IRAN'S INSISTENCE ON URANIUM ENRICHMENT: MOTIVES AND REPERCUSSIONS

Dr. Sami al-Harby

Researcher on nuclear affairs

Introduction

n 2002, the international community was shocked when an Iranian opposition group revealed the existence of a ▲ secret Iranian nuclear program at the Natanz uranium enrichment facility and Arak heavy water reactor without the knowledge of the International Atomic Energy Agency (IAEA). This is a breach of Iran's commitments under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). After the aforementioned discovery, a long journey of negotiations and diplomatic discussions began between Western countries and Iran in which uranium enrichment played a major part. These negotiations led to the signing of the Joint Comprehensive Plan of Action (JCPOA) in 2015. Iran insists that its nuclear program is peaceful, however, its insistence on locally enriching uranium; developing centrifuges; and choosing Natanz, a rugged mountainous region, to build enrichment facilities and fortify them underground, casts doubt on the allegedly peaceful nature of its program. Moreover, its attempt to hide another enrichment facility (Fordow), and not to announce it until 2009, increased suspicions surrounding its nuclear program. The aforementioned suspicious behavior raised a question about Iran's motives for locally enriching uranium, and its ramifications for Iran, the region, and the world.

One of the cornerstones of the nuclear fuel cycle is uranium enrichment, uranium-235 is increased to uranium-238. What distinguishes the enrichment process and makes it a central issue in international agreements is the dual use of enriched uranium: peaceful or nuclear use. This duality has made the production of nuclear fuel and the use of nuclear energy for peaceful purposes a very politically sensitive issue. This poses a challenge to controlling nuclear proliferation, especially since the NPT allows non-nuclear countries to produce their own nuclear fuel, as long as it is for peaceful purposes. Some countries such as India and North Korea have taken advantage of this to produce their own nuclear weapons. [1]

The Iranian nuclear crisis erupted in 2002 when an Iranian opposition group revealed a secret Iranian program to enrich uranium at the Natanz and Arak facilities without the knowledge of the IAEA. ⁽²⁾ This action was perceived as an indication of Iran's non-compliance with the NPT, which Tehran ratified in 1970, ⁽³⁾ after which the arduous process of negotiations began, culminating in the 2015 nuclear deal.

The issue of uranium enrichment is at the core of Iran's confrontation with the West, (4) which is what prolonged the aforementioned negotiations as the United States initially rejected this demand, while Iran insisted on it as a right guaranteed under the NPT. The US side shifted from "no to enrichment" during the administration of G. W. Bush to "no to the bomb" during the Obama administration. (5) This latter decision did not come until the Obama administration lost hope in the Iranians halting uranium enrichment, in addition, it wanted to avoid the worst case scenario that might arise from Iran's continual intransigence. (6)

Once Iran had obtained US consent to enrich uranium, the nuclear agreement was reached, and it did not object to making major concessions (in return for retaining the right to enrich), as the agreement restricted and legalized the enrichment process in a very significant way. But in 2018, the United States, during President Donald Trump's administration, withdrew from the agreement, and one of its main justifications was that the agreement permitted Iran to enrich uranium. This study will reveal Iran's motives for insisting on enriching uranium locally, despite all the sanctions that were imposed, and even though international guarantees secured its need for nuclear fuel, and at less cost than local enrichment. The study will also address this by taking into consideration three dimensions: strategic, political, and security. In addition, the study examines the ramifications of Iran's uranium enrichment for the country, the region, and the world. Finally, this study will shed light on the stages that the uranium enrichment program has gone through in Iran.

Iran's Uranium Enrichment Policy

The beginning of the enrichment process in Iran dates back to the mid-1970s, when a small research project was established at the Tehran Nuclear Research Center, with US assistance, to enrich uranium using laser technology, and enrichment did not go beyond this. Iran secured the supply of nuclear fuel for the Bushehr reactor by purchasing a 10 percent share in the Eurodif uranium enrichment company in 1975, which was a joint venture between various European countries, headquartered in France.

However, major transformations took place in the Iranian nuclear program as a whole after the Iranian revolution in 1979. Most international nuclear cooperation with Iran, including the supply of nuclear fuel, stopped, and the United States refrained from supplying the Tehran Research Reactor (TRR) with highly enriched uranium fuel. This forced Iran to shut it down temporarily, and Iranian officials were then forced to convert it into a low-enrichment reactor with the help of Argentina.

