

Akkuyu Nuclear Power Plant from the Perspective of Energy Security: A Solution or a Deadlock?

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Besides its lack of resources, Turkey's main problem in terms of energy security is its import dependency. Turkey is heavily dependent on imported fossil fuels, and natural gas is the most critical one among them. Natural gas has the largest share in Turkey's energy mix; 55% of Turkey's natural gas needs is met by Russia, which leads to interdependency between these parties in the energy domain. Turkey therefore is seeking ways to diversify its energy supplies. As part of such a search, Turkey initiated its nuclear expansion and started building a nuclear plant in Akkuyu, Mersin. Yet, Turkey's reliance on Russia in the construction and operation of the power plant has the potential of leading Turkey into a further stalemate in terms of energy dependency. This is because, Akkuyu Nuclear Power Plant will allow Russia to become more powerful within the scope of this interdependent relation with Turkey, which gives rise to serious geopolitical and geo-economical risks. This paper studies the implication of this dependency relationship on Turkey's energy security and argues that a nuclear power plant built by Russia in Akkuyu will be disadvantageous for Turkey. The paper also examines Akkuyu's possible effects on Turkey's natural gas dependency.



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Introduction

Although nearly all of Turkey's neighbors are self-sufficient when it comes to energy resources, Turkey's domestic resources are insufficient for its energy requirements. Thus Turkey, as a net energy-importing country, faces various dependency problems in terms of energy security. Moreover, Turkey's primarily reliance on imported fossil fuels in energy production and its "single source, single supplier, and single transfer method"

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policy further undermines its energy security. Turkey's use of fossil fuels in energy production gives rise to two specific problems. The first is the need for resource diversification, in order to overcome dependency on the single source/country/method. Secondly, given Turkey's ambition of becoming an "energy hub" in the region, this level of dependency means that Turkey cannot benefit from its geopolitical position. In this regard, projects such as the Akkuyu Nuclear Power Plant are considered to offer a means of overcoming all the above mentioned difficulties and dependencies.¹ As this paper argues, however, Turkey's cooperation with Russia in its nuclear endeavors will increase dependency on Russia in terms of energy. This paper, accordingly, analyzes the potential consequences of focusing on nuclear energy and of cooperating with Russia to do so.

Interdependency in energy relations

From the perspective of stability and reputation, possessing energy sources, which are considered to be among the national power elements², is of great significance for sovereign states. Energy exporters and importers have interdependent relations; in order to ensure their energy security, these countries benefit from the tools of energy diplomacy. The main framework of energy security is based on the policy of diversification, and importing and exporting countries follow these policies in order to balance their dependency levels. Ensuring an uninterrupted domestic energy supply is the common objective of both parties. For various reasons, the countries having difficulties in finding alternative source or market would be highly affected from any interruption of energy flow.

1 For an analysis of Turkey's nuclear energy initiatives such as Akkuyu and Sinop Nuclear Plants, see Telli, A. (2016) 'Content Analysis of Turkey's Nuclear Energy Initiative: Diversification or Submission?', *Bilge Strateji*, Spring, 8(14), pp. 19-36.

2 Hans, M. (1985) *Politics Among Nations. The Struggle for Power and Peace*. New York: McGraw Hill, pp. 85-86.

Rather than the unrealistic concept of *dependency*, which entails absolute dominance by one country over another, the concept of *interdependency* is of greater use in explaining the real relationship between countries. As a general definition, the concept of “interdependency” can be defined as mutual dependence.³ However, in an interdependent relationship, symmetrical dependency – wherein the parties have equal power or sufficient power to balance one another – is usually the exception. Usually there is an asymmetrical dependency, where one of the parties is more dependent than the other one.⁴ In the course of historical relations between Russia and Turkey, conflict seems to be the general rule, while the cooperation seems to be an exception. At this point, energy is an important bilateral issue, and it has led to cooperation between two parties that have generally been embroiled in serious geopolitical conflicts. Energy cooperation between Turkey and Russia represents asymmetric interdependency, and the continuity of energy flow is very important for the interests of both of parties. The interdependency relation between these countries is not *zero-sum*; interrupting the energy flow through natural or artificial interventions will come at a cost for both parties. Turkey, however, is more fragile because it is more sensitive and vulnerable from this perspective. Turkey’s level of dependency on Russian gas (55%) and its existing infrastructure, which does not allow for significant LNG imports or for another alternative in the short-term, are serious limitations on Turkish energy security. Turkey is the second biggest importer of Russian gas, after Germany. This interdependency relationship between Turkey and Russia would influence both parties in the event of a possible crisis. From the perspective of Russia, whose economy is based on energy revenues, stopping the gas flow to Turkey would both damage Russia’s international image as a reliable supplier country as well as reducing income, depending on the depth of crisis. However, the consequences would be more severe for Turkey, as the importer. In addition to its overdependence on Russian gas, Turkey is more vulnerable to any interruption in gas flow because of its low storage capacity and LNG infrastructure. For Turkey, as the vulnerable party in the asymmetric dependency relationship, a crucial step in strengthening supply security is reducing dependency on Russian energy sources via diversification.

