
Where Does Turkey Stand in the Quest for Civilian Nuclear Energy in the Middle East?

Nurşin ATEŞOĞLU GÜNEY*

Abstract

Some Middle Eastern states have proposed massive projects for building nuclear power plants (NPP) as part of their energy security plans to cut down reliance on electricity production from gas or hydro resources. The gold standard of attaining nuclear energy was introduced to the region by the UAE's experience and then Turkey came up with the BOO model of acquisition for its first NPP. The attraction of the BOO model is not only the financial relief that it brings for the aspirant country, but also the non-proliferation characteristics it carries. Turkey's second attempt at a BOT model nuclear plant is also in line with its aim of developing civilian nuclear energy, along with international non-proliferation frameworks. This paper examines why and how Turkey launched its civilian nuclear project as part of its energy supply security trajectory and where it currently stands in the Middle East from the perspective of nuclear non-proliferation.

Key Words

Akkuyu, ATMEA1, Russian Federation, Turkey, Japan, BOO, BOT.

Introduction

This paper analyzes Turkey's agenda to build nuclear power plants not only in terms of its domestic energy profile but also with reference to the rising interest in Middle Eastern countries to benefit from nuclear energy. It aims to point out similarities and dissimilarities between Turkey and selected countries in the Middle East that have proven a certain degree of commitment to building nuclear power plants as to increase the share of nuclear in their energy mix. Its main concern is to conclude to what extent Turkey's nuclear energy agenda entails similar and dissimilar characteristics from its counterparts and fits with nuclear non-proliferation rules.

The interest of aspirant countries for civilian nuclear power plants in the Middle East is not a new phenomenon. It was in 2006 when 14 states from both the Middle East and Asia opted to acquire nuclear technology. This new demand for civilian nuclear technology in the Middle East led to

* Prof. Dr., Dean of the Faculty of Economics, Administrative and Social Sciences of Bahçeşehir Cyprus University.
E-mail: gnursin@hotmail.com

a growing concern among Western countries on issues related to nuclear non-proliferation. The main question was whether the growing demand for nuclear technology was about nuclear renaissance or could it channel means to acquire weapons. Since then the international community's efforts have focused on the development of precautions that could strengthen international measures for nuclear non-proliferation.

Political consequences of the Arab Spring and the rise of doubts towards nuclear energy following the Fukushima nuclear power plant meltdown affected projects in a number of countries interested in developing nuclear power reactors. These effects were supported by the decisions of countries with established nuclear programs on diversifying their investment plans towards non-nuclear technology. For instance, both Germany and Switzerland decided to phase out their nuclear programs. However, despite the negative effects of the Arab Spring and Fukushima, most of the Middle Eastern countries that had nuclear power plant projects did not halt their programs. On the contrary, many, as in the case of Saudi Arabia and the United Arab Emirates (UAE), secured financial capacity to erect plants, and approved civilian nuclear energy as part of the diversification of their national energy

programs. The Turkish government, in the meantime, appeared determined to build nuclear power plants so as to sustain energy supply security for two significant reasons: First, to reduce its heavy dependence on coal, oil and gas imports; and second, to balance the environmental consequences of the extensive use of hydrocarbons by decreasing overall carbon emissions. Turkey's extreme dependence on coal, oil and gas imports differs from that of many other Middle Eastern countries, which have launched nuclear energy programs despite their being leading oil and gas exporters with no import dependence.

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Despite this difference there are important similarities shared by these countries in trying to build nuclear power plants. Concerns over carbon emissions have resulted in efforts to decrease them, and these countries' plans to limit carbon emissions constitute an

important shared argument. In other words, they perceive nuclear power as a necessary part of acquiring vital technology for transitioning to a low carbon economy. The second rationale is to decrease domestic use of oil and gas so as to save more hydrocarbons to export and sustain state revenues. Most of the countries in the Middle East in the last decade have been motivated more or less for these reasons along with the following specificities: Countries like the UAE, Saudi Arabia, Egypt, Jordan, Kuwait and Turkey have all found themselves facing a sharp increase in demand either for electricity or water. This has led to them facing the risk of being heavily reliant on natural gas for electricity generation. In some of these Middle Eastern countries, when the need for gas has outstripped the locally available supply, they have naturally been inclined to allocate increasing amounts of valuable liquid fuels to domestic power generation with a commensurate increase in economic and environmental costs. Hence, for Turkey the energy supply security naturally becomes a major priority, as it is for other energy dependent countries in the same geography. It is true that countries like Turkey felt the need to emphasize the diversification of sources of energy supply needed for their current demands for electricity power generation.