Through these events, Iranian officials became convinced of the need to build and develop Iran's own nuclear fuel cycle technology. Some sources indicate that Iran actually started a secret uranium enrichment program in the mid-1980s when it hired Pakistani nuclear scientist Abdul Qadeer Khan⁽⁸⁾ who visited Iran at the time and offered assistance by providing enrichment technology. With the support of the then Prime Minister Mir Hossein Mousavi, a deal was concluded between the representatives of the Atomic Energy Organization of Iran and the AQ Khan nuclear network;⁽⁹⁾ so Iran's uranium enrichment program was secretly born by obtaining technical drawings, manufacturing instructions, and samples of centrifuge components.

Iran provided the IAEA with information about the start of its nuclear cooperation with Pakistan in 2007, which included early research and development of the centrifuges obtained from Pakistan between 1987 and 1993.⁽¹⁰⁾

Between 1992 and 2002, Iran made steady progress toward industrializing its nuclear fuel cycle, and secretly carried out enrichment experiments on centrifuges installed at a facility belonging to the Kalay Electric Company⁽¹¹⁾ in violation of its obligations under the NPT.

Later, Iran admitted to the existence of its secret nuclear facilities, the Natanz enrichment facility and the Arak heavy water reactor after the National Council of Resistance of Iran exposed them in 2002. Iran claimed that they were for peaceful purposes. Then began a long journey of negotiations spanning more than a decade. The negotiations were initially undertaken by three European countries: France, Germany and Britain (the E-3 group), and they made diplomatic efforts to try to resolve the Iranian nuclear crisis. International negotiations focused on suspending Iran's enrichment activities,

and the IAEA called on Iran to suspend its enrichment activities and declare all materials and equipment connected to its nuclear program.

In November 2004, Iran agreed to stop enrichment and voluntarily signed the IAEA Additional Protocol. However, Iran adopted a tougher and more aggressive stance in the negotiations when President Mahmoud Ahmadinejad ascended to power. The Iranian authorities broke the locks placed by the IAEA on Iran's nuclear facilities and resumed uranium enrichment and succeeded in reaching a 3.5 percent enrichment rate in 2006, using more than 100 centrifuges. This caused the negotiations to be disrupted and the IAEA Board of Governors in February 2006 voted to refer the Iranian file to the United Nations Security Council (UNSC) for non-compliance with the NPT Comprehensive Safeguards Agreement.

The UNSC passed a series of resolutions demanding Iran to stop uranium enrichment, and it gradually imposed sanctions on it. The first was Resolution 1696 in July 2006, demanding Iran to suspend its enrichment activities, followed in the same year by Resolution 1737, which renewed previous claims and threatened to impose sanctions in the event of non-implementation. Successive UNSC resolutions (1747, 1803, 1835 and 1929) demanded a halt in Iranian enrichment activities with more sanctions imposed on Iran. In mid-2015, the JCPOA was signed between Iran and the five permanent members of the UNSC in addition to Germany (P5+1). Subsequently, the UNSC unanimously adopted Resolution 2231 in which it supported the JCPOA and superseded the previous resolutions.

Iran approved the JCPOA to lift the economic sanctions that had burdened it. As for the P5+1 group, the goal was to delay Iran's acquisition of the fissile material needed to build a nuclear bomb. (12) Therefore, the agreement aimed to restrict uranium enrichment activities both quantitatively and qualitatively, and tighten control over Iran's nuclear facilities as well as completely halt the production of plutonium by redesigning the Bushehr reactor.

