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B R I E F

Above and beyond: IAEA verification in Iran

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“Implementing these additional measures over a period of a decade could require additional funding in the region of €100-150 million.”

Executive Summary

The Joint Statement on the parameters of a Joint Comprehensive Plan of Action has successfully reinforced faith in the ongoing dialogue between the EU3+3 and Iran. It remains to be seen whether a full agreement will emerge in the summer, and a lack of uncontested information makes it difficult to assess what the verification implications such an agreement might have. Nevertheless, the International Atomic Energy Agency (IAEA) will be central to the success of a final agreement and it is important to consider what tools the agency might draw on to verify the arrangement, how these tools might be augmented, and what effect this might have on the agency’s safeguards system as a whole.

The Comprehensive Safeguards Agreement between the agency and Iran, when augmented with an Additional Protocol, will provide the agency with both information and access to all nuclear activities mentioned in the Joint Statement. However, the intensity with which these tools are applied is limited by predefined and universal standards. With this in mind, a JCPOA would likely require more frequent access to Iran’s programme, a stronger legal foundation upon which to require this access, as well as more detailed and frequent declarations from Iran, than are provided by the agency’s existing toolkit. This does not strictly require an ‘additional protocol plus’, and any attempt to introduce a new standard verification tool through a JCPOA could do more harm to the agency and its verification efforts than good.

Rather, the agency could act under Article III.A.5 of its Statute and augment its traditional activities with an ad-hoc verification mechanism explicitly linked to a JCPOA, and including

the strengthening measures described above. Implementing these additional measures over a period of a decade could require additional funding in the region of €100-150 million. However, this would also provide a valuable opportunity to introduce new verification procedures alongside tried-and-tested techniques; strengthening the agency’s safeguards as a whole.

Introduction

The most recent round of talks between Iran and the EU3+3—consisting of the UK, France, Germany, US, Russia, China and the EU—came to a close earlier this month. Typically, these talks are cloaked in secrecy, but this time the parties released a joint statement, read by Iran and the EU, to inform the world about where their discussions presently stand. This was a break from the norm for negotiations established on the principle that ‘nothing is agreed until everything is agreed’, but having set themselves a March 2015 deadline for a political agreement on the terms of a comprehensive agreement, they had to deliver something to shore-up faith in the ongoing dialogue.

The largely positive press reaction to the EU and Iran joint statement, and to subsequent statements and releases from the US government, suggests the parties succeeded in delivering a promising message. While all parties were careful to point out that cementing a comprehensive agreement would take more time and effort, this brief window into the dialogue suggests that positions are converging and that a comprehensive agreement may emerge during the summer.

However, it does not seem like all parties to the talks have the same understanding of what they have agreed on. Immediately after the discussions

concluded, the White House published a fact sheet on its website.¹ The Iranian Foreign Ministry responded by distributing their own informal fact sheet to their national press.² While the documents overlap in some areas, they differ in both the level of detail provided and in several aspects of the content. To complicate matters further, Israeli press have reported that they have come across a French fact sheet, which differs from both the American and Iranian.³

The White House fact sheet is the more detailed report, perhaps unsurprisingly since it was intended for presentation to a sceptical audience in US Congress, and therefore analysts have gravitated towards it as the more informative document. However, while the Institute for Science and International Security has claimed that the Iranian delegation to the negotiations accepted all its elements, recent actions by the Iranian leadership cast that conclusion in doubt. The Supreme Leader, Ayatollah Seyed Ali Khamenei, has expressed serious misgivings over the US fact sheet, accusing the White House in a series of tweets on 9 April 2015, of lying to and misleading the rest of the world. He stated that ‘most of it was contrary to what was agreed.’ Media reports that refer to these fact sheets as ‘the deal’ may therefore be somewhat premature.

On 16 April 2015, the European External Action Service released a press release saying that talks will continue from 22-23 April 2015, and will be held in Vienna. The principal questions now are whether outstanding differences can be bridged before the end of the summer, and whether the outlines of the final deal which can now be discerned are achievable, implementable and verifiable. On

the first question, only time will tell whether the proposals are acceptable to various national stakeholders. The expectations of these stakeholders have now been set by the circulated fact sheets—whether they are actually representative of a true agreement or not. The answer to the second question can at this stage only be speculative. The various sources of information, and their contested legitimacy, makes it difficult to assess the verification implications of the current framework proposal.