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What about the actual status of nuclear power plants in the Middle East? Iran constructed its first reactor despite long running problems and sanctions applied by the international community to increase the transparency of its nuclear program. The UAE is on the way to constructing its first reactor soon. The UAE's case, from the perspective of nuclear non-proliferation, has been introduced as the *gold standard*, whereby the Abu Dhabi government, by signing the "123" agreement with the U.S., has made clear that it is not going to enrich uranium on its territory despite its natural right to do so according to Article 4 of the Non-Proliferation Treaty (NPT). So, the UAE case has been introduced - especially by the West and particularly by the U.S.-as the most secure way of attaining civilian nuclear energy by the non-nuclear signatories to the NPT. However, this path of development for civilian energy has not been adopted by other countries, since Article 4 did not necessitate them to do so. But this dual track effort of opting

for civilian nuclear power reactors has not prevented the rise of a second wave of debates in the West about whether some of the states in the Middle East can hedge, and hence has led to the rise of a new tide of nuclear renaissance.

Turkey's attempt to acquire three nuclear power reactors came to the fore within these debates. It launched a new start in 2010 by signing an agreement with Russia on constructing a nuclear power plant in Mersin Akkuyu (by the Mediterranean) and later with a Japan-French consortium to construct a second plant in Sinop (by the Black Sea). In short, Turkey rationalizes its nuclear energy agenda by claiming the flaws in its supply security based on oil and gas imports on the one hand and the need for lower carbon emissions on the other. Reactors built by the Middle Eastern countries do not directly affect Turkey's nuclear agenda, and yet lead to another factor that supports construction of reactors in Turkey like anywhere else in Europe, Eurasia and the Middle East. Turkey's energy agenda, therefore, proves a certain degree of commitment to nuclear energy that is based on supply security and environmental concerns stemming from the continued priorities in government policy. This paper will first focus on Turkey's energy supply security strategy and then analyze Turkey's nuclear power plant deals from

the perspective of how appropriate they are within the main contours of nuclear non-proliferation rules.

The Energy Supply Security Issue and the Turkish Case

Global energy security is composed of supply and demand side countries, although a few of them totally benefit from domestic resources. In its most general sense, there are energy producers that determine the supply side of the story on the one side. The demand side seems to be more complicated and yet those countries that are dependent on imports are distinct with their own priorities, as in the case of high prices versus low prices. While the fuel producing, countries are trying to secure the demand for their resources at profitable prices, the consuming countries are leaning towards different methods of cost minimization as much as they are diversification of resources, routes, and technologies as well as energy efficiency, as the crucial tools of bettering and securing their energy supply security.

Turkey, within this structure, appears as a good case of an import dependent country that is in urgent need of supply and supplier diversification and cost minimization. Turkey geographically is located between the fossil fuel

producing countries to its east and hydro carbon consuming European countries to its west. This geographic feature partially explains why Turkey has been trying to become an efficient energy transit and if possible hub country with the purpose of channeling some of the oil and gas to its domestic markets. That is why Ankara has mostly focused on increasing the passage of the number of pipelines- either from east to west or from north to south--thus connecting itself between producing countries and consuming ones. However, Turkey's high rate of economic growth and urbanization has resulted in a continued increase of energy consumption, making the country's dependence on oil and gas imports reach 70 %.

Turkey does not have nuclear power plants and fossil reserves are extremely limited. At the same time, primary and secondary energy demand is growing rapidly for various reasons, among which economic growth, urbanization, and population increase take important shares. Turkey's electricity demand almost doubled in the ten years after 2004, reaching 207 terawatt-hours (TWh) in 2015. In addition, the country's gas demand has grown even faster, increasing from 22 billion cubic metres (bcm) to 49 bcm.¹

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On the one hand, this incessant growth has led to an increase in imports of coal, oil and gas. On the other hand, it has supported the rise of renewable energy and evoked the necessity of nuclear energy. The increase in consumption has also forced the country to liberalize its energy markets. The IEA's in-depth review of 2009 is noteworthy as it shows how Turkey, in that year, managed to introduce liberalization and privatization of the country's electricity generation and distribution. This report stated that by reforming the energy (electricity) sector, Ankara had specifically helped to trigger a private investment boom.² This was indispensable to increasing the number of electricity power plants fueled by coal, gas, hydro, sun and wind.

