IV. The Joint Comprehensive Plan of Action on Iran's nuclear programme

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The talks with Iran that had started in Vienna in April 2021 with the aim of reviving the Joint Comprehensive Plan of Action (JCPOA) continued in 2022, without leading to a solution. They took place against the backdrop of—and were complicated by—an investigation into Iran's past nuclear activities, a government crackdown on protests in the country and its military support to Russia in the war in Ukraine.[1]

The JCPOA was concluded in 2015 by Iran on one side and, on the other, the European Union (EU) and three European states—France, Germany and the United Kingdom—and China, Russia and the United States.[2] The agreement—which was endorsed by the United Nations Security Council—sought to end a crisis that had begun in the early 2000s and escalated over a dispute over Iran's right to uranium enrichment. The JCPOA was based on a compromise whereby Iran accepted limits on and strict monitoring of its proliferation-sensitive activities in return for the lifting of international sanctions on its nuclear programme. However, in May 2018 the US administration of President Donald J. Trump ceased to implement the agreement and imposed unilateral sanctions which, despite not being accepted by other JCPOA parties, effectively constrained their ability to lift sanctions and left Iran practically cut off from the global financial system. This prompted Iran to gradually reduce its own adherence to JCPOA commitments from May 2019. After having ceased to observe all the JCPOA's key operational limits by 2020, Iran stepped up its nuclear activities by raising the level of enrichment of the isotope uranium-235 and by increasing its enrichment capacity with the instalment of advanced centrifuges.[3]

This section reviews developments related to the JCPOA and Iran's nuclear programme in 2022, including the diplomatic process aimed at restoring the agreement and reports on JCPOA implementation in Iran by the International Atomic Energy Agency (IAEA). It then describes the IAEA's investigation into Iran's past nuclear activities, which created additional challenges for diplomatic engagement.

[1] On Iran's involvement in the war in Ukraine see chapter 2, section I, in this volume.

[2] Joint Comprehensive Plan of Action (JCPOA), 14 July 2015, reproduced as annex A of UN Security Council Resolution 2231, 20 July 2015.

[3] On the agreement and its implementation see Erästö, T., 'The Joint Comprehensive Plan of Action on Iran's nuclear programme', *SIPRI Yearbook 2022*, pp. 449–59; and sections in the 2016–21 editions of the SIPRI Yearbook.

Diplomatic efforts to revive the JCPOA

Following seven rounds of talks to restore the JCPOA in 2021, the eighth round—which had started in late December 2021—continued in Vienna in January 2022. As before, Iran would only interact with the United States indirectly through EU mediation, which complicated the diplomatic process between the two main negotiation parties.

The first quarter of the year was marked by a heightened sense of urgency and anticipation of an agreement; for example, in February the EU high representative for foreign affairs and security policy, Josep Borrell, said that 'The moment has come to make an ultimate effort and reach a compromise', while a US spokesperson argued that Iran and the USA were 'potentially within days' of reaching an agreement 'If Iran shows seriousness'.[4] The Vienna talks temporarily seemed derailed by Russia's attempt to link restoration of the JCPOA to an exemption from the Western sanctions imposed on Russia following its February 2022 invasion of Ukraine. However, the issue was settled in March with Russia specifying that its demand related only to nuclear cooperation under the JCPOA and the USA assuring Russia that this would not be affected by US sanctions.[5] Reportedly, by mid March the negotiators had produced a 27-page draft agreement outlining the steps that Iran and the USA would need to take to return to the JCPOA and how to verify those steps.[6]

However, a final agreement remained elusive. There remained long-standing differences related to the scope of sanctions relief and Iran's demand for guarantees against a future US withdrawal from the agreement. In early March the negotiations were further complicated by Iranian demands that the USA lift its designation of the Islamic Revolutionary Guard Corps (IRGC) as a Foreign Terrorist Organization and that the IAEA drop its claims related to the investigation to its past nuclear activities (see below).[7] In the months that followed, the demand to lift the IRGC designation—which would have been politically difficult for the US administration due to bipartisan domestic opposition to such a move—seemed to have become the key obstacle to a diplomatic solution.[8] In May the EU sought to mediate on the issue, sending

[4] Borrell, J. (@JosepBorrellF), Twitter, 14 Feb. 2022, <https://twitter.com/josepborrellf/status/1493284524146503684>; and Price, N., Press briefing, US Department of State, 23 Feb. 2022.

