



Iran Nuclear Tracker: November Quarterly Update

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JINSA recently updated its quarterly [Iran Nuclear Tracker](#), which presents analysis and data on Iran's nuclear weapons program, including enrichment capacity, uranium stockpiles, and breakout estimates. Data is drawn from the International Atomic Energy Agency's November 2024 [quarterly report](#) on Iran's nuclear activities and safeguards concerns.

Last week, Iran threatened to launch what could be its largest-ever enrichment expansion after the United States and its European partners put forward a censure resolution that, for the first time, creates a clear path to “snap back” UN Security Council sanctions in response to Tehran's safeguards violations.

1. Major Developments and Takeaways

- As Iran's capacity to quickly produce an arsenal's worth of fissile material continues expanding, on November 21 the International Atomic Energy Agency (IAEA) adopted a [censure resolution](#) that, for the first time, creates a clear path to “[snap back](#)” robust U.N. Security Council (UNSC) sanctions on Iran's illegal nuclear weapons program before they expire next year.
 - » The resolution explicitly calls for a comprehensive IAEA report on Tehran's safeguards compliance, including its suspected undeclared (and prohibited) work on a nuclear device – in stark contrast to four previous [censures](#) since June 2020 that criticized Iran's obstructions of inspectors without advancing any credible threat of real punishment.
 - » Iran's safeguards violations could be referred to the UNSC for snapback sanctions if this report, due by the March 2025 IAEA quarterly board meeting, concludes Tehran worked on a nuclear weapon and/or failed to cooperate with inspectors producing the report.
 - Western [diplomats](#) said the resolution is “the first significant step in a monthslong process that could end with international sanctions being reimposed on Tehran.”
 - This snapback provision expires October 18, 2025, after which the UNSC ends its formal consideration of Iran's nuclear program and, with it, potential future sanctions.
 - » Though the previous [such report](#), in November 2011, found widespread evidence of undeclared weaponization activities, further IAEA investigations were arbitrarily and peremptorily [foreclosed](#) in 2015 to appease Iran into implementing the JCPOA nuclear deal.
 - Tehran's systematic non-compliance with IAEA efforts to reopen this file, following Israel's 2018 heist of Iranian nuclear archives, ultimately led to last week's censure.
- By now standard practice, Iran offered preemptive [empty gestures](#) to forestall this latest censure resolution without actually addressing IAEA concerns and, when those failed, retaliated by declaring it will launch what could be the largest-ever growth of its enrichment capacity.

- » Prior to the latest board meeting, Rafael Grossi [visited](#) Iran to try to resolve IAEA concerns – the sixth such trip by the agency’s director since it restarted inquiries into Iran’s weaponization efforts in 2019, with likewise zero tangible Iranian commitment to comply.
 - With growing urgency, Grossi has [warned](#) for years that worsening access is erasing his agency’s “continuity of knowledge” of Iran’s nuclear activities, and he noted [this month](#) that the “margins for maneuver are beginning to shrink” and “his inspectors “need to see more ... given the size, depth, and ambition of Iran’s [nuclear program](#).”
- » In response to the censure, Iran [announced](#) it would launch “new and advanced centrifuges,” and it ditched its meaningless pre-meeting offers to cap its already-sizeable stockpile of [60 percent uranium](#) and allow four new inspectors access to certain facilities, after previously [banning](#) four other inspectors in response to prior [calls](#) for its cooperation.

