CHINA'S ENERGY SECURITY STRATEGY: OIL AND GAS DEPENDENCY

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DECLARATION

I, Sharukh Hoshmand hereby declare that the data presented in this Dissertation report entitled, "**China's Energy Security Strategy: Oil and Gas Dependency**" is based on the results of investigations carried out by me in the MA. International Studies at the School of International and Area Studies, Goa University, under the Supervision of Mr. Yugank Naik, and the same has not been submitted elsewhere for the award of a degree or diploma by me. Further, I understand that Goa University or its authorities will not be responsible for the correctness of observations / experimental or other findings given the dissertation.

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COMPLETION CERTIFICATE

This is to certify that the dissertation report **"China's Energy Security Strategy: Oil and Gas Dependency"** is a bonafide work carried out by Mr. Sharukh Hoshmand under my supervision in partial fulfillment of the requirements for the award of the degree of Master of Arts in the Discipline MA. International Studies at the School of International and Area Studies, Goa University.

Mr. Yugank Naik

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Content

Preface

This dissertation investigates the complex dynamics shaping China's energy security strategy, particularly emphasizing its growing reliance on imported oil and gas. The underlying conflict at the core of this reliance is balancing the constant desire for economic expansion with the need to ensure long-term energy stability and the increasing worries about the environment.

This research seeks to enhance the multifaceted challenges and strategic responses stemming from China's import reliance. It explores the economic implications, such as trade imbalances and vulnerability to price volatility. Furthermore, it examines the geopolitical dimensions, including China's expanding energy diplomacy and its role in reshaping relationships within the global energy sector. This dissertation analyses the environmental consequences of China's energy choices and the nation's efforts to transition towards a more sustainable energy mix.

The main argument is that China's energy strategy is determined by the dynamic interaction of environmental constraints, economic requirements, and strategic responses to changing global energy environments. China has implemented a comprehensive approach that includes supplier diversity, infrastructural expenditures, and a gradual shift towards cleaner energy sources to handle these complex issues.

This dissertation concludes that China's energy future hinges on a delicate balancing act. The choices made today will have profound implications for the nation's energy security, economic stability, environmental well-being, and its position as a global leader in the 21st century.

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Abstract

China's rapid economic growth has led to a growing need for energy resources, particularly oil and gas. This dissertation examines China's growing reliance on imported oil and gas, exploring the underlying economic, historical, and geopolitical factors driving this trend. The study analyses the impact of China's oil and gas dependency on domestic energy security, financial stability, and foreign policy strategies. Results show that China's reliance on imports has increased due to its economic growth and limits in domestic manufacturing. The Belt and Road Initiative continues to impact energy policies by strengthening geopolitical relationships and diversifying the supply chain. The dissertation underscores the potential economic vulnerabilities of import dependency, including trade imbalances and price volatility. China actively engages in energy diplomacy and aims to boost its energy sustainability to reduce these risks. The research provides insightful information about the changing energy landscape in China and how it affects the world's energy markets.

Keywords: *Dependence, Energy, China, Oil, Gas, Global Economy*

Figures

Abbreviations

Entity	Abbreviation
Alternative Policy Scenario	APS
Belt and Road Initiative	BRI
Carbon Capture and Storage	CCS
Carbon dioxide	CO2
Coronavirus Disease 2019	COVID-19
International Energy Agency	EIA
Enhanced Oil Recovery techniques	EOR
Gross Domestic Product	GDP
Greenhouse Gas	GHG
Gigawatts	GW
International Energy Agency	IEA
Liquefied Natural Gas	LNG
National Determined Contributions	NDCs
National Development and Reform Commission	NDRCs
State-Owned Enterprises	SOEs
Organization of the Petroleum Exporting Countries	OPEC
Photovoltaic	PV
Strategic Petroleum Reserve	SPR
Total Energy Supply	TES
United Nations Framework Convention on Climate Change	UNFCCC
World Trade Organization	WTO
National Oil Companies	NOCs
Emissions Trading System	ETS
Shanghai Cooperation Organization	SCO
Trillion Cubic Feet	TcF
Gas Infrastructure Investment Initiative Network Limited	GIINL
Ministry of Natural Resources	MNR
China National Petroleum Corporation	CNPC
Particulate Matter 2.5	PM2.5
China National Offshore Oil Corporation	CNOOC

CHAPTER 1

INTRODUCTION

China's phenomenal economic rise in recent years has been matched by an increase in energy consumption, primarily due to the country's expanding need for oil and gas. China's energy security is a complex topic, and this study explores it by concentrating on the country's significant reliance on oil and gas imports. This research attempts to give an in-depth understanding of China's energy environment and its ramifications on the national and global scale by examining historical patterns and clarifying the economic causes driving this reliance.

China's economy is the second largest globally in terms of size, underscoring how much energy it needs. China has consumed 26.4% of global energy in 2022. Notably, throughout the previous 20 years, China's oil consumption has more than quadrupled, and in 2025, it will reach over 16 million barrels per day[1]. In the same way, since 2000, its natural gas use has quadrupled due to government measures to shift to greener energy sources. China's goal of energy security carries substantial geopolitical implications, including its diplomatic and strategic alliances with prominent energy-producing nations. China establishes trade agreements and strategic partnerships with major participants in the world energy market, including Saudi Arabia, Iran, and Russia, to

[1] Distribution of primary energy consumption worldwide in 2022, by country. Statistica https://www.statista.com/statistics/274200/countries-with-the-largest-share-of-primary-energy-consumption/

ensure its energy supply. These significant commercial ties influence not just international relations and more extensive geopolitical processes but also China's import policies for energy.

The insatiable demand for energy resources profoundly influences the world's energy markets, shaping supply chains, pricing, and geopolitical strategies. This unquenchable thirst for energy has positioned China as a pivotal player in pursuing global energy security due to its significant role as a primary importer. However, despite China's efforts to diversify its energy sources, most of its energy demands still rely on imports. Understanding China's energy security concerns requires understanding the factors contributing to its reliance on imported gas and oil. This rise in demand has been driven by rapid urbanisation, industrialisation, and continuous economic expansion, making a steady supply of energy resources necessary to maintain China's development trajectory.

Furthermore, the inability of domestic production to keep up with rising consumption exacerbates China's need for imports. The ramifications of China's energy needs extend far beyond its borders, shaping investment decisions, policy frameworks, and diplomatic relations on a global scale. This study aims to discover the complex interactions between China's domestic energy security and energy consumption. They emphasise the imperative of addressing energy security concerns in the 21st century.

The dissertation is titled ‘’China's Energy Security Strategy: Oil and Gas Dependency. It is a comprehensive study of China's oil and gas dependency and its implications. The research questions focus on how China's dependency on imported oil and gas has increased, how China’s dependence on oil and gas will affect its energy security, and

how it will affect its economy." The dissertation is structured into five chapters, including an introduction, history, and background review, China's oil and gas dependency trends, implications and challenges of oil and gas dependency, and conclusion and recommendations. The theoretical bases for the research include Dependency Theory, Transition Theory, and Realism Theory. The literature survey encompasses five articles and three books, providing insights into China's energy security challenges, its role in global energy governance, the Belt and Road Initiative, clean energy leadership, and energy demand and supply.

The dissertation aims to contribute to and discuss China's energy security, focusing on its dependency on imported oil and gas by comprehensively analysing China's growing energy demands and their global implications. The research will include primary and secondary sources, including government data, publications, academic journals, research papers, and annual reports. Primary sources, such as government records, which are more critical, will serve as the foundation, while books, articles, research papers, and media will provide supporting evidence for the topic. With the combination of both qualitative and quantitative methods, this dissertation will provide a comprehensive understanding of China's energy security. The dissertation thoroughly examines and evaluates China's energy security, explaining it's escalating energy demands and their impact on its development. The forthcoming research will serve as a valuable contribution to ongoing discussions about energy security and aid in making informed choices regarding China's protection and sustainability.

1.1 THE RATIONALE FOR CHOOSING THE TOPIC

The dissertation, "China's Energy Security Strategy: Oil and Gas Dependency" has been carefully selected due to its immense global significance, highlighting China's influential position in shaping the international energy landscape. China is the world's second-largest economy; its dependency on imported oil and gas also affects its economic growth; by understanding this, we can have insightful information on one of their driving vital factors. As China's reliance on imported oil and gas continues to escalate, it is crucial to delve into the underlying factors driving this reliance and its far-reaching effects on geopolitical and economic developments. This research tackles a complex and relevant topic, providing valuable insights for policymakers, stakeholders, and academics to better understand the potential risks, opportunities, and policy approaches that can bolster China's energy security and promote stability in the global energy market.

1.2 RESEARCH OBJECTIVES

The primary objective of this study is to gain a deeper understanding of China's energy security dynamics by exploring the drivers behind its growing reliance on imported oil and gas. We will delve into the economic and historical factors contributing to this dependence to achieve this. Additionally, we will assess the potential risks and vulnerabilities associated with this reliance and how it impacts China's internal energy security. Ultimately, it aims to provide valuable insights into China's energy landscape and its implications on domestic and international energy security, including its effects on macroeconomic stability and trade balances.

1.3 RESEARCH QUESTIONS

1. Why has China's dependency on imported oil and gas increased.?
2. How will China’s oil and gas dependency affect its domestic energy security?
3. What are the economic implications of China's reliance on imported oil and gas?

1.4 HYPOTHESIS

Over the period 2000-2020, China's dependency on energy imports has increased significantly, driven by a combination of rapid economic growth, industrialisation, and an expanding middle-class

China's current and anticipated dependency on oil and gas has multifaceted impacts on its energy security, influencing economic stability, geopolitical relationships, and environmental sustainability. The magnitude of these impacts is subject to ongoing changes in global energy dynamics.

China's dependency on imported oil and gas has specific economic consequences, including potential trade imbalances, inflationary pressures, and challenges to overall financial stability. Both domestic policies and global market conditions influence the extent of these consequences.

1.5 RESEARCH METHODS

The dissertation's research method will include Primary and secondary resources that I will use. The primary sources could be government data and documents, which aim to gather firsthand insights. The secondary resources will be Books, Articles, Research Papers, and Media. Refer to relevant books to gain theoretical knowledge, historical context, and established concepts concerning China's energy security in dependency on imported oil and gas—Analyse academic articles from reputable sources to gain current perspectives, analyses, and case studies. Utilise media sources, including YouTube videos, to extract additional qualitative views, news, or expert discussions on China's energy security. Incorporating qualitative and quantitative analysis, these research methods aim to provide a comprehensive understanding.

1.6 CHAPTERIZATION:

Chapter 1: Introduction

This chapter will establish the foundation of the dissertation. It will define the scope of the research, Key research questions are outlined, and the rationale for their importance are explained. the literature review is also part of this chapter. Additionally, the objectives of the study and the theoretical framework used to analyze the findings will be introduced.

Chapter 2: History and Background Review

This chapter provides important context to understand the trajectory of China's energy policies. It will explore the historical evolution of China's energy landscape and the role

oil and gas have played. Key policy shifts and significant milestones shaping the country's relationship with energy resources are included in this chapter.

Chapter 3: China's Oil and Gas Dependency Trends (2002-2025)

This chapter Explores into the core of the analysis, tracing China's oil and gas dependency between 2002 and 2025. The focus will be on the interplay of economic growth and the Belt and Road Initiative (BRI), exploring how these factors have influenced dependency trends. China's strategies for managing its oil and gas resources, with emphasis on domestic production and diversification efforts.

Chapter 4: Implications and Challenges of Oil and Gas Dependency

The chapter examines the economic impact of reliance on imports, including susceptibility to price volatility and resource nationalism. It will dissect the geopolitical complexities stemming from China's energy needs and strategies pursued to secure resources. Lastly, the environmental challenges linked to oil and gas consumption, and potential Chinese mitigation approaches, have been mentioned..

Chapter 5: China’s foreign policy and impact on oil and gas

This chapter explores the interplay between oil and gas needs and China's foreign policy strategies. It analyzes how energy security concerns shape strategic partnerships, particularly with resource-rich nations.

Chapter 6: Conclusion

The dissertation concludes with a synthesis of the major findings, highlighting the most significant trends and insights about China's oil and gas dependency.

1.7 THEORETICAL BASES:

1.7.1 Neorealist Theory:

Neorealist theory is also known as structural realism. Claims that under the anarchic international system, governments are primarily interested in gaining power and security. This theory can help analyse how China's goal for dominance and flexibility in the global energy market shapes its energy security strategies, which is relevant to my dissertation. We learn how realist considerations drive China's efforts to protect its gas and oil imports and strengthen its energy independence by analysing its political policies and tactics.

1.7.1 International Trade Theory:

International trade theory highlights the advantages of concentration and global trade, encompassing comparative and absolute advantages. This theory clarifies why China depends on imported oil and gas for my dissertation. By examining its trade patterns and economic interdependencies, we can comprehend how market forces impact China's energy-sourcing decisions and trade linkages and how regional cooperation measures might improve its energy security.

1.8 LITERATURE SURVEY:

1.8.1 Articles:

a. energy security and energy risk management by lifan li, This article is about China's energy security challenges. The analysis of this article shows the imbalance between energy demand and domestic oil yield and explains the ineffectiveness of China's oil industry. Diversification of energy import channels and associated risks, particularly from the Middle East, is scrutinised. Also, this article points out the challenges caused by the rapid growth of industrialisation and the environmental implications of China's coal-dominated energy structure. By understanding international experiences, the article explores crisis management strategies, focusing on the importance of long-term strategic measures and short-term emergency responses. The conclusion shows a strong future for further global collaboration in the energy sector, and policy proposals are presented, focusing on legal improvements, foreign investment encouragement, and an enhanced business environment. This article also analyses China's energy security landscape and suggests strategic solutions for the nation's future.

b. The role of China in global energy governance by Gaye Christoffersen's analysis delves into the intricate dynamics between the international political system and the energy landscape. Scholars underscore the limitations of established frameworks like the International Energy Agency (IEA) and OPEC, which primarily address energy security in developed nations and relations with traditional oil-producing countries. A critical gap is identified in these structures concerning the escalating energy demands of the developing world and the ascendancy of non-OPEC producers, with China at the forefront. Christoffersen's work emphasises the delicate balance between China's status

as the leading net oil importer and its resistance to the norms inherent in global energy governance institutions, such as the IEA. The literature probes China's reluctance to fully integrate into these frameworks, considering factors like the 90-day strategic petroleum reserve requirement and hesitancy in disclosing petroleum data. Simultaneously, scholars examine China's domestic energy governance capacity, exploring ungoverned spaces in production and consumption, the role of the national oil companies, and the impact of bureaucratic restructuring. The dual nature of China's approach is highlighted, wherein it actively seeks participation in existing institutions while concurrently constructing an alternative global energy order through regional organisations like the BRICS and initiatives like the Silk Road Economic Belt. Collectively, the literature underscores the need for a nuanced understanding of China's strategic positioning and its multifaceted impact on the evolving governance structures of the world's energy resources.

c. the article "China's belt and road initiative and its energy-security dimensions" by Frank Umbach explains the multifaceted nature of China's Belt and Road Initiative (BRI), emphasising energy-security implications. President Xi Jinping's BRI, launched in 2013, is depicted as a geopolitical strategy intertwined with economic interests. The literature explores China's substantial investments in global infrastructure and energy projects, particularly coal-fired power plants and oil and gas ventures. It underscores the strategic importance of these initiatives in safeguarding China's growing dependence on imported oil and gas, highlighting associated risks and geopolitical challenges. Additionally, the review examines the environmental sustainability of BRI projects and their impact on global climate change mitigation efforts. The article also explores how China's energy investments influence diplomatic relations with European

Union countries, potentially creating divisions. Overall, the literature contributes to understanding China's BRI motivations and their significant energy-security ramifications.

d. ‘’China's quest for global clean energy leadership’’ by Barbara A. Finamore, the author, explores China's strategic pursuit of clean energy technologies as a cornerstone of its global technological leadership ambitions. The article underscores China's shift from a growth model centred on energy-intensive manufacturing to one focused on high-tech goods and services. By examining the 13th Five-Year Plan (2016–2020), Finamore delineates how clean energy technologies play a pivotal role in China's economic transition. The comprehensive analysis delves into the evolution of China's renewable energy industry, emphasising key policies, regulatory measures, and incentives that propelled the nation to a leadership position in solar, wind, and electric vehicles. Despite China's remarkable progress, the article elucidates challenges, including the continued construction of coal-fired power plants and the need to address curtailment issues. Finamore concludes by emphasising the critical role of renewable energy in China's transition and offers recommendations for the nation to accelerate its clean energy adoption, foster innovation, set ambitious targets, and reform its power sector. The article explores China's journey toward clean energy leadership, considering achievements and ongoing challenges.

e. "Energy demand and supply in China," by Erica Strecker Downs, the author addresses the concerns surrounding China's energy security, primarily focusing on the projections of the country's future energy demand and supply. The article begins by highlighting

China's rapid economic growth as a significant driver of its increasing energy demand, particularly for oil and gas. The gap between energy consumption and domestic production is a crucial challenge, resulting in a growing reliance on imports to provide the nation's energy needs. The analysis projects a substantial rise in China's total primary energy consumption, reaching 98.3 quadrillion Btu by 2020. Notably, the demand for oil and natural gas is expected to surge, with oil consumption anticipated to increase at a yearly average rate of 3.8 percent and natural gas at 11.7 per cent. The article delves into the challenges related to China's domestic energy supply, emphasising the precarious nature of its oil situation. Despite having vast coal reserves, the country's per capita energy endowment is considered inadequate. Downs underscores China's oil and gas supply limitations, with domestic resources unlikely to match the rising demand. The article also discusses the difficulties in estimating China's oil reserves and highlights the declining production in major oil fields. Consequently, China's increasing reliance on imported oil and gas is projected, with potential import dependence reaching almost 60 per cent for oil by 2020. This thorough examination will offer insightful information on the complex dynamics of China's energy environment, considering both demand and supply factors and their implications for the nation's energy security.

1.8.2 Books:

a. "The book "Energy Security in Times of Economic Transition " by Yao Lixia is a significant work exploring the complex relationship between China's energy policy, energy security, and macroeconomic reform over several decades. Lixia's research aims to understand the evolution of China's energy landscape, particularly in the face of unprecedented economic growth and transitions. The book introduces a new analytical framework called the 4-As Framework, which assesses energy security across four

dimensions: availability, applicability, acceptability, and affordability. This comprehensive framework enables a nuanced examination of China's energy sector's multifaceted challenges and dynamics. The Macro Economy-Driven Energy Security Mechanism, a central concept in the book, provides a systematic understanding of how macroeconomic reforms shape and constrain energy policies, consequently influencing the country's energy security landscape. Lixia uses a unique combination of quantitative and qualitative methodologies, establishing a quantitative framework to evaluate energy security in China. The quantitative analysis, grounded in indicators related to the 4-As, reveals that China's energy security situation did not significantly improve during the three decades of economic reform. This finding prompts a deeper exploration into the qualitative aspects of why this stagnation occurred. The analysis unfolds in three phases, tracing China's economic reform from 1978 to 2010. Each phase is scrutinised regarding its impact on the energy sector, highlighting the role of government restructuring, fiscal reforms, and the transformation of state-owned enterprises. The intricate connections between these macroeconomic measures and the evolution of energy policies underscore the reactive nature of China's energy strategies. Lixia argues that these policies are not inherently designed to enhance energy security but to respond to broader macroeconomic reform measures. Moreover, the book extends its purview to the Belt and Road Initiative (BRI), examining its implications for China's energy security on the global stage. This international perspective adds richness to the analysis, illustrating China's strategic considerations beyond its borders."

b. "A New Superpower? Dimensions Of Power, Energy, And Security," edited by Assoc. Prof. Atilla SANDIKLI explores China's rise as a global power and its implications for international politics, economy, and security. The collection of articles

addresses various dimensions of China's influence, including geopolitics, military capabilities, foreign policy, energy consumption, and security strategies. The introductory chapter highlights the transformative impact of China's economic growth and increasing energy needs on global political dynamics. The authors emphasise the need to understand China's rise and analyse its potential to become a superpower. The book delves into specific aspects of China's trajectory and comprehensively describes China's geopolitics, emphasising strategic concerns. "China: Future's Superpower?" discusses China's ongoing economic growth and foreign policy. The chapter on "China's Growing Need for Energy and Changing Balances" addresses the implications of China's expanding energy consumption on international relations. Several chapters focus on China's military power, global security perspectives, and regional strategies. China's military capabilities and security strategies. The collection also considers China's relations with the European Union, the United States, Africa, and Southeast Asia, comprehensively analysing China's foreign policy. The book concludes with reflections on China's last 15 years of socioeconomic transition. It notes China's integration into the global economy, its role in international organisations like the WTO, and its impact on the world economy. The conclusion raises concerns about the sustainability of China's economic growth, pointing to regional imbalances and potential social challenges.

c. "India And China: Strategic Energy Management And Security" by Bimal Kumar Sikdar comprehensively explores China's rise to global power and its implications for international politics, the economy, and security. The book contains articles covering various dimensions of China's influence, including geopolitics, military capabilities, foreign policy, energy consumption, and security strategies. The introductory chapter

emphasises the transformative impact of China's economic growth and escalating energy needs on global political dynamics. It highlights the importance of understanding China's rise and evaluating its potential to become a superpower. The book delves into specific aspects of China's trajectory, describing its geopolitics and emphasising strategic concerns. Chapters like "China: Future's Superpower?" provide insights into China's ongoing economic growth and foreign policy stances. The chapter "China's Growing Need for Energy and Changing Balances" also addresses the implications of China's expanding energy consumption on international relations. The book extensively covers China's military power, global security perspectives, and regional strategies. It also explores China's relations with the European Union, the United States, Africa, and Southeast Asia, thoroughly analysing China's foreign policy. The concluding reflections on the last 15 years of China's socio-economic transition highlight its integration into the global economy, participation in international organisations like the WTO, and its impact on the world economy. The conclusion raises valid concerns about the sustainability of China's economic growth, pointing to regional imbalances and potential social challenges. In the book's later sections, the focus shifts to a detailed examination of energy management in both China and India. It covers various energy sources in both countries, including coal, oil, natural gas, electricity, and nuclear power. The author discusses strategic energy management in China and India separately, highlighting each country's challenges and opportunities. Furthermore, the book addresses the securitisation of energy and explores the long-term implications of China's energy security policies and strategies for India. The background information explains the motivation behind compiling this extensive resource on energy management, emphasising the need for a holistic understanding of the subject in global and regional dynamics. The author acknowledges the increasing

interdependence among nations driven by energy resources and the emerging matrix of relationships influenced by resource availability, transport infrastructure, and geopolitical considerations. “India and China: Strategic Energy Management and Security" offers a multifaceted analysis of China's rise and impact on global affairs, coupled with an in-depth exploration of energy management in two of the world's most populous nations. The book contributes valuable insights to international relations, geopolitics, and energy studies.

CHAPTER 2

HISTORY AND BACKGROUND REVIEW

China is now leading the world in energy consumption due to its remarkable economic development in recent decades. The nation finds itself in a difficult situation as it attempts to balance its unquenchable demand for energy with worries about resource availability, environmental impact, and geopolitical complexity. This rise has been driven by the nation's unrelenting industrialisation and urbanisation . China's position as the world's largest energy consumer and its increasing reliance on energy imports have far-reaching implications for its domestic well-being, the dynamics of the global energy market, and international relations (Umbach, 2019). Understanding China's energy landscape requires a multi-faceted lens. Due to geopolitical manoeuvring, technical innovation, economic factors, and environmental concerns, its energy system is a dynamic and complex network (Li, 2015). China has evolved from a traditionally self-sufficient and coal-dominated energy system to one that must balance expanding its energy portfolio for long-term sustainability and maintaining access to reliable energy sources to support economic development (Downs, 2006). The environmental costs associated with its significant reliance on coal and the geopolitical ramifications of its increasing dependence on energy imports from strategically vulnerable world areas exacerbate these problems (Christoffersen, 2016).

