Azerbaijan's Renewable Energy Policy: Opportunities, Drivers and Challenges

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Renewable Energy in the South Caucasus

Introduction by the Special Editors Mary Keogh and Agha Bayramov (both University of Groningen)

The ratification of the Paris Agreement (2016) commits the states of the South Caucasus to reducing carbon emissions as part of the global effort to mitigate the worst effects of climate change. Replacing high-emitting hydrocarbons with renewable energy will be essential to realising that goal. For Armenia, Azerbaijan, and Georgia, fulfilling the Paris agenda requires a recalibration of energy policy and dramatic changes in the energy mix.

This special issue provides an overview of the latest developments and policies on renewable energy in the South Caucasus. While all three states have significant potential for renewable energy development, multiple political, financial, technical, and social barriers obstruct the rapid and effective implementation of renewable energy policy in the region. In addition, the transition towards renewable energy is progressing at different speeds in each of the three states. They occupy different positions in the energy supply chain and, consequently, have different energy agendas and policies: Azerbaijan, as a hydrocarbon producer and exporter, faces very different constraints and opportunities in implementing a renewable energy strategy in comparison to Georgia, a consumer and transit state, and Armenia, a consumer state. This special issue examines these different opportunities and developments in the context of the evolving regional energy situation.

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Azerbaijan's Renewable Energy Policy: Opportunities, Drivers and Challenges

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Abstract

This article looks at Azerbaijan's renewable energy developments. Existing research and media coverage of international energy politics in the South Caucasus is overwhelmingly dominated by a focus on oil and gas pipelines, especially in Azerbaijan, due to its central place in traditional hydrocarbon fuels markets. This article aims to expand the scope of the literature on energy to bring more attention to Azerbaijan's renewable energy sector, investigating the potential of and challenges to renewable energy development in the country. The key questions are: why would a small oil and natural gas-rich country seek to develop renewable energy? Who is promoting renewable energy in Azerbaijan and with what effects? And finally, how do low oil prices and Covid-19 affect the progress of renewable energy in Azerbaijan?

Introduction

Existing research and media coverage of international energy politics in Azerbaijan is overwhelmingly dominated by a focus on oil and gas extraction due to its crucial place in traditional hydrocarbon markets. While the strategic aspects of oil and natural gas are well-researched, there still exists a great deal of uncertainty about how renewable energy will reshape Azerbaijan's energy security. This article aims to expand the scope of the literature on energy geopolitics in the South Caucasus to bring more attention to Azerbaijan's renewable energy sector, which is still nascent.

Around the world, the use of renewable energy is growing rapidly because of climate change concerns, diversification strategies and strong economic investment. Although oil continues to hold the largest share of the energy mix (33.1%), the share of both natural gas and renewables

rose to record highs of 24.2% and 5.0% in 2019, respectively (BP, 2020). Renewables has now overtaken nuclear, which makes up only 4.3% of the energy mix. Recently, countries with significant oil and natural gas resources such as Nigeria and Qatar also have focused on developing their renewable energy potentials. The tendency is not only caused by concern for the environment, but also by economic demands. This trend is observed in almost all oil-rich countries, including Azerbaijan. For example, the Azerbaijani government has initiated various structural changes in order to facilitate investment in the renewable energy market. These initiatives include several draft pieces of energy efficiency legislation such as "Use of renewable energy sources in power generation" and "Efficient use of energy resources and energy efficiency" (IEA, 2020).

Traditional oil producers such as Saudi Arabia, Iran and Russia, which have historically enjoyed geopolitical influence because they supply fossil fuels, are likely to see a decline in their global reach and impact unless they can reinvent their economies for a new energy era. Azerbaijan may face challenges in adapting to a world increasingly powered by renewables. Azerbaijan's economy is smaller and less diversified than those of some of the Middle Eastern oil producers. Therefore, oil and gas rents are a vital component of the state budget, accounting for around 90% of fiscal revenues; Azerbaijan simply does not have competitive industries beyond fossil fuels. Declining export revenues will adversely affect Azerbaijan's economic growth prospects and the national budget.