Turkey's energy trajectory would be followed in subsequent IEA reports. The IEA's in-depth review in 2016 welcomed Turkey's efforts to achieve sustainable economic growth, which aims to meet the country's energy targets for 2023.³ Both of these objectives were presented in Turkey's

Energy's Strategic Plan (2010-2014)⁴ and (2015-2019)⁵ alongside Ankara's new 2030 climate pledge that was submitted to the Paris 21st Conference of the Parties (COP21) in 2015.⁶ As mentioned by IEA, Turkey has been aiming to develop and achieve a new energy development target specifically for 2023 (the 100th anniversary of the Republic of Turkey). Ankara, in this regard, wants to prioritize the development of Turkey's domestic resources. Among them lignite coal takes a special place with its ability to support employment and reduce costs. Renewable energy has been attributed considerable significance with a 30 % share in the energy mix. Reduction of energy intensity by 20 % below 2010 levels is aimed at through attaining improved efficiency. Turkey, even in a best-case scenario, which denotes full achievement of goals set for domestic coal and renewable resources while decreasing intensity and increasing savings, would face a vulnerability in supply security. Turkey, in this case will either increase its dependence on coal, oil and gas imports, or build nuclear power plants to prevent a further reliance on fossil fuels. This flaw in energy supply security appears as the most significant factor that rationalizes Turkey's interest in building nuclear power plants.⁷

Currently, half of Turkey's electricity

comes from natural gas, a quarter from coal and marginally less from hydroelectric.⁸ Two-thirds of its natural gas comes from Russia via pipelines, with most of the remainder coming from Iran, and a small amount of gas in the form of LNG from Algeria and Nigeria. Turkey, currently imports more than 89 % of all natural gas that it consumes, which is why Ankara feels obliged to take into account the challenges that can affect and disrupt the stable conditions of geopolitics around Turkey that may directly and negatively affect the country's energy supply security.⁹ Hence, Turkey, like other countries in the region, is evaluating nuclear power, alongside renewables, as a serious means of reducing its dependence on imported energy.¹⁰ In this regard, Akkuyu on the Mediterranean coastal area of southern Turkey and Sinop on the Black Sea coast in the north of the country have been chosen as possible sites for nuclear power projects.

Turkey's Quest for Nuclear Power Plants

Background

Turkey does not have any commercial nuclear reactors, even though its efforts of acquiring one date back to 1956.

Turkey's quest for nuclear energy has failed thus far for a number of political, diplomatic and economic reasons. Nevertheless, it resulted in the establishment of institutions and legal frameworks which would be supportive of recent plans to build Akkuyu and Sinop nuclear power plants. The establishment of the Turkish Atomic Energy Authority (TAEK) in 1956 was a significant breakthrough that would result in the educating of energy experts with specialization in nuclear energy technology. It should however be underlined that Turkey's nuclear capabilities have been consistently stalled at the research and development stage. Turkey conducted sophisticated nuclear fuel cycle research at the Çekmece Nuclear Research and Training Centre (CNRTC) near İstanbul and also at İstanbul Technical University. Ankara today only possesses a small research reactor, known as TR-2 with 5MWt nominal power, which is located at the CNRTC.¹¹ Even though the researchers in Turkey are familiar with the Purex process for separating plutonium from spent fuel, Ankara has made it clear that they are not interested in opting for either uranium enrichment or reprocessing capabilities from the nuclear power reactors planned for the future. Consequently, the CNRTC has remained as a small nuclear fuel fabrication pilot plant.¹²

Turkey's commitment to building nuclear power plants has been characterized by its urgent need for primary resources to secure the incessant growth in domestic consumption. Every failure, within this process, has taken place with the growing share of fossil fuels in industrial, commercial, and individual consumption as well as in electricity generation.

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The first formal civilian nuclear-energy program was launched in 1968 as part of a five-year national development plan. The project was shelved shortly after due to a lack of funds. Nearly fifteen years later, in 1983, Prime Minister Turgut Özal revived the project to build a 600MWe nuclear power plant at Akkuyu Bay. However, this project would also fail because of similar recurring technical and financial problems that faced Turkey at the time (high inflation, budget deficits, increasing international debts and instability of macroeconomic

parameters). It was in the late 1990s, when Turkey confronted the risk of energy shortages or a boost in imports of fossil fuels that it decided to revitalize its nuclear energy agenda. In turn the government acknowledged the urgent need for nuclear energy to fuel the expected economic growth. Turkey initiated a comprehensive nuclear-energy program, and hence invited bids for the construction of a power plant at Akkuyu.¹³ It was not until the start of 2000 that Ankara received various bids for its Akkuyu nuclear plant project but again because of recurring financial difficulties Turkey had to stop and postpone its nuclear project until 2008. The period after that differed from previous attempts. Turkey not only ended hyperinflation, it also managed to construct a reliable macro-economic environment with manageable international debts compared with other epochs of its nuclear initiatives. This was predominantly due to the rule of one party whose investment projects would be less vulnerable to political and economic dynamics, with the partial exception of negative consequences of the Syrian civil war.

