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2026 THE ENVIRONMENTAL QUALITY INDEX

This report is dedicated to the memory of Karen Buchwald Wright, whose generosity and unwavering commitment to advancing freedom and free markets made this work possible. Karen understood that environmental quality and economic liberty are not opposing forces, but complementary paths toward human flourishing. Through her leadership as CEO and Chairman of Ariel Corporation and the many causes she championed, Karen made her community and our country a better place. She will continue to inspire progress and innovation for years to come. It is no coincidence that Karen was born on the Fourth of July – she was, in every sense, a true American patriot.

2026

THE ENVIRONMENTAL QUALITY INDEX

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EXECUTIVE SUMMARY

The 2026 Environmental Quality Index (EQI) highlights the United States as a leading energy producer while maintaining high environmental and human freedom standards. Far from harming the planet, America's energy abundance delivers more global economic growth and genuine environmental progress than equivalent production from any other country.

Key Findings: U.S. Production Outperforms Global Peers on Environmental Quality

Using Yale University's 2024 Environmental Performance Index (EPI, 0–100 scale) weighted by each country's fuel production, the EQI reveals stark contrasts:

- **Oil**
  - U.S. EPI: 57.2
  - Production-weighted global average: 48.1
- **Natural Gas**
  - U.S. EPI: 57.2
  - Production-weighted global average: 49.9
- **Coal**
  - U.S. EPI: 57.2
  - Production-weighted global average: 38.7

Freedom Drives Environmental Performance

The EQI documents a strong positive correlation between economic and personal freedom (Cato Institute Human Freedom Index) and environmental outcomes:

- Countries in the top quintile of human freedom average an EPI score of 59.
- Environmental performance declines steadily as freedom decreases.

The United States ranks 17th globally in human freedom. By contrast:

- The next 21 largest oil producers average rank 113.42
- The next 19 largest natural gas producers average rank 102.95

Case studies of Venezuela (oil, freedom rank 159), Russia (natural gas, rank 139), and China (coal, rank 150) show how authoritarian control, weak property rights, and corruption produce economic collapse, severe environmental degradation, and systematic underreporting of ecological harm.

Why the U.S. Achieves More Energy with Less Environmental Impact

Three uniquely American factors explain simultaneous surges in production and environmental improvement:

1. **Private Mineral Rights**
   Approximately 75% of U.S. oil and 87% of natural gas come from private or state lands, aligning landowner and producer incentives for efficient, responsible development.

2. **Market-Driven Innovation**
   Technologies such as hydraulic fracturing and horizontal drilling increased U.S. oil output significantly in the past decade, while the total number of producing wells has fallen from its 2014 peak.

3. **Decades of Air Quality Gains**
   From 1970 to 2023, U.S. emissions of six criteria air pollutants declined 78% while GDP grew 321% and energy consumption rose 42%—consistent with the Environmental Kuznets Curve and driven by wealth creation and market incentives rather than central planning.

The United States is the only nation that combines massive scale in conventional energy production with high environmental standards and robust economic freedom. Policies that expand American energy abundance—rather than restrict it—represent the fastest, most effective path to global energy security, economic prosperity, and genuine environmental progress.

INTRODUCTION

Economic growth depends on affordable energy, yet much of the world lacks the natural resources and the proper economic and political institutions needed to escape poverty. As the world's largest conventional energy producer, the United States can meet its own needs while supporting global economic growth, benefiting both economies and the environment. The U.S. maintains high environmental standards unmatched by any other major producer of comparable scale. While some countries match or slightly exceed U.S. environmental performance, none produce even a quarter of U.S. oil or natural gas output. Given its high standards and significant output, U.S. energy production supports both economic growth and environmental quality more effectively than that of other countries.

In 2023, we published the *Environmental Quality Index* (EQI) to highlight the U.S.'s ability to produce significant quantities of oil and natural gas while upholding high environmental standards.[1] The election of President Trump and the passage of the One Big Beautiful Bill Act have reoriented federal focus away from pursuing net-zero policies that restrict U.S. oil, natural gas, and coal production and shift output to countries with lower environmental standards. Given these policy changes, we thought it prudent to update the EQI to further emphasize the importance of economic freedom in promoting energy abundance and environmental quality. In this version, we also provide new data on coal to better contextualize U.S. production and environmental quality compared to the rest of the world.

SECTION 01

ENVIRONMENTAL QUALITY WEIGHTED BY PETROLEUM, NATURAL GAS, AND COAL PRODUCTION

To compare the environmental quality of fuel production between countries, we selected the 2024 Environmental Performance Index (EPI), produced annually by the Yale Center for Environmental Law & Policy, to use as our proxy for national environmental standards.[2] Using 58 performance indicators across 11 issue categories, the 2024 EPI consolidates data on these environmental issues into a single score, rating countries on a 0–100 scale, where lower scores indicate poorer environmental quality and higher scores reflect stronger environmental protection.

Though the index does not directly measure the environmental impact of oil, natural gas, and coal production, we use it as a proxy, assuming that a country's demand for environmental quality is comprehensive, encompassing diverse environmental factors such as air, water, and land quality, and involving various stakeholders, including communities, industries, and policymakers.