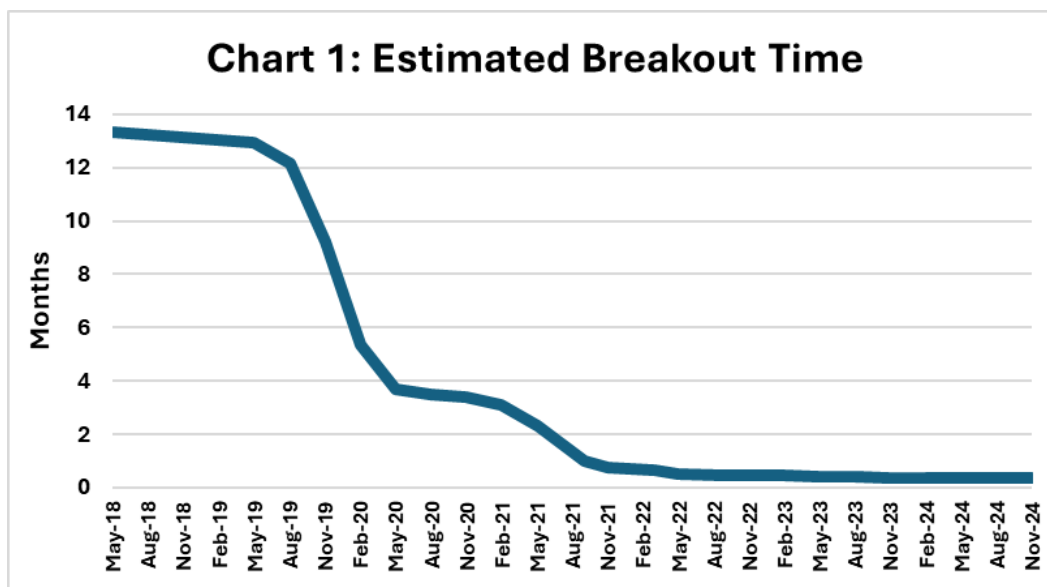
Iran's Non-Compliance with IAEA Monitoring and Verification	
Date	Safeguards Concern/IAEA Response
<i>March 2020</i>	Iran denies IAEA access to suspected undeclared nuclear sites.
<i>June 2020</i>	IAEA resolution censuring Iran for obstructing probe into undeclared nuclear sites.
<i>February 2021</i>	IAEA detects uranium at undeclared Iranian nuclear sites.
	Iran reduces IAEA access to declared nuclear sites, including by abrogating Additional Protocol.
<i>March 2021</i>	Iran reduces IAEA access at declared nuclear sites.
<i>June 2021</i>	Iran reduces IAEA access at Natanz enrichment plant.
<i>July 2021</i>	Iran begins producing 20 percent enriched uranium metal.
<i>October 2021</i>	IAEA chief warns Iran monitoring "no longer intact."
<i>November 2021</i>	Iran blocks inspectors at Karaj centrifuge facility.
<i>June 2022</i>	Iran removes IAEA cameras from declared nuclear sites.
	IAEA resolution censuring Iran for obstructing probe into undeclared nuclear sites.
<i>July 2022</i>	Iran nuclear chief says Tehran will not permit the IAEA's probe into undeclared sites to be reopened.
<i>November 2022</i>	IAEA resolution censuring Iran for obstructing probe into undeclared nuclear sites.
<i>February 2023</i>	Inspectors detect undeclared 83 percent enrichment at Fordo.
<i>May 2023</i>	Reports of undeclared nuclear facility being built at Natanz, Iran's deepest at an estimated 300' underground.
<i>September 2023</i>	Iran expels multiple IAEA inspectors from enrichment sites.
<i>March 2024</i>	Israeli reports of new covert Iranian weaponization work.
<i>June 2024</i>	IAEA resolution censuring Iran for obstructing probe into undeclared nuclear sites.
<i>July 2024</i>	U.S. intel director warns Iran's activities "better position it to produce a nuclear device."
<i>November 2024</i>	IAEA resolution censuring Iran for obstructing probe into undeclared nuclear sites, and requesting comprehensive report by IAEA Director General on Iran's safeguards compliance.