The agreement did not prevent Iran from enriching uranium; it delayed its possession of the nuclear material needed to produce a nuclear bomb from six months to a year rather than permanently thwart its efforts⁽¹³⁾ as it succeeded in preserving its right to enrich uranium under the NPT; this was classed as a great victory for Tehran. With this agreement, Iran moved from the stage of secrecy to retaining its technical know-how to build a nuclear bomb whenever it wanted to.(14)

Iran will keep its uranium enrichment level at 3.67 percent for 15 years, and it will not be able to preserve more than 300 kilograms of its total stockpile of uranium enriched at this rate for 15 years and will keep no more than 5,060 IR-1 centrifuges at the Natanz facility for 10 years. Iran was not allowed to carry out uranium enrichment or any related research and development activities

at the Fordow Fuel Enrichment Plant for 15 years. With this percentage and quantity of enrichment and the number of centrifuges, Iran will not be able to obtain the fissile material needed to produce a nuclear bomb within 15 years. ⁽¹⁵⁾ Iran also agreed to install live cameras to monitor the enrichment process in its nuclear facilities around the clock, with the footage broadcast to IAEA inspectors for 15 years. IAEA inspectors were also allowed to enter Iran and carry out inspections at nuclear sites.

Although the JCPOA limited or curtailed significant parts of Iran's nuclear program, recognition of its right to enrich uranium is in itself an acknowledgment of its nuclear potential in the future.^[16]

In May 2018, the United States, during the administration of former President Donald Trump, withdrew from the nuclear agreement with Iran, arguing that it would fail to prevent Tehran from developing a nuclear weapon once restrictions on uranium enrichment were lifted. Moreover, the agreement did not include Iran's missile program nor its regional interferences. ⁽¹⁷⁾ In return, the Iranian government announced that it would abandon the restrictions imposed on enriching uranium and related nuclear research and would resume enrichment using a range of advanced centrifuges, including the IR-6 which enriches uranium at a higher efficiency and speed than the IR-1 allowed under the JCPOA. ⁽¹⁸⁾

Since mid-2019, Iran has worked to expand its nuclear program and it began hastening the process of enriching uranium, reaching 60 percent purity in 2021. (19) According to the latest IAEA reports, Iran's stockpile of enriched uranium has reached 3,197.1 kilograms, more than 10 times what was agreed under the nuclear agreement, including 147.8 kilograms of 20 percent enriched uranium and 23.3 kilograms enriched at 60 percent. (20) This is a dangerous escalation because the time period to reach 90 percent purity has drastically decreased, cutting significantly Iran's nuclear break-out time. This prompted IAEA Director-General Rafael Grossi to declare that "only countries that manufacture bombs are enriching to 60 percent." (21)

After the US withdrawal from the JCPOA, Iran imposed severe restrictions on IAEA inspectors from accessing nuclear sites⁽²²⁾ and removed the watchdog's cameras at the Karaj site where sensitive parts for advanced centrifuges are produced.⁽²³⁾ The United States is currently attempting to revive the JCPOA, calling on Iran to return to observing the 2015 agreement.

Iran's Motives for Enriching Uranium

The Iranian government uses a range of arguments to justify its process of enriching uranium locally. It claims that one of the main reasons for this is to secure access to the nuclear fuel needed to operate its nuclear reactors, and its desire to end dependence on external sources. Iran's previous experience

in dealing with foreign countries may have had a significant impact on its decision to enrich uranium locally. (24) The United States had previously stopped supplying the TRR with nuclear fuel after its diplomats were held hostage in Iran and this forced Iran to shut down the reactor temporarily. Eurodif, with Iran owning a 10 percent stake, also refrained from sending nuclear fuel to Iran after the revolution in 1979.

However, uranium enrichment locally is not commensurate with Iran's needs, nor with its available uranium resources. Technically, Iran does not need to enrich yet⁽²⁵⁾ in light of its small number of nuclear reactors and its agreement with Russia to build nuclear reactors in Bushehr, which includes the provision of nuclear fuel. In addition, the estimates of Iran's stockpiles of uranium are in no way sufficient to supply its planned nuclear program, which includes at least seven reactors. (26) Thus, Iran will have to import uranium ore, and this means it is difficult for it have an independent nuclear fuel cycle.