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3 Nye, J. S. and Welch, D. A. (2011) *Understanding Global Conflict and Cooperation: An Introduction to Theory and History*. USA: Pearson, pp. 270-271.

4 Ibid, p. 288.

Turkey's energy mix and the problem of over-dependency on import

Even though Turkey's domestic oil and natural gas reserves seem to be limited, 72.7% of the proven oil reserves on earth and 71.8% of natural gas reserves are located in its vicinity.⁵ Turkey is capable of acting as a bridge between energy exporting and energy importing countries based on its geopolitical advantage, due to its proximity to Russia (which has 25% of the world's oil and natural gas reserves), the Caspian Basin, and the Middle East.⁶ Turkey is the eighteenth largest economy in the world with a GDP of 1.596 trillion USD and population of 79.414 million.⁷ In total, 38.6% Turkey's energy requirements are met from solid fuels, 32.5% from natural gas, 26.2% from oil, and 5% from the renewable energy sources. Turkey imports 73% of its energy: 98% of natural gas; 90% of oil; 43% of coal needs.⁸

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Of the OECD countries, Turkey's energy demand is among the fastest growing. After China, Turkey is the second biggest economy in terms of its rapidly growing demand for electricity and natural gas. Projections show that this trend will continue in the medium term.⁹ Turkey's main challenges in terms of energy security are its high import dependency, low energy efficiency, lack of investments, and poor reliability of suppliers.¹⁰

Double dependency: Threat to natural gas and diversification

Compared with natural gas, Turkey is in a stronger position when it comes to crude oil and coal. One of the Turkey's energy policy priorities is to achieve resource diversification in its natural gas agreements. Double dependency is also challenge to natural gas energy supply security. Turkey started to use natural gas in 1987,

5 Republic of Turkey Ministry of Foreign Affairs (2016) *Turkey's Energy Profile and Strategy*. Available at <http://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa> (Accessed: 20 July 2016).

6 Saygın, H. and Celik, C. (2011) *Jeoenerjik Bakış AB Bağlamında Jeoenerji Politikalarında Jeo-Enerji Alanları*. Istanbul: Istanbul Aydın University Publishings, p. 141.

7 CIA (2016) *The World Factbook-Turkey*. Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/tu.html>, (Accessed 06 January 2016).

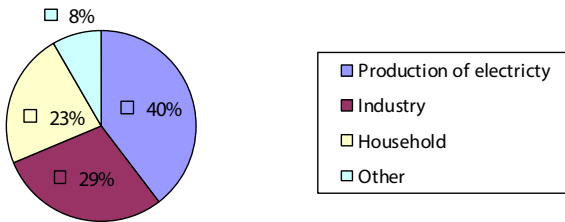
8 Union of Chambers of Turkish Engineers and Architect (February 2015) *The Outlook of Turkey's Energy in January 2015*, Bulletin, No: 200 (Special Issue), p. 2.

9 Republic of Turkey Ministry of Energy and Natural Resources (2009) *Activity Report of 2009*. Available at: http://www.enerji.gov.tr/yayinlar_raporlar/2009_faaliyet_raporu.pdf (Accessed: 10 June 2013).

10 Balat, M. (2010) 'Security of energy supply in Turkey: Challenges and solutions', *Energy Conversion and Management*, 51, p. 2002; Pehlivanoglu, F. and Tekce, E. (Fall 2013) 'The Analysis of Concentration on Electricity Energy Market in Turkey with Herfindahl-Hirschman and CRm Index', *AIBU Sosyal Bilimler Enstitüsü Dergisi*, 13 (2), p. 367.

and while its consumption increased by 87.75% over the next 15 years, production levels remained the same.¹¹ Since Turkey is in a position of over-dependency in relation to trade-based long-term pipeline agreements and a single supplier country, the country aims to ensure the diversification in terms of long-term agreements, transfer methods, and multiple suppliers.

