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Iran's Nuclear Program: Where Is It Going?

Raphael Ofek



Mideast Security and Policy Studies No. 198

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Cover image: : IR-40 heavy water reactor near Arak, Iran, image via Wikipedia

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EXECUTIVE SUMMARY

From the earliest days of the Iranian military nuclear program, it was directed primarily at Israel, which the revolutionary regime in Tehran deems an archenemy to be completely destroyed. Its real intentions notwithstanding, Iran has consistently presented its nuclear program over the years as designed “for peaceful use.” Even when, in the second half of 2002, Iran’s two major projects to obtain fissile materials for nuclear weapons were exposed—the Natanz plant for enriching uranium using centrifuges, and its plans to build a plutogenic reactor as a heavy water production plant—the regime claimed that both facilities were intended for energy production as alternatives to exploiting its oil reserves.

In 2003, Iran was forced for the first time to present its developed nuclear projects to the International Atomic Energy Agency (IAEA) and to allow IAEA inspectors access to all its facilities where nuclear activities had been conducted. It also agreed to “voluntarily disable” uranium enrichment at Natanz. Simultaneously, however, Iran was secretly promoting the “Amad Plan”—a highly classified project, headed by Mohsen Fakhrizadeh, to develop nuclear weapons.

In early 2006, in defiance of grave findings by IAEA inspectors in Iran that were reflected in the agency’s quarterly reports, the regime decided to renew uranium enrichment in Natanz—albeit at a rate of less than 5%, which is sufficient only to produce nuclear fuel for power reactors. Tensions between Iran and the IAEA increased in the second half of the decade, especially after it was revealed that the regime had set up an underground uranium enrichment facility at Fordow, a

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plant originally designed to enrich uranium for nuclear weapons. Iran acknowledged the existence of the facility in 2009. In late 2011, it began enriching uranium at a rate of 20% on the pretext that uranium at that enrichment grade was required to produce nuclear fuel for Tehran's research reactor.

Extensive intelligence activities were conducted by Israel, in cooperation with the West (particularly the US), to expose Iran's secret nuclear activities. This was not only for the purpose of supplementing the IAEA's regular monitoring of nuclear facilities under the aegis of the Atomic Energy Organization of Iran, which were supposedly intended for civilian purposes, but also to present the IAEA with information on Iranian facilities that were operating within a military nuclear program so the IAEA could demand access to them. A vital contribution to this effort was the passing of a stolen Iranian laptop to American intelligence that contained many details about the Amad Plan so it could be passed on to the IAEA. But the most significant intelligence contribution was the smuggling in 2018 of a vast Iranian nuclear archive to Israel by the Mossad (Israel's intelligence corps). The archive contained evidence that Iran had made great progress in its development of nuclear weapons.

To the regret of the Tehran regime, all elements of its nuclear program were gradually exposed, so it was forced to provide the IAEA with explanations. But those explanations stretched the bounds of plausibility to the breaking point. For example, during a visit of IAEA inspectors to Natanz in 2003, the regime claimed that the facility's centrifuges were the product of domestic research and development, but it soon became clear that it had acquired both knowledge and components for the centrifuges from Pakistan. Tehran also claimed that the heavy water reactor it had built was based on an Iranian design, but it turned out that the design was created by Russian research institutes.

The Tehran authorities also set about razing facilities revealed by Western intelligence to have been part of its military nuclear program before allowing IAEA inspectors access to the sites. However, despite the razing of the facilities, IAEA soil samples taken from sites were found, following testing at the IAEA laboratory in Austria, to contain

small amounts of uranium particles. These findings indicated that nuclear activity had taken place at all the sites.

In the first years of the decade beginning in 2010, contacts began between the P5+1 powers (the US, the UK, France, Russia, China, and Germany), the EU, and Iran with the aim of reaching an agreement that would prevent the Islamic regime from developing nuclear weapons. On July 14, 2015, an agreement was signed by the P5+1 powers, the EU, and Iran on an agreement—the Joint Comprehensive Plan of Action, or JCPOA—designed to limit various components of the Iranian nuclear program according to an agreed-upon timetable. A key actor in advancing this agreement was the administration of President Barack Obama.

Many activities were also carried out against the Iranian nuclear program. They include the computer worm Stuxnet, which debilitated many centrifuges in Natanz in 2010, as well as the killing of several Iranian nuclear scientists. The most recent of them was Fakhrizadeh, the father of Iran's military nuclear program, who was killed at the end of 2020. Recent attacks have been carried out on Iran's nuclear facilities at Natanz and Karaj. While these strikes are widely assumed to have been conducted by Israel, the US, or the two in combination, their provenance remains ambiguous.

After Donald Trump was elected president of the US, he decided, partly in response to the revelations contained in the Iranian Nuclear Archive operation, to impose sanctions on Iran that intensified throughout his presidency. Iran, for its part, began to violate the JCPOA agreement step by step as an act of defiance against Trump. In early 2020 it announced that it was no longer bound by the JCPOA restrictions. In 2021, Iran began to enrich uranium to 60%, as well as to produce metallic uranium—clear indications that its goal is to produce nuclear weapons.

Despite Joe Biden's intention, expressed before he assumed the US presidency, to reach a new settlement with Tehran and the partner EU countries on the nuclear issue as soon as possible, the situation as it has evolved since he took office is vague to the point of indicating a serious crisis. This is due to recent serious steps taken by Tehran that

constitute an almost complete abrogation of the nuclear agreement and that greatly advance it toward the status of a nuclear threshold state; the election of arch-conservative Ebrahim Raisi as president of Iran; and the savage rampage of Revolutionary Guards forces in the Persian Gulf, which has made the Persian Gulf a dangerous area in which to sail. As for the US, Biden's incompetence in the face of the Taliban's takeover of Afghanistan calls into question his administration's dealings with Iran.

Media reports, meanwhile, claim that Israel is preparing a military move against the Iranian nuclear program. If true, it is not clear whether Jerusalem would in fact take that step, particularly in view of the fact that Israel's new government seeks coordination with the Biden administration.

The ambitions of Biden and the EU countries to reach an agreement with Iran are puzzling. The Iranian regime is essentially a criminal gang that seeks to take over its entire environment through violence. The words of those in charge in Tehran cannot be trusted, because they use lies and deceptions as weapons. Does it make sense to do business with these people?

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EARLY DAYS

Iran's nuclear program was begun by Shah Muhammad Reza Pahlavi. His intention was to turn Iran into a nuclear power, allocating about \$33 billion for the purpose of building 20 nuclear power plants to generate electricity. Although Iran sought to include an effort to develop nuclear weapons under the umbrella of its civilian nuclear program, the US restrained it and prevented it from doing so. However, due to Washington's good relations with the Shah, it provided Iran with a small 5 megawatt research reactor, the Tehran Research Reactor (TRR), which was established at the Tehran Nuclear Research Center (TNRC) and was first operated in 1967.

Another nuclear research infrastructure established during the Shah era, in the second half of the 1970s, was the Esfahan Nuclear Technology Center (ENTC). The main contractor for the establishment of that center was the French company Technicatome (which also established the Osirak nuclear reactor project in Iraq). ENTC was designed to focus on studies in the development of the fuel cycle of nuclear reactors.¹

In addition to the establishment of nuclear research facilities, it was necessary to train scientific personnel to operate them. Accordingly, the Shah sent 35 students to the Massachusetts Institute of Technology (MIT) in the US for nuclear training, for a fee of \$1 million paid to the institute. About two-thirds of those students remained in the US after graduation. Among those who returned to Iran was one Ali Akbar Salehi, who completed his PhD at MIT in 1977.² Salehi advanced quite quickly in the Iranian hierarchy: he served as president of the Sharif University of Technology, the Iranian Minister of Foreign Affairs, and, for several periods, head of the Atomic Energy Organization of Iran (AEOI), a position he holds to this day.

The Islamic revolution of the Ayatollah Ruhollah Khomeini in 1979 put an end to the Shah's grandiose plans, and during Khomeini's early years as Iran's leader, he referred to nuclear development as a despicable technology derived from the Great Satan.

Iran's main enemy for most of the 1980s was Iraq, led by Saddam Hussein, with which it was in an intense state of war during those years. Iran's military nuclear program was born as a counterreaction to the Iraqi nuclear program. In 1981, Reza Amrollahi was appointed president of the AEOI, a position to which was added the title Vice President of Iran. Although Amrollahi was considered a megalomaniac, he was given that important role mainly due to his proximity to the new regime in Tehran.³

According to rumor, when Amrollahi was elevated to this position, he only had a bachelor's degree in physics. However, in the late 1980s, he invited Prof. Habibollah Minoo, then working in the department of Plasma Physics at the University of Paris in Orsay, to serve as head of the department of Plasma Physics at the Tehran Nuclear Research Center, dismissing Dr. Masud Naraghi from that position. In return, Prof. Minoo wrote Amrollahi's doctoral dissertation for him.

In 1997, the then President of Iran, Muhammad Khatami, fired Amrollahi. Khatami replaced him with Gholam Reza Aghazadeh, whose energy expertise lay in his earlier service as Minister of Petroleum.⁴

The eight years' war between the two countries ended in 1988, and after the Gulf War (1991) Iraq was forced by the victorious US-led coalition to bring its nuclear weapons program to an end. However, the main goal of the regime in Tehran ever since the Khomeini revolution in 1979—beyond securing its own survival—has been to transform Iran into the regional superpower, on the road to to the worldwide export of its Islamic revolution. The US, dubbed the "Great Satan" by the Islamic regime, and Israel, the "Small Satan," have always been perceived by the Iranian regime as implacable enemies. Once the Iraqi defeat in the Gulf War neutralized its nuclear threat to Iran, Israel became the regime's primary regional target.

Iranian nuclear activities under the ayatollahs' regime began in secret in two seemingly legitimate channels that even competed with each other to some extent. The AEOI, a legitimate organization, made contact with countries around the world, particularly Russia, China, and Argentina, to purchase a nuclear reactor with the potential for plutonium production for nuclear weapons, and its TNRC started developing uranium enrichment centrifuges designed for the same purpose. At the same time, in 1988, the Physics Research Center (PHRC), headed by Dr. Sayyed Abbas Shahmoradi, was established in the suburb of Lavisan-Shian in northern Tehran, under the "academic" auspices of two universities in Tehran, the Sharif University of Technology and the Amir Khabir Polytechnic University. Both had been engaged in research and development of many areas related to the development of nuclear weapons, from uranium enrichment to the development of a nuclear explosive device.

Due to the PHRC's exposure in the media, the institute's name was changed several times. In 1998, Shahmoradi was fired from his position as head of the institute and replaced by physicist Dr. Mohsen Fakhrizadeh, a senior officer of the rank of brigadier-general of the Islamic Revolutionary Guard Corps (IRGC). Fakhrizadeh was also a professor of physics at Imam Hussein University of the Revolutionary Guards in Tehran. The code name given to the project that was conducted within the institute under Fakhrizadeh's leadership was the Amad program.⁵

Iran maintained intensive nuclear contacts with Argentina under the leadership of senior nuclear scientist Dr. Ali Akbar Salehi. In the late 1980s, Salehi went to Argentina with a group of senior Iranian nuclear scientists for the purpose of being trained at Argentine nuclear facilities. As part of their training, they toured all Argentina's nuclear sites: nuclear reactors, the Ezeiza facility for plutonium separation, the Pilcaniyeu facility for enriching uranium by gaseous diffusion, and the large Arroyito heavy water production plant. The training of the Iranian nuclear scientists in Argentina was carried out following a nuclear cooperation agreement Buenos Aires signed with Tehran during the administration of Argentine president Raúl Alfonsín, probably at the end of 1985.

The bulk of the implementation of the nuclear agreement between the two countries fell to the Argentine company INVAP. Its proposals to Iran included joint development of a large RA-7 heavy water reactor of 70 megawatts' power, which existed only on INVAP's drawing boards. The reactor had considerable potential for military-grade plutonium production. It is possible that INVAP's intention was to build its first reactor of this type on Iranian soil, with Iranian funding. The reactor plan was ultimately not implemented, not even in Argentina itself, probably due to American pressure brought to bear in view of the serious significance of the project in terms of the proliferation of nuclear weapons technologies.

A \$5.5 million nuclear deal between Iran and INVAP was, however, signed in May 1987. The deal included an upgrade of Tehran's research reactor and its conversion to a 20% enriched uranium core. Accordingly, in 1993, Argentina supplied Iran with nuclear fuel rods totaling 115.8 kg of uranium enriched to 20%.

It should be noted that Tehran's reactor was supplied to Iran by the US in the late 1960s, first with a 90% enriched uranium core. But after the Khomeini revolution, the US stopped supplying Iran with nuclear fuel for its operation.⁶

In 1995, while Amrollahi was president of AEOI, it reached an agreement whereby the Russian nuclear corporation Atomstroyexport would reestablish the Bushehr nuclear power station. Construction of the Bushehr station had begun in the Shah era, in 1974, and was conducted by the German company KraftWerk Union (KW). It included the supply of two power reactors with a power generation capacity of 1,196 MWe (megawatts electric) each. In 1979, as a result of the revolution and the consequent change in the Iranian government's relations with the West, the project came to a halt. Neither reactor was finished: one was 85% complete and the other 50%. Moreover, during the Iran-Iraq war, the Bushehr station was bombed by Iraqi planes and sustained irreparable damage.

