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Is Energy Union Possible in the Organization of Turkic States?

Türk Devletleri Teşkilatı'nda Enerji Birliği Mümkün mü?

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Abstract

This study examines the current structure, strategic potential, and future prospects of energy cooperation within the Organization of Turkic States(OTS).It evaluates the distribution of natural gas, petroleum, coal, uranium, and renewable energy resources among the OTS members and assesses regional infrastructure projects, such as TANAP, BTC, and the proposed Trans-Caspian Pipeline. From a strategic management and regional integration perspective, the study investigates whether the OTS can evolve into an institutionalized regional energy union capable of enhancing collective energy security, geopolitical influence, and sustainable economic development. Methodologically, this research employs qualitative content analysis of academic literature, institutional reports, policy documents, and regional energy strategies. The findings indicate that although OTS members possess complementary energy capacities and strategic transit advantages, political asymmetries, infrastructure gaps, external geopolitical pressures, and institutional fragmentation continue to limit deeper integration. Nevertheless, coordinated infrastructure investments, harmonized energy policies, renewable energy collaboration, and regional governance mechanisms may gradually transform the OTS into a more integrated Eurasian energy corridor. The study contributes to the literature by evaluating OTS energy cooperation not only through geopolitical perspectives but also through strategic management and institutional integration frameworks.

Keywords: Strategic management, Energy cooperation, regional integration, energy union, Organization of Turkic States (OTS).

Öz

Bu çalışma, Türk Devletleri Teşkilatı (TDT) içindeki enerji işbirliğinin mevcut yapısını, stratejik potansiyelini ve gelecekteki beklentilerini incelemektedir. TDT üyeleri arasında doğal gaz, petrol, kömür, uranyum ve yenilenebilir enerji kaynaklarının dağılımını değerlendirirken, TANAP, BTC ve önerilen Trans-Hazar Boru Hattı gibi bölgesel altyapı projelerini de analiz etmektedir. Stratejik yönetim ve bölgesel entegrasyon perspektifinden bakıldığında, çalışma, TDT'nin kolektif enerji güvenliğini, jeopolitik etkiyi ve sürdürülebilir ekonomik kalkınmayı artırabilecek kurumsallaşmış bir bölgesel

enerji birliğine dönüşüp dönüşemeyeceğini araştırmaktadır. Metodolojik olarak, araştırma akademik literatür, kurumsal raporlar, politika belgeleri ve bölgesel enerji stratejilerine dayalı nitel içerik analizi yaklaşımını benimsemektedir. Bulgular, TDT üyelerinin tamamlayıcı enerji kapasitelerine ve stratejik transit avantajlarına sahip olmalarına rağmen, siyasi asimetrilerin, altyapı açıklarının, dış jeopolitik baskıların ve kurumsal parçalanmanın daha derin entegrasyonu sınırlamaya devam ettiğini göstermektedir. Bununla birlikte, koordineli altyapı yatırımları, uyumlu enerji politikaları, yenilenebilir enerji işbirliği ve bölgesel yönetişim mekanizmaları, TDT'yi kademeli olarak daha entegre bir Avrasya enerji koridoruna dönüştürebilir. Bu çalışma, TDT enerji işbirliğini yalnızca jeopolitik perspektiflerden değil, aynı zamanda stratejik yönetim ve kurumsal entegrasyon çerçevelerinden de değerlendirerek literatüre katkıda bulunmaktadır.

Anahtar Kelimeler: Stratejik Yönetim, Enerji İşbirliği, Bölgesel Entegrasyon, Enerji Birliği, Türk Devletleri Teşkilatı (TDT).

1. Introduction

The Organization of Turkic States(OTS), established in 2009 as the Turkic Council and renamed in 2021, represents a significant intergovernmental platform aimed at fostering political, economic, and cultural integration among Turkic-speaking nations (Aydilek 2022). Its full members include Türkiye, Azerbaijan, Kazakhstan, Kyrgyzstan, and Uzbekistan, while Hungary, Turkmenistan, and the Turkish Republic of Northern Cyprus currently hold observer status (Özer 2023). Through regular summits, ministerial forums, and sectoral cooperation platforms, the OTS promotes regional initiatives in transport, trade, energy, technology, and cultural exchange (Yesevi 2022). Acting as an umbrella organization that brings together multiple cooperation mechanisms-such as TURKSOY, TURKPA, the Turkic Academy, and the Turkic Investment Fund-the OTS plays a pivotal role in shaping the collective strategic vision of the Turkic world (Yaldız 2023).

In recent years, the OTS has gained prominence as a regional bloc uniting countries with shared historical, linguistic, and cultural identities, while simultaneously navigating the complex geopolitical dynamics of Central Asia, the Caucasus, and Eurasia (Mustofaev 2022). As global energy markets undergo

profound transformations driven by decarbonization policies, technological innovation, and shifting power balances, the question of whether energy integration within the OTS framework is feasible has become increasingly significant (Koçak, 2023, pp. 118–121). The OTS region possesses substantial and diverse energy resources, including vast reserves of natural gas, oil, coal, uranium, and renewable energy potential (Baghirov 2022). However, despite this endowment, energy cooperation remains fragmented, under-institutionalized, and heavily influenced by external actors (Gül 2024).

From a strategic management perspective, deeper integration in the energy sector offers transformative potential. Energy security, reduced dependency on non-member suppliers, enhanced bargaining power, and geopolitical leverage are among the potential benefits of establishing an energy union within the OTS (Koçak, 2023, pp. 118–121). Existing and planned infrastructure projects, such as the Trans-Anatolian Natural Gas Pipeline (TANAP), the Baku-Tbilisi-Ceyhan (BTC) oil pipeline, and the proposed Trans-Caspian Pipeline (TCP), demonstrate the strategic potential for energy collaboration.

However, the existing debate remains limited in two important respects. First, most studies examine OTS energy cooperation primarily through geopolitical, diplomatic, or resource-based perspectives, while paying insufficient attention to the strategic and institutional mechanisms through which regional energy integration can be gradually constructed (Koçak, 2023). Second, the relationship between resource complementarity, interdependence, institutional coordination, and collective strategic advantage has not yet been systematically conceptualized within the OTS context (Zhang, 2024). Therefore, this study argues that the feasibility of an OTS energy union should not be assessed only by the existence of energy resources or infrastructure projects, but by the extent to which these assets can be transformed into coordinated regional capabilities through governance mechanisms, policy harmonization, and long-term strategic alignment (Keohane and Nye, 2012).