The principal purpose of this research is to explore sustainable energy development in Azerbaijan through a transition to renewable energy. It intends to ascertain: why a small oil-rich country would seek to develop renewable energy; whether recent challenges on the world oil market in terms of consistently low oil prices can motivate Azerbaijan to increase the use of its renewable energy resources; and who is promoting renewable energy in Azerbaijan, and with what effects.

Renewable Energy Developments

Azerbaijan has been using oil as a principal driver of its economy since 1991. In this regard, the 2015 crash in oil prices negatively affected its economic and political stability; this was the first time in two decades that Azerbaijan's economy showed significant stagnation, causing two currency devaluations. Such a situation made Azerbaijan reassess its priorities and seek a diverse economic and energy strategy for its sustainable development. In this regard, renewable energy resources appear to be the one of the most efficient and effective solutions (see below).

Azerbaijan has a low share of renewable energy in its Total Final Energy Consumption (TFEC), varying between 3.1% in 2010 and 1.6% in 2019 (The State Statistical Committee, 2019). One explanation for this variance is the seasonal and year-on-year changes in hydropower production that have ranged from 2.4 % in 2010 to only 0.8 % in 2019 (The State Statistical Committee, 2019). Currently, 91.9% of electricity in Azerbaijan is produced from traditional sources of energy (mostly from natural gas), while 8.1% of electricity is produced from renewable sources (Savchenko, 2020a). In other words, renewable energy sources do not occupy the central position either in production or in consumption.

However, according to a 2019 report by the International Renewable Energy Agency (IRENA), Azerbaijan has outstanding renewable energy resources. More specifically, the potential of Azerbaijan's renewable energy generating capacity is 26,000 megawatts (MW). To benefit from this potential, the government has established a goal of increasing the share of renewable energy sources in electricity production to 30% by 2030 (Babayeva, 2020). On 29 May 2019, President Ilham Aliyev signed the order "On Accelerating Reforms in Azerbaijan's Energy Sector", which established the foundation for expanding the usage of renewable energy sources, introduced a new legal framework, and moved to create a friendlier investment climate (IRENA, 2019).

Among renewables, hydropower has traditionally maintained a promising position in Azerbaijan's energy production. It had the highest installed capacity of any renewable energy source (1134MW) in 2019, providing about 6–10% of total electricity generation demand (IRENA, 2019). The resources are located next to the rivers, such as the Kura and its tributaries, the Araz, streams terminating at the Caspian Sea, and irrigation canals. Additionally, Azerbaijan has a well-developed small hydropower generation sector, comprised namely of the Sheki, Mughan, Zeykhur, Gusar, Nyugedi, Chinarly, Balakan, Guba and Zurnabad power plants. To attract investors, the Azerbaijani government is considering the privatisation of these small power plants, which are of lesser importance for nationwide power supply. According to the Ministry of Energy, the six small hydroelectric power stations previously operated by the power generating company Azerenerji are most likely to be sold to private investors (AHK Azerbaijan, 2019).

After hydropower, wind energy has the second-highest installed capacity in the renewables sector (66MW). However, this is only a small fraction of total potential wind capacity, which is estimated at 3000MW (IRENA, 2019, 17). The Azerbaijani government plans to add 420MW in renewable energy capacity in 2020, including 350MW of wind. To develop this potential, Azerbaijan has completed several small-scale projects. For example, it inaugurated the Yeni Yashma Wind Park, with a capacity of 50MW, in October 2018. According to IRENA (2019, 18), Yeni Yashma is the largest operating wind park in the South Caucasus. In addition, on

9 January 2020, the Ministry of Energy signed agreements with two foreign companies, Saudi Arabia's ACWA Power and the United Arab Emirates' Masdar, on the implementation of pilot projects in the field of renewable energy.

ACWA Power will build 40 wind turbines with a total capacity of 240MW in Absheron and Khizi regions (Lmahamad, 2020). Despite its positive impacts, Azerbaijan should also consider wind energy's negative environmental, spatial and social effects. Numerous studies (Bilalova 2020; Dugstad et al. 2020) indicate that wind farms might be a problem for migratory birds if their locations are not carefully planned. Furthermore, several scholars highlight that due to issues of noise and landscape deterioration, wind energy has faced problems with social acceptance, namely "not in my backyard" (NIMBY) protests (Dugstad et al., 2020).