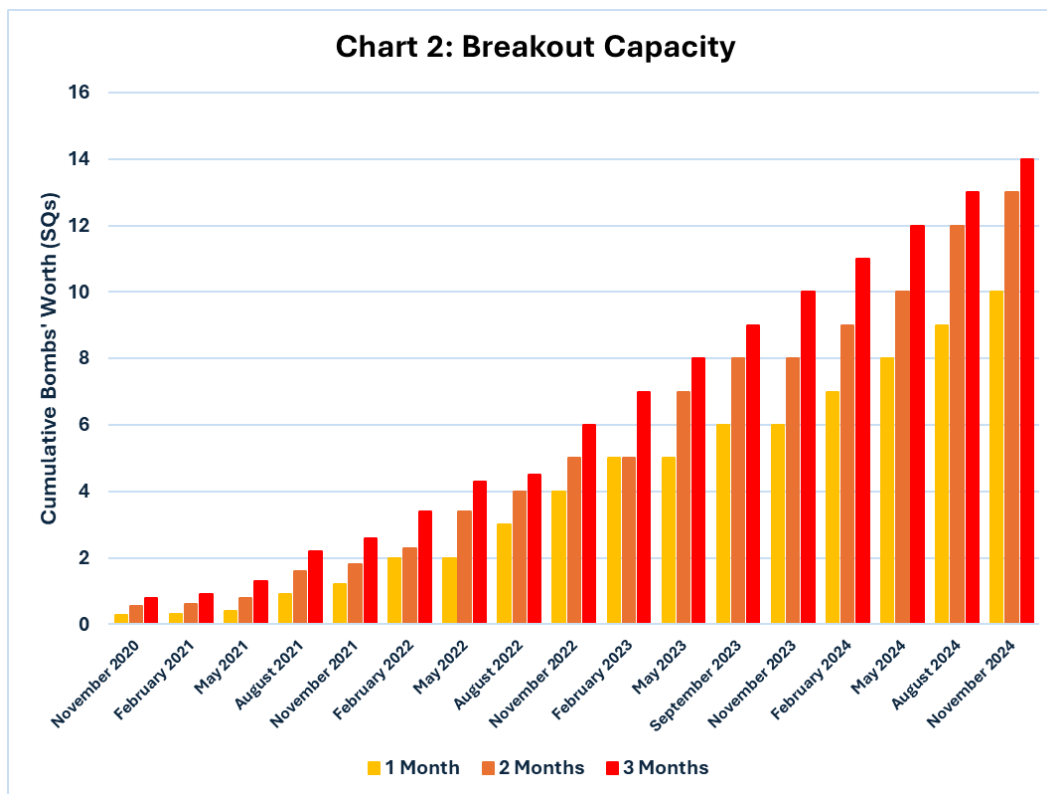
- The request for a comprehensive IAEA report, and Iran’s latest enrichment expansion, occur amid the [expected return](#) of “maximum pressure” under the incoming Trump administration, and will affect the leverage each side brings to the table in presumptive new [nuclear talks](#).

- » Tehran routinely enhances and obscures its nuclear activities in response to censures and other criticisms at IAEA meetings, precisely in order to deter snapback and, like in the [2021-22 talks](#), as leverage in nuclear negotiations to try to compel U.S. sanctions relief, run out the clock on snapback, and stave off U.S.-Israeli pressure, including military threats, against its nuclear program and other core regime assets.
 - *June 2022*: Iran [removed](#) 27 monitoring cameras from its Natanz enrichment plant in response to an IAEA censure resolution for its safeguards non-compliance.
 - *November 2022*: Iran installed new IR-1 and IR-6 [centrifuges](#) at Fordo, and moved 60 percent enrichment to this deeply-buried site, in response to an IAEA censure.
 - *September 2023*: Iran [revoked](#) credentials for some of the most-experienced inspectors in Iran, in response to the IAEA board’s criticism of Iran’s safeguards violations.
 - *June 2024*: Iran began installing [thousands](#) of new IR-2m and IR-6 centrifuges at Natanz and Fordo, in response to IAEA censure resolution for its safeguards violations.
 - *November 2024*: Iran [vowed](#) to launch “a substantial number of advanced centrifuges of various models,” in response to the new IAEA censure and report request.
- With the forthcoming IAEA report likely to determine Iran systematically violated its safeguards obligations, the United States and partners must be fully prepared to enact snapback by referring the matter to the UNSC, and to halt predictable Iranian retaliation that moves it closer to – possibly over – the nuclear weapons threshold and/or further obscures the outside world’s ability to track and assess this final progress.

