



Global Lithium Dynamics: US-China Geopolitical Competition and its Implications on Energy Security in South Asian Region

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ABSTRACT:

This paper examines the implications of U.S.–China geopolitical competition over lithium resources for energy security, with a focus on South Asia. Nearly 25% of the world's population, South Asia is a developing region facing rising energy demands driven by economic growth (World Bank, 2020). Lithium is a critical resource because of its central role in rechargeable batteries used in electric vehicles, smartphones, laptops, and renewable-energy storage systems, supporting the global shift from petroleum to cleaner energy. The lithium-ion battery market has expanded rapidly with growth in electric vehicles, electronics, and energy storage, increasing demand for lithium and related battery materials. Lithium was included in the U.S. list of minerals considered critical to economic and national security in 2018 (U.S. Geological Survey, 2018). These developments have heightened competition over lithium production, processing, and downstream supply chains, with potential implications for energy security and trade exposure in South Asia. The paper assesses how this rivalry may shape regional development.

KEYWORDS: Lithium Geopolitics, US-China Competition, Energy Security, South Asia, Renewable Energy.

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1. INTRODUCTION

Since the beginning of human history, energy has been essential for humanity. The overall demand for energy has grown because of population growth and modernization. The wider South Asian region faces significant energy-development challenges and opportunities for renewable-energy expansion (Ahmed et al., 2016). Lithium is not itself a primary energy source, but it is an important material for batteries used in electric mobility and energy storage. Figure 1 shows that the share of renewable electricity generation is expected to grow significantly by 2028, with a notable increase in variable renewables such as wind and solar PV, while hydropower remains fairly stable during this period. It underscores the growing importance of sustainable energy sources in combating climate change and supporting energy security. Keeping in view the importance of this transition, the world is moving toward renewables. This shift has also increased attention to U.S.–China competition over lithium production, processing and battery manufacturing, which is relevant to energy-transition and supply-chain debates in South Asia.

Geopolitics is a term surrounded by both the fields of 'geography and politics,' which is a much-debated term among academicians and writers, initially used to refer to the influence of geography on a state's decision-making power in international relations, at first as a deterministic causal relationship between geography and international relations. In general, according to the concept of power and space, geopolitics accentuates the significance of natural resources, supply lines, and strong points.

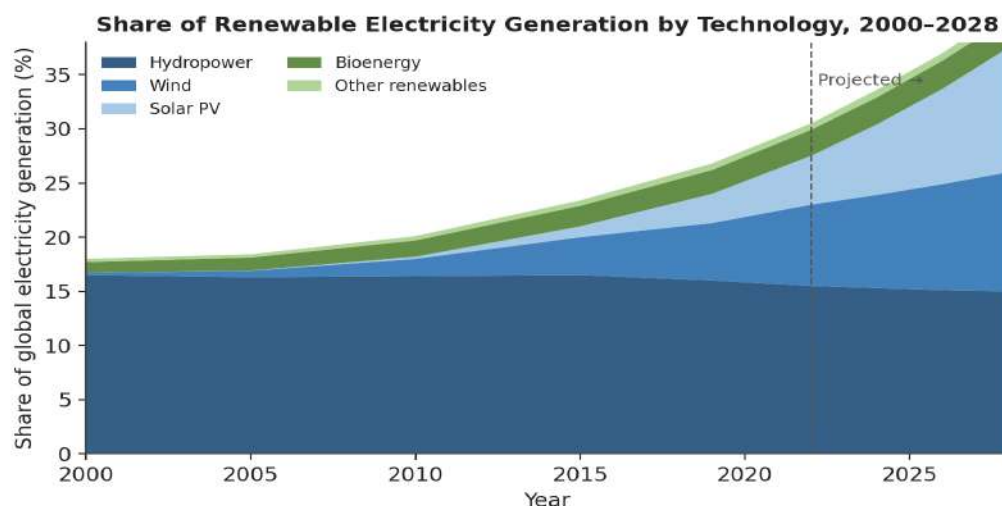


Figure 1: Share of renewable electricity generation by technology, 2000-2028 (IEA, 2023).

The original meaning of geopolitics links political power and strategic decision-making to geographic space and material resources (Vakulchuk et al., 2020). In the contemporary literature, relations between China and the United States are increasingly described in terms of strategic competition, including competition over technology, trade and supply chains (Campbell & Ratner, 2018; Mazarr et al., 2018). Energy and critical minerals have therefore become important components of wider geo-economic relations, but the implications for South Asia depend on the specific supply chains and forms of trade examined in this study.

Conflict is a contest between people who have opposing wants, ideas, views, values, or ambitions. Although the concepts of competition and conflict are somewhat similar, conflict is not the same as competition; competition includes, regardless of some conflict, a level of normal points, interests, and arrangements within a structure with rules or standards (Mnookin et al., 2004). Competition is a behavior that aims to limit the benefits accessible to others, and in a time of growing global competition, political, economic, and military rivalry are all on the rise (Milner, 1992). This is one of the most challenging, important, and evident facets of the strategic rivalry between the US and China (Center & Bates, 2019).