Thus, following a \$1 billion deal signed by Russia and Iran for the rehabilitation of the Bushehr station, Russia supplied Iran with two PWR

(pressurized power reactor) reactors with a total power of 2,100 Mwe. Following the completion of the reconstruction of the nuclear power station, it began operating in September 2013 to produce electricity in full power.⁷ But while the original Bushehr project fell into the “Peaceful Uses Cooperation” category, Russia secretly assisted Iran in promoting nuclear projects of military potential (to be described below) as well as in the field of ballistic missile development. Russian Atomic Energy Minister Yevgeniy Adamov was directly involved in these projects. In January 1999, after these activities had been exposed, the US imposed economic sanctions on three Russian research institutes: Nikiet nuclear research institute of Moscow, the Mendeleev University of Chemical Technology, and the Moscow Aviation Institute.⁸

China has assisted Iran mainly in the development of its uranium resources. It helped Tehran establish a large-scale uranium processing plant in Esfahan, and was the main supplier of the equipment for the project. This included production facilities for uranium compounds, in particular a facility for the conversion of uranium oxide U₃O₈ (“yellowcake”) into UF₆ (uranium hexafluoride), which is used in a gaseous state as the material for uranium enrichment, especially by centrifugation. In providing this assistance, Beijing helped Iran implement its military nuclear program. In addition, China sold Iran a Miniature Neutron Source Reactor (MNSR) with a power of 27 kilowatts (kWt), which was set up at the Esfahan Nuclear Technology Center (ENTC) and used primarily for manpower training.⁹

THE IRANIAN NUCLEAR PROGRAM: 2002-2006

The main components of the Iranian nuclear program in the early 2000s were the construction of the uranium centrifuge enrichment plant at Natanz, a plan to build a 40 megawatt heavy water reactor at the Khondab site near the city of Arak, IR-40, and a heavy water production plant (HWPP) for the IR-40 reactor, news of which was first circulated to the media on August 14, 2002, at a press conference hosted by the Iranian National Resistance Council (an Iranian opposition group based in Paris) in Washington.¹⁰ Despite Tehran’s signing of the Non-Proliferation Treaty (NPT) and the Safeguards Agreement with the IAEA, it had not declare these nuclear projects to the IAEA.

Thus, at the IAEA's annual general assembly in September 2002, the organization's Director General at that time, Egyptian diplomat Mohamed ElBaradei, asked AEOI President Gholam Reza Aghazadeh to comment on the revelations and confirm their veracity.

In his response, Aghazadeh sought to present the nuclear projects that had been exposed, including the heavy water reactor, as part of a comprehensive Iranian program in the field of "Peaceful Uses," which was to include nuclear power reactors as well as the production of nuclear fuel for these reactors. He either forgot, did not know, or ignored the fact that in terms of power generation, pressurized water reactors (PWRs) cooled in light pressure water, like the reactors Iran purchased from Russia for the Bushehr nuclear power plant, are preferable to heavy water type power reactors (HWPRs) like the CANDU type manufactured by Canada and sold to countries around the world. Regardless, Aghazadeh invited ElBaradei to visit Iran, which he did on February 21, 2003.

ElBaradei was very impressed by what the Iranians presented to him at the Natanz enrichment plant. He was told that 100 centrifuges had already been installed there (of the IR-1 type, the first centrifuge type manufactured in Iran), and that another 900 centrifuges were to be installed at Natanz by the end of 2003. ElBaradei's positive impression was mainly due to the fact that he was told that the Iranian centrifuge project was the result of local planning based on unclassified sources of information published in the professional literature.

Following ElBaradei's visit to Iran, the Tehran authorities agreed to allow IAEA inspectors to monitor Iran's nuclear facilities. However, although the IAEA's first quarterly report on Iran, published in June 2003, included serious findings regarding violations of the Safeguards Agreement by Iran (including the Iranians' concealment of a laboratory at which chemical experiments were carried out to produce uranium compounds, including metallic uranium, from which a nuclear weapon's core is made). Apparently because of ElBaradei's positive stance toward Iran, these serious findings were tempered in the IAEA report with soft language, calling them "failures" rather than violations.¹¹

ElBaradei deliberately downplayed the military aspects of the Iranian nuclear effort and preferred to deal with Iran through official diplomatic channels. Iran, for its part, agreed to sign an “Additional Protocol” to the Safeguards Agreement that would allow IAEA inspectors more authority to monitor its nuclear program.



Signing ceremony of the “Additional Protocol,” December 18, 2003. Present are Iran’s Ambassador to the IAEA Ali Akbar Salehi (left) and IAEA Director General Mohamed ElBaradei (right). Image credit: FDD.org

It was later revealed that the IR-1 centrifuges were replicas of the Pakistani P-1 centrifuge, the design for which the Iranians purchased (as well as its spare parts) from the Pakistani nuclear scientist Dr. Abdul Qadeer Khan, considered the father of the Pakistani nuclear bomb.¹² The rotors were manufactured by Iranian technicians using a flow-forming machine purchased in 1985 from the German company Leifeld.¹³ The Iranian scientist behind the centrifuge deal with Pakistan, signed in Dubai in 1987, was Dr. Masud Naraghi, who served at the time as head of the Department of Plasma Engineering at the Tehran Nuclear Research Center. Following his removal from office by Amrollahi, Naraghi defected to the US in 1992 and provided the American intelligence community with information on Iran’s centrifuge deal with Pakistan.¹⁴

In 1976, during the era of the Shah, a laser uranium enrichment program was begun in Iran together with an effort to obtain the technology

illegally from the US. But despite the purchase of four suitable lasers, the program was not a success and was off the table by the time the Shah fell in 1979. In 1991, the program resurfaced at the Tehran Nuclear Research Center as a laboratory study to test its feasibility. In 2002, a laboratory was established at the Lashkar-Ab'ad site, about 40 km west of Tehran, for developing the project.

The renewed uranium enrichment program at the Lashkar-Ab'ad laboratory included studies on both the atomic vapor laser isotope separation (AVLIS) method and the molecular laser isotope separation (MLIS) method. Later, it focused mainly on the AVLIS method using copper vapor (CVL) lasers with a power of up to 100 watts that had been purchased from China and Russia, probably in 1991.

Initially, the Iranians refrained from reporting the Lashkar-Ab'ad facility to the IAEA. They continued to do so until August 2003, after which IAEA inspectors first visited the laser laboratory. However, because the laser enrichment studies did not yield positive results (like similar studies conducted in many developed countries around the world), Tehran closed down the Lashkar-Ab'ad laboratory.

At the 2010 national exhibition on behalf of Iran's National Center of Laser Science and Technology, Iran's then-president, Mahmoud Ahmadinejad, stated: "Today we are able to enrich uranium with lasers." But it is very likely that he was just talking and had no scientific achievements to back up his words. (He also said on February 4, 2013 that he was ready to be the first Iranian to be launched into space.)¹⁵

Extensive intelligence activities were conducted by Israel, cooperating with the West (particularly the US), to expose Iran's secret nuclear activities and pass on the information to the IAEA. This was not only for the purpose of monitoring the nuclear facilities under the Atomic Energy Organization of Iran, which were supposedly intended for civilian purposes, but also to present the IAEA with information on facilities that were operating under the regime's military nuclear program so the IAEA could demand access to them.

The picture drawn in the Possible Military Dimensions (PMD) chapter of the IAEA's November 2011 report indicated significant progress in

Iran's military nuclear capability over the first decade of the 21st century. The vast bulk of the information on which the IAEA report relied was obtained through visits and investigations by its inspectors to Iran's nuclear sites, as well as that received from Western intelligence agencies.

Most notably, at the end of 2004, a stolen Iranian laptop containing more than 1,000 pages of computer simulations and reports of experiments carried out by Iranian nuclear scientists reached the American intelligence community. The material on the laptop revealed that Iran's military nuclear efforts were conducted in the early 2000s as part of the Amad Plan led by Mohsen Fakhrizadeh. It contained conclusive evidence on "Project 110"—Iran's nuclear bomb design—as well as Iran's attempt to locate a suitable nuclear test site. It also contained evidence about "Project 111", which concerned the development of a compact nuclear warhead to fit the Iranian Shahab-3 ballistic missile. In view of its great importance, the information on the laptop was transmitted in November 2005 to the intelligence services of Britain, Germany, and France, and to the IAEA.¹⁶

There is no comparison between the information on Iran's military nuclear program as reflected in the IAEA's November 2011 report and the staggering amount of information revealed as a result of the smuggling of the Iranian Nuclear Archive into Israel in 2018. According to information revealed in the archive, in the early 2000s—relatively early on in the Amad program—the Iranian government had a stated goal of producing five nuclear weapons with a yield of 10 kilotons each. The plan was approved by the Supreme Council of Advanced Technologies, then composed of the heads of the Iranian leadership: President Muhammad Khatami, Secretary General of the Supreme National Security Council Hassan Rouhani, Defense Minister Ali Shamkhani, and the head of the AEIOI, Aghazadeh.

Also revealed was that under Shamkhani's guidance, as a result of the exposure of the projects at the Natanz uranium enrichment plant and the construction of the heavy water reactor near Arak in 2002, the Iranian military nuclear program was split into two arms, an overt and a covert. The open arm, put under the responsibility of the AEIOI, was responsible for the construction of facilities that could be defined

as part of a “peaceful” program, such as uranium enrichment for nuclear fuel production for power and research reactors, construction of nuclear reactors for “research” purposes, and so on. The covert arm was established under the Amad program led by Fakhrizadeh.¹⁷

Because of Iran's duplicitous conduct on the nuclear issue dating back to the second half of 2003, talks were held between representatives of the governments of France, Britain, and Germany, in cooperation with the IAEA, and Iran with the aim of preventing the regime from advancing its nuclear weapons program. The US was also in the picture, albeit beyond the scenes. The European countries seem to have refrained from directly involving the US in the talks for fear that it would take an overly tough stance toward Tehran.

The basis for this concern was that at the June 2003 G8 summit in Évian-les-Bains, France, US representatives expressed serious concerns about Iran's secret nuclear weapons program and offered “our strongest support for a comprehensive examination of this country's nuclear program through the IAEA.” On September 12, 2003, the IAEA Board of Governors demanded that Iran “accelerate the scope of cooperation with the IAEA, demonstrate maximum transparency towards the Agency's inspectors, ensure that in the future it avoids any failures in reporting on its nuclear sites and materials, and temporarily suspend all its activities in the field of uranium enrichment and in the field of irradiated nuclear fuel reprocessing [the separation the plutonium from irradiated nuclear fuel] which could allow Iran to produce fissile materials for nuclear weapons.”

The IAEA's harsh criticism of Iran reflected new facts that had come to light indicating that Tehran had continued to conduct itself with insufficient transparency towards the agency. The regime in Tehran began to fear the possibility that the issue of its nuclear activities would be referred to the UN Security Council, and perhaps even—considering the fresh memory of the US invasions of Afghanistan and Iraq—that the US might take military action against it. Therefore, in October 2003, in coordination with the IAEA, Iran announced its decision to “voluntarily” suspend its activities in the development of the uranium enrichment. Iran restricted those activities by the end of 2003,

though it made it clear that as far as it was concerned, the restriction of uranium enrichment would be short-lived as it was intended to build trust between itself and the international community.¹⁸

In the years 2005-2004, Iran suspended its activities in the field of uranium enrichment, but during the same period, the IAEA accumulated a great deal of information that indicated a military aspect to the Iranian nuclear effort. In contrast to the IAEA report of June 2003, the IAEA's subsequent reports (November 2003 through November 2004) were much more critical of Iran. The person responsible for this change was Olli Heinonen of Finland, who was at the time the deputy director general of the IAEA and head of its Department of Safeguards. Heinonen was very hawkish on Iran compared to ElBaradei.

Heinonen had ample reason to suspect Iran. The list of the Islamic regime's deceptions and obfuscations vis-à-vis the IAEA is long and manifold.

- Iran admitted that centrifuge components were produced at Kalaye Electric's workshop in Tehran, but initially denied that any centrifuge tests had been carried out with nuclear material (i.e., with UF₆ [uranium hexafluoride compound], which, in its gaseous state, enables uranium enrichment). In a letter to the IAEA in October 2003, however, Iran confessed that a number of centrifuge-based uranium enrichment tests had in fact been carried out at Kalaye Electric. This admission was prompted by the IAEA's surprise discovery, in samples taken by its inspectors from centrifuges at Kalaye Electric, two types of uranium particles: those formed during the low-grade enrichment process and those formed during the 36% high-grade process.
- Enriched and highly enriched uranium particles were also found at the Natanz plant. These findings thus raised suspicions that Iran had quantities of uranium it had not reported to the IAEA. Therefore, the Iranian authorities had to admit that the source of the highly enriched uranium particles was in centrifuge components purchased from a foreign country.¹⁹ As a result, it was revealed that the IR-1 centrifuge was indeed a replica of the Pakistani centrifuge P1.

