



Civil Nuclear Energy Benefits

Institute for Science and International Security

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We are releasing a series of reports containing our analysis of specific key issues in the Joint Comprehensive Plan of Action. We are neutral on whether the deal should be implemented. We are using our role as a technical nonproliferation organization to instead highlight strengths as well as potential problems and remediation.

In return for limiting its nuclear program and complying with the Joint Comprehensive Plan of Action (JCPOA), Iran will receive significant civil nuclear energy benefits from the international community. If used, these benefits would greatly advance Iran's non-sensitive civil nuclear energy programs and integrate it more fully in the international nuclear system. As far as can be discerned, the JCPOA will provide no technical assistance in the sensitive areas of reprocessing and gas centrifuges, except in the area of stable isotope separation with first generation IR-1 centrifuges at the Fordow Fuel Enrichment Plant (FFEP).¹

Three categories of civil nuclear and scientific cooperation projects can take place under the agreement: bilateral or multilateral cooperation arrangements, projects under the auspices of the International Atomic Energy Agency (IAEA), and projects through International Science and Technology Centers.² The field in which this cooperation can take place are: reactors, fuels and facilities/processes, R&D, nuclear safety, safeguards and security, nuclear medicine, and waste management and decommissioning.

In addition to the assistance Iran will receive to modify the Arak reactor, the E3/EU+3 have also agreed to facilitate Iran's acquisition of light-water research and power reactors which are used for research, development and testing, and for the supply of electricity and desalination. They will provide assurances about the supply of nuclear fuel and also provide for the removal of spent fuel from the reactors.³ In order to fuel current and future reactors, the E3/EU+3 will cooperate to supply modern fuels or joint design and

¹ More specifically, 348 IR-1 centrifuges at Fordow will be modified to produce stable isotopes. The transition to this new type of production will be based on an agreed arrangement between Iran and the Russian Federation. The Joint Commission will be informed about the conceptual framework of stable isotope production at FFEP. The associated R&D activities will take place at the FFEP and at the manufacturing facilities for testing, modification, and balancing.

² All cooperation projects may be undertaken with a variety of potential participants and do not necessarily have to include participation by all E3/EU+3 parties. Additionally, projects must be mutually determined by the participating states and be consistent with the JCPOA and the national laws and regulations of the participating parties.

³ More specifically, the E3/EU+3 can cooperate in the construction and safe operation of new light water reactors (LWRs) according to Generation III+ requirements, construction of state of the art light water moderated multipurpose research reactors capable of testing fuel pins, assembly prototypes and structural materials with associated related facilities. They can also cooperate for the supply of state-of-the-art instrumentation and control systems, nuclear simulation and calculation codes and software solutions, first and second loop main equipment as well as core, on-the-job training on fuel management scenarios, joint technical review of Iran's current nuclear reactors, upon the request by Iran, in order to upgrade current equipment and systems, including concerning nuclear safety.

fabrication technologies, licenses, equipment, and infrastructure.⁴ They will also assist in making sure that Iran is meeting international qualification standards for nuclear fuel fabricated domestically.

Iran will also receive a considerable amount of R&D assistance in the following nuclear science and technology areas: accelerator-based nuclear physics and nuclear astrophysics research, stable isotope production (Fordow and involving only IR-1 centrifuges, not advanced ones), plasma physics, nuclear fusion, Tehran Research Reactor (TRR) applications, modernized Arak reactor, future research reactors, design/manufacture and/or assembly of in-core measuring instrumentation and technologies, nuclear instrumentation and control, systems and electronics design, manufacture and/or assembly, fusion technology and plasma physics, neutrino astronomy, accelerators, and data acquisition and processing software.

From a safety and security perspective, the E3/EU+3 and possibly others will cooperate with Iran to establish a domestic Nuclear Safety Centre, support interactions between nuclear regulatory authorities and facilitate exchanges and visits to nuclear regulatory authorities and nuclear power plants outside of Iran, and enhance and strengthen domestic emergency preparedness and severe accident management capability. The objective is to provide support and assistance so that Iran can join the conventions on nuclear safety and security. However, in this field they can also conclude bilateral/multilateral agreements with related organizations and research centers, supply of valid codes, instruments and equipment related to nuclear safety, strengthen domestic emergency preparedness and severe accident management capability, arrange training for reactor and facility operators and regulatory authority personnel, equip the Nuclear Safety Centre with tools, techniques and equipment, in order to support and facilitate technical and professional training and exchange of lessons-learned for reactor and facility operators, regulatory authority personnel and related supportive organizations.

Iran will also receive cooperation for the effective and efficient implementation of IAEA safeguards and transparency measures. This could entail on-the-job trainings and workshops to strengthen nuclear material accounting and control process, human resource development, and quality assurance/quality control processes. There will also be cooperation to implement nuclear security guidelines and best practices.

In the field of nuclear medicine, Iran will receive help in order to enhance its expertise in diagnostic imaging and radiotherapy, increase the availability of medical radioisotopes for diagnosis and treatment, and facilitate its participation in the international scientific and nuclear medicine community. In order to do so, the E3/EU+3 can provide upgrades to the infrastructure associated with existing cyclotron facilities, facilitate Iranian acquisition of a new cyclotron and radiopharmacy equipment as well as the acquisition of state-of-the-art diagnostic imaging and radiotherapy equipment for existing or new nuclear medicine centers, cooperation on occupational and patient dosimetry procedures, improved target utilization to increase radioisotope production, acquisition of radioisotope sources for brachotherapy, and radiotherapy instrument calibration, and other medical and industrial applications, and supply of state-of-the-art radio-medicine center and necessary laboratories.

The E3/EU+3 will also cooperate in the safe, effective, and efficient management and disposition of nuclear and radiological wastes derived from Iran's nuclear fuel cycle activities and nuclear medicine, radioisotope

⁴ This includes assistance on purification processes, forming and metallurgical activities for different types of nuclear fuel clads and cladding for the modernized Arak heavy water research reactor.

production and/or consumption activities and for facility decontamination and decommissioning, including co-operation on long term storage facilities for the repository of low and medium level waste.

Other projects can also be implemented, including in the nuclear desalination field and laser technology for medical applications.