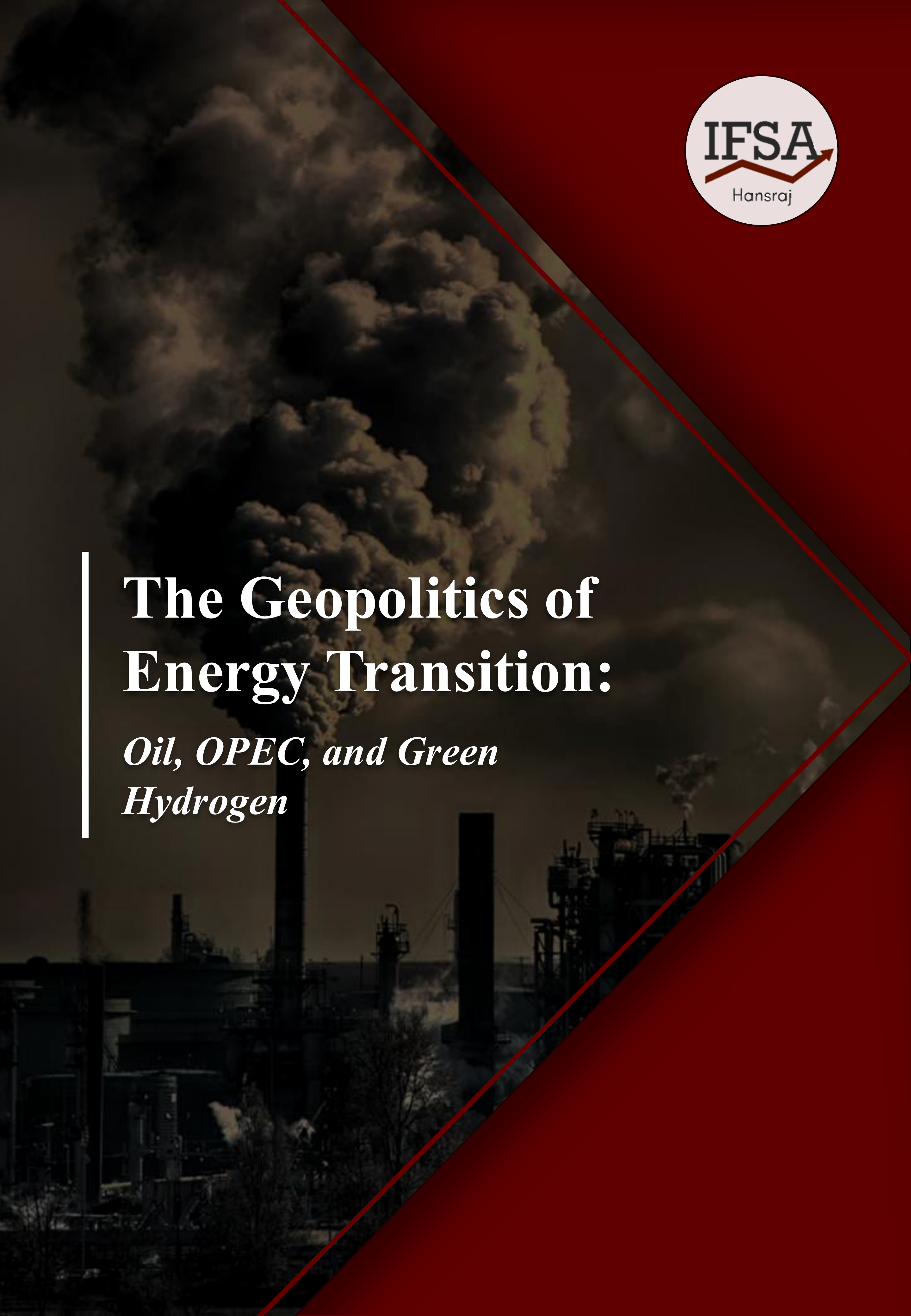

The Geopolitics of Energy Transition:

Oil, OPEC, and Green Hydrogen

Key Contributors

The International Finance Student Association (IFSA) is a global network of finance student associations around the world. Our mission is to empower our members and help them acquire the skills they need to have a successful finance career. We do this through a wide range of events, including conferences, workshops, and case competitions. But we' re more than just a series of events – we' re a community that' s dedicated to networking, sharing knowledge, and building connections that can help you succeed in the finance industry.

We aspire to establish a robust and adaptable network that can positively impact many lives for years to come. With mentorship support, the organization seeks to provide members with practical business acumen and prioritizes a quest for excellence, both as individuals and as a group. We aim to revolutionize the perception of college clubs by creating a more inclusive, thoughtful, and learning-focused community.

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Introduction

IFSA Hansraj

Beyond the familiar oil fields, a powerful shift is **reshaping the global energy landscape**. We're talking about Green Hydrogen, renewable energy sources, and powerful new regulatory bodies, the forces accelerating the transition away from fossil fuels. They are the agile players, **filling the crucial gaps** that traditional oil and gas cannot sustain long-term.

Here's why they matter: They inject vital **clean energy** into the real economy, fueling growth in underserved energy sectors. But this transition comes with risk. The **potential collapse of oil-dependent economies** exposes their vulnerability, a stark reminder that these titans can destabilize the entire system.

OPEC's Cartel Mechanics
How the group established its market dominance and political leverage.

The Climate Imperative
The global regulatory and technological push toward net-zero.

Green Hydrogen's Threat
Its emergence as a viable, emissions-free alternative to fossil fuels.

Economic Vulnerability
Analyzing the reliance of OPEC states on oil rent for their national budgets.

The Great Reshuffle
Predicting the new centers of power in a post-fossil fuel world.

Future Policy Pivots
Strategies OPEC nations must adopt to ensure long-term stability.

We aim to explore how **OPEC nations** can effectively **transition their economies and energy policies** away from **oil dependence** in the face of accelerating **global decarbonization**. As **renewable energy** gains momentum, these nations confront the challenge of maintaining **economic stability** while embracing **diversification** and **sustainable growth**. The **climate crisis** thus stands as both a potential driver of **innovation and reform** and a looming threat of **systemic instability** for the **Middle East**, making it crucial to ask: **how can this pivotal sector adapt and evolve in the post-oil era?**

OPEC: Past, Power & Advantage

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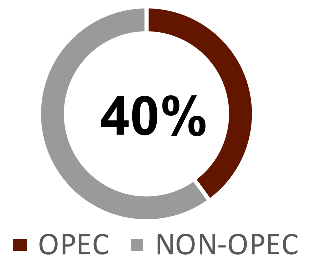
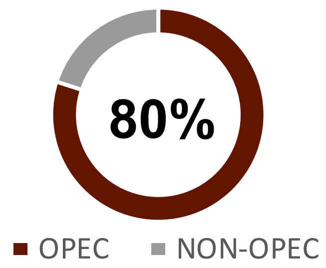
IMPORTANCE OF OIL

Oil, or petroleum, is one of the world's most **profitable commodities**, used in countless products like **plastics, tires, and fuels**, making its price crucial to the global economy.



IMPACT OF FLUCTUATIONS

Oil prices influence the cost of everyday goods and depend on global **demand**, **supply**, and major **producer** decisions. They remain highly **volatile** due to **geopolitics** and **market expectations**.



What is OPEC?