Compared with the twentieth century, the economic relationship between China and the United States has changed substantially, with greater emphasis in recent policy debates on strategic competition and supply-chain resilience (Mattis, 2018; Mazarr et al., 2018). These developments are relevant to South Asia because the region has growing energy needs and participates in international markets for batteries and other clean-energy technologies. Rather than assuming that either power exercises direct influence over South Asian lithium resources, this study examines the extent to which trade and investment patterns expose regional economies to different external supply chains.

The international energy and technology system is becoming more multipolar, while critical minerals and clean-energy technologies are increasingly incorporated into economic and strategic policy. This study therefore examines U.S.–China competition in relation to lithium and downstream battery supply chains across South Asia. It considers the possible implications for regional energy security, technological development and investment, while distinguishing documented trade patterns from broader geopolitical interpretations.

2. PROBLEM STATEMENT

South Asian economies are increasingly incorporating batteries and other clean-energy technologies into transport, electricity storage and renewable-energy systems. However, the available trade evidence in this study concerns battery imports rather than direct imports of raw or refined lithium. The central problem is therefore to assess whether differences in battery-supply exposure to China and the United States may create vulnerabilities for regional energy security and technological development, without treating battery-import values as a direct measure of lithium-resource dependence. These relationships are examined using geo-economic and dependency perspectives, while recognizing that the trade data provide an indicator of downstream supply-chain exposure rather than proof of political or economic dependence.

3. RESEARCH OBJECTIVE

This study examines the implications of U.S.–China competition over lithium and battery supply chains for South Asian countries. It also considers the potential implications of this competition for the development of South Asia as an energy hub, innovation hub and for financial development in the region.

4. RESEARCH QUESTIONS

- (i) What are the implications of U.S.–China competition over lithium and related battery supply chains for geopolitical dynamics and energy security in the South Asian region?
- (ii) What are the implications of South Asian exposure to lithium-ion battery imports from the U.S. and China for its economic and development goals?
- (iii) What role does this competition play in policy changes or shifts in South Asian countries in response to wider geopolitical objectives?

5. THEORETICAL FRAMEWORK

The lithium race between China and the United States has implications for the energy security and economic development of South Asia. This study applies Geo-Economic Theory and Dependency Theory as analytical perspectives for examining how economic instruments, trade, technology and investment can shape strategic relationships. These theories do not establish that South Asian states are economically subservient to either power; rather, they provide concepts for examining whether asymmetric trade, technology and investment relationships may create forms of structural dependence. The theoretical framework is therefore used to interpret observed supply-chain patterns rather than to assume the outcome in advance.

5.1 *Geo-Economic Theory*

Geo-Economic Theory holds that the use of economic instruments as tools of state power is growing as an alternative to traditional military supremacy. According to the theory, states leverage trade, investment, technology, and financial systems to fulfil their geopolitical goals. In the context of modern conflict, Edward Luttwak (1990) introduced the concept of geo-economics as “the logic of war carried out through other means,” in which economic power functions as a strategic weapon in conflict.

5.2 *Application of Geo-Economic Theory in the South Asian Context*

The United States and China are engaged in strategic and economic competition involving critical minerals, batteries and clean-energy technologies. China has a large role in battery manufacturing and lithium processing, while the United States is pursuing policies intended to strengthen and diversify critical-mineral and battery supply chains (Graham et al., 2021; Sun et al., 2021). In South Asia, the relevant issue is not demonstrated ownership of regional lithium resources, but the extent to which local markets are exposed to external suppliers and technologies. The bilateral trade data examined below are therefore interpreted as evidence of downstream supply-chain exposure rather than evidence that either country directs or owns South Asian lithium resources.

5.3 *Dependency Theory*

Dependency Theory provides a framework for examining how unequal patterns of trade, technology and investment can reproduce structural dependence between economies. In this study, it is used as an interpretive perspective for asking whether concentrated external supply of batteries and clean-energy technologies may constrain domestic industrial development. The theory is not treated as evidence that South Asian countries are necessarily underdeveloped or economically subservient to a particular external power.

5.4 *Application of Dependency Theory in the South Asian Context*

South Asian economies obtain batteries and other energy technologies through international trade, while domestic lithium extraction and processing capacity remains limited in several countries. The evidence presented in this study does not establish that Afghanistan, India or Pakistan directly purchase raw lithium from China or the United States at the levels implied by the earlier wording. Instead, the analysis focuses on downstream battery imports and on the broader capacity of South Asian states to develop domestic processing, manufacturing and recycling capabilities. Foreign investment may create economic opportunities as well as forms of exposure; whether particular investments produce dependence depends on their contractual, technological and institutional conditions.

5.5 *Integration of Theories*

From a dependency perspective, concentration in foreign technology, investment and trade can create structural exposure when domestic alternatives are limited. Geo-Economic Theory complements this perspective by examining how states may use trade, infrastructure, investment and technology as instruments of economic statecraft. The present study uses these theories to interpret the implications of external battery-supply exposure for South Asian energy security and industrial development, rather than to presume that China or the United States determines political outcomes in the region.