The distribution of Turkey's natural gas demand by sector (2014)



Source: Republic of Turkey Energy Market Regulatory (EMRA-2015) *Natural Gas Market 2015 Industry Report*. <http://epdk.gov.tr/TR/Dokumanlar/Dogalgaz/YayinlarRaporlar/Yillik>.

In addition to energy consumption, natural gas also ranks top in Turkey's electricity production. Compared with other European countries, Turkey has a high level of dependency on natural gas imports, in addition to its leading position in terms of dependency on natural gas in electricity production.¹² Turkey imports 55% of its natural gas from Russia, which poses a significant risk in terms of energy security. Considering that European Commission determined the critical value for non-EU countries to be 30 percent, Turkey's dependency on Russia is clearly very high.¹³ Any interruption or reduction in the energy flow between Turkey and Russia, which could arise from a political crisis, technical problem, or natural disaster, would significantly affect the daily life in Turkey depending on the seasonal conditions. For this reason, resource diversification must be accomplished, and nuclear energy, renewable energy and enhancing usage of native coal are

11 IEA (2013) *Turkey Oil and Gas Security Emergency Response of IEA Countries*. Available at: https://www.iea.org/publications/freepublications/publication/2013_Turkey_Country_Chapterfinal_with_last_page.pdf (Accessed: 11 January 2016).

12 Acar, O. (2013) *Doğal gaz tüketimi artıyor, depolama kapasitesi yerinde sayıyor*. Available at: http://www.tepav.org.tr/upload/files/1387547496-0.Dogalgaz_tuketimi_artiyor_depolama_kapasitesi_yerinde_sayiyor.pdf (Accessed: 14 May 2016).

13 Iseri, E. and Ozen, C. (2012) 'Sustainability and Turkey's Nuclear Energy Policy', *Istanbul University Faculty of Political Science Journal*, 47, p. 169.

some of the alternatives. The Adalet ve Kalkınma Partisi (AKP, Justice and Development Party) government has prioritized the nuclear energy among these alternatives, and aims to build three nuclear power plants.

Nuclear energy has several advantages in comparison to renewable energy. This type of energy can be considered as alternative or subsidiary to renewable energy, because renewable energy sources cannot work 24/7 due to seasonal conditions. By contrast, nuclear plants, which have base load plant qualification, can work constantly. Moreover, it is necessary to achieve the resource diversification among renewable energy sources, because the number of windy and rainy days depends on the climate, while solar energy is available only during the day. Nuclear energy plants have a significant advantage over renewable energy sources in terms of working hours as they have capacity to work 8000 hours in a year, excluding maintenance periods.¹⁴ However, in addition to environmental damage and dependence on energy import, there also are key risks such as vulnerability to terrorist attacks, earthquakes, political and economic instabilities, nuclear accidents, and the selection of new generation reactors, which have not been tried yet. Furthermore, there also some serious problems with nuclear waste storage and removal safely.

Russian hegemony in Turkey's energy mix

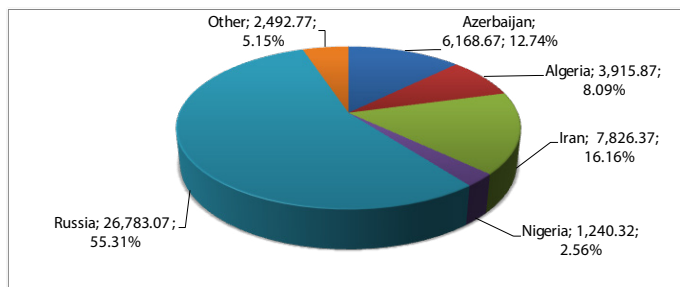
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Russia supplies 55% of Turkey's natural gas consumption, making Turkey the second biggest importer of Russian gas after Germany. The gas is transported from Russia to Turkey via two different pipelines: the Trans Balkan Pipeline (Western Line) and Blue Stream. Western Line supplies natural gas to the industrialized and populous Marmara region, while Blue Stream supplies the Anatolian region. These two pipelines should also be evaluated separately in terms of the energy security. Since Blue Stream provides natural gas exclusively and directly to Turkey, it is a more secure pipeline with regard to the possible problems in transit countries. In addition, since this pipeline supplies natural gas to less populous and industrialized areas, the potential consequences of supply interruption/reduction are less serious. On the other hand, because Western Line supplies natural gas to the populous and industrialized Marmara Region, Turkey is more vulnerable to