Formed in **1960** by Iraq, Kuwait, Iran, Saudi Arabia, and Venezuela, **OPEC** regulates oil production and prices, ensuring market stability once controlled by U.S. oil giants.

OPEC supplies **40%** of oil today but controls **80%** of future reserves, giving it strong long-term power.

Member Countries Of OPEC

Saudi Arabia
Largest oil producer

Kuwait
Small but wealthy

Libya
North African reserve

United Arab Emirates
Gulf energy hub

Venezuela
South American oil

Congo
African supplier

Iran
Middle East exporter

Nigeria
Africa's hub

Gabon
Coastal producer

Iraq
Rich oil reserves

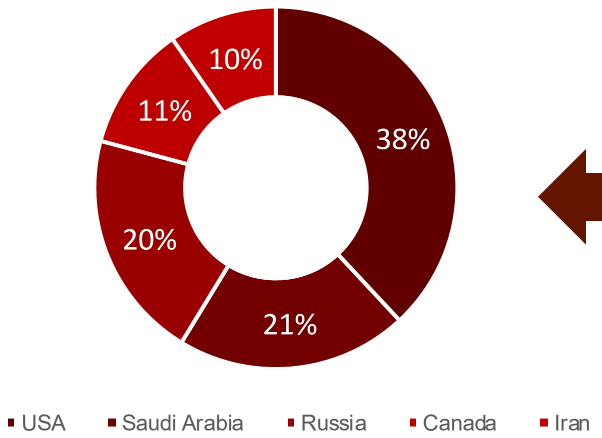
Algeria
Gas and Oil

Equatorial Guinea
West African producer

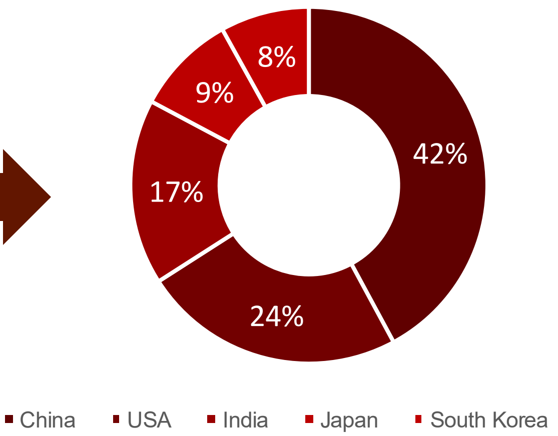
OPEC: Past, Power & Advantage

Key Players in the Global Oil Market

Top Oil Producing Countries



Top Oil Importing Countries



The **top oil-producing countries** are the **United States, Saudi Arabia, Russia, Canada, and Iraq** contributing to world's crude oil. These producers drive energy needs.

On the other hand, the **largest oil importers** are **China, India, the United States, Japan, and South Korea**, which depend heavily on foreign oil to meet their energy needs..

But does OPEC actually control world oil?

01 Oil's Political and Economic Importance

Exporting countries rely heavily on oil revenues for economic stability, while importing countries depend on oil as the essential fuel of the modern economy. Thus, both rely on each for oil.

02 OPEC's Influence on the Market

OPEC and (OPEC+) control about 40% of global oil and use production strategies to influence prices. However, growing non-OPEC production, especially U.S. shale oil, limits OPEC's long-term power.

03 Impact on Producing and Importing Countries

Producers adjust output to stabilize prices and revenues, while importers face economic challenges from price volatility which affects growth and inflation. This leads to importing countries rely on alternatives.

04 Future Challenges and Energy Transition

Geopolitics and supply-demand dynamics still shape prices, but as renewable energy rises, oil's dominance is at risk. The "Oil Age" may end before reserves run out, echoing past resource and energy transitions.

OPEC: Past, Power & Advantage

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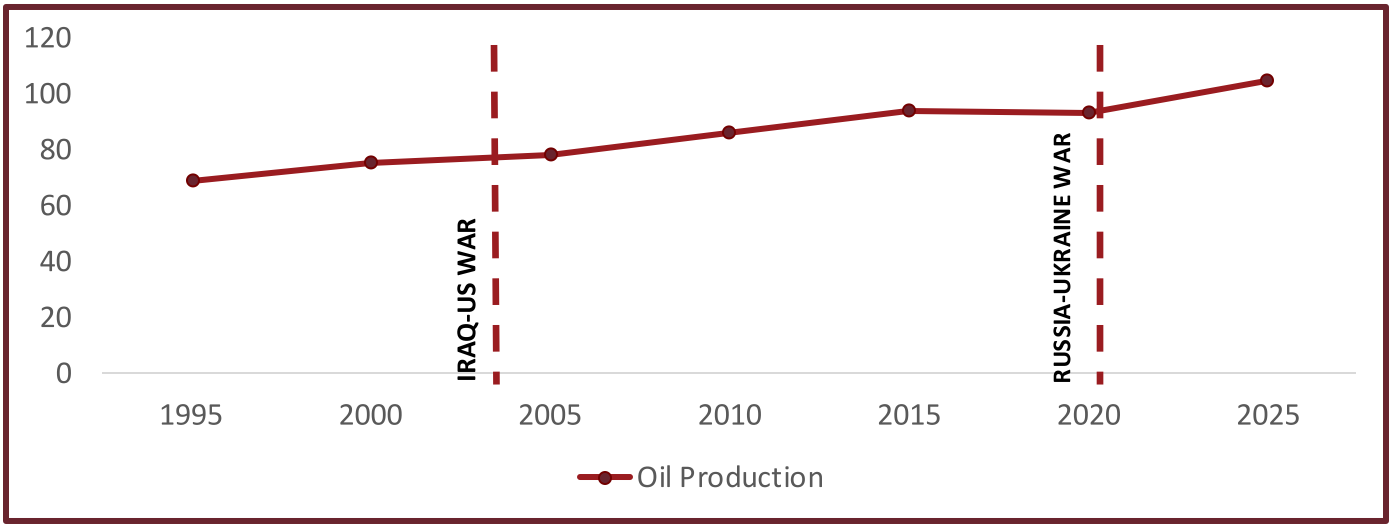
Tale of Two wars



Russia-Ukraine War

- **Oil became a weapon** under **Western sanctions**.
- **Exports shifted** to **China and India**.
- Output fell to **8.3m bpd** by 2025

Iraq- U.S. War

- U.S. invaded to gain oil control and influence
- Output **fell to 1.5m bpd** during war
- Recovery hit **2.8m bpd by 2011**

Conclusion: Oil, Power and Global Dependence

Oil continues to define **mutual dependencies** between **exporting** and **importing nations** exporters rely on **oil revenues** for stability, while importers depend on **secure energy access** to sustainable growth

Conflicts and **political unrest** reshape **global energy structures**, disrupting **production**, redirecting **trade flows**, and influencing the **balance of power** among nations, this causes **unrest in market of oil supply**

The **pursuit of energy dominance** remains central to **geopolitics**, where **sanctions**, **alliances**, and control over **oil reserves** determine both **economic resilience** and **political influence** on the **global stage**