2.1 CHINA'S ENERGY LANDSCAPE

China's energy industry was characterised by a strong emphasis on self-sufficiency, a significant dependence on its vast coal reserves, and a strictly centralised production and delivery system before the considerable economic changes that began in 1978 (Lixia, 2021). Growing the country's planned economy and industrial growth was the main driver of energy policy throughout this time. The energy industry was controlled by state-owned businesses, with little engagement from the private sector or international investment (Skidar, 2009). With coal making up a sizable share of the energy mix, coal was the lifeblood of the Chinese energy system. With coal making up a sizable share of the energy mix, coal was the lifeblood of the Chinese energy system. (Downs, 2006). Oil and natural gas played a much smaller role, with limited domestic exploration and production capabilities. Renewable energy sources such as hydropower were utilised but remained a minor component compared to fossil fuels. Decision-making in the energy sector followed a top-down approach, with the central government exercising strict control over energy pricing, resource allocation, and infrastructure development (Sikdar, 2009). While promoting fast industrialisation in the early stages, this centralised structure progressively lost its ability to adapt to the economy's expanding and changing energy demands as China started along its road of economic transition.

The economic liberalisation initiated in 1978 marked a turning point for China's energy sector. The shift from a centrally planned economy to a more market-oriented system triggered a surge in energy demand fueled by rapid industrialisation and accelerating urbanisation (Li, 2015). As China opened its doors to foreign investment and trade, the manufacturing sector boomed, leading to a significant uptick in electricity consumption. For example, electricity generation quadrupled between 1980 and 2000 (IEA, 2023).

This demand placed increasing strain on China's domestic energy resources. Coal remained the dominant fuel, but its production struggled to keep pace. Oil consumption increased substantially, with China's net oil imports jumping from near zero in the early 1990s to over 2 million barrels per day by 2000 (IEA, 2023). During this period, we have witnessed the beginnings of China's transformation into a net oil importer, foreshadowing future energy security challenges. Economic reforms also brought about gradual changes in the structure of the energy sector. While state-owned enterprises remained vital players, the government introduced measures to decentralise decision-making and encourage competition (Sikdar, 2009). Limited price reforms were initiated to better reflect market supply and demand dynamics. China cautiously opened its energy sector to foreign investment, particularly in exploration and upstream oil and gas projects.

China's energy demand has grown at an unparalleled rate since the turn of the twenty-first century. China's entry into the global economy quickened when it joined the World Trade Organisation (WTO) in 2001, making it the world's manufacturing superpower (Sandıklı, 2010). The country's middle class was growing, and this increased industrial activity resulted in a sharp rise in energy consumption. Interestingly, between 2000 and 2010, China's overall energy consumption more than doubled [2]. Faced with escalating energy needs, China embarked on several key strategies. Diversification of its energy mix became a priority. While coal still retains a significant share, investment in renewable energy sources like hydropower, wind, and solar grew exponentially. China is now the world leader in renewable energy capacity (IEA, 2023).

[2] Evolution of total final energy consumption in China, IEA, 2023. https://www.iea.org/countries/china/efficiency-demand accessed on 10/3/2024

Additionally, efforts were made to increase natural gas use through domestic exploration and rising imports. Energy efficiency measures gained prominence as China sought to curb the intensity of its energy consumption. The government set ambitious energy efficiency targets across various sectors to decouple economic growth from unbridled energy demand (Lixia, 2021). Regulations were implemented to promote energy-efficient technologies and practices in industry, buildings, and transportation. In addition, the energy industry kept up its slow change and grew more welcoming to international investment. To improve its upstream oil and gas capabilities, China actively pursued collaborations with foreign oil corporations (Christoffersen, 2016). Large-scale infrastructure projects were created, frequently requiring foreign funding and experience, such as international pipelines and LNG (liquefied natural gas) facilities.

China's energy mix is still evolving and complicated. Although coal remains the primary energy source, environmental concerns and a growing movement towards cleaner energy sources have slowly caused coal's proportion of the energy mix to decline in recent years. Data from 2021 indicated that coal comprised around 56% of China's overall energy consumption . That said, this is a notable decline from its peak of over 70% a decade prior [3]. China depends more on natural gas and oil to fulfil its growing energy demands and diversify its sources. Oil consumption has increased significantly, with China already importing more oil globally than the US (U.S. Energy Information Administration, 2023).

Similarly, a move towards cleaner-burning fuels in the industrial and residential sectors has substantially increased natural gas usage. China's energy security challenges are

[3] IEA (2021), Coal Information: Overview, IEA, Paris https://www.iea.org/reports/coal-information-overview accessed on 22/02/2024

highlighted by its reliance on imported gas and oil, as a large amount of China's supply originates from geopolitically complicated locations. The use of renewable energy has increased dramatically in recent years. China leads the world in installed hydroelectric, wind, and solar electricity capacity (International Energy agency, 2023) . The government's robust policy support, which includes objectives and subsidies, has driven the growth of the renewable energy industry. However, grid integration and controlling the intermittent nature of solar and wind generation still need to be solved. Nuclear energy plays a more minor but growing role in China's energy mix. China has an ambitious nuclear power development program, with several reactors under construction and many more planned. Nuclear power is a way to provide baseload electricity while mitigating carbon emissions (World Nuclear Association, 2023).

2.1.1 Key Energy Policies And Initiatives:

China has implemented increasingly stringent energy conservation and efficiency targets over the past few decades, recognising these as crucial for managing its growing energy demand; these targets are often embedded in its Five-Year Plans, which serve as blueprints for economic and social development; for instance, the 13th Five-Year Plan (2016-2020) aimed to reduce energy intensity (energy consumption per unit of GDP) by 15% [4]. Such targets have driven policies promoting energy-saving technologies, industrial efficiency standards, and building codes. Market Reforms in the Energy Sector: While still dominated by state-owned enterprises, China's energy sector has undergone gradual market reforms. These aim to introduce greater competition,

[4] World Energy Council. (2022). Energy Trilemma Index: China. accessed on 10/03/2024 https://www.iea.org/policies/6277-china-13th-renewable-energy-development-five-year-plan-2016-2020

improve pricing mechanisms, and attract private and foreign investment. Price reforms, particularly in the electricity sector, have sought to align prices better with supply and demand dynamics (Lixia, 2021). Efforts have been made to streamline approval processes and increase transparency in the energy market. Environmental Regulations (and their challenges): China has implemented several ecological rules for the energy industry in response to the country's extreme air pollution and growing calls for action against climate change. These include regulations requiring renewable energy production, tighter emissions limits for coal-fired power plants, and initiatives to advance energy efficiency in transportation and industry. (Finamore, 2020). However, enforcement of environmental regulations can be uneven at the local level, and the continued reliance on coal presents ongoing challenges in achieving China's decarbonisation goals. Strategic Initiatives like the Belt and Road Initiative (BRI) The Belt and Road Initiative (BRI), launched in 2013, has profound implications for China's energy landscape, China's access to energy resources in Central Asia, the Middle East, and Africa, as well as its energy trading links, are significantly impacted by BRI-related infrastructure developments in the form of pipelines, ports, and power plants (Umbach, 2019). Furthermore, China's desire to broaden its energy alliances and access new markets for its energy technologies makes the Belt and Road Initiative (BRI) geopolitically significant.

China has had significant economic progress, but maintaining expansion while meeting the world's rising energy needs is an ongoing challenge. A crucial concern is figuring out a sustainable course that guarantees a steady energy supply to support its economy without increasing environmental issues or leading to an excessive reliance on imports. The heavy reliance on coal in China's energy mix poses a significant environmental challenge. Coal combustion is a primary source of air pollution, contributing to severe

respiratory health problems in Chinese cities (World Health Organization, 2023). Moreover, coal is the most carbon-intensive fossil fuel, making it a leading obstacle to China's goal of achieving carbon neutrality by 2060. China's worries about energy security are highlighted by its increasing reliance on natural gas and oil imports. The stability of its energy supply may be threatened by geopolitical unrest or disruptions in the world energy markets (Christoffersen, 2016). China's reliance on imports has compelled it to diversify its energy sources and establish strategic alliances with countries with abundant energy resources. China is challenged to advance technical innovation in renewable energy to lessen dependency on fossil resources. Despite significant advancements, obstacles in grid integration, storage options for renewable energy sources like wind and solar power, and more cost savings to maintain competitiveness. There are several different ways in which China's energy relationships affect geopolitics. On the one hand, programs such as the Belt and Road Initiative (BRI) allow China to increase its power and acquire new energy supplies. On the other hand, these partnerships can also create friction points with other major powers and draw China into regional conflicts that could jeopardise its energy security (Umbach, 2019).

2.2 HISTORICAL ANALYSIS OF CHINA'S ENERGY POLICIES

Parallel growth of China's energy policy over the past three decades has been inexorably tied to the country's tremendous economic and social change. Before the reform period, China's energy system was mostly centred on self-sufficiency and heavily dependent on coal. Over time, however, it has progressively moved towards a more diversified energy mix, more market mechanisms, and higher interaction with the global energy scene. Numerous causes have contributed to this transition, such as the pressures of fast

industrialisation, the desire to address environmental issues, and the geopolitical imperatives of guaranteeing a steady energy supply. Government policies have played a pivotal role in shaping this evolution. In the early years of the People's Republic of China, energy policy was dictated by the principles of central planning, emphasising meeting domestic demand through state-owned enterprises (Sandıklı, 2010). The onset of economic reforms in 1978 introduced elements of market liberalisation, gradually loosening the state's tight grip over the energy sector. As China's economy boomed, accelerating after joining the WTO in 2001, its energy needs soared. This prompted policies aimed at diversifying energy sources, promoting energy efficiency, and cautiously opening up the sector to foreign investment (IEA, 2023). In recent years, environmental considerations have gained prominence, with China introducing stricter regulations and setting ambitious targets for renewable energy development to combat climate change.

China's evolution from a primarily self-sufficient energy model to a key player in global energy markets represents a profound shift with far-reaching implications. In its early decades, China's energy policies focused on domestic production and consumption, with limited reliance on imports. Coal dominated the energy landscape, and the centralised state apparatus maintained firm control over the development and distribution of energy resources (Lixia, 2021). However, relentless economic growth and integration into the global economy fundamentally altered China's energy trajectory. As domestic oil production plateaued and later declined, China became a net oil importer in the 1990s [5]. This marked a turning point, signifying a growing reliance on external sources to satisfy its energy needs. The trend accelerated dramatically in

[5] Leung, G. C. K. (2010). China's oil use, 1990-2008. Energy Policy, 38(2), 932-944. https://doi.org/10.1016/j.enpol.2009.10.045

the following decades; today, China imports over 70% of its crude oil and a significant portion of its natural gas [6]. This increasing engagement with global energy markets has been driven by necessity and strategic intent. China's state-owned energy companies have actively pursued equity investments in oil and gas fields worldwide, seeking to secure supplies and diversify their sources (Umbach, 2019). Initiatives like the Belt and Road Initiative (BRI) further exemplify China's ambition to reshape global energy flows through infrastructure development and strategic partnerships.

2.2.1 Pre-1978: Central Planning And Energy Self-Reliance:

China's energy industry functioned according to centrally planned economic principles in the decades before the historic economic changes of 1978. Almost every facet of energy production, delivery, and price was under the complete authority of the state. Driven by a confluence of historical events, ideological convictions towards self-sufficiency, and the availability of local coal deposits, this strategy was typified by a heavy emphasis on energy self-reliance. Decision-making in the energy sector followed a rigid, top-down model. Through ministries and state-owned enterprises (SOEs), the central government dictated production targets, resource allocation, and investment decisions (Sandıklı, 2010). Market mechanisms played virtually no role; prices for energy commodities were artificially set by the state, often without reflecting actual supply and demand dynamics. Coal reigned supreme as the foundation of China's energy system. The government heavily subsidised coal prices, making it a cheap and readily available fuel for heavy industry and households (Downs, 2006). Coal

[6] U.S. Energy Information Administration [EIA]. (June, 2023). OPEC REVENUES FACT SHEET. accessed on 13/03/2024
https://www.eia.gov/international/analysis/special-topics/OPEC_Revenues_Fact_Sheet

production targets were a central focus of national economic plans. Oil and natural gas played a much smaller role due to limited domestic exploration capabilities and technological constraints. Renewable energy sources like hydropower contributed to the energy mix but remained a minor component compared to coal. Pursuing energy self-sufficiency was a cornerstone of China's energy policy during this era (Lixia, 2021). Limited reliance on imports was seen as a way to insulate the economy from external shocks and maintain strategic autonomy. While facilitating rapid industrialisation in the early phases, this command-economy model became less efficient and responsive as China's economy grew in size and complexity.

Before 1978, while China was still under central planning, a network of state-owned companies (SOEs) controlled the country's energy market. As government representatives, these SOEs were in charge of almost every aspect of energy development, including discovering and extracting coal, oil, and gas and producing and distributing electricity (Wang et al., 2014). Foreign investment and private sector involvement were almost nonexistent in the energy industry. The government extensively subsidised energy rates, especially for coal, to support heavy industrialisation and make energy broadly available . Due to these subsidies, prices were intentionally maintained low, which distorted market signals and promoted patterns of wasteful energy use. For example, when coal was cheap and easily accessible, manufacturers had no reason to invest in energy-saving equipment. A core principle of China's energy policy during this period was minimising reliance on foreign sources (Lixia, 2021). While some limited energy trade did occur, the focus was on developing domestic resources to meet the nation's needs. Foreign companies were primarily excluded from exploration and production activities within China. Additionally, there needed to be more constraints on importing energy-related

technology or equipment. This self-reliance approach was driven by a desire for strategic independence and the practical limitations of engaging with the global economy during this period.

The pre-1978 era in China was marked by ambitious targets for coal production, driven by the central government's emphasis on rapid industrialisation. Coal, abundant and readily accessible, was deemed the lifeblood of the planned economy (Wang et al., 2014). Production targets were often incorporated into China's Five-Year Plans, which served as the overarching blueprints for economic development. Meeting and exceeding these coal production goals became a national priority. Energy, primarily coal, was pivotal in fueling China's heavy industries. Steel mills, cement factories, and other energy-intensive sectors heavily relied on a steady and affordable coal supply (De Gouvello & Song, 2023). State-owned enterprises in these industries were less concerned with energy efficiency and more focused on fulfilling production quotas assigned by government ministries. Coal was used in heavy industry and widely distributed for household heating and cooking. Subsidised coal prices ensured affordability, further exacerbating demand. While hydropower and, to a lesser extent, oil contributed to the energy mix, their role was dwarfed by the dominance of coal . This unwavering focus on coal shaped China's energy infrastructure and technological trajectory during this period.

2.2.2 Economic Reforms And Early Energy Market Liberalization-1978-2000:

The economic reforms initiated in 1978 had profound implications for China's energy sector, marking a gradual shift away from the rigid central planning model; as the economy transitioned towards more market-oriented principles, the government recognised the need for corresponding reforms in the energy sector to support accelerating growth and industrialisation . One significant change brought about by the reforms was a degree of decentralisation. While the central government maintained overall control, provincial and local authorities were granted more autonomy in energy-related decision-making (Wang et al., 2014). This aimed to increase responsiveness to local energy needs and encourage efficiency gains. The reforms also introduced limited elements of competition into the traditionally state-dominated energy sector. Restrictions on private companies entering specific energy market segments were cautiously loosened (Downs, 2006). This led to the emergence of smaller, non-state energy producers and distributors, particularly in coal mining and power generation. The goal was to stimulate greater efficiency and innovation within the sector. It is crucial to remember that this early liberalisation needed to be more bold and active. State-owned businesses continued to be commanding, especially in the upstream oil and gas industry. Furthermore, even with the introduction of certain market-based pricing adjustments, the government continued to have a significant impact on energy costs.

The 1978-2000 period witnessed the beginnings of price reforms in China's energy sector; recognising the distortions and inefficiencies caused by heavily subsidised energy prices, the government gradually aligned prices more closely with market dynamics (Kambara, 1984). The first round of changes largely liberalised the prices of

refined petroleum products and crude oil. This was done to encourage more efficiency in energy generation and use. The government continued to be worried about the possible social and economic effects of abrupt price rises, especially for low-income households and energy-intensive businesses, even as pricing changes proceeded carefully. For example, changes to coal pricing were made gradually and mostly kept under control. As a result, there was a hybrid system where the market set certain aspects of energy costs and controlled others by the government. Another critical development during this period was the initial opening of China's energy sector to foreign investment (Kambara, 1984). Driven by the need to modernise its oil and gas industry and access advanced technology, the government allowed foreign companies to participate in exploration and production projects, often through joint ventures with Chinese state-owned firms. This marked a shift away from the strict self-reliance of the pre-reform era and a recognition of the potential benefits of international cooperation in the energy domain. However, the opening up to foreign investment was selective and controlled. Strategic sectors like oil refining and power transmission remained mainly off-limits to foreign companies (Umbach, 2019). The terms of foreign participation were often subject to negotiation and restrictions. This cautious approach reflected China's desire to balance its need for foreign capital and expertise with its concerns about national economic security.

2.2.3 Present-2000:

China's accession to the World Trade Organization (WTO) in 2001 ushered in a period of unprecedented growth in energy demand, fueled by the country's rise as a global manufacturing powerhouse. Industries producing goods for export became significant

drivers of energy consumption (World Trade Organization 2012). Electricity demand soared as factories operated around the clock and China's expanding middle class purchased more appliances and energy-consuming goods. The Chinese government implemented a diversification policy after realising the dangers of an over-reliance on coal in the face of growing energy demands; this strategy aimed to reduce the share of coal in the energy mix and promote alternative sources to reduce pollution and enhance long-term energy security (Guilhot, 2022). Policy support for renewables—mainly hydroelectric, wind, and solar—was intense. Substantial subsidies were given to make renewable energy projects financially feasible, with ambitious objectives for growing renewable energy capacity [7]. As a result, China has become a world leader in renewable energy investment and installed capacity. Natural gas also emerged as a critical component of the diversification strategy; seen as a cleaner-burning alternative to coal, the government encouraged its use in power generation, industry, and the residential sector (Guilhot, 2022). Domestic production of natural gas was ramped up, and infrastructure for importing liquefied natural gas (LNG) was developed.

Since energy diversification alone would not be enough to manage its escalating energy needs, China emphasised energy efficiency from the 2000s onwards. Ambitious energy efficiency targets were frequently embedded in its Five-Year Plans, which serve as blueprints for economic and social development. For example, the 13th Five-Year Plan (2016-2020) targeted a 15% reduction in energy intensity energy consumption per unit of GDP [8]. The government launched several initiatives and measures to meet these

[7] Da. (2023, May 13). The right policies for 80% of energy could come from renewables by 2050. World Bank Blogs. accessed on 13/032024 https://blogs.worldbank.org/en/climatechange/right-policies-80-energy-could-come-renewables-2050

[8] World Energy Council. (2022). Energy Trilemma Index: China. accessed on 13/03/2024 https://www.iea.org/policies/6277-china-13th-renewable-energy-development-five-year-plan-2016-2020

goals. Among these were requirements for the energy efficiency of buildings, industrial machinery, and appliances (Lixia, 2021). Companies were encouraged to invest in energy-saving technology and modify existing buildings by offering financial incentives and subsidies. Regulations were implemented to promote energy-efficient techniques and gradually phase out inefficient industrial operations. The post-2000 period also witnessed a growing focus on environmental regulations in China's energy sector. The government moved due to growing worries about extreme air pollution, water contamination, and climate change (Chen et al., 2023). For coal-fired power plants, stricter emissions regulations were implemented, necessitating the construction of pollution control devices. Regulations were implemented to encourage using cleaner fuels and lower emissions from the transportation industry. China has also taken climate change seriously and made significant promises. The government set targets for reducing carbon intensity (carbon emissions per unit of GDP) and pledged to reach peak carbon emissions before 2030, followed by achieving carbon neutrality by 2060. These promises propelled additional policy actions in areas such as carbon pricing systems, low-carbon technology investment, and the growth of renewable energy.

a. Ongoing challenges:

Despite notable advancements in broadening its energy portfolio and tackling ecological concerns, China must work on balancing economic expansion with energy security and sustainability. A primary concern is finding a means to support its growing economy without aggravating environmental issues or becoming too reliant on foreign energy sources. Coal, while gradually declining in its share of the energy mix, remains a significant contributor to air pollution and greenhouse gas emissions; phasing down coal use without compromising energy security or causing economic dislocations requires careful planning and a massive scale-up of cleaner alternatives (World Health

Organization, 2023). Managing import dependency on oil and natural gas is another ongoing challenge. Geopolitical tensions, supply disruptions, and price volatility in global energy markets can threaten the stability of China's energy supply (Li, 2015). Diversifying import sources, investing in strategic reserves, and forging solid partnerships with energy suppliers are crucial for mitigating these risks. Additionally, technological innovation and cost reduction will be pivotal for China to achieve its ambitious renewable energy and climate goals (Finamore, 2020). Continued research, development, and deployment of solar, wind, energy storage, and other clean technologies are essential to drive down costs and ensure competitiveness with traditional energy sources.

2.3 GLOBAL ENERGY TRENDS AND IMPACTS ON CHINA

China's rising demand for energy is undoubtedly related to its economic growth. China's primary energy consumption increased rapidly from over 1.2 billion tonnes of coal equivalent (tce) in 1990 to an incredible 5.1 billion tce in 2021, driven by the country's fast industrialisation and urbanisation [9]. China is now by far the biggest consumer of energy consumption in the world, having increased by over four times in just over thirty years . China significantly depends on international markets to supplement its natural assets to fulfil this increasing need for energy. Understanding the comprehensive and ever-changing global energy trends is essential to understand the factors influencing China's energy security policies, import choices, and position within the international energy arena. The amount of energy sources used to meet the world's demand is changing significantly. The energy situation is changing away from fossil fuels like

[9] BP p.l.c. (2023, June 06). BP statistical review of world energy 2023. https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Coal, oil, and natural gas and moving towards cleaner, more sustainable options. The global energy mix, the incredible amount of various energy sources used to meet worldwide demand, is undergoing a significant transformation; usually dominated by fossil fuels like Coal, oil, and herbal gas, the power landscape is shifting closer to purifier and extra sustainable alternatives. Renewable energy sources like solar, wind, and hydropower will account for over 80% of global electricity generation by 2050, compared to just 28% in 2023 [10]. This rapid shift is driven by several factors, including:

2.3.1 Climate Change Concerns:

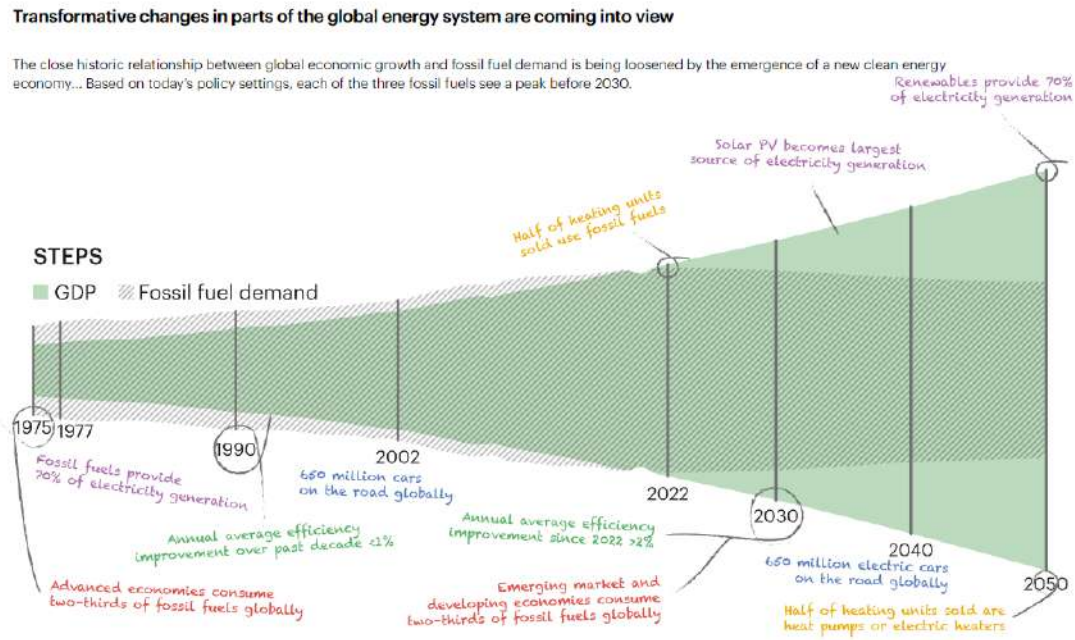
Climate change concerns are prompting a worldwide transition to cleaner energy sources that emit less carbon. Global agreements, such as the Paris Agreement, emphasise the joint obligation to minimise greenhouse gas emissions, and renewable energy is essential for reaching these targets. Technological Advancements: Renewable energy sources have recently become more affordable, making them more competitive with traditional fossil fuel options. Solar and wind energy costs have dropped considerably, resulting in their rapid expansion and acceptance worldwide . Energy Security Considerations: Geopolitical instability and concerns over the reliability of fossil fuel supplies are prompting countries to diversify their energy sources and invest in renewables for greater energy independence.