- The next in the row of dominoes to fall was the exposure of the secret nuclear deal between the Iranian Atomic Energy Organization and Abdul Qadeer Khan. As part of the deal with Khan, Iran had purchased more advanced centrifuges of the P2 type as well. After this revelation, the IAEA learned that Khan had also sold Iran nuclear bomb drawings.^{20, 21}
- Iran told the IAEA that the heavy water reactor was designed to produce radioisotopes for industrial and medical applications as well as for research purposes, and rejected the claim that it was designed to produce plutonium for nuclear weapons. But the reactor drawings submitted to IAEA inspectors in July 2003 lacked the “hot cells” (sealed and protected rooms intended for the treatment of radioactive materials) that are essential for radioisotope production.
- The IAEA received information about an Iranian effort to purchase manipulators and lead glass windows from France. This convinced IAEA leadership that the heavy water reactor was intended for the production of plutonium, as the manipulators and the lead glass windows were likely intended to establish a “hot laboratory” for separating plutonium from the spent nuclear fuel of the IR-40 reactor. After several attempts at evasion, the Iranians stated in November 2003 that they intended to build a dedicated structure for “hot cells” near the reactor in order to produce “long-lived radioisotopes for civilian applications.”¹⁹
- Civil engineering works for the construction of the IR-40 heavy water reactor in Khondab, near Arak, began in October 2004.²² On January 22, 2019, Ali Akbar Salehi said in a television interview that the IR-40 reactor, once completed and operated, would be able to produce about 8 kg of plutonium per year—enough to produce nuclear bombs.²³
- The Iranians lied to the IAEA on another point concerning the IR-40 reactor. They claimed that its design was based on local knowledge, but it turned out that the reactor had been designed by the Russian nuclear research institute Nikiet in Moscow with the help of a Russian company from Obninsk. It is highly likely that

that company was a subsidiary of the Obninsk Institute for Nuclear Power Engineering. At that time, many Iranian students were being trained at the Obninsk Nuclear Institute to operate the Bushehr nuclear power station, which had been supplied to Iran by Russia and had reached an advanced stage of construction. As it turned out, a deal had been signed linking the training of the Iranian students at the institute with the participation of its subsidiary in the design of the IR-40 reactor. Further proof that the design of the IR-40 reactor was carried out by Russian nuclear research institutes is that the nuclear fuel of the IR-40 was very similar to that of the Russian RBMK reactor.²⁴ In this context, it should be noted that the first director of the IR-40 project while it was still in the planning stages was nuclear scientist Dr. Ali Pazirandeh, who kept in touch with Nikiet Institute scientists and traveled to Moscow several times. At some point, Pazirandeh was fired for an unknown reason. It should also be noted that Ali Akbar Salehi admitted in the interview on January 22, 2019 that the construction of the IR-40 reactor was based on a Russian reactor design.²³

- Iran decided to establish a heavy water production plant (HWPP) in the 1990s following the success of laboratory-scale heavy water production experiments conducted at the Esfahan Nuclear Center (ENTC). The plan to build the HWPP facility was kept secret until August 14, 2002, when it was unveiled at a press conference hosted by the Iranian National Resistance Council.¹⁰ During ElBaradei's visit to Iran in February 2003, Iran officially announced its plan to build the HWPP. To justify the need for the plant, senior Iranian nuclear program officials argued in 2003 that in view of the uncertainty over whether the uranium enrichment program would succeed, or whether Iran would be forced to succumb to Western pressure, they had to build a nuclear power reactor fueled with natural uranium and using heavy water as a cooling and neutron moderating material. The HWPP began operating in November 2004 with an output of 16 tons of heavy water per year.²⁵
- Among the findings of IAEA inspectors, according to an IAEA report published in November 2003, was an experiment of uranium samples irradiated at the Tehran Research Reactor (TRR) that

resulted in samples containing plutonium. The plutonium was stored in the laboratory of Jabr Ibn Hayan at the Tehran Nuclear Research Center. Iran later acknowledged that it had indeed conducted plutonium separation experiments from the irradiated uranium samples, which were conducted in “hot cells” at the Tehran Nuclear Research Center. But it claimed that only a tiny quantity of 200 micrograms had been produced; that the scientist who performed the experiment had done so on his own, without any directive from above; and that he was no longer employed at the Center. But according to IAEA calculations, the amount of plutonium in the irradiated uranium was about 100 grams. Iran had to admit its mis-evaluation in the quantity calculation. Iran’s denials notwithstanding, this was proof that in its eagerness to develop a nuclear arsenal it was acting to promote, in addition to an enriched uranium route, a plutonium route. Moreover, the MIX (molybdenum, iodine and xenon radioisotope production) facility, which was established at the Tehran Nuclear Center and contained “hot cells,” was also suspected by the IAEA of plutonium separation. According to Iran’s claim to the IAEA, the facility was designed only for the treatment of radioisotope applications for civilian applications.¹⁹

- More rather bizarre evidence was discovered by IAEA inspectors in 2003. In 1989-1993, experiments for production of the polonium-210 isotope were carried out at Tehran’s nuclear center by irradiating bismuth metal targets with neutrons. The use of polonium-210 with the addition of beryllium is one of the methods for preparation of a neutron trigger for a nuclear weapon, known as an urchin. The Iranians claimed that the polonium-210 was intended for the production of thermoelectric batteries, a very rare application of this isotope.¹⁹

In 2004 and beyond, other important events occurred in the Iranian nuclear program suggesting that in terms of nuclear weapons development and probably also the production of various components of an actual weapon, Iran had come a long way. Among the indicators were procurement efforts in these areas, which were conducted by the Ministry of Defense Armed Forces Logistics (MODAFL).

- In June 2004, the IAEA asked Iran to allow its inspectors access to the Lavisan-Shian site in Tehran after it was informed that nuclear activity had taken place at the site, and that as a result, two systems for detecting and measuring radioactivity in the human body (whole-body counters) had been placed there. The agency made this request due to concerns that Iran had taken steps to conceal activities that had been carried out at the site.

The primary cause for concern was that in November 2003, Iran began razing all the buildings on the site to the ground. Iran said it had to raze the site as the area was the subject of a legal dispute between the Iranian Ministry of Defense and the Tehran Municipality that had been decided in favor of the municipality. According to information provided by the Iranian authorities, the organization that operated the site until 1998 was the Physics Research Center (PHRC), which was subordinate to the Ministry of Defense. Its original function was “readiness to prevent casualties due to nuclear attacks or accidents,” but it was later used by the Center for Biological Research.

IAEA inspectors who visited the site in 2004 took samples in which no traces were found of radioactivity. For this reason, the IAEA dropped the Lavisan-Shian subject as an area of concern.²⁵ However, according to the IAEA report for May 2021, the inspectors who visited the site in 2004 found a metallic natural uranium disk that could have been related to the nuclear weapons development project. The fact that this was not mentioned in the IAEA reports of the time probably indicate EIBaradei’s influence.²⁶

- As early as 2004, the IAEA suspected that key components of the nuclear program were conducted at the Parchin military complex, about 30 km north of Tehran, but Iran consistently concealed the activities at Parchin to the organization’s inspectors. In May 2012, satellite imagery identified suspicious activity at Parchin, including the demolition of several buildings and the razing of areas around them.

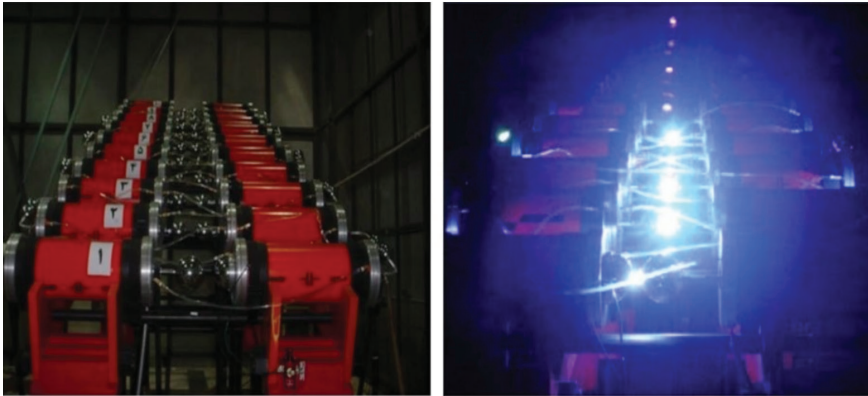
Information revealed in the Iranian nuclear archive allowed a correlation to be made for the first time between photos of the two main buildings at the site, Taleghan-1 and Taleghan-2, and satellite images of the buildings taken as early as 2004. A tall cylindrical steel chamber installed in the Taleghan-1 structure for explosives detonation experiments was first activated in February 2003. The purpose of the experiments was to develop a neutron trigger of a type designed to emit a flux of neutrons into the uranium core of the nuclear explosive device when the device is activated in order to increase the chain reaction of fission in the core and thereby greatly increase the nuclear blast yield.

The proof that Taleghan-1 was intended for neutron trigger development experiments are the photos found in the Iranian archive, which were taken inside the building. Two types of neutron detectors can be identified in the images.

Inside Taleghan-2, a smaller cylindrical steel tank was installed to carry out "cold tests" involving the compressing of natural (non-fissile) uranium cores using explosives to simulate the process of compressing the uranium core of a nuclear explosion device. The Taleghan-2 also contained a huge high-speed X-ray camera designed to diagnose the process of detonating a nuclear explosive device by photographing the compression of a uranium core as a result of an explosion. Such a camera is designed to take photographs using extremely fast and short pulses of X-rays that are 20 to 35 nanoseconds long. The IAEA had received information at the time about Iran's intention of purchasing the high-speed X-ray camera, but Iran claimed it was intended for civilian use.²⁷



*The main high explosive test chamber in Taleghan-1
Image credit: Institute for Science and International Security*



*Flash X-rays in Taleghan-2
Image credit: Institute for Science and International Security*

- Documents from the Iranian Archive also revealed another nuclear facility in Parchin that was built underground, the existence of which was not previously known. The facility was used to convert the gaseous compound UF₆ (uranium hexafluoride) to metallic uranium, melt it, cast it, and process it into hollow hemispheres for the future production of nuclear bomb cores.²⁷

In its 2008-2006 reports, the IAEA complained about the lack of adequate and satisfactory cooperation on Iran's part, the unacceptable excuses for the IAEA inspectors' findings at Iranian nuclear sites, and Iran's procurement activities through anonymous cover companies.²⁸

The IAEA report of May 2008²⁹ included a new chapter that had not yet appeared in previous reports entitled "Possible Military Dimensions," mentioned above, and which appeared in most subsequent IAEA reports—including the report published in February 2015,³⁰ just five months before the signing of the JCPOA agreement. The May 2008 report is particularly noteworthy, as one of its appendices contains a summary of documents presented to the Iranian authorities about a month earlier. It appears that the source of these documents was the stolen Iranian laptop. The appendix referred, among other things, to three Iranian documents regarding experiments related to the development of components of a nuclear explosive device activated by implosion. These experiments were detailed at length in the IAEA report of November 2011.¹⁶

Nuclear implosion is a process by which a subcritical mass of fissile material (highly enriched uranium or Pu-239) is surrounded by highly explosive material. When detonated, the high explosive material compresses the fissile material, causing it to reach supercritical mass and creating a chain reaction of fission. According to IAEA information, between 2002 and 2003, the Iranian Ministry of Defense conducted research on developing an Exploding-Bridge Wire (EBW), a detonator that is very safe compared to ordinary detonators and is therefore suitable for the implosion of a nuclear weapon. Iran also purchased high-speed electronic switches and spark-gap devices from abroad, both of which are used to initiate implosion. Despite Iran's claim that these components were intended for legitimate use, such as the aerospace industry or oil drilling, the IAEA fully believed they were intended for nuclear weapons.

Another technology developed by Iranian scientists was the multi-point initiation of an explosion, also known as a shock wave generator. This is the simultaneous operation of an explosive with the geometry of a hemisphere from a large number of points on the outer surface of

the hemisphere in order to initiate implosion. The development of the technology was carried out with the assistance of a “foreign expert” who was identified by the media in November 2011 as Vyacheslav Danilenko, a Ukrainian who had worked on the Soviet nuclear weapons program. He probably arrived in Iran in mid-1995.

According to the report, the Iranians conducted at least one large test of the MPI system in 2003. Although they claimed in a meeting with IAEA personnel in August 2015 that the MPI system they had developed was intended for applications in the field of conventional military armament, the IAEA’s November 2011 report noted that the “MPI technology developed in Iran has relevant characteristics for a nuclear explosive device, albeit for a small number of alternative applications.”¹⁶

These deceptions notwithstanding, the material obtained through the Iranian nuclear archive in 2018 greatly expanded the picture on the development of nuclear weapons in Iran, both before 2003 and after. For example, the material included a photo of Fordow’s main gate, probably from 2009. Few details about the Sanjarian facility had been revealed in 2009, but a fairly complete picture of the facility was obtained only through the Iranian archive.³¹

As far as is now known about the facility, Iran’s MPI system development activities were conducted there. Sanjarian was also the location for explosive bridge wire (EBW) detonator testing. Another critical activity conducted at Sanjarian was the production of PETN (pentaerythritol tetranitrate), a highly crush-resistant explosive designed to be installed inside MPI system shell channels. Thus, by around 2002 Iran had completed about two-thirds of the required tasks in the MPI system project. The archive documents indicate that the final third was probably completed by the end of 2003.

In view of the situation facing Tehran on November 15, 2004, it stated its readiness to suspend, albeit temporarily, the uranium enrichment program in exchange for a promise that the issue would not be referred to the UN Security Council for the imposition of sanctions. According to IAEA reports from the end of 2004 and 2005, Iran did not cooperate fully with the Agency, and despite its commitment to the

Non-Proliferation Treaty, it concealed information on its uranium enrichment and plutonium separation activities and failed to report on some locations that were involved in the research and development of nuclear weapons.

THE IRANIAN NUCLEAR PROGRAM: 2006 TO 2013

On January 6, 2006, Iran responded to strong criticism from the IAEA about its many falsified reports on its nuclear conduct and the IAEA accusation that Iran had conducted activities bordering on nuclear weapons development by defiantly informing the IAEA²¹ that it had resumed all activities related to uranium enrichment. In February 2006 Iran indeed returned to those activities.

Iran operated two enrichment facilities at the Natanz Uranium Enrichment Center: one for industrial scale uranium enrichment (the Fuel Enrichment Plant, or FEP), and the other a smaller facility (the Pilot Fuel Enrichment Plant, or PFEP), which is designed for the initial running of centrifuges after production and before operation in cascades on an industrial scale. The number of centrifuges already installed at each of the two facilities in the years 2007-2013 is given in the accompanying table, which shows the rapid pace of centrifuge production as well as the development of advanced centrifuge types by Iran.