One of the justifications often stated by the Iranian government is that enriching uranium will decrease the consumption of oil and gas, thus allowing it to export more energy and increase its revenues. (27) Nevertheless, the Iranian government has failed over the years to explain the economic rationale behind its enrichment policies. [28] Iran's proven reserves of natural uranium do not exceed 7,500 tons, (29) with most of it in the high-cost category. With the low quality of domestic enrichment, the total cost of enrichment in Iran will far exceed the cost of importing it. (30) For this reason, some countries, such as Belgium and Sweden, have already decided to import enriched uranium instead of enriching it locally as a more feasible option. (31) In addition, Iran's insistence on enriching uranium locally has caused international restrictions and sanctions to be imposed on it. This has greatly impacted its economy and added to the final cost of enrichment locally. Russian Foreign Minister Sergei Lavrov previously stated publicly that there is no economic justification for Iran to continue its uranium enrichment program. (32)

The justifications that Iran uses to enrich uranium locally are not convincing. By tracing the course of Iran's nuclear program, Tehran has been keen to hide its uranium enrichment facilities at Natanz and Fordow by building them underground, fortifying them with air defense systems, and installing a large number of centrifuges, approximately 20,000. Moreover, Iran converted the enriched uranium into uranium metal in early 2021, (33) which is an element needed to build a nuclear bomb.

Iran's desire to enrich uranium beyond the levels needed for civilian use has raised doubts about the true intention and nature of its nuclear program. (34) Therefore, some analysts have concluded that Iran has no realistic need for enrichment, unless its actual desire is to build or pursue the nuclear option. (35) Historically, the factors that contributed to the spread of nuclear weapons have been very similar, primarily the spread of uranium enrichment capabilities. (36) Uranium enrichment using centrifuges was the most widely used technology in nuclear proliferation and played a central role in the production of nuclear weapons because of their small size compared to other technologies and the ease of concealment. (37) It has been an option for many non-nuclear countries that built a nuclear bomb, such as Pakistan and North Korea. Controlling nuclear proliferation has become much more difficult with developments in enrichment technology because the IAEA safeguards are not strict enough in monitoring enrichment facilities. (38) Countries that possess uranium enrichment capabilities have become "nuclear latent," which varies according to the size and capabilities of the facilities that they own. (39)

Nuclear affairs expert at the Massachusetts Institute of Technology in the United States Vipin Narang divided Iran's nuclear proliferation strategy into three stages. Before the Iranian revolution, Iran followed a policy of technical nuclear precaution, which is the stage of establishment, with the country being a far distance from producing a nuclear bomb. In the 1980s to the beginning of its nuclear crisis with the West, Iran pursued a strategy of covertness and secrecy. Since the nuclear crisis to the present time, its strategy has been based on solid nuclear hedging, and at this point, it acquired the technology needed to build a nuclear bomb under the cover of peaceful use.

Therefore, the statements of Iranian officials about the justifications (self-sufficiency and economic benefits) for the country's pursuit of enriching uranium locally are subject to many doubts and indicate wider concealed motives.

Strategic Motives

The IAEA Low Enriched Uranium (LEU), a physical uranium stock, provides its members with low-enriched uranium, so it is not necessary for countries that are keen to secure their uranium energy needs to produce it at home — given the LEU legitimate supplies. [41] Iran claims that its uranium enrichment program — developed at home — is peaceful, yet it is keen on nuclear technology, which can quickly be converted for military purposes. Since the start of its secret uranium enrichment program in the 1980s, Iran has been keen to localize this industry, and has not sought the help of its closest allies, Russia or China, but relied on the AQ Khan network. Moreover, Iran obtained the technical base for the manufacture and development of centrifuges, [42] allowing it to develop advanced types such as IR-8, which has a faster enrichment capacity; up to 16 times faster than the centrifuge's first version, [43] thus reducing the time needed to produce highly enriched uranium for military purposes which some analysts have estimated to be about only three weeks. [44]

Here, it is clear that Iran aims at a long-term strategic dimension more than an operational one, as it is committed to possessing enrichment technology and building its national competency in this field. This indicates that Iran adopts a "nuclear hedging" strategy, (45) so that in the future it can take a political decision regarding increasing its enrichment rate, building a nuclear deterrent force, and protecting its national security whenever needed. This strategy is in force in some countries such as Japan and Germany. (46) By acquiring and maintaining enrichment technology, Iran can easily produce a nuclear bomb. The localization of enrichment technology will also ensure the sustainability of its nuclear program, as it will be able to rebuild it if any external forces destroyed it. Iran has demonstrated its ability to produce large quantities of fissile material through its activities at Natanz and Fordow, which is the most difficult stage in the development of any nuclear weapon. (47)

Iran's "nuclear hedging" has been evident because of the secrecy of its program, its high levels of enriched uranium, and the military's involvement in the program. (48) Iran may not aim to build a nuclear bomb now, as the consequences of political isolation and economic sanctions are greater than it can handle, but it is keeping the option available.