Nevertheless, it is clear from all statements released to date that the IAEA—which is already responsible for verifying the peaceful nature of Iran’s nuclear programme—will also be responsible for verifying any restrictions a final deal might place on this programme. It is therefore well worth considering what verification procedures, agreements, and technologies the IAEA might draw upon to verify any final agreement, how these tools might be augmented, and importantly, what effect this might have on the safeguards system as a whole.

What might a final deal look like?

Parties did not reach a final agreement in their latest round of talks. Instead, they only settled on a set of broad parameters for future talks. The only adopted text on what was agreed was read in English and Farsi versions by EU High Representative Federica Mogherini and Iranian Foreign Minister Javad Zarif at a joint press conference on 2 April 2015. This statement refers to a Joint Comprehensive Plan of Action (JCPOA), envisioned to have the following parameters:

- Iran’s enrichment capacity, enrichment level and stockpile will be limited for specified durations, and there will be no other enrichment

“It is therefore well worth considering what verification procedures, agreements, and technologies the IAEA might draw upon to verify any final agreement...”

1. Parameters for a Joint Comprehensive Plan of Action Regarding the Islamic Republic of Iran’s Nuclear Programme, Office of the Spokesperson, US Department of State, 2 April 2015.

2. Payam Mohseni, ‘Translation of Iranian Fact Sheet on the Nuclear Negotiations’, Iran Matters Blog, Harvard Belfer Center, 3 April 2015.

3. Times of Israel Staff, ‘French fact sheet differs from US on Iran’s centrifuge use, R&D’, The Times of Israel, 7 April 2015.

“Monitoring and verifying the scale and level of Iran’s uranium enrichment programme will be far simpler if it is concentrated into only one facility at Natanz, and limited to a certain throughput.”

facility than Natanz. Iran’s research and development on centrifuges will be carried out on a scope and schedule that has been mutually agreed.

- Fordow will be converted from an enrichment site into a nuclear, physics and technology centre. There will be no fissile material on that site.
- An international joint venture will assist Iran in redesigning and rebuilding a modernised Heavy Water Research Reactor in Arak that will not produce weapons grade plutonium.
- Reprocessing will not be allowed, and spent fuel will be exported.
- A set of measures have been agreed to monitor the provisions of the JCPOA including implementation of the modified Code 3.1 and provisional application of the Additional Protocol.
- The International Atomic Energy Agency will be permitted the use of modern technologies and will have enhanced access through agreed procedures, including to clarify past and present issues.

The first and second bullet points are significant, as it now appears accepted that Iran is allowed to carry out some uranium enrichment activities in the country, but under limitations designed to increase the lead time for possible nuclear weapons production (often referred to as ‘break-out’ time). It is a welcome development, from that perspective, that the centrifuge enrichment plant in Fordow will no longer enrich uranium, and that feedstock and product will be removed from the site. Monitoring and verifying the scale and level of Iran’s uranium enrichment programme will be far simpler if it is concentrated into only one facility at Natanz, and limited to a certain throughput. However, this

move may have unintended consequences for the agency’s current and ongoing work verifying the peaceful nature of Iran’s nuclear programme.

The third and fourth bullet points—redesigning the heavy water facility in Arak and prohibiting reprocessing—will curtail Iran’s ability to produce weapons-grade plutonium. The time required for redesign and rebuild is unknown, but is likely to be substantial. How effective this action will be in closing off plutonium production depends on the proposed reactor design itself, which has not been made available. More information is therefore required before an assessment can be made of this proposed action. Iran does not have a reprocessing plant at the moment, and has not announced plans to build one.

The final two bullet points relate to verification arrangements. They are vague at the moment, and will clearly require more discussion by the parties. It is significant that Iran has agreed to implement the modified Code 3.1. This would oblige Iran to supply design information on its nuclear facilities at an early stage. Furthermore, it will resume its provisional application of the Additional Protocol, a supplementary legal instrument which requires Iran to supply a broader set of information to the agency, and which also gives the IAEA a wider range of access rights. The implications of this will be discussed below.

