The Shale Revolution and Beyond: Has Turkey Faced the Consequences of US Energy Transition?

Mert BİLGİN*

Abstract

This article differentiates substantial factors from circumstantial ones in order to map the degree of their significance for Turkey's energy policy with highlights concerning Turkey's foreign policy. It primarily focuses on the consequences of US energy transition, in which the shale revolution plays a dominant role, as one of the most significant sources of the substantial change with a direct influence on global energy, Turkey's energy strategy and, therefore, indirectly on Turkey's foreign relations. It is not meant to simply identify substantial changes with one independent variable as if they are mere consequences of the US energy transition. The article aims at bringing out the technological, economic and geopolitical features of US energy transition in order to point to their interactions with Turkey's international relations in general, and Turkey's energy strategy in particular. This problematic deserves a further, in-depth analysis, not only because there is a lack of research on the impact of the US shale revolution and US energy transition in terms of their consequences at the domestic, global and international levels, but also because it may highlight policy options concerning energy strategy and foreign relations in due course.

* Prof. Dr., İstanbul Medipol University, Department of Political Science and International Relations, Kavacık, Beykoz, İstanbul. E-mail: mertbilgin@medipol.edu.tr

Key Words

Shale revolution, US energy transition, Turkey, energy policy, foreign policy.

Introduction

Supply security is the main driver of Turkey's energy strategy. Turkey attributes a special priority to the availability of resources at affordable costs with the least possible environmental and socio-economic negative externalities.[1] This article, however, points out that some effective factors, leading to the actual characteristics of Turkey's energy supply security, have been changing at regional, national, international and global levels.[2] These factors are assumed to emerge as circumstantial and substantial changing variables that might help in pointing out to what extent Turkey's energy strategy is likely to be affected in terms of individual policy priorities. Since it is practically impossible to include all of the independent variables, and label them as being circumstantial or substantial

factors, this article will refer to the consequences of global energy supply-demand correlation with a particular focus on the concept of energy transition in the USA and Turkey.

In terms of hypothetization, the article refers to the consequences of the shale revolution, and the energy transition in the United States of America (USA), as a substantial factor, with direct effects on domestic priorities on the one hand, and global and international factors on the other. Some studies indicate that the expected increase in production from shale in the USA will result in a major shift in the global order.[3] This article acknowledges the significance of the shale revolution, and considers it as an important driver in the US energy transition that deserves a further look. The US energy transition, and the role played by shale within this transition, emerges as an important factor domestically and globally.[4] The energy challenge is definitely one of the most significant issues that made the USA take historically vital decisions with worldwide spillover effects.[5] Domestically, the USA has faced the necessity of attaining an energy mix to avoid the risk of an external dependence on oil and gas while coping with environmental risks.[6] Globally and internationally, the USA faced the political outcomes of great and rising powers fueled by energy revenues.[7] It was therefore indispensable for the USA to extract shale reserves, increase oil and gas production, accelerate its shale based energy transition, become a key player in global energy, and re-define its international relations with great and emerging powers in Latin America, Eurasia, Asia, the Middle East and Africa.

The article seeks to bring out the technological, economic and geopolitical features of the US energy transition, and their actual and contingent interactions with Turkey's energy security and foreign policy.

This article, however, does not intend to expose the US energy transition as if it is the only independent variable causing drastic changes at the domestic, global and international levels with direct influences on Turkey. Rather, it aims to explore the interactions between the energy transition in the USA, its domestic priorities, and in turn, relevant global and international structures, some of which are assumed to be effective on Turkey's energy security and international relations. In this way the article seeks to bring out the technological, economic

and geopolitical features of the US energy transition, and their actual and contingent interactions with Turkey's energy security and foreign policy.

Conceptually, the term 'Turkey's energy strategy', or policy, in this article, will be used as to identify the state's official energy viewpoint with reference to those relevant state and non-state actors that interact within liberal market rules and which are highly responsive to actual energy security factors such as the volume, time and money needed to secure the energy of the country.[8] The analysis will not be about the trend in energy mix or targets set by the government as in the case of Turkey's 2023 energy vision, which aims to supply 30% of electricity demand from renewable energy sources, establish two nuclear power plants (with 10,000 MW installed capacity), and increase the use of domestic coal to balance extreme dependence on the imports of fossil fuels.[9] It will be about the strategic priorities. The article assumes that the current and former energy security documents released by the Turkish Republic Ministry of Energy and Natural Resources (MENR, thereafter) consider state and non-state aspects of energy security within well-defined legal and market frameworks. It, therefore, identifies Turkey's energy strategy, or policy, not only with these documents, but also with the state and non-state actors, issues and priorities clustered, mentioned or referred by them. As to the US energy transition, the article assumes that, unlike Turkey, where long-term strategic outlook stems from actual market trends, the US energy transition proves to be more responsive to technological change so far as it contributes to supply security and cost efficiency, both to support manufacturing sectors and to increase the employment rate. Technology, from this perspective, appears to be the driving factor of US energy transition.[10] The role of technology in US energy transition fundamentally differs from Turkey, where appropriate technology is being sought for the desired energy mix or concerned projects.[11] This is why the article assumes that official energy strategy in the US has an extensive and a complicated web of interaction between state and non-state actors, which can be best reflected with reference to Congressional bills and acts.[12]

Methodologically, the article will identify Turkey's energy security with reference to strategic documents released as MENR 2010-2014[13] and MENR 2015-2019[14] strategic plans. These documents are selected because both not only stem from the energy supply security definition mentioned above but also include relevant non-state actors while attempting to

combine geographic factors within Turkey's energy strategy. As for the US case, the article examines the legal acts released by Congress from 1927 to nowadays, since they are the legal frameworks that define strategies and policies in due course and reflect the necessities emerging from technological developments or changing market dynamics. The article will therefore point out strategic pillars and priorities of Turkey's energy security from strategic official documents and match them with contextual factors in terms of circumstantial and substantial changing variables, for which the US energy transition is assumed to be one of the main inputs.