The Akkuyu Nuclear Power Plant Project

The AK Party government first announced in 2006 that it was planning

to build three nuclear power reactors in Akkuyu reaching a total capacity of 4500 MWe, to become operational by 2012-15. Ankara made public that the port city of Sinop on the Black Sea was chosen to be the host of Turkey's second commercial nuclear reactor. While the government in Turkey was busy with issuing license procedures, in November 2007, a new law that was associated with the Construction and Operation of Nuclear Power Plants and Sale of Energy produced by them was passed by the Turkish parliament and subsequently approved by the president. This new bill authorized TAEK the right to set the criteria for building and operating the plants. Under this bill the Turkish Electricity Trade and Contract Corporation (TETAŞ) was authorized to buy all the power under a 15-year contract¹⁴. These newly published regulations have helped the determination of criteria for investors who are ready to construct and operate nuclear power plants in Turkey. IAEA safety rules were also made compulsory to be applied along with the ongoing legal processes. Additionally, a civil nuclear cooperation agreement between Ankara and Washington, signed in May 2008, has also entered into force.¹⁵

Turkey had to wait until 2008 to find a new way of transcending the financial burden of opening up new bids for the

Akkuyu power plant. Ankara previously has, in its attempt to initiate a nuclear-reactor project, several times faced the difficulty of providing the financial means and so has been obliged to shelve the project. Turkey first proposed 100 percent vendor financing in 1977, but could not succeed in codifying this approach into law until 1983. Prime Minister Turgut Özal introduced a new kind of financing arrangement for the nuclear power plant by securing the much-needed foreign direct investment without spending the limited capital of the country. The Build, Operate and Own (BOO) model is in fact an evolutionary financing approach to the Build, Operate and Transfer (BOT) financing model in itself. This BOT¹⁶ model, which the Turkish Prime Minister came up with in the early 1980s, became an inspiration for and brought the possibility of nuclear energy to many other developing countries.¹⁷ In this way Turkey solved the problem of finding investment for the Akkuyu project and in the aftermath of the introduction of new Law No: 3096. TETAŞ finally called for tenders. Soon after, in 2008, the Ankara government went on to pass another nuclear Law called Law No: 5710,¹⁸ which helped TETAŞ oversee the bidding process and select the most competitive contender. At the end of this bidding process, which included

14 interested bodies, only one bid, by Atomstroyexport in conjunction with Inter RAO (both from the Russian Federation) and Park Teknik (Turkey) was received/acknowledged for an AED-2006 power plant with four 1200 MWe reactors.¹⁹

Turkey, from the very inception of its bid for the Akkuyu power plant, has insisted on deferring the financing issue to the vendor. At the same time, Ankara has made it clear that they do not want to store the nuclear waste either. Therefore, from the perspective of nuclear non-proliferation, the Akkuyu BOO model itself can be considered as a non-proliferation proof plant similar to the gold standard of the UAE's nuclear project, since Ankara has already let suppliers know that it wants potential vendors to take back the spent fuel that would otherwise increase doubts about whether further technical processes could be used to develop nuclear weapons. This is clear evidence that demonstrates how Ankara does not have any plans, nor will in the future, for the reprocessing process at the Akkuyu project.

Technically speaking, most nuclear countries do not want to take back the waste fuel. Instead they prefer it to be stored in the host country. That is why, because of the general lack of interest from the majority of nuclear tender

companies- either because of the financing issue or take-back condition of spent-fuel- it soon became clear that most companies preferred to abstain from the bidding process. For instance, Westinghouse, in this regard, expressed that it had no interest in the bid and AECL insisted that Turkey should put money into the financing of the project. Eventually, on 10th of April 2008 only four companies decided to purchase the tender documents and at the end of the bidding process it became evident that only one firm, Russia's Atomstroyexport (ASE) in partnership with Ciner Holding, had opted to submit a bid for the tender. TAEK, after reviewing the Russian proposal in December 2008, approved it. However, since the price of electricity per kilowatt-hour was found to be a bit high, the Turkish government then focused on means of assuring that the Russian firm reached a rational electricity unit price. In fact, the Energy Minister at the time, Mr. Taner Yıldız, made clear in late September 2009 that the two sides needed to come to an agreement on a reasonable price. These efforts by Turkey finally succeeded and the Russians agreed to drop their previous bid of 21.16 US cents per kilowatt-hour (US cts/kWh) to 12.35 US cts/kWh. This paved the way for Ankara and Moscow to reach an agreement for Rosatom to build,