The IAEA will have to consider two main verification tasks if a comprehensive agreement is reached along the lines of the joint statement. The first relates to checking that restrictions placed on known sites or activities are being followed—such as the conversion of Fordow and the centrifuge limits at Natanz. The comprehensive

safeguards agreement currently in force between the IAEA and Iran provides some assurance that any violation of these restrictions would be detected, but is this assurance enough? The second relates to the continuing need to provide assurance that all nuclear material in Iran has been declared, and that there are no undeclared nuclear facilities in the country. Here, the agency has some standard tools at its disposal, but some innovative additions may be required.

Enhanced verification of declared activities

Iran's current safeguards agreement with the IAEA—its Comprehensive Safeguards Agreement (CSA)—requires it to submit information regarding all nuclear materials. In particular, the CSA requires Iran to declare the locations and quantities of all nuclear materials subject to IAEA safeguards, and submit and update design information on all nuclear facilities. The CSA then allows the agency to verify this information through on-site inspections.

However, the frequency and intensity of on-site inspections under this agreement is determined by a set of criteria that may not give the international community enough confidence that a violation of a JCPOA would be detected and responded to quickly enough. The IAEA defines the objective of CSA inspections as 'the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities' and the 'deterrence of such diversion by the risk of early detection'. The definition of what constitutes a 'significant' quantity of nuclear material, and of how fast detection must be to be considered 'timely', are universal to all CSAs, and can be found in the IAEA's Safeguards Glossary.⁴ The former is defined by

'the approximate amount of nuclear material for which the possibility of manufacturing a nuclear device cannot be excluded', and the latter is guided by the time it could take to convert that material into a weapons-usable form.⁵

However, a JCPOA will place highly specific restrictions on Iran's stockpile of enriched uranium, and the level at which it can enrich uranium to. In this sense, the agency's definition of a 'significant' quantity of material—25 kilogrammes of the isotope ²³⁵U in highly-enriched uranium or 75 kilograms in less enriched uranium—differs from what others might consider to be a significant material diversion by Iran. The same could also be said for the agency's definition of 'timeliness'. If such an agreement were to enter into force, many would see the production of *any* enriched uranium above the agreed threshold as a violation of the agreement, and therefore significant.

Clearly a balance between precision and practicality has to be struck. The detection techniques used by the IAEA are limited by their own technical accuracy, and while the agency's current technology can easily measure kilogram changes in enriched uranium, introducing more accurate measuring techniques could also introduce new uncertainties, such as an increased false alarm rate. The agency has long-established procedures to address questions regarding uncertain or imperfect monitoring techniques, and these have been tested on far more substantial nuclear facilities than those in Iran. Stakeholders in any JCPOA should acknowledge that while restrictions on Iran's programme may be highly specific, verification of these restrictions will inevitably have to accommodate technical imperfections. The agency's

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4. The IAEA Safeguards Glossary defines a 'significant quantity' of nuclear material as: 'the approximate amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded. Significant quantities take into account unavoidable losses due to conversion and manufacturing processes and should not be confused with critical masses'. IAEA Safeguards Glossary: 2001 Edition, International Nuclear Verification Series, No.3, The International Atomic Energy Agency, June 2002.

5. Given the political factors that dictate deterrence, the IAEA is not in a position to quantify what 'risk' of early detection and what threat of punishment might deter any attempts at diversion.

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6. See M.D. Laughler, Profile of World Uranium Enrichment Programmes, Oak Ridge National Laboratory, ORNL/TM-2009/110.

existing procedures for clarifying whether a worrisome measurement represents a violation or an inaccurate measurement should be respected in this regard.

Thankfully, the agency has a number of sophisticated technologies at its disposal, and by permitting the agency ‘the use of modern technologies’ in their joint statement, it is clear that the EU3+3 and Iran recognise that the agency should make best use of these. Some modern technologies that could be deployed in Iran are available off-the-shelf and are already certified for safeguards use. Others are more experimental, and may not be ready for deployment. Safeguards implementation varies from facility to facility. The exact approach in Iran is not a matter of public knowledge, but is likely to be based on techniques developed by the so-called Hexapartite Safeguards Project in the 1970s and 1980s. The underpinning methodology is a limited-frequency, unannounced access, inspection approach. All operators of gas centrifuge facilities allow for measurements to be taken of both feed and product, as well as waste (so called tails). In addition, environmental sampling is often allowed in the centrifuge cascade area. The level of access, however, varies for each plant as does the deployment levels of remote monitoring equipment.