The US energy transition, from this perspective, proves highly applicable for the aim of this article because this transition has helped the US boost oil and gas production, increase the installed capacity of renewable resources, while managing the share of other fuel types with a great deal of significance attributed to nuclear. The US energy transition therefore, leads to a substantial impact on oil prices, gas spot prices, contractual terms of gas deals, LNG markets and electricity industry while supporting non-energy manufacturing sectors, sustaining a competitive advantage based on relatively low electricity prices, increasing oil and gas exports, and enabling the US to hold a diplomatic advantage in relations with big oil and gas producers around the globe. The impact of US energy transition on global energy and its indirect influence over Turkey's energy policy and foreign relations, therefore, deserves a further in-depth analysis.

Turkey's Energy Strategy and Foreign Relations

Energy Policy and Foreign Relations

Turkey's foreign relations entail a myriad of historical continuities each connected with a diplomatic issue.[15] The way Turkey can use energy, as a foreign policy tool, is extremely limited. Turkey definitely differs from energy exporting countries such as Saudi Arabia, Iran, Azerbaijan and Turkmenistan, whose foreign policies have been based on issues of energy production, transportation and marketing. Turkey's being a net energy importer, with extreme dependence on imported fossil fuels, appears as an important restraint that limits foreign policy building on energy. Turkey also differs from big powers such as the USA, Russia and China, which can directly affect global markets, build regional energy trade systems and relevant foreign relations in due course by virtue of their economic,

technological, military and political capacities along with their extensive ability to affect global energy supply and demand. Turkey, in the meantime, differs from its European counterparts, as in the case of the UK, France, Italy, Germany and the Netherlands, which have a more efficient energy mix with well established relations on the one hand, and more efficient energy trade relations in diverse forms, by virtue of their state and non-state energy companies on the other.[16] In short, energy is an important driver of the foreign policy processes of these and other countries, which, unlike Turkey, benefit from at least one of the following characteristics:

Turkey definitely differs from energy exporting countries such as Saudi Arabia, Iran, Azerbaijan and Turkmenistan, whose foreign policies have been based on issues of energy production, transportation and marketing.

i) Vast potential to export primary or secondary energy;

ii) State or non-state companies channeling at least one competitive advantage such as vertical integration, market capability, financial capacity or technological development into a foreign policy tool;

iii) A sound and diversified energy mix which produces desirable average costs and manageable environmental externalities.

How can we define Turkey's position in the link between energy strategy and foreign policy? Turkey lacks a vast potential to export fossil fuels or non-fossil fuels. Despite the fact that Turkey has a liberal energy market, and a remarkable industry with competitive state and non-state companies, it is less likely, in the case of Turkey, to talk about integrity between energy deals and foreign policy priorities--with a few exceptions. Turkey's success in energy diplomacy, alongside the corporate strategies of private and state energy companies, have resulted in long-term bilateral and multilateral relations with diverse parties, including the concerned states, companies, and non-state institutions.[17] Energy, within this structure, does not emerge as a foreign policy tool but as an economic means to foster foreign relations by keeping bilateral and multilateral relations functioning even in times of diplomatic crises.

What about Turkey's energy mix? Do flaws in energy supply security affect the link between energy strategy and foreign relations? They indeed do.

Turkey's energy mix, as with consumption, has been characterized by the dominance of fossil fuels (coal, oil and gas), growing shares of renewable sources (mainly hydro followed by wind, sun and geothermal), non-existence of nuclear power plants, and very limited share of biofuels.[18] Turkey's energy mix has been less diversified, to the detriment of nuclear and renewable, on behalf of oil and gas, when compared with many other countries as well as with OECD and European averages.[19] Turkey's energy mix, therefore, emerges as an important restraint in political terms, and causes a huge burden in economic and environmental terms, and yet the flaws also lead to paths for additional investments and international agreements. Turkey's dependence on Russia in the energy sector appears as another fact with positive and negative influences. On the one hand, dependence on Russia, and the characteristics of energy trade relations with Russia, define the scope of new agreements with other countries. From this perspective, one can easily conclude that Turkey's dependence on Russia is a factor that limits Turkey's capacity to benefit from the link between energy strategy and foreign relations. On the other hand, Russia proves to be a reliable supplier that has never halted energy flaw even during diplomatic crises.[20] From this perspective, Russia supports Turkey's energy supply security while energy relations *per se* appear as an insurance to sustain bilateral relations.

In short, Turkey's flaws in energy supply security are important. They define the characteristics of bilateral and multilateral foreign relations by limiting the policy capacity of the link between energy strategy and foreign relations. This does not, however, mean that Turkey undermines the characteristics of its actual energy mix. On the contrary, the official energy strategy acknowledges the lack of a vast energy potential as given, and aims at overcoming the flaws in the energy mix by state and non-state initiatives on behalf of supply and supplier diversification. This approach has its own limits since the flaws in the energy mix are not simple outcomes of former policy options, but rather occur as the result of Turkey's idiosyncratic economic and demographic features stemming from incessant growth, population increase, urbanization, and changes in consumption patterns.

Building Blocks of Turkey's Energy Strategy

The MENR Strategic Plan of 2010-2014 (SP 10-14) and 2015-2019 (SP 15-19) are similar in terms of structure, assumptions, priorities and policies.[21] The international context however has changed economically and geo-politically, leading to unforeseen developments in economic (e.g. oil and gas pricing) and geopolitical (the international political outcomes of regional and bilateral conflicts) terms.

Turkey's flaws in energy supply security are important. They define the characteristics of bilateral and multilateral foreign relations by limiting the policy capacity of the link between energy strategy and foreign relations.

Supply security concerns over Turkey's incessant growth of energy consumption appear as the main similarity between SP 10-14 and SP 15-19.[22] Supply security, therefore is the main driver of these strategic plans, just like in many other countries. In short; the plans and policy implications are very much concerned with diversification of supplies and suppliers, benefiting more from domestic resources, curbing carbon emissions, increasing efficiency and savings, decreasing intensity, and developing infrastructures and capacities such as reserve, liquefaction, transport, export and re-export of diverse fuels. Increasing the share of renewable sources in the energy mix is an indispensable feature of this target.[23] Policy tools developed for these goals are well designed and are comprised of a cooperation between state and non-state actors not only in terms of supportive legal frameworks for energy investments but also in terms of effective business models.