OPEC: Past, Power & Advantage

IFSA Hansraj

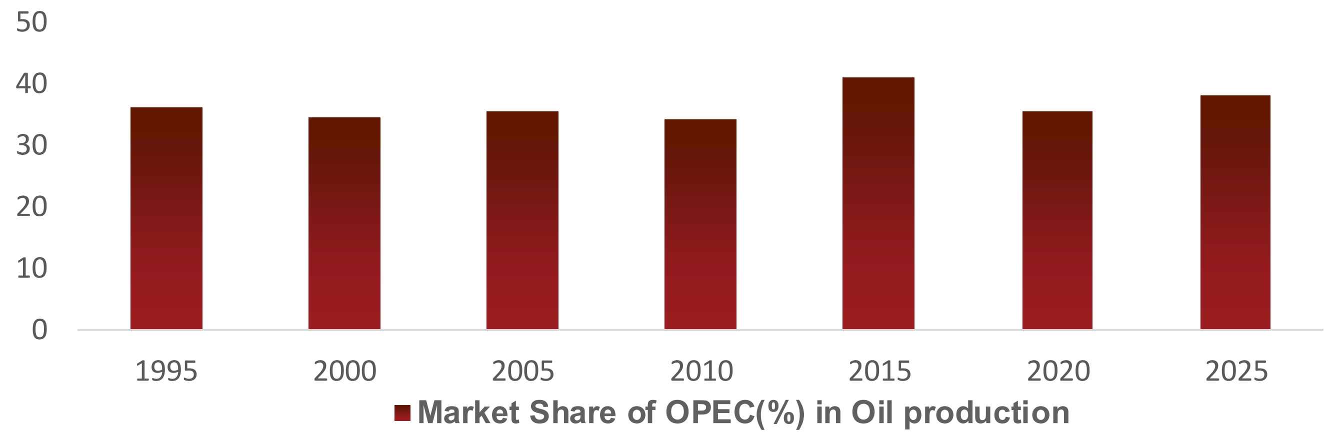
Strengthening Oil & Future Energy

OPEC nations are boosting oil capacity while **adopting blue hydrogen and carbon-capture technologies** to preserve hydrocarbon relevance as global demand plateaus

Expanding Beyond Oil Economies

With initiatives **like Saudi Vision 2030 and UAE renewable and tourism investments**, OPEC members are rapidly diversifying to secure long-term economic stability

Market Share and Future Challenges



Energy Transition Adaptation

OPEC is balancing **oil supply** with emerging **low-carbon technologies** to remain integral during the global shift

Economic Fuel Diversification

Member states are expanding into **non-oil sectors** to reduce dependence on **fossil fuel revenues**

Market Order Reorientation

Focus is shifting toward regions with **sustained energy demand**, especially in **Asia and the Global South**

Strategic Demand Flexibility

OPEC's influence now depends on **adaptive production policies** to navigate **demand peaks** and **market volatility**

OPEC: Past, Power & Advantage

IFSA Hansraj

From $3 to $12: The 1973 Embargo and the End of Cheap Oil

1969

Nixon becomes the U.S. President, marking a new phase in **Cold War** diplomacy

1972

Nixon visits China marking a major rapprochement**.** and signs the **SALT I treaty** with the USSR

1973

Arab nations **impose an oil embargo**, causing a global energy crisis and economic shock

1974

Ford becomes President after Nixon's resignation amid **the Watergate scandal**

1975

The **Helsinki Final Act** is signed, cooperation and human rights in Europe

Oil Turns into a Weapon

OPEC nations, led by Arab states, used oil as a political weapon during the Yom Kippur War, marking a shift in global power

The Arab Embargo

After the U.S. gave $2.2 billion in aid to Israel, Arab OPEC members imposed an oil embargo on the U.S. and its allies

The First Oil Shock

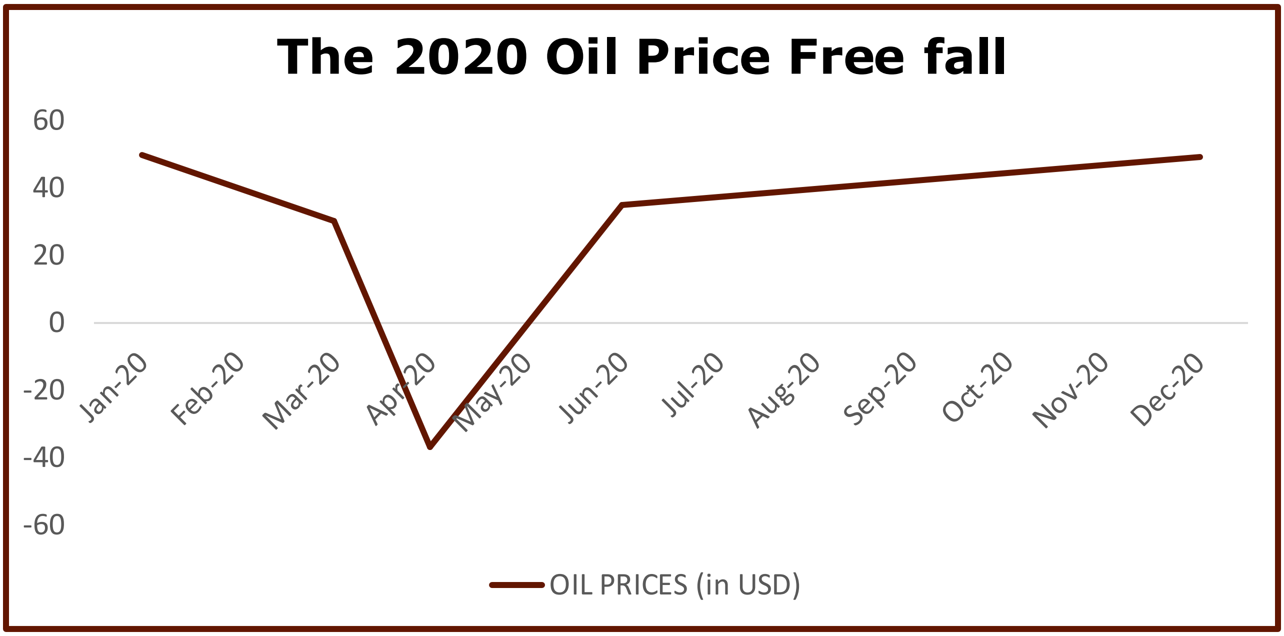
Oil prices quadrupled from $3 to $12 per barrel, causing worldwide panic and severe economic instability

Impact on the U.S.

Nixon's price controls deepened fuel shortages, resulting in long queues and widespread frustration at gas stations

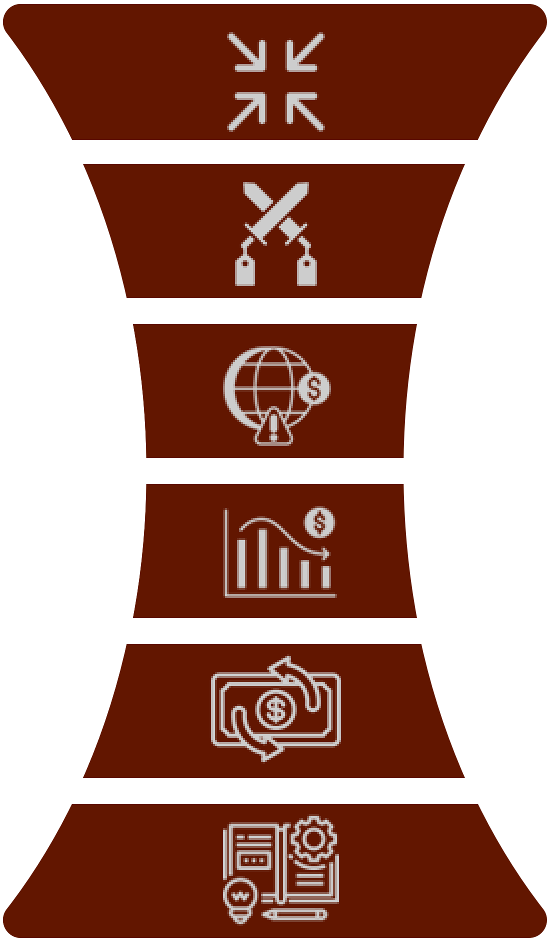
OPEC: Past, Power & Advantage

Pandemic Panic: When Black Gold Turned Negative



The 2020 Oil Market Collapse
COVID-19 lockdowns slashed global oil demand, halting travel and industry