This study evaluates the feasibility and strategic dimensions of establishing an energy union within the OTS. It adopts a qualitative content analysis approach and examines policy documents, institutional strategies, academic literature, and energy infrastructure projects to map the current

landscape of cooperation. It also identifies the strategic opportunities - such as energy diplomacy, transit corridor development, and sustainable growth - as well as the institutional and political constraints that may hinder deeper integration.

By integrating these perspectives, the study seeks to answer the central research question:"Is an energy union possible among Turkic states?"

The findings aim to contribute to the broader discourse on regionalism, energy diplomacy, and sustainable integration in Eurasia by offering actionable policy recommendations to decision-makers seeking to strengthen the OTS's collective energy security, institutional capacity, and long-term competitiveness.

This study contributes by proposing an OTS Energy Integration Framework that elucidates how resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment interact to shape the feasibility of an energy union among Turkic states.

2. Literature

The literature addressing the feasibility of an energy union within the OTS highlights both the opportunities and the multifaceted challenges of energy cooperation in the region.

Regional Energy Unions: The Case of the EU Energy Union From a strategic management perspective, regional energy unions offer valuable lessons for fostering collaboration, efficiency, and resilience in energy policy. The European Union's Energy Union initiative serves as a reference model for regional integration. The EU Energy Union emphasizes five pillars: energy security, a fully integrated internal energy market, energy efficiency, decarbonization of the economy, and research, innovation, and competitiveness(European Commission 2015). For the Turkic world, similar frameworks could provide a strategic roadmap for energy cooperation, enhancing collective bargaining power, policy harmonization, and infrastructure development.

From a strategic management perspective, interdependence theory emphasizes how cross-border flows of energy resources, infrastructure, and

investments foster mutual dependencies among OTS member states. These interdependencies directly influence collective bargaining power, strategic positioning in global energy markets, and the need for coordinated policy frameworks to ensure sustainable and secure energy supply chains. Such insights are grounded in seminal work on power and interdependence (Keohane and Nye, 2012), which emphasizes how states leverage interdependencies to pursue competitive advantages in complex geopolitical environments.

Within the strategic management framework, regionalism theory explains how institutional architectures, governance mechanisms, and cooperative agreements create opportunities for strategic complementarities and competitive advantage. By harmonizing energy policies, co-developing infrastructure projects, and integrating market frameworks, OTS member states can maximize shared value and enhance their collective role in shaping the global energy transition. This theoretical perspective is strongly supported by studies examining the interplay between regional cooperation and energy integration(Goldthau and Witte 2010; Prontera 2020).

Energy cooperation extends beyond the exchange of resources; it represents the institutionalization of long-term competitive strategies. Strategic energy governance involves aligning national energy policies with regional objectives, strengthening diplomatic engagement, and mobilizing investment structures to facilitate sustainable integration. Embedding strategic foresight into governance frameworks enables OTS member states to anticipate geopolitical shifts, mitigate energy security risks, and position themselves as regional energy hubs in an evolving global market. Literature on global energy governance emphasizes the necessity of such multi-level strategies for ensuring energy security, sustainability, and competitive resilience(Cherp et al., 2011; Van et al. 2016).

The Turkic states possess considerable energy reserves and occupy strategically important geographic positions. However, existing energy policies remain largely national and uncoordinated. Strategic management theory suggests that aligning national strategies through collaborative mechanisms can create synergy and competitive advantage (Porter, 1996, pp. 61–65). The

development of shared strategic goals and a long-term vision is essential for effective energy diplomacy. Projects such as TANAP, BTC, and the proposed TCP illustrate how joint initiatives can yield mutual benefits and enhance global positioning (Rzayeva, 2015, pp. 42–47; Furuncu 2018).

According to theories of energy security and integration, the concept is multifaceted, encompassing supply reliability, affordability, and sustainability. Strategic integration theories-such as neofunctionalism and intergovernmentalism-highlight the importance of institutional coordination and political will in regional cooperation (Moravcsik 1993). For the OTS, adopting a strategic management approach means creating a shared vision, establishing governance mechanisms, and identifying key stakeholders, all aimed at reducing external dependencies and fostering resilience. By doing so, the OTS can build a sustainable and cohesive regional energy architecture.

A comprehensive analysis of the structural barriers to energy collaboration among the Turkic Republics reveals several persistent challenges. These include political mistrust and geopolitical competition, particularly due to diverging foreign policy alignments and regional power rivalries, which hinder cohesive energy strategies (Koçak, 2023, pp. 118–121).Economic asymmetries are equally notable: some member states are energy exporters(e.g., Azerbaijan, Kazakhstan),while others, such as Türkiye and Hungary, remain heavily import-dependent, creating divergent national interests in energy negotiations. Technical incompatibilities further obstruct integration, stemming from heterogenous energy infrastructures, regulatory regimes, and grid interoperability issues across the region (Ağır and Aksu 2024). Additionally, varying environmental priorities among member states complicate the coordination of joint projects, particularly as Türkiye continues to rely heavily on fossil fuels despite renewable potential (Akiner 2025). While shared linguistic and cultural ties offer a foundation for cooperation, the limited institutional capacity within the OTS constrains implementation and follow-through of multilateral energy frameworks (Koçak, 2023, pp. 118–121; Ağır and Aksu 2024). Overall, these interconnected structural barriers underscore the complexity of fostering deep energy integration among the Turkic Republics.

The multidimensional strategic vision of the OTS is also emphasized in the edited volume Cumhuriyetimizin 100. Yılında Türk Devletleri Teşkilatı(Kaya et al., 2024, pp. 42–49), which argues that cooperation among Turkic states is increasingly expanding from cultural interaction toward institutional coordination in energy, transportation, trade, and regional diplomacy. The study further emphasizes that energy cooperation constitutes one of the most strategically significant pillars for strengthening long-term regional integration within the Turkic world.

The OTS region is endowed with a diverse array of energy resources. Azerbaijan, Kazakhstan, and Turkmenistan occupy prominent positions in global hydrocarbon reserves and production (BP 2022). Meanwhile, Kyrgyzstan and Uzbekistan stand out for their considerable hydropower capacity (UNDP 2020a). These resource distributions point toward a complementary energy profile, in which member states could benefit from shared trade and infrastructure development.