The second feature, shared by both of the strategic plans, diverges from many other national strategic plans based on the idea of supply security. SP 10-14 and SP 15-19 attribute a special significance to pipeline politics not simply to consolidate Turkey's supply security but also to build mutually beneficiary relations with major suppliers such as Russia, Azerbaijan, Iran, and Iraq, while trying to become an energy hub. This emphasis on the use of pipelines as a means of international politics seems to have a geopolitical aspect, and yet the main driver behind Turkey's energy policy for the past decade has proven to be supply security.

In short, SP 15-19 is the latest official document that defines Turkey's strategic priorities to diversify resources and suppliers, benefit more from domestic resources, increase efficiency and savings, decrease intensity, expand infrastructures and boost capacities such as reserve, liquefaction, transport, export and re-export of diverse fuels. It is similar to the previous one (2010-1014) in its general framework, yet builds upon it by emphasizing energy security flaws in detail as in the case of the need for resource and supplier diversification, the excessive share of natural gas in electricity generation, the inadequacy of savings and intensity, the need for more efficient and sustainable use of domestic resources (especially coal and hydro), and the necessity of further investments in infrastructures, networks and grids.

Turkey's Energy Strategy: Securing Supply in Uncertainty

Turkey's energy security can be analyzed through domestic, global and geopolitical factors.

Although the SP 15-19 does not mention it explicitly, it seems to be aware of growing flaws in energy security much more from an economic perspective as in the case of domestic factors:

i) Turkey's economic growth rate;

ii) Demographic changes (stemming from the rise in population, industrialization, and rapid urbanization);

iii) Changes in consumption patterns (replacement of concrete and stone buildings with energy consuming high towers covered by glass, greater use of electricity heating and cooling systems fueled by natural gas, greater use of individual gasoline and diesel vehicles despite the boost in public transport systems).

These economic factors lead to continuous high growth in energy consumption and happen to be a huge pressure on the MENR by imposing urgency as a primary concern over supply diversity, efficiency and intensity. This urgency is not as much as that of the 1990s, when Turkey was compelled to sign natural gas contracts at higher levels of price formulation when compared with European averages, since it suffered from air pollution in big cities and the risk energy shortage causing blackouts. It yet appears as an important factor that impedes long term planning destined to improve parameters of cost, capacity, efficiency, saving, and intensity while diversifying suppliers and fuel types. These domestic factors are intertwined with a myriad

of global factors, the most significant of which appears as oil price, since it emerges as a function of supply and demand embracing the actual and changing characteristics of energy at any one time. Socio-economic features of global consumption and characteristics of energy supply drive the features along with certain indirect factors, such as economic speculation, political manipulation, or unforeseen fluctuations due to other issues.

What about geopolitical tensions? Turkey's recent history has been characterized by a series of geopolitical tensions, which not only distorted the very foreign policy goal of sustaining regional stability, but also carried the potential to hamper its energy supply security.[24] Geopolitical tensions concerning energy supply security can be clustered in terms of oil and natural gas. Transport from Azerbaijan, Iran and Iraq entailed geopolitical risks of disruption of energy flow, while natural gas from Russia carried out the embedded risk of high dependence on one gas supplier.

Turkey's energy strategy in general, and energy sector in particular, are used to securing supply under an uncertainty that may lead to unexpected consequences, as in the case of fluctuation in oil prices on the one hand, and geopolitical risks and threats that affect Turkey's relations with oil and gas suppliers, on the other. In turn, Turkey has, thus far, managed to secure supply, regardless of the characteristics of geopolitical tensions, as in the case of, but not limited to, international sanctions on Iran and Russia, domestic turmoil in Iraq and Syria, problems between Azerbaijan and Armenia, and tensions between Turkey and Russia or between Turkey and Iran on issues concerning Syria. Turkey and its counterparts have considered energy trade within a distinct compartment, which is expected to sustain bilateral and multilateral relations regardless of the political consequences of geopolitical tensions. Although Turkey's domestic characteristics of energy supply and demand are significant, along with the geopolitical developments in the region, the global aspect of energy security deserves a further look, since it appears as a transcending variable with direct effects Turkey's energy security and foreign relations.

The Shale Revolution and the US Energy Transition

Making Sense of Shale in US Energy Transition

How did the US shale revolution occur? To what extent can a new energy

paradigm based on US priorities be possible?

These two questions deserve further elaboration from technological, economic and geopolitical aspects. The global economic consequences of the shale revolution have indeed turned into a significant issue of research much more from a trade or economic perspective since it leads to direct effects in global oil prices.[25] And yet, the plans and policy implications seem to skip the economic, strategic and geopolitical consequences led by the US shale revolution. Part of the problem stems from the fact that analyses identify US energy transition with the shale revolution, and the shale revolution with horizontal drilling and hydraulic fracturing.

There are two important issues to be clarified while talking about the US shale revolution:

The first one is that the US Shale revolution is a part of an energy mix that includes fossil fuels, renewable resources and nuclear energy.

The second one is that the technological development in the conventional and unconventional production of fossil fuels and renewable energy emerges as the main driver of the production increase in primary and secondary energy.

The technological development in the conventional and unconventional production of fossil fuels and renewable energy emerges as the main driver of the production increase in primary and secondary energy.

Horizontal drilling and hydro fracturing are, for sure, the main technological applications that sustain the boost in shale oil and shale gas production.[26] These techniques paved the way to boost the production in Barnett shale in Texas, Marcellus shale in the Appalachians, the Haynesville shale in Louisiana, and the Fayetteville shale in Arkansas, which together contain enough natural gas to serve all of the US' needs for 20 years or more.[27] Can the USA sustain the production increase from shale further and hold a major player's role in the global political economy of energy in the mid and long runs? This definitely will depend on legal and environmental regulations as much as on development and application of new technologies.

It is likely for the USA to include additional shale gas extraction sites. Further technological development seems possible in oil shale.