OPEC-Russia Price War
Russia's refusal to cut output sparked a price war and market oversupply



Historic Price Crash
Oil prices plunged from $50 to $10 per barrel as storage ran out causing a tension

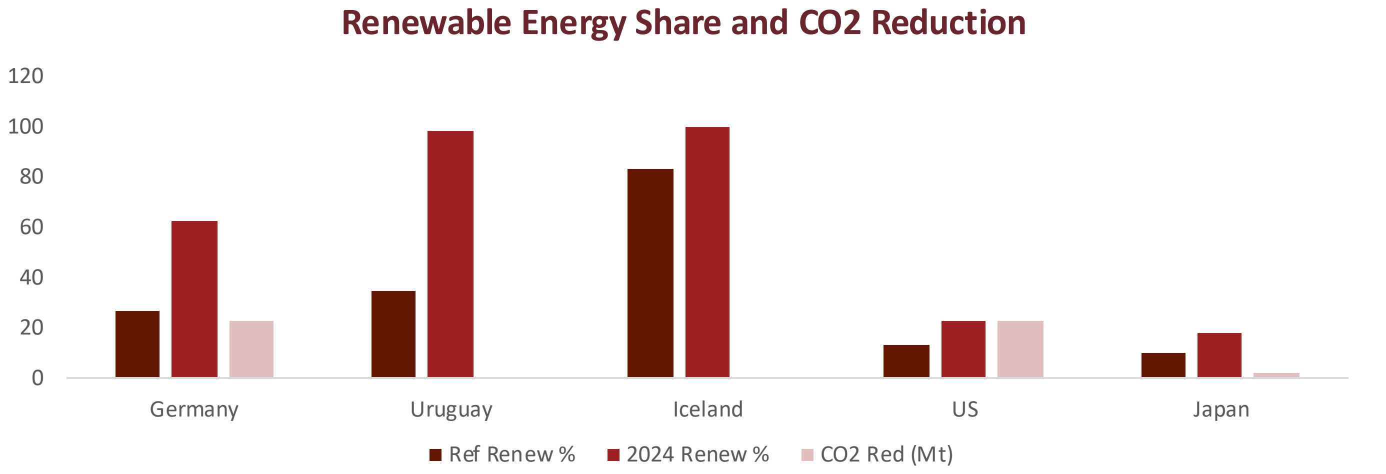
Negative Oil Prices
On April 20, 2020, WTI crude hit -$37 per barrel for the first time in history

Global Intervention and Recovery
Production cuts and easing lockdowns helped stabilize oil market

Lessons from the Crisis
The crash exposed the oil market's vulnerability and volatility all over the world

Catalyst of Change: Decoding the Power Shift

United Nations and Energy Transition Outlook



GERMANY

Renewables covered 62.7% of power in 2024, up from **47% in 2023** and **27% in 2015**. **Wind (33%)** and **solar (15%)** led growth, cutting emissions by **3.4%**. Strong **policies and grid upgrades** reflect the **UN's clean-energy vision**.

URUGUAY

98–99% of power came from **low-carbon sources** in 2024–25, up from **91% in 2022**. **Hydro (47%)**, **wind (34%)**, and **biofuels (14%)** dominate. **Public investment** and **equitable energy access** mirror the **UN's transition goals**.

ICELAND

99.9% renewable electricity in 2024 from **hydro (71%)** and **geothermal (29%)**. Focus now shifts to **transport and industry electrification**, showing full alignment with the **UN's energy transition framework**.

U.S.

Power-sector emissions dropped to **309 Mt** in 2024–25, down **0.6%**. **Renewables supplied 18%**, **nuclear 11%**. Japan targets a **46% cut by 2030** and **60% by 2035**, supporting the **global clean-energy shift**.

JAPAN

CO_2 emissions fell by 23 Mt in 2024 as **wind and solar surpassed coal**. Emissions are **20% below 2005 levels**, driven by **clean-tech investment** and **UN-aligned energy reforms**.

Catalyst of Change: Decoding the Power Shift

IFSA Hansraj

Article 6 of the 2015 Paris Agreement

Article 6 of Paris Agreement 2015 enables a policy framework that focuses on **climate change actions and enables countries to cooperate on reducing green gas emissions** through market and non market approaches.

ARTICLE 6.2

International transfer of mitigation outcomes

Enables countries to trade emission reductions to meet their Contributions.

ARTICLE 6.4

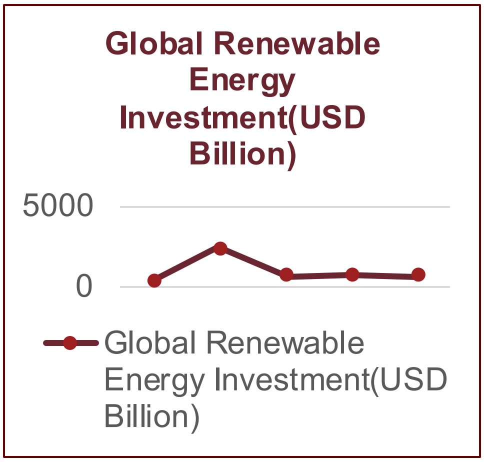
Centralized Mechanisms

Establishes a UN supervised mechanism to issue high-integrity carbon credits from projects.

ARTICLE 6.8

Non-Market Cooperation

Encourages non-market collaboration such as capacity building and knowledge sharing.



KEY FACTS

$1 trillion+ Projected climate finance mobilized by **2050.**

Major source of funding for renewable energy projects`

Vision of COP28 towards net-zero energy by 2050

Emissions

COP28 compels nations to align energy policies with **net-zero targets**, accelerating the global shift from **fossil fuels** to **renewables** and ensuring coordinated **emission reduction** efforts.

Funding

COP28 frameworks drive **trillions in green financing**, boosting **renewables**, **hydrogen**, and **clean tech** through initiatives like the **EU Green Deal** and **US Inflation Reduction Act**.

Transition

OPEC and **emerging economies** are diversifying into **renewables**, **hydrogen**, and **carbon capture**, balancing **energy security** with global **clean energy goals**

Catalyst of Change: Decoding the Power Shift

IFSA Hansraj

Levelized Cost of Energy

Metric

LCOE measures lifetime cost per unit of electricity, helping choose the **most affordable and efficient energy option** across sources.

Momentum

Renewables have reached a tipping point, now beating fossil fuels as the **cheapest source for new power** due to rapid advances and scaling.

Decline

Costs have plunged: **solar at $0.043/kWh** and **wind at $0.034/kWh in 2024**, making renewables **41–53% cheaper** than fossil fuel power.