It should be stressed that the number of centrifuges already activated for uranium enrichment at the FEP facility each year is lower than the numbers listed in the table, as some had been installed but not yet been activated. In practice, as of the end of 2013, about 8,900 IR-1 centrifuges were operated at the FEP facility to enrich uranium at a rate of less than 5%. At the PFEP facility, 328 IR-1 centrifuges were operated to enrich uranium from a rate of less than 5% to a rate of 20%. At the end of 2013, the amount of uranium enriched at FEP to less than 5% reached about 7,200 kg; the amount of uranium enriched at PFEP to 20% reached about 133 kg.³²

Year	FEP plant No. of installed centrifuges	PFEP facility						
		No. of IR-1 centrifuges	No. of IR-2 centrifuges	No. of IR-2m centrifuges	No. of IR-3 centrifuges	No. of IR-4 centrifuges	No. of IR-5 centrifuges	No. of IR-6 centrifuges
End of 2007	IR-1 2,952 units ³³	194	-	-	-	-	-	-
End of 2008	IR-1 3,936 units ³⁴	1	11	-	2	-	-	-
End of 2009	IR-1 8,692 units ³⁵	1	-	11	-	1	-	-
End of 2010	IR-1 8,426 units ³⁶	329	-	21	-	21	-	-
End of 2011	IR-1 6,208 units ¹⁶	359	-	195	-	97	-	-
End of 2012	IR-1 10,414 units ³⁷	328	-	2	-	2	-	-
End of 2013	IR-1 15,420 units + 1,008 IR-2m units ³²	342	-	164	-	178	1	14

Centrifuges at the enrichment facilities of the Natanz plant and their various types
Table created by the author using IAEA reports.

Another issue that brought harsh criticism from the US, Britain, France, Germany, and of course the IAEA came up around 2007, after the discovery by Western intelligence services of the Fordow underground uranium enrichment facility (though by that year Iran had not yet completed its construction). The facility was built in a mountainous area, about 32 km northeast of the city of Qom, on a site that had previously served as a base of the Revolutionary Guards.

Tehran claimed to have set up the facility over fears of an Israeli attack. Plans to build Fordow apparently began after the exposure of the Natanz uranium enrichment plant in 2002, which forced the Iranians

to settle for uranium enrichment up to 5%—suitable for nuclear fuel production, but not for nuclear weapons. When that occurred, the Iranian Revolutionary Guards began to prepare in secret to establish the Fordow facility.

According to American intelligence, construction of the Fordow facility began in 2006, though according to Iran it only began in the second half of 2007. But while Fordow's exposure probably took place as early as 2007, it was not until September 2009 that Iran admitted to the IAEA that it existed.³⁸ It claimed that it was intended for enrichment of less than 5%, but the facility was not suitable for enriching low-enriched uranium: it was small in size, and designed to contain only 3,000 IR-1 centrifuges. (The Natanz enrichment plant, for the sake of comparison, was designed to hold 50,000 centrifuges.)

Despite having made this claim, Iran told the IAEA in September 2011 that it intended to use the Fordow facility to enrich uranium to a level of 20%, on the pretext that it was intended to produce nuclear fuel for Tehran's research reactor. Sure enough, in December 2011, the facility began to enrich uranium to 20%. While 710 centrifuges had been installed at Fordow by the end of 2013, 696 IR-1 centrifuges were actually operating at the facility by January 20, 2014, and they were enriching uranium from a rate of less than 5% to a rate of 20%. The total amount of uranium enriched to 20% at Fordow had reached 166 kg by then.³²

The total amount of uranium enriched to 20% that Iran had accumulated reached almost 300 kg by the end of 2013. However, due to pressure from Western countries, Iran informed the IAEA in January 2014 that it had stopped enriching uranium to 20%.³⁴ It should be noted that uranium enrichment to 20% is a springboard from which to continue toward enrichment to 60%, and from there to 90%—the rate suitable for a nuclear weapon.

Theoretical calculations indicate that operating about 1,200 IR-1 centrifuges for a full year may allow the enrichment of 300 kg of uranium that has already been enriched to 20% in two stages, through 60% to about 40 kg at a rate of 90%. Therefore, in theory, Iran would

have been able by the end of 2014 to produce enriched uranium for two nuclear weapons. Timing worked in Iran's favor here, due to the warming relationship Tehran was developing with the US under the presidency of Barack Obama.

As for the IR-40 heavy water reactor, which began construction in late 2004, in 2008 there were conflicting reports about its expected date of operation: one said it would be operational as early as 2009, while another said operation would be postponed until 2011.³⁹ Both were wrong: the reactor never started operating, and the possibility that it might go into operation one day is still an open question. However, by 2013, the reactor reached an advanced stage: its vessel, the most important component, was installed in June 2013 inside the reactor building and connected to heavy water piping designed to provide neutron moderation and cool the reactor. Iran's president at the time, Ahmadinejad, participated in this event.

According to the IAEA's November 2013 report, the nuclear fuel-loading machine and heavy water pumps had not yet been installed. In addition, nuclear fuel production for the reactor has not yet been completed. Iran informed the IAEA that the start-up date for the IR-40 would not be completed before the second quarter of 2014.⁴⁰ As for the heavy water production plant (HWPP), it was designed to produce 16 tons of heavy water per year. The Iranians did not allow IAEA inspectors to visit the plant, claiming that heavy water is not a nuclear material.

During 2006-2013, Iran opened to the IAEA all facilities and programs it operated under the "legitimate" framework of AEOI, the Iranian Atomic Energy Organization. But while many elements of Iran's military nuclear program were exposed, it continued to conduct work on the program in secret. According to the IAEA's report of November 2011, which focused in detail on Tehran's military nuclear effort, Fakhrizadeh had, in February 2011, transferred the activities of the Amad Project to a new organization he founded nicknamed Innocent: SPND, a Persian abbreviation for "Organization for the Development of Scientific Knowledge."¹⁶ It appears that at that time, Fakhrizadeh went underground.

It is worth noting that security cooperation between Iran and North Korea, which had intensified in the first half of the 1990s when North Korea sold Iran the technology of the Nodong-1 ballistic missile (which, after being manufactured in Iran, was called the Shahab-3), expanded into the nuclear field.⁴¹ The goal of the Iranian engineers was to develop a nuclear warhead for the Shahab-3 as part of Project 111, which was headed at the time by Kamran Daneshjoo.⁴² Information found on the stolen Iranian laptop contained correspondence in Persian from 2002-2004 between Fakhrizadeh, the head of the Amad Program, and the unnamed head of Project 111. One correspondence concerning development of a nuclear weapon was sent on March 14, 2004, from Project 110 to Daneshjoo.²⁹

Daneshjoo served as Minister of Science and Technology in 2009-2013,⁴² and in 2012 signed a cooperation agreement with North Korea ostensibly intended for the following civilian applications: “information technology, energy, environment, agriculture, and food.” The agreement was ratified by AEOI president Ali Akbar Salehi. Iran’s Supreme Leader Ali Khamenei, who was present at the signing, said that “the agreement is a result of Iran and North Korea having common enemies, as the arrogant powers are unable to tolerate independent states.”^{41,43}

What is the connection between cooperation in the fields of agriculture and food and the common enemies of the two countries? The answer to this is that the cooperation agreement was intended to mask cooperation between the two countries focusing mainly on the issues of nuclear and ballistic missiles.

Fakhrizadeh reportedly headed a delegation of Iranian nuclear scientists that landed in Pyongyang after being invited to participate in North Korea’s third nuclear test on February 12, 2013. The Iranian delegation appears to have arrived in North Korea via China under false identities.

The core of the nuclear explosive device in North Korea’s third experiment was uranium. This was in contrast to North Korea’s previous two nuclear tests in which nuclear explosive devices were equipped with plutonium cores. Note that the only fissile material

Iran could have produced in 2013 was enriched uranium, so there was good reason for the Iranian delegation to watch the North Korean nuclear test.

According to one report, Fakhrizadeh was also present at North Korea's first two nuclear tests, which occurred on October 9, 2006 and May 25, 2009. This report may be related to Iran's heavy water reactor, the construction of which was carried out during those years and which was intended for the production of plutonium.⁴⁴

The US stance during this period was worryingly loose in the face of the Iranian nuclear effort. There appears to have been a common desire within both the administration in Washington and the US intelligence community to avoid a confrontation with the regime in Tehran.⁴⁵

THE WEST'S AFFAIR WITH IRAN :2014-2016

It was only in the second half of 2013 that the American public and the world began to hear about the nuclear deal that the Obama administration had forged with Iran. It was widely believed, when the Joint Comprehensive Plan of Action (JCPOA) was signed in Vienna on July 14, 2015, that the warming of relations between Washington and Tehran was the result of two events: the election of Hassan Rouhani as president of Iran in June 2013 (who was viewed by Washington as a moderate), and his arrival in New York three months later, in September, for the UN General Assembly. Although Rouhani rejected President Obama's request to meet him during that visit, apparently on the instruction of Khamenei, the two presidents did speak by telephone.

The US position on Iran at the end of 2013 represented a 180-degree change. In late 2011 and in 2012, the US imposed sanctions on banks trading with Iran and on companies and individuals associated with Iran's Revolutionary Guards. Obama also signed an order freezing all Iranian government assets held in the US. Moreover, in order to prevent Israel from taking military action against Iran, which would have placed Obama in an intolerable dilemma, he embraced Israel in a bear hug, significantly increasing military and intelligence cooperation with it. Obama argued vehemently that his object was to prevent Iran from acquiring nuclear weapons at all costs. With the help of influential

American Jews as well as Israelis, he was able to blunt the criticism that he was hostile to Israel.

Up to that point, Obama had used the stick on Iran. He also had the carrot. It later emerged that Obama was determined from the start, indeed as soon as he was elected in 2009 for his first term as president, to reach an agreement with Iran. The “Death to America” chants led by the Revolutionary Guards in Tehran, even after his telephone conversation with Rouhani, did not concern him. His claim, during a meeting with American Jewish leaders in October 2013, that the military option against Tehran remained on the table was nothing more than an attempt to mislead them into a false sense of security.⁴⁶

Several reports stated that senior members of the Iranian regime, including Khamenei himself and Ali Akbar Salehi, who was then serving as Iran's foreign minister, had begun secret talks with the US in 2011. It was also reported that John Kerry, who was still a senator at the time, was personally involved in those talks and had visited Oman several times.⁴⁷ These contacts were also discussed in the *New York Times Magazine* in May 2016 in an interview with Ben Rhodes, then US Deputy National Security Advisor for Strategic Communications. Rhodes, a key figure in President Obama's inner circle and his senior speechwriter, boasted about his involvement in the covert and cunning manner in which Obama promoted the Iranian agreement, and provided numerous details.

Rhodes said the first secret meeting with the Iranians took place in early July 2012. Jake Sullivan, then director of the planning unit at the State Department, headed by Hillary Clinton, was secretly sent to Oman for a meeting with Iranian officials. According to Rhodes, the turning point in relations between the two countries was not Rouhani's election to the presidency of Iran in June 2013, as published in the official version, but the reelection of Barack Obama in November 2012. It turns out, therefore, that the presidential election in Iran was not the main factor in advancing the agreement with Iran, but an exaggeration of the scope of reform in Tehran was used as a backdrop with which to sell the deal to Congress and the American public.⁴⁸

Prior to the signing of the JCPOA on July 14, 2015, numerous meetings were held between representatives of the P5+1 countries (US, Russia, China, France, UK, and Germany) and the EU and representatives of Iran, with a view toward reaching a deal to prevent Iran from developing nuclear weapons. The meetings took place in Geneva, Istanbul, Baghdad, Moscow, and Almaty, the capital of Kazakhstan. But the meetings ended in nothing. An example was the meeting in Geneva in October 2009, which was scuppered by the exposure of the uranium enrichment facility Iran had secretly set up in Fordow. The meeting in Istanbul in January 2011 also failed due to Iran's insistence on its "right" to continue developing its nuclear fuel cycle, including uranium enrichment.

The US, however, entered into meetings with no prior demands on Iran, in part because Obama was determined to alter the policy of his predecessor, George W. Bush.

In the four meetings that took place before the signing of the JCPOA, there was progress from meeting to meeting:

- At the meeting in Almaty in April 2013, Iran proposed that sanctions be lifted, in exchange for which it would completely eliminate its uranium reserves, some of which had already been enriched to 20%. In the end, the P5+1 agreed in principle to allow Iran to continue enriching uranium up to 5%. This was despite previous UN Security Council resolutions ordering Iran to completely cease all its enrichment activities.⁴⁹
- At the meeting in Geneva on November 24, 2013, an interim agreement was reached on the Joint Plan of Action (JPOA), which was intended to freeze the situation for a certain period and give both parties time to negotiate a comprehensive final agreement. By consenting to the JPOA, Iran agreed to freeze enrichment of uranium to 20%, dilute half the 20% enriched uranium in its possession to less than 5%, not install new centrifuges at the enrichment facilities of Natanz and Fordow, and stop construction of the IR-40 heavy water reactor intended for plutonium production. This was in exchange for an easing of some of the sanctions. In practice, the

agreement only served to freeze US pressure, but did not stop the Iranians from advancing their nuclear program.⁵⁰

- One result of the Geneva meeting was a personal connection formed between Kerry, who had begun serving as US Secretary of State, and Iranian Foreign Minister Javad Zarif. They were photographed traveling together on a Geneva bridge and were seen riding bicycles together through the city. The friendly contact formed between the two men stemmed to a degree from the fact that Zarif's academic studies, including his doctorate, were conducted in the US, and he was well acquainted with the American mentality.
- On February 18, 2014, representatives of the P5+1 and the EU met in Vienna with Iranian representatives for three days to advance negotiations on the nuclear agreement, after which it was decided to hold another meeting in early 2015.⁵¹
- At the April 2015 meeting in Lausanne, Switzerland, the main agreements were reached that were to serve as the basis for the JCPOA nuclear deal. The meeting in Lausanne was joined by US Energy Secretary Ernest Moniz and Ali Akbar Salehi, head of the Iranian Atomic Energy Organization, both of whom are physicists by training. Moniz served in the 1970s as a lecturer and later as a professor of nuclear engineering at MIT at the same time that Salehi was a doctoral student in nuclear engineering at the same institute. They developed a friendship at MIT and were able to revive it at their meeting in Lausanne.
- After the announcement of the Lausanne agreements, Obama held a press conference at the White House at which he said a good deal had been reached. The agreement, he claimed, meant the time it would take Iran to reach nuclear breakout—that is, to obtain enough fissile material to produce one nuclear weapon—would be extended from two or three months to one year.⁵²
- The next meeting between the parties, which began on June 30, 2015, was once again held in Vienna, at the end of which the JCPOA agreement was signed on July 14. As reported by AP, there was such a strong sense of coziness between the Iranian and US

delegations that the media covering the talks got the impression that the US was actually Iran's lawyer.