[5] Slavin, B., 'Will domestic politics trump nonproliferation in stalled Iran deal?', *Arms Control Today*, vol. 52, no. 5 (June 2022); and Hickey, S. M., 'Restored Iran deal may be in reach', *Arms Control Today*, vol. 52, no. 3 (Apr. 2022).

[6] Slavin (note 5).

[7] Motamedi, M., 'Iran, IAEA hold talks as nuclear negotiations near finish line', Al Jazeera, 5 Mar. 2022. The IRGC (and its Quds Force) were designated as a Foreign Terrorist Organization by the US State Department in Apr. 2019. US Department of State, 'Designation of the Islamic Revolutionary Guard Corps', Fact sheet, 8 Apr. 2019.

[8] Ward, A. and Toosi, N., 'Biden made final decision to keep Iran's IRGC on terrorist list', Politico, 24 May 2022.

its lead negotiator, Enrique Mora, to Tehran to convey that the USA 'might be willing to discuss the IRGC sanctions issue after the deal is restored', even though it would 'not take unilateral action to lift the designation as part of the package to restore the JCPOA'.[9]

After three months of diplomatic stalemate, on 28–29 June indirect talks between Iran and the USA resumed in Doha, without results.[10] Following another meeting in Vienna on 8 August, Borrell circulated what he referred to as a 'final text' of the agreement to restore the JCPOA, appealing to Iran and the USA to respond positively.[11] The draft reportedly also included a reference to the Iranian demand related to the ongoing IAEA investigation of its past nuclear activities, saying that 'Iran will respond to the agency's inquiries with the intent of clarifying the IAEA questions, and when the IAEA is satisfied with the Iranian responses, the parties to the JCPOA will encourage the [IAEA] board of governors to close the investigation'.[12] Moreover, the draft proposed that the investigation be closed within two months.[13] While US statements suggest that the USA would have accepted the draft, Iran's additional demands in late August—which reportedly included closing the investigation even sooner and preventing any new investigations to its past nuclear activities—seemed to signal an end to the diplomatic momentum.[14] No more negotiations to restore the JCPOA were held in the remainder of the year.

In addition to the diplomatic deadlock over the terms of restoring the JCPOA, the political environment for diplomacy was also subsequently undermined by the violent crackdown on domestic protests by Iran as well as Iran's military support for Russia in the war in Ukraine.[15] The protests started in September in response to the death of Mahsa Amini, a Kurdish Iranian woman, at the hands of the Guidance Patrol (known as the 'morality police'). The harsh response by security forces had claimed hundreds of lives by the end of the year.[16] Also by the end of the year there was mounting evidence that Iran had transferred arms to Russia, notably loitering munitions,

[9] Davenport, K., 'EU attempts to save Iran negotiations', Arms Control Now, 20 May 2022.

[10] Middle East Monitor, 'Report: Iran–US talks in Doha reportedly end without result', 29 June 2022.

[11] Wintour, P., 'EU team submit "final text" at talks to salvage 2015 Iran nuclear deal', *The Guardian*, 8 Aug. 2022.

[12] Davenport, K., 'Iran nuclear deal negotiations reach final stage', *Arms Control Today*, vol. 52, no. 7 (Sep. 2022).

[13] Davenport, K., 'Iran nuclear talks stall again', Arms Control Now, 28 Sep. 2022.

[14] Davenport (note 13).