6. REVIEW OF LITERATURE

South Asian nations, including India, Pakistan, Bangladesh, Nepal and Sri Lanka, are increasingly relevant to debates about clean-energy technology, critical minerals and regional energy security. The lithium value chain spans mining, chemical processing, cell manufacturing and downstream applications, with production and processing concentrated in a limited number of countries. China is a major battery-manufacturing hub, while lithium resources and mining are geographically distributed across Australia, South

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America, China and other regions (Dorn & Peyré, 2020; Graham et al., 2021). Battery and critical-mineral supply chains can therefore transmit disruptions across borders (Dyatkin & Meng, 2020). Research on lithium demand also indicates substantial future growth associated with electric vehicles and energy storage (Graham et al., 2021; Calisaya-Azpilcueta et al., 2020). The literature identifies China as a major actor in lithium processing and battery manufacturing, while the United States and other economies are developing policies to diversify critical-mineral and battery supply chains (Graham et al., 2021; Sun et al., 2021). These developments make downstream trade exposure an important issue for importing economies. However, battery-import values should not be treated as equivalent to raw-lithium dependence because batteries include substantial value added from cells, components, assembly and technology. This distinction is central to the empirical interpretation adopted in the present study.

Figure 2 illustrates how lithium use is distributed among various applications. In the source-vintage distribution shown in Figure 2, batteries accounted for 65% of global lithium end use, followed by ceramics and glass (18%), lubricating greases (5%), polymer production (3%), continuous casting mold flux powders (3%), air treatment (1%), and other uses (5%). With 18% of the market, ceramics and glass form the second-largest category, using lithium to improve material qualities. Smaller shares are allocated to continuous casting mold flux powders and polymer synthesis (3%) and lubricating greases (5%). Usage is low for air treatment (1%) and other miscellaneous applications (5%). This distribution emphasizes the significance of lithium in contemporary technologies, particularly energy storage systems.

Distribution of Global End-Use Markets of Lithium

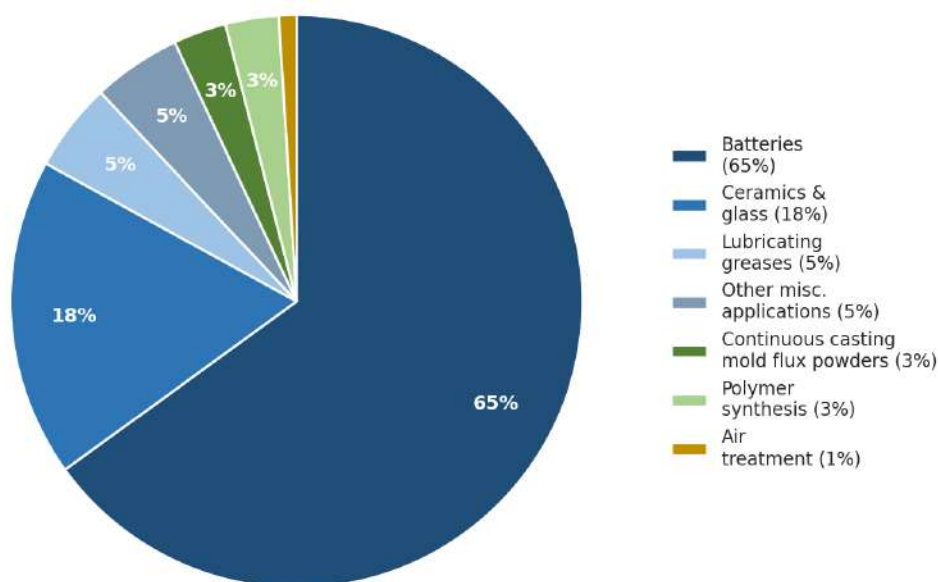


Figure 2: Distribution of global end-use markets of lithium (U.S. Geological Survey, 2020).

Although lithium geopolitics has been widely discussed, comparatively less attention has been given to how U.S.–China competition in lithium and downstream battery supply chains may affect South Asian economies as a group. The present study is an explicitly disclosed extension of the authors' earlier Pakistan-focused article, Imran, Mohsin, Zehra, and Ashraf (2025), which examined U.S.–China lithium competition primarily through the lens of Pakistan's energy security. The present manuscript retains the broad research problem but changes the unit of analysis and empirical scope by examining eight South Asian economies, comparing bilateral battery-import values from China and the United States for 2018–2022, and incorporating country-level renewable-energy developments. It also applies Geo-Economic Theory and Dependency Theory to a regional comparison rather than the earlier Pakistan-focused framework. Any continuity in the research problem and conceptual background is therefore intentional and disclosed; the present study does not claim that the underlying research question is entirely new. The principal contribution is the comparative regional analysis of downstream battery-supply exposure and its implications for energy-system resilience. Because the trade data measure batteries rather than raw or refined lithium, the study does not use them as proof of direct lithium-resource dependence. Instead, it asks how concentrated exposure to external battery suppliers may affect technological and supply-chain resilience in South Asia.

7. BATTERY IMPORT EXPOSURE OF SOUTH ASIAN COUNTRIES (2018–2022)

Table 1. Imports of lithium-ion batteries from China by South Asian countries in M\$ and K\$ (OEC bilateral product data, 2018–2022).