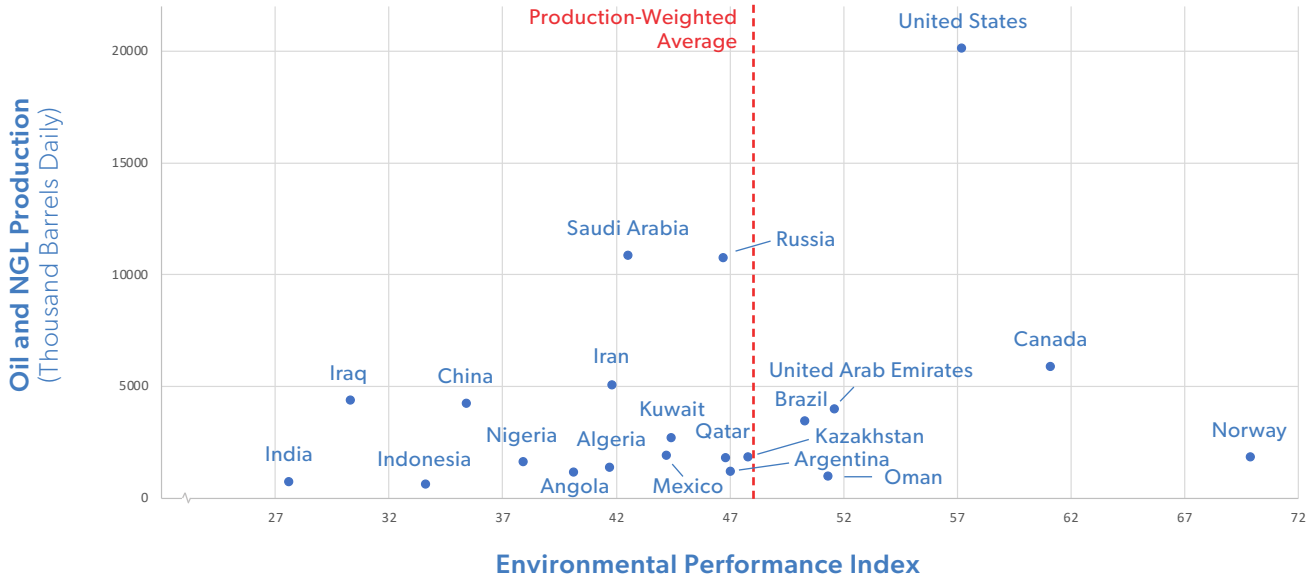
Oil

The U.S. is the world's largest oil producer, and the scale of our production is especially impressive given our environmental standards.

FIGURE 1: OIL PRODUCTION BY COUNTRY AND EPI

Country	2024 EPI	2024 Oil and NGL Production Thousand Barrels Daily[3]	Country	2024 EPI	2024 Oil and NGL Production Thousand Barrels Daily[3]
United States	57.2	20,135	Kazakhstan	47.8	1,836
Saudi Arabia	42.5	10,856	Norway	69.9	1,833
Russia	46.7	10,752	Qatar	46.8	1,806
Canada	61.1	5,888	Nigeria	37.9	1,641
Iran	41.8	5,062	Algeria	41.7	1,380
Iraq	30.3	4,398	Argentina	47.0	1214
China	35.4	4,264	Libya	NA	1,188
United Arab Emirates	51.6	4,006	Angola	40.1	1,181
Brazil	50.3	3,466	Oman	51.3	993
Kuwait	44.4	2,719	India	27.6	735
Mexico	44.2	1,911	Indonesia	33.6	613

FIGURE 2: EPI AND 2024 OIL PRODUCTION BY COUNTRY



These national EPI scores can be multiplied by production volumes to create a production-weighted environmental quality score for the group of countries. When weighted by production volume, it serves as a benchmark for environmental quality for the average barrel of oil produced in all of these countries.[4]

The production-weighted average EPI of 48.14 represents the environmental quality score of the average barrel of oil produced by the countries in this group. The United States' EPI score of 57.2 is 9.06 points higher than the production-weighted average of 48.14 for this major group of global producers.

To make the policy contrast even more stark, we can exclude developed democracies like the United States, Canada, and Norway, which face the same political pressure to halt domestic oil production. Without those countries' high environmental scores skewing the average, the remaining oil production's environmental score falls to just 43.07.