The Green River Formation straddling the borders of Colorado, Utah and Wyoming contains oil shale reserve of 1.5 to 1.8 trillion barrels of oil, of which 800 billion are recoverable with three times more than Saudi Arabia's proven reserves.[28] The results of oil shale development are not clearly foreseen yet.[29] The production from oil shale is possible by means of two technologies based on heating. Oil shale contains kerogen, the precursor of crude oil that would have turned into crude oil had it already passed through the geological formation time. Kerogen is a light rock that can be transformed into products such as jet fuel and natural gas liquids. The heat releases crude oil and gas from oil shale kerogen. The mining for surface retorting technology starts by the conventional mining of the shale, followed by heating until the kerogen liquefies. This technology is compatible with the actual standards in mining but due to its carbon intensity, is equally detrimental to the environment as the oil sands of Canada.[30] The in-situ retorting technology developed by Shell and some other companies avoids the hazards of conventional mining and hence fares better *vis-a-vis* the environmental stewardship interest.[31] It applies a ceramic composite material originally used for manufacturing electric cables, which resists high temperatures.[32] Developers drill bare holes and create electrical resistance by laying ceramic-composite cables into the shale. By heating and liquefying the kerogen, they finally extract it by pumping it onto the surface.[33] In the oil shale sector, the cost structure of the mining for surface retorting technology requires relatively high oil prices to make first-of-a-kind commercial complex profitable, whereas the in-situ retorting technology can be competitive at low oil prices above US$ 25 per barrel.[34] Although in-stu rotating, applying ceramic composite material, has not created considerable effects in production yet, the whole process proves to be compatible with the strategic priorities set by the US Department of Energy (USDOE) on the one hand and market characteristics on the other. Oil shale, in the meantime, may pave the way to increase production depending on the availability of resources, necessities of legal frameworks and environmental regulations, and finally low electricity costs.[35] In short, current in-stu rotating technology, which extracts oil shale by benefitting from composite cable technology to heat the kerogen in shale and release oil and gas, ensures the US' capacity to sustain or increase production from shale.[36]

The shale revolution, with reference to actual production of shale gas and the potential carried out by oil shale,

is of utmost significance for the US to increase oil and gas production, sustain an exporter position, became effective in global oil price mechanisms, and create new jobs. As to the technological implications, hydraulic fracturing to extract shale oil and shale gas necessitates a compromise between state and federal level on environmental standards, with the likelihood of granting more options to states, while deciding about individual environmental and ecological commitments. The USA, in turn, considers the energy transition from an integral perspective which attributes a special significance to shale revolution to increase oil and gas production; and to renewable and nuclear energy to balance the environmental externalities at national level in terms of averages, and the mix obtained out of actual fuels to keep electricity prices low, support manufacturing and create new jobs.

The in-situ retorting technology developed by Shell and some other companies avoids the hazards of conventional mining and hence fares better vis-a-vis the environmental stewardship interest.

Phases of US Energy Transition

What are the main characteristics of the US energy mix? First of all, the energy mix represents the actual responses to sustain supply security. Secondly, the energy mix is thought to be the generator of sustaining low electricity prices, creation of new jobs, increasing non-energy manufacturing and balancing environmental consequences. This strategy can be characterized in terms of supply security and low energy prices (and electricity prices in general) to support non-energy manufacturing sectors. The role of the energy sector in creating new jobs and securing more employment has been very effective in the rise of fossil fuels and renewable energy, whereas renewable energy in general (hydro, wind and sun in particular) have been considered as supportive of overall environmental quality along with nuclear energy. Nuclear energy, within this regard, has become an indispensable factor of the link between energy policy and foreign relations since the very beginning of the Atoms for Peace Project.[37]

The shift in the US energy mix, therefore, tells a lot about economic, political, environmental and foreign policy agendas in due course.

Nuclear energy has become an indispensable factor of the link between energy policy and foreign relations since the very beginning of the Atoms for Peace Project.

To start from the very beginning, one should acknowledge the significance of the legal acts from 1920 to 1970.[38] The legal frameworks of this period were mainly concerned with the support for hydropower, networks, oil and gas and nuclear energy. The Federal Water Power Act (1920) supported hydroelectric power; the Public Utility Holding Company Act (1935) defined the size and geographic spread of electric and gas utilities; the Rural Electrification Act (1936) granted loans to expand electrical transmission systems to rural zones by supporting distribution companies; the Natural Gas Act (1938) created a system to apply reasonable rates for transmission and sales of natural gas; and the Atomic Energy Act (1946) defined how nuclear energy and nuclear weapons for peaceful uses could be developed under the civil authority of the US Atomic Energy Commission. These legal acts help in building the main blocks of the US energy mix in terms of nuclear, fossil fuels and renewable resources with an explicit concern over infrastructures, electric transmission systems as well as safety and security.

The second period, from 1970 to 1980, was driven by the urgency of securing energy supply on the one hand, and the necessity to institutionalize environmental regulations over the energy sector under the United States Environmental Agency, on the other. Securing oil, managing prices and strengthening nuclear safety appeared to be the main concerns within this period. The Energy Reorganization Act (1974) detailed institutional responsibilities concerning nuclear power production, nuclear weapon development and nuclear safety. The Energy Policy and Conservation Act (1975) created the strategic petroleum reserve of the US and defined criteria for fuel economy and aimed at regulating oil prices. The Department of Energy Organization Act (1977) founded the Department of Energy in order to manage the duties and responsibilities set in the relevant acts. The National Energy Act (1978) described incentives to support alternative fuel types, energy efficiency, and other measures to avoid contingent outcomes of oil crises. Three legal acts authorized the US Environmental Protection Agency (EPA) in response to the need for institutionalization of environmental regulation in energy: The Clean Air Act (CAA, 1970)

started to regulate air emissions from stationary and mobile sources as federal law and established National Ambient Air Quality Standards (NAAQS) to regulate emissions. The Clean Water Act (CWA, 1972) started to regulate standards for surface waters and discharges of pollutants in the waters. The Toxic Substances Control Act (TSC, 1976) started to regulate chemical substances and/or mixtures, and would be updated by the Frank R. Lautenberg Chemical Safety for the 21st Century Act as of 22 June 2016 (EPA 2017).