Year	Nepal	Pakistan	India	Maldives	Sri Lanka	Afghanistan	Bangladesh	Bhutan
2022	6.97 M\$	124 M\$	2.08 B\$	2.55 M\$	35.7 M\$	1.05 M\$	89.8 M\$	463 K\$
2021	7.79 M\$	135 M\$	1.26 B\$	1.59 M\$	2.45 M\$	1.14 M\$	122 M\$	36.3 K\$
2020	6.55 M\$	62 M\$	840 M\$	0.659 K\$	2.09 M\$	1.24 M\$	116 M\$	57 K\$
2019	12.4 M\$	74 M\$	903 M\$	808 K\$	1.99 M\$	2.4 M\$	83.6 M\$	285 K\$
2018	8.21 M\$	64 M\$	1.02 B\$	820 K\$	1.63 M\$	3.07 M\$	106 M\$	200 K\$

Table 2. Imports of lithium-ion batteries from the USA by South Asian countries in M\$ and K\$ (OEC bilateral product data, 2018–2022).

Year	Nepal	Pakistan	India	Maldives	Sri Lanka	Afghanistan	Bangladesh	Bhutan
2022	67.5 K\$	1.11 M\$	19.3 M\$	361 K\$	43.7 K\$	4.61 K\$	0	0
2021	28.1 K\$	439 K\$	17.7 M\$	128 K\$	58.3 K\$	155 K\$	308 K\$	0
2020	37.9 K\$	535 K\$	13.3 M\$	220 K\$	59 K\$	1.88 M\$	0	0
2019	59.9 K\$	984 K\$	13.1 M\$	121 K\$	146 K\$	2.3 M\$	0	0
2018	228 K\$	1.55 M\$	3.75 M\$	131 K\$	134 K\$	3.13 M\$	0	0

The data show substantially higher reported import values for lithium-ion batteries from China than from the United States across the eight South Asian economies during 2018–2022. India is the largest importer by reported import value in both series, with imports from China rising from about \$1.02 billion in 2018 to \$2.08 billion in 2022, compared with \$3.75 million and \$19.3 million from the United States in those years. Pakistan, Bangladesh, Sri Lanka and Nepal also recorded higher Chinese than U.S. battery imports in most years, while U.S. trade was small or absent for Bhutan and some other smaller economies. These figures indicate greater exposure to Chinese downstream battery supply chains during the period examined. They do not, however, establish direct dependence on Chinese-mined or Chinese-refined lithium, because the traded product is a finished battery and its value includes components, manufacturing and technology. The pattern should therefore be described as concentration of battery-supply exposure rather than as proof of comprehensive regional lithium dependence.

8. GLOBAL LITHIUM RESOURCES / RESERVES

Table 3. Global lithium resources and reserves (metric tons), based on U.S. Geological Survey Mineral Commodity Summaries, January 2021 (Jaskula, 2021).

Country	Lithium Resources (tons)	Lithium Reserves (tons)
Bolivia	21,000,000	NA
Argentina	19,300,000	1,900,000
United States	7,900,000	750,000
Australia	6,400,000	4,700,000
China	5,100,000	1,500,000
Germany	2,700,000	NA
Canada	2,900,000	530,000
Congo (Kinshasa)	3,000,000	NA

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Country	Lithium Resources (tons)	Lithium Reserves (tons)
Mexico	1,700,000	NA
Czechia	1,300,000	NA
Serbia	1,200,000	NA
Chile	9,600,000	9,200,000
Peru	880,000	NA
Mali	700,000	NA
Brazil	470,000	95,000
Zimbabwe	500,000	220,000
Spain	300,000	NA
Portugal	270,000	60,000
Namibia	50,000	NA
Ghana	90,000	NA
Finland	50,000	NA
Austria	50,000	NA
Kazakhstan	50,000	NA
World total	86,000,000	21,000,000

The U.S. Geological Survey reported about 86 million metric tons of identified lithium resources and 21 million metric tons of reserves in its January 2021 Mineral Commodity Summaries. These figures indicate a substantial global resource base, but the availability of economically recoverable lithium depends on geology, extraction technology, investment, infrastructure, regulation and environmental and social constraints. Graham et al. (2021) similarly note that expanding lithium production raises sustainability and energy-security challenges. The concentration of lithium processing in China, particularly for material from hard-rock sources, is an additional supply-chain consideration, but it should not be equated with Chinese ownership of global lithium resources.

9. EXPECTED WORLDWIDE GROWTH OF LITHIUM EXTRACTION AND PROCESSING

Lithium is an important input to energy-storage technologies, including lithium-ion batteries used in electric vehicles, renewable-energy systems and portable electronics. Energy security also concerns the resilience of supply chains against disruptions, geopolitical risks and other external shocks. Strategies for reducing vulnerability can include supply diversification, resilient infrastructure, efficiency improvements, recycling and domestic production where economically and technically feasible. Global lithium demand is expected to grow as battery applications expand, while research highlights the continuing trade-off between rapid deployment, supply-chain resilience and sustainable extraction (Graham et al., 2021; Fan et al., 2020). China's important position in lithium processing and battery manufacturing is therefore relevant to energy-security discussions, but the specific risks for South Asia depend on the downstream supply chains through which individual countries obtain batteries and other technologies.