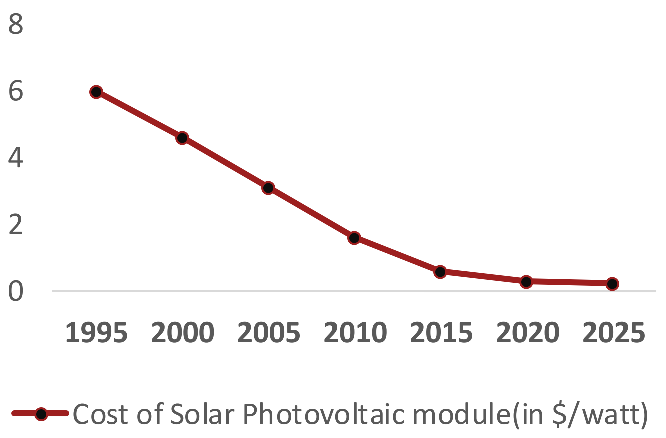
How Affordable Renewables Empower Developing Nations

Energy Over Aid
Renewable energy, not foreign aid, may be the key to breaking global poverty cycles.

OPEC's Green Shift
OPEC plans **$18.2 trillion** in investments by 2050, including clean energy projects like Egypt's wind plant.

Coexistence Economy
Fossil fuels and renewables now coexist, with oil maintaining about **30% of global energy demand.**

Green Growth
Renewables have created **16 million+ jobs**, driving economic growth and cleaner environments worldwide.



Sharp fall in cost from **~$6/watt to ~$0.2/watt**

Overall **90%+** reduction on the cost of renewables

Catalyst of Change: Decoding the Power Shift

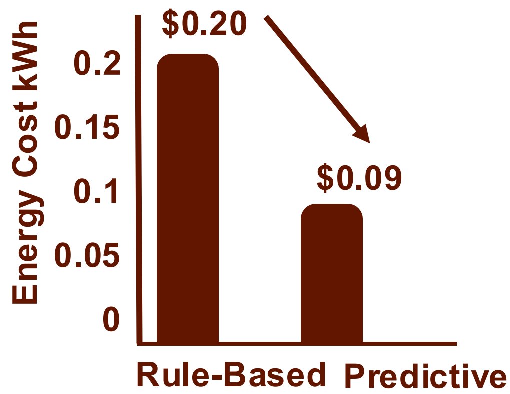
IFSA Hansraj

AI in Smart Grids and Predictive Energy Analytics

The Smart Grid and Predictive Analytics for Energy Management enable real time forecasting and adaptive control, improving energy efficiency, reducing costs and increasing the reliability of modern power networks.

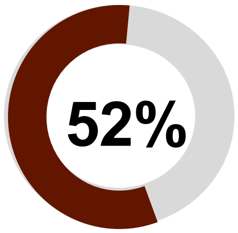
Key Metrics	Traditional EMS	AI Powered EMS
Optimization	40-50%	80-90%
Energy Cost	High	↓ 15%
Energy Efficiency	Base	↑ 20%
Peak Load Demand	Unstable	↑ 15%
Predictive Accuracy	—	0.9

Cost Reduction through Predictive Smart EMS



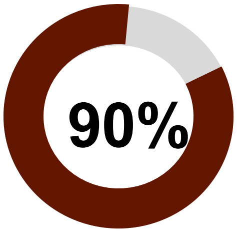
Smart Grid and Predictive Energy Flow

Data Acquisition → Real-Time Monitoring → Predictive Analytics → Predictive Operations → Optimized Operations



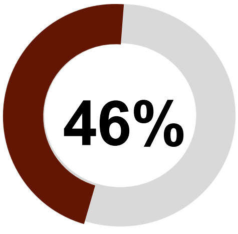
Forecasting

AI forecasting reduces reliance on central grids.



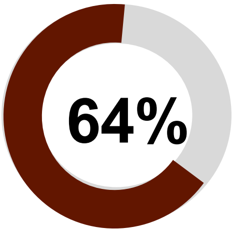
Energy Efficiency

Predictive control intelligently optimizes power use.



Renewable Integration

Smart grids balance renewables and demand.



Grid Dependency

AI scheduling **significantly** lowers carbon emissions.

Catalyst of Change: Decoding the Power Shift

Enhancing Green Hydrogen Production with AI driven efficiency

AUSTRALIA

Commonwealth And Industrial Research Organization (CSIRO) developed an AI-driven control system for renewable hydrogen

INDIA

India Oil Corp has a vast AI plan for hydrogen production automating plants predicting maintenance and improving supply chain

More than 50 projects use AI in green hydrogen production worldwide

Electrolysis Efficiency Optimization Achieves 90%+ Performance

AI boosts electrolysis efficiency from 60-80% to over 90%, revolutionizing hydrogen production and energy conversion

Energy Consumption Reduction Delivers 10–20% Cost Savings

AI cuts energy consumption by up to 10%, significantly lowering hydrogen production costs and improving process efficiency

Predictive Maintenance Cuts Downtime by 30-40%

AI-based maintenance lowers equipment failures by 30-40%, significantly reducing downtime, saving time, and cutting operational costs

Smarter Hydrogen Production with AI

Achieves higher operational performance, ensures optimized energy utilization, and enables scalable, efficient hydrogen output

Green Hydrogen's Strategic Emergence

IFSA Hansraj

Global Climatic Challenges: Hard to Abate Industries

Global Energy Demand projected to **Rise by 50% by 2050**

Over 80% of our primary needs still come from **Fossil Fuels**

Hard to Abate industries are responsible for **over 40% of emissions**

The Future is Green: Unlocking Hydrogen's Potential

Energy Independence

Green hydrogen shifts global power, **empowering nations with sun and wind** to produce clean fuel

Clean Industry Solution

Green hydrogen can replace fossil fuels as both a **high-temperature fuel and a raw material**

The 24/7 Renewable Grid

Green hydrogen **"bottles" renewable energy,** to provide a stable, **24/7 clean power supply**

A Globally Scalable Solution

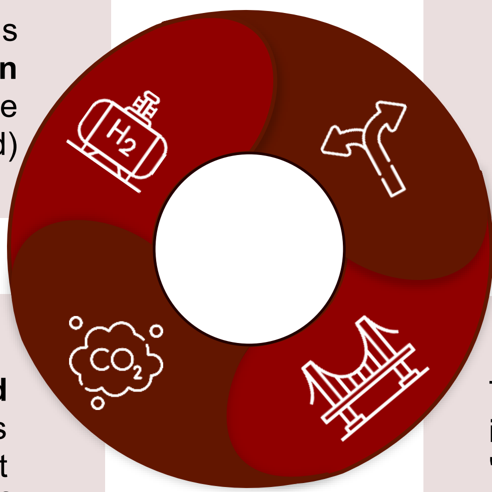
Unlike biofuels, **its modular production can be built anywhere with sun or wind**, making it a global solution

The "Green" Method

Green hydrogen is produced with **zero carbon emissions** using renewable electricity (like solar or wind) to split water

The "Dual" Roles

Hydrogen is a versatile fuel used in two ways: chemically in a **fuel cell** to create electricity **or** by **burning it directly** for heat



The "Grey" Reality

The **most common and cheapest method.** It's made from natural gas but releases large amounts of CO2 into the atmosphere

The "Blue" Bridge

This "low-carbon" compromise is made from natural gas (like "Grey"), but the **CO2 emissions are captured** and stored instead of released