The potential for renewable energy production in Azerbaijan through solar power is promising. As of 2017, photovoltaic installations with a capacity of 34.6MW were installed across the country, including at businesses and on the roofs of various public buildings (IRENA, 2019). Currently, there are several solar power plants in Azerbaijan operating in the cities of Gobustan and Samukh, the Baku districts of Pirallahi, Sahil and Surakhan, and in Nakhchivan. Similar to other renewable energy sources, Azerbaijan's solar power potential is estimated at 2040MW (IRENA, 2019, 19), which is also not fully developed. The Azerbaijani government's 2020 renewable energy target (420MW) also includes 50MW of new solar power. The Ministry of Energy also signed an agreement with the UAE's Masdar in the field of solar energy, the company taking on construction of a 200MW solar power facility in Garadahg and Absheron regions.

Another project that has contributed to Azerbaijan's renewable energy development is the Baku-Waste-to-Energy Plant, which became operational in 2012. The plant is located in Baku's Balakhani settlement and features two incineration lines, each with a capacity of 250,000 tonnes and a power generation capacity of 231.5 gigawatts-hours (GWh) per year.

Environmental and Economic Benefits

One might ask: why would a small resource-rich country want to develop a renewable energy sector? First, Azerbaijan's prime incentive for developing wind and solar power is to ensure sufficient domestic production whilst maintaining gas export levels. In recent years, Azerbaijan's domestic energy consumption has increased. Due to the resulting high internal gas consumption, Azerbaijan has struggled to meet its obligations on a variety of contracts to export gas westward. To meet those shortfalls, it has had to import natural gas from Russia (O'Byrne, 2020). In this regard, renewables offer a way to keep that from happening, and when fewer fossil fuels are used domestically, more oil and natural gas can be exported.

Secondly, the fall in oil prices since 2014 has exposed Azerbaijan's significant economic vulnerability. In order to address its financial problems, in early 2016 Azerbaijan sought emergency loans from the International Monetary Fund and the World Bank. The country's leadership highlighted the importance of diversifying the economy and decreasing its dependence on the oil and gas sectors in its "Strategic Road Map on National Economic Perspectives" (approved by Presidential Decree on 6 December 2016). In this context, the increased share of renewable energy in the energy mix can offer multiple benefits, including job creation (direct and indirect), economic diversification and associated increases in GDP (Vidadili et al., 2017).

Furthermore, renewables offer the most prominent low-carbon solution to meeting Azerbaijan's climate targets. Azerbaijan has signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) and adopted the Kyoto Protocol as a non-annex country on the international greenhouse gas emission standard. Since the electric power industry is one of the most significant emitters of carbon, the success of renewable power plants is key, as well as increasing the efficiency of existing fossil fuel facilities.

Finally, replacing fossil fuels-based electricity generation with renewables could force Azerbaijan to modernise its national electrical grids. According to AHK Azerbaijan (2019), the investment of US$6.1 billion in the electric power industry from 2006–2017 was not sufficient to ensure a stable and, above all, efficient electricity supply for the country. Azerbaijan has also invested in modernising its old power plants, but the system is still designed to switch back to heavy oil in emergencies (IEA, 2020). In this regard, renewable energy can help Azerbaijan to modernise its electrical infrastructure, apply energy-efficient technologies and set up market-oriented management systems.

Who is Promoting Renewable Energy?

The realization of renewable energy projects requires the involvement of private actors and intergovernmental institutions, as they offer a number of the required resources to realise and evaluate the projects. These resources include financial investment, global networking, technical knowledge and advanced technology.

Considering BP's critical economic and technical role in oil and natural gas projects, Azerbaijan is also interested in BP's participation in auctions on providing the right to generate electricity in its territory through renewable energy sources. Azerbaijan has signed a memorandum of understanding on cooperation with nine

international energy companies including BP (UK), Masdar (UAE), Avelar Solar (Russia), Tekfen (Turkey), Total Eren (France), Equinor (Norway), ACWA Power (Saudi Arabia), Mitsui & Co. (Japan), and Quadran International (France) (Savchenko, 2020b).