Natural Gas

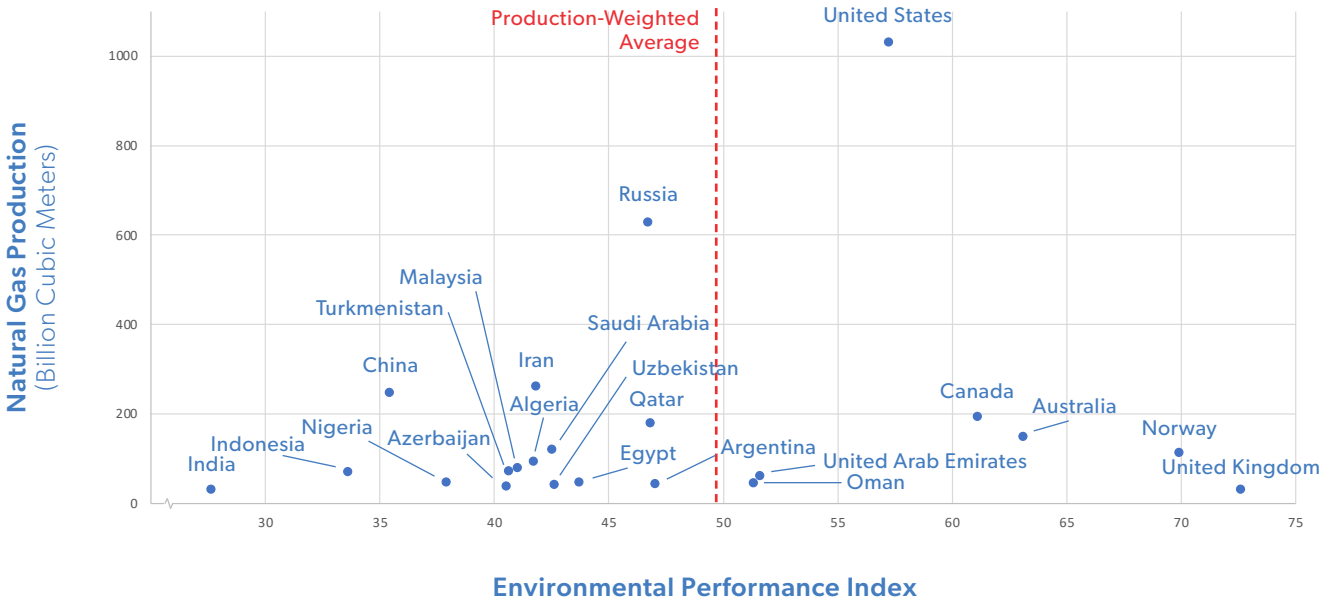
The story of world natural gas production is similar. The production-weighted average for major non-U.S. natural gas producers is also well below that of the United States. Figure 3 below shows the natural gas production of the U.S. and other top producers, along with their EPI scores.

These national EPI scores can be multiplied by production volumes to create a production-weighted environmental quality score for the group of countries.[6] When weighted by production volume, it serves as a benchmark for the environmental quality of the average billion cubic meter of natural gas produced by this group of countries.

FIGURE 3: NATURAL GAS PRODUCTION BY COUNTRY AND EPI

Country	2024 EPI	Natural Gas Production - Billion Cubic Meters[5]
United States	57.2	1033.0
Russia	46.7	629.9
Iran	41.8	262.9
China	35.4	248.4
Canada	61.1	194.2
Qatar	46.8	179.5
Australia	63.1	150.1
Saudi Arabia	42.5	121.5
Norway	69.9	113.2
Algeria	41.7	94.7
Malaysia	41.0	80.4
Turkmeni-stan	40.6	73.5
Indonesia	33.6	71.4
United Arab Emirates	51.6	61.4
Egypt	43.7	47.5
Nigeria	37.9	46.8
Oman	51.3	45.3
Argentina	47.0	44.1
Uzbekistan	42.6	42.2
Azerbaijan	40.5	37.8
India	27.6	32.4
United Kingdom	72.6	30.7

FIGURE 4: EPI AND 2024 NATURAL GAS PRODUCTION BY COUNTRY



The weighted average EPI for all countries in the dataset is 49.88. Compared to this baseline, the national EPI score of 57.2 for the United States is 7.32 points higher, demonstrating superior environmental standards. To make the policy contrast even more pronounced, when the five high-scoring developed democracies (the U.S., Canada, Australia, Norway, and the U.K.) are excluded, the benchmark EPI for the remaining global production falls significantly to just 42.94. This creates a difference of 14.26 points compared to the United States.

Coal

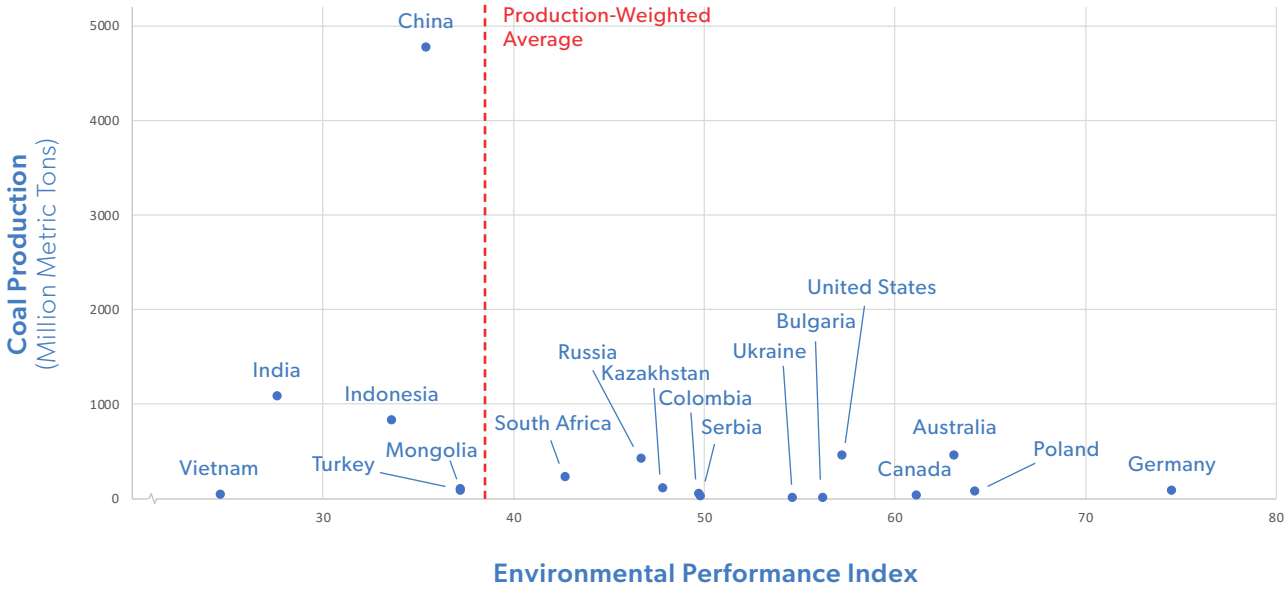
Although the U.S. does not dominate coal production to the same degree as in the past, it still has a comparatively high EPI score when compared to other large coal producers. Figure 6 shows that of the nine countries with over 100 million metric tons of coal produced in 2023, only Australia has a higher EPI score than the U.S. at 63.1, with no other country above 50, and the top three producers — China, India, and Indonesia — each below 40, well below the United States.