To aid in material accountancy at Natanz, the agency could draw upon remote on-line enrichment monitors, which provide a real-time assessment to the IAEA in Vienna of the enrichment level in operating centrifuge cascades. A number of applications have been developed to date. Canberra System’s Continuous Enrichment Monitor (CEMO) notifies the agency automatically if it detects enrichment levels outside programmed bounds.

It operates on very high levels of accuracy, and has been deployed in at least one major gas-centrifuge enrichment plant since the mid-1990s.⁶ The system’s installation can be complicated by a number of factors, such as the type of piping used in the facility, but there is no argument against deploying this technology at Iran’s principal enrichment facility. As the JCPOA is intended to run for several years—perhaps more than a decade—more technologies could become available during its implementation. For instance, Los Alamos’ Advanced Enrichment Monitor (AEM) and On-Line Enrichment Monitor (OLEM) promises to deliver similar continuous monitoring, covering more areas of the enrichment process at a lower cost. The JCPOA should be flexible enough to allow technologies of this kind to be deployed if they are certified for safeguards use.

Similarly, the agency might draw upon Containment and Surveillance (C&S) technologies, which aim to verify information on movement of materials, equipment and samples, or preservation of the integrity of relevant data. These technologies aim to preserve continuity of knowledge when inspectors may not be present at the site itself. C&S technologies range from relatively simple seals to sophisticated, remotely connected surveillance cameras. On the latter, the IAEA is well into its efforts to phase in the Next Generation Surveillance System (NGSS), which is a highly versatile digital camera system capable of being triggered by other sensors (such as an electronic seal). It takes high resolution, full colour images, at a rate of about one image per second. If desired, various lenses can be installed, including fisheye lenses, providing more than 180 degrees of coverage. Its data feed can be encrypted and con-

nected to Vienna over the internet, allowing the agency to instantly gain knowledge of unscheduled access to—for instance—storage rooms where centrifuges are being kept. It is protected by a tamper-indicating enclosure, and is already being deployed in a number of facilities worldwide. Ensuring that Iran allows the use of the latest available technology certified for safeguards implementation, and that it also allows for data to be transmitted off-site, would go a long way towards strengthening safeguards at its sites. Hopefully, it would also, in the long run, reduce the JCPOA's significant implementation costs.

Whether the IAEA can verify the implementation of a JCPOA at known facilities, and whether it can do this through Iran's Comprehensive Safeguards Agreement, depends on how parties to the JCPOA balance their requirements for precision against their desire for practicality. If the demands for precision placed upon the agency cannot feasibly be met through their established safeguards criteria, the IAEA will have to move beyond its current verification agreement with Iran. The reference to 'enhanced access according to agreed procedures' in the joint statement suggests that the EU3+3 are preparing for this possibility.

Finding assurance that Iran's declarations are complete

This 'enhanced access' is also likely to extend beyond nuclear facilities declared through Iran's existing comprehensive safeguards agreement. While this agreement requires Iran to declare *all* nuclear materials, it provides little assurance that these declarations are indeed complete. The current dispute over Iran's nuclear programme originates from its failure in the past to declare its extensive uranium enrich-

ment programme, and a deal that failed to provide suitable tools to verify the completeness of Iran's declarations would satisfy almost nobody. This second verification task will be far more challenging than the first.

The joint statement suggests that the implementation of the 'Additional Protocol' to Iran's comprehensive safeguards agreement will play a key role in fulfilling this task. This is not surprising: the Additional Protocol was designed in the wake of Iraq's failure to declare a covert nuclear programme. It aims to provide the agency with more opportunities to assess whether a state has declared all it should. The protocol is not novel for Iran. It signed the protocol with the IAEA in December 2003, and provisionally implemented its provisions for just over two years. It should therefore be straightforward for Iran to immediately re-apply the protocol's provisions after the JCPOA has been signed.