¹⁴ Ministry of Energy and Natural Resources (MNRE) Nuclear Energy Project Implementation Department (March 2013) *Nuclear Power Program and NPP Projects in Turkey* Report No. 2. Available at http://www.enerji.gov.tr/File/?path=ROOT%2F1%2FDocuments%2FSayfalar%2FNucl eer_Guc_Santralleri_ve_Turkiye.pdf (Accessed: 15 January 2015).

possible disruptions along this line.

The distribution of Turkish natural gas import (2015/ bcm)



Source: Republic of Turkey Energy Market Regulatory (EMRA-2015) *Natural Gas Market 2015 Industry Report*. <http://epdk.gov.tr/TR/Dokumanlar/Dogalgaz/YayinlarRaporlar/Yillik>.

When compared to EU countries, Turkey is the most vulnerable country to any gas supply reduction due to its limited gas storage capacity.¹⁵ The only alternative for the Marmara and Istanbul regions is LNG, as for such regions supplying gas from the eastern lines is not possible. However, Turkey's LNG capacity is insufficient to replace this line, which supplied 10 bcm³ of gas in 2014.

Western Line passes through Ukraine, Romania and Bulgaria to reach Turkey, and any problems in transit countries and other parties would seriously affect the gas transfer. On the other hand, Russian efforts to bypass Ukraine after the Ukraine crisis, which deepened following Russia's occupation of Crimea, have increased risks to Turkey in the short-term, while also creating certain opportunities for Ankara. The future of South Stream, Turkish Stream, and North Stream-2 projects, proposed by Russia in order to end transfer via Ukraine in autumn 2019, are vital for Turkish energy policies.¹⁶ In the context of the normalization of bilateral relations, the restoration of Turkish Stream is a key opportunity for Turkey. The realization of these four line projects is closely related to the future of North Stream-2.

In the context of the normalization of bilateral relations, the restoration of Turkish Stream is a key opportunity for Turkey.

Russia uses these three projects, which are closely related to EU energy security, as bargaining chips. Moscow has declared that it

¹⁵ Cetingulec, M. (2016) *What will Turkey do if Russia turns of gas?*

Available at: <http://www.al-monitor.com/pulse/originals/2014/09/turkey-russia-ukraine-european-union-natural-gas-tanap.html#> (Accessed: 11 January 2016).

¹⁶ Chow, E. C. (2016) *'Turkish Stream Redux'*. Available at: <https://www.csis.org/analysis/turkish-stream-redux> (Accessed: 11 August 2016).

is ready to reach an agreement with Turkey on Turkish Stream-1. If this line is realized, it is Turkey’s import route will change while the amount of imported gas will remain almost the same. Natural gas agreements are generally long-term ones, and this applies to almost all of Turkey’s natural gas agreements. Turkey, which has low level of spot LNG purchase, should consider its long-term commitments while pursuing resource diversification.

Table 1: Turkey’s Natural Gas Agreements

Current Agreement	Volume (During The Plateau Period) (Billion m ³ /year) (Using 9000 Kcal/m ³)	Date Of Agreement	Status	End Date
Algeria (LNG)	4.4	1988	In operation	October 2024
Nigeria (LNG)	1.3	1995	In operation	October 2021
Iran	9.6	1996	In operation	July 2026
Rus. Fed. (Black Sea)	16	1997	In operation	End of 2025
Rus. Fed. (West)	4	1998	In operation	End of 2021
Turkmenistan	15.6	1999	-	
Azerbaijan(Phase-I)	6.6	2001	In operation	April 2021
Azerbaijan(Phase-II)	6	2011	2018	2033
Azerbaijan(BIL)	0.15	2011	In operation	2046

Source: BOTAŞ (2016) *Natural Gas Sales and Purchases Agreement*. <http://www.botas.gov.tr/>

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Turkey imports 98% of its domestic natural gas consumption, and uses 38% of that for electricity production.¹⁷ Given the critical role of Russia in natural gas imports, it is evident that Turkey’s energy/electricity systems as well as its economy in general would be severely affected if Russia were to reduce gas supplies.¹⁸ The ratio of natural gas used in electricity production fell to under 40% following tensions between Turkey and Russia, which began to emerge in 2015 and aggravated after the with the “jet crisis” of October 2015. This deterioration in relations indicted the importance of the use of national sources and the energy efficiency, and was also an important signal for Turkey’s energy security. However, it is still too early to make a prediction regarding stability.