Although the U.S. does not dominate coal production to the same degree as in the past, it still has a comparatively high EPI score when compared to other large coal producers.

FIGURE 5: COAL PRODUCTION BY COUNTRY AND EPI

Country	2024 EPI	Coal Production - Million Metric Tons[7]	Country	2024 EPI	Coal Production - Million Metric Tons[7]
China	35.4	4780.0	Germany	74.5	91.9
India	27.6	1085.1	Turkey	37.2	87.0
Indonesia	33.6	836.1	Poland	64.2	85.2
United States	57.2	464.6	Colombia	49.7	52.7
Australia	63.1	462.9	Vietnam	24.6	43.8
Russia	46.7	427.2	Canada	61.1	42.6
South Africa	42.7	235.0	Serbia	49.8	31.3
Kazakhstan	47.8	112.6	Ukraine	54.6	17.4
Mongolia	37.2	106.5	Bulgaria	56.2	15.1

FIGURE 6: EPI AND 2024 COAL PRODUCTION BY COUNTRY

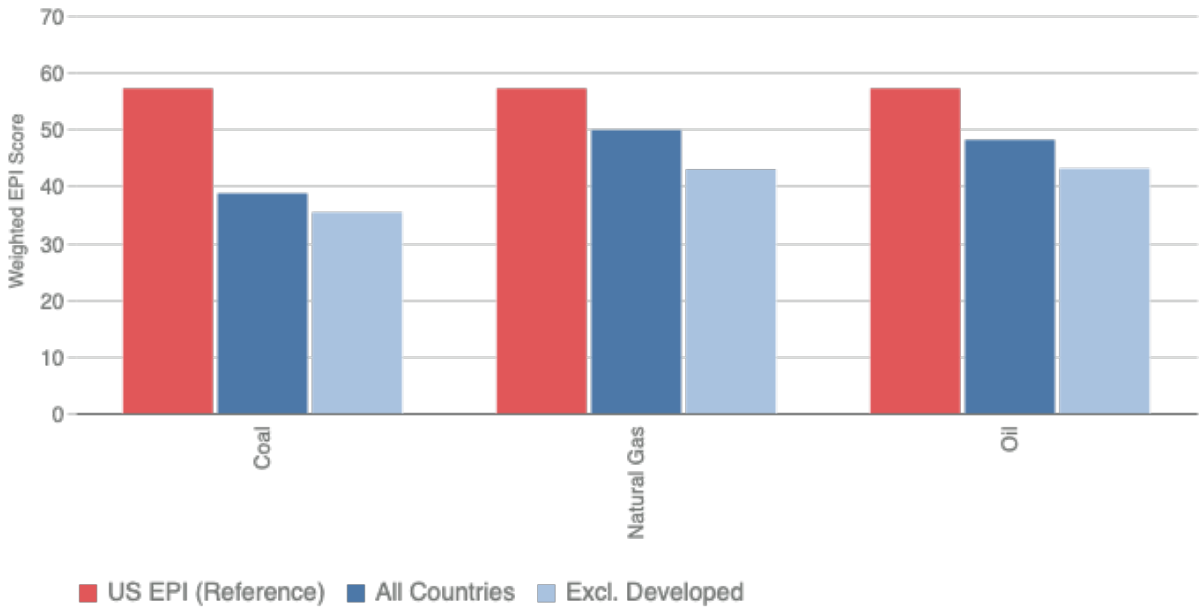


These national EPI scores can be multiplied by production volumes to create a production-weighted environmental quality score for the group of countries.[8] When weighted by production volume, it serves as a benchmark for environmental quality for the average metric ton of coal produced in all of these countries.

The overall weighted-average EPI for coal production across all 18 countries is relatively low at 38.72. When the five high-EPI developed democracies—the U.S., Australia, Germany, Poland, and Canada—are excluded from the calculation, the environmental quality score of the remaining global coal production falls to just 35.36. The U.S. EPI score of 57.2 is dramatically higher than both weighted averages, confirming that U.S. coal production operates under a far higher standard of national environmental protection than nearly all other major global coal producers.

As the figure below shows, conventional fuels produced in the United States are governed by significantly higher national environmental standards than the global average. For every fuel, the U.S. EPI score (57.2) stands notably higher than the global weighted averages. For coal, the difference between the U.S. score and the lowest benchmark (35.36) is over 21 points, representing a massive gap in environmental regulatory quality. When other high-EPI developed nations are excluded from the calculation, the weighted average for the rest of the world drops significantly for all three fuels. This demonstrates that if U.S. domestic production were halted, the resulting global supply would be replaced by production under substantially lower environmental standards.