Green Hydrogen's Strategic Emergence

IFSA Hansraj

Energy Transition Overview

Global Fossil Fuel Dependence (2024): 80% of total energy supply

Projected Share of Renewables (by 2030): ~35% of total energy mix

Green Hydrogen Market CAGR (2024–2030): ~40%

Planned Global Green Hydrogen Capacity (by 2030): 450+ GW

CO_2 Reduction Potential: 20% of global emissions by 2050

Energy Security and Independence

Green hydrogen production depends on abundant renewable energy reducing reliance on energy imports. Fossil fuels, which are unevenly distributed, creating dependencies and political leverage

Redistributes Energy Power

Traditional fossil fuel exporters (Middle East, Russia) may lose some geopolitical influence as green hydrogen creates energy exporters in countries like Australia, Chile, and Morocco

Infrastructure

Green hydrogen infrastructure currently involves significant upfront costs which are projected to decrease as technology advances and production scales up

Environmental Impact

Green hydrogen aligns with international climate goals such as Paris Agreement by supporting carbon neutrality and reducing ecological harm. Fossil fuels contribute to biodiversity loss

Trade Structure Differences

Value chains are expected to be more competitive and less controllable. Electrolyzes can be deployed widely, production can happen in many locations, limiting monopoly power

Green Hydrogen's Strategic Emergence

IFSA
Hansraj

Green hydrogen is highlighted everywhere in political speeches, international reports and major investment pictures. It is tagged as "**fuel of the future**". But beneath these claims and headlines, of our economic and environmental conditions relay a very different story.

High Expenditure

- Green hydrogen production is costlier than fossil-based hydrogen.
- Needs large investment in renewables, electrolysis, and RTC power.
- Flexible electrolyzes and smart controls can reduce power costs by using cheap renewable energy efficiently.

Energy Losses

- Electrolysis leads to 30–35% energy loss, giving only 60–70% efficiency.
- Equipment lifespan is often less than five years.
- Stronger materials and high-pressure stacks can improve durability and output.

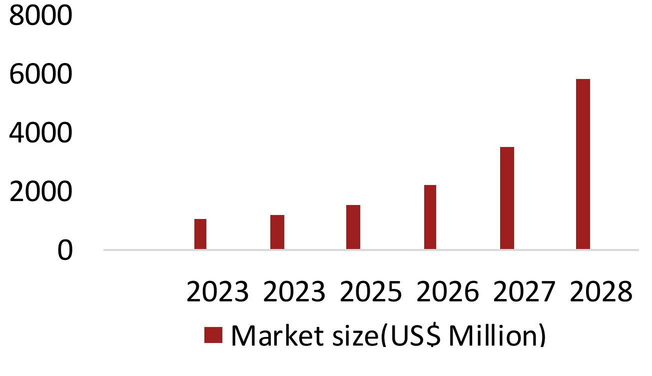
Refueling Stations

- Hydrogen transport and refueling are expensive and energy-intensive.
- Liquefaction demands extreme cooling, adding high energy costs.
- Smarter, renewable-powered stations can improve cost efficiency.

Storing Hydrogen

- Compression and liquefaction consume 10–15% energy.
- Leakage and material embrittlement still persist.
- Advanced tank materials and insulation can reduce energy loss and damage.

Green Hydrogen Market Size



66.83%
CAGR 2022-28

US$ 46.2 Bn
Incremental growth between 2023-2028

The graph shows an exponential rise in green hydrogen's market size, mainly driven by global decarbonization goals, renewable investments, government incentives, and industries shifting toward zero-emission fuel alternatives.

The Great Reshuffle

IFSA Hansraj

The Fall in OPEC'S Political Dominance

1973-1980s

OPEC peaked with the oil embargo, then declined as the West sought energy independence.

1990-2000s

Falling oil prices and rising global suppliers steadily reduced OPEC's control and policy influence.

2008-2018

The U.S. shale boom and deep internal rifts severely fractured OPEC's unity and weakened its global power...

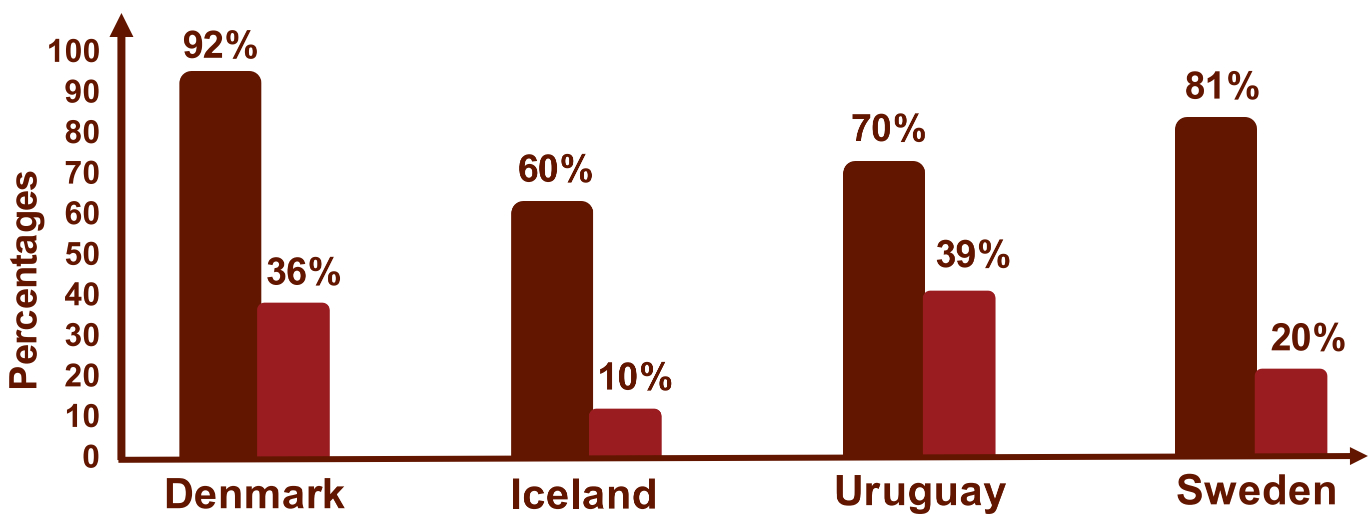
2019-2020s

Global climate goals and the accelerating clean energy shift steadily reduced OPEC's influence and policy power.

Oil dependence in Past (late 1980s) vs Today

Significant reduction in oil dependence over time

Four countries dramatically decreased reliance on oil since the late 1980s



79.5% of global reserves but falling demand, OPEC's influence is constrained by carbon budgets, climate finance, and new global energy blocs

The Great Reshuffle

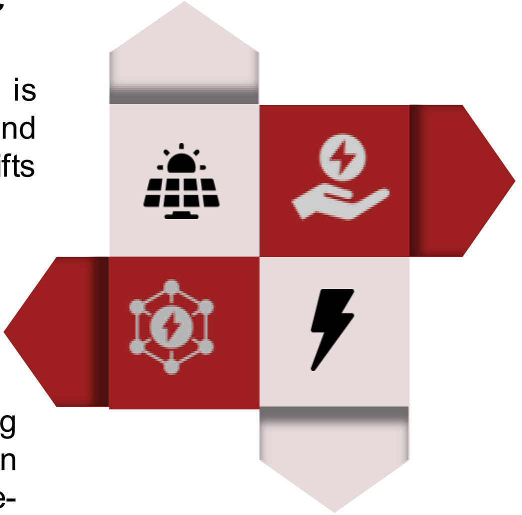
New energy dependencies

New Economic Model

OPEC's market control is eroding amid demand stagnation and capital shifts toward decarbonization

Decentralised Energy Power

Green hydrogen's ability to be produced anywhere promotes energy democratization and reduces the concentrated geopolitical power.



