



PERSPECTIVES

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Egypt's Nuclear Deal with Russia

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EXECUTIVE SUMMARY: The long-term agreement recently signed between Russia and Egypt to build a nuclear power plant at El-Dabaa is aimed at improving Egypt's electricity sector and has no direct implications for the development of nuclear weapons. It is, however, likely to legitimize any future attempt by Egypt to build a uranium-enrichment or nuclear-fuel-reprocessing facility. While Egypt has already gained significant experience in the nuclear field, neither its plans to develop a civilian nuclear power plant nor its efforts to develop nuclear weapons have yet borne fruit.

Egypt is taking its nuclear energy effort out of the deep freeze.

On December 11, 2017, during Russian President Vladimir Putin's visit to Cairo, the two countries signed a nuclear agreement that reflects a convergence of their interests: Russia would like to return to its position as the dominant power in the Middle East, and Egyptian President Abdel Fattah Sisi wants to rehabilitate his country's economy and once again make Egypt a central actor in the Arab world.

The agreement stipulates that Russia's Rosatom Corporation will build a nuclear power plant at El-Dabaa, about 140 kilometers west of Alexandria. The plant will include four light-water reactors for electricity production, each with a 1,200-megawatt output. Egypt and Rosatom also concluded that a storage depot would be built beside the nuclear plant to hold spent nuclear fuel from the reactors before it is sent to Russia for reprocessing. Test runs of the first reactor are expected in 2022 and its full commissioning is anticipated in 2026. Rosatom estimates that the project will be completed in 2028 or 2029.

Russia will also build factories in Egypt for the domestic manufacture of nuclear plant components, bringing in the required expertise; and Rosatom will

service the plant for 60 years. According to reports, the project will cost about \$30 billion, with \$25 billion to be provided by Russia as a loan to be repaid over 35 years.

There are many gas deposits in Egypt as well as oil fields, but the country's faulty pricing policy and economic crisis have caused the energy industries to collapse. With a population now numbering 104 million, Egypt urgently needs nuclear power to improve its energy sector.

Many in Egypt, from disparate parts of the population, oppose building a nuclear plant at El-Dabaa. Businesspeople want to develop tourism in the area, which is on the seacoast; some are concerned about environmental damage; and the Bedouin tribes in the area claim the land has been stolen from them. In February 2012, amid the chaos in Egypt following the revolution, the El-Dabaa site was attacked by thousands of Bedouin; the costs from damage and the looting of equipment were estimated at \$80 million.

Egypt's plans to build a nuclear reactor go back to the days of Nasser. As Egyptian energy expert Ali Saidi, who served as electricity and energy minister from 1999 to 2001, told *Al-Monitor* in September 2015:

At first, the nuclear project was stopped because of the 1967 war. It was to be implemented with the Soviet Union at that time ... The project was bid upon in the 1970s in a competition between US companies, after US President Richard Nixon promised to provide nuclear plants to both Egypt and Israel. Then a US law was passed obliging countries acquiring nuclear plant technologies to be subject to inspection standards from the country of origin, which was America, so the project stopped.

Saidi added that in the 1980s, during Mubarak's presidency, American and French companies competed over the nuclear plant project. He explained that the project was dropped from the agenda for two reasons: negative public opinion in Egypt after the disaster of the Ukrainian Chernobyl reactor (1986), and the discovery of gas deposits in the 1990s.

Saidi focused solely on the civilian aspect of nuclear energy in Egypt as a source of electricity production. However, Israeli intelligence has suspected for years that Egypt is interested in covertly building a military nuclear potential – from the crisis of the German scientists, who helped Egypt develop ballistic missiles in 1962, through the Mubarak presidency.

Naturally, the issue of Israeli nuclear weapons has had an effect on Egypt's nuclear development efforts. Egypt's entry into the nuclear arena was primarily

impelled, however, by Gamal Abdel Nasser's pan-Arab policy and by his view of Egypt as a leading country in the Arab world.

After the founding of the Atomic Energy Establishment (AEE) in 1956, Egypt made impressive progress in building a nuclear infrastructure and developing research in the field. For Nasser, the nuclear endeavor was not solely for "peaceful purposes" but was also a means of developing nuclear weapons. The nuclear activity, which at first only involved research, was concentrated at the Inshas Nuclear Research Center about 40 kilometers northwest of Cairo.

The heart of the Inshas Center was a small, 2-megawatt research reactor that the Soviet Union had provided. It began construction in 1958 and became operational in 1961. But according to media reports, from 1960 to 1967, Egypt made intensive efforts to obtain "off-the-shelf" nuclear weapons or the means to produce them, turning for this purpose to the Soviet Union, China, and India. Nasser referred to this openly in a speech in 1961, warning that if Israel were to have nuclear weapons "we will secure atomic bombs for ourselves at any price."