Turkey’s nuclear energy expansion

Turkey’s interest in nuclear energy began in 1970s,¹⁹ and the

17 Republic of Turkey Ministry of Foreign Affairs (2016) *Turkey’s Energy Profile and Strategy*. Available at <http://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa> (Accessed: 20 July 2016).

18 Pamir, N. (10 October 2015) *Katar, Türkiye’nin enerji sorununa çözüm mü?* Available at <http://www.dw.com/tr/katar-turkiye-nin-enerji-sorununa-%C3%A7%C3%B6z%C3%BCm-%C3%BC/a-18909704?maca=tr-Facebook-sharing> (Accessed: 04 January 2016).

19 Turkey’s interest in nuclear energy as a means of ensuring energy supply security can be traced back to the 1950s. The first steps towards using nuclear power for peaceful reasons were taken in 1955, and the steps to build first nuclear power plant were taken towards the end of 1970s. However, these steps have not been finalized due to political and economic reasons.

major acceleration of its nuclear energy expansion occurred in the 2010s. As a net energy importer, Turkey aims to build three nuclear plants, which have 15.000 megawatt (MW) capacity in total, by 2023. The necessary collaborations have been made for two of the planned projects, while the process of site selection and identification of contractor country/firm is ongoing for the third project. Although there are various criticisms of Turkey's nuclear energy expansion, the AKP government has remained steadfast in its commitment, repeatedly stating that nuclear energy is key to ensuring resource diversification and will help reduce import dependency.²⁰

Turkey aims to meet its increasing energy needs with maximum profit at minimum cost. Turkey's main objectives for nuclear energy expansions are listed below:²¹

- Ensuring diversification of source country and route;
- Increasing energy efficiency;
- Decreasing the energy intensity;
- Maximizing the use of national resources;
- Increasing the rate of renewable energy sources to 30 % (decreasing the rate of natural gas to 30 %) for electricity production by 2023.

Although there was a period of uncertainty regarding nuclear plants after the Fukushima disaster, there are 438 operational nuclear reactors in the world.²² Turkey is pursuing this avenue not only because nuclear technology is an important national power generator, but also because other countries in its region have nuclear energy plants.

The model that Turkey has chosen for its nuclear energy production is the first of its kind. While in the rest of the world, nuclear power plants are built based on turnkey contracts, Turkey has opted for the Build-Own-Operate (BOO) model. Under this model, the site will be provided for free in return for building the plants in Turkey; then the builder country operates the plants until their removal at the end of their lifecycle. This model entails

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20 Anadolu Agency Energy (01 January 2016) *Turkey needs nuclear energy: Turkish Minister*. Available at <http://aaenergyterminal.com/news.php?newsid=7195541> (Accessed: 04 January 2016).

21 MNRE (2011) *Information on Nuclear Plants and Nuclear Power Plants to Be Established in Our Country*, Report No. 1. Available at http://www.enerji.gov.tr/File/?path=ROOT%2F1%2FDocuments%2FBelge%2FNukleer_Santraller_ve_Ulkemizde_Kurulacak_Nukleer_Santrale_Iliskin_Bilgiler.pdf (Accessed: 15 February 2015).

22 IEA (2015) *Key Electricity Trends*, p. 4. Available at <https://www.iea.org/media/statistics/Keyelectricitytrends2015.pdf> (Accessed: 04 January 2016).

a smaller financial obligation for Turkey. However, on the other hand, it also has the risk of increasing costs depending on the foreign exchange rate, because commitments were given to guarantee the investment costs in US Dollars.

Turkey's nuclear objective and the Russia factor

Turkey's electricity demand is consistently rising, and the average annual increase during last 20 years has been 10.6%.²³ Despite criticism by environmentalists and other opponents of nuclear, nuclear energy is included in the energy mix in order to meet this increasing demand. The nuclear energy option was put back on the agenda in order to ensure resource diversification, because the dependency on natural gas and coal as imported resources for electricity production needs to be reduced. If nuclear energy makes up a greater proportion of Turkey's energy mix, then the country's carbon emissions will decrease. Nuclear energy seems to be a vital option in terms of balancing the risk of seasonal imbalances in natural gas supply, and then Turkey's dependency on natural gas for electricity production will drop to 50%.