[15] Fassihi, F. and Engelbrecht, C., 'Tens of thousands in Iran mourn Mahsa Amini, whose death set off protests', *New York Times*, 26 Oct. 2022; and Koshiw, I., 'Drone analysis in Ukraine suggests Iran has supplied Russia since war began', *The Guardian*, 10 Nov. 2022.

[16] Hagedorn, E., '2022 in review: Iran's protests threw another wrench into JCPOA revival', Al-Monitor, 26 Dec. 2022.

that were used to attack civilian targets in Ukraine.[17] This context created new political hurdles for the JCPOA talks, which had previously been kept separate from other issues of concern. In addition to increasing opposition in the West to any engagement with the Iranian government, the latter also accused the USA of encouraging the protests.[18]

Key developments in Iran's nuclear programme relevant to the JCPOA

Despite the lack of implementation by Iran of the key provisions of the JCPOA, in 2022 the IAEA continued to report on its verification and monitoring activities in Iran 'in light of' the resolution whereby the UN Security Council had endorsed the JCPOA.[19] As noted in the reports, however, Iran's suspension in February 2021 of additional transparency measures under the JCPOA—notably the Additional Protocol to its Comprehensive Safeguards Agreement (CSA)—had 'seriously affected' the agency's monitoring and verification activities.[20] While a CSA is based on the state's declarations of its nuclear activities and materials and their verification by the IAEA, an additional protocol expands the agency's inspection authority outside the declared facilities to allow the detection of potential clandestine activities.[21] The absence of enhanced monitoring coincided with an expansion in Iranian nuclear activities, as detailed below.

End to continuous surveillance and monitoring

On 21 February 2021 Iran and the IAEA had reached a temporary understanding that allowed the agency's monitoring equipment to continue recording information at Iranian nuclear facilities, in line with the JCPOA. However, the IAEA would only gain access to the recordings in the event of a diplomatic solution that would restore the nuclear agreement. The purpose of this arrangement—and of the subsequent agreements in May, September and December 2021 to extend it—was to ensure 'continuity of knowledge' about Iran's nuclear programme.

[17] E.g. Kube, C. and Lee, C. E., 'Russia is providing "unprecedented" military support to Iran in exchange for drones, officials say', NBC News, 9 Dec. 2022. On Iranian arms transfers to Russia see chapter 6, section I, in this volume.

[18] Hagedorn (note 16).

[19] UN Security Council Resolution 2231 (note 2).

[20] IAEA, Board of Governors, 'Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)', Reports by the director general, GOV/2022/4, 3 Mar. 2022; GOV/2022/24, 30 May 2022; GOV/2022/39, 7 Sep. 2022; and GOV/2022/62, 10 Nov. 2022.

[21] IAEA, 'IAEA safeguards overview: Comprehensive safeguards agreements and additional protocols'; and Protocol Additional to the Agreement between the Islamic Republic of Iran and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, signed 18 Dec. 2003, no yet in force, provisionally applied from 16 Jan. 2016, IAEA INFCIRC/214/Add.1, 4 Mar. 2016.

On 8 June 2022—in response to the adoption by the IAEA Board of Governors of a resolution that censured Iran (see below)—Iran requested that the IAEA remove all surveillance and monitoring equipment related to the JCPOA. The agency did so on 9–11 June.[22] As the IAEA warned, the move would complicate potential future efforts 'to re-establish its knowledge of Iran's nuclear-related activities'.[23] If the JCPOA were to be restored, the agency 'would need to apply additional safeguards measures and Iran would need to provide comprehensive and accurate records to the Agency'. Even then, 'considerable challenges would remain to confirm the consistency of Iran's declared inventory of centrifuges and heavy water with the situation prior to 21 February 2021'.[24]

Even after 11 June, the IAEA nevertheless continued to have regular access to all key Iranian nuclear sites under the CSA, although this no longer included daily access upon its request, as mandated by the JCPOA.[25]