A major figure in the Egyptian nuclear establishment during the Nasser era was Salah Hedayat, who was appointed director-general of the AEE and then served until 1970 as minister of scientific research and as Nasser's scientific adviser. It appears that Hedayat strove to develop an independent nuclear fuel cycle based on a plutonium-production reactor and a facility for reprocessing plutonium from fuel irradiated in the reactor. In this context, in 1964 the Soviet Union helped Egypt set up a radiochemistry department at Inshas that included "hot laboratories" for treating irradiated fuel. Moreover, at the end of 1965 the Egyptian government issued a tender for the construction of a 150-megawatt electricity production reactor at Borg al-Arab on the Mediterranean coast, about 45 kilometers southwest of Alexandria, ostensibly intended for desalination of seawater.

In a 1995 interview, Hedayat confirmed that Egypt had indeed launched a military nuclear program at the beginning of the 1960s that continued until Nasser's death in 1970.

It is possible that on the eve of the Six-Day War, one of the Egyptian army's objectives was to destroy the Israeli nuclear reactor in Dimona, but Egypt's swift defeat and loss of the Sinai Peninsula disrupted any such plans. After the war, Egypt's difficult economic situation prevented further efforts towards nuclear development. On top of the loss of transit dues for ships going through the Suez Canal and revenues from the Sinai oil wells, Egypt had to allocate huge sums to the defeated army's rehabilitation. Thus Egypt decided to shift the struggle against Israel's nuclear superiority to the diplomatic sphere.

One step it took was to join the Non-Proliferation Treaty (NPT) in 1968, though it had not ratified it. This was a tactical measure for Egypt since its nuclear program was stagnating in any case because of a lack of financial resources. Egyptian diplomacy began working through various channels – without success – to compel Israel to sign the treaty as well.

In any case, Hedayat continued with his nuclear plans, aiming to develop an infrastructure to produce fissile materials for nuclear weapons. In 1965, he established the DCA (Design Consultant Association), which was funded by the Egyptian government and employed a group of nuclear-engineering experts. The DCA functioned independently of the official Egyptian nuclear sector, the framework of which is the AEE.

The DCA's mission was to help Egypt develop an indigenous nuclear fuel cycle. In 1970 it presented its plan to build a "dual-use nuclear reactor for desalination" near Alexandria with an output of 40 megawatts. The plan was backed by Nasser, who showed great interest in involving Libyan leader Muammar Qaddafi. Qaddafi promised financial support in exchange for conducting the project in Libya.

In 1970, Nasser reached an agreement with Qaddafi on establishing a joint Egyptian-Libyan federation and appointed Hedayat its minister of scientific cooperation. However, because Qaddafi wanted faster results than what Hedayat could provide, the joint venture failed to get off the ground and Libyan financial support evaporated.

The Egyptian-Libyan federation continued under the Sadat regime but finally broke up in 1974 because of Qaddafi's undermining of Sadat. Hedayat was dismissed as the federation's minister of scientific cooperation. In about 1977, the DCA was dismantled. Sadat wanted to put the nuclear establishment on a new path.

Israeli intelligence closely monitored Egypt at the time on suspicion that it was interested in establishing a centrifuge project for enriching uranium, which is much less expensive than plutonium. An attempt was made to uncover ties between Egypt and Western European, especially German, companies that dealt with the development and manufacture of components and equipment for uranium enrichment.

In August 1976, after Nixon's visit to Egypt in 1974, Egypt, the US, and the International Atomic Energy Agency signed a draft agreement to build a nuclear power plant in Sidi Krir near Alexandria that was to include two 600-megawatt light-water reactors manufactured by Westinghouse. The project was not carried out, but the Nuclear Power Plants Authority, which had been

set up under the aegis of the Electricity Ministry, opened intensive talks with companies from Germany, France, and Japan on the purchase of a number of power reactors to be placed in El-Dabaa.

Then-president Hosni Mubarak intended, generally speaking, to continue the policies of his predecessor Sadat, which included the safeguarding of close ties with the US, the maintenance of the peace with Israel, and the promotion of an Egyptian nuclear power program. The Chernobyl disaster prompted a suspension of efforts to promote the nuclear program.

However, a visit to Egypt by the Canadian energy minister in May 1982, and his announcement of his country's intention to sign a nuclear cooperation agreement with Egypt with the aim of selling it CANDU power reactors, set off alarm bells in the Israeli intelligence community. This Canadian-developed type of reactor is heavy water-moderated and cooled and is fueled with natural uranium. Hence, unlike light-water power reactors, it can be used to produce military-grade plutonium.