Turkey has opted for the BOO model in order to accomplish its nuclear power objectives. It was projected that the commitment process might become easier, and Ankara preferred to reach an agreement without causing a competition. The political and economic uncertainties may cause delays in construction, already a lengthy process. A serious crisis in Turkey-Russia relations occurred in the last quarter of 2015. After Turkey's appeal to arbitration because of Russian intransigence in regard to a promised discount on natural gas price, as well as the jet crisis in November 2015, the Turkish Stream project, to which both countries attach great importance, was firstly diminished, and then cancelled. In addition to the termination of the Turkish Steam project, the risks of possible interruption in natural gas supplies forced Turkey to intensify its search for alternatives. However, finding an alternative to Russian gas is not possible in short-term due to technical reasons. Faced with the risks stemming from dependency on Russia in this critical context, the nuclear option acquired even greater importance. The crisis also affected the construction of the plants. Hence, after the declaration by Turkey that, "We do not have to work with Russia for Akkuyu"²⁴, it was claimed that

23 Benli, H. (2013) 'Potential of renewable energy in electrical energy production and sustainable energy development of Turkey: Performance and policies', *Renewable Energy*, 50, p. 45.

24 BloombergHT (08 October 2015) *Erdoğan: Akkuyu'yu Ruslar yapmazsa başkası yapar*. Available at <http://www.bloomberght.com/haberler/haber/1829066-erdogan-akkuyuyu-ruslar-yapmazsa-baskasi-yapar> (Accessed: 15 February 2016).

Russia would halt or cancel the project.²⁵

Table 2: Schedule for Akkuyu NPP (Nuclear Power Plant)

<i>Steps</i>	<i>Scheduled dates</i>
Construction License Application to TAEK	By 31 March 2015
Signing PPA	By the end of 2015
Obtaining Electricity Generation License from EMRA	By the end of 2015
Obtaining Construction License from TAEK	By the end of 2016
Starting the construction of first unit	The first months of 2016
Commissioning date of units	2020, 2021, 2022 and 2023

Source: Erturk, E. (November 2014) ‘Significant progress in nuclear power plant projects of Turkey’, *Energy IQ*, No. 2014-21/39, p. 2.

The construction of Akkuyu NPP project was scheduled to begin in 2015, but the field preparation work is still ongoing, and the bidding process for construction has not yet been started.²⁶ It seems unlikely that construction will begin in 2016, because the necessary license from the Turkish Atomic Energy Authority has not yet been obtained.²⁷

Turkey’s willingness to normalize relations with Russia accelerated after the attempted coup on July 15 2016. Because Turkey deemed the West’s response biased, it wanted to send them a message them by deepening ties with Russia.²⁸ Conformity on Akkuyu was reiterated by both presidents during bilateral meetings in that period. However, it is not expected that the project will be executed in accordance with the original schedule due to the political, economic, judicial, and especially financial problems.

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²⁵ Reuters (09 December 2015) UPDATE 1-Russia halts Turkey nuclear work, Ankara looks elsewhere. Available at <http://www.reuters.com/article/mideast-crisis-turkey-russia-nuclear-idUSL8N13Y31G20151209> (Accessed: 15 February 2016).

²⁶ Milliyet (01 June 2016) *Rusya: Akkuyu NGS inşaatı 2018’de başlayabilir*. Available at: <http://www.milliyet.com.tr/rusya-akkuyu-ngs-insaatı-2018-de/ekonomi/detay/2255375/default.htm> (Accessed: 16 August 2016).

²⁷ Available at <http://web.tbmm.gov.tr/gelenkagitlar/metinler/371425.pdf> (Accessed: 05 January 2016)

²⁸ Tattersall, N. and Winning, A. (06 August 2016) *As Turkey’s coup strains ties with West, detente with Russia gathers pace*. Available at <http://www.reuters.com/article/us-turkey-security-russia-idUSKCN10H05A> (Accessed: 15 August 2016).