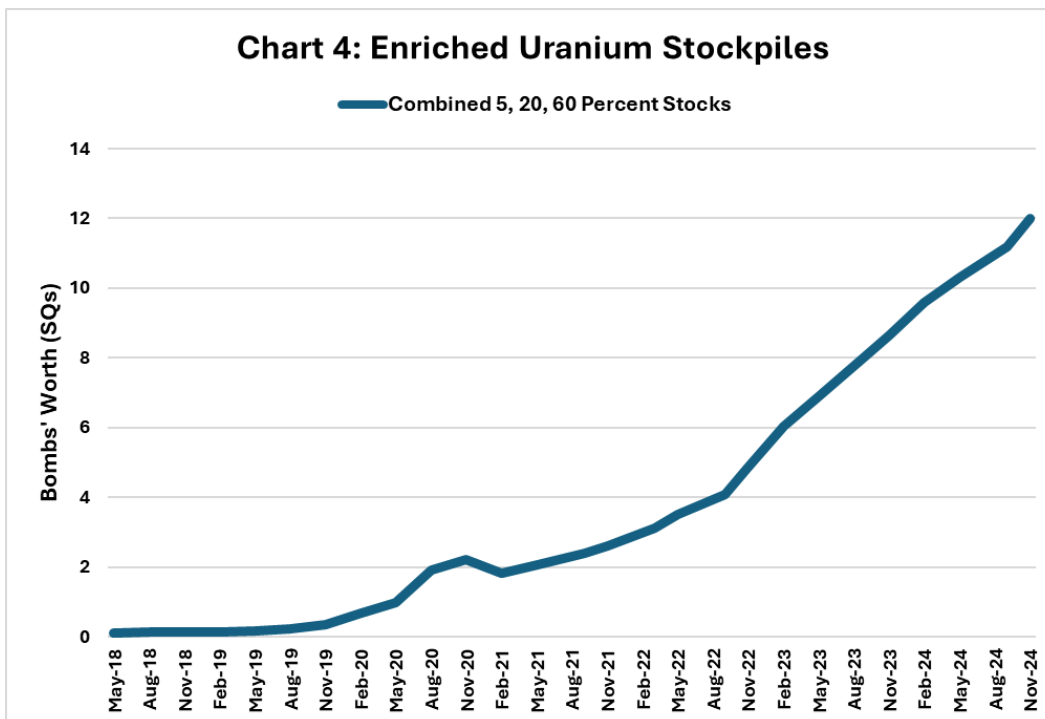
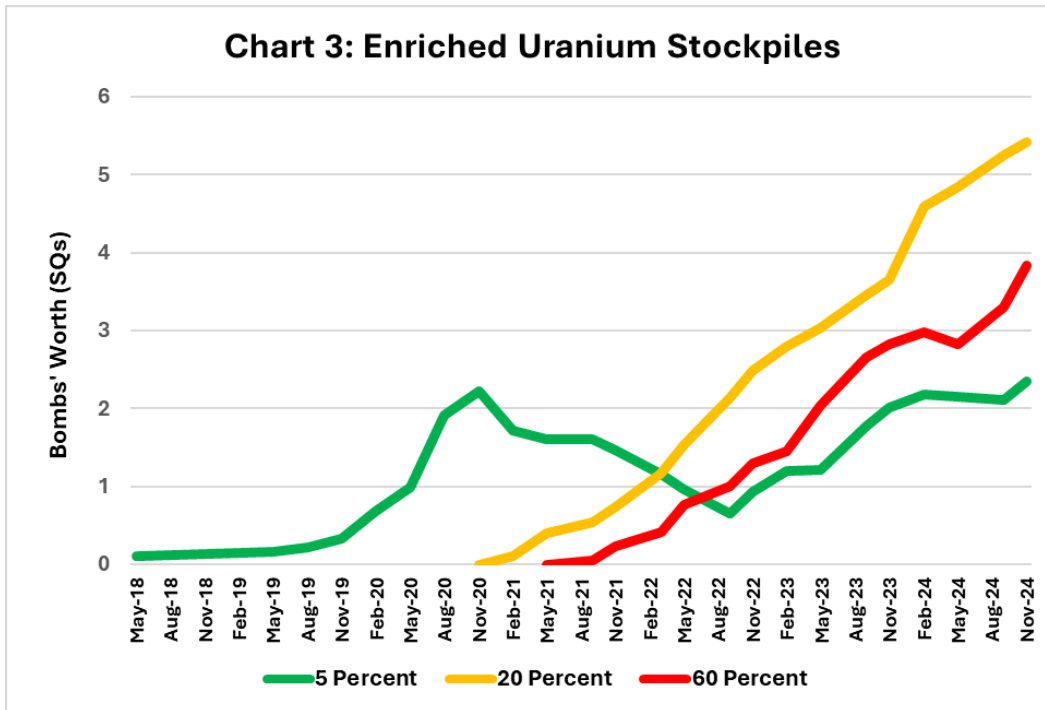
2. Iran’s Enrichment Advances Since August 2024

- Iran’s enrichment program expanded apace during the latest quarterly IAEA [reporting](#) period, further growing its already-appreciable ability to make an arsenal’s worth of 90 percent weapons-grade uranium (WGU) in just weeks, and to sustain such production afterward.
- Iran’s “breakout time” to produce its first bomb’s worth (“significant quantity,” SQ) of 90 percent enriched uranium is often used as a proxy for its nuclear advances and threat, but its “breakout capacity” – the number of SQs it can produce in 1-3 months after a decision to break out – more fully and accurately captures the magnitude of the problem (Charts 1-2).
 - » Though it fell sharply from 12+ months starting in late 2019, Iran’s breakout time became a less useful metric after effectively levelling off at <1 month by early 2022.