FIGURE 7: PRODUCTION-WEIGHTED ENVIRONMENTAL PERFORMANCE BY FUEL



SECTION 02

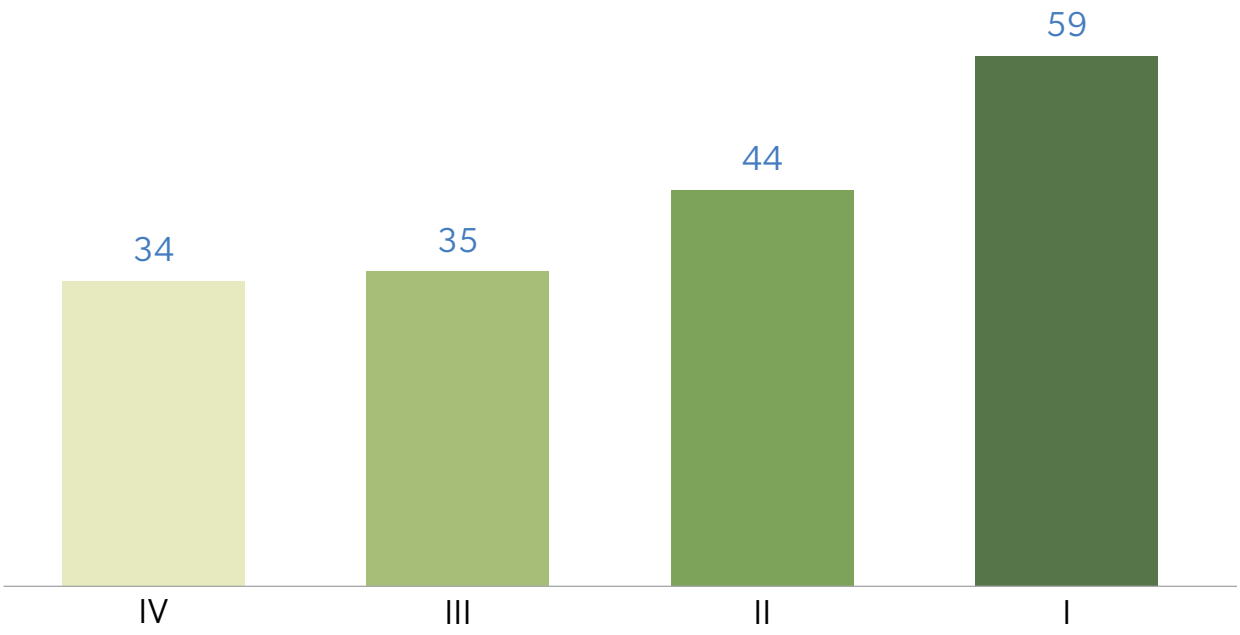
ECONOMIC FREEDOM AND POLITICAL STRUCTURE AS ECONOMIC, SOCIAL, AND ENVIRONMENTAL FACTORS

Repressive regimes often curtail property rights and seize businesses, disrupting the incentive structures of free markets. Typically, private ownership encourages better care of assets. When individuals or companies hold mineral rights, they have a vested interest in responsibly managing those resources to maintain their value and discourage waste. However, in repressive regimes that lack the rule of law, this dynamic reverses. The focus shifts to meeting production quotas, with little regard for long-term resource quality or collateral damage.

The Cato Institute's *Human Freedom Index* presents the state of human freedom in the world based on a broad measure that encompasses personal, civil, and economic freedom.[9]

When individuals or companies hold mineral rights, they have a vested interest in responsibly managing those resources to maintain their value and discourage waste. However, in repressive regimes that lack the rule of law, this dynamic reverses.

FIGURE 8: ENVIRONMENTAL PERFORMANCE BY HUMAN FREEDOM QUARTILE



Source: Sebastian Block et al., 2024 Environmental Performance Index (Yale Center for Environmental Law and Policy, 2024).

It employs 86 unique indicators of personal and economic freedom across these areas:

- Rule of law
- Security and safety
- Movement
- Religion
- Association, assembly, and civil society
- Expression and information
- Relationships
- Size of government
- Legal system and property rights
- Sound money
- Freedom to trade internationally
- Regulation

Countries in the top quintile of human freedom have an average EPI score of 59, and environmental performance drops as countries rank lower in human freedom.[10]