However, the State Oil Company of Azerbaijan Republic (SOCAR) has showed little interest in renewable energy and has not formulated a clear renewable energy vision. For example, BP wants 50 gigawatts (GW) of renewables in its portfolio by 2030, up from just 2.5GW today. Contrastingly, it is not clear whether SOCAR is planning to transition from an oil and gas company to a broader-based energy company in the future. One might argue that moving away from its traditional base is risky for SOCAR because of the uncertainty in the speed of transition. Nevertheless, a wait-and-watch strategy by postponing investment decisions can create a window of opportunity for competitors. By analyzing international oil companies' renewable energy investment strategies, Pickl (2019) argues that there is a strong linkage between the oil companies' proven reserves and their renewable energy strategies. Oil majors with less proven oil reserves to tap into seem to be moving into the renewable space faster, with the aim of developing more diverse and less volatile portfolios sooner. Those companies with large pools of oil reserves, remarkably including US majors owning oil assets with especially low breakeven points, are rather selecting the strategy to embrace the renewable industry at a slower pace (Pickl, 2019).

In addition, several international organisations are active in Azerbaijan's renewable energy sector, namely the Asian Development Bank (ADB), the International Energy Charter, the European Bank for Reconstruction and Development (EBRD), the European Union (EU) and the United States Agency for International Development (USAID) (Aydin, 2019). The EBRD helps Azerbaijan with developing renewable energy auctions to facilitate private investment in future renewable energy projects. Furthermore, the ADB has allocated financial and technical support for the development of floating solar panels on Boyuk Shor Lake in Baku. The project involves the creation of a 300-kilowatt solar panel network on the lake (Cekuta, Schulz and Cohen, 2020). The World Bank and the Ministry of Energy have signed an agreement to increase the efficiency of small hydropower plants. Azerbaijan has also been cooperating with IRENA since 2009, and has been a full member of the organisation since 2014. In 2019, IRENA completed the Renewables Readiness Assessment (RRA) report for Azerbaijan.

However, development partners have so far contributed to the renewable energy sector mostly through technical assistance, with limited direct investment in renewable energy projects. Unlike oil and gas projects, the state budget is the main financing source for the development of renewable energy in Azerbaijan. The main reasons for this are the current investment climate, the state monopoly of the power sector, and the fact that renewable energy legislation is not yet investor-friendly.

As mentioned above, renewable energy has many benefits for Azerbaijan, such as more diversified energy mix, less harmful greenhouse gas emissions, and job creation. However, it can be seen that the key actors promoting renewable energy in Azerbaijan are mainly Western-based. While implementing their renewable energy suggestions, Azerbaijan should ask: do these measures actually promote energy security or replicate existing technical, social and legal problems? When are they useful and when are they counterproductive in terms of Azerbaijan's energy security? The existing measures are mainly designed to address energy importing countries' needs, and therefore they should not simply be copy-pasted by Azerbaijan.

Conclusion and Challenges

Considering the fact that the concept of renewable energy is relatively young in Azerbaijan, there are several challenges to its development in the country, such as low oil prices, limited private foreign investments, legal barriers, institutional barriers, lack of political will (including on the part of state-owned energy companies SOCAR and Azerenerji), and inadequate public awareness.

The first issue is low oil prices. The decline in oil prices hinders the development of renewable energy. Since Azerbaijan's economy is based on fossil fuels, low oil prices result in tighter finances, economic slowdown and limited public budgets restricting the county's ability to invest in its renewable energy sector. As expected, annual oil production in Azerbaijan has also begun to decline as its reserves are running out. The Covid-19 crisis has further exacerbated global oil demand and financial uncertainties. In light of this, the Azerbaijani government has prioritised financial resources for the response to the spread of Covid-19.