- The only “righteous man in Sodom” among all the P5+1 representatives during the Vienna talks was French Foreign Minister Laurent Fabius, who announced: “France will not accept any deal if it is not clear that it will be possible to carry out inspections at all Iranian facilities, including military sites.” He sharply criticized US conduct in 2012, when it conducted secret negotiations with Iran in Oman via a back channel that was only revealed to the P5+1 at the Geneva summit. Moreover, according to Fabius in an article published in 2016, the British were also eager to reach an agreement with Iran in view of the oil export sanctions that were preventing the purchase of oil from Iran. The Germans, for their part, were indifferent. Eventually, under US pressure, the nuclear deal with Tehran was signed, despite its many holes. Those holes included sunset clauses on the commitments of all parties and other points detailed below.⁵³

The IAEA's director-general at the time, Japanese diplomat Yukiya Amano, began that position in December 2009, replacing ElBaradei. In contrast to ElBaradei, Amano was accused in the early years of his tenure by former senior IAEA officials of a pro-Western and anti-Iranian bias and an overreliance on unverified intelligence. The main reason for this was that the IAEA's reports on Iran during those years were very critical of Iran. The November 2011 report cited above is particularly notable, as it included a 14-page appendix that provided a highly detailed picture of the organizational and technological aspects of the Iranian effort to develop nuclear weapons.

Moreover, the summary chapter of that report said: “With regard to the possible military dimensions of the Iranian nuclear program, the Agency faces serious concerns. After careful and meticulous evaluation of the extensive information available to it, the Agency generally finds the information to be reliable. The information indicates that Iran has carried out appropriate activities to develop a nuclear explosive device.” Also, according to the IAEA report of August 2013,⁵⁴ “Iran does not provide the necessary cooperation, including the non-

implementation of the Additional Protocol.” However, on November 11, 2013, there was a turning point. Amano, at a joint signing in Tehran with AEOI head Salehi, agreed to a “joint statement on a framework for cooperation.”

Although the IAEA’s role in the negotiations with Iran had mainly to do with the professional aspect of the nuclear issue, the momentum of the negotiations at the Geneva summit in November 2013 encouraged the IAEA to align itself more closely with the position of the P5+1 countries. It appears that even after that, when the JCPOA agreement with Iran had been signed in Vienna, Amano continued to swim with the current. This had to do with the effect of prolonged contacts with Iran and his desire to reconcile his initial opposition with the ambition of the P5+1 countries and the EU to reach an agreement at almost any cost.⁵⁵

In the end, as a result of the intense pressure Obama exerted on members of Congress, he was able to ratify the agreement on the part of the US. It helped him that according to Congressional law, a two-thirds’ majority in each house was required to veto. As for Ben Rhodes, he was full of pride in the May 2016 interview about the way he managed to sell the Iran deal to Congress. “Let’s drive them crazy,” he said of opponents of the deal.⁴⁸

The main sanctions imposed on Iran from the date of entry into force of the JCPOA Agreement (January 16, 2016) concerned the monitoring and verification of the nuclear programs it had advanced to that point, with an emphasis on uranium enrichment, construction of the heavy water reactor (IR-40), and plutonium management. Of course, the activities Iran had carried out in the past regarding the development of nuclear weapons were banned under the agreement, and Iran undertook to start revealing to the IAEA the day after the signing of the agreement all its actions defined in IAEA reports as “possible military dimensions.”

The commitments of both sides (the P5+1 states, the EU, and the IAEA vs. Iran), according to their expiration schedules (“sunset clauses”) were as follows:⁵⁶

- Limiting until **mid-2025** the number of IR-1 centrifuges in Iran’s possession to 6,104 units, while operating only 5,060 units; also

dismantling all other centrifuges (over 13,000 units) and storing them under the control of IAEA inspectors; also a ban on the production and installation of additional centrifuges.

- Uranium enrichment by Iran will be limited until **2031** to a rate not exceeding 3.67%, with all enrichment activities carried out exclusively at the Natanz plant. However, in 2023 some relief will begin for Iran in developing advanced centrifuges.
- In the period **2026-2028**, Iran will be allowed to replace IR-1 centrifuges with the advanced IR-6 or IR-8 centrifuges, provided that the total enrichment capacity at Natanz will not increase as a result (it should be noted that the IR-6 production capacity is estimated to be about seven times the IR-1's capacity, while that of the IR-8 is assessed as about 12 times more than the IR-1). In any case, **between 2029 and 2030** this restriction will also be removed.⁵⁷
- Only 1,044 IR-1 centrifuges will remain at the Fordow facility by **mid-2025**, which will be disconnected from the UF6 feed pipeline. Of these, 348 centrifuges will be converted to isotope separation as part of cooperation between Russia and Iran. But all the other centrifuges at the facility and their infrastructure will be transferred to storage at the Natanz enrichment plant. (It appears that the intention to convert the 348 centrifuges designed to enrich uranium into separating isotopes for medical and agricultural uses was impractical, and was intended only to market Fordow to the world as a facility intended for "peaceful use.")
- Iran will be allowed to stockpile until **2031** only 300 kg of enriched UF6 up to 3.67% (which contain 202.8 kg of uranium enriched to 3.67%). As for the remaining enriched uranium Iran had accumulated prior to the signing of the agreement, and in particular the 20% enriched uranium, it will have to get rid of it in some way, such as by selling or diluting it.
- By the **end of 2023**, Iran will be allowed to conduct at Natanz a study of individual centrifuges of the advanced IR-4, IR-5, IR-6, or IR-8 types, and will then be allowed to conduct a study of 30 units of IR-6 or IR-8 types. From **mid-2023** it will be allowed to produce 200 units of IR-6s or IR-8s centrifuges, but without their rotors.⁵⁷

- By **mid-2035**, the IAEA will monitor the development and production of centrifuges in Iran.
- As for the IR-40 reactor, the reactor core will be removed from its pit and made inoperable. In place of the IR-40, a new reactor will be built that will not be suitable for plutonium production for nuclear weapons. Iran is banned until **2031** from building more heavy water reactors, and is also forbidden to store more than 130 tons of heavy water.
- Iran is banned until **2031** from engaging in activities related to the separation of plutonium from irradiated nuclear fuel.
- Iran's uranium mines and uranium processing plants will be subject to IAEA monitoring until **mid-2040**.
- Iran also pledged not to carry out any activities related to nuclear weapons, and by **mid-2025** to allow tracking of its purchases of equipment that is defined as being "dual-use" (that is, usable for the development of nuclear weapons). It pledged to allow IAEA inspectors until the **middle of 2030** the transparency and access to sites it had not yet provided.
- All the sanctions imposed on Iran under the agreement were supposed to be lifted in **2031**.

To offset the restrictions imposed upon it, Iran was granted relief according to the following terms:

- On the date of entry into force of the JCPOA Agreement (January 16, 2016), the freezing of Iran's assets in banks around the world worth approximately \$100 billion was canceled. The embargo on Iran's sale of oil expired, as did some of the economic sanctions imposed on Iran by the UN, the US, and the EU.
- In **2020**, the embargo imposed by the UN on arms deals with Iran ended. Iran was free to resume both arms imports and the export of weapons to other countries.
- Also in **2020**, some sanctions on Iran by the US and the UK for the sale of various items that may be related to the proliferation of

weapons of mass destruction were supposed to be lifted. The ban on the issuance of visas imposed on Iranian individuals under the auspices of the UN was also to be selectively repealed.

- By the **end of 2023** or even earlier, if the IAEA had concluded that Iran was pursuing its nuclear program solely for “peaceful use,” the US would initiate legislation to repeal, or at least alleviate, the restrictions imposed on Iran in the nuclear field.

But despite these these concessions:

- From the point of view of the UN, until **mid-2020** the embargo on Iran in the field of heavy weapons was to continue, and the restrictions imposed on Iran on the issue of ballistic missiles were to continue until **mid-2023**.
- The US was supposed to continue the sanctions it had imposed on Iran on issues such as human rights violations, terrorism, and the development of ballistic missiles, and also to reserve the possibility of imposing further sanctions on Iran in the future.

According to statements by senior Iranian officials, Iran began to breach its obligations to the JCPOA agreement as soon as it was signed, particularly in regard to the IR-40 heavy water reactor. The agreement stipulated that the reactor vessel would be removed from the reactor but would remain in Iran. It was to be filled with concrete so the IAEA could be ensured that it was inoperable for nuclear application in the future. In the IAEA report of January 2016, it was stated: “The calandria [the heavy water reactor core] was removed from the reactor and rendered inoperable... and has been retained in Iran.”⁵⁸

However:

- Salehi, head of the AEOI, threatened in September 2017 that Iran could quickly renew its military nuclear program. He referred specifically to the IR-40 heavy water reactor: “We only poured concrete into a few [external] pipes of the reactor that are several cm in diameter and 2 to 3 meters long, and not into the reactor itself... If we are instructed to rebuild the previous reactor and

advance the previous plan... we will have to remove the front and rear sections of these pipes and install new pipes, [which can be done] within a few months.”⁵⁹

- Hamid Baeidinejad, Iran’s ambassador to London in 2020 who in 2015 was a member of the Iranian negotiating delegation in Vienna, tweeted in January 2018⁶⁰ that Iran only filled the core openings with concrete, so that, if necessary, the reactor can be put back into use. He described the behind-the-scenes discussions in Vienna this way: “After forcing P5+1 members to allow us to preserve the Arak reactor as a heavy water reactor and to renew it, they argued that renewing the core means replacing it with a new core. And in order to prevent unwanted use [of the old core], it must be sent out of Iran... Iran objected to this and stated that it would not agree to send any nuclear equipment out of the country. After long conversations we recognized that a technical way should be found to prevent immediate use of the core. They proposed to weld the core, made of steel, and cut it into pieces... Iran opposed this proposal and stated that it wanted to place the core in a museum for public display, to show the creativity of Iranian scientists. Finally, it was suggested that the core openings, not the core itself, be filled with concrete so that it could not be used immediately.”
- Salehi said during an Iranian TV interview on January 22, 2019 that during the negotiations leading up to the signing of the 2015 agreement, Iran refused to completely shut down the IR-40 reactor by filling its calandria with concrete but agreed only to cut off the heavy water pipes connected to the calandria and fill their openings with concrete. Iran had secretly purchased replacement pipes ahead of time to ensure that the functionality of the reactor would not be impaired. He added that the photos showing the IR-40 reactor pit being filled with concrete had been Photoshopped.⁶¹

Salehi’s statement contradicted the January 2016 announcement by AEOI spokesman Behrouz Kamalvandi that the reactor core would be filled with concrete to make it unusable. They also made a mockery of the enthusiasm expressed by senior US administration officials over Kamalvandi’s remarks. At the time, Secretary of Defense John

Kerry announced, “Only yesterday did the [Iranian] Foreign Minister inform me that the calandria of the plutogenic nuclear reactor has now been removed [from the reactor], and in the coming hours it will be filled with concrete and destroyed.” Verification of the sealing of Arak’s plutogenic reactor in concrete was allegedly provided by “nuclear weapons distribution experts on the Iran deal.” At a briefing given in October 2017 by Robert Malley, who served as US Special Representative for Iran, he said, “Concrete spilled into [Iran’s] only reactor capable of producing nuclear-level plutonium. It is now permanently shut down.”⁶²



*IMAGE 4 - Photos of the Arak plutonium reactor, one of which is doctored. The image on the left, which appears to show the heavy water reactor pit filled with concrete, is Photoshopped. The man holding a wheelbarrow at the left bottom of the image is hovering slightly above the ground. The image on the right shows the heavy water reactor pit with the reactor core inside
Image credit: [Twitter.com/Esferayn1/status/955385176221257728](https://twitter.com/Esferayn1/status/955385176221257728), Jan. 22, 2018, via JNS.org*

Not surprisingly, the instant the nuclear deal with Iran was signed the EU countries began surging toward the Iranian market. On July 19, 2015, Sigmar Gabriel, Angela Merkel’s Vice-Chancellor and the German Minister of Economy and Energy, arrived in Tehran with “a small delegation of representatives from companies, industry groups and scientists” to establish a “stable and lasting economic cooperation.” In so doing, he marked the first visit to Iran by a senior Western official since the signing of the historic nuclear deal.⁶³ A week later, French Foreign Minister Laurent Fabius visited Tehran for the same purpose, his first visit to Iran in 12 years.⁶⁴ Italy, formerly one of Iran’s main trading partners, sent a delegation of 300 businessmen in early August.⁶⁵

Moscow won a significant role in the JCPOA in the implementation of the project to separate stable isotopes at the Fordow facility. On January 20, 2017, Russia and Iran signed documents promoting their cooperation in nuclear energy for peaceful purposes. These documents referred, among other things, to the stable isotope project at Fordow. Iranian envoys traveled to Russia and Russian experts to Iran. These included experts from Rosatom Corporation, one of the leading organizations in Russia's nuclear energy program, who arrived at Fordow on February 4, 2017 to begin installing equipment. It was learned in 2021 that Rosatom's project at Fordow did not, in fact, materialize.⁶⁶

China, meanwhile, was hoping to convert Iran's IR-40 reactor into a smaller heavy water reactor to be used to produce radioisotopes for medicine and agriculture as well as for research. This was to be done through the CNNC (China Nuclear Energy Industry Corporation). The conversion would have necessitated the replacement of the IR-40's heavy water vessel. To date, significant progress does not appear to have been made on this project.⁶⁷

The exhaustive nuclear talks in Vienna spawned a bad deal. While the agreement reversed Iran's military nuclear program, this reversal was later found to be reversible, leaving Iran the big winner.