China, the world's top greenhouse gas emitter, has problems due to the worldwide shift to cleaner energy, but it also has tremendous potential. China has emerged as a global leader in developing and producing renewable energy, realising the long-term

[10] United Nations. (n.d.). Renewable energy – powering a safer future. Climate Change. Retrieved April 24, 2023, from https://www.un.org/en/climatechange/raising-ambition/renewable-energy

advantages to the economy and environment. In 2022, China constituted more than half of the world's investments in renewable energy [11]. By concentrating on renewable energy sources, China can effectively tackle climate change issues, improve its energy security by decreasing its reliance on imported fossil fuels, and become a significant participant in the global energy market in the future.

Figure 2.1: Global Energy Transition



Source: International Energy Agency

Over the past three decades, the global energy mix has experienced a significant transformation. Over the past three decades, it has been fueled by economic development, technological innovation, and a growing emphasis on sustainability. Even while fossil fuels are still essential, the fast growth of renewable energy sources is

[11] IEA (2023), World Energy Outlook 2023, IEA, Paris. accessed on 04/01/2024 https://www.iea.org/reports/world-energy-outlook-2023, Licence: CC BY 4.0 (report); CC BY NC SA 4.0 (Annex A)

making fossil fuels less dominant. Significant regional differences in energy use patterns, notably between industrialised and developing countries, coincide with this change. Historically, Coal, oil, and natural gas have been the foundation of world energy systems. However, their comparative part of the energy mix has gradually decreased during the past few decades. In 1990, fossil fuels provided around 80% of the world's total energy supply (TES) [12]. This percentage progressively declined to about 80% by 2021 despite a continuous rise in energy consumed . This pattern indicates the beginning of a move away from conventional energy sources, even if it is still essential. The remarkable rise of renewable energy sources, which include solar, wind, hydropower, bioenergy, and geothermal energy, correlates with the diminishing percentage of fossil fuels. The global total energy supply increased 2.6 times from 1971 to 2019 [13]. Solar and wind power, in particular, have experienced exceptional growth. Globally, solar photovoltaic (PV) capacity increased from a mere 1 gigawatts (GW) in 2002 to over 920 GW in 2021 [14]. This shift is primarily driven by the possibility of renewables as affordable replacements for fossil fuels.

Across the world, the global energy shift is happening at different rates. Because of policies aimed at lowering greenhouse gas emissions and diversifying their energy sources, developed nations have frequently taken the lead in implementing renewable energy. For example, the share of renewable energy in the EU's final energy consumption increased from 1.2% to 23% in 2022 [15]. On the other hand, emerging

[12] International Energy Agency. (2023). Greenhouse Gas Emissions from Energy Data Explorer – Data Tools & Resources [IEA]. Retrieved on 12/03/2024 https://www.iea.org/data-and-statistics/data-tools/greenhouse-gas-emissions-from-energy-data-explorer

[13] Iea (2021), World Energy Balances: Overview, Iea, Paris. accessed on 30/03/2024 Https://Www.Iea.Org/Reports/World-Energy-Balances-Overview

[14] International Solar Alliance. (n.d.). Solar Market Report. https://isolaralliance.org/uploads/docs/d998384d914dbf6499abe666ddb47f.pdf

[15] European Environment Agency. (2024). Share of energy consumption from renewable sources in Europe. accessed on 01/04/2024

countries, especially those with quickly growing economies, remain more dependent on fossil fuels to fulfil their rising energy needs. In the next several decades, we will see much more significant changes in the world's energy mix. Renewable energy sources could provide over 80% of global electricity generation by 2050 in their Net Zero Emissions (NZE) Scenario [16]. However, there are obstacles to a greener energy future. The successful implementation of this significant change will depend on ongoing investments in renewable technology, grid modernisation, and regulations that promote fair competition between fossil fuels and renewable energy sources.

2.3.2 Instability In Oil And Gas Markets:

Historically, we can see that there was no stability in the price of oil and gas. Complex factors affecting supply, demand, and geopolitical conditions cause this instability. A disruption in these areas can send shockwaves to the market, causing prices to go up and down sharply. We need to understand several key factors of this volatility: Geopolitical conflicts in crucial oil-producing regions may significantly decrease supply, leading to shortages and price increases like Russia's invasion of Ukraine in 2022. Similarly, OPEC (Organization of Petroleum Exporting Countries) decisions significantly affect the global oil market, frequently adjusting production quotas to control prices. Technological shifts: Advancements in extraction technologies can reshape the supply of energy. The development of hydraulic fracturing

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https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from?activeAccordion=ecdb3bcf-bbe9-4978-b5cf-0b136399d9f8

[16]Kammen, Daniel. 2011. “80% of All Energy Could Be from Renewables by 2050...with the Right Policies.” World Bank. https://blogs.worldbank.org/en/climatechange/right-policies-80-energy-could-come-renewables2050#:~:text=But%20the%20reasons%20not%20to,the%20right%20enabling%20public%20policies

(fracking),changed the dynamics of the global market and significantly increased domestic output, transforming the oil and gas sector in the United States [17].

In the same way, developments in deep-water exploration may reveal undiscovered resources and impact future supply levels. Instability of demand: The oil and gas consumption trends closely connect with the economy's condition. Intense periods of global economic expansion increase demand for energy and increase prices.

Conversely, economic downturns or recessions, like the 2008-2009 financial crisis, can lead to a decline in oil and gas demand, suppressing prices. (Rogoff, 2023) Structural shifts towards less oil-intensive energy sources, such as renewables, could gradually reshape global demand.

The global energy markets are naturally unstable, especially regarding oil and gas. Natural disasters in important oil-producing locations, geopolitical conflicts like the Russia-Ukraine War, and OPEC+ production strategies can all cause supply interruptions that significantly reduce supply and increase price volatility [18]. Also, by increasing domestic output and changing trade flows, the United States' technical developments, like hydraulic fracturing or fracking, have changed global oil markets. Also, the global demand patterns for oil and gas are influenced by economic cycles, the progress of energy consumption patterns of emerging economies, and the ongoing transition towards renewable energy sources. China, for instance, saw its rapid economic growth drive a significant increase in oil demand in the early 2000s,

[17] US Energy Information Administration (EIA). (2023). China - International - U.S. Energy Information Administration (EIA). accessed on 30/03/2024.
https://www.eia.gov/international/analysis/country/CHN

[18] International Energy Agency [IEA]. (2023). Oil Market Report. 30/03/2024
https://www.iea.org/reports/oil-market-report-march-2023

impacting global markets [19]. China's energy landscape is particularly vulnerable to instability in the world's oil and gas markets since it is both a significant energy user and the world's top oil importer. The energy sector in China has both possibilities and problems due to price volatility. Price expansion puts pressure on energy budgets and raises import expenses, while price drops can also offer an opportunity for intelligent storage purchases . China is strongly developing diversification-focused energy security policies to reduce the risks associated with market instability. To reduce the nation's reliance on unstable fossil fuel markets, they include investments in domestic oil and gas exploration and production, establishing energy partnerships with various providers, and speeding the spread of renewable energy sources.

2.3.3 Climate Change And International Environmental Policies

There is a rising emphasis worldwide on creating agreements and regulations to lower greenhouse gas emissions as a result of the urgency with which climate change must be addressed; for example, The United Nations Framework Convention on Climate Change (UNFCCC) established the Paris Agreement in 2015, which aims to keep global warming to far below two °C, ideally 1.5°C, relative to pre-industrial levels [20]. Countries have filed national plans (NDCs) detailing their climate adaptation and emission reduction policies to accomplish this. Alongside the Paris Agreement, other policy mechanisms have emerged to support the transition to a low-carbon economy. Many nations have adopted carbon pricing imposed through carbon taxes or emissions

[19] De Gouvello, C., & Song, Y. (2023). Renewable Energy Development in China: A 40-Year China-World Bank Partnership. World Bank Group. https://documents1.worldbank.org/curated/en/162841638508597254/pdf/Renewable-Energy-Development-in-China-A-40-Year-China-World-Bank-Partnership.pdf

[20] United Nations Framework Convention on Climate Change. (n.d.). The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

trading plans. This approach puts a direct cost on carbon emissions, encouraging businesses and industries to invest in cleaner technologies and practices. Governments are also gradually cutting fossil fuel subsidies and redirecting funds to energy efficiency and renewable energy initiatives.

China's remarkable economic expansion over recent decades came at the cost of a massive increase in greenhouse gas emissions, making it the world's top emitter. This places China squarely at the heart of international efforts to tackle climate change. Lately, China has shown greater willingness to participate in global climate initiatives, indicating a change in its approach. However, this change must carefully balance continued economic progress with the urgent need to reduce the environmental impacts of its development path. Historically, China's position in international climate negotiations emphasised the principle of "common but differentiated responsibilities," arguing that developed nations bear greater historical responsibility for climate change. However, mounting domestic environmental pressures and growing international scrutiny have shifted China's position. Faced with severe air pollution, water scarcity, and the impacts of extreme weather events, the Chinese government increasingly recognises the urgency of mitigating climate change impacts (Finamore, 2020).

China took a big step in the right direction towards constructive engagement in international climate action by signing the Paris Agreement in 2015. China agreed to reach carbon neutrality by 2060 and to peak its carbon dioxide emissions before 2030[21]. They show that they are willing to take on more accountability under the global framework for climate governance. China's domestic policies and Five-Year Plans

[21] United Nations Framework Convention on Climate Change. (n.d.). The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

demonstrate its climate change objectives. Which increasingly prioritises sustainability and environmental protection. The nation has invested heavily in renewable energy, becoming a global leader in solar and wind power development (IRENA, 2023)[22]. Moreover, China has established a national emissions trading system (ETS) to price carbon and incentivise emissions reductions (Huang et al., 2020).

2.3.4 The Geopolitics Of Energy

Access to energy resources is a crucial driver for geopolitics, shaping power dynamics, alliances, and even global conflicts. Oil and gas, in particular, have played an essential role in international relations for decades. The unequal Distribution of these resources creates a dependency between states and can serve as an opportunity for collaboration and competition. Nations possessing substantial quantities of oil and gas frequently hold considerable sway in international trade and diplomacy. For instance, the Organisation of Petroleum Exporting Countries (OPEC) has a history of using pressure and attaining geopolitical goals by managing the oil supply .

Moreover, political struggles and regional wars have been exacerbated by competition for control over energy resources, especially in regions like the Middle East and the South China Sea. One of the main strategic concerns for nations is the safe and efficient transportation of energy resources. Large-scale oil and gas pipelines cross continents, influencing commerce and perhaps posing risks . Comparably, marine routes are vital

[22] International Renewable Energy Agency (IRENA). (2023). Cost of Renewable Energy Deployment. Report https://mc-cd8320d4-36a1-40ac-83cc-3389-cdn-endpoint.azureedge.net/-/media/Files/IRENA/Agency/Publication/2023/Aug/IRENA_Renewable_power_generation_costs_in_2022.pdf?rev=cccb713bf8294cc5bec3f870e1fa15c2

conduits for the world's energy commerce, primarily through strategically important chokepoints like the Straits of Hormuz and Malacca. Shockwaves through the global economy can result from disruptions to these essential conduits.

China is the biggest energy consumer in the world; consequently, securing access to energy resources is crucial to its geopolitical strategy. China has adopted a multifaceted approach to reduce its dependence on unstable international markets. Strategic Partnerships: Through infrastructure investment projects such as the Belt and Road Initiative (BRI), China has established strategic alliances with resource-rich countries in Africa, Latin America, and Central Asia (Umbach, 2019). These alliances protect access to energy resources and increase China's economic and political influence. Resource Development Investments: To gain control over supply chains and production, Chinese state-owned oil corporations have made significant investments in purchasing oil and gas assets overseas . With this policy, China's energy security will be improved, and its reliance on outside sources will be decreased. Energy-related Organizations: China actively participates in global energy organisations, including the Shanghai Cooperation Organisation (SCO) and the International Energy Agency (IEA). China gains more influence in energy-related decision-making and shapes global energy governance using these platforms (Christoffersen, 2016).

Finally, China's energy security quest has opportunities and challenges due to the constantly shifting global energy landscape. China's energy project is shaped by market volatility, geopolitical shifts, the changing energy mix, and the increasing need to address climate change. China is especially susceptible to changes in oil and gas prices and supply interruptions because of its long-standing reliance on fossil fuels and status as the world's largest energy consumer. China is strongly diversifying its energy

supplies, investing in developing its resources, increasing the use of renewable energy, and proactively interacting with energy-rich countries worldwide to reduce these risks.

CHAPTER 3

CHINA'S OIL AND GAS DEPENDENCY TRENDS (2002-2025)

The fundamental relationship between economic growth and energy demand rests on the understanding that expanding economies require increasing energy inputs to sustain industrial production, transportation, infrastructure development, and rising living standards. This principle has been repeated throughout history, and China's remarkable economic ascent in recent decades exemplifies this dynamic. As the World Bank notes, China's sustained high levels of GDP growth, accompanied by rapid urbanisation and a burgeoning middle class, have exerted immense pressure on the country's energy sector . To fuel this expansion, China has looked towards a diversified energy mix. However, oil and gas remain indispensable components, particularly in sectors where ready substitutes are not widely available. While China strategically diversifies its energy sources, oil and gas remain pivotal in the nation's energy landscape. The transportation sector, in particular, heavily relies on oil-based fuels, powering its rapidly expanding network of personal vehicles and commercial fleets in conjunction with the rise of the middle class .

Furthermore, China's vast manufacturing base utilises oil and gas in various industrial processes and as feedstock for the petrochemical industry, where it cannot easily be substituted. Additionally, natural gas has gained momentum as a cleaner-burning alternative to coal, as evidenced by its increasing role in residential heating and power generation. This dependence on fossil fuels, particularly oil and gas, underscores

China's challenges in balancing its robust economic development with its commitments to decarbonisation and energy transition (Christoffersen, 2016).

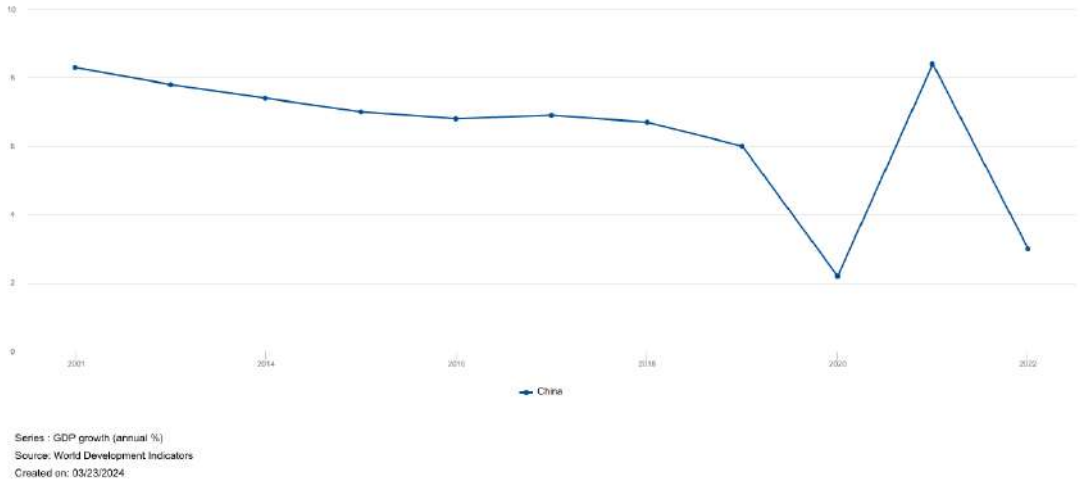
3.1 ECONOMIC GROWTH AND INITIAL OIL AND GAS TRENDS

3.1.1 Key Economic Indicators:

a. Gross Domestic Product (GDP):

A vital indicator of the progress of China's economy is the gross domestic product per capita or (GDP) growth rate. GDP measures the total monetary value of all final goods and services produced within a country during a specific period. Tracking the ups and downs in GDP growth shows the pace at which the Chinese economy has expanded. Times of robust GDP growth often mean increased production, investment, and overall economic activity. On the other hand, declining or stagnant GDP growth can signal economic slowdowns or recessions. Analysing China's GDP growth provides valuable insights into its financial system's health, strengths, and potential challenges. China’s Gross Domestic Product (GDP) experienced sustained growth throughout this period, demonstrating the overall expansion of its economy. World Bank data reveals a notable acceleration in GDP growth rate following China's accession to the WTO in 2001 (World Bank, 2023). This trend is visually represented in Figure 3.1.

Figure 3.1 China's GDP Growth Rate 2002-2022

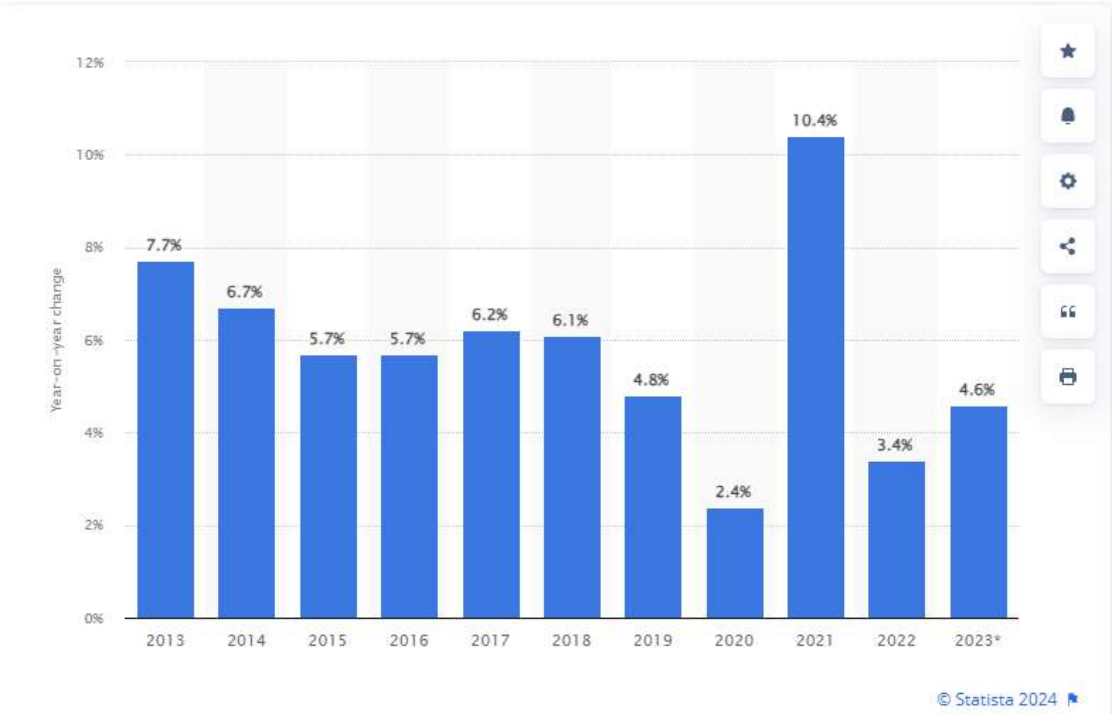


b. Industrial Output:

Industrial production is one key metric to consider in order to understand the direction of China's remarkable economic progress. Industrial output measures the total value of goods produced within a nation's industrial sector, encompassing manufacturing, mining, construction, and utilities. Tracking fluctuations in industrial production reveals the pace of a nation's industrialisation, technological advancements, and changing demand patterns for manufactured goods. By analysing China's industrial output, we gain insights into the factors propelling its economic expansion, the transformation of its workforce, and the broader impacts on both the domestic economy and global markets.

Figure 3.2 This statistic shows the development of China's industrial production from 2013 to 2023. In 2023, China's industrial production increased by about 4.6 per cent compared to the previous year (Textor, 2024).[23]

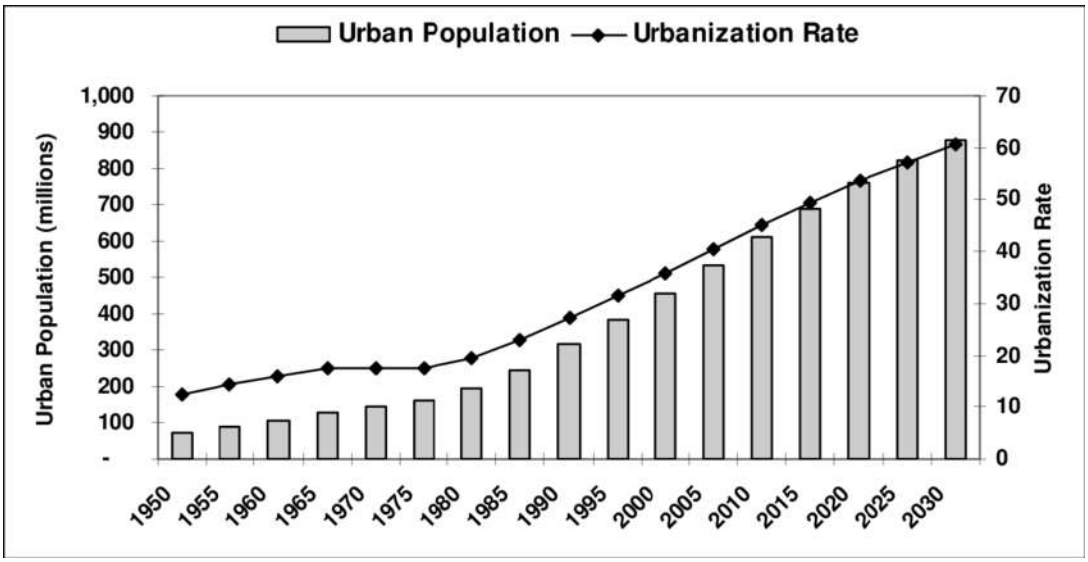
[23] The available data on the Statistica website about the development of china's industrial production is from 2013 to 2023



c. Urbanisation Trends:

Urbanisation trends are a potent development indicator within the larger framework of China's economic transition. Urbanisation refers to the process of increasing population concentration in cities and towns. As nations industrialise, urbanisation often accelerates due to shifts from agricultural to industrial and service-based economies. Monitoring China's urbanisation reveals the movement of labour into higher productivity sectors, the growth of the domestic consumer market, and the infrastructural demands accompanying rapid urban expansion. By analysing urbanisation trends, we better understand the complexities driving China's development and the challenges associated with this profound demographic shift.