Energy projects such as the Trans-Caspian Pipeline(TCP)aim to enhance regional interdependence by transporting Turkmen gas through the Caspian Sea to European markets (Akyener 2018). The Southern Gas Corridor, especially the TANAP and TAP pipelines linking Azerbaijan and Türkiye to Europe, has already demonstrated the potential for cross-border cooperation (BP 2022).

Renewable energy is gaining traction in the region. Kazakhstan and Turkmenistan have initiated projects targeting carbon neutrality (UNDP, 2020a). The region's solar, wind, and hydroelectric potential can be leveraged through joint investments and technology sharing. Energy security is a strategic driver of foreign policy within the OTS. Despite China's influence via the Belt and Road Initiative and Russia's traditional dominance, Turkic states are increasingly pursuing diversified energy corridors and autonomy in energy policy (Yergin 2006; OECD 2021).

Regional initiatives highlight the importance of a unified energy strategy, focusing on infrastructure development, crisis response mechanisms, and energy market integration. Investments in interconnection projects and

electricity transmission lines could support this goal and strengthen resilience during supply shocks (UNDP 2020b).

Interdependence theory provides a framework for understanding how TANAP has lowered Türkiye's import costs and opened new markets for Azerbaijan, thereby reinforcing regional cooperation and reshaping geopolitical balances (Keohane and Nye 2012). Future opportunities include integrating hydrogen energy and other low-carbon technologies into the regional energy mix. These innovations would align with global sustainability goals and elevate the strategic importance of the OTS in climate diplomacy (UNDP 2020b).

Resource distribution is another critical aspect. Turkmenistan holds nearly 19.5 trillion cubic meters of proven natural gas reserves, making it the largest gas supplier in the region (BP, 2022). Azerbaijan's role in the Southern Gas Corridor further amplifies its strategic value (Rzayeva, 2015, pp. 42–47). Kazakhstan (with its 30 billion barrels of oil), Azerbaijan, and Turkmenistan also play significant roles in the global oil trade (KazEnergy 2021).

Key projects illustrate the benefits of cooperation. The BTC pipeline facilitates the export of Azerbaijani oil to global markets, while the TANAP pipeline demonstrates the strategic and economic importance of cross-border natural gas infrastructure (BP 2022; Rzayeva 2015). However, existing infrastructure requires modernization and additional investment to support growing demand and interconnectivity (OECD 2021).

Recent studies on the OTS increasingly emphasize the strategic, geopolitical, and institutional dimensions of regional cooperation. Sarı(2023, pp. 141-149) argues that the OTS has evolved beyond cultural cooperation toward a broader security and strategic integration framework. Similarly, Tatlı (2023, pp. 54–58) highlights the growing importance of the Middle Corridor and energy transit routes in strengthening the geopolitical relevance of Turkic states within Eurasian connectivity. Gündoğdu (2023, pp. 270–273) underlines that the OTS has become an important geopolitical instrument for Türkiye's regional opening strategy, particularly in economic and energy-related cooperation. Furthermore, Toraman (2023, pp. 1-12) emphasizes that the OTS possesses significant strategic potential in logistics, international trade, and

European energy supply security due to its geographical position between Asia and Europe.

The literature reveals a dynamic interplay among national interests, energy resources, and geopolitical constraints. While the vision of an OTS-wide energy union remains aspirational, existing infrastructure, successful bilateral projects, and a shared interest in diversification and sustainability provide a strong foundation for progressive integration.

This study integrates regionalism theory, interdependence theory, and strategic management to develop an OTS Energy Integration Framework. Regionalism theory explains the institutional conditions under which geographically and culturally connected states can transform sectoral cooperation into structured regional governance. Interdependence theory clarifies how cross-border energy flows, pipelines, electricity networks, and investment relations generate mutual dependencies that may increase collective bargaining power. Strategic management, in turn, explains how these dependencies can be converted into regional capabilities, competitive positioning, and long-term strategic advantage.

The proposed framework suggests that an OTS energy union can emerge when four mechanisms interact: resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment. Resource complementarity refers to the uneven but potentially synergistic distribution of natural gas, oil, coal, uranium, hydropower, solar, and wind potential among OTS member states and relevant observer states. Infrastructure connectivity encompasses pipelines, electricity grids, storage facilities, and digital monitoring systems that physically link national energy systems. Institutional coordination refers to common rules, ministerial platforms, energy committees, investment mechanisms, and crisis-response arrangements. Strategic alignment reflects the convergence of national energy policies around shared objectives such as energy security, market diversification, bargaining power, and sustainable transition (Van de Graaf and Colgan, 2016, pp. 2–5).

This framework advances the literature by shifting the analysis from the descriptive question of whether Turkic states possess sufficient energy resources to the explanatory question of under what strategic and institutional

conditions these resources can be transformed into a regional energy union. The study contributes to the literature on strategic management and regional energy governance by conceptualizing energy integration as a gradual capability-building process rather than as a purely geopolitical or infrastructure-based outcome.

Figure 1: OTS Energy Integration Framework

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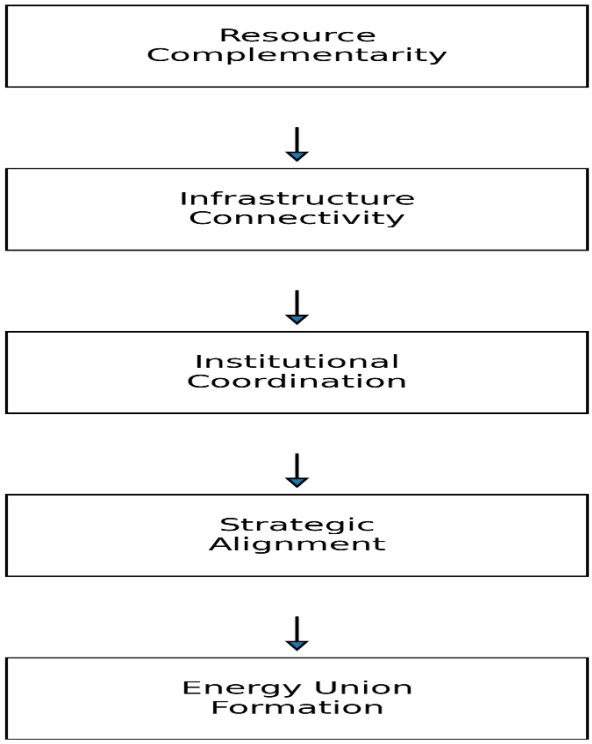


Source: Prepared by the author

Figure 1 illustrates the proposed OTS Energy Integration Framework developed in this study. The framework suggests that the feasibility of an

energy union depends on the interaction of four mutually reinforcing dimensions: resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment. Together, these dimensions facilitate the gradual transformation of national energy assets into collective regional capabilities, thereby increasing the likelihood of energy union formation.