As for the course of the IAEA's operations after the signing of the JCPOA, it conducted inspections of Iran only in accordance with the deal and checked Iran's nuclear sites only with Tehran's consent. As a result, the IAEA routinely repeated in its quarterly reports from 2016 through 2018 that Iran continued to fulfill the 2015 nuclear agreement and restrict its nuclear activities accordingly. But in fact, the deal gave Iran a boost with which to fund its efforts to develop ballistic missiles, destabilize the Middle East, and continue to sow terror in the world.

2017-EARLY 2021: TRUMP REDEALS IRAN'S CARDS

Donald Trump, who was hostile to the deal, began his term as president of the United States on January 20, 2017. However, regardless of Trump's position on the matter, there was a growing sense among many experts in the Western world that the JCPOA agreement was a bad deal.

Despite Trump's statement during the campaign that he would "tear up" the agreement, he reaffirmed it about six months after taking office. This occurred after lengthy discussion with his security advisers, who believed Iran was complying with the terms of the deal. At the same time, the US decided to punish Iran via sanctions for its development of ballistic missiles in disregard of UN Security Council Resolution 2231, continued support for terrorism, and undermining of international order and security. The sanctions won full bipartisan support in Congress, and Trump signed them on August 2.⁶⁸

Iran reacted angrily, claiming the sanctions violated the nuclear deal. It vowed to respond to them "accordingly, but proportionately." In a televised appearance by Rouhani on August 15 following his reelection as Iran's president, he threatened to end the agreement "within hours" if the US imposed further sanctions. He warned the US, "If we decide to do so, then within five days at most we can start enriching to 20% at the Fordow facility." Knowing he was walking a tightrope, he immediately withdrew his threat: "Of course, we would not want such a thing to happen, because we made a great effort to obtain the JCPOA ... Our highest priority is to maintain the JCPOA, but not at any cost."⁶⁹

Did Iran abide by the nuclear deal or not?

The IAEA's sixth quarterly report since the signing of the deal, released on June 2, 2017, routinely echoed its predecessors: "The agency has verified and supervised the implementation of Iran's nuclear-related commitments in accordance with the modalities set out in the JCPOA."⁷⁰ But the report appears to have been written more in a spirit of political correctness than to address the key question of whether Iran had, in fact, fully met its obligations. Mark Fitzpatrick, head of the US branch of the International Institute for Strategic Studies (IISS) in London, published an article in June 2017 criticizing Iran's nuclear behavior, which he described as "problematic." He said Iran had violated some of its obligations under the JCPOA, and that it should allow IAEA inspectors access to facilities suspected of developing nuclear weapons or developing and manufacturing advanced centrifuges. He also added that the US should continue to maintain the nuclear deal as a necessary evil.⁷¹ Unlike Fitzpatrick, the Institute for Science and International

Security in Washington, run by David Albright, identified a tendency for proponents of the JCPOA agreement to ignore its violations by Iran.⁷²

Iran did violate the agreement again and again, each time in small but important ways. At the end of January 2017, Salehi announced that Iran had begun testing the most advanced centrifuge, the IR-8 type. He said the experiment, which included injecting UF₆ into a centrifuge, went more smoothly than expected. However, he noted in a television interview on April 8 that the checking of the injection process would take about two years, and that after that, Iran would start setting up IR-8 centrifuge cascades. Salehi said he saw this as a milestone in Iran's project of developing centrifuges, but claimed this was not contrary to the nuclear agreement. He also noted that the mass production of centrifuges of the IR-2, IR-4, and IR-6 types had begun. This was probably an example of a trial balloon launched by Iran to assess global response in general and that of the IAEA in particular.^{70,73}

It could be that in light of the complex reality of those days, Trump concluded that as long as Iran was careful not to go too far in its violations, the threat he had made during his presidential campaign to tear up the nuclear deal was not feasible. It is also possible that he thought the warnings from Iran's leaders that they could quickly withdraw from the agreement and enrich uranium to a rate higher than the 3.67% allowed in the agreement were nothing but statements aimed at local audiences. But regardless of the content of the Iranian statements, the war of words pointed to the fragility of the JCPOA. It should also be remembered that all this took place against the background of a nuclear crisis that arose between US and North Korea, Iran's ally. Iran was likely encouraged by Pyongyang's provocative stance against Washington.

But on May 8, 2018, Trump withdrew the US from the nuclear deal with Iran and reimposed some of the sanctions on Iran that had been lifted by the Obama administration. Some were supposed to take effect on August 5, 2018, while others, including sanctions on the oil trade, were supposed to take effect in November 2018.⁷⁴ The main push behind Trump's decision was the televised appearance of Israeli Prime Minister Benjamin Netanyahu on April 30 in which he revealed the

contents of the Iranian nuclear archive that had been smuggled into Israel in early 2018 by the Mossad.⁷⁵ Trump expressed support for Netanyahu's speech and referred to it with these words: "Today we have absolute proof that the Iranian promise was false," adding that the information revealed by Israel proved he was right all along in his attitude toward the nuclear agreement with Iran.

Another blow to Iran was Netanyahu's September 27, 2018 speech to the UN General Assembly. In his remarks, he revealed the existence of a secret warehouse at the center of one of the suburbs of Tehran, in the Turquz-Abad district. Netanyahu claimed that the warehouse was used for the storage of nuclear equipment and radioactive materials that were related to the Iranian nuclear weapons program. He urged IAEA Director General Yukiya Amano to "do the right thing," telling him: "Go and inspect the atomic warehouse immediately before the Iranians empty it... and when you are there, monitor the other sites as well. Once and for all, tell the world the truth about Iran." Netanyahu added that Iran had removed 15 kilograms of radioactive material from the warehouse in the Turquz-Abad suburb and "distributed the material throughout Tehran in order to hide the evidence."⁷⁶

On May 1, 2019, sanctions were imposed on all Iran's oil exports, with the aim of depriving the regime in Tehran of its main source of income.⁷⁷ On May 8, Iran responded by announcing the "cessation of implementation of some of its obligations under the nuclear agreement, which included the removal of the 3.67% enriched UF₆ storage limit up to 300 kg and the storage limit of heavy water up to 130 tons. It even threatened to renew uranium enrichment to 20% as well as complete construction of the IR-40 heavy water reactor. The US responded in turn by imposing sanctions on other Iranian industries—iron, steel, aluminum, and copper—which comprised the largest source of revenue for the Iranian government after the oil sector.

The crisis that erupted between Iran and the US was the worst since the Iranian revolution in 1979 and the establishment of the ayatollahs' regime in Tehran.

On July 7, Iran began enriching uranium to 4.5%, exceeding the 3.67% rate stipulated in the nuclear deal (however, enrichment up to 5% is still considered to be for a legitimate purpose: to produce nuclear fuel for power reactors).⁷⁸

Tehran expected that the EU, particularly the European powers at the Security Council, (France, Britain, and Germany), would fully back it against the US. But the US push for sanctions on Iran left the EU in an awkward position. These countries wanted to keep the nuclear agreement with Iran intact, but Washington was Europe's most important ally. This was reflected not only in the political sphere but also in the business sector. Many European companies had close trade relations with American companies, and feared those ties would be severely damaged if they breached the US embargo on Iran.

Still, the governments of Western Europe believed that even if Washington had a legitimate right in principle to activate the snapback clause and withdraw from the deal, doing so violated the original spirit of the agreement, as the snapback clause was intended to punish Iran only when it had blatantly violated the agreement. The EU position was that Iran began to violate the agreement by enriching uranium beyond the permitted limits as a result of the US withdrawal from the deal.

In September-November 2019, other significant events related to the JCPOA occurred:

- On September 5, Iran announced its decision to violate JCPOA for the third time by ceasing to respect the restrictions on research and development of advanced centrifuge types. Two days later, the IAEA confirmed that Iran had begun to do so. On September 25, it confirmed that Iran had begun to enrich uranium in advanced centrifuges.⁷⁹
- In a speech delivered by Netanyahu at the Foreign Ministry in Jerusalem on September 9, he referred to his remarks at the UN General Assembly the previous year during which he had revealed the warehouse in Turqez-Abad. He said, "Even before that, Iran knew we were above them, so they evacuated the site. They evacuated them and then actually covered the site ... they

put gravel on it to try to hide their tracks. But they could not hide. The IAEA found uranium traces that Iran hid at these sites. It was a direct violation of the Nuclear Non-Proliferation Treaty (NPT). Some time ago the IAEA demanded that Iran answer its questions about these violations and Iran refused.” He then said, “Today we reveal that in the archive we brought from Tehran, another secret nuclear site was uncovered. At this site Iran conducted experiments to develop nuclear weapons. This is the site near Abadeh, south of Esfahan. When Iran realized that we discovered the site, this is what they did: they destroyed the site, just deleted it ... Here they conducted nuclear tests on nuclear weapons ... They destroyed the evidence or at least tried to destroy the evidence.”⁸⁰

- On November 5, Iranian President Rouhani announced the resumption of uranium enrichment at the Fordow facility at a rate of 4.5%, Iran’s fourth violation of the JCPOA agreement. He said a container containing 2 tons of UF₆ was transferred to Fordow in order to enrich the material, using two cascades in each of which 174 centrifuges were installed. However, according to Rouhani, the intention was to operate all the 1,044 centrifuges at the Fordow facility. According to Salehi, he was referring to the introduction of 30 new advanced IR-6 centrifuges at the Natanz enrichment plant (in addition to the 30 IR-6 centrifuges already installed), as well as commenting upon the great progress Iran had made in developing IR-8 and IR-9 centrifuges to glorify the country’s nuclear program.⁸¹
- Against the background of Iran’s non-compliance with its commitments on the nuclear issue, the relationship between it and the IAEA was severed. This was largely due to the death of IAEA Director General Amano on July 22, 2019, who, since the beginning of the talks between the P5+1 countries and Iran in 2013 that led to the signing of the JCPOA agreement in 2015, had adopted a conciliatory attitude toward the regime in Tehran. The first blow to relations between Cornel Feruta, acting IAEA Director General following the death of Amano, was an episode in which an IAEA inspector was arrested in early November 2019 when she was about to enter the Natanz enrichment plant. Her documents were

seized, her power of attorney was revoked, she was detained for a few days, and was deported from Iran⁸².

- On November 7, the IAEA Board of Governors was convened by Feruta for a special conference to discuss Iran's lack of cooperation in examining Netanyahu's claims to the UN on September 27, 2018 regarding 15 kg of radioactive material allegedly in a warehouse in Turquz-Abad, and the claim that the Iranians had acted to conceal evidence by dispersing the material throughout Tehran. IAEA Deputy Director General Massimo Aparo also reported in the first week of November in a closed-door hearing that Iran continued to "not cooperate with the investigation into the nuclear depot uncovered in Tehran." As for the samples taken by IAEA inspectors from the warehouse in Turquz-Abad following its exposure by Netanyahu, they were examined in the IAEA laboratory in Seibersdorf, Austria, and according to the IAEA report of November 11, 2019, anthropogenic uranium particles that had undergone processing by humans at a low level of enrichment were found to be present. The IAEA report from November 2020 stated that the particles found in the samples were similar to particles previously exposed in centrifuge components purchased from Pakistan.⁸³ Assuming the Turquz-Abad warehouse really did contain 15 kg of radioactive material, as Netanyahu claimed, it may have been a dummy version of a nuclear weapon for the purpose of conducting a cold test designed to simulate a nuclear explosion. Under this scenario, the casting of the natural uranium core was carried out at one of the facilities at the Parchin site, where Iran had previously carried out nuclear weapons development experiments.
- The election of Rafael Grossi from Argentina on December 2, 2019 as IAEA Director General not only did not improve Iran's relations with IAEA but made them worse due to Iran's manipulations on the nuclear issue. However, Iran seemed to have taken these steps for a number of reasons unrelated to the IAEA: defiance of the sanctions imposed on it by the Trump administration, an attempt to force EU countries to side with it, and in particular to prove to the Iranian people that the Tehran regime was unwilling to submit to US pressure.

In 2020, tensions between the US and Iran—already elevated over the nuclear issue—worsened even further in the face of Iran’s attempts to seize control of the Persian Gulf. On May 12, 2019, four merchant ships were wrecked as they docked in the territorial waters of the United Arab Emirates. Although Iran did not take responsibility, the incident received wide coverage in the Iranian media, which claimed that seven to 10 tankers, including Saudi-owned ships, had been severely damaged in the attack. About a month later, two oil tankers were attacked in the Gulf of Oman.

On September 14, Saudi oil fields were attacked by UAVs (unmanned aerial vehicles) and cruise missiles, an attack Riyadh claimed caused a 50% drop in its oil production and that shook the global energy market. Although the Houthi militia in Yemen, which is directed by Tehran, claimed responsibility for the attack, Western sources believe it was carried out from Iranian soil.

The situation in 2020, before the start of Joe Biden’s term as US president, was as follows:

- On January 5, Iran announced it was no longer bound by any restrictions imposed on it under JCPOA.⁸⁴
- In the IAEA’s June quarterly report, the agency expressed its displeasure at Iran’s refusal to allow its inspectors access to two sites suspected of nuclear activities in the past, as well as Iran’s failure to clarify questions posed by the Agency regarding nuclear material that had not been declared as well as other nuclear-related activities in Iran.⁸⁵
- Despite this, European member states of the UN Security Council predictably refrained from voting in favor of the US demand to extend the heavy arms embargo on Iran that was due to expire in August 2020. Russia and China voted against the American demand and the embargo expired⁸⁶.
- According to a November IAEA report, agency inspectors were finally allowed to take samples from the two sites listed in the previous report as suspected of nuclear activity. According to the

Washington Institute for Science and National Security, headed by David Albright, one of these sites was Marivan, which was in fact the Abadeh site mentioned by Netanyahu in his speech at the Israeli Foreign Ministry in Jerusalem on September 9 2019. The Institute for Science and International Security published satellite photos showing that the Iranian authorities had razed part of the Marivan facility in July 2019 (i.e., more than a year before IAEA inspectors were allowed access to the facility) in order to prevent exposure of nuclear activity that had taken place there in the past. Traces of radioactive materials found in samples taken by inspectors in August 2020 appear to indicate activities to develop nuclear weapons previously conducted at the site.