operate and own VVER-1200 nuclear reactors at the Akkuyu site.²⁰

According to the BOO deal on the Akkuyu power plant, TETAŞ would buy a fixed proportion of the power at a fixed price of 12.35 US cts/kWh for 15 years or until 2030. The proportion would be 70 % of the output of the first two units and 30 % of that from units 3 and 4 for 15 years of commercial operation of each. Hence, the remainder of the power would be sold by the project company at market prices. In addition, since the cost of building the plant was expected to be paid off after 15 years, the project company was then expected to pay 20 % of the profits to the Turkish government.²¹

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Some debates in the media and concerns of public opinion have come into the fore about the Akkuyu plant deal following its being ratified at the Russian and Turkish parliaments. They concentrated on whether or not the

BOO agreement brings any advantages for Turkey. Consequences of the civil war in Syria, that started to increase their negative impact on Turkey and Turkey's relations with third parties, would make the nuclear deal between Russia and Turkey confront important political issues related to the developments in Syria. The downing of the Russian jet on 24 November 2015 by Turkey can be exemplified as having had the greatest impact. Bilateral relations between Russia and Turkey would be suspended for about seven months between Ankara and Moscow. Russia declared economic sanctions against Turkey. It was not clear whether or not the sanctions, imposed by Russia on Ankara following the jet incidence, would negatively affect the Akkuyu project. However, it soon became clear that Russia had no such plans to include the Akkuyu project in the content of the various sanctions that were forwarded to Turkey. In short, Turkey's energy relations with Russia were not affected by the jet incident although extensive sanctions hampered Turkey's economic revenues in non-energy sectors. The timetable concerning the construction phases of the Akkuyu nuclear power plant would stay behind the schedule not due to political factors, but because of, allegedly, the expressed difficulty of Russia and Russian firms to secure a financial scheme due to international

sanctions against Russia following its rising problems with Ukraine, the European Union and the USA on the Crimea issue.

Operational delays in the project were in fact mostly associated with Russia's and Rosatom's difficulty of raising loans from the commercial banks: a result of the rapid drawdown of capital in the Russian Reserve Fund from previous years. Moscow and Ankara searched for alternative means of finance that were needed for the Akkuyu plant. Russia and Turkey agreed in August 2016 to give Akkuyu a "strategic investment status."²² With this new assigned status, it was expected that there would be special terms and conditions facilitating effective and rapid engagement of financial institutions and authorities within the investment funding of the project.²³ The other crucial impediment that stopped either side from terminating or denouncing the Akkuyu BOO agreement during the time of the "jet crisis" was associated with the fact that neither side wanted to take the risk of becoming exposed to sizeable compensation requests emanating from the conditions of the deal.²⁴ The BOO model and its likely success was crucial for Turkey's energy diversification objectives that have been made clear in Ankara's energy supply security strategic plans. On the other hand, the successful completion

of the Akkuyu plant was also essential for Russia, especially for assuring and increasing the credibility of Moscow's nuclear reactors within the existing competitive reactor market conditions, and to sustain beneficiary relations with Turkey with whom it shared occasional, yet vital, disagreements on the Syrian civil war.

Turkey's occasional problems with Russia, along with significant incidents most of which were somehow linked with the Syrian issue, raised further doubts about Turkey's increasing dependence on Russia for its energy supply security.

The public and political critiques emphasized that Turkey's extreme dependence on Russia would be even further exacerbated by the nuclear deal since Ankara was only diversifying the source but not the supplier. This approach has validity when the nuclear agreement is considered along with Turkey's fossil fuel imports from Russia. Although Turkey is the most dependent country on Russian gas in terms of electricity generation, the nuclear deal on its own seems to differ from this general picture. The characteristics of the BOO model make both Russia and Ankara mutually dependent on each another. Again, if Turkey's nuclear energy sector initiative is analyzed with no reference to its