Secondly, Azerbaijan does not have a dedicated, comprehensive law governing the various aspects of renewable energy development. This creates challenges for private investors when navigating legal and regulatory requirements, resulting in delays in the development of new projects and increased perception of risk among investors. In an aim to fill this gap, the draft law on "The Use of Renewable Energy Sources in the Production of Electricity" has been submitted to the relevant government agencies for approval. Furthermore, Azerbaijan has a significant fossil fuels subsidy system. This implies that the subsidies go to the oil and gas sector, while in actuality they benefit the population through

artificially low fuel prices. Because of this, household prices for energy are very low in the country. However, the renewable energy sector does not receive an equal amount of government support. This unbalanced subsidy system makes the renewable energy sector unattractive for potential investors. Several intergovernmental organisations' reports (e.g., IRENA, 2019) highlight energy subsidy reform, but this reform should be well-designed because it can have a significant adverse impact on the welfare of middle and lower-income consumers.

Thirdly, while measures have been recently implemented to align its banking sector regulations with international norms, renewable energy projects continue to face challenges in terms of access to capital in Azerbaijan due to lack of liquidity in the local banking system and high interest rates, which can be as high as 30% per annum in local currency. In this regard, private domestic investors' willingness to invest in renewable energy has yet to strengthen.

Finally, customers' preference to receive energy from renewable sources, rather than oil and natural gas, was and still is almost non-existent in Azerbaijan. The Azerbaijani public remains poorly informed in terms of the potential presented by a transition away from fossil fuels. Therefore, awareness-raising among the public also needs to be enhanced in order to expand the deployment of renewables in Azerbaijan.

About the Author

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Renewable Energy Development and Energy Security in Armenia

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Abstract

Overly dependent on Russian gas imports and an aging nuclear power plant, lacking domestic hydrocarbon resources and excluded from regional oil and gas projects, the development of indigenous renewable resources will play a key role in bolstering Armenia's energy security in general and limiting reliance on Russia in particular. The country has significant renewable energy potential and has committed to increasing the share of renewables in the energy mix to 26% by 2025. The implementation of renewable energy projects has been slow, however, with prohibitive installation costs and a continued emphasis on nuclear power stymying government investment in resource development. Yerevan has consequently sought to cooperate with both private investors and external political actors to realise its renewables agenda. This paper will explore the contribution of renewable energy to Armenian energy security, focusing in particular on the opportunities made available by and consequences of cooperation with external actors on renewable energy initiatives.

Introduction

Landlocked, without hydrocarbon reserves, and isolated from regional energy projects due to its hostile relations with Azerbaijan, Armenia's energy situation has been precarious since its independence in 1991. The country has remained highly dependent on Russian imports to fulfil domestic energy requirements. Both this dependency and the mismanagement of the energy sector have contributed to several energy crises since independence. The first, which lasted until 1994, highlighted issues with virtually all areas of Armenia energy security including affordability, availability, and security of supply. The second, in 2015, was more limited but nonetheless highlighted issues with the affordability of electricity supply in particular, as well as local corruption in the energy sector and popular dissatisfaction with overdependence on Russia (Kazarian, 2018).

In seeking to redress the dependence on hydrocarbon imports, as well as to address concerns around climate change and sustainability, Yerevan has increasingly sought to develop indigenous renewable resources. Renewable resource development is also essential for Armenia to limit its carbon output and pursue a more environmentally-friendly energy strategy, meaning that diversifying resources will also facilitate the realisation of the state's climate change goals. This paper presents an overview of those renewable policies in the context of efforts to diversify energy sources and reduce dependence on external hydrocarbon suppliers. The next section will briefly outline the contemporary energy situation in Armenia, highlighting in particular the security implications of import dependency. The paper will then briefly explore renewable energy policy in general before focusing more specifically on solar power. In particular, the paper will highlight the necessity of attracting external foreign direct investment (FDI) to develop the renewables sector and the implications of that FDI for energy security.

Armenian Energy Security

Armenia is heavily dependent on fossil fuels. In 2018, crude oil and natural gas accounted for 10% and 64% of total primary energy supply (TPES) respectively. Nuclear power from Armenia's sole nuclear power plant