Overall, the literature demonstrates that the OTS possesses substantial geopolitical and energy-related potential; however, most existing studies remain descriptive, resource-oriented, or geopolitically focused. Comparatively little attention has been devoted to explaining how energy resources, infrastructure projects, institutional mechanisms, and strategic objectives interact to produce regional integration capacity (Koçak, 2023, pp. 118–121). This gap is important because energy union formation is not merely a matter of resource abundance; it requires the transformation of dispersed national assets into coordinated regional capabilities (Keohane ve Nye, 2012, pp. 7–12). T his study contributes to the literature by developing an OTS Energy Integration Framework linking regionalism theory, interdependence theory, and strategic management. Through this framework, the article evaluates not only the opportunities and constraints of energy cooperation but also the strategic mechanisms through which the OTS may gradually evolve into a more institutionalized regional energy actor.

3. Methodology

3.1. Research Design

This study adopts a qualitative, exploratory research design to investigate the feasibility and strategic dynamics of establishing an energy union within the OTS. Given the complex and interdependent nature of regional energy integration, a qualitative approach enables a comprehensive, context-sensitive analysis of institutional, economic, and geopolitical factors shaping cooperation among member states (Yin 2018).

3.2. Data Collection

The study employs document analysis, a systematic qualitative method for examining and interpreting textual data to derive meaningful insights (Bowen

2009). Documents were selected using purposive sampling to ensure their relevance, credibility, and comprehensiveness. The data sources include:

Academic literature on strategic management, energy policy, and regional integration; Institutional reports from the IEA, UNDP, OECD, and World Bank, providing policy baselines and statistical insights; Governmental and intergovernmental documents, including OTS summit declarations, ministerial communiqués, national energy strategies, and regional cooperation frameworks. Triangulating these diverse sources strengthens the validity and trustworthiness of the findings.

3.3. Analytical Framework

The research uses qualitative content analysis to systematically identify, categorize, and interpret themes, concepts, and patterns relevant to energy cooperation (Schreier 2012). The analysis follows four stages.

The coding framework was directly derived from the proposed OTS Energy Integration Framework. Accordingly, the documents were examined through four theoretically informed categories: resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment.

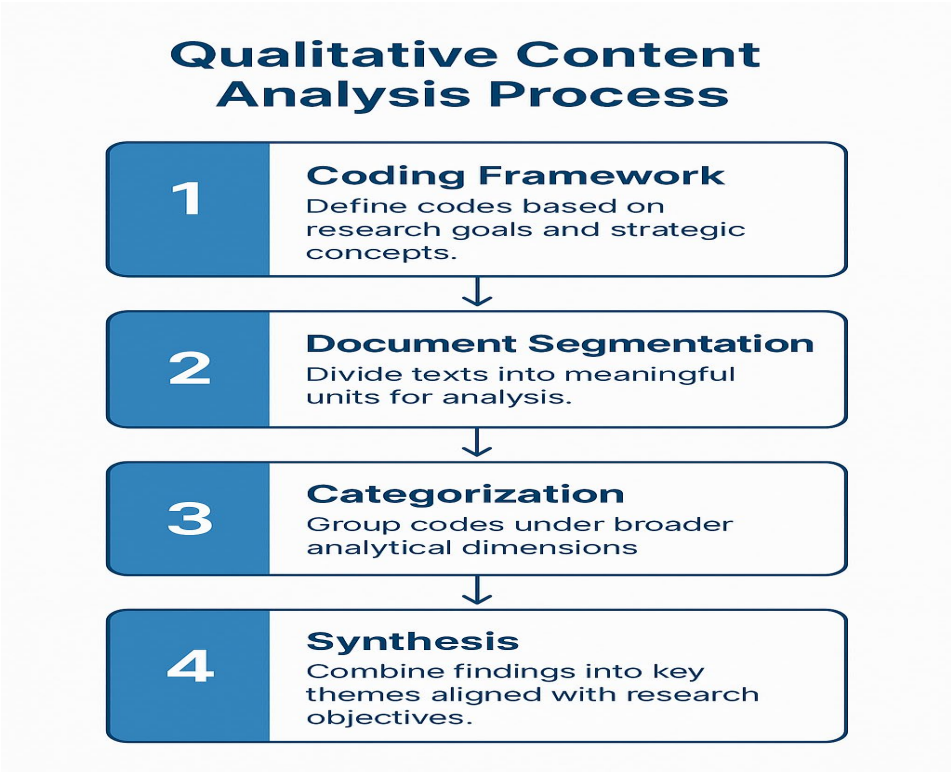
Table 1: Coding Categories Derived from the OTS Energy Integration Framework

Analytical Theme	**Coding Categories**
Resource Complementarity	Natural gas, oil, coal, uranium, renewable energy
Infrastructure Connectivity	TANAP, BTC, TCP, electricity interconnections
Institutional Coordination	OTS meetings, Vision 2040, Energy Committee, cooperation programs
Strategic Alignment	Energy security, policy harmonization, market diversification, geopolitical positioning, sustainable energy transition.

Source: Prepared by the author

Table 1 summarizes the coding structure employed in the analysis. The coding categories were derived deductively from the proposed OTS Energy Integration Framework and guided the identification of recurring themes across the examined documents.

Figure 2: Qualitative Content Analysis Process



Source: Prepared by the author

Figure 2 illustrates the qualitative content analysis process employed in this study, which was designed to ensure a systematic and theoretically grounded examination of the data. In the first stage, a coding framework was developed based on the research objectives and key concepts derived from the

strategic management literature. This framework provided a structured basis for identifying and organizing relevant information within the selected documents. In the second stage, the documents were segmented into meaningful units of analysis, allowing for a more systematic interpretation of the textual data. The third stage involved categorizing the coded information into broader analytical dimensions, thereby facilitating the identification of patterns, relationships, and recurring themes across the dataset. In the final stage, the findings were synthesized into overarching themes that were closely aligned with the study's objectives and theoretical framework. This multi-stage process ensured that the evidence was interpreted in a rigorous and transparent manner while maintaining a strong connection to strategic management theories. As a result, the analysis enabled a deeper understanding of the institutional opportunities, strategic complementarities, and integration challenges associated with energy cooperation within the Organization of Turkic States.