Political Motives

Uranium enrichment brings the Iranian government several internal and external political achievements. In general, nuclear capabilities indicate important symbols of the technological progress of a modern state, reflecting its identity, and its position in the international system. (49) Iran views its success in uranium enrichment as reflecting its position in the international system and the capabilities of its people. (50) The Iranian government depended on a broad internal consensus to develop its nuclear capabilities and move forward with uranium enrichment. The Iranian government played on identity issues and defending the independence of Iran from the "unfair restrictions" imposed by the international community. An opinion poll found that the majority of Iranians considered it important for Iran to have a full nuclear program. Uranium enrichment provided the Iranian government with popular support and political legitimacy to serve its ideology. (51)

In terms of foreign policy, uranium enrichment provided Iran with international momentum, ended its isolation, improved its global position, and led it to the negotiating table with world powers. (52) Enrichment has become an asset for Iran to achieve its political ends and extend its influence in the region. (53) A number of analysts believe that the purpose of Iran's nuclear program, at the moment, is not to produce a nuclear weapon, but that the Iranian government is using uranium enrichment as a pressure tool to achieve political and economic concessions. The former US Secretary of State

Henry Kissinger believes that Iran's possession of some nuclear technology (nuclear potential) enhances its influence in the Middle East. (54)

Security Motives

The decision to obtain nuclear technology for military purposes is often driven by security considerations. (55) Uranium enrichment capabilities either represent a stepping-stone toward developing a nuclear weapon, or act as a deterrent, as a nuclear potential state can deter opponents by using the nuclear card in response to military escalation or nuclear blackmail. (56)

Since its inception, Iran has faced three nuclear neighboring states (Israel, Pakistan and India), while Iraq allegedly had an arsenal of "weapons of mass destruction" that could have been used against Tehran during the first Gulf War. (57) The aforementioned is in addition to the US presence in the Arabian Gulf and its tense relations with Tehran since the Iranian revolution. The combination of international isolation and Saddam's use of chemical weapons during the 1980s were key events for the Iranian leadership and may have convinced it of the need to develop an unconventional deterrent force to balance the threats surrounding Iran. Therefore, the decision was made at that time to develop nuclear capabilities and enrich uranium. (58) Iran will be ready and able under any circumstances to increase its enrichment rate and build a nuclear bomb by possessing enrichment technology. Iran has already exceeded the rate of uranium enrichment needed for peaceful purposes. (59) Thus, uranium enrichment represents a "virtual deterrent force" for Iran, (60) and a kind of "nuclear hedging" that will enhance its political position and military power, and safeguard its security and sovereignty.

Regional security and its determinants are the key driving factors behind Iran pursuing the military nuclear path, and it still chooses to keep the option of nuclear weapons open despite the demise of the Iraqi threat after the elimination of Saddam Hussein in 2003. [61]

The Ramifications of Uranium Enrichment

Iran's insistence on enriching uranium locally has ramifications which will impact Iran, the region, and the world. The first ramification impacts Iran itself. Iran's uranium enrichment program has led to heavy economic sanctions on the Iranian government, with their severity increasing because of the secret nature of the nuclear program and its nuclear facilities. The construction of a clandestine enrichment facility near Natanz buried underground with 25 feet of cement and concrete consumed all the cement that Iran produced at the time. (62) Its insistence on enriching uranium prompted Western intelligence agencies to target the country, and also led to acts of sabotage, including the launch of the first cyberwar of this century, with the Natanz uranium enrichment facility targeted in 2010 with the Stuxnet virus, known

in intelligence circles as the "Olympic Games." The virus damaged about 11 percent of the centrifuges at Natanz, (63) leading to the temporary halt of most enrichment activities. The aim of the Stuxnet operation was to delay the enrichment program, giving Western countries breathing space in order to find solutions to deal with the Iranian nuclear program. The attack was denied by all parties, but suspicion was cast over Israel and the United States. (64) The acts of sabotage also included the assassination of Iranian nuclear scientists. most notably the nuclear scientist Mohsen Fakhrizadeh, who was killed on November 27, 2020.