The third period started in late 1980, and responded to concerns over supply diversification to include more renewable energy and benefit from technology to boost unconventional production of hydrocarbons and avoid negative externalities such as environmental degradation and hiking food prices. The Energy Security Act (1980) set principles to offer loans, incentives and support to Synthetic Fuels, Biomass, Alcohol Fuels, Renewable energy, Solar Energy and Geothermal Energy but also presumed the study of preventive measures to avoid acid precipitation, set the legal minimum for the Strategic Petroleum Reserve, and indicate clear targets for the production, consumption and import of energy concerning 1985, 1990, 1995 and 2000. The Ocean Thermal Energy Conversion Act (1980) and the Nuclear Waste Policy Act (1982) responded to ecological risks and safe management of nuclear wastes. The Energy Policy Act (1992) and Farm Security and Rural Investment Act (2002) aimed at improvements in issues already defined.

The fourth period refers to the era from 2005 to 2016. It was started by the Energy Policy Act of 2005, which considered energy security from a broad and integral perspective with an interaction between diverse resources. The Energy Policy Act (2005) appeared as a comprehensive legal document to support domestic production of energy and increase efficiency. It described general terms of oil shale extraction on the one hand, and support for nuclear and renewable energy on the other. And yet it did not address, in detail, features and criteria for a sustainable oil shale industry. The main concern of the act was to ensure jobs with secure, affordable, and reliable energy. The rise of the oil and gas industry stemming from the technological innovation in shale extraction created new jobs, contributed to employment while securing the supplies and attaining the capacity to export oil and gas. Nuclear and gas power plants did not only lead to low electricity prices but also contributed to further technological innovation in shale oil production, e.g. in-situ and surface retorting,

by completing a sort of life circle between shale technology, hydrocarbon production and electricity generation; a life circle that decreased electricity costs, gained a cost advantage to the manufacturing sector, thereby creating new jobs and making possible incentives given to renewable energy.

The Energy Policy Act (2005) appeared as a comprehensive legal document to support domestic production of energy and increase efficiency. It described general terms of oil shale extraction on the one hand, and support for nuclear and renewable energy on the other.

The Energy Independence and Security Act (2007) clearly defined standards and measures to build upon savings and efficiency as in the case of increasing the amount of domestic biomass to be used by federal fleet vehicles, increasing energy saving lighting, offering training for green jobs, and supporting business in energy efficiency applications. The Food, Conservation, and Energy Act (2008) supported biorefineries and biofuels with concern over securing food supplies. The American Recovery and Reinvestment Act of (2009) offered an US$ 800 billion economic stimulus package concerned with energy policy as in the case of creating new jobs in energy, granting tax credits to increasing energy efficiency in houses, reducing diesel emissions, and supporting research in conventional, unconventional and renewable energy. The Clean Power Plan (2015) did not only appear as a comprehensive document to manage carbon emissions nationally, but also granted states rights and flexibility to meet their reduction targets.[39] The Clean Power Plan (2015) will directly affect US energy transition by favoring nuclear and renewable gas power plants over fossil fuel-fired power plants that release 31 percent of US total greenhouse gas emissions. It would, indeed, be the first nationwide plan to curb emissions produced by power generators.

The plan, which aimed at making coal plants more efficient, using gas plants more effectively, increasing reliance on renewable and nuclear sources, and improving end use energy efficiency, is a good example of cooperative federalism since it grants the right to the states to formulate their own plans for reducing emissions.[40] The plan, if fully implemented, would lead to a 32% reduction of carbon pollution from the power sector, which will decrease emissions of sulfur dioxide

and nitrogen oxides from power plants by 90% and 72% respectively.[41] According to the EPA, the plan would prevent 3,600 premature deaths, 1,700 heart attacks, 90,000 asthma attacks, and 300,000 missed work and school days every year, while also resulting in climate benefits of $20 billion, health benefits of US$14- US$ 34 billion, and net benefits of US$ 26- US$ 45 billion.[42] The comprehensive plan leading to nationwide commitments has not, however, had the expected effect, since it became more likely for the US Federal Government to keep the traditional approach based on the particular policy choices made by the states rather than applying a top-down spillover effect. This does not necessarily mean that the US has given up on the environmental standards set in the plan. It will turn into a matter of authority of individual states to adopt the most contributive plan in terms of their idiosyncratic priorities and restraints.

As to the Clean Power Plan (2015) and other contingent commitments, it seems more likely for the US to sustain the legal tradition of attributing priority to individual states, rather than adopting a top-bottom environmental approach.

The fifth period, from this perspective, can be considered as 2017 and thereafter, since President Donald Trump's administration acknowledged the Clean Power Plan (2015), but practically dismissed it, by emphasizing the significance of supply security, employment and the rise in manufacturing sectors with reference to fossil fuels, shale in particular, along with other factors of the US energy mix including nuclear and renewable sources.[43] It is therefore possible to say that the US is likely to carry out the energy transition based on the shale revolution, and renewable sources, while sustaining the share of nuclear and other fuels. This transition is expected to contribute to increasing oil and gas production, creating new jobs, keeping electricity prices low and managing environmental consequences. Continuities from the fourth period in terms of the shale revolution, significance of nuclear to keep emissions and electricity costs low, the rise of renewable energy in general and wind and solar in particular at the detriment of coal, are likely to remain in the fifth period.

As to the Clean Power Plan (2015) and other contingent commitments, it seems more likely for the US to sustain the legal tradition of attributing priority to individual states, rather than adopting a top-bottom environmental approach.

The compromise between new jobs, increases in oil and gas production, low electricity costs, the rise of non-energy sector fueled by this structure, and the environmental impact are likely to be treated in general as an outcome of a desirable energy mix composed of conventional fossil fuels, oil and gas produced through conventional methods, hydraulic fracturing, renewable energy and nuclear. To what extent the USA will be able to sustain, and even increase, oil and gas production through conventional and unconventional techniques, will be highly linked to priorities related to environmental issues, creation of new jobs, significance of manufacturing sectors, electricity prices and availability of reserves.

Discussion: Has Turkey Faced the Consequences of US Energy Transition?

Turkey's energy strategy and foreign policy have been challenged by foreseen and unforeseen factors causing drastic effects on its bilateral and multilateral foreign relations. Some of these factors emerged as circumstantial independent variables, whereas, some others gained the characteristics of substantially intervening variables. Among the external variables; the US energy transition based on the shale revolution has played a significant role, and emerges as one of the most significant substantial variables with direct influences on global energy and international relations.