3.4. Analytical Dimensions

Resource Complementarity:

Examines the distribution of natural gas, oil, coal, uranium, and renewable energy resources among OTS members and evaluates how these resources create opportunities for mutual benefit and regional specialization.

Infrastructure Connectivity:

Assesses pipelines, electricity interconnections, storage facilities, and other cross-border energy infrastructure that facilitate regional energy integration and market access.

Institutional Coordination:

Investigates OTS energy cooperation mechanisms, ministerial platforms, policy frameworks, and governance arrangements that support collective decision-making and regional energy management.

Strategic Alignment:

Evaluates the extent to which member states share common objectives regarding energy security, market diversification, geopolitical positioning, and sustainable energy transition.

By structuring the analysis around these dimensions, the study integrates findings with the OTS Energy Integration Framework, providing a theoretically grounded assessment of the prospects for the formation of a regional energy union.

3.5. Research Validity

To enhance validity and reliability, the study combines multi-source triangulation, systematic coding, and transparent documentation. Analytical rigor is strengthened by aligning findings with established strategic theories and situating them within the institutional and geopolitical realities of the OTS region (Elo et al. 2014). This integrated approach ensures that conclusions are both theoretically grounded and policy-relevant.

4. FINDINGS

This section presents findings regarding the current status, resource potential, and future prospects for energy cooperation among OTS members. The analysis explores energy resource distribution, production capacities, strategic projects, renewable energy opportunities, and institutional mechanisms, providing insights into how the region can enhance its role as a strategic energy corridor between Asia and Europe.

4.1. Resource Complementarity among OTS Members

Energy Profiles of Member States Azerbaijan and Kazakhstan are leading hydrocarbon exporters, with Kazakhstan holding over 30 billion barrels of proven oil reserves and Azerbaijan actively engaged in natural gas exports via the Southern Gas Corridor (BP 2022). Turkmenistan holds one of the world's largest gas reserves, while Uzbekistan contributes significantly to the region's fossil fuel output. Türkiye, despite limited hydrocarbon reserves, plays a vital transit role, especially through TANAP and BTC (Furuncu 2018). Kyrgyzstan, despite its relatively small energy exports, has substantial hydropower potential, thereby positioning it as a key contributor to renewable energy.

OTS members possess significant energy resources, including natural gas, oil, coal, and uranium, which create substantial opportunities for regional integration and increased influence in global markets. Although resources are unevenly distributed, effective collaboration facilitates optimal utilization of these assets, strengthening the region's role as a strategic energy corridor between Asia and Europe.

Table 2: Production Of Natural Gas, Petroleum and Coal

Country / Indicator	**2019**	**2020**	**2021**	**2022**	**2023**
Türkiye - Natural Gas (bcm)	0,47	0,44	0,39	0,38	0,81
Türkiye - Oil (thousand bbl/day)	61	63	65	68	71
Türkiye - Coal (Mt)	79,5	80,3	81	82,4	84
Azerbaijan - Natural Gas (bcm)	35,6	36,3	37,1	38	39
Azerbaijan - Oil (thousand bbl/day)	780	750	730	710	700
Azerbaijan - Coal (Mt)	0,2	0,2	0,2	0,2	0,2
Kazakhstan - Natural Gas (bcm)	19,8	20	20,2	20,4	20,6
Kazakhstan - Oil (thousand bbl/day)	1750	1800	1850	1900	1950
Kazakhstan - Coal (Mt)	108	109	110	111	112
Kyrgyzstan - Natural Gas (bcm)	0,03	0,03	0,03	0,03	0,03
Kyrgyzstan - Oil (thousand bbl/day)	2	2	2	2	2
Kyrgyzstan - Coal (Mt)	1,5	1,5	1,5	1,5	1,5
Turkmenistan - Natural Gas (bcm)	59,5	58	57	56	55
Turkmenistan - Oil (thousand bbl/day)	275	277	279	281	283

Uzbekistan - Natural Gas (bcm)	57,2	57,4	57,6	57,8	58
Uzbekistan - Oil (thousand bbl/day)	70	68	66	64	62
Uzbekistan - Coal (Mt)	3,4	3,3	3,2	3,1	3

Source: Energy Institute

An analysis of natural gas reserves and production among OTS members reveals significant regional imbalances. Turkmenistan holds 19 Tcm of reserves but underutilizes its capacity; production fell from 69.3 bcm in 2015 to 55 bcm in 2023. In contrast, Azerbaijan increased its output from 29.1 bcm to 39 bcm by leveraging offshore projects and pipelines. Kazakhstan and Uzbekistan exhibit stable production despite moderate reserves, whereas Türkiye more than doubled its production but remains a minor contributor. Kyrgyzstan, with negligible reserves, relies heavily on external supplies. These trends underscore a divergence in strategy between resource-rich but underutilized states and expansion-oriented producers (Table 2).

An analysis of petroleum reserves and production among OTS members shows clear regional disparities. Kazakhstan is dominant, with 30 billion barrels of reserves and production, which increased from 1.6 mb/d in 2015 to 1.95 mb/d in 2023. Azerbaijan, despite its 7 billion barrels of reserves, experienced a slight decline in output from 842 kb/d to 700 kb/d, owing to the maturity of its fields. Türkiye, despite modest reserves, steadily increased production from 53 kb/d to 71 kb/d, whereas Turkmenistan and Uzbekistan experienced only limited growth. Kyrgyzstan remains a negligible contributor and relies heavily on imports (Table 2).

Table 3: Reserves Of Natural Gas, Petroleum and Coal

Country	**Natural Gas Reserve (Tcm)**	**Petroleum Reserve (Billion Barrels)**	**Coal Reserve (Billion Tons)**
Azerbaijan	2,3	7	0,2
Kazakhstan	1,8	30	25,6

Kyrgyzstan	0,004	0,04	1,3
Turkmenistan	19	11	0,1
Uzbekistan	1	0,6	1,9
Türkiye	0,75	0,6	1,2

Source: Energy Institute

Turkmenistan, Azerbaijan, Kazakhstan, and Uzbekistan are the leading natural- gas-rich countries in the OTS. Turkmenistan holds the largest reserves of 19 trillion cubic meters (Tcm), followed by Azerbaijan (2.3 Tcm), Kazakhstan (1.8 Tcm), and Uzbekistan (1 Tcm). Türkiye, with 0.75 Tcm(trillion cubic meters), plays a strategic role in transit and consumption. Kyrgyzstan has limited reserves. Kazakhstan accounts for 30 billion barrels of the region's petroleum reserves, followed by Turkmenistan (11 billion barrels)) and Azerbaijan (7 billion barrels). Türkiye and Uzbekistan each hold 0.6 billion barrels, whereas Kyrgyzstan holds only marginal amounts (Table 3).