Figure 3.3: China’s Urbanization, 1950-2030

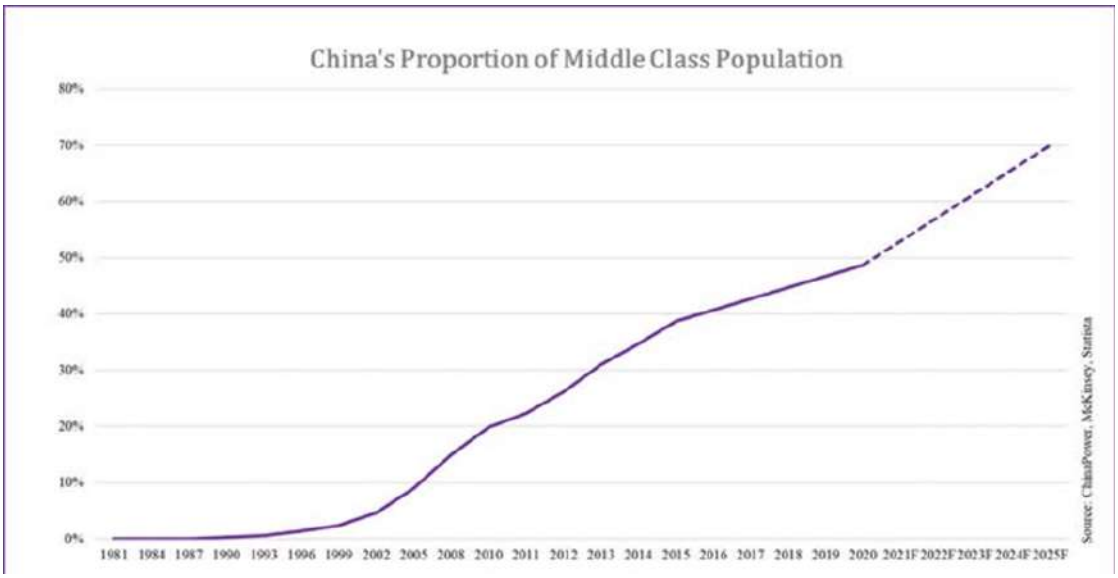


Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2004 Revision and World Urbanization Prospects (http://esa.un.org/unpp).

d. Expanding Middle Class:

A pivotal factor within China's economic story is the dramatic rise of its middle class. The middle class broadly refers to a segment of the population with a certain income level, affording them discretionary spending and a greater variety of consumer choices. The expansion of China's middle class indicates rising living standards due to increased wages and economic opportunities. It signals a shift toward a consumption-driven economy, boosting demand for goods and services beyond necessities. Understanding China's middle class's growth and consumption patterns offers insights into the nation's changing economic structure and expanding influence in global consumer markets.

Figure 3.4: China’s Proportion of Middle Class Population



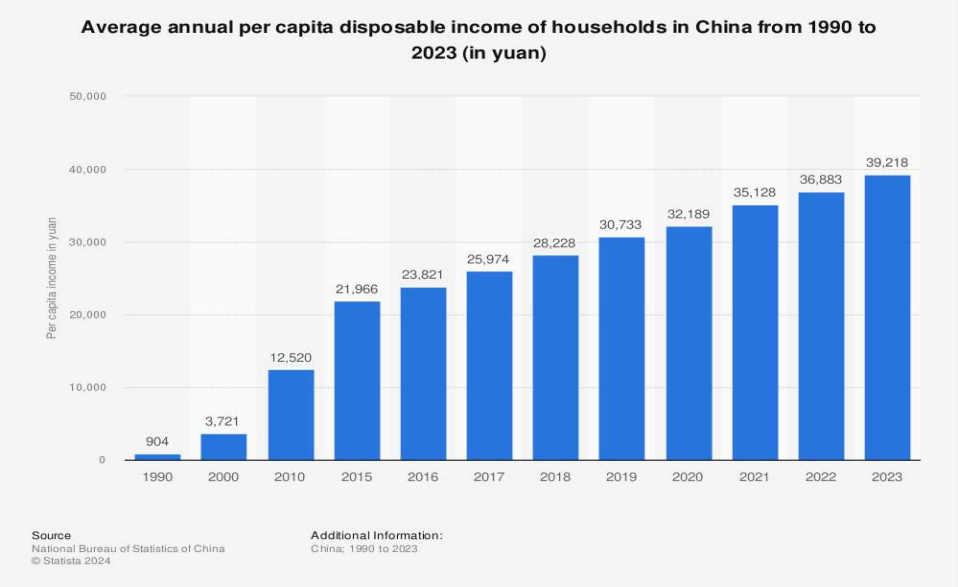
Source: ChinaPower, McKinsey, Statista

China's economic reforms have fueled a remarkable expansion of its middle class. Now comprising nearly half the population, the middle class enjoys an income bracket of RMB25,000 to RMB250,000 annually (US$3,660 - $36,600) (Zhou, 2018). Government policies, like tax cuts and the "Made in China 2025" industrial modernisation plan, aim to increase this demographic further (Wübbeke et al., 2016). Industry analysts, including McKinsey & Company, project that the middle class could reach 70% of the population by 2025 (Kharas, 2017). This rising middle-class drives increased purchasing power, with consumption growing an average of 11.24% annually in the past decade. Despite external pressures, the resilience of Chinese consumers supports the nation's transition to a consumption and services-driven economy (World Bank, 2023).

e. Changes In Disposable Income:

Disposable income, the amount of money households have available after taxes and mandatory deductions, is a vital indicator of economic well-being and a driver of China's economic development. Tracking changes in disposable income reveals trends in living standards, consumer spending power, and potential economic shifts. Rising disposable income signifies improved economic opportunities and higher wages, empowering consumers to purchase more goods and services. This increased demand stimulates various sectors, fueling production, investments, and economic growth. Understanding China's disposable income patterns offers insights into its trajectory of increased consumption and the potential challenges of sustaining this growth amidst income inequality concerns.

Figure 3.5: Average annual per capita disposable income of households in China from 1990-2023(in



Source: National Bureau of Statistics of China @ Statistica 2024

3.1.2 Evolution Of China's Oil And Gas Demand

It is essential to do a sector analysis to comprehend the intricate patterns of China's demand for oil and gas. Analysing oil and gas consumption by industry, such as manufacturing, transportation, and residential, reveals the sectors of the Chinese economy that are the primary consumers. The transportation industry, including automobiles, trucks, and aeroplanes, frequently needs oil products. The manufacturing sector may heavily utilise oil and natural gas for energy and production. Demand in the residential sector varies according to energy choices and heating requirements. These sectoral patterns may be used to analyse where demand is growing, shrinking, or staying the same. This information can be used to understand China's infrastructure development, economic goals, and possible weak points in its energy market.

China's transportation sector is a significant consumer of oil products, driven by its rapidly growing vehicle fleet and expanding aviation industry; the increasing number of private vehicles reflects rising disposable incomes and urbanisation trends[24]. Furthermore, China's vast logistics network, essential to its manufacturing and e-commerce sectors, relies heavily on trucks for freight movement, increasing oil demand (World Bank, 2022).

Alongside its transportation and manufacturing sectors, China's growing power generation needs to contribute significantly to its rising demand for natural gas. As the country transitions from coal-fired power plants to address environmental concerns, natural gas has emerged as a cleaner-burning alternative. Gas-fired power plants offer

[24] International Energy Agency (IEA). (2023). China Energy Outlook. https://www.iea.org/countries/china/

greater flexibility and lower emissions than coal, making them an attractive option to balance China's growing energy needs with its climate goals . This increased reliance on gas for electricity generation will likely shape China's overall energy consumption patterns in the coming years.

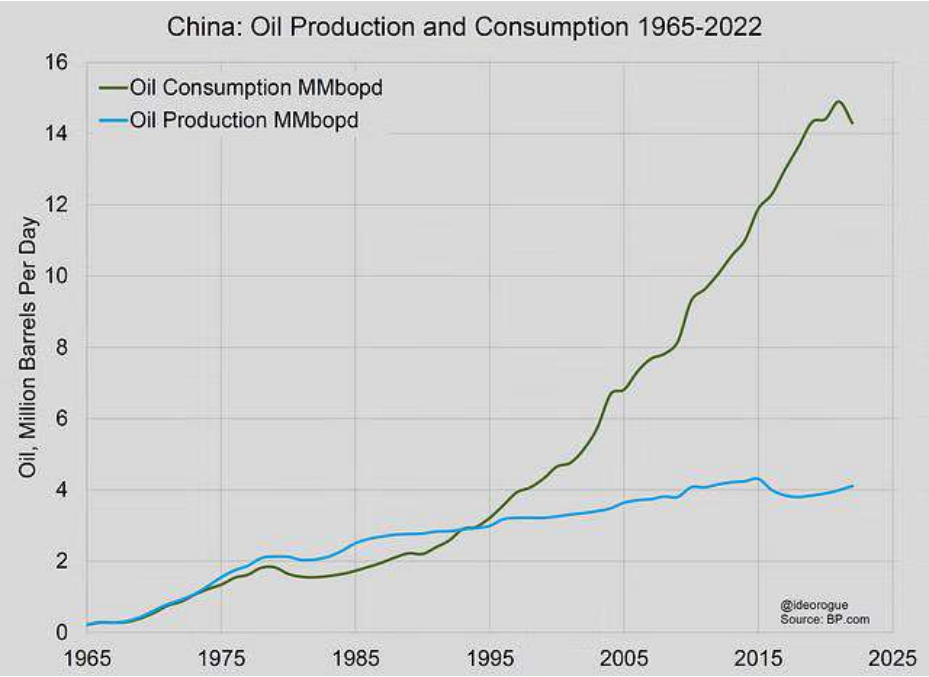
The manufacturing sector, the backbone of China's economy, exhibits diverse oil and gas consumption patterns. Energy-intensive industries like steel, cement, and chemicals traditionally depended on oil and gas for energy and feedstock [25]. However, recent government policies promoting energy efficiency and shifting towards higher-value manufacturing have begun to alter this dynamic. While overall manufacturing demand remains substantial, specific sub-sectors are seeing a gradual decline in oil and gas intensity .

Oil and natural gas play a role in the residential sector, primarily in heating and cooking. Climate, urbanisation, and government policies promoting cleaner energy sources influence this sector's demand. Traditional biomass fuels remain prevalent in rural areas, while urban centres have seen a rise in natural gas consumption for heating (China Daily, 2023). Government initiatives to expand natural gas networks and promote electric heating aim to reduce future residential reliance on oil-based fuels.

[25] United Nations Industrial Development Organization (UNIDO). (2021). Industrial Development Report 2022.
https://www.unido.org/sites/default/files/files/2021-11/IDR%202022%20-%20EBOOK.pdf

a. China's Oil Consumption And Production Patterns:

Figure 3.6: China's Oil Production and Consumption 1965-2022.



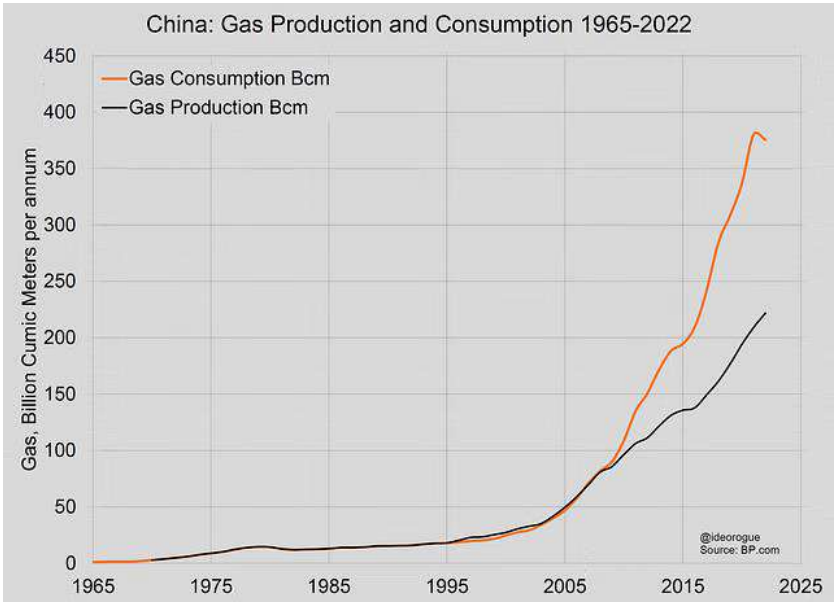
Source: BP.com

Figure 3.6 showcases China's oil consumption patterns and highlights several significant trends. After a period of steady growth, a noticeable dip in oil consumption occurred around 2015, likely due to factors like the COVID-19 pandemic and economic fluctuations. However, from 2019 onwards, the trend reversed, indicating a renewed increase in oil consumption. This uptick coincides with China's success in reversing declining production in legacy oil fields and developing new oil finds, particularly in the Bohai Bay area. While domestic production gains are significant, China remains heavily reliant on oil imports, with projections indicating that this dependency will persist throughout the decade due to the gap between consumption and domestic production.

China heavily depends on imports from other nations due to the significant difference between its domestic oil Production (Blue curve) and consumption (Green curve) in Figure 6. The text makes clear this reliance by describing China as the biggest crude oil importer in the world. China imports oil from several regions, including the Middle East (especially OPEC+ members), Russia, and even sanctioned nations like Iran, to fulfil its enormous energy demands. The country's increasing oil consumption is likely to hinder local production from keeping up, even with recent gains. Therefore, this import need is expected to persist for the foreseeable future.

b. China’s Gas Production And Consumption:

Figure 3.7: China’s Gas Production and Consumption 1965-2022.



Source: BP.com

Figure 3.7 showcases China's rising natural gas consumption trend, with the orange line illustrating a demand that has outpaced domestic production for some time. Despite impressive increases in domestic gas production (the black line), China remains

dependent on imports to fill the gap. This import reliance is evidenced by the significant portion of gas sourced through LNG and pipelines, as described in the article. However, the graph could also foreshadow a potential turning point, as recent agreements with Russia and Central Asian nations pave the way for increased pipeline imports. If these new supply routes materialise as planned, they could significantly reduce China's reliance on LNG imports, impacting markets for major gas exporters like Australia and Qatar.

3.1.3 Dependency Trends:

a. Oil Import Reliance:

China's oil imports exhibit intense concentration within OPEC+ nations, primarily from the Middle East and Russia. The Middle East accounts for roughly half of China's oil imports, with Russia providing approximately one-sixth [26]. This dependence on a limited group of suppliers enhances China's vulnerability to geopolitical instability and potential supply chain disruptions [27]. While China sources some oil from other regions, including Africa and South America, these volumes remain proportionally smaller (IEA, 2023). Efforts to meaningfully diversify oil import sources have faced challenges due to long-term contracts with OPEC+ members, the extensive infrastructure tied to these suppliers, and established geopolitical partnerships .

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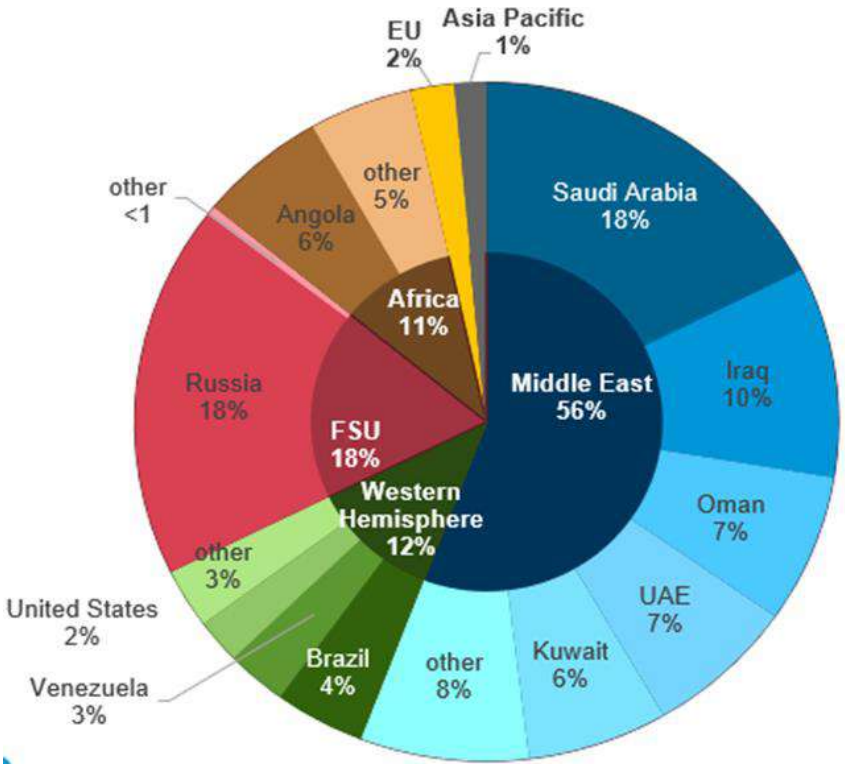
[26] United Nations Industrial Development Organization (UNIDO). (2021). Industrial Development Report 2022.
https://www.unido.org/sites/default/files/files/2021-11/IDR%202022%20-%20EBOOK.pdf

[27] UNCTAD. (2023). INCLUSIVE DIVERSIFICATION AND ENERGY TRANSITION. Commodity Development Report.
Commodities and Development Report 2023 - Chapter 1: The Predicament of Commodity-dependent Developing Countries (unctad.org)

b. Gas Import Reliance:

China has historically filled its gas import needs through two primary channels: Liquefied Natural Gas (LNG), mainly sourced from Australia and Qatar, and pipelines delivering gas from Central Asia (primarily Turkmenistan) and Russia [28]. This traditional pattern reflects established trade routes and infrastructure investments. Recent agreements with both Russia and Central Asian nations signal a potential shift towards increased reliance on pipeline gas imports . This diversification strategy could lessen China's dependence on LNG markets, potentially mitigating risks associated with maritime trade routes and price fluctuations in global LNG trade [29].

Figure 3.8: China Oil Imports 2022



[28] International Energy Agency (IEA). (2023). China Energy Outlook. https://www.iea.org/countries/china/

[29] World Bank. (2023). China Overview: Development news, research, data. https://www.worldbank.org/en/country/china/overview

Source: Vortexa and global trade tracker

China's oil imports faced a second consecutive annual decline in 2022, dropping 1% to 10.2 million b/d due to lower fuel demand and weak refining margins . Despite this trend, a late-year import surge, driven by discounted Saudi Arabian and Iranian crude and independent refineries maximising their quotas, Sanctions and price caps in 2023 caused Russia to offer heavily discounted crude, surpassing Saudi Arabia as China's top import source . Additionally, 2022 saw significant import increases from Iran (doubling), Venezuela (52% increase), and the UAE (40% increase) (EIA, 2023). Interestingly, while China's overall petroleum product imports declined by 8% to 2.4 million b/d, imports from the U.S. (China's top source for petroleum products) increased by 15% [30].

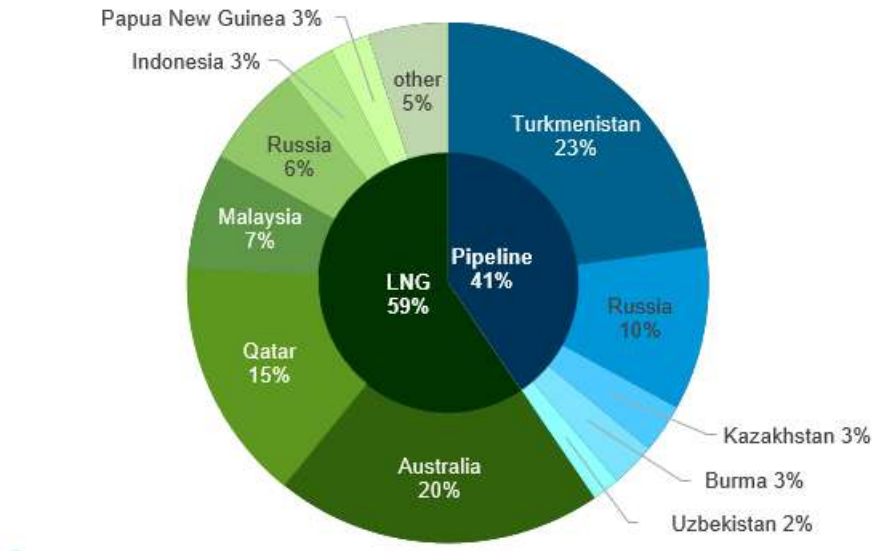


Figure 3.9: China’s Gas Imports 2022

[30] U.S. Energy Information Administration (EIA). (2023). China Country Analysis Brief. accessed on 30/03/2024
https://www.eia.gov/international/analysis/country/CHN

Source: Energy Institute statistical review of World Energy and GIINL Annual Report 2023

China experienced a substantial decline in LNG imports during 2022, with a 20% drop to 3.0 Tcf, attributable to increased domestic production, high spot prices, and reduced demand (EIA, 2023). This decline reduced LNG's share of total gas imports, while pipeline imports remained relatively stable, increasing their overall share [31]. Notably, 2022 saw a shift in China's top natural gas suppliers, with Turkmenistan surpassing Australia as the primary source. Russia also made significant gains, becoming China's third-largest gas supplier due to increased pipeline and LNG deliveries .

3.1.4 Considerations:

a. Geopolitical Factors:

China's methods for importing oil have been profoundly altered by its strengthening relations with Russia since the crisis in Ukraine . The allure of discounted Russian oil has grown, which might result in a reduced dependence on conventional Middle Eastern sources . Furthermore, China's intricate ties to the US and its allies may make it more challenging to form future energy relationships with other Western countries, increasing its dependence on a limited number of suppliers[32].

[31]EIA (2023, February). China's Reliance on Long-Term Oil Contracts May Be Waning. https://www.eia.gov/international/analysis/countrv/CHN

[32] UNCTAD. (2023). INCLUSIVE DIVERSIFICATION AND ENERGY TRANSITION. Commodity Development Report.
Commodities and Development Report 2023 - Chapter 1: The Predicament of Commodity-dependent Developing Countries (unctad.org)

b. Impacts on Domestic Production:

China continues to develop domestic oil and gas to improve long-term energy security. Some hope is offered by achievements such as the most recent discovery in Bohai Bay . However, experts still need to be wary, given the difficulties in tapping into unconventional and deepwater hydrocarbon resources . Even while advances in local production may cause a minor decrease in import dependency, it will likely continue for some time.

Future Projections: In the medium run, China's reliance on imports is anticipated to persist or rise due to its expanding energy consumption and limited domestic resources (IEA, 2023). The Chinese government may introduce new suppliers to diversify import sources, especially in the gas industry (Nikkei Asia, 2023). China's total energy import mix is projected to be dominated by long-standing trading agreements with large actors like Russia and other OPEC+ countries.

d. Drivers of Increasing Oil and Gas Reliance:

Despite recent improvements, China's domestic oil and gas output must be increased to meet its fast-growing energy demands. Several elements add up to this deficit. Firstly, China's legacy oil fields, like Daqing, are experiencing declines in natural production (IEA, 2023). Secondly, while China possesses sizeable unconventional resources, its exploitation faces technological and economic hurdles. Also, geological complexity has curtailed investment in high-risk exploration areas, limiting the amount of significant new domestic reserves that may be found. Despite recent successes in boosting domestic oil and gas output, China's robust economic growth and ongoing industrialisation drive a demand trajectory that outpaces production increases. This imbalance fuels the need

for imports to bridge the gap between domestic supply and national energy requirements.

e. Demand Outpacing Supply:

China's impressive economic growth, fueled by continuous industrialisation and a rapidly expanding transportation sector, has driven a sharp increase in energy demand . This demand growth exceeds the pace at which China can realistically increase domestic oil and gas production. While efforts to boost domestic output continue, China's energy demand's sheer scale and speed make it difficult for production to catch up, resulting in a persistent reliance on imports .

f. Transportation Sector Growth:

A significant contributor to China's surging oil demand is the rapid expansion of its transportation sector. The growing number of private vehicles and increased freight movement reflect rising living standards and the needs of China's vast manufacturing and logistics networks. This transportation-driven demand will continue, further pressing China's oil import requirements.

g. Policy Focus:

China's energy policies have historically played a complex role in its reliance on oil and gas imports. While initiatives exist to promote renewables and energy efficiency, specific guidelines have inadvertently reinforced the dominance of fossil fuels in the energy mix. For instance, price controls and subsidies in the past artificially lowered domestic prices for oil and gas products, disincentivising robust investment in alternatives and conservation measures. Additionally, mandates driving heavy

industrial growth and infrastructure expansion have fueled energy-intensive economic activities, increasing fossil fuel demand .

h. Changing Policy Environment:

Recognising that China's energy policies are changing is critical. The government has recognised the environmental and economic implications of heavy fossil fuel reliance and is taking steps to promote cleaner energy sources. However, transitioning to a vast economy like China's takes time, and the legacy of past policies favouring fossil fuels continues to influence the current energy landscape.