It is possible to highlight relevant intersections between US energy transition and some domestic, global and international factors:

i) Domestic: Electricity prices, job creation, environmental and ecological management;

ii) Global: Oil prices, spot markets and contractual terms;

iii) International: The role of domestic and global features on the US position with regard to Russia, China and the European Union, countries in the Middle East and Africa such as, but not limited to, Saudi Arabia, Qatar, Iran, Iraq, Israel, Egypt, (Greek) Cyprus and Libya, and finally in Latin America such as Brazil, Ecuador and Venezuela.

The interactions among US energy transition, domestic (electricity prices, job creation, environmental and ecological management) and global (oil prices, spot markets and contractual terms) factors prove to have had reciprocal effects, some of which have been mentioned in the previous section.

The structural correlation regarding the international aspect points to important policy issues, and necessitates a further elaboration to respond to the following questions:

Does US energy transition based on the shale revolution entail economic and geopolitical consequences at the global and international levels that may play the role of a substantial variable affecting Turkey's energy policy and position in the Middle East, Eurasia, Europe and Africa?

If so, as this section assumes, how will Turkey, in general, and Turkey's energy strategy in particular, will be affected from the consequences?

To answer these questions, it is necessary to cluster the main characteristics of US energy transition regarding their relationship with domestic, global and international structures, and then point out where and how Turkey's energy strategy and foreign relations with relevant actors take place within this picture. The most practical way of attaining this goal is to start from the most discernible interactions of the USA energy transition, which, in this case, are domestic and global factors, then transform them into a meaningful structure just to bring out the contingent international outcomes as a discussion point.

Domestically, and as discussed in the previous section, the characteristics of the energy mix will drive, or stem from, the economic, socio-economic and environmental priorities. An energy mix based on fossil fuels (coal, oil and gas), nuclear, and renewable energy will be of utmost significance where technological innovation in material sciences is expected to increase supply and efficiency in:

i) Production of fossil fuels (conventional oil and gas as well as unconventional shale oil and shale gas with the likelihood of oil shale);

ii) Renewable energy (wind and solar energy in particular with contingency of an increase in hydro and geothermal).

Characteristics of such an energy mix are expected to make it possible to consolidate the domestic and international policy priorities of the USA.

In terms of domestic priorities, US energy transition is likely to keep on carrying over the former features based on a desirable mix between fossil fuels, nuclear, and renewable energy where innovation in technology and material sciences may add up to the expected value as in the cases of actual production from shale and the contingency of further development of oil shale and offshore wind installations.

Regardless of the hypothetical breakthrough, the current energy mix seems to be potent enough to achieve some of the domestic priorities such as:

i) Creation of new jobs in the energy sector,

ii) Sustaining low electricity prices,

iii) Gaining an export-oriented competitive advantage to manufacturing sectors,

iv) Creation of additional jobs in non-energy manufacturing,

v) Managing environmental and ecological issues at state level with overall desirable consequences at the national level.

The energy mix, and the track of change in the energy transition with substantial structural effects, has been leading to significant consequences at the global level by enabling the USA to benefit from:

i) A global position of oil and gas exporter.

ii) The ability to directly affect the international political economy of global oil prices with secondary effects on spot markets and long-term oil and gas contracts.

From these structural aspects, which seem to be discernable and measurable, it may be possible to move on with strategic spillover effects with reference to priorities that have shaped US foreign policy within the same period:

i) An outsider position with capability to influence global energy. The most significant example of this type can be made with reference to actual limits on the corporate expansion of Russian firms in Europe, Africa and Latin America.

ii) Less dependence on oil imports from the Middle East. This has been resulting in a new approach towards the Middle East and North Africa. This type can be illustrated with reference to US attitudes towards the big oil and gas exporters such as Saudi Arabia, Qatar, Iran, Iraq and Libya and energy exporter incumbents such as Israel, Egypt and Cyprus.

iii) Relatively low electricity prices to support the country's non-energy exports that carry out the likelihood of a new trade relationship with China.

The combination of domestic, global and international features indicates that the shale-based US energy transition has been causing changes in international relations concerning the growing emphasis on the Asia-Pacific region with changing policy towards

Europe, Eurasia, the Middle East and Africa.

It is, therefore, worth mentioning that the policy shift stemming from the US energy transition highly concerns the region around Turkey with spillover effects in Eurasia, the Middle East, North Africa and Europe.

Turkey has established sound energy relations in these regions, in particular, with Russia, Azerbaijan, Iran, Iraq, and Turkmenistan as the main providers. Russia undoubtedly has a privileged position within Turkey's supply security since there is no other country where the share of Russian gas exceeds 50% in total consumption, 50% of which has been used in electricity generation. Turkey, in terms of supply security, tries to diversify supplies and suppliers. To this end, domestic resources, e.g., coal, has been attributed a special significance along with drastic increases in installed capacities of wind, solar, hydro and geo-thermal energy. In addition, Turkey has been trying to construct nuclear power plants in Akkuyu, Mersin in cooperation with Russia, and in Sinop in cooperation with a Japanese-French Consortium. Turkey, in the meantime has been looking for additional gas supplies and pipelines from the Caspian (Azerbaijan and Turkmenistan), the Middle East (Iran, Iraq and Qatar), the Eastern Mediterranean (Israel, Cyprus and Egypt), and Africa (Algeria and Libya), not only for supply security but also to support Turkey's transit capacity to European markets.

Turkey, in terms of supply security, tries to diversify supplies and suppliers. To this end, domestic resources, e.g., coal, has been attributed a special significance along with drastic increases in installed capacities of wind, solar, hydro and geo-thermal energy.

In short, the basic pillars of Turkey's energy strategy and the regional and global relations built upon it, have shown a certain degree of vulnerability to the global and international consequences of the US energy transition from energy supply security perspective, and a considerable degree of vulnerability to the political spillover effects of this transition from a foreign policy perspective.

Does Turkey's energy strategy display readiness for the actual and upcoming consequences of US energy transition? Not exactly, since Turkey needs much more time to overcome the flaws in its energy mix by sustaining an increase in

the share of domestic energy resources (mainly coal and renewable with a contingency of shale), constructing the nuclear power plants, and including new gas suppliers with its domestic energy grid. Turkey's energy strategy is likely to be affected by the global aspect of the US energy transition; which, in this case, will be about the spillover effects of global oil and gas prices on secondary energy. The direct effects of changes in oil prices and indirect effects of changes in spot and contractual oil and gas prices seem to be the most effective independent variables that are highly linked to the role of the US in global energy.