Enrichment activities and the enriched uranium stockpile

To prevent Iran from obtaining highly enriched uranium (HEU), the JCPOA set a limit of 3.67 per cent on the level of the isotope uranium-235 in any enriched material until 2030. During the same period, it also confined enrichment to one location, the Fuel Enrichment Plant (FEP) at Natanz, Isfahan province. Moreover, enrichment was to be done only with IR-1 centrifuges until 2025—even though the JCPOA allowed limited research and development on certain more advanced centrifuge types and, starting from 2023, their manufacturing.[26]

Iran had breached these limits since 2019.[27] Having first enriched up to 5 per cent, in 2021 it increased the level of enrichment up to 20 per cent and then to 60 per cent. While the latter is classified as HEU, it falls short of the 90 per cent threshold at which uranium is considered suitable for manufacturing a nuclear bomb.[28] In addition, from September 2019 Iran had used advanced types of centrifuge in its enrichment activities, which, in addition to the FEP, also took place at the Pilot Fuel Enrichment Plant (PFEP) at Natanz and the Fordow Fuel Enrichment Plant (FFEP), Qom province.[29]

In 2022, Iran continued to produce enriched uranium to all of the levels mentioned above, leading to a growing stockpile over 10 times larger than the

[22] IAEA, GOV/2022/39 (note 20), para. 7. See also 'Iran removing 27 surveillance cameras at nuclear sites: IAEA', Al Jazeera, 9 June 2022.
[23] IAEA, GOV/2022/39 (note 20), para. 8.
[24] IAEA, GOV/2022/39 (note 20), paras 62, 8.
[25] See e.g. GOV/2022/4 (note 20), para. 13, p. 4.
[26] Joint Comprehensive Plan of Action (note 2), paras 3–5, 27.
[27] Erästö, 'Implementation of the Joint Comprehensive Plan of Action', *SIPRI Yearbook 2020*, pp. 418–26.
[28] Erästö (note 3).
[29] Erästö (note 27).

JCPOA limit of 300 kilograms; by October it had reached 3673.7 kg.[30] Of particular concern was the growing stockpile of 60 per cent enriched uranium, which reached 55.6 kg in August.[31] This was well above the IAEA definition of 'significant quantity'—that is, 'The approximate amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded'—which in the case of HEU is 25 kg of uranium-235.[32] The situation fuelled speculation among US officials that Iran could try to 'break out' by quickly enriching the 60 per cent HEU to a weapon-grade level and then transferring it elsewhere in between IAEA inspections.[33]

Such concerns were highlighted by Iran's growing enrichment capacity resulting from the instalment and operation of greater numbers of advanced centrifuges. This increase was mandated by a law passed in December 2020 by the Iranian Parliament that had, among other things, set a target of having 1000 IR-6 centrifuges installed by early 2022.[34] That target was ultimately reached in September.[35]

In January and April Iran moved the manufacturing of centrifuge components from the TESA Karaj centrifuge complex near Tehran to two new sites in Isfahan. Apart from being a response to a reported sabotage attack against the Karaj complex in June 2021, this move seemed consistent with Iranian efforts to increase its enrichment capacity.[36]

Nuclear fuel production

Iran's decisions to significantly raise enrichment levels in 2021 were partly a response to covert operations against its nuclear programme that were suspected of having been carried out by Israel.[37] However, Iran also justified the enrichment to 20 per cent in terms of a pre-existing plan to produce advanced fuel for the Tehran Research Reactor (TRR).[38] In February 2022

[30] IAEA, GOV/2022/4 (note 20), para. 47; IAEA, GOV/2022/24 (note 20), para. 56; IAEA, GOV/2022/39 (note 20), para. 50; and IAEA, GOV/2022/62 (note 20), para. 52.

[31] IAEA, GOV/2022/39 (note 20), para. 51.