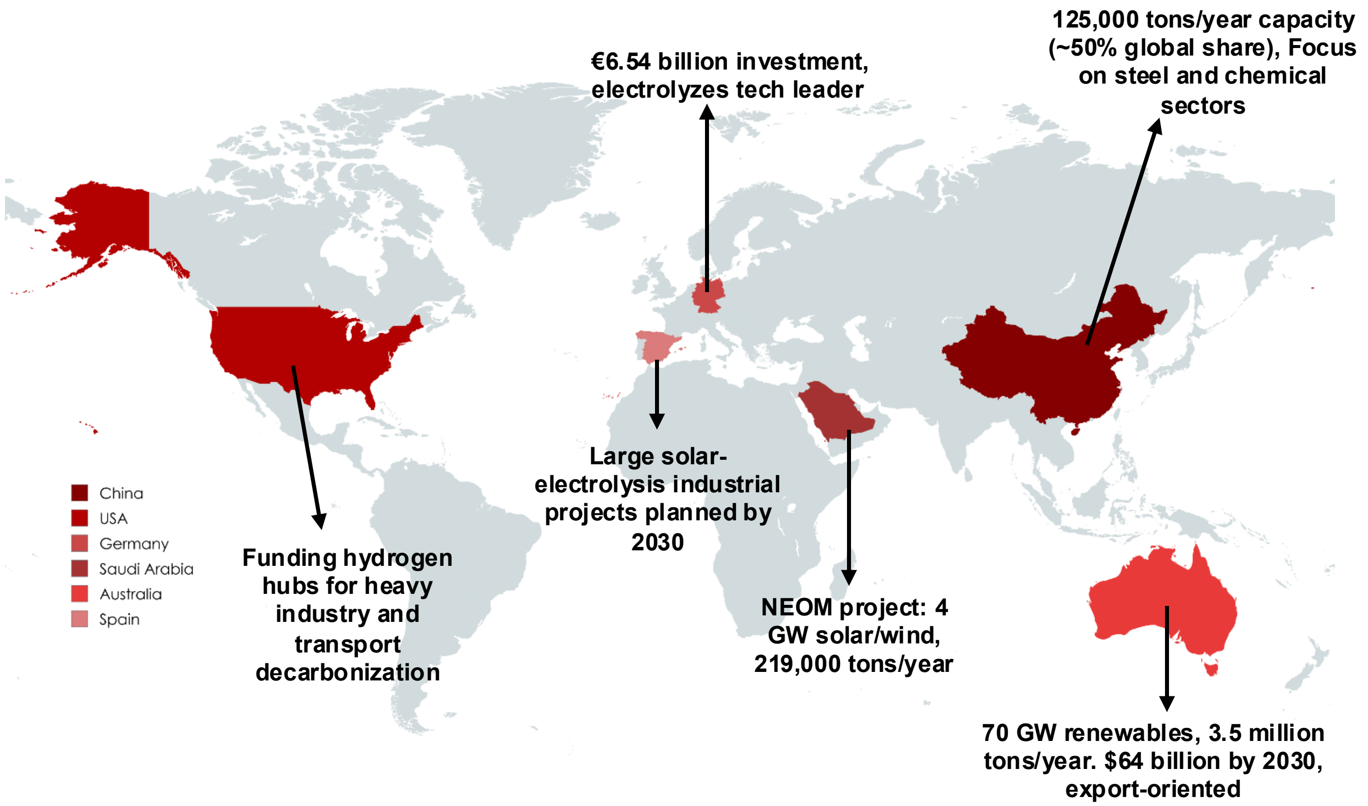
Energy Transition

Green hydrogen is shifting dominance to hydrocarbon extraction for renewable-based conversion systems

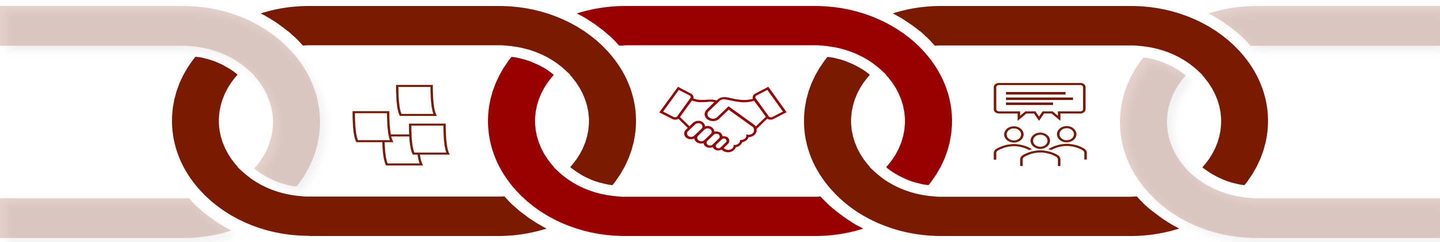
Decline of Oil Dominance

The hydrogen economy prioritizes conversion and renewable integration over resource endowment

Leaders in production of green hydrogen



The 3 E's of Green colonialism



Exploitation

Developed nations exploit Global South resources for green energy, causing displacement. Indigenous rights are often ignored or suppressed

Extraction

Extraction of minerals for green technologies follows colonial patterns, benefiting the Global North and disadvantaging the Global South

Expropriation

The international green agenda masks neocolonial practices, shifting environmental and social burdens onto vulnerable communities

Tunisia's Green Hydrogen Paradox

Resource Identification → Foreign Intervention → Local Displacement → Export Dominance → Inequality Reinforced

- Tunisia signs a **€10 billion deal** with TotalEnergies for **H2 Notos** to export **200,000 tons** of green hydrogen yearly.
- The export network to Europe covers **10 percent of EU hydrogen** demand. Tunisia targets **six million tons** of annual hydrogen exports.
- Tunisia faces **a 40 percent energy deficit** and raises concerns about land grabbing and displacement. Limits local jobs and energy access.
- They **import high-value technologies** but export low-value raw materials, reinforcing **unequal trade relationships**.
- New energy ties risk a **€3–4 billion yearly** inequality gap, echoing **patterns of green colonialism**.

From Crisis to Vanguard: Denmark's Energy Revolution

Denmark's **92% oil dependence** during the OPEC embargo, triggered an urgent energy rethink

The government turned to **coal, North Sea oil, and nuclear proposals** to restore energy security

The 1985 Parliament **rejected nuclear power**, steering investment toward wind as the main renewable path

In 2024, with **86% clean electricity**, Denmark stands as a global model of sustainable transformation and has made a successful transition

Architects of Denmark's Green Transition

System Integration

Converting **surplus wind to heat** and storing in district networks creates **thermal flexibility**

Decoupled Growth

80% economic growth over **30 years** with flat energy consumption and **plummeting emissions**

Diversification

Wind, solar, biomass, waste-to-energy portfolio reduces single-technology dependence

Public Participation

Citizen ownership and transparent policies, built trust, making its energy transition a shared mission

The Great Reshuffle

IFSA Hansraj

Structural Challenges in the Danish Energy System

Transport Decarbonization

Oil still fuels 39% of Denmark's final energy consumption, with road transport, shipping, and aviation remaining heavily carbon-intensive despite electricity sector success.