Does Turkey's foreign policy show proven readiness for the actual and upcoming consequences of US energy transition? It can barely be possible to talk about this issue within Turkey's foreign policy, which has been overwhelmingly busy with regional and international problems. It is nevertheless possible to draw attention to some of the changes in bilateral and multilateral relations, since they have shown a definite responsiveness to the global and international consequences of US energy transition.

Conclusion

This article differentiated substantial factors from circumstantial and intervening ones in order to map the degree of their significance for Turkey's energy policy with highlights concerning Turkey's foreign policy. It made a distinction between circumstantial, intervening, and substantial variables by benefitting from a comparative analysis of the roles played by energy transitions in the USA and Turkey.

The article drew attention to the consequences of the US energy transition that has been resulting in significant consequences at the domestic, global and international levels. The US energy transition entailed a continuing significance of nuclear energy with a growing importance of oil, gas and renewable energy, to the partial detriment of coal.

This energy transition was found to be highly effective in the US':

i) Domestic structures (the rise of shale and renewable sectors and their role in the creation of new jobs, the need for keeping electricity prices low to support manufacturing so as to sustain a competitive advantage and contribute to employment);

ii) Global affairs (the willingness and ability of the USA to remain a major oil and gas producer with an influence on global supply, and therefore prices);

iii) International relations (the influence and spillover effects of domestic and global shifts on the US' international relations with countries such as Saudi Arabia, Qatar, Iran, Iraq and Libya and energy exporter incumbents such as Israel, Egypt and Cyprus.

An analysis of Turkey's energy security and relevant foreign policy priorities showed how they might intersect with the consequences of US energy transition in terms of *domestic*, *global* and *international* structures.

i) Domestically, Turkey's official energy strategy has been constructed on security pillars, and yet with continuing flaws that arise from the mismatch between incessant growth in energy consumption and the lack of sufficient domestic resources and inadequate supply diversification. Turkey's energy supply security suffers from the awkward characteristic of its energy mix (dominated by imported fossil fuels and domestically produced renewable energy but not nuclear). The extreme share of imported gas in electricity generation emerges as an important flaw in terms of electricity costs. It is not possible to talk about the role of Turkey's energy transition in creating new jobs or in sustaining a competitive advantage in manufacturing sectors by keeping electricity prices low, which is in contrast to US energy transition.

ii) Globally, Turkey's energy mix results in high vulnerability to short term fluctuations in oil prices and long term changes in contractual prices, not only because of its excessive use of natural gas in electricity generation but also due to insufficient shares of renewable energy and the lack of nuclear energy.

An analysis of Turkey's energy security and relevant foreign policy priorities showed how they might intersect with the consequences of US energy transition in terms of domestic, global and international structures.

iii) Internationally, Turkey's bilateral and multilateral relations with a myriad of energy exporters seem to be affected by the characteristics of the US energy transition and the growing role of the USA in global energy markets and its spillover effects in foreign policy, for at least

the USA has turned into a major oil and gas producer with newly defined interest relations in Europe, Eurasia, the Middle East, Africa, Asia-Pacific and South America.

As to policy findings, not only short-term oil prices, and their effects on spot markets, but also the consequences of the US energy transition on mid-term and long-term pricing of primary and secondary energy, are found to be significant in understanding the capacities of Turkey's energy strategy and relevant foreign policy initiatives in due course. Turkey, therefore, seems to be in need of increasing the economic priorities and conventional criteria of energy supply security so as to better cope with the circumstantial, intervening and substantial independent variables that have been analyzed in this article.

Endnotes

1 Turkish Republic Ministry of Energy and Natural Resources, (MENR 2010-2014) Strategic Plan, *Enerji ve Tabbi Kaynaklar Bakanlığı 2010-2014 Stratejik Planı*, at http://www. enerji.gov.tr/yayinlar_raporlar/ETKB_2010_2014_Stratejik_Plani.pdf (last visited 5 January 2011); Turkish Republic Ministry of Energy and Natural Resources, (MENR 2015-2019) Strategic Plan, *Enerji ve Tabbi Kaynaklar Bakanlığı 2015-2019 Stratejik Planı,* at http://sp.enerji.gov.tr/ETKB_2015_2019_Stratejik_Plani.pdf (last visited 2 April 2017).

2 For this approach, see, Mert Bilgin, "Turkey's Energy Strategy: Synchronizing Geopolitics and Foreign Policy with Energy Security", *Insight Turkey*, Vol. 7, No. 2 (September 2015), pp. 67-81; Mert Bilgin, "Energy and Turkey's Foreign Policy: The Link between State Strategy, Regional Cooperation and Private Sector Involvement", *Turkish Policy Quarterly*, Vol. 9, No. 2 (Summer 2010), pp. 81-92; Mert Bilgin, "Geopolitics of European natural gas demand: Supplies from Russia, Caspian and the Middle East", *Energy Policy*, Vol. 37, No. 11 (2009), pp. 4482-4491.

3 Ghazale Haddadian and Mohammad Shahidehpour, "Ripple Effects of the Shale Gas Boom in the U.S.: Shift in the Balance of Energy Resources, Technology Deployment, Climate Policies, Energy Markets, Geopolitics and Policy Development", *The Electricity Journal*, Vol. 28, No. 2 (March 2015), pp. 17-38.

4 Robert A. Hefner, III, *The Grand Energy Transition*, New Jersey, Wiley, 2009.

5 Concerning the significance of energy challenge for the USA and Americans, see Sam H. Schurr, Joel Darmstadter, Harry Perry, William C. Ramsay and Milton Russell, *Energy in America's Future: The Choices Before Us*, New York, RFF Press, 2011.

6 Sophie Méritet and Fabienne Salaün, "The United States Energy Policy: At a Turning Point", in Jean-Marie Chevalier (ed.), *The New Energy Crisis: Climate, Economics and Geopolitics*, Basingstoke, Palgrave Macmillan, 2009, pp. 173-201.