According to the Institute for Science and International Security, the second site mentioned in the report was a pilot plant for uranium conversion near Tehran that was razed in 2004. The November IAEA report also referred to a third site, which, although its name was not mentioned, was likely a facility that operated until the early 2000s in the Lavisian-Shian suburb of Tehran. This suspicion is based on the fact that in 2002-03 a metallic natural uranium disk was found at the site that had been processed by drilling and compressing hydrogen atoms inside the metal (hydriding). Iran had not reported this to the IAEA and did not provide an explanation for it. This finding indicated the possibility that Iran was developing a UD3 neutron trigger at the site at the time⁸⁷.

- The findings cited in IAEA reports, as well as the November 27 assassination of Iran's head of the military nuclear program, Mohsen Fakhrizadeh, were blows to Iran. In defiance of the US and the IAEA, on December 2, Muhammad Baqer Qalibaf, Speaker of the Iranian parliament, announced the enactment of a law to take effect on December 23 that stated that Iran would immediately increase uranium enrichment to 20% and would store at least 120 kg of 20% enriched uranium each year. Although President Rouhani refused to sign the bill, the law was approved by the Iranian parliament on December 8.⁸⁸
- In an interview with Reuters on December 17, IAEA Director General Rafael Grossi disapproved of Joe Biden's commitment

to the Iranian nuclear deal, stating: “I cannot imagine that they are just going to say, ‘We are back to square one’... The starting point no longer exists... It is clear that a protocol, or an agreement, or an understanding, or some accompanying document will be needed that will clearly determine what is done.” He protested the Iranians’ conduct: “There is more [nuclear] material... there is more activity, there are more centrifuges.”⁸⁹

- According to IAEA reports from January-February 2021, Iran continued to disregard its commitments to the JCPOA. It renewed uranium enrichment to 20%, and as of mid-February 2021, had accumulated 17.6 kg of enriched uranium to 20%. In addition, according to these IAEA reports, Iran began a research and development program for the production of metallic uranium, with the intention in the first stage of producing it from natural (unenriched) uranium and in the next stage from 20% enriched uranium in order to produce nuclear fuel for the Tehran Research Reactor (TRR). However, Britain, France, and Germany—three of the five countries (P5+1) that remained in the nuclear deal after the US withdrawal—condemned Tehran and said they were “very concerned” about its announcement. Uranium metal production has serious military consequences.⁹⁰

IS JOE BIDEN’S PRESIDENCY A NEW ERA FOR IRAN?

Joe Biden took office as president of the United States on January 20, 2021, and appears to hold the key to the Iranian nuclear issue. Although Biden said before the election that he intends to return the US to the JCPOA while making amendments and removing sanctions imposed by the Trump administration on Iran, it is doubtful whether he has formulated a clear policy on the issue.

On February 8, Biden announced that the US would not lift sanctions until Tehran met its obligations under the nuclear deal. Secretary of State Antony Blinken warned during the Senate hearing ahead of his nomination that “Iran’s nuclear weapons cut-off date has been reduced to three to four months” and said the agreement should be “longer and stronger,” a statement that sent a message about the failure of the original agreement reached by Obama.

Although the fact that senior members of the Biden administration dealing with the nuclear issue were involved in reaching the agreement in 2015—particularly Robert Malley, who was appointed US envoy to Iran—raised concerns about Washington's relations with Tehran, it seems that US policy on the Iranian issue is in Blinken's hands. Blinken said in an interview on NPR on February 17, "Iran is far from meeting the requirements of the agreement, so we will have to look at what it will do." On the other hand, on February 19, the US administration informed the UN Security Council that it had reversed the snapback mechanism, by which in September 2020 the Trump administration had demanded that the UN reimpose all the sanctions on Iran that had been lifted by the nuclear agreement.⁹¹

Contrary to the Biden administration's expectation that it would be able to reach a modus vivendi and an amended nuclear deal with the Tehran regime, ever since the beginning of the Biden presidency there has been a worsening in the extent and intensity of Iran's deviations from the deal, as reflected in the April-June IAEA reports. Apparently, Tehran believed that ramping up its aggressiveness would increase pressure on the Biden administration to blink first and lift all sanctions before Tehran returns to the original nuclear deal.

According to the reports, Iran began enriching uranium to 60% on April 17. According to an audit by IAEA inspectors on May 24, 5,060 IR-1 centrifuges were installed at Natanz's FEP plant in 30 cascades, 1,004 IR-2m centrifuges in six cascades, and 348 IR-4 centrifuges in two cascades, designed to enrich uranium to 5%. Some have already been activated. By mid-May, Iran had accumulated 2 kg of UF₆ (i.e., 1.3 kg of uranium) enriched to 60%,⁹² a figure that had increased to 6.5 kg by June 15 according to an Iranian government spokesman.⁹³ At that rate, it is likely that by the end of October 2021, Iran will have stockpiled about 30 kg of enriched uranium to 60%, which could, within a matter of weeks, be further enriched to 20 kg of 90% enriched uranium—i.e., enough for one nuclear weapon and maybe even a little more.

As far as Iran is concerned, enrichment to 60% has no use except for a military purpose. But Iran justified the move to 60% enrichment in response to an explosion at Natanz on April 11 that destroyed a large

number of centrifuges. In addition, production of metallic uranium began at the uranium processing plant near Esfahan. According to the IAEA Director General, about 200 grams has already been produced in 2021. US State Department spokesman Ned Price said this about the report: “Iran has no credible need to produce uranium metal, which has direct relevance to nuclear weapons development.”⁹⁴

Also, in its May 31 report, the IAEA complained that as of February 23, its inspectors had been denied access to the recording and photography monitoring devices it had installed at the Natanz and Fordow uranium enrichment plants, as well as at Iran’s rotor and centrifuge component production factories. The inspectors were also denied access to sites that were recently exposed as facilities where activities related to the development of nuclear weapons was carried out.⁹²

Britain, France, and Germany have also expressed great concern about Iran’s continued flouting of the nuclear deal, especially since the beginning of 2021. This is despite the efforts of the three countries to revive the agreement. In the view of the three countries, the recent steps taken by Iran are critical to nuclear weapons production and create an irreversible state of acquisition of the knowledge needed for its development.⁹⁵

As for the US, President Biden informed then president of Israel Reuben Rivlin during his visit to the White House on June 28 that “my commitment to Israel is solid... It includes a commitment to uncompromising support for Israel’s right to self-defense... Iran will have no nuclear weapons on my watch.”⁹⁶ However, according to the June 21 report, at the end of the sixth round of negotiations in Vienna on Washington’s return to the deal, the US agreed to lift Trump’s sanctions on Iranian oil while Iran agreed to return to complying with the original demands of the agreement. What delayed the return to the nuclear deal was Iran’s demand, in the wake of Trump’s withdrawal from the deal, for a written commitment from the US that it would not violate the nuclear deal again until it expires in 2030. The Biden administration refused this demand because it contradicted the US system of government, which requires Senate approval for such decisions.

The US also had a demand for Iran that it was unwilling to give up. Secretary of State Blinken demanded that the Iranians enter into negotiations on an “improved nuclear deal” that would be “longer and stronger” than its predecessor.⁹⁷ IAEA Director General Rafael Grossi summed up his disappointment with Iran’s recalcitrant behavior toward the IAEA in an interview on June 16 in Milan with the Italian newspaper *La Repubblica*, in which he said, when asked about the status of contacts for the renewal of the nuclear deal, “Everyone knows that at this point, it will be necessary to wait for a new government in Iran.”⁹⁸ On August 20, he again expressed his frustration with Iranian conduct, saying the original JCPOA nuclear agreement was no longer “feasible” because “Iran has accumulated knowledge, has accumulated centrifuges and has accumulated material.”⁹⁹

Meanwhile, on June 21, extremist cleric Ebrahim Raisi, known as the “Butcher of Tehran,” was elected president of Iran. It is likely that the US, the UK, France, Germany, and IAEA Director General Rafael Grossi were disappointed with that outcome. As reported on July 19, Iran has made clear that it will be ready to return to a seventh round of talks with the US through European mediation only after the formation of a new government led by Raisi, which could mean September or October.⁹⁷

To sum up: Iran faces four blocs that present varying degrees of challenge. The first is the IAEA. The second contains Britain, France, Germany, and possibly also the EU, which signed the agreement in 2015. The third contains Russia and China, which also signed the agreement. The fourth is the Biden administration in the US:

- The **IAEA** must be vigilant in the face of Iran’s nuclear deceptions. Grossi seems frustrated that the question marks over the continuation of the agreement arose during his term and he wants the IAEA to emerge this time with an effective and sustainable deal.
- **Britain, France, and Germany** appear interested in renewing the agreement, but are troubled by Iran’s defiance in violating all of its 2015 commitments and speedy approach to nuclear status.

- **Russia and China** are willing to return to the 2015 agreement as is, as they see Iran as a country with important potential for economic deals.
- The **Biden administration** has not yet fully formulated its position on the issue, though it is concerned about Iranian conduct over the past year. It is also troubled by the election of Raisi as president of Iran.

On the other side of the barricade stands Iran. The regime is divided between ultra-conservatives, who were recently strengthened as a result of Raisi's election, who oppose any compromise, and who seek nuclear weapons as quickly as possible; and the so-called "moderates." Given their country's precarious economic situation, the moderates are trying not to push things too far and prefer to wait and see how relations develop with the Biden administration.

ISRAELI OPPOSITION TO IRAN'S NUCLEAR PROGRAM

As is well known, ever since the 1979 revolution Israel has been considered by the Tehran regime its arch and eternal enemy that must be destroyed. This implacable hostility was originally due to the close ties that had existed between Israel and the Shah, but developed into a pathological religiously-based hatred. Iranian hostility became a serious matter of concern to Israel when it became clear that Tehran aspires to acquire nuclear weapons.

Israeli intelligence had been aware of the Shah's efforts to develop nuclear technology. However, this issue, compared to the real threat of the Iraqi nuclear program against Israel at the time, was given very low priority, not least since the Shah was a close ally of the Jewish state.

The Islamic Republic has always claimed that its nuclear program is for "peaceful purposes," but as early as 1988, the Israeli intelligence community recognized the beginnings of a military nuclear program and began to monitor its development. The first sign of this was the interest of Dr. Masud Naraghi, who then served as head of the plasma physics department at the Tehran Nuclear Research Center, in acquiring professional literature in the field of uranium enrichment

and in particular gas centrifuges for uranium enrichment.¹⁴ In 1989, the PHRC Institute, which engaged in research and development in many areas related to the development of nuclear weapons, was also exposed by Israeli intelligence. Since then, especially after the end of the 1991 Gulf War with the defeat of Iraq and the decline of the Iraqi nuclear threat, Iran's nuclear effort has been given a high priority by Israeli intelligence.

With that said, the great awakening around this issue—not only in Israel but throughout the Western world—came in the second half of 2002, when Iran's plan was first published in the media to carry out the two projects that would enable it to develop military nuclear capability: the Natanz uranium enrichment plant and the heavy water reactor near Arak.

A very real, albeit behind-the-scenes, clash between Israel and Iran took place during the Second Lebanon War, which broke out on July 12, 2006. Although Iranian forces were did not take part in the fighting against Israel, Tehran used the war to divert Western attention from its military nuclear program. Iran's motivation to activate Hezbollah against Israel in the Second Lebanon War relies heavily on statements of senior members of the leadership of both Iran and Hezbollah in the media.¹⁰⁰

Based on this thesis, Ehud Olmert, while serving as Israeli Prime Minister, played an indirect part in the war against Iran by destroying (on September 6, 2007) Syria's plutogenic reactor, which, according to Gen. Ali Reza Asghari, a former deputy defense minister and defense advisor to Iranian president Khatami who defected to the US, was funded by Tehran.^{102 101}

The most vigorous Israeli statesman against the Iranian nuclear program was Benjamin Netanyahu. This issue became the defining task of his life.

According to the book *A Storm Toward Iran*¹⁰³ by former Israeli military journalist Ilan Kfir, who was close to Ehud Barak, in September 2010, when Netanyahu was prime minister and Barak defense minister, Israel was very close to attacking Iran's nuclear facilities by air. This was ostensibly because Netanyahu did not believe Obama would work to

stop the Iranian nuclear program. According to Kfir, it was Barak who persuaded Netanyahu to launch an operation. Netanyahu, for his part, saw Barak as a kind of a buffer protecting him from responsibility for the operation.

As it turned out, the resolute opposition of the heads of the defense establishment—Chief of Staff Gabi Ashkenazi, head of the Mossad Meir Dagan, and head of the Shabak (General Security Service) Yuval Diskin stopped the operation from being carried out. According to Kfir: “Not only did they oppose [it], they also warned Netanyahu and Barak that this was an illegal order, because in their opinion only the cabinet is authorized to declare such [an operation], not a limited ministerial forum.”

Barak, whose relations with Ashkenazi were shaky, was furious, and Netanyahu were shocked by the reaction of the three. Barak suggested to Netanyahu that they share responsibility for the operation despite the opposition of the heads of the security forces, but the PM refused.

According to Kfir, in October 2011, Netanyahu and Barak decided to reopen the possibility of a military operation against the Iranian nuclear program. By that point, all three opposing members of the defense establishment—Ashkenazi, Dagan, and Diskin—had retired. Benny Gantz took over as Chief of Staff, Tamir Fardo as head of the Mossad, and Yoram Cohen as head of the Shabak.