high dependence on fossil fuel imports from Russia, other projects promise to balance Russia's role in nuclear power generation for Turkey. Turkey's choice of a Japanese-French consortium for the second nuclear power plant in Sinop supports this argument. Another counter argument against the public concern over Turkey's increasing dependence on Russia is about the unique characteristics of the nuclear energy sector, which show a minimal interaction with issues other than nuclear. Russia attributes a strategic importance to expanding the geography on which it is building nuclear power plants. In turn, Russia has become the leader of the US\$ 500 billion global nuclear energy market by attempting to build 37 % of all new reactors in the world.²⁵ In actuality, the Kremlin's new strategy goes back to 2006, when Russia first resolved to become one of the top suppliers of the global nuclear energy industry. Strategically, Russia would not be interested in damaging energy relations with countries that import its technology. As for technology, in 2006 Russian nuclear companies introduced a new edition of the VVER nuclear reactor that can generate power and desalinate water at the same time,²⁶ which has appealed especially to customers that are in water-stressed countries.²⁷ The marketing success of this technology is likely to be linked

to Russia's ability to establish reliable relations in the nuclear power sector. Rosatom is not only aware of this necessity but also very careful about offering the necessary service to maintain and manage processes within and outside of the nuclear chain, for which most of the importer countries lack the skill and know-how, as in the case of Turkey. Furthermore, the attractiveness of Moscow's nuclear reactor industry, in terms of confidence building, stems from Rosatom's new marketing method, which is called the BOO service, wherein Russia provides uranium fuel, manages the reactors, and disposes of the nuclear waste in different parts of the world. This Russian BOO service is appealing to energy hungry and dependent countries, as it cuts out many of the difficulties involved in attaining a nuclear reactor thus helping them to reach their objective faster and relatively easily. In fact, these features are those that a country would look for while building its first nuclear power plant. In short, it is not only about political relations between Russia and Turkey or Turkey's increasing dependence on Russia and Russian technology, but also about the terms of the Russian BOO model, which fits with Ankara's concerns and demands in this regard since support for production and post-production phases are crucial factors.²⁸

The Sinop Nuclear Power Plant Project

Turkey plans to construct a second nuclear power plant in Sinop, in the northern part of the country, by the Black Sea coast. Japan's Prime Minister Abe and Turkish President Erdoğan, with the aim of assuring parties tracking the international standoff at that time between the West and Iran over its suspected nuclear arms, found it necessary in 2013 to sign a deal covering the peaceful use of atomic energy. In doing so they made it clear that the intention of building a reactor in Sinop had nothing to do with proliferation objectives, rather it was purely associated with Ankara's overall diversification efforts of its current energy mix so that Turkey could reduce its energy dependence on sources from abroad.²⁹

The Sinop nuclear power plant project is a very important project not just for Turkey but also for "Mitsubishi Heavy Industries" MHI because it will be introducing the most advanced, latest, and safest technology, as noted by the CEO of Mitsubishi Heavy Industries MHI.

In 2015 the Turkish Parliament ratified an intergovernmental agreement with Japan to construct a nuclear power plant at Sinop-Inceburun.³⁰ The legal terms of the Sinop nuclear power plant fundamentally differ from the Akkuyu project since it will be operated on a Build-Operate-Transfer (BOT) basis. Atmea, a joint venture consortium of Japanese Mitsubishi Heavy Industries and French Areva, will carry out the project.

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new reactor in Sinop, "even in a severe accident, there will be no need for long-term relocation of people in the proximity of the plant."³²

Where Does Turkey Stand in the Face of the Debate on Proliferation?

Civilian nuclear programs, under the umbrella of the NPT, entail the possibility of covertly attaining nuclear military capability. A country with a nuclear power plant might be able to develop and so own nuclear weapons by either using uranium enrichment or spent fuel reprocessing if it acquires the technology. In fact, that is exactly how North Korea acquired nuclear weapons, thus increasing the concerns of the international community on the link between nuclear energy and nuclear weapons. In this respect, the likelihood of the Iranian civil energy program leading to a military nuclear capability has been slightly stalled by the signature of the Joint Comprehensive Plan of Action (JCPA) treaty in July 2015.

