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Resource Rush: Mining, Oil, and Economic Development in Greenland

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Introduction

Greenland sits at the intersection of geology, geopolitics, and global transition. Beneath its ice and along its coasts lie deposits of rare earths, base metals, iron ore, and offshore hydrocarbons that could reshape local economies and influence strategic supply chains far beyond the Arctic. Yet the promise of a resource rush is entwined with profound environmental uncertainties, cultural considerations, and the practical realities of operating in polar conditions. This book asks what responsible development looks like in a place where climate change is both altering the physical landscape and intensifying global interest.

Our aim is to equip investors, activists, policymakers, and community leaders with a common factual ground and a shared vocabulary. We analyze the mineral and hydrocarbon prospects that attract capital; the licensing and fiscal regimes that govern who participates and how benefits are shared; and the social and environmental trade-offs that determine whether projects earn legitimacy. Rather than advocate for or against extraction in the abstract, we focus on the concrete: regulatory frameworks as written and as implemented, the costs and benefits as they accrue to households and municipalities, and the procedures by which communities express consent or dissent.

The approach is comparative and case-based. We draw on recent projects to illuminate recurring questions: How are baseline studies conducted in fragile Arctic ecosystems? What does Free, Prior, and Informed Consent mean in Greenland’s political and cultural context? When do impact and benefit agreements deliver on promises of training, employment, and local ownership—and when do they fall short? Each case study is paired with a discussion of the relevant statutes, guidance notes, and international standards, allowing readers to see how rules are interpreted in practice.

Environmental risk runs through every chapter. Permafrost dynamics complicate infrastructure, tailings management demands exceptional caution, and marine ecosystems connect mining sites to fisheries and coastal livelihoods. Climate change adds layers of uncertainty to hydrology, ice conditions, and emergency preparedness. Against this backdrop, robust Environmental Impact Assessments, transparent monitoring, and adaptive management are not bureaucratic hurdles; they are the backbone of credible development strategies in the Arctic. We examine the science, the safeguards, and the pathways for independent oversight.

Equally central is the question of who decides. Greenland’s evolving autonomy and governance frameworks shape licensing, revenue sharing, and land-use planning,

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while communities assert their rights through consultation, local elections, and civic organizations. The legitimacy of any project depends on the quality of engagement—early, inclusive, and informed—and on tangible benefits that outlast construction booms. We explore models for benefit-sharing, avenues for local procurement and equity participation, and mechanisms to handle grievances before they escalate.

Finally, the book looks beyond any single commodity cycle. Greenland’s development choices will reverberate through education systems, public finances, and the viability of complementary sectors such as fisheries and tourism. We outline scenarios to 2040 to help readers stress-test assumptions about prices, technology, and policy. Whether you approach this topic from the perspective of capital allocation, environmental stewardship, or community planning, the chapters that follow are designed to clarify options, illuminate trade-offs, and support decisions that are economically sound, environmentally responsible, and socially legitimate.

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Chapter One: Greenland at a Crossroads: Geology and Geopolitics

Greenland, a landmass often perceived as a vast, white expanse, is in fact a dynamic stage where ancient geological forces meet contemporary global ambitions. Far from being a static icy giant, it is a key player in the unfolding drama of Arctic resource development, a drama heavily influenced by both its deep geological history and its increasingly vital geopolitical position. This unique confluence of factors places Greenland at a critical juncture, balancing the allure of economic independence against the complexities of environmental stewardship and international relations.

A Geological Tapestry of Billions of Years

To truly understand Greenland’s resource potential, one must first delve into its extraordinary geological past, a chronicle spanning nearly four billion years. The island is essentially a colossal open-air museum of Earth’s evolution, showcasing rocks that are among the oldest on the planet. Its bedrock is primarily composed of the Precambrian Shield, a robust foundation of crystalline rocks that bears strong resemblances to the Canadian and northern European shields. This ancient shield, particularly in areas like Nuuk and the Isukasia region, boasts some of the Earth's oldest known rocks, dated at approximately 3.7 to 3.8 billion years old.

This deep history has left Greenland with a wide variety of mineral deposits. The formation of these ancient rocks involved numerous geodynamic processes, resulting in a diverse range of minerals. The central basement shield, for instance, consists of gneiss complexes and belts of metamorphosed sedimentary and volcanic rocks that originated during mountain-building events between 3,800 and 1,600 million years ago. Over succeeding epochs, thick sedimentary deposits accumulated in extensive basins along the margins of this shield, with the thickest successions now found offshore on Greenland's continental shelf.