An assessment of coal reserves and production among OTS members reveals that coal resources are highly concentrated. Kazakhstan dominates, with 25.6 billion tons of reserves, and has increased production slightly from 107.3 Mt in 2015 to 112 Mt in 2023. Türkiye ranks second in production, growing steadily from 72.9 Mt to 84 Mt, despite its smaller reserves. Uzbekistan holds 1.9 billion tons but has experienced a decline in production from 3.8 Mt to 3 Mt, whereas Kyrgyzstan's production has remained stable at 1.5 Mt. Azerbaijan and Turkmenistan contribute minimally, underscoring Kazakhstan's dominant role in the region's coal sector (Table 2).

Table 4: The Production of Uranium

Year	Kazakhstan	Uzbekistan
2015	23800	2385
2016	24600	2404
2017	23321	2404
2018	21705	2404
2019	22808	2404
2020	19477	2400
2021	21819	2500

2022	21227	2500
2023	21000	2500

Source: Energy Institute

An evaluation of uranium production within OTS demonstrates Kazakhstan's global dominance: production was 23,800 tons in 2015 and declined slightly to 21,000 tons by 2023. Uzbekistan, the only other notable producer, increased output modestly from 2,385 tons to 2,500 tons. These figures highlight Kazakhstan's leading role and Uzbekistan's potential as a supporting partner, thereby creating strategic opportunities for regional nuclear collaboration and strengthening their positions in the global nuclear energy supply chain (Table 4).

4.2 Infrastructure Connectivity and Transit Capacity

Regional energy integration within the OTS is significantly shaped by strategic cross-border energy infrastructure projects, most notably the TANAP and BTC pipelines. These projects not only enhance regional interconnectivity but also strengthen the collective geopolitical influence of OTS members in global energy markets.

The TANAP pipeline, operational since 2018, plays a pivotal role in transporting natural gas from the Shah Deniz field in Azerbaijan through Georgia and Türkiye to European markets. Strategically, TANAP contributes to European energy diversification efforts, reducing dependence on Russian gas supplies while reinforcing Türkiye's emerging role as a regional energy hub(Rzayeva 2015).Within the OTS framework, TANAP represents a model of successful multilateral collaboration, aligning national energy policies with broader regional objectives and enabling member states to translate resource wealth into geopolitical leverage (Furuncu 2018).

Similarly, the BTC pipeline has redefined the regional oil export landscape since its commissioning in 2006. By transporting crude oil from the Caspian basin to the Mediterranean port of Ceyhan, BTC has significantly strengthened Azerbaijan's export capacity while consolidating Türkiye's strategic importance in global energy transit(BP 2022).From a strategic management perspective, BTC illustrates how infrastructure-driven regionalism can enhance

competitive positioning by linking resource-rich producers directly with high-demand European markets (Sovacool 2012).

Together, TANAP and BTC demonstrate how integrated energy infrastructure can foster regional interdependence, enhance collective bargaining power, and enable OTS member states to play a more proactive role in shaping the evolving dynamics of global energy governance. These projects also provide a scalable blueprint for future initiatives, such as the Trans-Caspian Gas Pipeline and the Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline, which could further consolidate the region's strategic relevance to global energy security.

While the region possesses diverse energy assets, infrastructure coordination remains fragmented. Kazakhstan and Turkmenistan have pipeline networks oriented toward Russia and China, thereby limiting their flexibility. The TCP (Trans-Caspian Pipeline) remains a strategic yet unrealized project for connecting Central Asian gas to European markets (Rzayeva, 2015, pp. 42–47). Infrastructure gaps, such as electricity interconnections and renewable energy grids, hinder deeper integration. Harmonizing infrastructure investments could foster a more resilient and interconnected energy system within the OTS framework.

Regional integration within the OTS is increasingly shaped by collaborative initiatives in electricity interconnection and renewable energy deployment. Ongoing cross-border electricity projects among Kazakhstan, Uzbekistan, and Turkmenistan aim to enhance grid stability, reduce supply fluctuations, and support mutual energy sharing during peak demand periods (UNDP 2020a). These interconnections not only foster energy security but also lay the groundwork for an integrated regional power market, enhancing operational efficiency and cost optimization.

The region also possesses significant potential for renewable energy development, particularly in solar and wind power. Kazakhstan has some of the highest solar irradiation levels in Central Asia, while Turkmenistan holds considerable untapped wind energy potential (Tesfaye 2021). Accelerating investment in renewables would support decarbonization objectives, diversify the regional energy mix, and align OTS member states with global

sustainability agendas. Strategically, coordinated development of renewable energy infrastructure could position the OTS as a regional leader in clean energy transitions and strengthen climate diplomacy within multilateral frameworks.

Kazakhstan and Uzbekistan have a strategic advantage in the nuclear energy sector because of their substantial uranium production. Kazakhstan, as the world's largest uranium producer, and Uzbekistan, with its steadily growing output, provide a resource base for regional nuclear collaboration (KazEnergy 2021). Establishing joint ventures, technology-sharing mechanisms, and research partnerships would enable OTS members to develop nuclear power capabilities while ensuring energy security, sustainability, and technological sovereignty. Moreover, coordinated nuclear policies could enhance the bloc's bargaining power in global nuclear markets and strengthen strategic autonomy in low-carbon energy transitions.

4.3 Institutional Coordination and Governance Capacity

The institutional framework of energy cooperation within the OTS has evolved considerably following the Energy Ministers' Meetings held in 2021 and 2023. The creation of the Energy Coordination Committee and the implementation of the Multilateral Energy Cooperation Program (2023–2027) reflect a strong political will to enhance regional integration, promote policy alignment, and strengthen strategic collaboration among member states (OTS 2023). Furthermore, the Vision 2040 framework outlines a long-term strategic roadmap focused on energy diplomacy, infrastructure connectivity, and technology transfer (OTS 2024). These institutional mechanisms enhance collective governance capacity, facilitate investment coordination, and enable the formulation of evidence-based regional strategies for energy security and sustainability.