Bioenergy Sustainability

Two-thirds of Denmark's renewable energy comes from bioenergy, much of it imported wood pellets and biomass, raising questions about true carbon neutrality and sustainability.

Offshore Frontier

Building the world's first offshore wind farms in the 1990s was a massive financial and engineering gamble, forcing them to invent solutions for corrosion and subsea transmission.

Grid Dependencies

Heavy reliance on interconnections with Germany, Norway, and Sweden for grid balancing creates vulnerabilities and leads to wind energy curtailment during peak periods.

Key Takeaways

Efficiency is the Foundation

A relentless focus on energy saving was the non-negotiable first step for Denmark

Key Integration

Consistent, tough policies like taxes and co-ownership held the entire structure together

Policy is the Mortar

True innovation was system integration, using district heating as a thermal battery

It’s a Marathon

This was a 50-year project of pragmatic adaptation, not an overnight miracle. Its length forced constant refinement rather than quick fixes

The Future Of Energy Geopolitics

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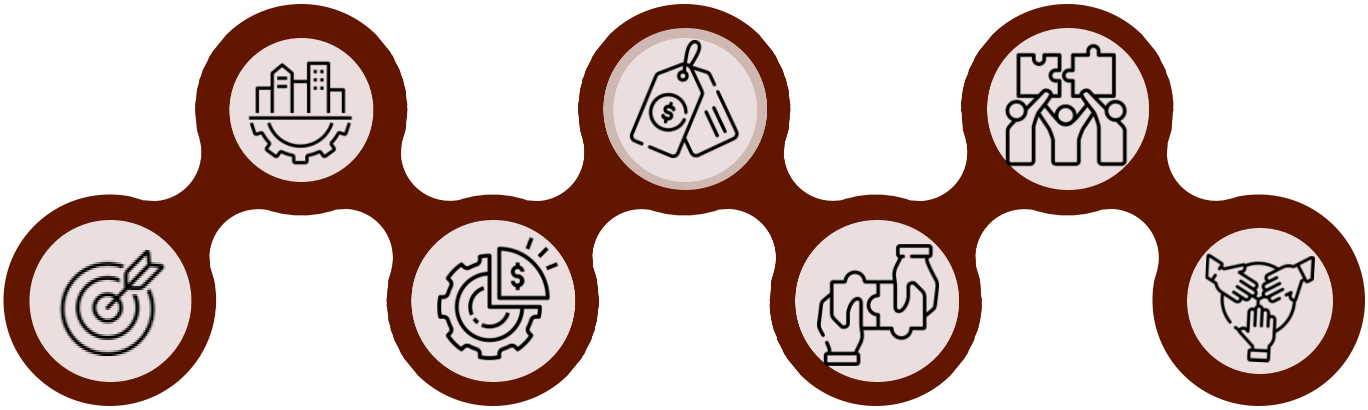
Political Blueprint

Infrastructure
Expand clean-energy grids, hydrogen systems

Pricing
Remove fuel subsidies, implement carbon pricing

Alignment
Align foreign policy with climate goals



Targets
Set clear clean-energy & net-zero goals

Equity
Ensure a fair green transition for equity

Cooperation
Boost international climate partnerships

Engagement
Involve government, industry, and citizens

Major Initiatives

01 **India's Green Hydrogen Mission (2023–2030)** aims to invest **₹8 lakh crore**, **cut fossil-fuel imports**, create **6 lakh jobs**, and reduce **50 MT CO_2** per year.

02 The United States' **Hydrogen Shot** seeks an **80% cut** in **green hydrogen** production costs, pushing forward **renewable energy expansion**, encouraging **new technologies.**

03 **The EU's REPowerEU plan** partners with **Africa** to drive a **fair, sustainable energy transition** and strengthen **green diplomacy**.

04 **Japan's Green Transformation (GX) Program,** investment to expand **hydrogen**, **renewables**, and **carbon-neutral industries** by **2050**.

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1908 – **Oil was discovered** in Persia, marking the beginning of a global energy revolution.

1930 – The **“Seven Sisters”** oil companies formed, **dominating the early oil industry**

1960 – **OPEC was founded** to unite oil-producing nations and **stabilize prices**.

1970 – OPEC nations raised oil prices, signaling their **growing influence** on global energy markets.

1973 – **The Arab Oil Embargo** triggered a global energy crisis and economic shockwaves.

1980 – **The Iran-Iraq war** led to extreme oil price volatility worldwide.

2005 – Countries began pushing **hydrogen-powered vehicles** to cut oil dependence.

2014 – **Toyota released the Mirai**, the world’s first commercial hydrogen fuel cell car..

2018 – **Germany** rolled out **the first hydrogen fuel cell train**, The US overtook OPEC as **Top Producer.**

2019 – The IEA published **its first Global Hydrogen Review,** highlighting hydrogen’s rising role.

2020 – The COVID-19 pandemic and OPEC’s alliance with Russia disrupted

2022 – The Russia-Ukraine war caused energy turmoil, while the U.S. and Kuwait advanced green hydrogen.

2023 – India approved its **National Green Hydrogen Mission** to produce **5 million tonnes** by 2030.

2025 – **Brazil joined the OPEC+** alliance, strengthening global oil cooperation.

2030 – The world aims to generate half of **its electricity from renewable sources**, per IEA projections.

Conclusion

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OPEC's dominance is shifting as **climate goals** and **technological advancements** reshape global energy systems. Its historical control has gradually waned due to falling **oil prices**, increasing **global supply** driven by **U.S. shale**, and persistent internal divisions. In response, OPEC nations are increasingly compelled to **diversify** their economies through plans like **Saudi Vision 2030** and to integrate **low carbon solutions** such as **blue hydrogen** and **carbon capture**, all in an effort to remain relevant as global demand begins to plateau and energy structures evolve.

The rise of **Green Hydrogen** is becoming the foundation of a new **energy backbone**, offering genuine **energy independence** and greater **decentralization** across countries. By reducing reliance on fossil fuel exporters, it significantly weakens the traditional resource based power of oil dependent economies and opens new pathways for cleaner, more resilient global energy networks.

This broader transition is being rapidly accelerated by **AI**, which is dramatically lowering operational costs, improving **electrolysis efficiency** to beyond **90 percent**, and enabling smoother, more responsive **smart grid integration.**

These advancements allow renewable energy systems to function more reliably, scale more effectively, and support a wider range of industries and technologies.

Despite this momentum, the shift still faces challenges such as high **production costs**, notable **energy losses** during **storage**, and the complex ethical risk of **Green Colonialism**. In many regions across the **Global South**, resource extraction for clean energy technologies can reinforce unequal trade patterns, deepen social burdens, and recreate older forms of dependency under a new green narrative

Ultimately, the way forward depends on meaningful **global collaboration** and **shared accountability**. OPEC nations, advanced economies, and emerging markets must move beyond narrow energy competition and create coordinated approaches that align **technological innovation**, **financing**, and **policy coherence**. Only through such inclusive partnerships can the world ensure that no country is left behind and that the transition results in a global energy landscape built on **prosperity**, **sustainability**, and **resilience**.

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