of this much low-enriched uranium makes the Iran challenge more acute. But several caveats are in order; including the range of uncertainty in the variables that feed into the equation of how much is enough for a weapon. Because the low-enriched uranium is under IAEA surveillance, further enriching it could not be done without tipping off inspectors. And the basic truth bears repeating, that having a stockpile of enriched uranium is not the same as having a bomb. Treating Iran's enrichment capabilities as equivalent to nuclear weapons status could empower its hard-line leaders and exaggerate the perception of danger among Iran's neighbors, increasing whatever security motivations they may already have for keeping open a nuclear weapons option of their own.

For a weapon, the low-enriched uranium first would have to be further enriched to 90% or more. Although it may be counter-intuitive, about two-thirds of the effort required to produce weapons-grade uranium has already been expended by the time it is enriched to just 3.5%. Nevertheless, the further enrichment to weapons-grade would still take several weeks. Based on public information, it is impossible to say how long it would then take Iran to reconvert the gaseous highly enriched uranium to metal and fashion a weapon from it, but a very rough estimate might assign at least at six months or more to this task. Other nations would then have some time to react, provided they could muster the political will to do so.

Having just enough enriched uranium for one weapon, even once enriched to weapons-grade, cannot be said to confer nuclear-weapons status. A real deterrent capability would require more. Most countries also feel the need for a test to ensure reliability, although this perhaps would not be necessary if Iran received a proven weapons design through the black market. The notorious Pakistani black marketer A.Q. Khan sold a nuclear weapons design to Libya at the beginning of the decade, and other members of his network made digital copies of the blueprints.

There is no publicly available evidence that Iran obtained a weapons design as well. It is noteworthy, however, that the Libya blueprints have been described as being from the "same family" as the documentation that Iran admitted it did receive from the Khan network in 1987 on the casting of uranium in hemispherical shapes.

As has been widely reported, the US intelligence community assessed that Iran was working on nuclear weapons development up until late 2003. What has not been reported, and is probably unknown, is how far Iran got in this research. The publicly available evidence suggests that it was at the developmental -- not yet operational -- stage.

Whether Iran has actually made a decision to build nuclear weapons is uncertain. But its purpose in pursuing uranium enrichment clearly seems to be to have a weapons option for the future. It is hard to reach any other logical conclusion, based on the secrecy and deception behind the program, the military connections and evidence of weapons development work, and the economic illogic of investing in these expensive technologies without having any power plants that can use the enriched uranium. With regard to this last point, for example, the Bushehr reactor that underwent a start-up test last week can be run safely only on fuel made in Russia. Iran's claims about the purpose of its enrichment program obfuscate this point.

Iran's main justification has been an argument for self-sufficiency. The argument breaks down on several grounds, however, including that Iran's known uranium reserves are insufficient for the nuclear power program it envisions. Iran already has exhausted most of its stock of uranium concentrate, known as yellowcake, in order to produce 357 metric tons of uranium hexafluoride at its facility at Esfahan. This is far from sufficient for a power plant, but is enough feed material for at least three dozen weapons.

A key policy challenge is how to build a barrier between a latent nuclear weapons capability and actual weapons production. This is difficult when, as in

Iran's case today, the distinction is blurred almost to the point of invisibility. The United States and its allies do, however, have several policy tools to help keep Iran's enrichment program from unlimited expansion. If Iran continues to defy the Security Council, its enrichment program can be constrained by export controls, sanctions, financial pressure, interdiction and other means of exploiting Iran's vulnerabilities.

Among the dangers presented by Iran's nuclear program is the risk that it will start a domino effect in the region. Many of Iran's neighbors are concerned about its growing weapons capability. For some states, such as its Gulf neighbors, an Iranian nuclear weapon would present a direct and dire threat. For others, such as Egypt and Turkey, the threat is indirect, and more tied to concerns about the balance of power and loss of relative status and influence in the region. Together, these concerns have contributed to a surge of interest in nuclear power in the region, almost certainly in part to signal to Iran—and to their own populations—that they have a hedging strategy.

Since 2006, 15 countries in the Middle East have announced new or revived plans to explore civilian nuclear energy. They have justified their interest in terms of electricity needs, energy diversification, a desire to conserve oil and gas for export earnings, and the role of nuclear energy in retarding global warming. They do not talk openly about it in strategic terms, and certainly do not say they want nuclear energy as the building block for an atomic bomb. But they do see nuclear energy as a status symbol, and a way to keep technological pace with Iran. The question is how to keep this interest confined to purely civilian nuclear programs. Keeping Iran from getting nuclear weapons is the best preventative.

Nuclear power in itself is not a proliferation threat. It can contribute to proliferation risks by providing cover for clandestine activities and an industrial and personnel infrastructure that could be useful to a weapons programme. However, it is only the sensitive areas of the fuel cycle – primarily uranium enrichment and plutonium reprocessing – that pose the problem. If states agree to forgo these technologies and to accept enforceable transparency measures, then nuclear power can contribute to their economic development without sparking proliferation concerns.

The introduction of nuclear energy elsewhere in the Middle East should not be seen as a foregone conclusion. To date, no commercial contracts have been signed; no irreversible decisions have been made, and most of the national plans have been limited to feasibility studies. Indeed, there is reason to doubt the will and ability of many of the states in the region to follow through with the large technical, financial and political challenges of nuclear-energy development. These hurdles have postponed many nuclear energy plans in the past and are likely to do so again. From a technical standpoint, most of these states are starting from a very low base, lacking the necessary physical infrastructure, legal systems and trained scientific and engineering personnel. Those states that do go ahead will take 10-15 years before nuclear power becomes a national reality. There is time, therefore, to put in place a robust regime of policies and practices that can serve as a bulwark against a proliferation cascade in the region.

In a book-length assessment last year of *Nuclear Programmes in the Middle East: In the shadow of Iran*, the International Institute for Strategic Studies concluded that if any one of Iran's neighbors were to seek to acquire nuclear weapons in response, this would put additional pressure on others to do the same. A

proliferation cascade would become more likely if Israel felt obliged to relinquish its long-standing doctrine of nuclear "opacity" or ambiguity, whereby it refuses to confirm or deny any aspect of its nuclear activities.

The policies and practices adopted by the next states to embark on nuclear power projects can set a new standard to help correct the damaging Iranian precedent. Central to this new standard should be a shared understanding that the proliferation risks of nuclear energy are manageable as long as countries accept full transparency with enforceable verification and concentrate on the technologies they really need for nuclear power, while relying on more economical imports of nuclear fuel, rather than indigenous development of sensitive parts of the fuel cycle. A good example of this is the decision by the United Arab Emirates unequivocally to forgo enrichment and reprocessing and to accept the IAEA safeguards Additional Protocol. This sets a positive model for the region and beyond, in stark contrast with Iran. If such a stance helps the UAE to acquire state-of-the-art nuclear technology from the West, the Iranian people might well ask their leaders why they persist with policies that lead to increasing political and economic isolation while their Gulf neighbours can freely enjoy the benefits of peaceful nuclear cooperation.