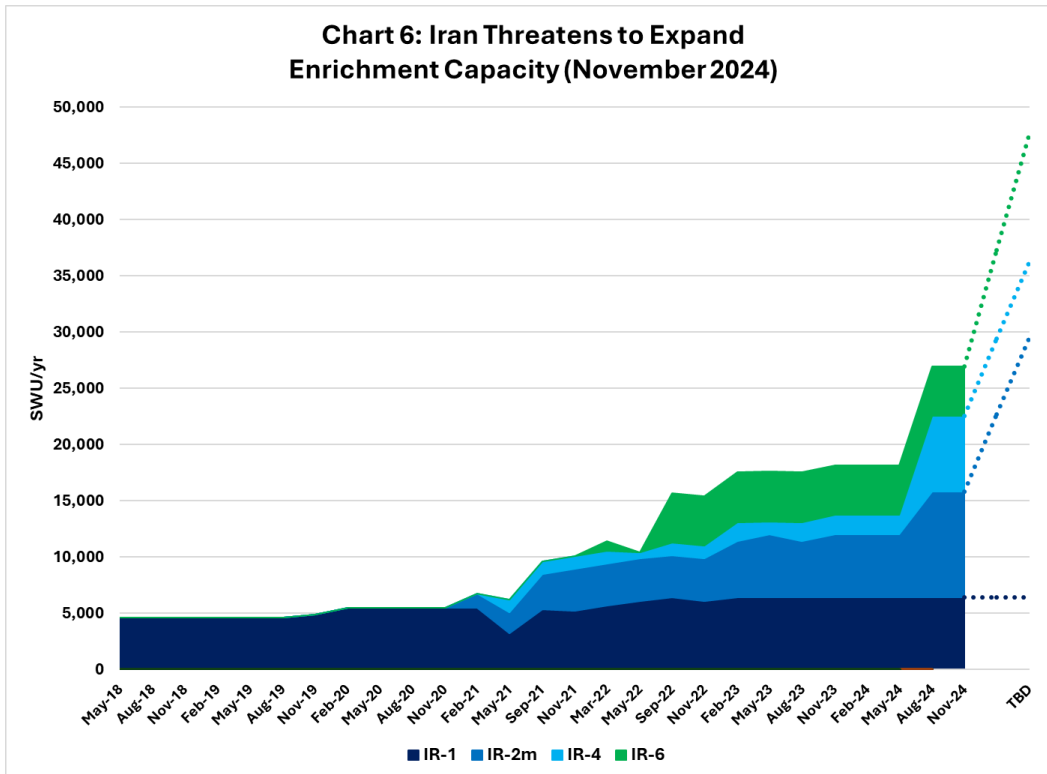
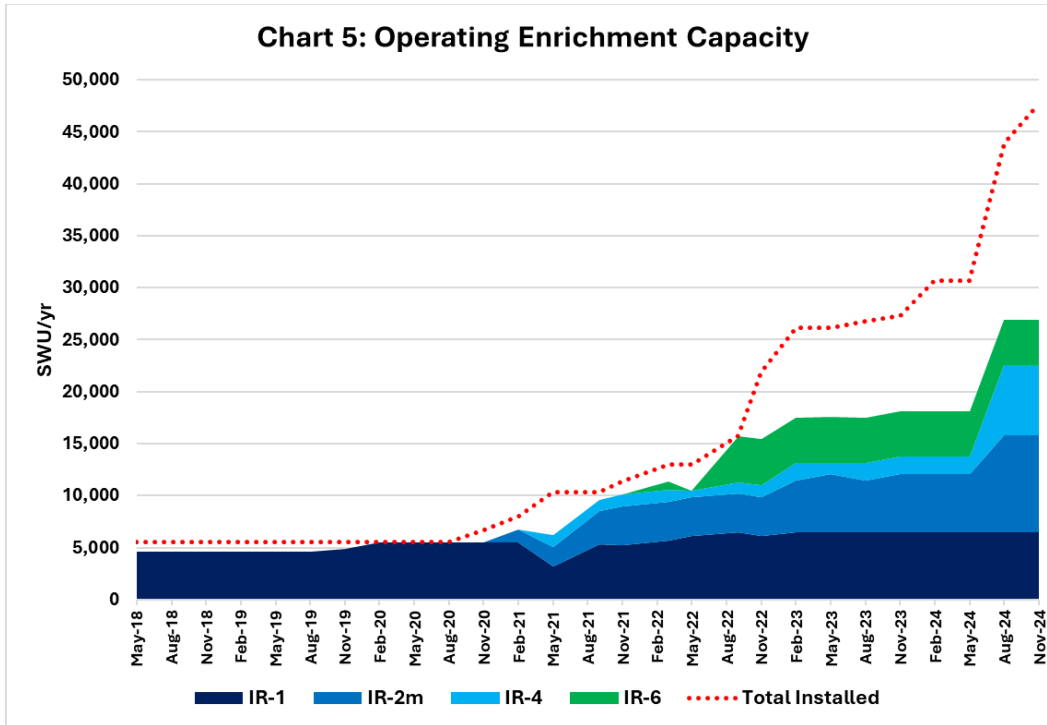