9.1 Expansion in Lithium Carbonate Demand

In 2020, global demand for lithium, expressed in kilotons of lithium carbonate equivalent, was estimated at 429 kt. Graham et al. (2021), drawing on IEA projections, report that demand could exceed 1,000 kt in 2030 under current policies and exceed 2,500 kt under a pathway consistent with the IEA's sustainable development scenario. The projected increase is associated particularly with electric vehicles and energy storage. These are scenario-based projections rather than observed outcomes, and they should therefore be interpreted as estimates of possible future demand rather than forecasts of a single certain trajectory.

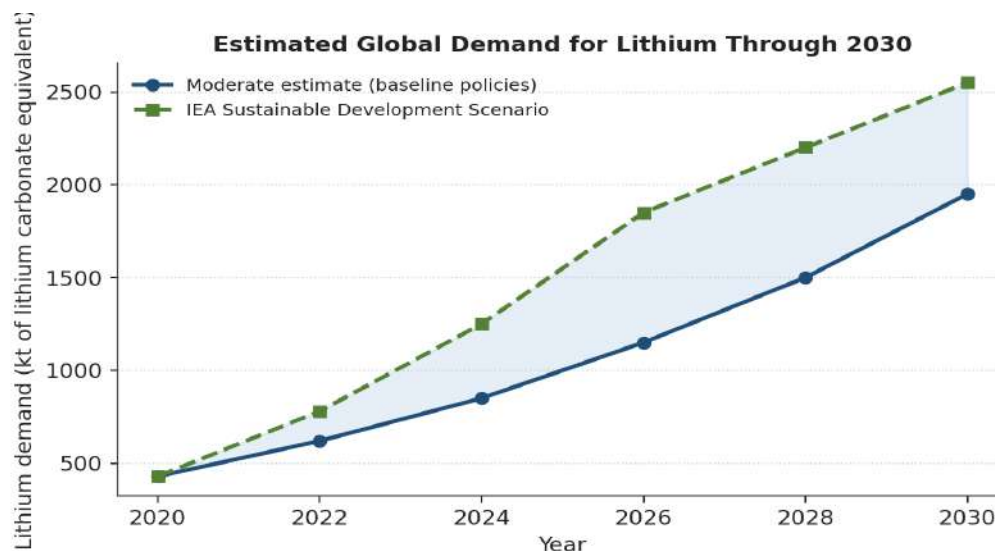


Figure 3: A moderate estimate of the demand for lithium through 2030 in Kt of lithium carbonate equivalent, assuming the IEA's sustainable development scenario is not implemented. Batteries for electric vehicles account for the majority of demand (Gonzales et al., n.d.).

9.2 Average Price of Lithium Carbonate, 2010–2023

The annual average U.S. price for battery-grade lithium carbonate reached \$37,000 per metric ton in 2022, according to the U.S. Geological Survey (2023). The increase reflected strong lithium demand and tighter market conditions, although spot prices varied by market and month. Figure 4 illustrates the longer-term price series. The price movement demonstrates the volatility of lithium markets and the potential relevance of commodity-price changes to battery and energy-storage costs; it does not by itself demonstrate deliberate price-setting behavior by any country.

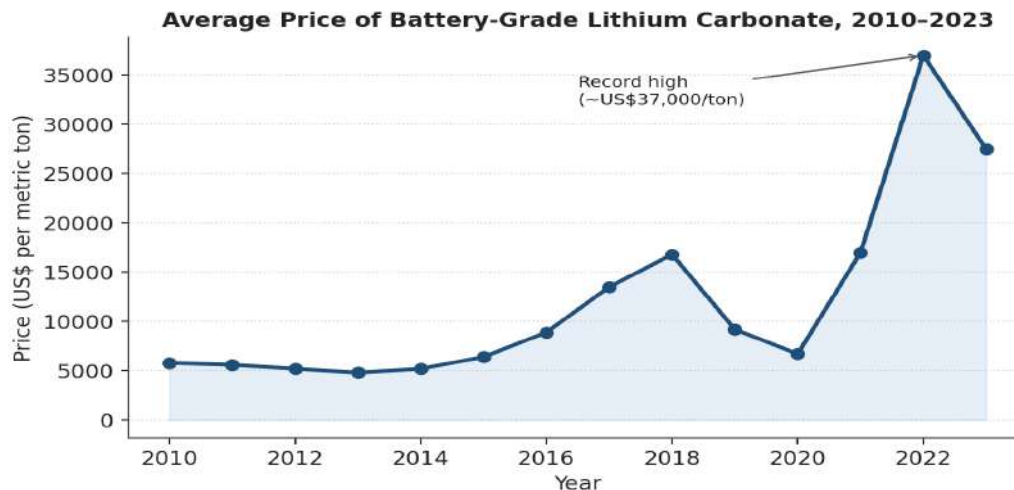


Figure 4: Average price of lithium carbonate, 2010–2023 (in US\$ per metric ton) (Statista, 2024).

10. COMPETITION FOR CLEAN-ENERGY TECHNOLOGY AND INVESTMENT

China and the United States both treat technological capability as a strategic consideration in contemporary strategic competition (Altıparmak, 2023).

10.1 Investment and Policy Initiatives by China and the USA for Renewable Energy

China has made significant investments in renewable energy and clean-energy manufacturing. The IEA reports that Chinese energy investment accounted for about one-third of global clean-energy investment and that China commissioned very large additions of solar PV and wind capacity in 2023. The country's solar, lithium-battery and electric-vehicle industries also expanded strongly (IEA, 2024a). These figures demonstrate substantial industrial and investment capacity, but they do not by themselves establish political dominance over South Asian energy systems.