This would require Iran to submit a broader range of information regarding its nuclear programme, including (amongst many other things) a description of nuclear fuel cycle research and development, a description of fuel cycle equipment manufacturing, information on uranium mines and mills, and information on the import and export of fuel cycle-related equipment. It also provides the agency with 'complementary access' to related sites and facilities to check for undeclared nuclear material and activities, or to resolve a question or inconsistency regarding the information provided. In this sense, the Additional Protocol should provide the agency with information on, and access to, all the key parts of Iran's nuclear programme; including its centrifuge research, development, and production facilities, its uranium mines and mills, any other

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7. In the case of a centrifuge production facility, the Agency could use ‘visual observation; collection of environmental samples; utilization of radiation detection and measurement devices; examination of safeguards relevant production and shipping records; and other objective measures which have been demonstrated to be technically feasible and the use of which has been agreed by the Board and following consultations’ between the Agency and Iran.

buildings on the same site as a known facility, and any other facility associated with fuel cycle research, development, and production.

It is worth noting that if the Fordow enrichment site were converted to a nuclear physics and technology centre as outlined in the joint statement, it would no longer hold any inventories of nuclear material. While its conversion would be declared and verified under the CSA, once this conversion is complete it would cease to be considered a relevant nuclear facility under the CSA. Hence, it would not be subject to declarations or inspections under Iran’s CSA. However, if this centre maintained a role in nuclear fuel cycle research and development, Iran would still need to provide periodic reports on it, and complementary access, to the agency under an Additional Protocol.

Perhaps more importantly, the Additional Protocol would require Iran to provide the agency with access to requested locations to carry out wide-area environmental sampling (WAES) to check for undeclared nuclear materials or activities. WAES techniques have been under development for the last decade, but their deployment would need both board approval and consultation with the inspected state. Atmospheric sampling is considered one of the most promising techniques for detecting hidden nuclear activities, but its strengths are primarily focussed on identifying clandestine reprocessing activities, which release more tell-tale materials than gas centrifuge enrichment plants. Gas centrifuge enrichment plants in particular have a small footprint, which means that a sampling campaign in a large country such as Iran could carry significant—most likely prohibitive—costs. Clandestine nuclear reactors are not a major

concern in most cases. The large visual and thermal signatures of a nuclear reactor are very hard to hide.

While the Additional Protocol provides the agency with far greater powers in principle, this power comes with a number of practical caveats. Firstly, a state has 180 days after implementing the Protocol before submitting the majority of its expanded declarations. As Iran would be resuming application of the Protocol, however, it would be reasonable to press it to update its past declarations well before 180 days have passed. It would then have to update most of this information on an annual basis, and some on a quarterly basis.

Second, complementary access is provided only for specific tasks, and with recourse to certain verification techniques.⁷ For instance, the Additional Protocol only allows access to facilities associated with nuclear fuel cycle research and development (such as gas centrifuge production plants) to resolve a question or inconsistency relating to information provided under the Protocol. It is not clear whether Iran would feel required to provide such access if such a question or inconsistency emerged from third-party information provided by other IAEA Member States.

Third, the agency is only provided this access on the condition that it ‘shall not mechanically or systematically’ seek to verify the information declared. The meaning of the words ‘mechanical’ or ‘systematic’ in the Additional Protocol is unclear, as is the distinction between the two. Without a clear understanding of the rights being ceded in this wording, the EU3+3 may fear that this could be used to restrict the agency’s verification activities.

Measures going beyond the Additional Protocol

As of the end of 2013, 117 Member States have both a CSA and an Additional Protocol in force. 63 of these have received a ‘broader conclusion’ from the IAEA that all nuclear material remains in peaceful activities. However, this means that the agency is unable to draw such a conclusion for the remaining 54.⁸ Clearly, providing assurance as to the completeness of a State’s declarations is not easy.