China's ambitious climate objectives have brought about significant legislative changes supporting the growth of renewable energy and the desire to reduce its dependency on energy imports. Important projects involve substantial investments in wind and solar energy production to raise their proportion in the energy mix. Furthermore, China is gradually eliminating subsidies for fossil fuels and enacting feed-in tariffs to encourage the development of renewable energy. Moreover, a drive for greener transportation options is reflected in the government's emphasis on electric cars and the infrastructure that supports them. China has demonstrated its strong commitment to a cleaner energy future with these recent legislative actions, even if there are still obstacles to totally shifting away from fossil fuels.

i. Trade Imbalances:

China's energy industry has a sizable trade deficit due to its substantial reliance on petrol and oil imports. The enormous amounts of money spent on importing these fuels, especially from large oil-exporting countries, add to a general trade imbalance . This imbalance can pressure foreign exchange reserves and influence currency values. Currency Management: To maintain a competitive exchange rate and promote exports,

China historically aimed to manage its currency, sometimes resulting in accusations of currency manipulation . While many factors influence currency policy, the need to finance large-scale energy imports plays a role in China's overall economic and currency management strategies. Diversification Efforts: China recognises the financial risks of heavy reliance on imported energy. Consequently, its efforts to diversify energy sources and promote domestic production are driven partly by the desire to mitigate trade imbalances and reduce the impact of energy import costs on its currency management.

n. Trade Imbalances:

China's energy industry has a sizable trade deficit due to its substantial reliance on petrol and oil imports. The enormous amounts of money spent on importing these fuels, especially from large oil-exporting countries, add to a general trade imbalance . This disparity may impact currency values and strain foreign exchange reserves. China has always attempted to regulate its currency to maintain a competitive exchange rate and encourage exports, occasionally leading to currency manipulation charges . Although various factors affect currency policy, China's overall economic and currency management methods are influenced by the necessity of financing large-scale energy imports[33]. China recognises the financial risks associated with heavy reliance on imported energy. Consequently, its efforts to diversify energy sources and promote domestic production are driven partly by the desire to mitigate trade imbalances and reduce the impact of energy import costs on its currency management (IEA, 2023).

[33] China's currency policies are complex and influenced by various economic factors beyond energy imports alone. This analysis focuses on the specific link between the two.

Inflationary Pressures: Changes in the price of petrol and oil worldwide can significantly affect domestic inflation in China. As a significant importer, China is susceptible to price surges that result in increased expenses for enterprises and customers . These inflationary pressures can cause economic instability and provide difficulties for decision-makers who want to keep growth steady . Implications for Investments: China's domestic oil and gas sector has seen a significant influx of capital due to the country's increasing energy consumption. State-owned businesses lead these investments, prioritising technology, infrastructure development, and exploration to boost domestic output. Furthermore, possibilities for foreign investment in sectors such as unconventional resource development and sustainable energy technology are created by government incentives and growing demand .

3.1.4 Initial Lessons And Transition Points:

While pinpointing a precise "tipping point" is difficult due to the complexity of economic systems, specific periods suggest a more significant negative impact on China's energy import dependency; the Global Financial Crisis of 2008-2009 is one such period, where a sharp decline in global demand led to oil price volatility, China's vulnerability to these price fluctuations became evident during this economic slowdown[34]. Beyond purely economic metrics, China's fossil fuel reliance's rising environmental costs represent a "tipping point." Heavy pollution from coal and oil consumption negatively affects public health and contributes to climate change challenges; this spurred an acceleration of China's energy transition policies and

[34] World Bank. (2023). China Overview: Development news, research, data. https://www.worldbank.org/en/country/china/overview

recognition of the urgency to shift towards a less import-dependent, cleaner energy mix . Recent years have highlighted how rising geopolitical tensions can abruptly impact energy trade routes and prices. The Russia-Ukraine conflict is a prime example, where China's increased reliance on discounted Russian oil underscores the risks associated with overdependence on specific import sources. This vulnerability can have long-term consequences for energy security and economic stability.

a. Policy Shifts:

China's changing energy policy has been motivated mainly by realising the hazards connected to a high reliance on imported energy. Long-term import dependency is intended to decrease by focusing more on domestic production of conventional fossil fuels and renewable energy sources . Furthermore, China's aggressive climate goals drive legislative measures supporting energy efficiency, electric cars, and renewable energy investment .

b. Technological Innovations:

Much money was invested in research and development to optimise domestic resources and switch to greener energy. With increasing exports and domestic deployment of solar and wind power technology, China has emerged as a leader in these fields. Additionally, advancements in unconventional oil/gas extraction and energy storage technologies are pursued to diversify energy options further.

c. Public Awareness Campaigns:

Alongside policy and technological shifts, public awareness campaigns play a role in China's energy transition. Government initiatives promote conservation and energy efficiency at individual and industrial levels . There is also a growing environmental

consciousness among the Chinese public, driving demands for cleaner air and sustainable solutions. This public pressure further influences policy direction.

3.2 BELT AND ROAD INITIATIVE IMPACT ON OIL AND GAS DEPENDENCY:

With its focus on extensive infrastructure development and improved connectivity throughout Eurasia, China's ambitious Belt and Road Initiative (BRI) significantly affects the nation's energy landscape and reliance on petrol and oil imports. Thanks to the Belt and Road Initiative's focus on promoting commerce and economic growth in partner states, Chinese goods and services find new markets. Constructing massive infrastructure projects, such as ports, pipelines, and transportation networks, simultaneously affects China's energy import patterns and strategic partnerships with its suppliers (McKinsey, 2016). In addition, China's aim to safeguard resource supplies for its ongoing growth and lessen its susceptibility to supply interruptions in conventional import routes is reflected in the Belt and Road Initiative (BRI) .

3.2.1 Increased Demand Potential

The BRI's extensive infrastructure development within participating nations presents the risk of significantly increasing energy demand, potentially creating a long-term dependency on China as a supplier of oil and gas. This effect is linked to several factors: Industrialization and Economic Growth: BRI projects, including power plants, industrial parks, and transportation networks, directly contribute to the economic growth of developing nations (Hillman, 2020). This economic activity intrinsically fuels

energy demands, potentially locking these countries into long-term contracts with China for oil and gas. Urbanisation and Infrastructure Expansion: The BRI facilitates urbanisation trends in participant nations, creating new hubs of energy consumption. This includes the increased need for transportation fuels, construction materials reliant on petrochemicals, and electricity generation – sectors where China could become a dominant supplier. Potential for Inefficient Technologies: A concern exists that some BRI-funded energy projects may utilize older or less efficient technologies due to cost considerations or limited regulation in host nations. This could exacerbate demand and further entrench dependence on fossil fuels.

3.2.2 Domestic Production vs. Imports

Whether the increased energy demand triggered by the BRI will primarily be met through imports or domestic production remains a complex open question. China has invested heavily in domestic oil and gas exploration and extraction technology (Privacy Shield, 2019). However, its resources are limited compared to global demand. This suggests that even with a surge in domestic production, China would still need to import significant quantities of oil and gas to meet the increased energy demand created along BRI corridors entirely.

The BRI holds the potential to create a feedback loop: China's infrastructure investments fuel development in BRI participant nations, leading to increased oil and gas demand, which in turn positions China as a critical supplier. These dynamics warrant close study, with dissertation research potentially focusing on specific case studies of BRI projects to evaluate the interplay between energy demand creation, domestic production limitations, and long-term supply arrangements.

3.2.3 Diversification Of Import Sources

Opening up new avenues for China to get oil and gas resources is a crucial effect of the BRI, particularly emphasising Central Asia, Africa, and other developing countries (Aoyama, 2016). Significant advancements include Central Asia: China's relations with the energy-rich countries of Kazakhstan, Turkmenistan, and Uzbekistan have improved thanks to new pipelines and transportation infrastructure (see Figure 3.10) (Jiang, 2022). As a result, China is less dependent on maritime routes via the Strait of Malacca, which might become a chokepoint in the event of hostilities. Africa: Investment in oil and gas development projects has resulted from the Belt and Road Initiative (BRI) in nations like Nigeria and Angola (Sun et al., 2017). Russia: BRI initiatives in the Arctic and Siberia deepen Sino-Russian energy cooperation, providing China with an alternative source outside the Middle East (Lanteigne, 2017)[35].

[35] Lanteigne, M. (2017, September 12). Who Benefits From China's Belt and Road in the Arctic? The Diplomats.
https://thediplomat.com/2017/09/who-benefits-from-chinas-belt-and-road-in-the-arctic/

Figure 3.10: Central Asia gas pipeline maps connecting to China

Souruce: © macpixxel for GIS

3.2.4 Reduced Vulnerability: Potential And Limitations

In politically unstable areas, China may be less dependent on established suppliers if its import sources are more diverse; this can lessen the chance of supply chain interruptions brought on by disputes or unstable conditions (Bednarski, 2023). Nonetheless, it is essential to remember that this diversification strategy's effectiveness depends on several factors: Geopolitical Stability: New supply routes that pass via Africa and Central Asia pass through areas with differing levels of political stability. Events that occur in these areas can negate the advantages of variety. Over-reliance on Specific Regions: While the BRI introduces new suppliers, it may shift dependency from one geographic region (the Middle East) to another (Central Asia) (Pant, 2021). This creates new vulnerabilities that require careful management. Long-Term Contractual Agreements: The effectiveness of diversification depends on China's ability to secure stable, long-term supply agreements with new partners. Global competition for resources could create hurdles in achieving this.

3.2.5 New Supply Chains And Infrastructure:

Major oil and gas infrastructure projects are being built under the auspices of the Belt and Road Initiative (BRI), which is changing China's energy import environment. Significant instances consist of pipelines, which are vast networks of pipelines that carry gas and oil straight into China from Russia and Central Asia. Two notable projects are the Power of Siberia oil pipeline and the Central Asia-China gas pipeline (The Times of India, 2023). By increasing import capacity, these pipelines lessen dependency on maritime routes. Ports: China's capacity to import energy by sea, especially from the Middle East and Africa, is improved by BRI investments in ports like Gwadar in Pakistan and Hambantota in Sri Lanka (Terry, 2019). Thanks to its improved logistical capacity, China can now handle more LNG and oil cargo. Other Infrastructures: BRI-funded roads, trains, and other transport projects make it easier for energy resources to move inside China and between it and its neighbours, enhancing supply chains .

3.2.6 Impact On Import Capacity And Bargaining Power

These new BRI-driven supply routes considerably augment China's oil and gas import capacity. Diversifying import routes and reducing reliance on maritime chokepoints through pipelines enhances energy security. Additionally, by accessing new suppliers and alternative transport methods, China potentially increases its bargaining power and flexibility in negotiating energy contracts .

3.2.7 Geopolitical Implications

The BRI's energy infrastructure projects are a powerful tool for China to deepen its strategic partnerships with various oil and gas-producing nations. By investing in

pipelines, ports, and other infrastructure in countries like Russia, Kazakhstan, and nations along the Arabian Peninsula, China secures long-term access to vital energy resources [36] These investments often come with agreements for preferential supply contracts, solidifying economic and geopolitical ties . Additionally, China influences the negotiation of advantageous energy deals and regional energy markets because of the BRI's emphasis on connectivity. Furthermore, BRI energy projects may serve as pillars for more extensive political outreach and economic collaboration, increasing the dependency between China and its supply countries [37]. China's standing as a significant energy consumer and player in the global economy is strengthened by this dependency .

While the BRI offers China opportunities to diversify energy sources and strengthen relationships, it also exposes potential vulnerabilities arising from geopolitical instability. Several BRI corridors traverse regions with existing tensions or potential flashpoints. For instance, maritime routes through the Strait of Malacca and the South China Sea could be disrupted during regional conflict . Similarly, pipelines and other infrastructure in politically volatile Central Asia or the Middle East might face security threats or supply disruptions due to regional disputes (Nikkei Asia, 2022). Rising global tensions and the potential for trade or energy-related sanctions pose another risk to the BRI's energy routes. Should China's relationship with key supplier nations deteriorate, access to energy imports through BRI infrastructure could be jeopardised (Weng et al.,

[36] International Energy Agency (IEA). (2023). China Energy Outlook. accessed on 08/01/2024 https://www.iea.org/countries/china/

[37] China Power Team. "How Is the Belt and Road Initiative Advancing China's Interests?" China Power. May 8, 2017. Updated November 3, 2023. https://chinapower.csis.org/china-belt-and-road-initiative/

2021). Such disruptions would significantly affect China's energy security and economic stability.

3.2.8 Shift Towards Gas

The BRI's emphasis on building transcontinental pipelines aligns with China's increasing reliance on natural gas as a cleaner-burning alternative to coal and oil. Extensive pipeline networks, like those originating in Central Asia and Russia, directly address China's need to import vast quantities of natural gas (Hu, 2019). This pipeline infrastructure significantly strengthens China's access to gas suppliers outside its traditional maritime import routes . The BRI's focus on pipelines serves the dual purpose of increasing natural gas imports while reducing China's reliance on LNG shipments. Pipelines often provide a more cost-effective and secure mode of natural gas transportation over long distances than LNG, which requires liquefaction and regasification infrastructure . By investing in pipeline connectivity, China optimises its gas import strategy and supports its transition to a lower-carbon energy mix.

The Belt and Road Initiative's emphasis on pipeline infrastructure is a significant factor in supporting China's increasing natural gas use and its goal of diversifying its energy sources. China may now more affordably enter these markets because of new pipelines that open its access to significant gas resources in Russia and Central Asia . Consequently, China's reliance on LNG exports, which are sometimes more volatile in terms of price, may be lessened as pipeline-delivered gas accounts for a growing portion of the nation's overall gas imports [38]. However, it is essential to note that the BRI's impact is not a direct substitution of oil imports with pipeline gas. Oil and gas serve

[38] U.S. Department of Energy. (2023). Global LNG Outlook 2023-27. https://www.energy.gov/sites/default/files/2023-06/Ex%20L%20IEEFA%2C%20Global%20LNG%20Outlook.pdf

different sectors within China's vast economy. While gas is primarily used for heating, power generation, and some industrial processes, oil remains crucial for its transportation sector. Therefore, BRI-driven gas imports are more likely to displace coal use and partially reduce LNG reliance rather than directly impacting oil import volumes.

3.3 CHINA'S OIL AND GAS MANAGEMENT:

China's rapid economic ascent has propelled it to become the world's second-largest oil consumer and a significant force in global energy markets . Despite possessing domestic oil reserves, production has struggled to keep pace with the country's escalating energy demand (Downs, 2008). Consequently, China has increasingly relied on oil imports to meet its growing needs, heightening its energy security concerns. Central to China's strategy for securing oil imports are its powerful state-owned enterprises (SOEs), primarily CNPC, Sinopec, and CNOOC. Restructured in the late 1990s, these SOEs function as crucial instruments of the state, balancing market influences with the broader goal of energy security (Kong, 2010). These SOEs play a dual role—they maximise domestic production from mature fields like Daqing and aggressively pursue overseas acquisitions and production deals to diversify China's oil supply sources (Downs, 2008). China's reliance on imported oil poses complex challenges. Domestic price controls, aiming to protect vulnerable populations, clash with volatile international prices, creating economic strain .

Furthermore, China’s heavy reliance on Middle Eastern crude oil presents an infrastructural hurdle, as existing refineries were primarily designed for lighter oil grades (Kong, 2010). China has embarked on a nationwide modernisation of its refining

sector to address this bottleneck, upgrading facilities and constructing new refineries . China's reliance on imported oil poses complex challenges. Domestic price controls, aiming to protect vulnerable populations, clash with volatile international prices, creating economic strain. Furthermore, China's heavy reliance on Middle Eastern crude oil presents an infrastructural hurdle, as existing refineries were primarily designed for lighter oil grades (Kong, 2010). China has embarked on a nationwide modernisation of its refining sector to address this bottleneck, upgrading facilities and constructing new refineries .

Navigating China's energy sector involves utilising a complex network of government entities, with the National Development and Reform Commission (NDRC) and the Ministry of Natural Resources (MNR) assuming pivotal roles in shaping policies and regulations specific to the oil and gas sector. As China's top macroeconomic planning entity, the NDRC exerts broad influence by setting national energy production targets, determining overarching energy strategies, and influencing investment flows. Its authority extends to approving major domestic and international energy projects, including greenlighting overseas acquisitions often pursued by China's state-owned oil giants, Furthermore, the NDRC plays a critical role in regulating domestic energy prices, a complex task that can create friction when international market prices fluctuate sharply (Downs, 2008). The MNR, conversely, focuses on direct stewardship of China's natural resources, including oil and gas. It oversees the assessment and management of reserves, the allocation of exploration and production rights for both onshore and offshore fields, and the development and enforcement of environmental regulations specific to the energy sector. While the MNR's mandate includes environmental preservation, its ability to comprehensively enforce these regulations can be constrained by local interests or the NDRC's overarching focus on boosting energy supply to meet

economic growth targets. This misalignment can introduce a degree of tension within the policymaking landscape.

China's domestic oil and gas production strategies between 2002-2025 reflected the urgent need to address a widening gap between its production capacity and rapidly escalating energy demand. A key focus remained to maximise output from mature fields, exemplified by the Daqing oil field, China's largest and oldest. Advanced technologies, including Enhanced Oil Recovery techniques (EOR) like water and chemical flooding, were increasingly deployed to extend the lifespan of these ageing fields . Simultaneously, recognising the finite output of mature fields, China aggressively pursued exploration in new frontiers. Driven by state-owned oil giants like CNPC and Sinopec, intensive exploration targeted China's geologically complex western provinces like Xinjiang, with its Tarim Basin, and offshore areas in the Bohai Bay and the contested South China Sea (Kong, 2010). These campaigns yielded significant discoveries, such as the Puguang gas field in Sichuan province. However, the technical challenges and high costs associated with extracting and transporting these resources from remote or deep-water locations have tempered the overall success of these new finds in fully offsetting China's growing reliance on imports .

Recognising the limitations of its mature oil fields, China has aggressively deployed and developed innovative technologies to improve exploration and production efficiency. A central focus has been on Enhanced Oil Recovery (EOR). As of 2021, chemical flooding, a central EOR technique, contributed to over 10% of China's total oil production [39]. China has significantly expanded 3D seismic surveys to identify new resources, which is crucial for pinpointing potential deposits (Yihe, 2020). Investments

[39] International Energy Agency (IEA). (2023). China Energy Outlook. accessed on 08/01/2024 https://www.iea.org/countries/china/

in these technologies have spurred discoveries like the Puguang gas field in Sichuan, which is estimated to hold trillions of cubic feet of recoverable natural gas . China's domestic innovation drive is further exemplified by its advancements in horizontal drilling, enabling the extraction of unconventional oil and gas. Research institutions and SOEs collaborate on projects to tailor these technologies to the challenges of Chinese oil and gas formations (Yihe, 2020).

3.3.1 Import Diversification Strategies:

China, which has historically relied mainly on a limited number of big oil and gas suppliers, is deliberately trying to diversify its import sources geographically. This approach seeks to increase geopolitical influence, reduce reliance on supply interruptions, and ensure access to a greater variety of resources to support its expanding economy. Some critical regions are essential to understand: The Middle East: Despite diversification efforts, the Middle East remains a cornerstone of China's oil import strategy. Saudi Arabia, a long-standing partner, often ranks as China's top oil supplier due to its vast reserves and reliable production (Yu, 2024). However, China recognises the need to reduce overdependence on any single region. Africa: China has actively cultivated relationships with African oil producers, notably Angola, Sudan, and, more recently, Nigeria . Through these alliances, China's economic and political might on the continent is increased, and it has access to fresh reserves, sometimes with advantageous contractual conditions. Russia: Geopolitical and economic factors are driving Russia's rise to prominence as a supplier. Due to Western sanctions, Russia is now looking for new markets for its gas and oil. At the same time, China values Russia's position as a significant natural gas supplier and is looking for a dependable partner outside of the

Middle East. Russia's pipelines provide gas and oil straight to China, and seaborne LNG commerce has increased dramatically between the two countries.

3.3.2 Driving Forces Behind Diversification:

Energy Security: China's primary motivation lies in reducing vulnerability to supply disruptions. With its growing energy demands, China must rely on more than just a few suppliers, especially in politically volatile regions. Diversification mitigates risks associated with conflicts, sanctions, or resource nationalism that could restrict oil and gas flows. Geopolitical Leverage: China gains greater leverage in negotiating import contracts by expanding its supplier base. Competition between suppliers potentially allows China to secure more favourable prices and terms. This leverage is precious in a global market with fluctuating oil prices. Resource Access: Diversification will enable China to access different oil grades and qualities from various regions. This is crucial as China's refining capabilities evolve and its refineries require a more comprehensive range of feedstocks to produce the specific fuel products it needs. Foreign Policy Alignment: Energy agreements frequently overlap with China's general foreign policy objectives. Its infrastructure development and oil exploration investments reinforce China's economic presence in Africa. Similarly, strengthening energy ties with Russia signals a developing strategic alliance with worldwide ramifications.

3.3.3 China's Oil and Gas Import Contracts:

To satisfy its energy demands, China, the largest oil importer in the world, uses a variety of contractual arrangements. Let us examine the primary categories, their influence on

import security, and the associated costs: Long-Term Contracts: Description: These multi-year contracts with a particular supplier ensure a set amount of petrol or oil delivery at a predetermined price. They often involve upfront investments or pre-payments by China to secure long-term resource access. Impact on Import Security: Long-term contracts provide high import security. Suppliers must deliver a set amount, mitigating disruptions caused by short-term market fluctuations. This predictability allows China to plan its energy needs and economic development strategies; Pricing: Prices in long-term contracts are typically linked to a benchmark, such as Brent crude, but with a pre-determined premium or discount negotiated between China and the supplier . While offering stability, these contracts might only sometimes reflect the most competitive market price, potentially leading to higher costs for China if global oil prices fall significantly.

China employs these tactics to balance pricing competitiveness and import security. Focus on Long-Term Contracts: Historically, China relied heavily on long-term contracts, particularly with significant Middle Eastern suppliers, to guarantee a steady oil flow. This approach ensured import security during periods of price volatility (EIA, 2023). Shifting Strategies: Recently, China has incorporated a larger share of spot purchases into its import strategy. This allows them to benefit from potentially lower prices and diversify their supplier base. However, it also exposes them to more significant price risks .

Understanding that its oil imports were susceptible to supply interruptions and price shocks, China launched an extensive initiative to create a Strategic Petroleum Reserve (SPR) system. The first stages of this SPR program were implemented in the early 2000s. China can keep oil at lower prices and release reserves when prices rise or supplies are endangered, thanks to the SPR, which serves as an essential buffer. The

SPR has expanded significantly in both size and capacity. Although China does not release precise numbers, estimations indicate that storage capacity increased dramatically throughout the studied period (Downs, 2008).

In several ways, this growth has resulted in increased energy security. Mitigating Price Shocks: The ability to release SPR oil during price spikes helps stabilise domestic markets and reduces the immediate economic impact of volatile international prices. With oil reserves, China gains leverage in the global oil market and reduces the burden of high import costs on its economy . Managing Geopolitical Disruptions: The SPR offers China a vital tool in case of supply disruptions stemming from conflicts, sanctions, or natural disasters impacting its import sources. Having reserves on hand allows China to maintain a crucial lifeline for its industries and transportation sector, mitigating the potential impact of such events (Kong, 2010). Boosting Confidence and Market Influence: The existence of a substantial SPR sends a signal to global markets, bolstering China's confidence as a major oil importer. It strengthens China's position in negotiations with suppliers and can act as a deterrent against sudden supply reductions targeting the country .

3.3.4 Pipeline Network Expansion:

In addition to concentrating on creating a Strategic Petroleum Reserve, China invested significantly in building a massive network of gas and oil transportation pipelines throughout its enormous area.

This domestic pipeline infrastructure has overcome several logistical obstacles to improve energy security significantly: Connecting Production and Consumption Centers: Historically, China's major oil and gas production fields were concentrated in

the western and northern regions, far from the densely populated and industrialised coastal areas experiencing primary energy demand. Pipelines bridge the gap, transporting oil and gas efficiently and reliably. This reduces China's dependence on seaborne routes, which are potentially vulnerable to disruption . Diversifying Import Sources: The construction of pipelines from Central Asia and Russia has opened new routes to China for oil and gas imports . These overland pipelines reduce reliance on the Strait of Malacca, a potential chokepoint in maritime routes (Kong, 2010). This diversification minimises the risk of supply disruptions stemming from geopolitical tensions or logistical bottlenecks. Facilitating Domestic Resource Development: Pipelines enable China to transport oil and gas from remote onshore fields to where needed. This has promoted the exploitation of domestic resources, contributing to China's overall energy self-sufficiency goals. Expanding pipeline networks also facilitate the growth of China's natural gas sector, aiding in the shift towards a cleaner energy mix . Enhancing Market Integration: A well-developed pipeline infrastructure promotes a more integrated energy market within China. It facilitates the movement of oil and gas, smoothing regional price disparities and improving supply stability across the country. This integrated market strengthens China's resilience to localised supply shocks.