[32] IAEA, *IAEA Safeguards Glossary*, 2022 edn, International Nuclear Verification Series no. 3 (Rev. 1) (IAEA: Vienna, 2022), p. 30. See also Goddard, B., Solodov, A. and Fedchenko, V., 'IAEA "significant quantity" values: Time for a closer look?', *Nonproliferation Review*, vol. 23, nos 5–6 (2016).

[33] Davenport, K., 'Sanctions dispute threatens Iran deal', *Arms Control Today*, vol. 52, no. 4 (May 2022).

[34] Strategic Action Law for the Lifting of Sanctions and Protection of the Interests of the Iranian People, Iranian law approved 2 Dec. 2020, English translation by National Iranian American Council, 3 Dec. 2020.

[35] Albright, D., Burkhard, S. and Faragasso, S., 'Updated highlights of comprehensive survey of Iran's advanced centrifuges', Institute for Science and International Security, 22 Sep. 2022.

[36] 'Experts reportedly see major damage in attack on Iran centrifuge plant', Times of Israel, 5 July 2021; IAEA, GOV/2022/24 (note 20), para. 5; and Murphy, F., 'Iran moves machines for making centrifuge parts to Natanz—UN nuclear watchdog', Reuters, 6 Apr. 2022.

[37] Erästö, T., 'Implementation of the Joint Comprehensive Plan of Action on Iran's nuclear programme', *SIPRI Yearbook 2021*; and Erästö (note 3).

[38] IAEA, Board of Governors, 'Verification and monitoring in the Islamic Republic of Iran in light of United Nations Resolution 2231 (2015)', Report by the director general, GOV/INF/2021/36, 6 July 2021.

Iran informed the IAEA that it would also start using 60 per cent enriched uranium to produce fuel for the TRR.[39] The process—which included the transfer of uranium hexafluoride (UF_6) to the Fuel Plate Fabrication Plant (FPFP) at Isfahan and its conversion there into triuranium octoxide (U_3O_8) powder—would be identical to one whereby Iran was producing fuel plates containing 20 per cent enriched uranium.[40] As with the earlier process, the conversion of UF_6 to powder form—which would be harder to enrich further to weapon-grade uranium—could, in principle, reduce proliferation concerns related to the HEU stockpile.[41] In practice, however, the amount that was thus converted represented only a small fraction of the overall stockpile of 60 per cent enriched uranium, which had increased to 62.3 kg by October.[42] At the same time, most of Iran's stockpile of 60 per cent enriched uranium was kept at the FPFP—a conversion facility that contained no equipment allowing further enrichment—which could also be viewed as signalling restraint.[43]

As for the stockpile of 20 per cent-enriched uranium, most was similarly stored at the FPFP. For example according to the November report, 327 kg of the total of 386.4 kg of uranium enriched up to 20 per cent was at the FPFP, whereas about 8 per cent of it was reported as being in forms other than UF_6.[44] In addition to fuel plates using U_3O_8, these other forms included a few fuel plates containing uranium silicide, which is manufactured through a different process that includes the production of uranium metal as an intermediate product. Having produced two fuel plates using uranium silicide containing 20 per cent enriched uranium in November 2021, the IAEA verified that Iran had produced three more such plates in February.[45] As with the production of fuel plates using U_3O_8, the conversion of uranium to silicide reactor fuel could be seen as reducing the proliferation risks of the UF_6 stockpile enriched to 20 per cent—even though by the end of 2022 only a small part of it had been used to manufacture silicide fuel plates.[46] At the same time, the equipment and experience gained in the production of uranium metal could be applied

[39] IAEA, GOV/2022/4 (note 20), paras 31, 33.

[40] IAEA, GOV/2022/4 (note 20), paras 28, 33.

[41] Davenport (note 33); and Davenport, K., 'IAEA reports signal escalating nuclear crisis with Iran', Arms Control Now, 1 June 2022.