Deriving a broader conclusion can take many years even if a state has limited nuclear inventories, few facilities, and a clean compliance history. In Turkey’s case, questions regarding its dual-use exports to Pakistan (and potentially onto known nuclear proliferator AQ Khan), as well as concerns regarding its earlier exploration of nuclear fuel cycle research and development, may have doubled the time taken by the IAEA to draw a ‘broader conclusion’.⁹

For a state—such as Iran—with a relatively sophisticated fuel cycle, and with a compliance history of concern to other members of the organisation, the process is likely to take much longer, most likely more than a decade. This raises difficult questions about how well suited the Additional Protocol is for resolving historic questions of non-compliance and therefore whether it can deliver a ‘broader conclusion’ of purely peaceful nuclear activities in all cases.

Iran voluntarily implemented the Additional Protocol in 2003, shortly after its clandestine enrichment programme was revealed. In this time, the agency came to learn a lot about Iran’s undeclared nuclear fuel cycle research and development activities through the expanded declarations and access provid-

ed under the protocol. However, Iran suspended its implementation of the Additional Protocol in 2006, and it is unclear whether its continued implementation would have helped resolve the lingering questions that remain regarding possible military dimensions of Iran’s past nuclear activities.

During this period of implementation Iran provided limited ‘transparency visits’ to sites beyond the strict remit of the Additional Protocol, and has provided sporadic information on suspected nuclear activities since then—either through the agreed Work Plan of 2007, or through the current Framework for Cooperation. It is possible that the ‘enhanced access through agreed procedures’ mentioned in the Joint Statement that would seek to ‘clarify past and present issues’ go beyond those contained in an Additional Protocol, and would bypass the agency’s existing Framework for Cooperation by providing a list of specific actions related to specific questions—much like the 2007 ‘Work Plan’.

On the other hand, many member states and commentators have argued that the a comprehensive deal between Iran and the EU3+3 should require the country to implement an ‘Additional Protocol Plus’. This would strengthen the scope and frequency of declarations required by the original Protocol. It would also provide the agency with greater powers to pursue questions and inconsistencies through access to both declared and undeclared facilities, as well as information, documentation, and persons linked with a declared programme.¹⁰

Introducing a modification of established verification agreements could set a precedent that would be of concern to many members of the IAEA. The Additional Protocol was carefully

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8. It is important to note that a lack of a ‘broader conclusion’ is not equivalent to being in non-compliance with Agency safeguards.

9. Mark Hibbs, ‘The IAEA’s Conclusion about Turkey’, Arms Control Wonk, 16 April 2015.

10. It has been proposed that such an Additional Protocol Plus should enter into force automatically when a state has been found in non-compliance with its safeguards obligations.

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developed over time by an array of committees and through a number of working documents. Despite this painstaking process, it has still taken a lot of time and effort to establish the Protocol as the ‘enhanced verification standard’ amongst Member States. Hastily adding an ‘Additional Protocol Plus’ to the agency’s standard toolkit of safeguards agreements for the particular case of Iran would seem, to many member states, like a drastic departure from proper procedure, and would exacerbate the impression that the five nuclear-weapon states (making up most of the EU3+3) have disproportionate influence over the agency.

Alternatively, Article III.A.5 of the IAEA’s Statute allows it to establish verification mechanisms on an ad-hoc basis when asked to by parties to an agreement. Such a request would be transmitted to the Director-General of the agency, who would then present this request along with a tailored verification plan to its Board of Governors.

However, segregating the agency’s ‘normal’ safeguards activities in Iran from the tailored verification of any JCPOA introduces a somewhat artificial administrative distinction between similar activities working towards the same goal: verifying the purely peaceful nature of Iran’s nuclear programme. In 2013, the agency already spent €12.5m—about ten per cent of its safeguards budget—on verification activities in Iran. The agency’s implementation of the interim and ongoing Joint Plan of Action (JPOA) with Iran puts another €10m on top of that, making overall activities in Iran the organisation’s most expensive venture, costing more overall than implementation in large nuclear power states, such as Japan.

If a JCPOA replaces the ongoing JPOA, it would probably add much more to these costs. The introduction of sophisticated monitoring technology could eliminate the need for a near-permanent inspector presence on Iran’s sites to verify the implementation of any JCPOA. However, it is likely that a heavy inspection presence will remain in the future, mostly for political reasons.