China's increasing environmental consciousness has led to tightening laws about the oil and gas industry. Key regulatory impacts include Exploration and Production: New oil and gas projects require more rigorous environmental impact assessments. Regulations governing waste disposal, pollution control, and ecological restoration during the exploration and production phases have become more demanding; this aims to reduce the environmental footprint in sensitive regions, limiting potential damage caused by drilling and extraction activities. Transportation and Refining: Stricter environmental

regulations target oil and gas pipelines and refineries. Emissions standards, wastewater treatment guidelines, and pollution prevention requirements have tightened in response to air and water quality concerns around these facilities. Moreover, refining heavier, more sulfurous crude oils, necessitated by China's import profile, has pushed refineries to adopt cleaner technologies to reduce harmful byproducts . Implications for Industry: Environmental regulations, while undeniably beneficial for sustainability, constrain and incentivise the sector. Companies face higher costs to comply with laws, potentially through investments in cleaner extraction methods, pollution control systems, and advanced refining technologies . Stricter environmental reviews often lead to delays in approvals for new projects. Conversely, regulations provide strong incentives to innovate. Chinese companies investing in research to develop greener technologies like carbon capture or more efficient, cleaner oil and gas processes gain a competitive advantage in the long term.

China's rise to become a significant player in the global energy market is characterised by its ambition and complexity. The nation's quest for energy security has led it to adopt a comprehensive energy policy in response to the difficulty of sustaining its economic progress. Although China is still focused on domestic production, its strategy has changed due to its growing reliance on petrol and oil imports. Diversifying import sources, using a combination of long-term and spot oil contracts, developing a strong Strategic Petroleum Reserve, and growing its pipeline network are essential components of this plan. Strong state-owned businesses, government agencies in charge of the industry, and changing environmental laws all support this tactic. The nation’s oil and gas sector will continue to be shaped by the friction between China’s increasing environmental consciousness and its unwavering energy need. China is searching for cleaner extraction methods, more effective refineries, and alternate energy sources,

pushing technical innovation. The nation's capacity to strike a balance between these demands will significantly influence its growth, the world's energy markets, and the movement toward sustainability.

CHAPTER 4

Implications and Challenges of Oil and Gas Dependency

Dependency on imported gas and oil exposes nations to various risks and vulnerabilities while creating severe economic issues; dependence on these vital energy commodities worsens supply chain disruptions and inflationary pressures, affecting national budgets and fiscal policies. Geopolitical tensions that have recently arisen, as seen by conflicts like those in Ukraine, highlight the vulnerability of the world's energy markets and the possible ramifications for countries that rely significantly on imports This chapter explores the economic impacts of dependency on imported oil and gas, focusing on China's changing energy environment; China is the world's biggest importer of petrol and oil. Thus, its movement to a low-carbon energy mix and growing dependency on foreign countries' resources will significantly impact the country's competitiveness and stability. I will analyse the opportunities and challenges these changes bring to draw attention to how important international collaboration and strategic planning are to reducing the financial risks of foreign energy dependency .

Dependency on imported gas and oil has a negative economic impact and highlights the difficulties encountered by countries that import large amounts of these essential energy commodities. Due to this dependency, countries are exposed to various risks related to supply chain disruptions, macroeconomic stability, and the dynamics of global markets. Changes in oil and gas prices can directly affect import costs internationally, affecting national budgets and fiscal policy . For example, the conflict in Ukraine and other recent events have shown that supply chain interruptions can make it more difficult to find and pay for these necessary imports. This is not limited to the energy industry; it also affects

other commodities, such as food and fertilisers, resulting in more general economic problems like inflation and a crisis related to the cost of living. The study that follows focuses on specific aspects of the effect on the economy, emphasising the dangers and consequences that come with nations that import a significant amount of petrol and oil. The economic ramifications on central government revenue and spending are among the Economic implications; sudden changes in the price of oil may affect imports' affordability, which in turn affects national budgets; countries that rely heavily on imports are likewise subject to inflationary pressures from rising import costs and worldwide price hikes, Another degree of complication is added by exchange rate volatility, as changes driven by import dependency can have an impact on external debt and currency values.

a. These impacts can be specifically:

Countries that depend on importing petrol and oil are vulnerable to the world's commodities markets. Their import expenses can be immediately impacted by changes in global pricing, which can create economic uncertainty and make monitoring their external trade balances difficult; most developed and developing countries are the net importers of essential commodities like oil and gas. Dependency on this commodity can lead to supply chain vulnerabilities, particularly during geopolitical unrest or interruptions in the global energy markets. Sudden changes in international oil prices can impact central government revenue and spending patterns and can affect national and fiscal policies. Inflationary pressures are also one of the causes of dependency on imported oil and gas, and the increase in the global price can lead to higher import bills, impacting the general cost of living and causing domestic inflation. Aside from oil and gas, interruptions in the world's commodity markets can also affect other essential commodities like food and fertiliser. Rising import costs can result in higher import

bills, inflation, and difficulties safeguarding disadvantaged households; increased import costs, supply chain interruptions, and growing energy prices all add to a more significant dilemma related to the cost of living; the whole populace is impacted by this crisis, which has consequences for social justice and wealth inequality .

4.1 ECONOMIC IMPACTS OF IMPORTED OIL AND GAS IN CHINA:

China's economic environment changed dramatically in 2018 as the country moved from high-speed to high-quality growth; the nation's energy consumption increased rapidly despite the economic downturn, hitting 4.71 billion tonnes of standard coal—the most significant growth rate in seven years . The transition to a low-carbon energy mix accelerated, with non-fossil fuels and natural gas acting as major catalysts . China became the world's most significant oil and gas importer as its energy structure changed, with coal's percentage falling to less than 60%; this shift in the economy demonstrated a dedication to greener energy sources and created opportunities for foreign capital to enter the oil and gas industry [40].

China has committed significantly to lowering its reliance on conventional, high-carbon energy sources during this economic development. Once a considerable factor in the energy mix, coal saw its share decline and, for the first time, dip below 60%; the rise of natural gas and non-fossil fuels filled the hole left by the depletion of coal [41]. These resources played a crucial role in guiding China's energy structure towards one that is

[40] China National Petroleum Corporation. (2018). 2018 ANNUAL REPORT. https://www.cnpc.com.cn/en/2014enbvfgr/201907/c9318a5301b1471dba8122de3a63f6d9/files/124e79a378e44857a392ccdee63af9c6.pdf

[41] China National Petroleum Corporation. (2018). 2018 ANNUAL REPORT. https://www.cnpc.com.cn/en/2014enbvfgr/201907/c9318a5301b1471dba8122de3a63f6d9/files/124e79a378e44857a392ccdee63af9c6.pdf

lower in carbon emissions and more ecologically friendly. This revolutionary stage was not limited to the home front; China made history in 2018 by rising to the top of the global oil and gas import rankings; this change reflected how the international energy scene was evolving, with China taking on a more significant role . These adjustments had far-reaching economic effects beyond local concerns; they affected the dynamics of international commerce and encouraged more foreign investment in China's oil and gas industry; this was a significant step forward for China's aspirations to influence the global energy transitions while changing its economic destiny.

China's dependency on foreign oil significantly impacted its economy. Primarily due to increased crude runs in nearby refineries and improvements to refining capacity, apparent oil consumption climbed by 7% to 625 million tonnes; with over 440 million tonnes of oil imported, the nation's dependency on foreign oil was 69.8%, up 2.6% from the year before, Though this dependence guaranteed energy supplies, China was also a factor in changes in the price of oil worldwide [42]. A growing slowdown in demand for oil products was caused by economic restructuring, a decline in traditional oil-dependent industries' markets, and a slowdown in automobile sales. Furthermore, China's status as a net oil importer affected the nation's economy and trade dynamics, which in turn affected the country's trade balance and fiscal policies . The projections show that even with a transition towards cleaner energy sources, fossil fuel consumption will persist beyond 2050; the economic effect involves combining significant oil imports with local energy consumption, which helps China maintain its position as a critical market mover in the world energy markets, Economic factors that must be

[42] China National Petroleum Corporation. (2018). 2018 ANNUAL REPORT. https://www.cnpc.com.cn/en/2014enbvfgr/201907/c9318a5301b1471dba8122de3a63f6d9/files/124e79a378e44857a392ccdee63af9c6.pdf

considered include controlling the decrease in coal use and navigating the rise in natural gas use .

China's reliance on imported oil has severe economic ramifications because it is the world's largest producer, importer, and oil user. Due to increased oil imports, it has become the world's top natural gas and oil importer in recent years. Forecasts show that even with a transition towards cleaner energy sources, fossil fuel consumption will persist beyond 2050; the economic consequence entails balancing significant oil imports with local energy consumption, which helps China maintain its position as a critical market mover in the world energy markets, Economic factors that must be considered include controlling the decrease in coal use and navigating the rise in natural gas use (IEA, 2023).

2018 China's growing dependency on natural gas imports significantly impacted its economy. Natural gas usage increased by 16.6% to 276.6 billion cubic meters during the year, or 7.8% of China's primary energy consumption; natural gas imports rose by 31.7%, with a 45.3% rise in dependency on imported gas [43]. Air pollution regulations and the switch from coal to natural gas for industrial, heating, and residential uses caused the increase in natural gas usage. Although these regulations aimed to use cleaner energy sources, the growing reliance on imports sparked worries about supply security and susceptibility to the fluctuations of the world market. The economic effect was demonstrated by the trade balance, concerns over energy security, and the nation's capacity to handle possible interruptions in the world gas market (CNPC, 2018). China's increasing natural gas usage impacts the country's economic environment. Up to 2030, the latest data points to a substantial increase in natural gas usage; beyond that, future

[43] International Energy Agency. (2023). China Oil and Gas. accessed on 25/12/2023 https://www.iea.org/countries/china/oil

estimates indicate a decrease; even though it is an essential importer of natural gas, by 2030, there will be an excess of contractual gas due to shifts in demand patterns, particularly under the Alternative Policy Scenario (APS). Economic factors include making the best use of this excess and coordinating it with changing patterns in several industries, including transportation, buildings, industry, and power. The management of the switch from fossil fuels to greener alternatives while maintaining economic stability and energy security is included in the financial effect (IEA, 2023).

4.1.1 Energy Supply And Demand In China:

China's energy demand has significantly increased due to China's fast economic growth, especially in the area of gas and oil. Estimates suggest that local supply may need help to meet this growing demand. The ever-increasing discrepancy between output and consumption suggests a greater need for imports to keep up with the rising oil and gas demand. Energy security is a significant problem as China's energy consumption, which is directly correlated with its economic development, is expected to increase even more . China's supply and demand dynamics are about to undergo significant changes due to its growing reliance on imported oil and gas; problems with local production, particularly in declining important oil sources, imply that self-sufficiency could not meet the rapidly increasing demand. China is susceptible to variations in global prices and geopolitical concerns due to its increased reliance on imports, which has created economic weaknesses. The increasing need for energy-intensive industries in the country, especially with the move towards natural gas imports, highlights the complex relationship between the dynamics of the world market and China's economic environment; the implications identify a critical stage in China's energy landscape with far-reaching effects on its financial stability and competitiveness, They include potential

supply disruptions and adjustments to economic policy, trade considerations, and sensitivity to international pricing structures .

China's unstable oil supply is made worse by several factors; even though the nation has proven oil reserves, they make up a minor portion of the global total, given its enormous population; the expectation that local oil output would fall short of the demand for oil points to an increasing reliance on imported oil. This scenario is influenced by uncertainty in resource estimates, diminishing large oil fields, and difficulties developing offshore and onshore reserves; it is anticipated that China's reliance on oil imports will increase from 11% in 1996 to around 60% in 2020, underscoring any potential economic risks connected to this dependence (Downs, 2008).

China's access to natural gas is restricted since the world's known reserves comprise a tiny portion of the total; infrastructure limitations and policy objectives have left these areas to be more developed; growing energy demands and environmental concerns are driving up natural gas demand, which suggests a significant shift towards gas imports, By 2020, at least 30% of China's natural gas consumption will come from imports, The increasing dependence of China on external sources of natural gas highlights the economic consequences of the country's energy security issues [44].

4.2 GEOPOLITICAL IMPLICATIONS AND STRATEGIES FOR OIL AND GAS

China, the world's second-largest and most populous economy, faces a significant challenge in securing its energy needs. Despite possessing domestic reserves, China

[44] DOWNS, E. S. (2006). ENERGY DEMAND AND SUPPLY IN CHINA. In China’s Quest for Energy Security (1st ed., pp. 3–10). RAND Corporation. http://www.jstor.org/stable/10.7249/mr1244af.9

relies heavily on imported oil and gas to fuel its rapid economic growth. In 2021, for instance, China accounted for over 70% of its crude oil consumption through imports (International Energy Agency, 2023). This dependence on foreign sources exposes China to geopolitical vulnerabilities, shaping its foreign policy and international relations. This heavy reliance has grown steadily over the past decades. According to the China National Petroleum Corporation (CNPC), China's oil import dependency surpassed domestic production in the 1990s and has continued to climb ever since (U.S. Department of Commerce, 2022). Natural gas imports also play a crucial role, with China accounting for over 40% of its total gas demand through imports in 2021, This heavy reliance has grown steadily over the past decades. According to the China National Petroleum Corporation (CNPC), China's oil import dependency surpassed domestic production in the 1990s and has continued to climb ever since. Natural gas imports also play a crucial role, with China accounting for over 40% of its total gas demand through imports in 2021 [45]. This dependence on external sources for a vital resource like energy creates a complex geopolitical landscape for China. The following sections will explore China's vulnerabilities due to this dependence, its strategic responses to mitigate those risks, and the broader regional and global implications of China's energy security concerns.

The concept of geopolitics, as defined by Colin S. Gray, explains the intricate relationship between a nation's "geography and power" (Gray, 2009, p.20). It describes how a country's physical location, resource endowment, and international relations shape its foreign policy and global influence. On the other hand, energy security focuses

[45] Upstream Online. (2022, February 7). China's energy security ambitions are at risk as oil imports hit high.
https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/lng/072623-chinas-natural-gas-consumption-to-grow-55-7-in-2023-reverse-2022-decline-nea

on a nation's ability to guarantee a reliable and affordable supply of energy resources to meet its domestic needs [46]. This secure access to energy is critical for a nation's economic development, national security, and societal well-being. The nexus of geopolitics and energy security arises due to the global unequal distribution of energy resources. Significant oil and gas reserves often reside in regions with political volatility or strained relations with major energy-consuming nations. This creates a scenario where access to energy transcends a purely economic concern and becomes a political issue heavily influenced by geopolitical considerations. According to the China National Petroleum Corporation (CNPC), China's oil import dependency surpassed domestic production in the 1990s and has continued to climb ever since (U.S. Department of Commerce). Natural gas imports also play a crucial role, with China accounting for over 40% of its total gas demand through imports in 2021 [47].

More recently, the ongoing Russia-Ukraine war in 2023 has sent shockwaves through global energy markets. Sanctions on Russia, a significant oil and gas producer, coupled with disruptions to transportation routes, have raised concerns about potential supply shortages and price volatility, impacting China's energy security.

4.2.1 Resource Nationalism:

Producer countries may impose export restrictions, prioritise domestic consumption, or use energy resources as leverage in political disputes, jeopardising the energy security of reliant nations. Venezuela's nationalisation of its oil industry in 2006 raised concerns among significant consumers like China about potential future export restrictions

[46] U.S. Energy Information Administration. (2023, February). Energy security. https://www.eia.gov/

[47] Upstream Online. (2022, February 7). China's energy security ambitions are at risk as oil imports hit high. accessed on 15/12/2024 https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/lng/072623-chinas-natural-gas-consumption-to-grow-55-7-in-2023-reverse-2022-decline-nea

(Financial Times, 2006). (International Energy Agency, 2023). This can leave China vulnerable to sudden changes in policy or political tensions with producer nations. For instance, in 2006, Venezuela, a major oil exporter, began nationalising its oil industry. These moves raised concerns for consumers like China about potential export restrictions (Financial Times, 2006).

The International Energy Agency (IEA), a leading intergovernmental organisation, warns about this growing trend in its 2020 World Energy Outlook report, noting that "resource nationalism can pose a significant risk to global energy security" (International Energy Agency, 2020).

China's dependence on a limited number of oil and gas suppliers creates the potential for manipulation for political leverage. Supplier countries may use the threat of withholding resources or manipulating prices to pressure China on political issues (Str mijne, 2012). During the 2010 trade tensions between China and Japan, there were concerns that Japan might pressure China to use its influence with resource-rich Southeast Asian nations to restrict energy supplies to China (The Wall Street Journal, 2010). The United States Department of State acknowledges these concerns in its 2019 Energy Security Futures report, highlighting "the risk that countries may use their energy resources as a political tool" (U.S. Department of State, 2019). Economic Consequences of Volatile Prices: A Delicate Balance China's heavy reliance on imported oil and gas makes it susceptible to fluctuations in global energy prices. Sudden price hikes can strain China's economy and hinder economic growth (Mitchell, 2017). The oil price shocks of the 1970s significantly impacted China's economic development, highlighting its vulnerability to price volatility (Energy Information Administration, 2019). The World Bank, in its 2022 Commodity Markets Outlook report, emphasises this vulnerability, stating that "Rising oil prices can hurt developing

countries like China, leading to higher inflation and reduced economic growth" (World Bank, 2022). These vulnerabilities underscore the precarious position China finds itself in due to its dependence on imported energy resources.

China actively pursues diplomatic efforts to forge partnerships with major oil and gas producers. These partnerships often involve high-level visits, political dialogues, and economic cooperation agreements (Xinhua News Agency, 2023). For instance, China's President Xi Jinping's state visit to Saudi Arabia in 2022 aimed to strengthen energy ties and explore joint ventures in oil and gas exploration and production (Al Jazeera, 2022). The effectiveness of this strategy hinges on China's ability to cultivate long-term relationships with producer states, offering economic incentives and political support in exchange for secure access to resources (U.S. Department of State, 2020).

China heavily invests in resource-rich countries, particularly Africa, Central Asia, and Latin America. These investments often target oil and gas fields, refineries, and infrastructure projects like pipelines (The Diplomatist, 2023). By investing in upstream and downstream sectors, China seeks to secure a stake in the resource extraction process and transportation networks, enhancing its long-term access to energy supplies . However, critics argue that these investments can create "debt traps" for developing countries, raising concerns about resource neocolonialism and unsustainable lending practices [48].

The BRI, a massive infrastructure development initiative launched by China in 2013, plays a significant role in its energy security strategy. The BRI also aims to create a network of land and maritime trade routes connecting China to Europe, Africa, and

[48] International Monetary Fund. (2021, April 6). Debt vulnerabilities in low-income developing countries.accessed on 26/12/2023 https://www.elibrary.imf.org/view/journals/001/2023/079/article-A001-en.xml

Southeast Asia. This network includes pipelines, ports, and other infrastructure projects that can facilitate the transportation of oil and gas resources from producer countries to China (Xinhua News Agency, 2019).

The effectiveness of the BRI in securing energy resources remains a subject of debate. While some analysts view it as a strategic tool for diversification and access, others highlight concerns about transparency, debt sustainability, and potential environmental damage associated with BRI projects (The Brookings Institution, 2023).

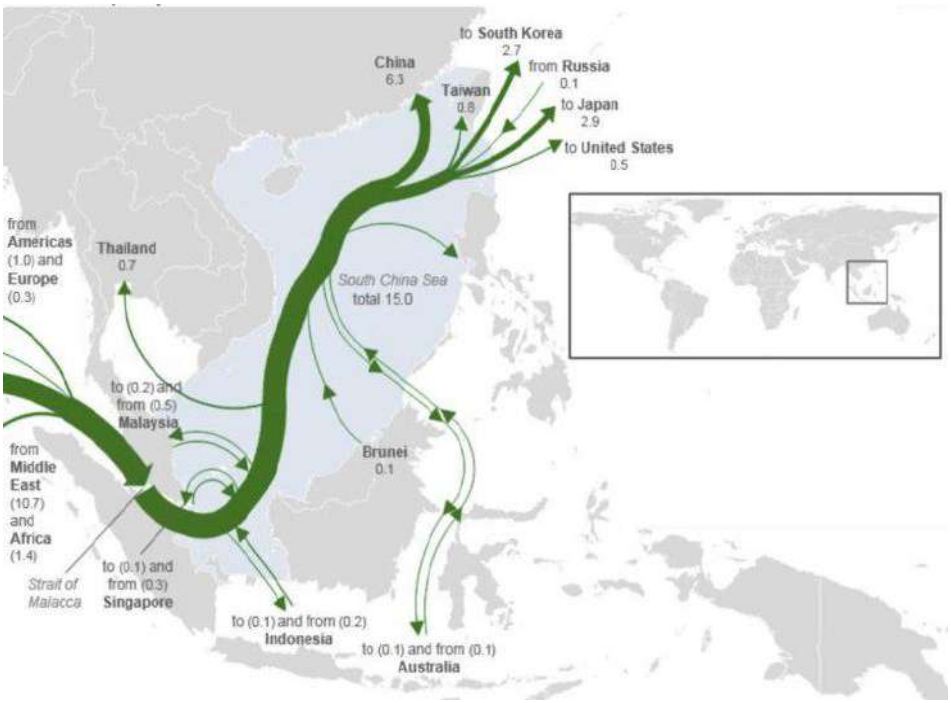
China's multifaceted approach toward securing oil and gas supplies has yielded mixed results. Diplomatic efforts have fostered partnerships with critical producers, while investments in resource-rich countries have provided access to new energy sources. The BRI's infrastructure projects offer the potential for diversification and transportation efficiency. However, these strategies also present challenges. Overreliance on a few key suppliers remains a vulnerability. Debt-trap diplomacy and opaque lending practices associated with investments can strain relations with resource-rich countries. The long-term success of the BRI in securing energy resources will depend on addressing concerns about transparency, sustainability, and environmental impact.

4.2.2 Geopolitical Risks Of Import Dependence

China's reliance on imported oil and gas exposes it to a complex matrix of geopolitical risks. As the world's largest oil importer, with import dependency expected to reach 80% by 2030 (IEA, 2022), any disruption in supply chains can significantly impact its economy and energy security. Historical events like the Arab Oil Embargo of 1973-1974 and the ongoing conflicts in the Middle East underscore the vulnerability of supply chains due to political instability in major oil-producing regions (U.S. Department of State, 2021). China's import map (see Figure 1) reveals significant reliance on nations such as Saudi Arabia, Iraq, and Iran – countries facing internal conflicts, civil unrest, and regional tensions [49]. Any escalation in such conflicts could potentially jeopardise the flow of oil and gas, hindering China's economic activity. Dependence on a limited number of suppliers increases the risk of manipulation for political leverage. For instance, during 2010, Russia repeatedly cut off natural gas supplies to Ukraine as a geopolitical bargaining chip amidst political disputes (Niklas et al., 2018). China's growing reliance on Russian energy imports, while potentially diversifying its supply sources, also exposes it to similar risks of politicised supply disruptions should future diplomatic relations between the two nations sour. The volatility of global oil prices poses substantial economic risks for China. Sudden price spikes triggered by geopolitical events or supply disruptions can lead to inflationary pressures, trade imbalances, and fiscal strain on the Chinese economy (Kilian, 2014). The Price of oil shocks of the 1970s and the more recent 2008-2009 price fluctuations highlight the detrimental impact of such volatility on oil-importing economies (Kilian, 2009).

[49] EIA. (2022). China: International Energy Data and Analysis. U.S. Energy Information Administration. accessed on 26/12/2023
https://www.eia.gov/international/analysis/country/CHN

Figure 4.1 illustrates the geographic concentration of China's oil and gas imports. Most of its oil imports pass through the Malacca Strait, a crucial maritime chokepoint (Gong, 2022). Political instability or disruptions in this region could severely impact China's energy supply chains.