[42] After Mar., when Iran converted about 2 kg of uranium enriched to 60% to powder form, no such conversion was reported by IAEA reports in 2022. IAEA, Board of Governors, 'Verification and monitoring in the Islamic Republic of Iran in light of United Nations Resolution 2231 (2015)', Report by the director general, GOV/INF/2022/8, 16 Mar. 2022, para. 3; and IAEA, GOV/2022/62 (note 20), para. 53.

[43] In Nov. the IAEA reported that in Oct. it had verified a total of 53 kg of uranium in the form of UF_6 enriched up to 60% at FPFP. IAEA, GOV/2022/62 (note 20), para. 35.

[44] IAEA, GOV/2022/62 (note 20), paras 35, 53.

[45] IAEA, GOV/2022/4 (note 20), paras 27, 29.

[46] Kelley, R., 'Iran is actually reducing its weapons-usable uranium inventory', IranSource, Atlantic Council, 28 Jan. 2021.

in nuclear explosives in the future—which is why the production of uranium metal had been proscribed by the JCPOA.[47]

Activities related to heavy water and reprocessing

Under the JCPOA, Iran agreed to redesign the heavy water reactor at Arak, Markazi province (renamed the Khondab Heavy Water Production Plant (HWPP) in 2018), in order to minimize the amount of plutonium in the spent nuclear fuel produced there. Iran also agreed to keep its stock of heavy water below 130 tonnes (reduced to 90 tonnes after commissioning the reactor) and not to reprocess spent fuel from any of its nuclear reactors, with an exception for producing medical and industrial radioisotopes.[48]

While Iran's reserve of heavy water had largely remained below the agreed limit until February 2021, Iran then stopped informing the IAEA about its heavy water inventory or production. Similarly, it did not allow the agency to monitor heavy water stocks or the amount of heavy water produced at the HWPP. The IAEA's monitoring equipment nevertheless remained at the facility until June 2022.[49]

As in previous years, in 2022 the IAEA reported that Iran had neither pursued the construction of the HWPP based on its original design nor carried out reprocessing-related activities at the TRR or any other declared facility.[50]

Outstanding issues under Iran's Comprehensive Safeguards Agreement

While the issue of the so-called possible military dimensions of Iran's past nuclear activities was formally closed with the adoption of the JCPOA, the IAEA reopened the investigation with new evidence apparently provided to the agency by Israel in 2018.[51] In February 2019 the IAEA conducted a visit to a warehouse that Iran had not declared to the agency—named Location 1 in previous IAEA reports but identified in May 2022 as being in the Turquzabad district of Tehran. Environmental samples taken there contained natural uranium particles, which pointed to past uranium conversion activities.[52] The IAEA subsequently requested clarification on four locations in Iran that

[47] Albright D. and Burkhard, S., 'Iran's recent, irreversible nuclear advances', Institute for Science and International Security, 22 Sep. 2021.

[48] JCPOA (note 2), annex I.

[49] IAEA, GOV/2022/39 (note 20), para. 7.

[50] See e.g. GOV/2022/62 (note 20), paras 12, 14.

[51] Sanger, D. E. and Specia, M., 'Israeli leader claims Iran has "secret atomic warehouse"', *New York Times*, 27 Sep. 2018.

[52] Erästö (note 27), p. 422; and IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', Report by the director general, GOV/2021/15, 23 Feb. 2021.

it suspected of having hosted undeclared nuclear material and activities prior to 2004.[53]

In January 2022 the IAEA reported that it had no more questions on one of the four locations, which had previously been called Location 2 and which was subsequently identified as Lavisan-Shian, in north-eastern Tehran.[54] This followed an assessment that in 2003 a metal disc had undergone drilling and chemical processing at the location. Iran had not declared these activities to the IAEA, in contravention of its CSA obligations.