Even before the signature of the Iranian nuclear deal between Tehran and the P5+1, speculation began that some states in the Middle East might have felt obliged to pursue a nuclear program because of Iran's newly gained status. However, immediately following

the signature of the JCPOA, a number of eminent nuclear experts expressed their belief that this was not going to be the case. According to these experts,³³ international doubts on the likelihood of nuclear proliferation were outcomes of overestimation, since most of the countries in the Middle East had serious constraints and limitations to becoming a nuclear power. Some other experts,³⁴ however, pointed out that the quest for nuclear power plants had the very potential to trigger a nuclear weapons cascade in the region, and in turn they immediately called for limiting the spread of civilian nuclear power plants in the Middle East. Legally, the NPT has no prohibition on non-nuclear countries that are interested in development of a domestic nuclear fuel cycle. Technologically speaking, to acquire a domestic fuel cycle does not appear as an attainable goal unless a nuclear power supports them. As Dina Esfandiary asserts, the development of a nuclear bomb is not an easy task even for those countries which have nuclear power plants, since it necessitates further technological knowledge and equipment.³⁵ In this regard Esfandiary reminds us that it took nearly six years for the US to attain nuclear power despite Washington's vast resources and advanced know-how,³⁶ whereas it took China roughly 10 years and two decades for Pakistan.³⁷ As was mentioned

earlier, a country that aims to develop a nuclear bomb has either to go through the uranium enrichment process or will try to extract plutonium from the used waste fuel. Yet, as Esfandiary³⁸ and other experts believe, since both of these processes involve complicated technologies that are certainly subject to strict international controls, it is not easy to achieve. Hence, the aspirant countries for nuclear energy, by being signatories to the NPT and members of the non-proliferation community, have already agreed to forego the enrichment or reprocessing process and put their civilian nuclear programs under strict controls. Those who have enough financial means to overcome these technical constraints will definitely face political constraints as long as they pursue illicit ways of acquiring military nuclear capability. Thus, after examining the above-mentioned status of the aspirant states for nuclear reactors, one can easily repudiate the debate that states like Saudi Arabia, Egypt or Turkey may feel the need to "go nuclear" due to the newly attained position of Tehran in the aftermath of the JCPOA deal- namely Tehran's legitimate right for 3.65 % of uranium enrichment.

After having explained why experts in general do not expect a new wave of nuclear cascade in the aftermath of the Iranian nuclear deal in the Middle

East, it would be very beneficial to explain at this point Turkey's choices of nuclear power plants and how they are compliant with the aims of nuclear non-proliferation objectives. This situation of course stems from Ankara's transparent non-proliferation record where Turkey up to now has signed all the crucial international agreements that are related to and compatible with regional and global nuclear aims of the non-proliferation community.

Turkey has proven full commitment to the necessities of the NPT since 1979, being a member of the IAEA since 1957. It furthermore has supported all non-proliferation initiatives regardless of the political concerns. In turn, Turkey not only signed and ratified the international agreements but became one of the actors that pursued the full commitment of the parties so as to avoid nuclear weapon proliferation.

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Ankara's trajectory can be followed from the legal milestones signed and ratified by the governments at the time:

- (i) In 1981 acceptance of the IAEA Comprehensive Safeguards Agreement;
- (ii) in 2001 acceptance of the IAEA Additional Program to its Safeguards program;
- (iii) in 1986 acceptance of the IAEA Convention on the Physical Protection of Nuclear Material;
- (iv) in 2000 acceptance of the UN Comprehensive Test Ban Treaty;
- (v) acceptance of the Convention on Early Notification of a Nuclear Accident;
- (vi) in 1995 acceptance of the Convention on Nuclear Safety, and finally;
- (vii) in 2009 acceptance and signing of the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Management.³⁹

In addition to these multilateral agreements at the international level, Turkey engaged in bilateral agreements with the purpose of sustaining reliable management of power plants and avoiding proliferation of nuclear weapons. To this end, Turkey signed a technical agreement in place with Ukraine and early notification agreements in place with Bulgaria, Russia, and Romania. In addition to these countries that had nuclear power plants in its vicinity, Turkey engaged in cooperation and agreements with countries further afield- signing various

bilateral agreements with Canada, Argentina, South Korea, the United States, Ukraine, Russia, France, Jordan and Germany.⁴⁰ Ankara, since the beginning of its first attempt to obtain a nuclear reactor and later during its renewed quest for nuclear power plants, cooperated with international institutions especially throughout the policy development and legal processes. Turkey, within this perspective, has given its utmost attention to working and cooperating with the IAEA and the OECD's Nuclear Energy Agency. Turkey's full commitment to international standards and agreements can be summarized with reference to a remark made by the Turkish ambassador to the United Nations, Tomur Bayer. "Bayer [made a pledge that was witnessed back] in September 2010 [where he] said Turkey [would be] committed to the goal of ensuring safe, secure and peaceful utilization of nuclear energy and would continue to work closely with the IAEA [is clearly meant to recognize and acknowledge Ankara's path to civilian nuclear energy]".⁴¹ This remark still continues to reflect Turkey's priorities of acquiring nuclear power plants as in the cases of Akkuyu as well as Sinop.

