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## **The JCPOA and the Role of Scientists**

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The 63rd Pugwash Conference, Hiroshima, 2 November 2025

# Joint Comprehensive Plan of Action (JCPOA)

- **14 July 2015** – JCPOA adopted by China, France, Germany, Iran, Russia, the United Kingdom, and the United States with the participation of the EU
- Helped to prevent the crisis escalation and increase predictability
- Considered a landmark achievement of multilateral diplomacy
- Served as an important agreement to strengthen the global nuclear non-proliferation regime



# Multiple technically-intensive issues to resolve as part of the JCPOA negotiations

- Uranium enrichment capacity (Natanz, Fordow, R&D)
- LEU stocks
- The Arak heavy water reactor
- Heavy water stocks

The Salehi-Moniz framework was established to address technical issues during the negotiations

# Fordow Fuel Enrichment Plant (FFEP) (1)



- Disclosed to the IAEA by Iran in September 2009 and became operational in December 2011
- Designed capacity: up to 2976 centrifuges in 16 cascades producing UF<sub>6</sub> enriched up to 20% U-235 and up to 5% U-235
- By October 2015, produced a total of 245.9 kg of UF<sub>6</sub> enriched up to 20% U-235 and 364.6 kg of UF<sub>6</sub> enriched up to 5% U-235



# The Fordow Fuel Enrichment Plant (2)



- heavily fortified underground facility, 80m below the ground surface
- two-mile security perimeter surrounding the site
- ringed by anti-aircraft batteries
- estimates: it could take Iran 1-4 years to enrich natural uranium to HEU sufficient for one nuclear bomb

# JCPOA negotiations stalemate over the FFEP

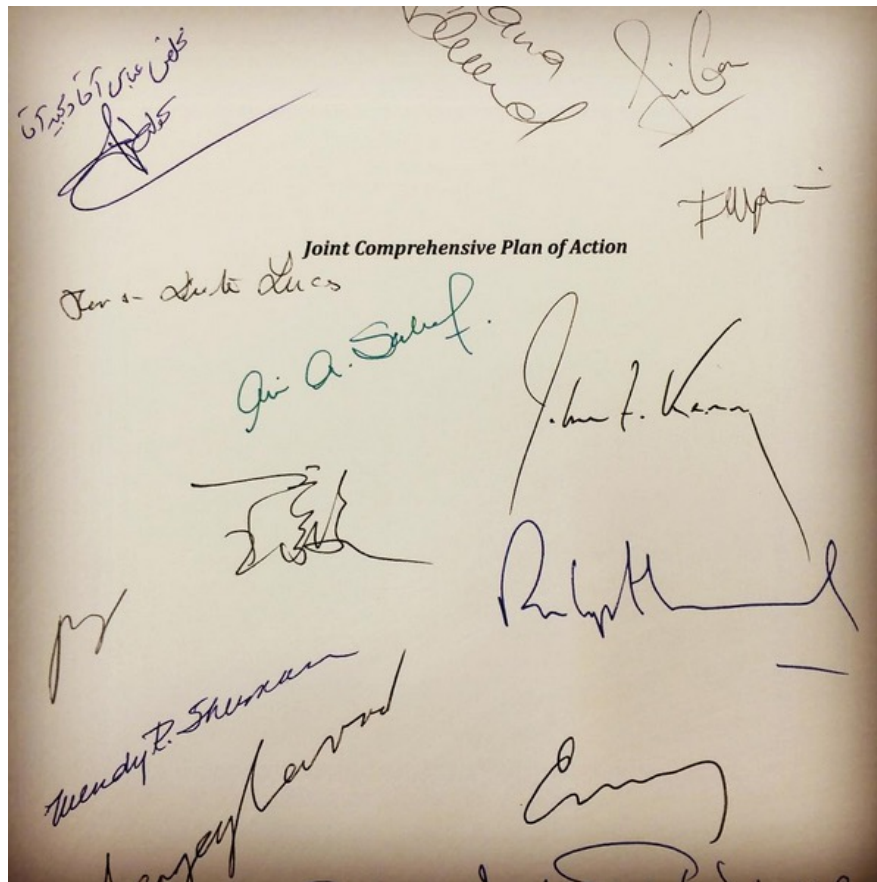
- **Iran:** had made major investments in that facility, making its complete loss hard for Tehran to accept.
- **Western countries:** insisted that zero enrichment was the only option acceptable for the FFEP, which is less vulnerable to airstrikes than the Natanz enrichment plant; conversion of the FFEP to a 'research-only' facility for inter alia testing and developing advanced centrifuges was also unacceptable.
- Participants of the talks faced the problem of finding a solution that would be acceptable to all sides. There was a distinct possibility that the future of the FFEP could become an insurmountable obstacle for the diplomats at the Vienna talks, potentially blocking progress that had been achieved on all other fronts.

# Origin of the solution: Zelenogorsk, Eastern Siberia



- Distance between Fordow and Zelenogorsk – ~5,500 kilometers
- Electrochemical Plant (JSC “PA “ECP”), Zelenogorsk (Krasnoyarsky Krai, Siberian Federal District); former name: Krasnoyarsk-45
- Industrial-scale gas centrifuge enrichment plant (since 1964)
- Stable isotope production facility (since October 1971)
- Production of 95 stable isotopes of 19 chemical elements (C, Si, S, Ar, Fe, Ni, Zn, Ge, Se, Kr, Mo, Cd, Te, Xe, Ir, W, Os, Pb)<sup>7</sup>

# The JCPOA at the FFEP



- A.5. [...] For 15 years, Iran will carry out its uranium enrichment-related activities, including safeguarded R&D exclusively in the Natanz Enrichment facility, and, at Fordow, refrain from any uranium enrichment and uranium enrichment R&D and from keeping any nuclear material.



# The JCPOA at the FFEP (2)

- *The JCPOA. A.6 Iran will convert the Fordow facility into a nuclear, physics and technology centre. International collaboration including in the form of scientific joint partnerships will be established in agreed areas of research. 1044 IR-1 centrifuges in six cascades will remain in one wing at Fordow. Two of these cascades will spin without uranium and will be transitioned, including through appropriate infrastructure modification, for stable isotope production. The other four cascades with all associated infrastructure will remain idle. All other centrifuges and enrichment-related infrastructure will be removed and stored under IAEA continuous monitoring as specified in Annex I.*

# Conversion of the Fordow Facility: Outline



- Nuclear technology center was going to specialize primarily in the production of stable isotopes used in nuclear medicine
- Stable isotopes production facility was planned to be based on IR-1 centrifuges
- The project was expected to be built on a commercial basis
- The timeframe from the start of Russian-Iranian consultations to the launch of production spanned several years.

# Conversion of the Fordow Facility: Steps Forward (1)

- Iran was not conducting any uranium enrichment or related R&D at the FFEP
- Iran had removed all nuclear material from the FFEP
- Iran was maintaining no more than 1044 IR-1 centrifuges at FFEP, which were all in one wing
- Iran had modified for the production of stable isotopes two of the cascades at the FFEP that had never experienced UF<sub>6</sub> by removing the connection to the UF<sub>6</sub> feed main header

Report by the IAEA Director General, 'Verification and Monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)', January 16, 2016

# The Fordow Facility as of 31 May 2025

## The IAEA estimates as of May 2025:

- Number of centrifuges:  
6 cascades of IR-1 (all operational)  
10 cascades of IR-6s (7 operational)

**408.6 kg of 60% enriched uranium produced** (jointly by Fordow and Natanz facilities)