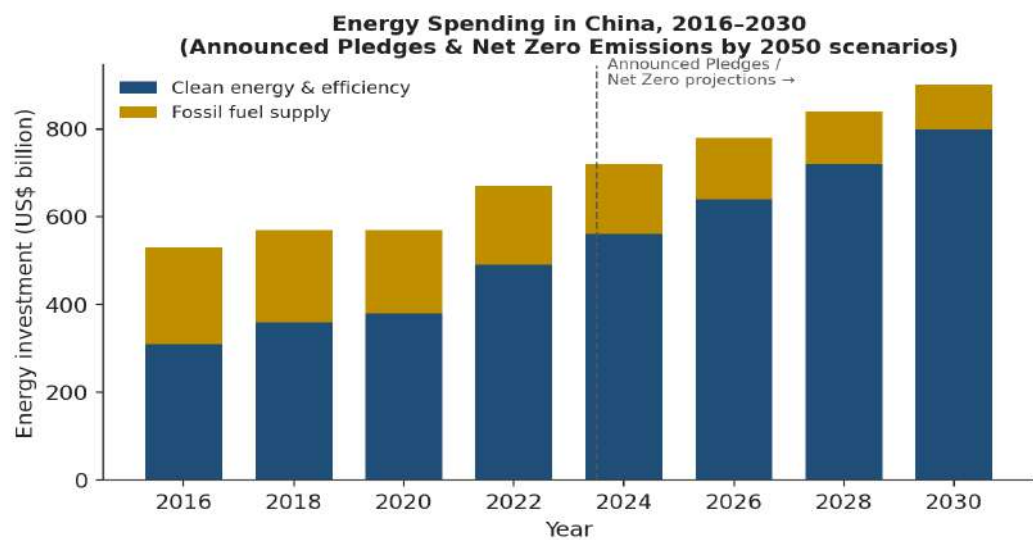


Figure 5: Energy spending in China, 2016–2030, under the Announced Pledges and Net Zero Emissions by 2050 scenarios (IEA, 2024a).

Investment in clean energy has risen substantially in the United States, reaching about \$280 billion in 2023, according to the IEA. The Bipartisan Infrastructure Investment and Jobs Act and the Inflation Reduction Act provide major policy support for clean-energy and infrastructure investment. These measures are intended to expand clean-energy manufacturing, grid investment, energy efficiency and workforce development, while financing and permitting constraints remain relevant (IEA, 2024b). The scale of U.S. investment provides an alternative source of technology and capital, but the present study does not infer from these policies that U.S. battery supply to South Asia is already comparable with China’s.

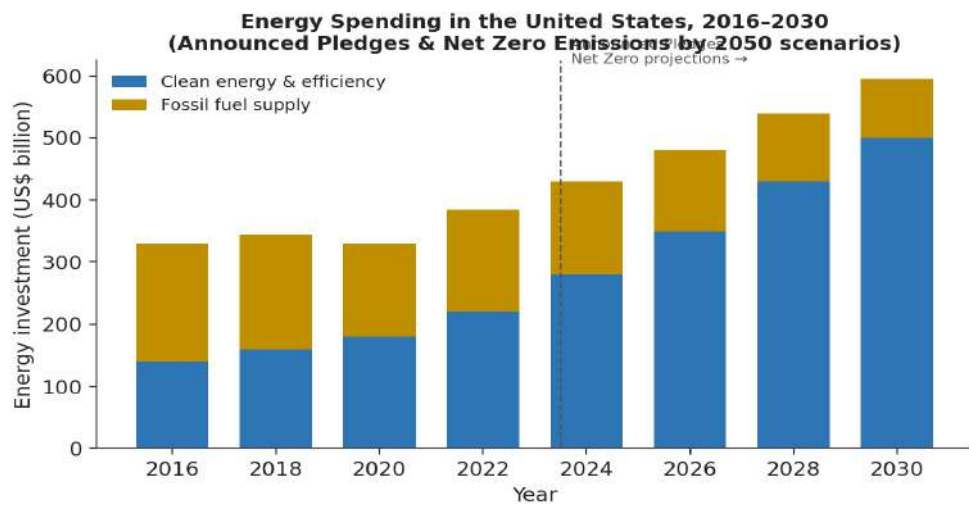


Figure 6: Energy spending in the United States, 2016–2030, under the Announced Pledges and Net Zero Emissions by 2050 scenarios (IEA, 2024b).

11. RENEWABLE ENERGY DEVELOPMENTS ACROSS SOUTH ASIA: TRENDS, TARGETS AND CHALLENGES

11.1 Pakistan

Pakistan has experienced rapid growth in imports of Chinese photovoltaic and related energy equipment. According to reporting on China Photovoltaic Industry Association data, Pakistan was a major export market for Chinese PV products in 2024, including inverters. The government has also set renewable-energy targets, while the IGCEP 2047 provides longer-term capacity planning (The Express Tribune, 2024). These developments indicate growing exposure to imported clean-energy hardware, but they should not be treated as direct evidence of lithium dependence. The battery-import data in Tables 1 and 2 provide a separate indicator of downstream battery-supply exposure.