While resource endowments and production capacities vary significantly among OTS member states, the region demonstrates substantial potential for deepening energy integration. Ongoing infrastructure projects, renewable energy development, nuclear cooperation, and strengthened institutional mechanisms collectively create a strategic foundation for advancing a cohesive and sustainable energy union.

4.4 Strategic Alignment and Collective Energy Vision

Beyond physical infrastructure and institutional mechanisms, the feasibility of an OTS energy union depends on the extent to which member states pursue compatible strategic objectives. Analysis of OTS declarations, Vision 2040 documents, and ministerial statements reveals a growing convergence around four priorities: energy security, market diversification, regional competitiveness, and sustainable energy transition. Collectively, these priorities indicate an emerging strategic alignment that may support deeper regional cooperation.

At the same time, differences in national energy structures, geopolitical orientations, and external partnerships continue to constrain full policy harmonization. While Türkiye prioritizes energy transit and market integration, hydrocarbon-exporting states such as Azerbaijan, Kazakhstan, and Turkmenistan focus more strongly on export diversification and revenue stability. Consequently, strategic alignment remains an evolving, rather than a fully institutionalized, dimension of OTS energy cooperation. Nevertheless, the increasing emphasis on common objectives suggests that the foundations of a shared regional energy vision are gradually taking shape.

5. Results And Discussion

The findings broadly support the proposed OTS Energy Integration Framework. Resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment emerge as mutually reinforcing dimensions shaping the prospects of regional energy integration (Keohane ve Nye, 2012, pp.7–12; Prontera, 2020). However, the analysis also demonstrates that progress across these dimensions remains uneven, creating both opportunities and constraints for the future development of an OTS energy union (Ağır ve Aksu, 2024, pp. 105–128).

Political, Economic, and Technical Barriers: Political will varies across member states and is influenced by domestic priorities and external pressures. Russian and Chinese interests constrain independent energy strategies. Disparities in economic development and institutional capacity affect project implementation. Technical barriers include outdated transmission networks and insufficient digitalization of energy monitoring. Addressing these issues

requires cross-border governance structures and shared risk management mechanisms (OECD 2021).

Shared Interests and Strategic Opportunities Despite differences, OTS members share common interests in energy security, economic growth, and regional influence. Joint ventures in renewables, coordinated crisis response mechanisms, and cross-border electricity trading represent viable areas for cooperation. The creation of a regional energy coordination platform under OTS could facilitate dialogue, standardization, and strategic alignment, fostering a gradual yet resilient path toward an energy union (Tesfaye 2021).

5.1. Strengthening Energy Cooperation Among Turkic States

Strengthening energy cooperation within the OTS is strategically important for fostering regional solidarity and accelerating economic development. Developing joint energy policies can ensure trade stability and more efficient resource use (Akyener 2018). These policies should include mechanisms for crisis management, pricing frameworks, and energy-sharing protocols.

Renewable energy cooperation offers substantial opportunities. Countries like Turkmenistan and Kazakhstan, with significant solar and wind potential, can lead regional renewable energy projects through technology and knowledge Exchange (Tesfaye 2021). These projects contribute not only to economic benefits but also to carbon neutrality goals across the OTS.

Beyond existing cooperation mechanisms, the OTS should establish more concrete institutional and operational structures to deepen regional energy integration (Prontera, 2020; European Commission, 2015). First, a common Turkic energy-exchange platform could be established to facilitate regional electricity and natural gas trading through standardized pricing and digital monitoring systems (Van de Graaf ve Colgan, 2016). Second, member states could establish a joint strategic natural gas reserve mechanism to improve collective resilience during geopolitical crises or supply disruptions (Yergin, 2006, pp. 69–82; Cherp vd., 2011, pp.75–88). Third, harmonizing technical standards-covering electricity transmission, renewable-certification systems, and pipeline-security regulations-would significantly reduce infrastructure incompatibilities across the region (Prontera, 2020; OECD, 2021). Fourth, the

creation of a Turkic Renewable Energy Investment Fund could accelerate solar, wind, hydrogen, and energy storage projects through coordinated financing mechanisms (Tesfaye, 2021, pp. 118–130). Finally, joint energy research centers and technical training programs should be established to strengthen regional human capital and technological cooperation in the energy sector (Van de Graaf and Colgan, 2016)

5.2. Geopolitical and Economic Potential

The OTS region enjoys a geopolitical advantage as an energy corridor connecting Caspian resources to Europe and Asia. Projects such as TANAP and BTC illustrate the strategic use of this positioning. TANAP enhances energy security by delivering Azerbaijani gas to Europe, while BTC facilitates Caspian oil exports to global markets, elevating the economic and strategic relevance of OTS (Rzayeva 2015; BP 2022).

Beyond energy transportation, the OTS region increasingly functions as a geopolitical balancing corridor among Russia, China, the European Union, and the Middle East (Tatlı, 2025, pp. 519–537). This strategic positioning enhances the bargaining power of OTS members within global energy diplomacy and strengthens their role in Eurasian connectivity initiatives (Toraman, 2023, pp. 1–12). The integration of transport corridors, logistics infrastructure, and energy transit systems may gradually transform the OTS into a multidimensional regional hub linking Asian energy resources with European markets (Gündoğdu, 2023, pp. 266–279).

Energy trade remains a crucial component of national economies. Hydrocarbon exports support public budgets, while cooperation among energy-importing members enhances supply security and economic stability (TESPAM 2019). Moreover, energy partnerships foster regional economic solidarity and mitigate geopolitical risks.

5.3. Challenges to Energy Cooperation

OTS energy cooperation faces several challenges arising from political and economic conditions. Political instability in some member states hinders project sustainability and amplifies external influence, especially from Russia and China (OECD 2021).

Inadequate infrastructure also poses major barriers. Expanding and modernizing pipelines, electricity grids, and renewable energy facilities require significant investment (TESPAM 2019). Limited financial resources threaten project viability and scalability. Leveraging international funding and enhancing intra-regional collaboration will be critical (Sovacool 2012).