Source: U.S. Energy Information Administration, based on Clipper Crude Data Service and IHS EDIN Total, includes small flows (less than 0.1 million barrels per day) not shown on the map.Strategic.

a. Responses: Securing the Flow of Energy

With the geopolitical vulnerabilities associated with its dependence on oil and gas imports, China has actively deployed a multipronged strategy to secure its energy supplies. This strategy includes diplomatic outreach, strategic investments, and infrastructure development, all aimed at diversifying sources and ensuring reliable access to resources.

China has prioritised establishing diplomatic ties with major oil and gas producers to strengthen its bargaining power and secure long-term supply contracts. Notable partnerships include Saudi Arabia: Saudi Arabia has consistently been China's top crude oil supplier. The two countries have enhanced cooperation through joint ventures in the refining and petrochemical sectors (Reuters, 2023). Russia: Sino-Russian energy cooperation has deepened in recent years. China has become a significant importer of Russian crude oil and natural gas, mainly through the "Power of Siberia" pipeline (Reuters, 2023). Central Asia: China has nurtured close ties with energy-rich Central Asian countries like Kazakhstan and Turkmenistan. This has resulted in oil and gas supply contracts and the construction of transnational pipelines (PEKÇETİN, 2023). Africa: China has significantly increased its presence, securing oil and gas concessions in countries like Angola, Sudan, and Nigeria. This engagement often involves a mix of diplomacy, aid, and infrastructure investment packages (Denis, 2007).

Beyond diplomatic partnerships, China has strategically invested in resource-rich countries, acquiring stakes in oil and gas fields while funding infrastructure projects to facilitate extraction and transportation. "Loans for Oil" Model**:** In some instances, China provides loans to resource-rich countries with struggling economies in exchange for future oil and gas supplies. Examples include Venezuela and Angola (Awan, 2014).

b. Infrastructure Projects:

China invests heavily in pipelines, refineries, ports, and other infrastructure critical to the energy supply chain. This bolsters its influence and access to energy resources (Umbach, 2019).

China's expansive Belt and Road Initiative (BRI) has become a central tool in its quest for enhanced energy security. The BRI aims to diversify China's energy supply routes and sources through infrastructure development, targeted investments and expanded trade linkages (Umbach, 2019). This strategy seeks to reduce the nation's vulnerabilities associated with its reliance on a limited set of suppliers and traditional transit points. Key elements of the BRI's role in energy security include massive investments in pipelines, railways, ports, and power plants across strategically important regions (Umbach, 2019). Additionally, Chinese companies, often with state backing, are acquiring equity stakes in oil and gas ventures within BRI member nations, securing long-term supplies (Luthra & Gupta, 2023). Furthermore, the BRI seeks to promote overall trade expansion with member states, laying the foundation for increased oil and gas imports along these newly developed channels.

Critics raise concerns about a potential "debt-trap diplomacy," where BRI projects leave developing countries with unsustainable debt, increasing China's leverage over their resources (Jones & Hameiri, 2020). Investments in BRI countries also carry inherent political risks stemming from instability, regime change, or nationalisation, potentially jeopardising China's energy assets. Finally, large-scale infrastructure projects under BRI have raised widespread environmental concerns (Losos et al., 2019). These ecological issues could undermine China's efforts to project an image of a responsible international player, particularly as it simultaneously pushes toward cleaner energy domestically.

4.3: ENVIRONMENTAL CHALLENGES AND MITIGATION STRATEGIES FOR OIL AND GAS

China's incredible economic rise has been driven mainly by the country's demand for energy, namely Oil and Gas. However, this reliance on fossil fuels comes at a steep environmental cost. As China's energy consumption expands, so do the associated ecological burdens, including greenhouse gas (GHG) emissions, air pollution, water contamination, and biodiversity loss. These environmental impacts pose localised health and ecological risks and severely undermine China's long-term sustainability ambitions. Recognising the interconnectedness between energy security and environmental protection is essential for China's development trajectory (Ministry of Ecology and Environment, 2020). Addressing its current energy pathway's environmental challenges requires a paradigm shift in energy policy and investment. While China has made strides in renewable energy development, its continued reliance on fossil fuels jeopardises its environmental goals. China's heavy dependence on oil and gas has profound implications for greenhouse gas (GHG) emissions and its role in global climate change. As the world's largest energy consumer and top GHG emitter, China's energy choices significantly impact the trajectory of global warming.

4.3.1 Quantifying Emissions:

Oil and gas exploration, production, transportation, and consumption contribute substantially to China's GHG emissions. In 2021, fossil fuels accounted for approximately 86% of China's total energy-related CO2 emissions, with coal remaining

the most significant source [50]. However, emissions from oil and gas are increasing rapidly due to expanding industrial activity and increased vehicle ownership. Exacerbating Global Climate Change: China's rising GHG emissions seriously undermine global efforts to limit warming as outlined in the Paris Agreement (Ministry of Ecology and Environment, 2020). The continued expansion of China's fossil fuel infrastructure locks in emissions for decades, jeopardising global climate goals. Future Emission Scenarios: If China maintains its current fossil fuel reliance trajectory, emissions will continue to rise significantly. Conversely, a decisive shift towards renewable energy and efficiency could bend the emissions curve downward. China's choices in its energy sector will shape the global climate outlook for years.

In addition to its effect on climate change, China's reliance on petrol and oil significantly negatively impacts ecological integrity and human health due to localised environmental deterioration.

4.3.2 Air Pollution:

The combustion of oil and gas releases harmful pollutants, including particulate matter (PM2.5)[51], sulfur dioxide, and nitrogen oxides. These pollutants contribute significantly to smog formation in major Chinese cities (World Bank, 2022). Staying in the air pollution for a long time can cause cardiovascular issues, respiratory illnesses, and increased cancer risk, burdening China's healthcare system (Ministry Of Ecology And Environment The People's Republic Of China, 2020). Water Pollution: China's oil

[50] IEA. (2022). World Energy Outlook 2022. International Energy Agency. accessed on 26/12/2023 https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf

[51] PM2.5 refers to fine particulate matter less than 2.5 microns in diameter. These tiny particles pose significant health risks because they can penetrate deep into the lungs and enter the bloodstream

and gas industry poses serious water contamination risks. Oil spills onshore and offshore can damage aquatic ecosystems and threaten water supplies . Communities' access to clean water is jeopardised when wastewater from extraction and refining operations, including dangerous chemicals, contaminates rivers and groundwater. Biodiversity Loss: Deforestation, habitat fragmentation, and ecosystem degradation are frequently caused by oil and gas infrastructure construction. This negatively impacts biodiversity, particularly in ecologically sensitive areas . Furthermore, human-animal conflicts can arise from pipeline building and transportation operations that interfere with wildlife movement patterns.

4.3.3 Strategies For Mitigation:

Switching to Renewable Energy China has made significant expenditures in developing renewable energy sources because it recognises the importance of moving away from fossil fuels. Particularly in recent years, there has been a substantial development in solar and wind power use.

a. Renewable Energy Progress:

According to the IEA (2023), China and wind-generating capacity are The world leaders in installed solar. Since solar and wind energy have become much more affordable, they are becoming a more viable alternative to fossil fuels. China has set lofty goals for renewable energy, hoping to reach a quarter of its primary energy consumption from non-fossil fuels by 2030 (IEA, 2023).

b. Projected Emission Reductions:

A large-scale transition to renewable energy would significantly reduce China's greenhouse gas (GHG) emissions, as solar, wind, and other renewables produce minimal to no direct emissions during operation. Analyses suggest increased reliance on renewables would mitigate climate change and significantly improve air quality and public health outcomes (Ministry of Ecology and Environment, 2020).

4.3.4 Transitional Challenges:

Although China has made progress, several obstacles still need to be overcome in its shift to renewable energy. Intermittency: As fossil fuel power sources become less reliable due to their weather-dependent nature, solar and wind energy challenges the grid's reliability (IEA, 2023). Infrastructure Investment: Transmission lines, energy storage devices, and smart grid technologies must all be heavily invested in expanding renewable energy (World Bank, 2022).

a. Conflicts over Land Use:

Careful land use planning is necessary because large-scale solar and wind projects may compete with agricultural and other uses for available land. Enhancing energy efficiency in many industries is essential to China's plan to mitigate environmental impacts. Using less energy to achieve the same amount of production or service is referred to as energy efficiency. Although China has made considerable progress in this area, there is still much room for development.

b. Successful Efficiency Measures:

China has implemented several policies to enhance energy efficiency, including Energy efficiency standards for buildings, appliances, and industrial equipment (UNEP, 2021).

Financial incentives and tax breaks for energy-efficient investments . Public awareness campaigns to promote energy-saving behaviour (Ministry of Ecology and Environment, 2020).

4.3.5 Areas for Improvement:

China must still enhance its energy efficiency despite these efforts. Enforcement of efficiency standards: While standards exist, ensuring consistent implementation remains challenging [52].

a. Upgrading legacy infrastructure:

Many older buildings and industries need to be more efficient, requiring substantial investment for modernisation. Efficiency in Transportation: Rising vehicle ownership necessitates fuel efficiency standards and the promotion of public transportation. China can reduce energy demand through more robust policies, such as bolder and more comprehensive energy efficiency targets, accompanied by stricter regulations and enforcement mechanisms .

b. Technological Innovation:

Investing in research and development (R&D) of energy-saving technologies across multiple sectors can be helpful for improvement

c. Behavioural Shifts:

[52] United Nations Environment Programme (UNEP). (1997). Environmental management in oil & gas exploration & production. https://wedocs.unep.org/bitstream/handle/20.500.11822/8275/-Environmental%20Management%20in%20Oil%20%26%20Gas%20Exploration%20%26%20Production-19972123.pdf?sequence=2%26isAllowed=y

Promoting sustainable consumption patterns and encouraging individuals and businesses to adopt energy-saving practices.

Carbon dioxide (CO2) emissions from power stations and other industrial sources are collected using carbon capture and storage. CCS is transferred underground and stored there to keep them from escaping into space. CCS can potentially mitigate emissions from the continued use of oil and gas, particularly in hard-to-abate sectors . China has been actively developing CCS technology, with several pilot projects underway. Examples include the Sinopec Qilu Petrochemical CCS project and the China Huaneng Group's project capturing CO2 from a coal-fired power plant (World Resources Institute, 2021).

While promising, scaling up CCS in China faces significant challenges: CCS remains expensive, requires large capital investments, and potentially hinders economic competitiveness . Long-term storage reliability, transport infrastructure, and potential environmental risks must be addressed (World Resources Institute, 2010). More substantial government incentives and regulations are needed to drive widespread CCS adoption. There needs to be more debate about whether CCS should be considered a critical long-term climate solution. Critics argue that CCS perpetuates reliance on fossil fuels and diverts investments away from the rapid expansion of renewable energy . However, the CCS offers a pragmatic solution for mitigating emissions from legacy fossil fuel infrastructure during the transition to a low-carbon future .

Although China has many difficult obstacles in its attempts to lessen the environmental effects of its reliance on petrol and oil, there are also many promising prospects for growth and the economy. Its transition to sustainable energy will depend on how well it manages these variables.

Substantial economic costs are associated with transitioning from fossil fuels, including investments in renewables and infrastructure upgrades . However, these costs must be weighed against the escalating economic impacts of climate change and environmental degradation. These include health costs due to pollution, losses from extreme weather events, and damage to agricultural productivity and ecosystems (UNEP, 2021). A shift towards renewable energy and sustainable technologies can create new jobs and industries and drive economic growth in China (World Resources Institute, 2021). Investing in a "green transition" can position China as a leader in clean energy innovation, boosting domestic growth and enhancing its global competitiveness.

While renewable technologies have advanced rapidly, challenges remain in ensuring consistent power supply due to intermittency issues. Further research and development (R&D) in large-scale energy storage systems, smart grids, and advanced materials is needed (World Resources Institute, 2021). China is making substantial investments in clean energy R&D. Continued emphasis on breakthroughs in battery storage, hydrogen power, and advanced solar and wind technologies will be essential to ensure the technological feasibility of a low-carbon future.

China has implemented various regulations and financial incentives to promote environmental sustainability. Assessing the effectiveness of these policies and identifying areas for more robust mechanisms is crucial . China's national carbon market is still in its early stages. Analysing its effectiveness in reducing emissions and implementation challenges will provide insights for future policy development (. Effective environmental mitigation requires coordination between various levels of government, robust enforcement mechanisms, and transparent decision-making processes. China must continue pursuing governance reforms to enhance policy coherence and accountability.

A complicated range of geopolitical, environmental, and economic issues are brought about by China's reliance on imported gas and oil. Due to this dependence, supply chain interruptions, price volatility, and geopolitical leverage impact the country's foreign policy and economic stability. Moreover, a persistent reliance on fossil fuels has dire environmental repercussions, including air and water pollution, biodiversity loss, and climate change. These problems challenge China's aspirations for long-term sustainability and its capacity to play a constructive role in resolving the global climate catastrophe. China has aggressively adopted a complex approach to reduce these dangers despite recognising these problems. Diversifying energy supplies and securing supply networks are the Belt and Road Initiative (BRI) goals, investments in resource-rich nations, and diplomatic outreach. Crucially, China has advanced both energy efficiency and the development of renewable energy sources. These initiatives are a prime example of China's desire to shift to a greener economy. A careful balance is required for China's energy reform to be successful. Even if maintaining energy supplies is essential for economic expansion, environmental consequences are becoming irreversible. Prioritising is necessary for a successful approach.

CHAPTER 5

CHINA'S FOREIGN POLICY AND IMPACT ON OIL AND GAS

China's impressive economic growth has made it the second-largest economy in the world and a significant contributor to the rise in global energy consumption. Oil and gas remain crucial to China's energy security plan despite its deliberate efforts to diversify its energy sources. In 2022, China consumed approximately 26.4% of the world's primary energy, with a large portion attributed to oil and gas (Jaganmohan, 2024). To meet these vast needs, China has become heavily reliant on imports; its crude oil import dependency exceeded 72% in 2021 [53]. This reliance underscores energy's profound role in shaping Chinese foreign policy and the necessity of securing reliable energy supplies. China has developed strategic partnerships with significant oil and gas-producing nations worldwide to achieve energy security; these collaborations go beyond straightforward business dealings and frequently entail significant infrastructural investments, technological transfers, and cooperative political efforts (Ackay, 2023).

China's energy policy shows a clear understanding that stable and continuous access to essential energy sources is necessary for both economic expansion and stability. China hopes to reinforce its position as the world's preeminent power and lessen the risks

[53] The State Council of the People's Republic of China. 2022. "China's Oil Dependence on Imports Sees Drop." Government of the People's Republic of China. accessed on 02/02/2024 https://english.www.gov.cn/news/topnews/202202/24/content_WS6216e221c6d09c94e48a569e.html

related to disruptions in the energy market by forming these alliances; creating coalitions centred on cooperative energy practices emphasises the crucial relationship between foreign policy and the unwavering pursuit of energy security; by making these partnerships, China wants to strengthen its position as the world's leading power and reduce the risks associated with disruptions in the energy market, Building relationships through cooperative energy practices highlights the critical connection between foreign policy and the uncompromising pursuit of energy security .

4.1 STRATEGIC PARTNERSHIPS IN KEY OIL AND GAS PRODUCING REGIONS:

a. The Middle East:

The Middle East has been a historically vital energy source for China's economic expansion. Since establishing its first major oil contracts with Middle Eastern nations in the 1990s, China has steadily increased its reliance on the region's vast reserves; critical players in this complex energy relationship include Saudi Arabia, Iran, Iraq, Kuwait, Oman, and the United Arab Emirates, This partnership goes beyond simple import transactions, China has strategically expanded its engagement by investing significantly in infrastructure projects, securing lucrative construction contracts, establishing joint ventures across the Middle East, deepening economic ties, and enhancing energy cooperation; the evolving financial landscape of the Middle East provides opportunities for Chinese firms, Nations within the region seek investment and infrastructure development to diversify their economies and move away from solely relying on hydrocarbon exports (Yetiv & Lu, 2007). With substantial state support, Chinese companies have eagerly filled this role, securing contracts for ports, railways,

and other critical infrastructure projects, often under the Belt and Road Initiative (BRI); this deepening economic interdependence solidifies China's vested interest in a stable Middle East and provides leverage in negotiations concerning oil and gas supply contracts. However, navigating the complex geopolitical landscape of the Middle East remains a delicate balancing act for Chinese diplomacy (Aminjonov et al., 2019). China's pragmatic approach has pursued mutually beneficial economic ties with all major players while avoiding direct involvement in regional conflicts. Constant challenges include the long-standing rivalry between Iran and Saudi Arabia, sectarian tensions, and regional conflicts. (Li, 2015). By maintaining this careful neutrality, China seeks to secure uninterrupted access to the vast energy reserves of the Middle East, regardless of shifting alliances or internal tensions within the region.

b. Russia:

Because of the ongoing crisis in Ukraine and the Western sanctions imposed on Russia, China and Russia have significantly strengthened their energy partnership; China has become an important export market for Russian energy resources, further solidifying their historical economic ties . With planned additions to boost significant capacity, the Power of Siberia pipeline was put into service in 2019 and is an essential route for natural gas exports to China; in addition, China has increased its LNG and crude oil purchases from Russia to benefit from lower prices and partially offset the losses from Western sanctions. This expanding energy sector engagement significantly affects the bilateral relationship between China and Russia. Increasing energy commerce helps China maintain energy security by diversifying its supplies and lowering its reliance on politically unstable areas like the Middle East. It also gives Russia vital cash streams in times of economic strain, and this energy cooperation indicates a growing unity of interests between the two countries and obvious financial benefits. A possible broad

strategic alliance is anchored on a shared resistance to Western hegemony and a goal of creating a multipolar global order (Frederic et al., 2010).

c. Africa

China has been present in Africa for over a couple of decades, and one of its main characteristics has been its long-standing goal of gaining access to natural resources like oil and gas. China has emphasised oil-rich nations such as Equatorial Guinea, Sudan, Angola, and Nigeria (Ian, 2006). Through exploration, production, and infrastructure projects, Chinese National Oil Companies (NOCs) have solidified their positions within the African oil market by securing significant contracts; the enormous unexplored oil and gas deposits on the continent appeal to China, whose energy needs constantly increase, using "resource-for-infrastructure" agreements has been essential to China's African strategy. These deals usually entail Chinese investment in crucial infrastructure projects, including ports, power plants, railroads, and highways, in exchange for preferential access to oil and other natural resources. This paradigm appears mutually beneficial as China obtains a reliable supply of vital commodities. At the same time, African countries acquire much-needed development by increasing connectivity and promoting commercial possibilities between Africa and Asia (Power et al., 2012). China's growing involvement in Africa has come with criticism, too. Experts worry about "debt-trap diplomacy," in which African countries become too dependent on Chinese finance and loans, jeopardising their sovereignty (Al-fadhat, 2022). There are also worries over China's relations with nations with a track record of bad governance, as obtaining a consistent energy supply might occasionally take precedence over more general concerns about human rights and democracy (HRM, 2020).

d. Central Asia

The landlocked nations of Central Asia, including Kazakhstan, Turkmenistan, and Uzbekistan, have emerged as significant partners in fulfilling China's energy security ambitions. The region possesses substantial oil and – crucially for China – natural gas reserves. China has constructed extensive pipeline networks to tap into these resources, transforming Central Asia's geopolitical and economic landscape. (Öğütçü & Ma, 2007). The Central Asia-China gas pipeline (Lines A, B, and C), operational since 2009, transports vast quantities of natural gas from Turkmenistan, Uzbekistan, and Kazakhstan directly into China's Xinjiang province; additionally, the Kazakhstan-China oil pipeline allows for importing significant volumes of crude oil into China's northwestern region, Chinese investments in Central Asia extend beyond just pipelines (Xinhua, 2023). Beijing has strategically financed numerous infrastructure and development projects along these energy routes. This includes investments in railway lines, highways, and logistical hubs, which bolster regional connectivity and facilitate trade. China's substantial presence in Central Asian infrastructure development is often seen as a critical part of its Belt and Road Initiative (BRI), which aims for deeper integration between Asia and Europe (Yu, 2017). These investments underscore China's long-term interest in the stability and development of these Central Asian nations as it seeks to secure long-term, reliable energy sources.

4.1.1 Beyond Traditional Suppliers: Diversification Strategies

a. South America

Over the past twenty years, China has made substantial territorial and political gains in Latin America to achieve a diversified energy portfolio. China's influence in the oil markets of Latin America has increased significantly since 2005; about $30 billion in foreign direct investment, mostly going to Brazil, Argentina, Venezuela, and Peru, was invested in the oil and gas industry in the area between 2005 and 2017 (Webster & Tobin, 2024). With its substantial oil reserves, the region provides an attractive alternative to dominant suppliers in the Middle East and Africa (Downs, 2006). Venezuela, Ecuador, and Brazil have become critical partners for China. Chinese state-owned oil companies, including China National Petroleum Corporation (CNPC), China Petroleum & Chemical Corporation (Sinopec), and China National Offshore Oil Corporation (CNOOC), have forged strategic partnerships with state-owned entities in these nations; historically, China's engagement in the Latin American energy sector has centred around securing crude oil exports; however, recent trends indicate a shift towards increased investment opportunities that extend further along the energy supply chain. In Venezuela, Chinese firms have developed heavy oil fields in the Orinoco Belt. There are also growing Chinese investments in renewable energy projects within the region, contributing to Latin America's evolving energy landscape (Webster & Tobin, 2024). The "loans-for-oil" model has been a cornerstone of China's strategy in Latin America. It involves providing substantial loans and financing to resource-rich nations in exchange for long-term oil supply contracts. This model offers resource-rich Latin American nations access to much-needed capital while securing reliable energy sources for China. However, critics raise concerns about debt sustainability and lack of transparency in such deals, especially in nations with weak governance standards (Maeidan, 2016).

b. Arctic Energy Exploration

As global warming melts Arctic Sea ice and opens up new opportunities, China is growing interested in the Arctic's abundant energy resources. Estimates suggest the region holds significant untapped oil and gas reserves; however, extraction in the harsh Arctic environment poses technological and logistical challenges. China recognises the potential to lessen its dependence on existing suppliers. China has been steadily increasing its presence in the Arctic, obtaining observer status on the Arctic Council in 2013 and releasing an official Arctic policy white paper in 2018 (Pelaudeix, 2018). Strategic partnerships with Russia, which holds extensive Arctic territory, are crucial for China to gain a firmer foothold in the region. Chinese investment in Russian LNG projects in the Yamal Peninsula and potential collaboration on developing the Northern Sea Route exemplify this ambition; however, exploration and development ventures in the Arctic raise environmental concerns and the potential for geopolitical friction with other nations with overlapping claims (Staalesen, 2023).

c. Securing Resources

China's strategic partnerships with oil and gas-producing nations worldwide have played a crucial role in stabilising its energy supply and mitigating risks associated with market volatility. China has secured a significant and diversified flow of oil and gas resources by building long-term relationships with major players in the Middle East, Russia, Africa, and Latin America (Li, 2015). China's diversification approach has improved its overall energy security position by reducing its reliance on any one area or source. However, because of the complexity of geopolitics, weaknesses still exist. China's economy is highly dependent on energy imports, especially oil, and any interruptions brought on by political unrest or tensions in the area might have a significant impact. For example, Middle Eastern unrest and instability might endanger the oil supply, making Chinese energy security plans more difficult. In addition, the

concentration of significant oil imports passing via chokepoints in the marine route, such as the Strait of Hormuz, presents a risk if these pathways are interrupted.

4.1.2 Soft Power and Influence

Besides having access to resources, China frequently uses energy diplomacy to promote significant investments, infrastructure development, and aid. Such an investment is crucial for using soft power and strengthening diplomatic ties with ally countries, and This is particularly clear when considering the Belt and Road Initiative (BRI), in which China offers financial support and technical assistance to African, Central, and Southeast Asian nations to help them expand their energy infrastructure (YAĞCI, 2018). As China strengthens economic ties with energy-rich nations, its political influence in these regions grows. Energy access in return for strategic loans and development aid might result in some economic reliance on China and a thawing of criticism of China's internal policies and actions abroad (Christoffersen, 2016).