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11.2 India

India's medium- and long-term renewable-energy targets include 500 GW of non-fossil energy capacity by 2030 and net-zero emissions by 2070. These targets were presented in the context of the COP26 commitments (International Trade Administration, n.d.). India is also the largest importer of lithium-ion batteries from China among the eight South Asian economies in the dataset used here (Table 1). This combination makes India an important case for examining how renewable-energy expansion interacts with downstream battery-supply exposure, without assuming that such exposure is equivalent to direct lithium-resource dependence.

11.3 Afghanistan

Afghanistan's Renewable Energy Roadmap (RER2032) sets technology-specific objectives for expanding renewable-energy capacity and developing a private-sector-led renewable-energy industry by 2032 (Asia Pacific Energy Portal, n.d.-a). Afghanistan's lithium potential is frequently discussed in strategic-resource debates, but the present study does not treat prospective resources as established production capacity. Any future mining development would depend on investment, infrastructure, governance and environmental conditions; its effects on regional supply chains therefore remain uncertain.

11.4 Bangladesh

Over the past 15 years, low-cost Chinese technology has played a major role in Bangladesh's solar-energy sector. The Financial Express reported in June 2023, citing IDCOL data, that more than 4.5 million solar home systems were operating and that Chinese firms accounted for about 60% of the solar home-system market. The report also discussed the role of Chinese manufacturers in solar equipment and the importance of quality assurance and possible diversification (Rahman, 2023). These figures support a claim about Chinese participation in Bangladesh's solar-technology market, not about direct lithium-resource dependence.

11.5 Sri Lanka

The share of renewable energy (RE) in Sri Lanka's electricity mix increased after the nation achieved its goal of generating at least 10% of its electricity from renewable sources in 2014. Following this, in 2015, the share of fossil fuels in the electricity mix declined while the share of large hydro and renewable energy increased. In order to achieve the goal of 100% renewable electricity generation by 2050, a co-publication of the Asian Development Bank and the United Nations Development Programme outlines scenarios and mechanisms for this transition, highlighting the many technical and financial obstacles Sri Lanka is likely to encounter, including the feasible electricity generation mix and financial interventions needed to meet the target (Asian Development Bank, n.d.-a).

11.6 Bhutan

Bhutan primarily relies on hydropower and has also begun exploring solar development to diversify its energy mix (Observer Research Foundation, n.d.). Its renewable-energy profile differs from countries whose energy-transition hardware is more strongly associated with imported batteries. This contrast is useful for the present discussion, but it should not be interpreted as evidence that Bhutan has avoided all forms of external technology or supply-chain exposure.

11.7 Maldives

The Government of Maldives and the Asian Development Bank (ADB) signed an agreement for a \$50.5 million renewable energy initiative, the Accelerating Sustainable System Development Using Renewable Energy (ASSURE) Project. Supported by ADB, the project will improve energy security and move the Maldivian power sector toward sustainable renewable energy by using grid-scale energy storage, energy management systems, and upgrades to distribution grids on 20 islands. It will also implement emerging renewable technologies such as ocean-based floating solar panels, wind turbines, and flow batteries, and will support skill development for Maldivian agencies to improve their financial and technological knowledge of renewable energy systems. The financing includes \$41.5 million from the Asian Development Fund, an \$8.5 million concessional loan, and a \$500,000 Climate Change Fund grant, with \$48 million in co-financing from partners including Japan's JFJCM, alongside private-sector investments (Asian Development Bank, n.d.-b).

11.8 Nepal

In order to unite and coordinate policies and programs in the RE sector behind a set of strategic objectives, the Alternative Energy Promotion Center (AEPC) uses the National Renewable Energy Framework (NREF) as an umbrella mechanism. Its objective is to unite the efforts of the Government of Nepal (GoN), development partners (DPs), and other organizations behind a single, overarching vision implemented through an integrated results framework, jointly owned by the GoN and DPs. The RE Framework will engage stakeholders, facilitate fundraising, and coordinate and track the results of various RE projects (Asia Pacific Energy Portal, n.d.-b).

12. RESEARCH METHODOLOGY

This study adopts a qualitative, descriptive-analytical research design grounded in secondary data. It draws on peer-reviewed journal articles, institutional reports (IEA, USGS, ADB, World Bank), and international trade statistics to trace how U.S.-China competition over lithium is shaping energy security outcomes in South Asia.

Trade data presented in Tables 1 and 2 (bilateral imports of lithium-ion batteries by South Asian countries from China and the USA, 2018–2022) were obtained from the Observatory of Economic Complexity (OEC) using its lithium-ion battery product series. OEC notes that HS 850760 is the classification used for lithium-ion batteries. These data are used as an indicator of downstream battery-technology and supply-chain exposure, not as a direct measure of raw or refined lithium imports. The same OEC lithium-ion battery product series was queried separately for each of the eight South Asian countries shown in Tables 1 and 2. Raw-lithium trade is not used as the primary comparative dataset because a consistently comparable country-level series was not available for all eight countries. Reserve and resource figures in Table 3 are drawn from the U.S. Geological Survey's January 2021 Mineral Commodity Summaries (Jaskula, 2021). Data on renewable-energy targets and country-level developments were compiled from government policy documents, multilateral development-bank publications, and other identified institutional or industry sources for the eight South Asian countries covered in this study.