Egypt's talks on CANDU reactors with Canadian company AECL (Atomic Energy of Canada Ltd.) continued sluggishly for at least eight years, during which time the Chernobyl disaster transpired. According to a 1989 agreement, about 30% of the reactor's parts were supposed to be manufactured in Egypt, while AECL was supposed to give Egypt technology with which to produce CANDU nuclear fuel. But ultimately, because of funding difficulties, the plan collapsed.

Meanwhile, accelerated development had begun at the Inshas Center. In 1982 the Hot Laboratory and Waste Management Center (HLWMC) was set up there to treat radioactive waste accumulating in Egypt's nuclear facilities. The HLWMC also had a hot-cells complex for research on the use of plutonium, which had been purchased from France. Furthermore, in 1989 work began, with German assistance, on a facility for the domestic production of nuclear fuel. In 1990, the old reactor at Inshas was upgraded and reactivated after having been decommissioned in the 1980s. At the end of 1992, a new 22-megawatt research reactor, purchased from the Argentinian company INVAP, began installation at Inshas. INVAP also built a nuclear fuel production facility for the reactor.

Concurrently, Egyptian defense minister Field Marshall Abdel Halim Abu Ghazala began working in 1984 to renew his country's nuclear weapons program. According to media reports, he did so notwithstanding misgivings on the part of President Mubarak. Abu Ghazala was close to the Muslim Brotherhood in his views and was known to strongly oppose the peace treaty with Israel. In a closed forum in 1987, he stated emphatically, "Israel is our main and only enemy."

Abu Ghazala began to seek channels through which to procure nuclear materials and forged ties with senior Iraqi officials to look into possible nuclear cooperation. (It was also reported that his aide, Brigadier Hossam Khairat Youssef, attempted to buy 100 kilograms of uranium from a French civilian with the aim of enriching it in France, but it is not known whether this initiative led to any results.)

A serious episode connected to Abu Ghazala was the Badr 2000 project, headed by Khairat Youssef, which involved plans for a two-stage, solid-fuel ballistic missile with a range of about 1,000 kilometers. The project, based on German technology, began in 1982 in cooperation with Iraq and Argentina.

However, some of the missile's components were illegally purchased in the US by an Egyptian missile engineer with American citizenship, Abdel-Kader Helmi, whom Abu Ghazala had recruited. The American authorities caught Helmi loading missile materials onto an Egyptian military transport plane, tried him, and sentenced him to 46 months in prison and a \$350,000 fine.

Though there is no proof, Mubarak was probably in the loop about the Badr-2000 project. When the episode was exposed, it caused a severe crisis in US-Egyptian relations. Mubarak had to sacrifice Abu Ghazala, dismissing him as defense minister in April 1989.

Egypt lost the nuclear arms race. From the 1950s to the mid-1970s, nothing was done to impede its purchase of nuclear facilities for the production of military-grade plutonium and enriched uranium. Reasons included the economic interests of nuclear exporters, as well as a naïve belief that the development of nuclear weapons was beyond the capability of third world countries. Thus, in the Nasser era, Egypt had the chance to start acquiring facilities for plutonium production but did not exploit it. Probable explanations include failed management of the nuclear sector, the channeling of resources into preparing the Egyptian army for war against Israel, and the Soviet "bear hug," which was intended to keep Egypt's nuclear progress on a low flame so Egypt would not grow overly independent.

Though Egyptian industry, including its military industry, has progressed greatly in recent decades, Egypt has not yet tapped its capacity for nuclear development. Sadat, who opened Egypt's gates to the Americans, did not want to take such a risk. His successor, Mubarak, was skeptical about the potential success of a nuclear weapons development project, particularly after the diplomatic crisis over the Abu Ghazala affair. Egypt also had trouble in those years financing a civilian nuclear program.

The need for nuclear weapons returned to the agenda in Egypt and Saudi Arabia after the Iranian nuclear deal was struck in July 2015, though the Trump administration's moves to stop Iran from nuclearizing have calmed the situation for now.

As for the nuclear plant at El-Dabaa, ten years will be needed to complete the project – a very long time in the Middle East. It is entirely possible that the project will meet the same fate as Egypt's past efforts to build nuclear power plants. If the project is carried out, it will be impossible to use it directly for the development of nuclear weapons because of the need to use light-water reactors for ongoing electricity production and because the plutonium in these plants' spent nuclear fuel will not be of nuclear weapons grade.

In the long term, however, the existence of nuclear power plants in Egypt could give Cairo the legitimacy to build a uranium-enrichment plant at a low enrichment rate for the production of nuclear fuel for reactors. From there the path is short to a high rate of military-grade uranium enrichment. Operating power plants can also provide legitimacy for the building of a facility for reprocessing the plants' spent nuclear fuel. If Egypt eventually builds a plutonium production reactor, it will have a new route towards developing nuclear weapons.

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