Questions related to the three other locations remained outstanding. On 5 March the IAEA and Iran agreed a road map to address those issues by June.[55] However, as in previous years, in 2022 the IAEA continued to find Iran's answers related to these locations to be insufficient, whereas Iran argued that it had provided the necessary clarifications to the agency and suggested that the presence of the uranium particles at the three locations was the result of third-party sabotage.[56] The IAEA's May 2022 safeguards report concluded that,

> unless and until Iran provides technically credible explanations for the presence of uranium particles of anthropogenic origin at Turquzabad, Varamin [Location 3] and 'Marivan' [Location 4] and informs the Agency of the current location(s) of the nuclear material and/or of the contaminated equipment, the Agency cannot confirm the correctness and completeness of Iran's declarations under its Comprehensive Safeguards Agreement.[57]

The May safeguards report contributed to the decision by the IAEA Board of Governors to adopt a resolution that censured Iran for its 'insufficient substantive cooperation' in addressing the outstanding safeguards issues under the CSA.[58] As noted, this triggered Iran's decision to remove IAEA surveillance and monitoring equipment from its nuclear sites. When the IAEA Board adopted a similar resolution in November, Iran responded by announcing that it had started to enrich uranium to 60 per cent purity at the underground FFEP for the first time.[59]

Based on discussions they had started in September, Iran and the IAEA agreed that that the agency would 'conduct a technical visit to Tehran before

[53] IAEA, GOV/2021/15 (note 52).

[54] IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', GOV/2022/5, 5 Mar. 2022, para. 7.

[55] Hickey (note 5).

[56] Davenport (note 33).

[57] IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', Report by the director general, GOV/2022/26, 30 May 2022, para. 36.

[58] IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', Resolution, GOV/2022/34, 8 June 2022.

[59] IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', Resolution, GOV/2022/70, 17 Nov. 2022; and Hafezi, P. and Murphy F., 'Iran starts enriching uranium to 60% purity at Fordow plant', Reuters, 22 Nov. 2022.

the end of November 2022 . . . on matters related to the outstanding safeguards issues'.[60] The visit took place on 18 December, but no progress was reported as having resulted from it.[61]

Looking ahead

Restoration of the JCPOA would have brought apparent gains for both Iran and the United States, including the latter's long-term objective of cutting Iran's enriched uranium stocks—and thus increasing its 'break out time'. Despite this, disagreement over seemingly secondary issues once again resulted in diplomatic opportunities being missed in 2022. This led to questions about the actual degree of political commitment on both sides to reach a solution. On the Iranian side, this commitment was arguably undermined by concerns that the USA might again leave the agreement. Meanwhile, many in the USA argued that the JCPOA had lost its previous value since some of Iran's nuclear advances, such as the know-how generated by operating advanced centrifuges, were irreversible. Thus, voices on both sides questioned the long-term benefits of reviving it.

In addition, it has become increasingly difficult to isolate the nuclear issue from other political developments—such as the Russia–Ukraine War and political repression and human rights violations inside Iran—which created further obstacles for engagement between the West and Iran. Disillusionment with the JCPOA and its promise of normalization of trade with the West has already contributed to the deepening of Iran's relationship with Russia—which might in the future also involve Russian exports of advanced weapon systems to Iran.[62]

Having said this, it is hard to see any alternative that would address the key concerns of both sides as effectively as the JCPOA could. While this realization could ultimately lead to greater flexibility and new diplomatic efforts to reduce proliferation risks, the past few years have shown that the parties are also willing to live with the status quo despite the costs and risks.

[60] IAEA, Board of Governors, 'NPT Safeguards Agreement with the Islamic Republic of Iran', Report by the director general, GOV/2022/63, 10 Nov. 2022, para. 7.

[61] 'UN nuclear officials leave Iran after talks, result unclear', Reuters, 19 Dec. 2022.

[62] Gramer, R., 'Iran and Russia are closer than ever before', *Foreign Policy*, 5 Jan. 2023.