Iran's enrichment program provided its adversaries, such as the United States and Israel, a justification for launching preemptive attacks to destroy the infrastructure of its nuclear program. (65) Iran openly and provocatively as well as defiantly, despite international pressures, implements an ambitious and sophisticated uranium enrichment program. (66) In April 2021, the Natanz facility was targeted with a deliberate explosion which partially damaged it. The Israeli government was accused of being behind this explosion and that it had escalated its secret war against Tehran's nuclear weapons program. (67)

Allowing Iran to enrich, especially in the context of the JCPOA which did not necessitate Tehran to abandon support for terrorism or other aggressive policies, was seen as a big failure on the part of the P5+1 negotiations. (68) It also encouraged Iran to continue destabilizing the region, and negatively impacting the stability of the region. Moreover, it ignited escalation between countries as the active regional powers, such as Turkey, Egypt and Saudi Arabia, lacked confidence in US deterrence. Thus, these countries may consider developing similar nuclear capabilities⁽⁶⁹⁾ and enrich uranium, the outcome of which will be a nuclear arms race in the Middle East. These countries fear that a nuclear Iran will be more daring and assertive in the region, (70) and is likely to become more confrontational with the Gulf states while it seeks to secure its foreign policy goals, including the guardianship of the Shiite community across the world.(71)

The presence of an active nuclear enrichment program in Iran will increase international concerns about its goals, not only because of its history of concealing its enrichment activities, and its pursuit of denial and misinformation throughout the period of its nuclear crisis with the West, (72) but also because of further suspicions. These suspicions include Iran's distribution of enrichment facilities across multiple sites, "its documented weaponization-related research, including experiments with high explosives, detonator development, and warhead design."(73)

Besides, Iran's enrichment of uranium will undermine the international system for nuclear non-proliferation and provide a green light for others who are considering the development of nuclear weapons. (74) Acceptance of Iranian nuclear precaution, even at a low level of latency or nuclear capabilities, will lead to proliferation-control challenges and impose further pressure on the NPT if not handled carefully.⁽⁷⁵⁾ This could prompt some countries to change their strategy toward possessing nuclear technology, the most important of which is uranium enrichment, as this enrichment technology allows for the transfer from the enrichment path to the military one, if desired.

Conclusion

Iran, as well as any country in the NPT, has the right to enrich uranium for peaceful purposes, but the lack of transparency and secrecy surrounding its enrichment activities, its expansionist policy, and 60 percent purity casts a shadow of doubt over Iranian claims about the peaceful nature of the country's nuclear program. This study examined the strategic, political and security motives behind Iran's insistence on enriching uranium locally.

Iran has been keen on owning and localizing enrichment technology as a long-term strategic goal. Enrichment has strengthened the Iranian government's political position internally through harnessing popular consensus and political and international legitimacy by removing its isolation and improving its international standing. Regarding the security dimension, uranium enrichment gives Iran a virtual deterrent and puts it in the nuclear hedging mode.

Given these motives, Iran cannot give up its uranium enrichment technology as demanded by the United States and the European Union. From an Iranian perspective, this will fundamentally harm its sovereignty and independence and diminish its status and expose it in front of the Iranian people.

Many analysts view Iran's nuclear research and development efforts as a precursor to developing a nuclear weapons program, with uranium enrichment providing a civilian cover for its ambitions. In its uranium enrichment, Iran may not aim to acquire a nuclear weapon for now, but it is clear that it is working hard to preserve its enrichment technology locally. Thus, staying at a level of nuclear latency will leave the door open for the nuclear option, and can be activated when needed. This has backfired on Iran, as uranium enrichment has led to strict international sanctions which have negatively impacted its economy and may be a justification for attacks by its opponents. In the foreseeable future, uranium enrichment may ignite an arms race in the region, a phase of instability and anxiety and undermine global efforts to limit the spread of nuclear weapons.

All of these ramifications stem from Iran's insistence on enriching uranium locally, and the suspicious activities that have accompanied it. It is difficult to ascertain Iran's intentions behind its uranium enrichment capabilities, but all possibilities remain, unless it changes its behavior and cooperates with efforts to ensure that its nuclear program is of a peaceful nature, and in the interests of regional and global stability.

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