

EFFECTIVE REGIONAL TRADING OPPORTUNITIES FOR ENERGY RESOURCES: AZERBAIJAN AND GEORGIA CASE

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Overview

This research examines the efficient electricity trade opportunities between Georgia and Azerbaijan. The Republics of Azerbaijan and Georgia possess abundant oil, gas and hydropower resources and this paper investigates the efficient use of those resources in the context of cross-border trading. The author summarizes relevant academic literature on the subject, assesses the energy potential of both countries, examines the similar experiences of other countries, and proposes solutions for developing efficient cross-border energy trading based on the selected methodology and approach. Various solutions and the discussion of these options were presented, recommendations were given and a conclusion was reached.

Methods

Secondary data covered the information on power sector operations of both countries for the last ten years for general analysis purpose. Monthly electricity demand and supply data were reviewed for the purpose of analyzing seasonal fluctuations in generation and consumption patterns in Azerbaijan and Georgia. These covered data on countries' electricity generation, intercountry export and import indicators and tariffs.

The evaluation of Georgia's feasible electricity export was carried out from two perspectives: base case (existing situation) and a long-term future projection. To evaluate Georgia's electricity export potential from base case perspective, the summarized electricity balance for the last ten years, including electricity generation, import, export, domestic consumption, as well as the nameplate and available capacities of hydropower plants, were reviewed. These indicators were averaged based on arithmetic mean, and the actual 'surplus water' period were established relative to the average mean values. Possible additional potential export opportunities were evaluated. Additional export potential of 'surplus water' period were calculated by finding the difference of hydro power plants' (HPP's) production and HPP's available capacity. To assess the economic viability of potential electricity trading between Azerbaijan and Georgia, comparative analysis of production costs for one kWh was conducted.

The evaluation of a long-term export potential was analyzed for the 10-year period (2017-2027). The reference point for this analysis was the Ten-Year Network Development Plan of Georgia for 2017-2027 prepared by the Georgian State Electrosystem (GSE) JSC. The plan encompasses the electricity generation development trend for next ten years, including development of HPPs. It serves as the main source of key data used to assess future perspectives in feasible electricity flows from Georgia to Azerbaijan, including capacities, commissioning period and generation of planned HPPs, as well as the country-wide electricity generation, consumption and export in the said period.

To assess the potentially viable electricity export from Georgia to Azerbaijan in the next ten years, the volumes of feasible electricity export from Georgia to individual neighboring countries were statistically determined using regression analysis. The feasible export volumes to neighboring countries in future were considered as the potential import by 'green energy' by Azerbaijan. The data related to largest thermal power plant of Azerbaijan was used to evaluate the potential economic and environmental benefits of potential electricity import from Georgia.

Results

The following results are noted based on the conducted data analysis and simulations:

1. The potential import of hydropower electricity from Georgia can result in significant fossil fuel savings. Volumes of natural gas to be used in base case situation, potential gas saving and natural gas use after saving (reduction). The total savings would be 3492 million cubic meters of natural gas up to 2026.

2. The electricity import can also reduce heavy fuel oil consumption. The quantities of heavy fuel oil to be used in base case situation, potential heavy fuel oil saving and fuel oil use after saving (reduction). The total savings would be 3007 thousand tons of heavy fuel oil up to 2026.

The gathered data, its processing and analysis show that the proposed approach on electricity trading has significant economic and environmental benefits. The potential electricity trading between Azerbaijan and Georgia would enable the efficient use of energy resources, and save fossil fuels of natural gas and heavy fuel that could provide countrywide economic benefits by exporting them to other countries. Moreover, it provides an incentive to fully utilize the environmentally hydropower resources.

Conclusions

To achieve the set research objective, similar practices and academic approaches of various countries were studied. In this context, the electricity sectors of Georgia and Azerbaijan were analyzed from the point of potential impact of other regional countries; bottlenecks to rational use of energy resources and feasible mitigation activities were identified. The demand-supply analysis of Azerbaijan's and Georgia's electricity sectors was conducted from seasonality aspect; the impact analysis was done for base case and future perspective. An effective energy trading approach with long-run positive environmental impact was developed and introduced. The relevant quantitative estimations on potential fossil fuel saving in electricity generation and CO₂ emissions reduction were performed using the approach accordingly.

The analysis in this study indicates the potential electricity export from Georgia to Azerbaijan could bring large amount of revenues for Georgia. These earnings could be used as investments for building new hydropower generation capacities and maintaining existing ones. As to Azerbaijan, the saved fossil could be exported to neighboring countries (including Georgia) and Europe. The saved fossil fuel would then contribute to emission reductions. The revenues from potential gas export could be used for better maintenance of thermal power plants in Azerbaijan. Ultimately, given the abundant hydropower resources and convenient geographical position, Georgia could export its 'green' energy resources to neighboring countries and serve as an energy hub for the transit of electricity to third-party countries. This would contribute to strengthening the energy security of the overall South Caucasus region.

Summarizing the data analysis and discussion of findings, the authors has identified the following recommendations as the follow-up on this study:

1. Use the opportunity of potential energy trading scheme between Azerbaijan and Georgia analyzed in this study to achieve mutual economic and environmental gains for both countries.
2. Thorough research on potential energy trading opportunities, based on more complex research tools (statistical analysis, demand elasticity, etc.), cohesively assess the mutual energy trading between Azerbaijan and Georgia.
3. Conduct broader research on more comprehensive mutually beneficial energy trading between Azerbaijan and Georgia—Commodity-based energy trading, such as natural gas vs. electricity, could be studied for this purpose.
4. Analysis and use of energy trading for the countries located in regions with similar features – Caspian Basin and Central Asian countries could be options for considerations for detailed research on such opportunities.
5. Study other renewable energy sources for potential 'green' energy trading in Caspian Basin and Central Asia region.