Oil

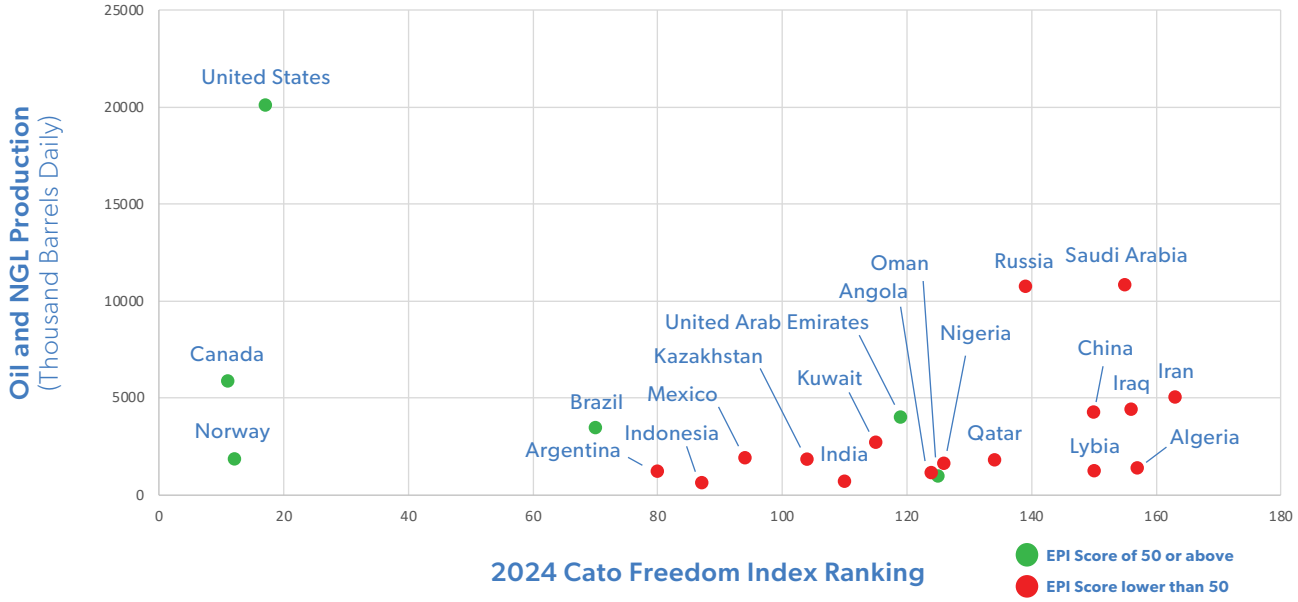
Figure 9 shows the largest oil producers and their rank in the Cato Institute's *Human Freedom Index* and their EQI score.

The United States ranks 17th in human freedom according to the *Human Freedom Index*. The average rank of the next 21 largest oil producers is 113.42. Saudi Arabia, the second-largest oil producer behind the United States, ranks 155th, and Russia, the third-largest oil producer, ranks 139th.

FIGURE 9: EPI, OIL PRODUCTION, AND HUMAN FREEDOM

Country	2024 EPI	2024 Oil and NGL Production Thousand Barrels Daily	Cato Freedom Index 2024	Country	2024 EPI	2024 Oil and NGL Production Thousand Barrels Daily	Cato Freedom Index 2024
United States	57.2	20,135	17	Kazakh-stan	47.8	1,836	104
Saudi Arabia	42.5	10,856	155	Norway	69.9	1,833	12
Russia	46.7	10,752	139	Qatar	46.8	1,806	134
Canada	61.1	5,888	11	Nigeria	37.9	1,641	126
Iran	41.8	5,062	163	Algeria	41.7	1,380	157
Iraq	30.3	4,398	156	Argentina	47.0	1214	80
China	35.4	4,264	150	Libya	NA	1,188	151
United Arab Emirates	51.6	4,006	119	Angola	40.1	1,181	124
Brazil	50.3	3,466	70	Oman	51.3	993	125
Kuwait	44.4	2,719	115	India	27.6	735	110
Mexico	44.2	1,911	94	Indonesia	33.6	613	87

FIGURE 10: EPI, OIL PRODUCTION, AND HUMAN FREEDOM



Natural gas

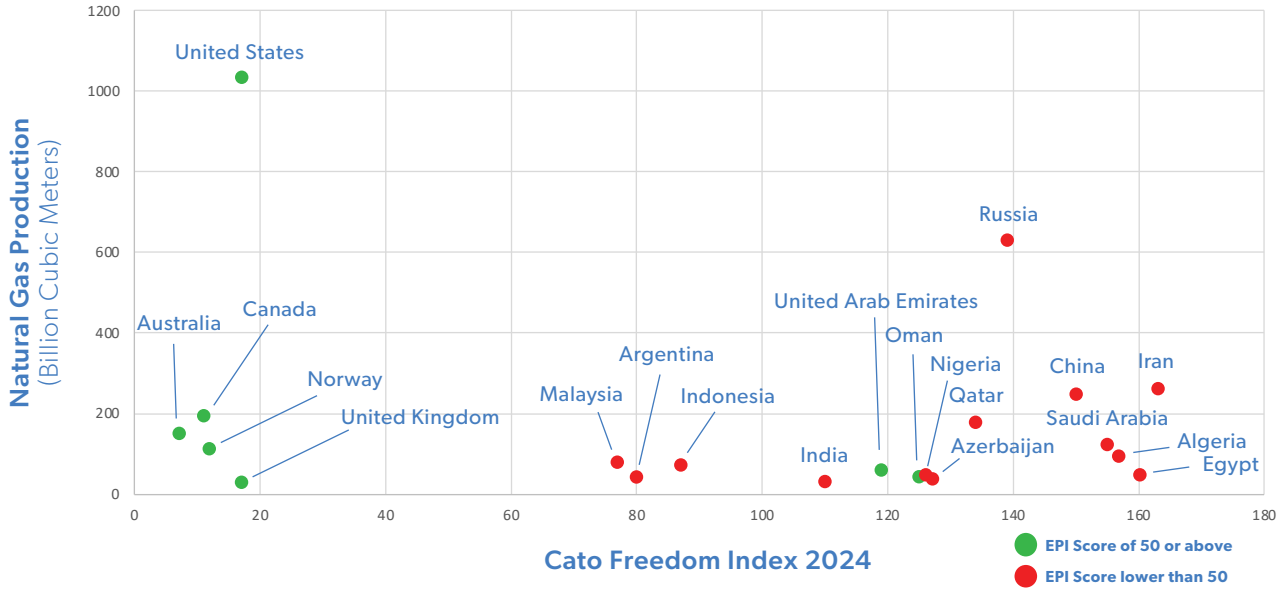
Figure 11 shows the largest natural gas producers and their rank in the Cato Institute's *Human Freedom Index* and their EQI score.