Turkey, when pursuing the two nuclear power plants at Akkuyu-Mersin and Sinop, made clear that it was not planning to use either enrichment or

reprocessing processes at these projects. Since the Akkuyu project is based on the BOO model, Ankara would in no way be able to conduct either uranium enrichment or reprocessing processes at the plant. This legal requirement was added by Turkey to assure the international community about transparency on the one hand and a call on other countries at different phases of their nuclear energy programs to follow the example of BOOs terms at Akkuyu or agree with additional commitments made by Turkey as in the BOT model at Sinop. Regarding the BOT model of the Sinop Power Plant, Ankara accepted to store the spent fuel at the end of the nuclear process, and yet declared that this would be subject to full transparency to increase safeguards on the one hand and avoid any reprocessing process on the other. This does not mean however that Turkey- as with other non-nuclear NPT countries--is withdrawing from its right of maintaining all potential fuel cycle technological opportunities.⁴² Turkey underlined that the re-use of waste from the Sinop Power Plant would be treated as a matter of cost reduction and safety management rather than for military purposes.

After Turkey signed an agreement with Russia to build its first NPP this decision was criticized by environmentalists and some nuclear experts on the grounds

that Russian technology is old and has safety concerns. After the meltdown of the Japanese Fukushima reactor there was an increase in opposition to the plan. However, Ankara is quite confident about its first NPP nuclear safety standards especially since it has implemented its stress test activities based on European Nuclear Safety Regulators Group (ENSREG) specifications and preliminary design information provided by the utility.

Conclusion

Turkey is in need of nuclear power plants because of its growing energy demand, lack of domestic fossil fuels, high reliance on energy imports, and plans to decrease carbon emissions.

Turkey is in need of nuclear power plants because of its growing energy demand, lack of domestic fossil fuels, high reliance on energy imports, and plans to decrease carbon emissions.

Turkey, as a non-nuclear member of the NPT, has been attempting to construct nuclear power plants in accordance with international non-

proliferation frameworks to which it is a party. Turkey's full commitment to international bilateral agreements, with other states and international institutions and organizations, characterize the general framework of its nuclear power plant projects to be constructed in Akkuyu and Sinop. Despite their similarities, in terms of full commitment to international transparency and safety measures, there are certain differences between the Akkuyu and Sinop nuclear power plants because of different counterparts (Russia in Akkuyu, a Japanese-French consortium in Sinop) and different legal terms (BOO in Akkuyu, BOT in Sinop). Differences between these two projects are primarily in economic and managerial terms. The most significant difference arises from the peculiarities of the BOO model of Akkuyu and the BOT model of the Sinop Power Plant. Turkey, according to the BOO model of Akkuyu, will not store the used fuel. The BOT model of Sinop, in the meantime, obliges Turkey to take care of the used fuel for which the government voluntarily adopted full transparency safeguards. Both of the cases proved important compatibility with Turkey's international agreements at the state, institutional and organizational levels to sustain transparency and international auditing for peaceful and safe management of nuclear

power plants. These terms arising from nuclear power plant agreements and Turkey's international commitments are significant since it seems likely for Turkey to launch a third nuclear power plant project to be constructed in İğneada in Kırklareli province on the Black Sea. It is likely for Turkey to sustain transparency and reliability from this general framework regardless of the BOO, BOT or a third model to be adopted if this project comes to fruition.

As to the political and financial climate, Turkey, with its transparent and perfect non-proliferation record, and its modest built-up capacity in the nuclear sector, is able to operate research reactors with a pool of nuclear professionals and newly launched nuclear education programs.

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with a pool of nuclear professionals and newly launched nuclear education programs. Together with a determined political commitment it is now trying to adapt itself to the existing/present civilian nuclear energy realm by arranging and making its legal framework and institutional infrastructure compatible with this objective.⁴³ Ankara in this regard, has been adopting new regulations since 2010 to shift from a private investment model for nuclear generation to a public-private-partnership model. In effect, Turkey has been trying to minimize the government's financial risks by targeting state-to-state cooperation for the construction and operation of nuclear facilities, thus overcoming what used to be one of the crucial impediments in Ankara's quest for nuclear power.

Today, after having experienced a short stalemate in the Akkuyu project in 2015-2016, with the positive effect of newly reset Turkish-Russian relations, Turkey is confidently expecting to have the reactor units online in Akkuyu by 2023. Success in this first project would give Ankara a leverage for the completion of the second and possibly third civilian nuclear power plants.

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