- The remarkable sustained growth of Iran's breakout capacity reflects its concerted efforts, in recent years, to improve simultaneously each main element of its enrichment program:
 - » *Enrichment level:* Iran's 60 percent uranium production since April 2021 properly draws attention, as it has no civilian use, but its production of 20 percent uranium since November 2020 is also technically fissile material that can be converted quickly to WGU.
 - 20 and 60 percent enriched uranium represent fully 90 and 95 percent, respectively, of the enrichment work to achieve WGU.
 - Iran also makes sizable amounts of 5 percent uranium as feedstock for enriching to 20 and 60 percent, since this represents fully 80 percent of the work to reach WGU.
 - » *Stockpiles:* the growth rate of Iran's breakout capacity rose as it achieved its first SQs of 20 and 60 percent uranium in 2022 (Charts 3-4), and has ticked up in tandem since.



- » *Centrifuge capacity*: across several overlapping buildouts starting in November 2020, Iran increasingly employs [more efficient](#) centrifuges that reduce its longstanding dependence on large fleets of relatively unproductive first-generation IR-1 machines (Chart 5).
 - November 2020-May 2022: at its largest, underground Natanz plant, Iran brought online IR-2m and IR-4 machines that are roughly 5-6 times as efficient as the IR-1.
 - May 2022-May 2024: Iran first operated large numbers of IR-6 machines, roughly 8-10 times as efficient as the IR-1, at both of its underground plants (Natanz, Fordo).
 - November 2022-: Iran expands total installed capacity of IR-2m, IR-4, and IR-6 machines at both sites nearly six-fold, and operates steadily more of these at Natanz.

- » Were Iran to fulfill its latest threat by activating the entirety of its installed but currently dormant centrifuges, its enrichment capacity would increase fully 75 percent, its biggest ever leap, by bringing online advanced IR-6 machines at Fordo and IR-2m machines at Natanz (Chart 6).



- During these expansions, Iran makes its infrastructure more [resilient and opaque](#) by moving its most sensitive activities deeper underground and hampering inspectors at relevant sites.
 - » The more Iran improves the efficiency of its centrifuges, it needs fewer machines, and less time and space – and thus smaller, more easily-concealed sites – to enrich an SQ.

- » In November 2022, Iran [relocated](#) its 60 percent enrichment from Natanz to the smaller, even more deeply-buried, plant at Fordo, where it also enriches 20 percent uranium.
- » Since 2021, Iran has steadily [rolled back](#) IAEA access and monitoring at Natanz, Fordo, and a [facility](#) at Esfahan where it stores its 20 and 60 percent uranium stockpiles.
- » Since 2023, Iran has been observed building a [new facility](#) near Natanz for enrichment and/or centrifuge production that would be even more deeply-buried than Fordo, though Iran has failed to comply with its safeguards obligations to declare this site to the IAEA.

Mapping Iran's Uranium Path to the Bomb