The average rank of the next 19 largest producers of natural gas is 102.95.[11] Russia, the second largest producer of natural gas behind the United States, ranks 139th. Iran, the third largest producer of natural gas, ranks 163rd.

FIGURE 11: EPI, NATURAL GAS PRODUCTION, AND HUMAN FREEDOM INDEX

Country	2024 EPI	Natural Gas Production - Billion Cubic Meters	Cato Freedom Index 2024	Country	2024 EPI	Natural Gas Production - Billion Cubic Meters	Cato Freedom Index 2024
United States	57.2	1033.0	17	Turkmenistan	40.6	73.5	NA
Russia	46.7	629.9	139	Indonesia	33.6	71.4	87
Iran	41.8	262.9	163	United Arab Emirates	51.6	61.4	119
China	35.4	248.4	150	Egypt	43.7	47.5	160
Canada	61.1	194.2	11	Nigeria	37.9	46.8	126
Qatar	46.8	179.5	134	Oman	51.3	45.3	125
Australia	63.1	150.1	7	Argentina	47.0	44.1	80
Saudi Arabia	42.5	121.5	155	Uzbekistan	42.6	42.2	NA
Norway	69.9	113.2	12	Azerbaijan	40.5	37.8	127
Algeria	41.7	94.7	157	India	27.6	32.4	110
Malaysia	41.0	80.4	77	United Kingdom	72.6	30.7	17

FIGURE 12: EPI, NATURAL GAS PRODUCTION, AND HUMAN FREEDOM INDEX



Coal

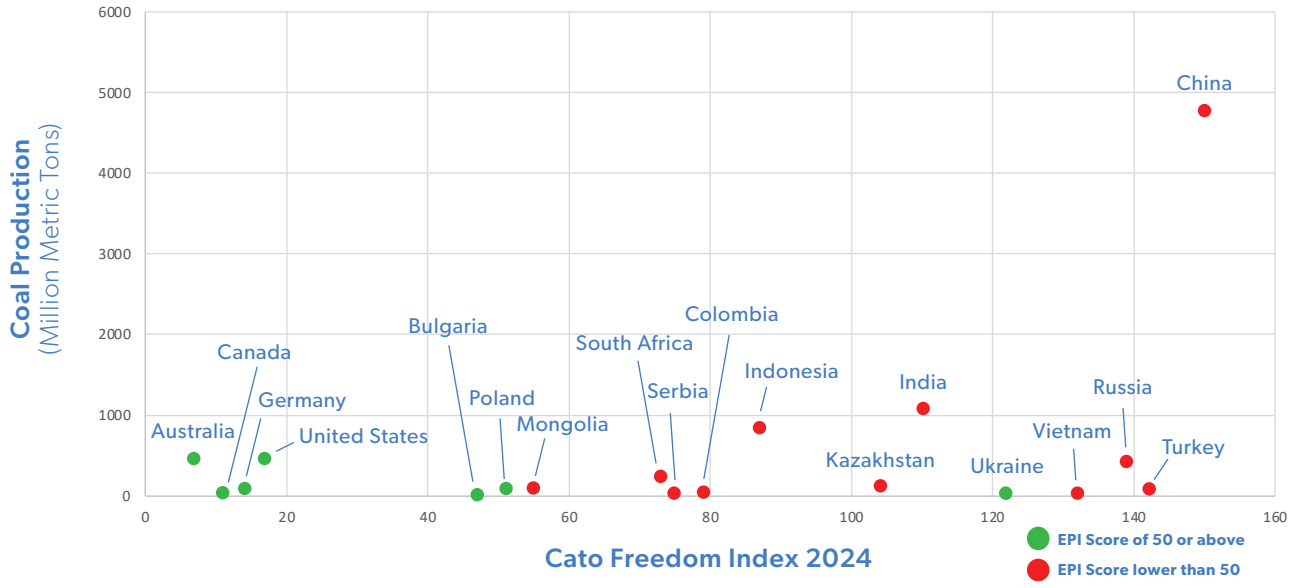
Figure 13 shows the largest coal producers and their rank in the Cato Institute's *Human Freedom Index* and their EQI score. China, India, and Indonesia, the top three coal producers (all ahead of the United States), rank 150th, 110th, and 87th, respectively.

Potentially more concerning than shifting production to countries with lower environmental standards is the risk that limiting U.S. production transfers demand, wealth, and influence to nations with far worse records on human freedom.