Unfortunately for Netanyahu and Barak, Gantz threw his full weight against the operation, and managed to get a majority of the security cabinet to oppose it. Kfir writes that a third attempt was on the agenda in October 2012, but was canceled in light of the US presidential election of that year. Another reason was that Barak had distanced himself from Netanyahu. He now objected to an attack on Iran, both due to the political situation in the US and for operational reasons.

Netanyahu’s strengths in his efforts to contain Iran were expressed inter alia in the many speeches he delivered:

- One of Netanyahu’s best-known speeches was the “bomb speech” at the UN General Assembly on September 27, 2012. In response to Barack Obama’s refusal to respond to his request to draw a clear

red line for Iran regarding its nuclear program, Netanyahu drew an illustration of a bomb with a fuse. He explained that a red line should be placed before Iran that would prevent it from enriching sufficient uranium to manufacture a nuclear bomb, and drew a literal red line on the image where uranium enrichment would reach 90%. He warned that “by next spring or at most by summer,” Iran would have a nuclear weapon.¹⁰⁴



Netanyahu's "Bomb" Speech at the UN. Image credit - Flickr CC

- On March 3, 2015, Netanyahu addressed a joint session of the two US Houses of Congress on the emerging agreement between the P5+1 countries and Iran on the nuclear issue. The invitation to Netanyahu to address Congress was sent by the then Speaker of the House of Representatives, Republican John Boehner. In his remarks, Netanyahu reviewed the Iranian regime's dubious history of concealing its nuclear efforts, and presented the danger of the nuclear arms race that could occur among Arab countries following Iran's acquisition of nuclear weapons. Boehner admitted that the invitation had been made without consulting the White House, provoking controversy in both the US and Israel.¹⁰⁵

- On April 30, 2018, Netanyahu presented the well-known presentation, which was broadcast live on media networks in Israel and around the world, in which he displayed examples of documents and digital media found in the Iranian nuclear archive that had been smuggled into Israel by the Mossad. This was to point out Iran's lies to the world and the IAEA while secretly working to develop nuclear weapons.¹⁷
- In his September 27, 2018 speech to the UN General Assembly, Netanyahu revealed the existence of the secret warehouse in the Turqz-Abad district that was used by the Iranian regime to store nuclear equipment and radioactive materials related to its nuclear weapons program.⁷⁶
- In his speech at the Foreign Ministry in Jerusalem on September 9, 2019, Netanyahu referred to his remarks at the UN General Assembly in 2018 and noted that after his speech, the Iranians took steps to hide all traces of nuclear material at the Turqz-Abad warehouse.⁸⁰

One of the first measures taken in late 2009 against the Iranian nuclear program was the computer worm Stuxnet, which was specifically designed to cause the centrifuges at the Natanz plant to fail. The international media claimed the operation had been developed jointly by American and Israeli intelligence. Indeed, a comparison of the numbers of centrifuges operated in Natanz in enriching uranium between the IAEA reports from August and November 2009 and February 2010 indicated that close to a thousand IR-1 centrifuges stopped enriching uranium in Natanz during this period—about one-fifth of Natanz's production capacity—and new centrifuges were installed in their place.

It's possible that about 1,000 centrifuges fell out of use during that period (they break from time to time), but not in such large quantities. According to media reports, the cause of the damage was sabotage by the Stuxnet worm, which stopped the centrifuges from operating while sending messages to their operators that they were operating normally. In November 2010, the Iranians were forced to completely disable Natanz for a few weeks in an effort to overcome the damage caused by the worm.¹⁰⁶

During the period 2010-2012, a string of senior scientists connected to the Iranian nuclear program were assassinated. While Iran (and the media) blamed Israel, in cooperation with the United States, for the killings, Israel never admitted any involvement. The Iranians who were eliminated were:

- Masoud AliMuhammadi, a professor of elementary particle physics at the Department of Physics at Tehran University, who was assassinated on January 12, 2010. According to the Iranian legal system, Majid Jamali Fashi, who was convicted for AliMuhammadi's murder and executed on May 15, 2012, was an agent of the Israeli Intelligence.¹⁰⁷
- On November 29, 2010, a motorcyclist attached an explosive device to the car of Dr. Majid Shahriari, killing him. Shahriari was a member of the Department of Nuclear Engineering at Shahid Beheshti University in Tehran.¹⁰⁸
- On the same day, a motorcyclist attached an explosive device to the car of Dr. Fereydoon Abbasi-Davani, seriously injuring but not killing him.¹⁰⁹ Abbasi-Davani eventually recovered from the attack. He served at the time as a professor at the Shahid Beheshti University in Tehran, and headed the Faculty of Physics at Imam Hussein University in Tehran. He also served as Fakhrizadeh's deputy in the Amad program. In recognition of his many services before his injury, Iranian president Ahmadinejad appointed him head of Iran's Atomic Energy Organization, where he served from February 2011 to 2013. At that time, his name appeared on the UN list of Iranian scientists suspected of being members of the military nuclear program.¹¹⁰
- Darioush Rezaeinejad, who apparently worked in a nuclear laboratory in northern Tehran in a nuclear explosive device development study, was shot in the neck on July 23, 2011 by two gunmen on a motorcycle outside his daughter's kindergarten in Tehran.¹⁰⁹
- Mostafa Ahmadi Roshan, a chemist by training who served as deputy director of the Natanz uranium enrichment facility for procurement, was killed by an explosive device attached to his car on January 11, 2012.¹⁰⁵

For the last year or so, a series of events occurred in Iran apparently intended to destabilize its military nuclear program. Again, these attacks were attributed to Israel, possibly in cooperation with the US. Unlike Netanyahu's exposure of the Mossad's smuggling out of the Iranian nuclear archive in 2018, Israel maintained ambiguity on these events and refrained from taking responsibility for them:

- Early on June 26, 2020, Tehran was rocked by a huge explosion at the Parchin military complex, which had been involved in experiments related to the development and production of nuclear weapons. This was most likely due to an explosion of explosives and/or solid fuel for missiles. According to satellite photos and eyewitnesses, the explosion caused damage over an area about half a kilometer long and networked in a large number of underground tunnels. The area houses the Khojir plant, which produces solid fuel for Fajr rockets, cruise missiles, and Sejil-2 ballistic missiles, which are designed to have a range of 2,500 km. A spokesman for the Iranian Ministry of Defense downplayed the incident, claiming it was an explosion of an industrial gas tank without casualties.¹¹¹
- About two weeks later, on July 2, a fire and explosion occurred at the main uranium enrichment plant in Natanz, the flagship of the Iranian nuclear program. Satellite imagery of Natanz published in *The New York Times* on July 11 indicated that the damage to the facility was severe, as the Iranians initially claimed. US experts claimed, based on the photos, that the explosion had occurred in a workshop where advanced types of uranium enrichment centrifuges were assembled. It was also assessed that the explosion was deliberately caused. According to reports published about two weeks later in channels affiliated with the Revolutionary Guards, Arshad Karimi, a contractor at the Natanz facility for many years who was responsible for installing centrifuges at the site, was suspected of detonating an explosive device in the central hall of the facility. It was further alleged that he carried out the operation through his staff at Natanz, in collaboration with foreign intelligence agencies. According to the report, Karimi had a strong engineering background—he founded and managed the engineering company Mehr, which specialized in manufacturing accurate measuring

instruments. According to reports, Mehr and Karimi's management were investigated by Iranian special services before his hiring at Natanz to verify his credibility. It was reported that Karimi fled Iran before the incident to an unknown destination, and that Iran asked Interpol to locate and extradite him.¹¹²

- After a hiatus of nearly nine years in assassinations of Iranians associated with their country's nuclear program, on November 27, 2020, Mohsen Fakhrizadeh, a senior member of Iran's military nuclear program, was killed by remote gunfire at his car. This occurred after he had spent many years underground. Fakhrizadeh's lofty status in Iran, and in particular its nuclear community, could be gleaned from his glorious funeral, which was attended by the heads of the regime.¹¹³ Fakhrizadeh was not only a good scientist but an excellent manager. It is unlikely that he has a worthy replacement.
- On the night of April 11-12, 2021, there was another mysterious explosion at the uranium enrichment site in Natanz. According to experts, it was caused by an explosive device that had been smuggled into the facility. The blast reportedly completely destroyed the plant's centrifuge power supply system, including backup systems. It is estimated that "this was a very severe blow to Iran's ability to enrich uranium," and that "Iran may need at least nine months to resume uranium production at the site."¹¹⁴
- The latest incident took place on June 26. The factory of TESA, Iran's main centrifuge company, located in the TABA complex near the city of Karaj, was attacked by a drone that took off from nearby. According to US sources, the plant was among the targets presented by Israel to the Trump administration in early 2020 as a possible target for attack. The director of the plant is Jafar Mohammadi, one of Iran's top experts in centrifuge production, whose name was included on the list of people on whom the UN imposed sanctions in 2006. According to Iranian witnesses, the attacking glider was a quadcopter drone (with four propellers). The factory includes three large production buildings, to which over the years several small buildings have been added. Although Iran claimed to have thwarted the attack, satellite photos afterward

showed one of the buildings of the Ghalaviz company without a roof. The roof area was 40 by 15 meters. A black color visible inside the building indicated that a fire had broken out. As far as is known, bellows were produced in the attacked building and classified documents kept inside it.¹¹⁵



*Satellite photograph of TESA company buildings near Karaj
Image credit - Israeldefense.co.il*

All the attacks on the Iranian nuclear program and in particular the assassination of Fakhrizadeh likely had a severe impact not only on the morale of the Iranian nuclear community but on the regime as a whole, as the killings of key figures and mysterious explosions inside the country indicated a chronic failure of Iranian internal intelligence. The Iranian intelligence community, which had failed to defend Fakhrizadeh, was fully exposed.

As in the past, Israel did not admit responsibility for any of these strikes. However, in an interview on the Uvdah (Fact) TV show on June 9 that took place after his retirement as head of the Mossad, Yossi Cohen may have hinted that Israel was involved.¹¹³ Cohen provided some details about the Iranian nuclear archive operation, compared to which the sabotage operations against the Iranian nuclear infrastructure were insignificant.

CONCLUSION

The JCPOA agreement was extremely bad, as it allowed Iran to continue its dogged drive toward nuclear weapons (albeit by stealth) and gave it a boost with which to fund its ballistic missile development efforts, destabilize the Middle East, and continue to sow terror around the world. It would be extremely foolish to return to the original agreement. The foolhardiness of such a move is further underscored by Tehran's sustained attempts to hide its military nuclear program, and the steps it has taken since May 2019 to establish facts on the ground and advance to the nuclear weapons threshold.

Any future agreement must pull Iran back at least to its nuclear status in 2015, while banning the use of the advanced centrifuges it has developed. The sunset time frames must be much longer, and must be closely monitored by the IAEA. It is also highly desirable that the US approve Israel's freedom of action vis-à-vis Iran.

Of course, the current situation is quite blurry. There is a new government in Israel and new presidents in both the US and Iran. It is highly unlikely that Biden will have the wherewithal to square that circle.

Israel must remain vigilant in the face of all possibilities. It must not compromise its principles to satisfy the new US administration, and should prepare a military option. Indeed, the Israeli defense establishment recently discussed the possibility that Israel will have to attack Iran's nuclear facilities in the near future.

Under the leadership of Chief of Staff Lt. Gen. Aviv Kochavi, the IDF General Staff has begun initial preparations for implementing several possible means of attack. It is likely that these will include not only missile and aircraft attacks but also cyber warfare. In a government discussion on July 28 on the defense budget, it was agreed that the IDF's needs as it prepared for offensive capabilities against Iran would be provided. With that said, the demand by FM Yair Lapid that any action taken by Israel be coordinated with the Biden administration is expected to weigh heavily on the possibility of military action against Iran.

In the first stage, instead of a military operation against Iran, more efforts might be made to overthrow the ayatollahs' regime, and it is possible that the situation has matured to the point that such a thing would be possible. Iran is faced with a severe economic crisis and very high morbidity from the coronavirus pandemic, and is experiencing riots across the country. Inflation stands at more than 50%, with a high unemployment rate, and many workers say they do not receive their salaries. Also, riots over access to water broke out in Khuzestan province in July due to a severe drought that has gone on for decades. Residents of the province complained of severe water shortages and prolonged power outages. Khuzestan is the most oil-rich Iranian province, but due to its large Arab (i.e., non-Persian) minority, it suffers neglect and discrimination by the Tehran regime.

As a result of all these factors, turnout in the presidential election in which the ultra-conservative Raisi was elected was the lowest in the history of the Islamic Republic—only 48.8%, with Raisi winning 61.9% of the vote. Had the election been conducted in an orderly manner, only about 30% of the Iranian people would have chosen Raisi as president. In light of this, it is to be hoped that the days of the ayatollahs' regime in Tehran are numbered, that it will be replaced by a new and more liberal regime, and that the Iranian nuclear problem may be resolved.

But despite Biden's ambition, which he already voiced before being elected, to reach an agreement with Tehran, and the EU's concurrence with this course of action, the picture is vague to the point of indicating a crisis. This is due not only to Tehran's recent drastic measures to completely crush the deal, but also to the election of Raisi as president—especially against the backdrop of the Revolutionary Guards' aggressiveness in the Persian Gulf that made it a dangerous area for international shipping. Still, Biden's incompetence in the face of the Taliban's takeover of Afghanistan calls into question his administration's ability to address the Iranian nuclear problem.

Twentieth-century history proves the peril of reaching agreements with brutal dictators. Any agreement with the tyrannical Islamist regime in Tehran would represent a catastrophic march of folly.

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Natanz only in recent years, according to the photos published by the Iranians, although its rotor consists of only two rollers connected by a bellows, it is larger than the IR-4. Compared to all previous models, the even more advanced IR-8 centrifuge rotor consists of four cylinders connected by bellows and is probably of the same diameter as the IR-6.

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