Nuclear investments have become more vital for Russia, despite its financial problems; the economy has contracted due to sanctions after the Ukraine crisis, and declining oil prices.²⁹ While canceling the project does not seem to be rational for Russia, Turkey may well re-evaluate the situation before the construction begins, as Turkey will not be responsible for additional liability if the agreement is cancelled by consensus before construction begins.³⁰ Yet, if the project is cancelled during the construction phase or later, Turkey would be stuck in a difficult situation.³¹ Moreover, there is serious question at play here, namely that a new reactor type, the first of its kind, will be used in Akkuyu. This highlights the issue of the security of nuclear power plants.³² Like the rest of the world, Turkey faces uncertainties about transportation and storage of nuclear waste; there is no precise solution for the problem of storage of nuclear waste.³³

Akkuyu NPP from the perspective of the asymmetric interdependency relationship

Resource diversification features prominently among Russia's energy policy objectives. Russia tends towards the Asian market as an alternative to European market, preferring direct pipelines to by-pass transfer countries, and aims to balance its dependency on fossil fuels revenues via the export of nuclear technology and fuel. The Russian State Atomic Energy Corporation (Rosatom) has 29 NP project abroad, and is continuing its nuclear energy diplomacy to reach new agreements in this context.³⁴ It aims to build 80 NP abroad, and operates 36 NP in Russia according to 2015 statistics. If Russia, the energy superpower, accomplishes this objective, its disadvantage of dependency on fossil fuel revenues would be significantly mitigated, and its hegemonic position would be greatly strengthened. Russia will gain a long-term geopolitical advantage thanks to Rosatom's investments in 40

29 The Guardian (2016) *Russia's GDP falls 37 as sanctions and low oil price-take-effect*. Available at: <https://www.theguardian.com/world/2016/jan/25/russias-gdp-falls-37-as-sanctions-and-low-oil-price-take-effect> (Accessed: 15 August 2016).

30 Kumbaroglu, G. and Ulgen, S. (October 2011) *Nükleer Enerjiye Geçişte Türkiye Modeli*. İstanbul: EDAM Yayınları.

31 Full text of the agreement available at <http://www.resmigazete.gov.tr/eskiler/2010/10/20101006-6.htm> (Accessed: 10 December 2015).

32 Pamir, N. (2015) *Enerjinin İktidarı: Enerji Kaynaklarını Elinde Tutan, Dünyayı Elinde Tutar!* İstanbul: Hayy Kitap, pp. 422-425.

33 Telli, A. *ibid*, p. 28.

34 Armstong, I. (2015) *Russia is creating a global nuclear power empire*. Available at <http://globalriskinsights.com/2015/10/russia-is-creating-a-global-nuclear-power-empire/> (Accessed: 14 August 2016).

Table 3: Details of Akkuyu NPP

Details	Akkuyu NPP
Location	Akkuyu-Mersin
Land ownership	No remunerative allocation
Reactor	VVER 1200[1] (AES 2006 Design)
Installed capacity	4 x 1,200 MWe (4,800 MWe)
Project duration	Until the decommissioning process of NPP
Commissioning	Unit-1: 2020
	Unit-2: 2021
	Unit-3: 2022
	Unit-4: 2023
Company and shareholders	Main Contractor JSC “Atomstro-yexport” (ASE)
Financing	100% funded by Russia
Feed-in tariffs	The average sales price to be equal to USD cents 12.35/kWh for the half of electricity generated during the first 15 years. The price cap is set at USD cents 15.33/kWh.
Feed-in tariff period (Year)	15
Fuel price	Included in the tariff
Waste management tariff (USD cents/kWh)	0.15
Decommissioning fund tariff (USD cents/kWh)	0.15
Post PPA period after feed-in tariff	20% of the net profit to be transferred to Turkish party by the Project Company.
Radioactive wastes	Radioactive wastes will be transferred
Dispute mechanism	Arbitration if the disputes not solved by negotiations

Source: Erturk, E. (November 2014) ‘Significant progress in nuclear power plant projects of Turkey’, *Energy IQ*, No. 2014-21/39, p. 2.

different countries.³⁵ Rosatom is the only entity in the world that is capable of offering services at all phases of the nuclear energy value chain. As the operator of Akkuyu NPP, Russia gains an important geopolitical advantage over Turkey.

³⁵ Rosatom (2016) *Global presence*. Available at: <http://www.rosatom.ru/en/global-presence/> (Accessed: 15 August 2016).