Who will pay for an intensive inspection effort over a decade-long implementation period does not appear to be settled in the Iran talks. Whichever verification activities remain under the agency’s existing safeguards agreement would likely be funded from the agency’s regular budget, for all its members to bear. Additional tailored verification activities may have to be funded by voluntary extra-budgetary contributions by Member States; most likely by the US, who already supply some 67 per cent of extrabudgetary contributions, and the European Commission, who supplies another 14 per cent. On the one hand, extra budgetary funding furnishes the process with flexibility. On the other hand, funding this long-term effort exposes it to the risk that future funding may be withdrawn or withheld.

Conclusions and recommendations

It is too early to draw definite, or even preliminary, conclusions on the adequacy of the future verification effort in Iran. The agency’s existing verification toolkit—in particular its existing safeguards agreement with Iran and the Additional Protocol to this agreement—provide the agency with both information and access to all nuclear activities mentioned in the joint statement delivered by the EU and Iran. However, the intensity with which these tools are applied is limited by predefined and universal standards.

These tools provide the agency with the same level of access in Iran as they do elsewhere, and Iran is unavoidably a special case. With this in mind, a JCPOA would likely require more frequent access to Iran's programme, a stronger legal foundation upon which to require this access, as well as more detailed and frequent declarations from Iran, than are provided by the agency's existing toolkit.

This does not strictly require an 'Additional Protocol Plus', and any attempt to introduce a new standard verification tool along these lines through a JCPOA could do more harm to the agency and its verification efforts than good. If a JCPOA is eventually agreed, the agency could find it more straightforward to act under Article III.A.5 of its Statute and submit a tailored plan to augment its traditional activities along the lines described above to its Board of Governors for approval. If a JCPOA is eventually agreed, verifying its implementation carries the potential of not only contributing to a peaceful resolution of the Iranian nuclear issue—a situation that has troubled the international community for the last decade—but also to a general strengthening of safeguards implementation as a whole. However, this is not guaranteed, and stakeholders in any future JCPOA should bear the following in mind.

First, any JCPOA seems likely to provide the agency with a valuable opportunity to trial 'modern technologies' and 'enhanced access' provisions outlined in the joint statement above alongside tried-and-tested verification techniques. The agency and its Member States should conduct a thorough survey of new technologies and procedures to assess their applicability and suitability for application in Iran. If Iran agrees, the agency has

the opportunity to apply some of the most up-to-date measurement and monitoring technologies in its arsenal in a gas-centrifuge enrichment plant. This may well lead to a general acceptance of these technologies in other member states, and a harmonisation of safeguards approaches in these facilities. However, the agency should avoid deploying prototype systems that may not be ready for field use, as these may supply false positive or false negative readings.

Second, any JCPOA seems likely to require a long-term and systematic verification effort by the IAEA. Over a period of ten years or more, it may require additional funding in the region of €100-150m. The financial burden of these measures should, to a great degree, be carried by those states that request for them to be implemented. However, the JCPOA should be drafted in a way that allows for safeguards implementation to be gradually eased as the international community's confidence in Iran's nuclear programme strengthens. As resolving the Iranian nuclear issue benefits the IAEA membership as a whole, the question of how much of the JCPOA's implementation should reasonably be financed from the regular budget should also be given some consideration.

Third, any JCPOA seems likely to require an expansion of the agency's verification toolkit beyond the combination of comprehensive safeguards agreements and Additional Protocols. The parties to the JCPOA should exercise caution when designing any ad-hoc verification arrangements to ensure it does not adversely affect ongoing work promoting the Additional Protocol as the enhanced safeguards standard. Their proposals should be coordinated with the IAEA Secretariat to the greatest degree possible.

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About this paper

The April 2015 Iran-EU statement on the parameters of a Joint Comprehensive Plan of Action gives insight into what a final agreement on Iran's nuclear programme may look like. There are still many details left unresolved or uncommunicated to the outside world. Negotiators will come together in the coming months to discuss specific language designed to bridge remaining issues. What is clear is that stringent verification arrangements—in some cases going above and beyond those in the present International Atomic Energy Agency safeguards system—will be critical for the deal to be accepted on both sides of the Atlantic and by the international community as a whole. The verification work of the International Atomic Energy Agency will therefore be central to the success of the agreement. This brief outlines what verification arrangements may be applied when the agreement enters into force.

Building trust through verification

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