Another critical challenge is the absence of a fully institutionalized supranational governance mechanism within the OTS (Koçak, 2023, pp. 118–121). Unlike the European Union's Energy Union model, the OTS currently lacks binding regulatory frameworks, centralized coordination capacity, and integrated energy market institutions (European Commission, 2015, pp. 2–6). This institutional limitation constrains the implementation of long-term regional strategies and reduces the effectiveness of collective energy governance.

5.4. Policy and Strategic Implications

Energy cooperation within the OTS carries significant policy and strategic implications, shaping both regional integration and global energy dynamics. TANAP plays a pivotal role in this process, with its current annual capacity of approximately 16.2 billion cubic meters(Bcm),of which around 10 Bcm is delivered to Europe(Pipeline Journal 2024).TANAP's planned expansion to 31 Bcm/year will further enhance the OTS's influence over European energy security and diversify supply routes away from Russian dominance(S&P Global 2025).

Similarly, the BTC oil pipeline, with a transport capacity of nearly 1 million barrels per day, significantly strengthens Azerbaijan's export capabilities while consolidating Türkiye's strategic role as a regional energy hub (European Commission 2006).Moreover, Kazakhstan increased its oil exports via BTC by approximately 12% in the first half of 2025, reaching approximately 785,000 tons, demonstrating a strategic shift toward alternative export corridors that bypass traditional, Russia-centric routes(Reuters 2025).

Collectively, these developments underscore the strategic leverage that OTS members gain by aligning infrastructure, harmonizing energy policies, and diversifying supply channels. Through coordinated energy strategies and strengthened institutional mechanisms, the OTS is increasingly positioned as a

key actor in global energy governance, capable of shaping regional power balances and offering Europe reliable alternatives for energy imports.

Strengthening energy cooperation among OTS members necessitates a phased, strategic, and data-driven framework grounded in infrastructure, policy harmonization, and external engagement.

In the short term, OTS should prioritize the development of a unified regional energy strategy, the modernization of pipeline infrastructure, and the initiation of knowledge-sharing programs focused on renewable technologies. TANAP currently delivers approximately 16.2 billion cubic meters (Bcm) annually, of which approximately 5.7 Bcm is allocated to Türkiye and the remainder is routed to Europe. Expansion efforts targeting 31 Bcm/year by 2027 would significantly enhance OTS's geopolitical influence (TANAP Consortium 2024).

Medium-term objectives should include integrating the electricity grid, securing international financing, and establishing regional crisis-response mechanisms. These steps will enhance resilience and interdependence across the OTS energy network.

Over the long term, OTS can develop a regional energy market, implement carbon-neutral energy policies, and establish research centers to facilitate the transfer of energy technologies. Achieving these goals depends on overcoming persistent challenges, such as political instability, external influences, infrastructure gaps, financial limitations, and technology-sharing constraints.

The infrastructure illustrates OTS's capacity for strategic change: the BTC pipeline continues to expand its role, with Kazakhstan increasing its oil exports by 12% during the first half of 2025, reaching 785,000 tons (Reuters 2025). This diversification helps the landlocked nation bypass Russia-dominated routes and assert greater autonomy in energy exports (Reuters, 2025). Moreover, Azerbaijan's natural gas exports to the EU have contributed to reducing Europe's dependence on Russian pipeline gas; Azerbaijan's share of EU imports rose from 3% (8 Bcm) to 7% in 2021. The broader regional impact is evident as the EU's share of Russian gas imports fell dramatically from 45% in 2021 to 15% in 2023 (Bruegel 2024).

Looking ahead, OTS-driven energy corridors stand to further strengthen economic ties and political cohesion, and to elevate the bloc's strategic presence in global energy governance. With coordinated planning and robust institutional support, the OTS can transition from a collection of fragmented resource holders to a unified energy corridor connecting Europe, Asia, and the Middle East.

6. Conclusions

This study examined the feasibility of establishing an energy union within the Organization of Turkic States (OTS) through the lens of regionalism theory, interdependence theory, and strategic management. The findings demonstrate that the prospects for regional energy integration depend not only on the availability of energy resources and infrastructure assets but also on the extent to which member states can develop institutional coordination, policy harmonization, and long-term strategic alignment. In this respect, the study advances the literature by proposing the OTS Energy Integration Framework, which conceptualizes energy union formation as a gradual capability-building process driven by the interaction of resource complementarity, infrastructure connectivity, institutional coordination, and strategic alignment.

The findings reveal that the OTS possesses significant structural advantages for deeper energy cooperation. The region combines substantial reserves of natural gas, oil, coal, uranium, and renewable energy resources with a strategically important geographical position linking Europe, Central Asia, and the Caucasus. Existing infrastructure projects such as TANAP and BTC demonstrate that energy cooperation among Turkic states can generate mutual economic and geopolitical benefits. However, the analysis also indicates that political asymmetries, infrastructure gaps, external geopolitical pressures, and limited supranational governance capacity continue to constrain the emergence of a fully integrated regional energy market. Consequently, the findings suggest that any future OTS energy union is more likely to evolve through gradual and differentiated integration rather than through a highly centralized institutional model.

From a strategic management perspective, the study highlights that energy integration should be understood as a process of transforming dispersed

national assets into collective regional capabilities. This perspective shifts the discussion beyond traditional geopolitical and resource-based explanations by emphasizing the role of governance mechanisms, strategic coordination, and institutional capacity in shaping regional competitiveness. Accordingly, the long-term success of energy cooperation within the OTS will depend on the ability of member states to coordinate investment decisions, harmonize regulatory frameworks, strengthen energy governance institutions, and develop shared strategic priorities.

The study also offers several policy implications. Establishing a regional energy coordination platform, harmonizing technical and regulatory standards, expanding cross-border electricity and renewable energy projects, and creating joint investment mechanisms could significantly enhance regional energy resilience and competitiveness. Furthermore, increased collaboration in renewable energy technologies, energy storage systems, hydrogen development, and research and development activities would support both energy security objectives and sustainable transition goals. Such initiatives could strengthen the OTS's position as a strategic Eurasian energy corridor while enhancing its role in global energy governance.

Despite these contributions, the study has certain limitations. The analysis relies primarily on qualitative content analysis and secondary data sources, which may limit the ability to evaluate causal relationships among the identified dimensions of energy integration. Future research could test the proposed OTS Energy Integration Framework using quantitative methods, expert surveys, panel data analyses, or comparative studies involving other regional energy integration initiatives. Such research would provide additional evidence regarding the institutional and strategic conditions under which regional energy unions emerge and evolve.

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