In addition to the strategic leverage gained by controlling a nuclear plant in a NATO country, the Akkuyu NPP project is also economically important for Russia. The sanctions following the Ukraine crisis, the EU's decreasing natural gas demands, declining

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oil prices, and the downward trend in natural gas prices have all severely affected the Russian economy.³⁶ However, after Russia encountered difficulties in financing of the project due to the economic crisis, Turkey needed to provide more attractive options in relation to the project. Russian acquisitions will be increased, if Turkey's promised strategic investment decision is adopted.

Cooperation with Russia in the energy field is the power balancing the global and regional powers from the geopolitical perspective. Nonetheless, the political and economic consequences of this over-dependency on Russia should also be taken into consideration. Cooperating with Russia on nuclear energy as an alternative to natural gas in this fragile situation has the potential to render the dependency relationship more complex and multifaceted, increasing the existing asymmetry of the relationship to Russia's benefit.

Nuclear plants require long-term and stable relations, as does the natural gas industry. The fact that Russia will have sole ownership of a nuclear plant on Turkish territory for 60 years will seriously influence bilateral relations. Akkuyu will deepen the dependency relation, because Turkey will be dependent on Russian for technology, qualified labor force, nuclear fuel, and operation.

Energy partnerships cannot be evaluated exclusively from the aspect of their economic impact. These projects are frequently used to advance foreign policy objectives, as important tools of energy diplomacy. Having a NP is an element of national power for Turkey, but the possible negative consequences of the build-own-operate (BOO) model, which will be used for the first time, are being ignored. The strategic gains for Russian national power have gone largely unnoticed. Considering the deficiency of fossil fuels in terms of national resources and its energy mix, this strategy is high risk in terms of energy security, although nuclear energy is an option that Turkey must pursue.

³⁶ Alaksashenko, S. (01 July 2016) *Russias Economy Doomed Collapse*. Available at: <http://nationalinterest.org/feature/russias-economy-doomed-collapse-16821> (Accessed: 14 August 2016).

Conclusion

As demonstrated above, natural gas takes second place in Turkey's energy mix, following the natural gas expansion in 1990s and its subsequent proliferation. Assuring the security of natural gas supply is a very sensitive due to Turkey's 40% dependency on natural gas for electricity production. In this respect, Turkey's most vital and sensitive cooperation is with Russia. Since the natural gas market is more rigidly structured than the oil market, there arises an interdependency relationship. Being dependent on Russia both in terms of pipelines and pipe gas is a serious handicap for Turkey in short- and mid-term. Developing native energy resources in addition to source and country diversification are key steps for Ankara.

The AKP government concluded the first nuclear agreement with Russia to address Turkey's natural gas dependency. A Russian nuclear plant became the preferred option in order to decrease natural gas dependency to Russia; this is simple resource diversification. Turkey's preference for resource diversification rather than country diversification will positively impact natural gas dependency. However, because there are uncertainties both in regard to bilateral relations and in the regional conditions of investment area, Turkey's room for maneuver against Russia will be weakened in every aspect of national security, especially energy.

Turkey further consolidated Russia's already advantageous position via selected the BOO model for Akkuyu NPP. The more urgent strategic necessity for Turkey is to increase its natural gas storage capacity as quickly as possible. Moreover, increasing the daily LNG conversion capacity plays strategic role in decreasing Turkey's dependency on natural gas pipelines. Nuclear investments are important for Turkey's goal of decreasing natural gas use in the electricity production. However, considering the economic and technological uncertainties in the course of nuclear investment, it can be said that delays are likely.

Any sort of energy investment is of strategic importance, especially in regard to the NP. Having a NP offers economic and political leverage, but may lead to serious security risks for host countries. Likewise, numerous factors such as the preferred model, technology, location and partner country may influence potential security risks. Akkuyu, which is the first nuclear power plant using BOO model, is evaluated in terms of dependency on Russia, and regarded as the Turkey's greatest point of vulnerability when it comes to natural gas dependency. Nuclear power is

an option for Turkey's resource diversification, but cooperation with Russia increases Turkey's vulnerability in terms of its interdependent relationship with Russia.

As a final word, it is claimed that the NP may lead a decrease in Turkey's level of dependency on imported energy, yet Turkey would still need to import fuel for the nuclear plants and because the electricity generated by these nuclear power plants will be purchased in US Dollars, it is hard to make revenue predictions.