7 Mert Bilgin, "Energy Transitions, and International Security in the 21st Century", in Sai Felicia Krishna-Hensel (ed.), *New Security Frontiers*, Aldershot, Ashgate, 2012, pp. 31-66.

8 Mert Bilgin, "Energy Policy in Turkey: Security, Markets, Supplies and Pipelines", *Turkish Studies,* Vol. 12, No. 3 (2011), pp. 399-417.

9 Mehmet Melikoğlu, "The Role of Renewables and Nuclear Energy in Turkey's Vision 2023 Energy Targets: Economic and Technical Scrutiny", *Renewable and Sustainable Energy Reviews*, Vol. 62, (September 2016), pp. 1- 12.

10 Zachary Williamson, *Deployment of Advanced Energy Technologies*, New York, Nova Science, 2009.

11 The use of technology in Turkey's pipeline projects and its impact upon regional relations may be considered from this perspective. See, Justyna Misiagiewicz, "Oil and Gas Pipeline Infrastructure and its Significance for the International Relations in eastern Europe", in Monika Szkarłat and Katarzyna Mojska (eds.), *New Technologies as a Factor of International Relations*, Cambridge, Cambridge Scholars Publishing, 2016, pp. 412-422.

12 Patricia Park, *International Law for Energy and the Environment*, New York, CRC Press, 2013, pp. 131-151.

13 Turkish Republic Ministry of Energy and Natural Resources, (MENR 2010-2014) Strategic Plan.

14 Turkish Republic Ministry of Energy and Natural Resources, (MENR 2015-2019) Strategic Plan.

15 See, William M. Hale, *Turkish Foreign Policy, 1774-2000*, London, Frank Cass, 2000; Richard Falk, "Turkish Realignment: Prospects amid Uncertainty", *Foreign Policy Journal*, at https://www.foreignpolicyjournal.com/2016/12/09/turkish-realignment-prospects-amid-uncertainty/ (last visited 12 March 2017).

16 EU Commission, DG ENER, Unit A4, *Energy Statistics, Energy datasheets: EU-28 countries*, 16 March 2017.

17 Ministry of Foreign Affairs, *Turkey's Energy Profile and Strategy*, at http://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa, (last visited 27 March 2017).

18 Ibid.; MENR 2015-2019.

19 EU Commission, 2017.

20 Gazprom, *Transmission*, at http://www.gazprom.com/about/production/transportation/ (last visited 2 April 2017).

21 MENR 2010-2014; MENR 2015-2019.

22 Ibid.

23 Melikoğlu, "The Role of Renewables" , pp. 1–12.

24 Aaron Stein, *Turkey's New Foreign Policy*, Whitehall Paper 83, Abingdon, Routledge, 2014.

25 Thierry Bros, *After the US Shale Gas Revolution*, Paris, Editions Technip, 2012.

26 Sergey S. Zhiltsov and Igor S. Zonn, "Shale Gas Production in the USA", in Sergey S. Zhiltsov (ed.), *Shale Gas: Ecology, Politics, Economy*, Cham, Springer International, 2017, pp. 25-36.

27 James G. Speight, *Shale Gas Production Processes*, Oxford, Gulf Professional Publishing, 2013, p. 6.

28 Ibid, pp. 5-7.

29 Sam Fletcher, "Efforts to Tap Oil Shale's Potential Yield Mixed Results", *Oil and Gas Journal,* (25 April 2005), p. 26.

30 Tyler Hamilton, "A Cheaper Way to Draw Oil from Shale", *MIT Technological Review*, at https://www.technologyreview.com/s/412912/a-cheaper-way-to-draw-oil-from-shale/ (last visited 3 March 2017).

31 See Ibid.; James T. Bartis, Tom LaTourrette, Lloyd Dixon, D.J. Peterson and Gary Cecchine, *Oil Shale Development in the United States: Prospects and Policy Issues*, Santa Monica, RAND, 2005.

32 Ibid.

33 Ibid.

34 Ibid.

35 Just like Canadian oil sands, shale industry in the USA is highly vulnerable to environmental regulations. See, API (2017), *US Oil Shale: Protecting Our Environment*, at http://www.api.org/~/media/Files/Oil-and-Natural-Gas/Oil_Shale/Oil_Shale_Factsheet_2.pdf (last visited 14 March 2017).

36 Bartis, LaTourrette, Dixon, Peterson and Cecchine, *Oil Shale Development in the United States.*

37 Ira Chernus, *Eisenhower's Atoms for Peace*, Texas, Texas University Press, 2002; Mary Jo Rogers, *Nuclear Energy Leadership: Lessons Learned from U.S. Operators*, Oklahoma, PennWell, 2013.

38 This section comprised of a comparative analysis of energy legal frameworks in the USA from 1920 to 2017 has been compiled from US Congress Bill Searches and Lists. It is based on the assumption, as set in the introduction,that these legal frameworks timely respond to actual and expected challenges and goals, and point to the strategic pillars in the US energy strategy. See, US Congress, *Bill Searches and Lists*, at https://www.congress.gov/ (last visited 15 March 2017).

39 EPA, *US Environmental Protection Agency, Overview of the Clean Power Plan (2015)*, at https://www.epa.gov/sites/production/files/2015-08/documents/fs-cpp-overview.pdf (last visited 13 March 2017).

40 There emerged a discussion in the US, whether this plan was for or against the state's rights to develop their own energy plans stemming from their idiosyncratic priorities. See, David B. Rivkin, Jr., Andrew M. Grossman, and Mark W. DeLaquil, "Does EPA's Clean Power Plan Proposal Violate the States' Sovereign Rights?", *Engage*, Vol.16, No. 1 (February 2015), pp. 36-45.

41 Pacific Research, *The Clean Power Plan*, at https://www.pacificresearch.org/fileadmin/images/Studies_2016/CleanPowerPlan_RegressivityReduction_Web.pdf (last visited 25 March 2017).

42 EPA, *Laws and Regulations*, at https://www.epa.gov/laws-regulations (last visited 13 March 2017).

43 White House, *An America First Energy Plan*, at https://www.whitehouse.gov/america-first-energy, (last visited 7 May 2017).