4.1.3 Implications For Us-China Rivalry

Energy security is an area in which the US and China's geopolitical conflict is becoming more complex. The United States' long-standing dominance in several important strategic regions, most notably the Middle East and Central Asia, is under threat from the rise of China to recognition as a global economic force and its quest for stable energy sources (Umbach, 2019). The Middle East remains a central arena for geopolitical competition since it supplies a significant portion of the world's energy. Concerns about possible alliance shifts that may lessen American power are raised in U.S. policy circles

as China increases its influence in the area (Christoffersen, 2016). Tensions have also increased due to China's expanding connections with rivals of the United States, such as Iran. China uses its energy cooperation as a political and economic weapon to offset US attempts to isolate or pressure these countries. Also, Central Asia is now a crucial area for competitiveness. China's increasing economic power and investments in infrastructure across Central Asia may lessen the historical dominance of the US and Russia in the area (De Aragao, 2024).

4.1.4 Cooperation With Russia

China and Russia have formed comprehensive strategic Partnerships that significantly affect the global energy market and more extensive geopolitical arrangements, especially in the energy sector; China offers a vital economic lifeline as Western sanctions isolate Russia by providing an alternative market for its energy resources. These two nations' strategic partnership is strengthened by their growing energy cooperation, fostering a common objective to challenge American hegemony and restructure the global order. The Russia-China axis has become a powerful player in the energy markets (Ministry of Foreign Affairs of The People’s Republic of China, 2024). Growing energy flows, especially in oil and natural gas, give China greater energy security and give Russia critical new sources of income .

China has strengthened its influence in critical regions and diversified its energy supplies by forming strategic alliances with significant oil and gas suppliers. Alongside this quest for stable energy sources, China has increased its infrastructure investment and strengthened its ties with its allies, strengthening its soft power and shifting the geopolitical landscape. China's energy diplomacy shows its growing global influence and threat to the United States' long-standing supremacy. China's stance is further

reinforced by its growing strategic relationship with Russia, which shows a willingness to change the global order. China must balance its partnerships with competing countries and deal with issues, including political unpredictability in partner states and environmental concerns. China's developing approach to energy security will have significant implications for domestic growth and its position in global resource management as it deals with a transition toward renewable energy sources. In the continually changing energy environment, the lessons it has learned from its strategic focus on oil and gas will continue to be vital in forming its future policies and foreign alliances.

4.2 CHINA'S ENERGY DIPLOMACY AND GLOBAL INFLUENCE:

China became the biggest crude oil importer in the world in 2022 when its imports grew from about 160 million tonnes in 2000 to over 540 million tonnes (IEA, 2023). Energy diplomacy is a fundamental foreign policy weapon shaped by this reliance on foreign energy supplies. The strategic use of international relationships, economic cooperation, and diplomatic measures to guarantee access to essential resources and shape global energy markets is known as energy diplomacy (Umbach, 2019). China's energy diplomacy takes various forms. China promotes strategic partnerships, invests in infrastructure, and even provides resource-backed loans to close energy deals through initiatives like the Belt and Road Initiative (BRI) to strengthen its energy security and increase its influence in global energy governance (IEA, 2023). This proactive energy diplomacy highlights the critical link between energy resources, economic stability, and the pursuit of China's long-term geopolitical goals.

4.2.1 Strategic Partnerships: Building a Network of Energy Suppliers

China strongly develops strategic energy partnerships globally, emphasising Africa, the Middle East, and Central Asia. These partnerships include many kinds of agreements, such as long-term supply contracts, resource development initiatives, and investments in energy infrastructure. China has established strong energy ties with Africa. For example, Chinese state-owned oil corporations have sponsored significant infrastructure projects such as roadways and railways in Angola and have considerable interest in oil field development (EIA, 2023). Other African countries, including Nigeria, Sudan, and Algeria, also exhibit this pattern of "resources-for-infrastructure" agreements. China builds transport networks and actively invests in African energy resources to improve supply security and lessen reliance on potentially unstable marine shipping routes (Foster et al., 2009).

Middle Eastern countries rich in oil, especially Saudi Arabia, Iran, and Iraq, are essential partners for China's energy security, and China secures long-term oil supply contracts from these countries, sometimes supported by financial investments in projects further downstream, such as petrochemical complexes and refineries, With this multifaceted strategy, China gets more influence over the energy sectors in the area and gains greater bargaining power in the world oil market (Yetiv & Lu, 2007)

China and Central Asian nations, including Kazakhstan, Turkmenistan, and Uzbekistan, are strengthening their energy cooperation; the building of massive oil and gas pipelines that deliver energy resources straight from Central Asia to China has been a critical component of this plan China depends on these pipelines to increase energy security

because they diversify supply channels and reduce reliance on potentially unstable marine trading lanes (Öğütçü & Ma, 2007).

4.2.2 Resource-Backed Loans:

Resource-backed loans, sometimes called "oil-for-infrastructure" agreements, are used by China to get strategic access to vital energy resources, especially in developing countries. Thanks to this financial approach, China now has an additional option to ensure energy supply and increase its clout in resource markets. This is how these loans work: First, China frequently lends money to a resource-rich nation through state-owned Banks like the Export-Import Bank of China and the China Development Bank (Alves, 2013). Instead of traditional cash repayments, the loan is secured by future commodity exports, usually oil, gas, or minerals. The recipient country commits to supplying China with a predetermined resource volume at a set price, often below market rates, over a specified period (Alves, 2013). Finally, the loan proceeds are primarily used to finance infrastructure projects within the recipient country. Chinese companies often secure contracts to construct these projects, including roads, railways, ports, or energy-related infrastructure (Alves, 2013).

Angola is a clear example of how China employs this strategy. China has extended billions of dollars in resource-backed loans to Angola, which are repaid with oil shipments. These loans have funded the construction of extensive infrastructure projects within Angola, primarily carried out by Chinese firms (Alves, 2013). Venezuela is another nation that has heavily relied on oil-for-loan agreements with China to obtain critical financing during economic instability (Reuters, 2023). Similarly, Ecuador has secured considerable loans from China, backed by its future oil exports (Aidoo et al., 2017).

4.2.3 Role In International Energy Organizations

China actively participates in many international energy organisations, showing its commitment to energy security and its aim to influence global energy policy. The following are a few of the most prominent platforms where China is involved:

a. International Energy Agency (Iea):

While China does not hold full member status within the IEA, it has significantly enhanced its relationship with the organisation in recent years. As an Association Country, China collaborates on energy data analysis, technology development, and policy discussions. This participation gives China a voice in shaping global dialogues on critical issues like clean energy transitions and the stability of energy markets (Christoffersen, 2016).

b. OPEC+:

Though not a member of OPEC (Organization of Petroleum Exporting Countries), China communicates and cooperates with this influential bloc of oil-producing nations. Through informal consultations and occasional participation in OPEC+ meetings, China aims to influence decisions on oil supply and pricing – factors directly bearing on its energy import costs [54].

[54] Organization of the Petroleum Exporting Countries (OPEC). (2024, March 30). 53rd Meeting of the Joint Ministerial Monitoring Committee (JMMC) took place via videoconference. https://www.opec.org/opec_web/en/press_room/7312.htm

c. Shanghai Cooperation Organization (SCO):

China is a founding member of the SCO, a Eurasian political, economic, and security alliance. Energy cooperation stands as a crucial pillar within the SCO framework. China leverages this platform to fortify energy partnerships with Central Asian member states and Russia, diversifying its supply chains and coordinating the development of cross-border energy infrastructure (Wenting & Xiaoyi, 2022).

China's involvement in these organisations provides multiple options to safeguard its energy interests and influence the direction of global energy governance. Firstly, membership in platforms like the IEA and engagement with OPEC+ grants China access to invaluable data, market insights, and analysis of emerging policy trends. This knowledge empowers China to make well-informed strategic decisions and navigate the complexities of international energy markets (Christoffersen, 2016). Furthermore, these organisations serve as platforms for China to advocate for its perspectives on energy security, combating climate change, and technological innovation in the energy sector. By actively shaping these conversations, China aims to mould global energy policies that align with its priorities and ambitions (Christoffersen, 2016). China's participation strengthens its energy security posture. Through cooperative frameworks like the SCO, China fosters strategic energy partnerships, diversifies its suppliers, and promotes projects like transnational pipelines. This multi-pronged approach mitigates supply risks and bolsters China's energy resilience (Baisalbek et al., 2024). These initiatives also help China achieve its goal of increasing its global energy influence. Being a part of these groups makes it easier for Chinese energy firms to get international contracts and promote themselves. This boosts China's energy industry's global expansion and increases its economic clout in the energy sector. Finally, China’s growing presence in established organisations like the IEA and its influence within the SCO can be viewed

as a subtle challenge to the traditional dominance of Western nations and major oil producers within global energy governance structures (Christoffersen, 2016).

4.2.4 Impact on Global Oil and Gas Markets:

a. Diversification of Supply Sources

A central goal of China's energy diplomacy is to reduce its over-reliance on any single supplier or geographic region. This diversification strategy has seen tangible results. In the past, China heavily depended on Middle Eastern oil. However, through strategic partnerships with countries in Africa (like Angola and Nigeria), Central Asia (e.g., Kazakhstan), and Russia, China has steadily broadened its network of oil and gas suppliers (Ener Data, 2020). Influence on Prices: China's growing market power and diversification of suppliers enhance its leverage in price negotiations. With a broader array of sources, China is less vulnerable to supply shocks and can play suppliers against each other to secure better terms. For example, when geopolitical tensions disrupt supplies from one region, China can increase imports from alternative partners, putting downward pressure on prices. China's ability to negotiate long-term supply contracts backed by infrastructure investments further strengthens its bargaining position (World Bank, 2022).

4.2.5 Cases Such:

a. Russia-Ukraine War:

The disruption of Russian oil exports due to sanctions has showcased China's price influence; China has secured discounted Russian crude at more favourable prices as Russia seeks alternative buyers (Reuters, 2024).

b. African Partnerships:

China's resource-backed loans and infrastructure investments in African nations have often translated into long-term oil supply contracts at competitive prices. This has allowed China to negotiate better terms than spot market purchases (Alves, 2013).

4.2.6 Geopolitical Implications Of China’s Energy Expansion

China's diversified energy import portfolio has broader geopolitical implications. By reducing dependence on traditional Middle Eastern suppliers, China has greater flexibility in its foreign policy; stronger energy ties with Russia and Central Asian nations also reshape regional power dynamics and trade flows; furthermore, by providing African countries with an alternative market for their energy resources, China's influence on the continent grows, potentially reshaping relationships in the region (The Oxford Institute of Energy Studies, 2023). Its investments in energy infrastructure, strategic partnerships with resource-rich nations, and growing influence within international energy organisations transform the geopolitical landscape. One significant consequence is a shift in power dynamics; traditionally, China's reliance on Middle Eastern oil granted significant leverage to nations in that region (Öğütçü & Öğütçü, 2017). However, China's diversification strategy reduces this dependence, granting China greater flexibility in foreign policy matters and decreasing its vulnerability to supply shocks caused by regional instability (Umbach, 2019).

Furthermore, China's expanding role in global energy governance and its deepening bilateral energy relationships subtly challenge the traditional influence of Western nations and established oil producers like OPEC (Christoffersen, 2016).

China's energy diplomacy also strengthens its relationships with resource-rich nations across Africa, Central Asia, and Latin America; investments in infrastructure and resource development are improving economic interdependence and solidifying China's influence within these regions. Growing economic integration can put diplomatic pressure on trade flows and shift regional alliances (The Oxford Institute of Energy Studies, 2023). Finally, China's energy footprint directly affects regional conflicts and disputes. In the South China Sea, China's energy needs amplify its claims over this contested and potentially resource-rich region. This intensifies territorial disputes with neighbouring countries and escalates the risk of conflict over potential oil and gas reserves .

To conclude, China has launched a massive energy diplomacy effort with far-reaching implications due to its constant pursuit of energy security. Through strategic partnerships, resource-backed loans, and active participation in international organisations, China has diversified its energy suppliers, strengthened its bargaining position in global markets, and expanded its geopolitical influence. This transformation has implications for traditional power dynamics within the energy sector, potentially reshaping relationships between significant energy producers and resource-rich developing nations. While securing its energy future, China's actions introduce both opportunities for cooperation and the potential for increased resource competition in an increasingly complex global energy landscape.

CHAPTER 6

CONCLUSION

China's energy landscape is a complex tapestry connected with historical trends, contemporary needs, and future goals. Its energy system experienced a significant change due to its continuous economic growth, which has moved it from independence to interdependence. The development of this landscape has been thoroughly covered in the second chapter, with attention to the effects of environmental requirements, changes in legislation, global energy dynamics, and economic reforms. The study shows that China's energy mix is gradually becoming more diverse. China, historically relying on coal, is becoming more dependent on natural gas, oil, and renewable energy sources to meet its growing energy needs. Both strategic demand and intent drive this move; China is exposed to supply interruptions and price volatility in the world energy markets due to its reliance on a single dominating fuel source (Christoffersen, 2016).

Furthermore, diversity is consistent with China's environmental goals to reduce emissions and tackle serious air pollution issues (Finamore, 2020). It is particularly significant since China's energy mix now includes more renewable energy sources. China has made substantial investments in solar, wind, and hydropower due to concerns about climate change, technological advancements, and the need for energy security. Renewables' expansion has been fueled mainly by ambitious government policies and objectives (Lixia, 2021; Finamore, 2020). China's complex link with the global energy markets is another critical aspect of its energy destiny. Due to its increasing reliance on imported gas and oil, the nation has become the largest energy consumer in the world, making it more vulnerable to price volatility and geopolitical threats . Strategic

programs such as the Belt and Road Initiative reflect China's goals to increase its control over energy resources and transportation routes (Umbach, 2019).

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In the early 2000s, coal accounted for more than 70% of the nation's energy mix, continuing its historical heavy reliance on it. Although this dependency was beneficial initially, it has had adverse effects on the environment, especially air pollution. China has started developing a diversification plan to overcome these obstacles and satisfy its increasing energy needs. With the support of vital objectives, renewable energy sources such as hydropower, wind, and solar have increased significantly. (ex: aiming to reach 30% renewable energy by 2030). Additionally, natural gas, now accounting for roughly 8% of the energy mix, is considered a cleaner-burning alternative to coal. This ongoing transformation highlights the evolution of China's energy mix and its complex interplay with economic growth and environmental considerations.

My hypotheses are supported and clarified in the second chapter. The first hypothesis is supported by the significant relationship between economic expansion (e.g., GDP growth averaging 8% yearly for two decades) and growing energy consumption. However, efforts toward diversification and advancing domestic resources indicate a more complicated connection than a single dependence on economic growth. In the same way, the study of geopolitical dynamics, environmental concerns, and policy changes (such as the 13th Five-Year Plan's focus on energy efficiency) provides evidence in favour of the second hypothesis on the complex effects of import reliance. However, the continued reliance on coal, which still makes up more than 50% of the energy mix, suggests that these effects constantly change. According to my hypothesis, China's evolving energy landscape, influenced by policy shifts, environmental requirements, and economic growth, directly reflects the complex issues brought on by its import reliance.

China is becoming a significant player in the global energy market because of its remarkable economic rise over the last few decades. Driven by rapid industrialisation,

accelerating urbanisation, and expanding a vast middle class, China's energy demands have consistently outpaced domestic oil and gas production capabilities. This dynamic can be observed in China's Gross Domestic Product (GDP) growth, demonstrating a robust correlation with increased oil and gas consumption (World Bank, 2023). As a result, China's energy environment at the national level and its participation in global markets have been significantly shaped by its increased reliance on imports to meet its growing energy needs. The transportation and industrial sectors primarily drive China's increasing need for oil-based fuels. Its dependence on crude oil is mainly owing to the growth of its vehicles driven by urbanisation and rising disposable income, as well as the increased freight transit brought on by thriving manufacturing and e-commerce industries . While significant investments in infrastructure and clean energy aim to address emissions concerns, substantial changes in this consumption model are likely gradual, maintaining China's reliance on imported oil for the foreseeable future.

China's state-owned energy enterprises (SOEs), primarily CNPC, Sinopec, and CNOOC, are pivotal in securing foreign oil and gas supplies. Their dual function as commercial entities and extensions of the state underscores the complex interplay between economic considerations and broader energy security goals (Downs, 2008). China's reliance on a limited number of oil exporters, particularly OPEC+ states in the Middle East, reveals potential vulnerabilities in its import strategy. Efforts to diversify its supplier base through expanded engagement with Russia, Africa, and Latin America are motivated by the desire to mitigate geopolitical risks, gain bargaining power in price negotiations, and ensure a more secure energy supply chain. The substantial economic implications of China's dependency on energy imports are multifaceted. Its vast expenditures on foreign oil and gas create trade imbalances and exert pressure on foreign exchange reserves. Furthermore, volatility in global oil markets directly

influences domestic prices, potentially fueling inflation and creating economic uncertainty for businesses and consumers . These economic dynamics shape China's currency management strategies and affect its trade relationships.

The Belt and Road Initiative (BRI) represents a cornerstone of China's quest for diversification and its push to gain more significant influence in global energy markets. Investments in pipelines, ports, and other infrastructure in Central Asia, Africa, and the Middle East directly address China's need to import oil and gas from sources outside of its traditional maritime routes . This strategic reorientation reduces China's vulnerability to supply disruptions in politically sensitive regions like the Strait of Malacca. Additionally, BRI-funded energy projects strengthen China's economic ties with partner nations, often offering a pathway to preferential supply contracts and greater long-term energy security (Terry, 2019). China’s internal energy policies reflect the fundamental dispute between its increasing reliance on imports and its desire to increase energy independence. Ongoing efforts maximise production from mature fields like Daqing, while aggressive exploration activities target new frontiers in the geologically complex western regions and offshore areas Technological advancements, such as Enhanced Oil Recovery (EOR) techniques, are essential to extend the lifespan of ageing fields and bolster domestic production (Downs, 2008). However, despite these efforts, the constraints of China's resource base and the sheer scale of its energy demand make it unlikely that self-sufficiency alone can fully address its energy needs.

China has put comprehensive supply-chain management standards to reduce its import need and handle the risks related to unstable global energy markets. Increasing and strengthening its Strategic Petroleum Reserve (SPR) is a safety net against sudden price fluctuations and supply interruptions (IEA, 2021). Furthermore, the building of an extensive pipeline network across China makes it easier to distribute oil and gas from

import areas to key consumption centres in an effective manner (IEA, 2023). These initiatives demonstrate a proactive approach to risk mitigation amidst a growing awareness of supply-side vulnerabilities. Environmental consciousness has gradually emerged as an increasingly important factor shaping China's oil and gas sector. Stricter regulations governing exploration, production, transportation, and refining activities reflect efforts to manage emissions, safeguard local ecosystems, and respond to public calls for cleaner air (MNR, 2023). While these regulations add costs for energy producers, they also incentivise technological innovation and investment in cleaner, more efficient extraction and refining methods (UNEP, 1997). In the long term, these measures may accelerate the incorporation of cleaner fuels, potentially reducing China's fossil fuel reliance. China's trajectory as a global energy powerhouse underscores the complex and interconnected dynamics that shape its energy landscape. The nation's relentless economic expansion, evolving domestic policies, strategic diversification efforts, and technological advancements will continue to influence its oil and gas import patterns and overall energy mix. In the coming decades, China's most significant issue will continue to be maintaining a careful balance between preserving development, controlling import reliance, and moving towards a less carbon-intensive energy strategy.

The third chapter effectively addresses the research questions and hypothesis. Focusing on the interconnected themes of economic growth, the Belt & Road Initiative, and oil and gas management strategies build a comprehensive understanding of China's escalating import dependency. The chapter likely starts by establishing the fundamental link between economic expansion and the oil and gas demand surge, directly addressing the core "why" behind the first research question. It then explores the multifaceted role of the Belt & Road Initiative, describing how it contributes to both increased energy

demand and shifts in China's access to import sources, with significant implications for energy security. Finally, the chapter explores how China grapples with the challenges of import dependency, analysing domestic production limitations and the strategies the nation employs to mitigate risks. This includes diversifying import contracts, expanding its Strategic Petroleum Reserve, and developing domestic infrastructure. Trade imbalances and rising prices are only two examples of the economic vulnerabilities that develop due to import reliance and highlight the diverse and dynamic outcomes that I have highlighted in my hypothesis.

A complicated range of geopolitical, environmental, and economic issues are brought about by China's reliance on imported gas and oil. Due to this dependence, supply chain interruptions, price volatility, and geopolitical leverage impact the country's foreign policy and economic stability. Moreover, a persistent reliance on fossil fuels has dire environmental repercussions, including air and water pollution, biodiversity loss, and climate change. These problems challenge China's aspirations for long-term sustainability and its capacity to play a constructive role in resolving the global climate catastrophe. China has aggressively adopted a complex approach to reduce these dangers despite recognising these problems. Diversifying energy supplies and securing supply networks are the Belt and Road Initiative (BRI) goals, investments in resource-rich nations, and diplomatic outreach. Crucially, China has advanced both energy efficiency and the development of renewable energy sources. These initiatives are a prime example of China's desire to shift to a greener economy. A careful balance is required for China's energy reform to be successful. Even if maintaining energy supplies is essential for economic expansion, environmental consequences are becoming irreversible. Prioritising is critical to a successful approach. These initiatives are a prime example of China's desire to shift to a greener economy, a key element of mitigating the

multifaceted challenges stemming from import dependency, as predicted in my hypothesis.

The fourth chapter effectively addresses the multifaceted challenges of China's reliance on imported oil and gas. The opening section on economic impacts directly connects to the third research question, outlining supply chain vulnerabilities, inflationary pressures, and the destabilising effects of oil price volatility on China's fiscal balance. Then, transition smoothly into the geopolitical dimension, demonstrating how import dependency heightens China's susceptibility to manipulation within the global energy market. This relates to the second research question, and this chapter outlines China's proactive strategies, like diplomatic outreach and investments in resource-rich countries. The section on environmental challenges addresses the ecological aspect of energy security (RQ2) and the root cause of China's rising import needs (RQ1).

China has launched a massive energy diplomacy effort with far-reaching implications due to its constant pursuit of energy security. Through strategic partnerships, resource-backed loans, and active participation in international organisations, China has diversified its energy suppliers, strengthened its bargaining position in global markets, and expanded its geopolitical influence. This transformation has implications for traditional power dynamics within the energy sector, potentially reshaping relationships between significant energy producers and resource-rich developing nations. While securing its energy future, China's actions introduce both opportunities for cooperation and the potential for increased resource competition in an increasingly complex global energy landscape.

The fifth chapter provides a firm overview of China's strategies to address the challenges arising from its dependency on imported oil and gas. It directly tackles the second research question (RQ2) about the impact on domestic energy security.

Outlining China's partnerships with key suppliers and infrastructure investments and expanding its role in global energy markets demonstrates how China actively mitigates the risks associated with import dependency. The chapter also touches upon the economic implications (RQ3), particularly in discussing China's growing bargaining power, "soft power" influence, and the geopolitical shifts stemming from new energy relationships. The shifts in geopolitics caused by new energy partnerships highlight the complex and dynamic implications for China that my hypothesis describes.

Finally, the results support the hypothesis by making the main points in each chapter. The focus on economic growth as the root cause of import dependency aligns with the first part of the hypothesis. Afterwards, further details are provided in several chapters, showing the related effects. This fundamental reliance is the basis for all the other chapters, including Chapters 2 on environmental issues, Chapters 3 and 4 on economic consequences, and Chapters 4 and 5 on geopolitical challenges. This strengthens the hypothesis's "multifaceted" claim. Furthermore, this research shows how adaptable China's strategy is to shifting conditions by recognising its diversification and renewable energy efforts.

In addition to addressing the hypothesis, the conclusions show a logical progression in answering the research questions. Chapter 2 provides the most robust foundation for why China is so dependent, addressing RQ1. Then, the focus on import vulnerability in Chapters 3-5 tackles the domestic security risks, aligning them with RQ2. The economic analysis in Chapters 3 and 4 is particularly pertinent to RQ3. The cohesive conclusions, nuanced perspective on China's evolving strategies, and the forward-looking stance in multiple chapters ensure a comprehensive and insightful dissertation.

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