The analytical approach combines Geo-Economic Theory and Dependency Theory (Section 5) as an interpretive lens through which the trade and investment data are read, rather than as a basis for statistical hypothesis testing. The study is therefore exploratory and interpretive rather than causal or predictive in nature.

12.1 Limitations

Several limitations should be noted. First, battery-import values are an imperfect proxy for lithium dependency, since batteries embed value added from components other than lithium itself, and this study does not have access to disaggregated raw-lithium trade data for most South Asian countries. Second, the country case studies in Section 11 rely on secondary reporting of varying vintage and depth, which limits direct cross-country comparability. Third, as a desk-based study, this paper does not incorporate primary interviews with policymakers or industry actors in the region, which would allow for a richer account of how these dependencies are perceived and managed domestically. These limitations point to clear directions for future research, including firm- or country-level surveys and disaggregated commodity-trade analysis specific to raw and processed lithium.

13. FINDINGS AND ANALYSIS

The findings indicate that Chinese battery and other clean-energy products have a substantial role in South Asian energy-transition markets. The bilateral trade data show higher reported import values for lithium-ion batteries from China than from the United States across the countries and years examined. From a dependency-theory perspective, this concentration can be interpreted as potential structural exposure to external technology and supply chains; however, the data do not demonstrate political dominance by China or direct dependence on Chinese lithium resources. Geo-economic analysis is therefore used to examine how trade, investment and technology may create opportunities and vulnerabilities rather than to assume a predetermined hierarchy of influence.

13.1 Chinese and American Influence on South Asia's Renewable Energy Transition

The trade data indicate substantially greater exposure of several South Asian economies to Chinese lithium-ion battery supply chains than to U.S. battery supply chains during 2018–2022. India recorded the largest reported import values from China, followed by Pakistan and Bangladesh, while U.S. battery imports remained comparatively small across the countries examined. These data point to stronger downstream supply-chain integration with China in the battery segment; however, they do not establish direct dependence on Chinese-mined or Chinese-refined lithium. From a geo-economic perspective, this pattern can be examined as an indicator of commercial and technological concentration. From a dependency-theory perspective, it may indicate potential structural exposure to external suppliers and technologies, while the degree of dependence varies by country and cannot be determined from battery-import values alone. Chinese investment and the Belt and Road Initiative are relevant to the broader regional context, but the evidence in this study does not establish that such engagement necessarily produces political influence or an asymmetric economic relationship.

13.2 Strategic Implications for Energy Security and Economic Growth

The concentration of South Asian battery imports from China has implications for energy-security resilience because disruptions affecting a major external supplier could affect the availability and cost of downstream energy-storage technologies. The relevant risk identified by the data is therefore supply-chain concentration rather than demonstrated political dominance. South Asian progress toward greater energy-system resilience may also be affected by commodity-price volatility, logistics disruptions, technology bottlenecks, and wider geopolitical tensions. U.S. efforts to develop and diversify critical-mineral and clean-energy supply chains provide an alternative policy direction (Graham et al., 2021), but the relatively small U.S. battery-export values observed in the present dataset indicate that such diversification was limited within the specific trade channel examined during

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2018–2022. Afghanistan's potential lithium resources may be relevant to future regional supply diversification, but prospective resources should not be treated as established production capacity. India has also pursued domestic manufacturing and clean-energy expansion, but the present evidence does not support a conclusion that these initiatives have already displaced Chinese supply-chain exposure. Overall, the findings suggest that regional energy security may be strengthened through supplier diversification, domestic processing and manufacturing capacity, recycling, technology transfer, and resilient infrastructure.

13.3 Economic Growth, Innovation, and Environmental Considerations

The results show that China has a significant position in global lithium processing and battery technology, while South Asian economies have opportunities to expand their own energy and manufacturing capabilities. Higher investment in electric vehicles, batteries and renewable-energy equipment could support regional industrial development. From a geo-economic perspective, governments can use economic instruments to strengthen their technological and industrial positions. From a dependency perspective, limited domestic capabilities may leave countries more exposed to external suppliers. The evidence therefore supports policy attention to technology transfer, skills, recycling, supply diversification and domestic industrial capacity, while avoiding the conclusion that South Asian countries are necessarily restricted to consumer roles.

14. CONCLUSION

The findings indicate that the reported import values for lithium-ion batteries from China were substantially higher than those from the United States across the South Asian economies examined during 2018–2022. This demonstrates pronounced regional exposure to Chinese downstream battery supply chains, but it does not establish direct dependence on Chinese lithium resources or political dominance over South Asian energy policy. The second research question is therefore addressed by showing that limited domestic extraction, processing and battery-manufacturing capacity can increase exposure to external technology and supply chains, although the extent differs across countries. The third research question is addressed by identifying trade, investment and industrial-policy responses as important elements of geo-economic competition; the available evidence supports discussion of diversification and supply-chain resilience rather than a conclusion of direct strategic influence. South Asian countries therefore face both opportunities and vulnerabilities as the United States, China and other actors expand clean-energy technologies and critical-mineral strategies.

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