Further shaping this geological tapestry were significant volcanic successions, particularly in East and West Greenland, which erupted approximately 60 to 55 million years ago, coinciding with the plate-tectonic opening of the North Atlantic Ocean. This rifting process, which separated Greenland from Norway and northern Europe, also led to the formation of the Labrador Sea and Davis Strait. These volcanic activities, visible today in areas like Disko and Nuussuaq, contributed to the diverse mineral inventory.

The Ice Age, which began about two million years ago, also left its indelible mark, shaping the landscape with widespread glacial deposits and erosional features that we

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see today in the form of the Inland Ice. This massive ice sheet, covering about 80% of Greenland, has historically kept much of its mineral wealth under wraps. However, as the climate changes, this ice cover is receding, gradually revealing the ancient bedrock and the mineral riches it has long protected.

Greenland resides on the North American tectonic plate, a geological fact that underscores its physical connection to the North American continent, despite its political ties to Europe. This tectonic setting, combined with its long and complex geological evolution, has positioned Greenland as a potential treasure trove of natural resources, including not only rare earth elements but also iron ore, graphite, tungsten, palladium, vanadium, zinc, gold, uranium, copper, and even oil and gas. The Geological Survey of Denmark and Greenland (GEUS) works in collaboration with the Government of Greenland to map and understand these resources.

The Geopolitical Chessboard of the Arctic

Beyond its fascinating geology, Greenland's strategic location makes it a critical piece on the global geopolitical chessboard. Positioned between North America and Europe, and increasingly accessible due to melting Arctic ice, Greenland finds itself at the heart of intensifying international interests. This growing focus is driven by a combination of economic ambitions, military considerations, and environmental concerns.

One of the most significant geopolitical shifts stemming from climate change is the increasing navigability of Arctic shipping routes, such as the Northwest Passage and the Northern Sea Route. These routes, once largely impassable, offer the potential for significantly reduced shipping times and costs between major global markets. While commercially unviable for now due to treacherous weather and floating ice, their long-term potential has not gone unnoticed by global powers. As vessel traffic in the Arctic Ocean increases, Greenland is poised to become a key player in managing this new maritime frontier, including emergency response and prevention.

Militarily, Greenland has long been a strategic asset. The island hosts Pituffik Space Base (formerly Thule Air Base), a U.S. military installation crucial for missile early warning, defense, and space surveillance. This base, integral to NATO's defense system, underscores Greenland's importance in monitoring and potentially restricting naval movements in the North Atlantic and Arctic Ocean. The U.S. has maintained a defense agreement with Denmark concerning Greenland since 1951, highlighting the island's enduring strategic value.

However, the geopolitical landscape of the Arctic is becoming more crowded and competitive. Major powers like the United States, Russia, and China are increasingly vying for influence in the region. China, for instance, has articulated its "Polar Silk Road" policy and has attempted to increase its presence through scientific research

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and infrastructure investments, though many such projects have not yet materialized due to geopolitical concerns. This interest from various global actors reflects not only the strategic maritime routes but also Greenland's vast, untapped natural resources.

The desire for economic self-sufficiency and eventual independence also plays a significant role in Greenland's geopolitical stance. As an autonomous region within the Kingdom of Denmark, Greenland manages most of its domestic affairs, including natural resource development. This autonomy fuels its pursuit of resource extraction as a pathway to greater financial independence from Denmark. However, this ambition is often tempered by concerns about the environmental impact of mining and the potential for foreign influence.

The melting ice, while revealing mineral deposits, also presents a complex dilemma. On one hand, it creates opportunities for resource extraction and new shipping routes, promising economic growth and job creation. On the other hand, it profoundly impacts the natural environment and the traditional livelihoods of the Inuit population, who have adapted to the harsh Arctic environment for thousands of years. These environmental changes, including alterations in marine ecosystems and the challenges to traditional hunting practices, are central to the discussions surrounding Greenland's future.

In this intricate dance of geology and geopolitics, Greenland finds itself navigating a future where its ancient rocks hold modern value, and its remote location is increasingly central to global strategic interests. The choices made today regarding resource development will not only shape Greenland's economic trajectory but also reverberate across international supply chains and influence the balance of power in the rapidly changing Arctic. This chapter merely sets the stage, introducing the inherent geological wealth and the complex geopolitical currents that define Greenland's unique position in the world.

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