FIGURE 13: EPI, COAL PRODUCTION, AND HUMAN FREEDOM

Country	2024 EPI	Coal Production - Billion Cubic Meters	Cato Freedom Index 2024	Country	2024 EPI	Coal Production - Billion Cubic Meters	Cato Freedom Index 2024
China	35.4	4780.0	150	Germany	74.5	91.9	14
India	27.6	1085.1	110	Turkey	37.2	87.0	142
Indonesia	33.6	836.1	87	Poland	64.2	85.2	51
United States	57.2	464.6	17	Colombia	49.7	52.7	79
Australia	63.1	462.9	7	Vietnam	24.6	43.8	132
Russia	46.7	427.2	139	Canada	61.1	42.6	11
South Africa	42.7	235.0	73	Serbia	49.8	31.3	75
Kazakhstan	47.8	112.6	104	Ukraine	54.6	17.4	122
Mongolia	37.2	106.5	55	Bulgaria	56.2	15.1	47

FIGURE 14: EPI, COAL PRODUCTION, AND HUMAN FREEDOM



Institutions Shape Incentives that Drive Energy Development

Although oil and natural gas production on federal lands has increased in recent years, the majority of production today occurs on private lands within the United States. This plays a vital role in driving innovation, efficiency, and positive environmental outcomes.

According to a 2025 Energy Information Administration (EIA) report, in 2024, federal onshore and offshore territory accounted for approximately 25% of U.S. crude oil production (1.7 million barrels per day onshore, and 1.8 million barrels per day offshore out of a total of approximately 13.3 million barrels per day).[12] This implies that roughly 75% of crude oil production occurred on non-federal lands, primarily private and state lands.[13] For natural gas, federal onshore lands produced 4.2 trillion cubic feet (Tcf) and federal offshore produced 0.8 Tcf in 2024, out of a total U.S. production of 37.8 Tcf, equating to about 13% from federal lands and waters.[14] Thus, approximately 87% of natural gas production occurred on non-federal lands, predominantly private and state lands.[15]

The United States is unique as our private mineral rights regime is a distinctive feature of our property law system, particularly in the context of natural resource extraction.[16] In the U.S., mineral rights — the rights to extract subsurface resources such as oil, natural gas, coal, or minerals — are often privately owned, a system rooted in historical land allocation policies dating back to the 19th century. Unlike many countries where the state retains ownership of subsurface resources, the U.S. allows individuals or entities to own mineral rights separately from surface land ownership.

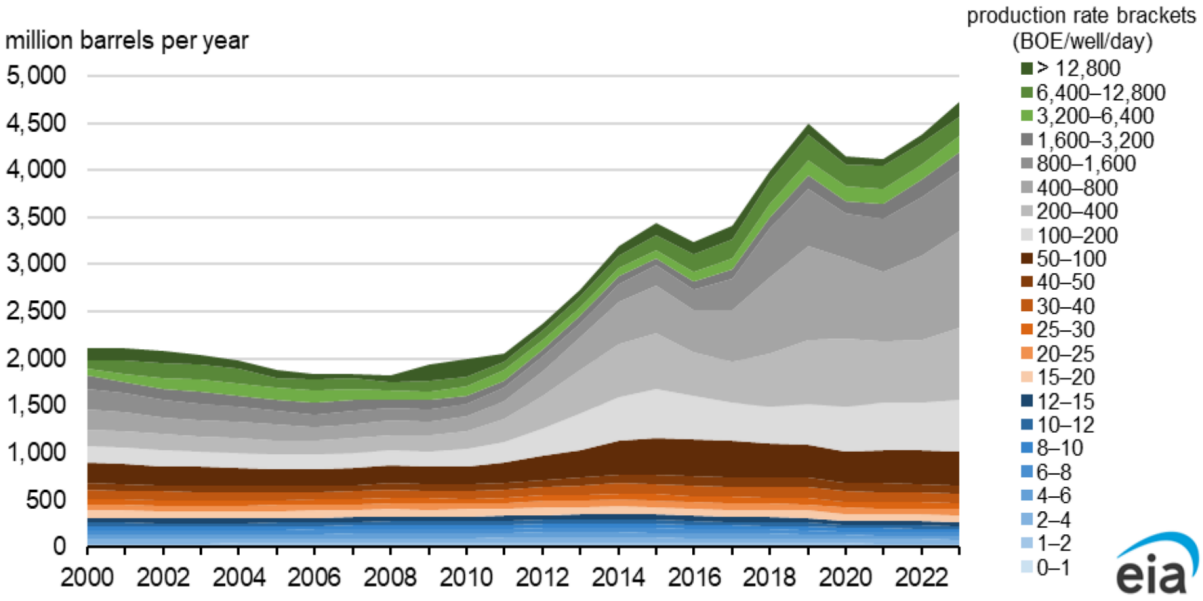
Private mineral rights have been a critical driver of the U.S. energy boom.[17] They incentivized rapid leasing and development, as owners directly benefited from royalties and bonuses. Importantly, they encourage efficient resource extraction, reducing waste and unnecessary environmental disruption.[18]

As a result of the U.S.'s property rights framework, in 2024, U.S. oil production reached 20,135 thousand barrels per day (kb/d), up from 19,433 kb/d in 2023.[19] Production has nearly doubled over the decade, rising from 11,796 kb/d in 2014 to 20,135 kb/d in 2024 — an absolute increase of 8,339 kb/d.[20] Over this period, the U.S. share of global production rose from about 13% to 20.8%, highlighting its shift from a net importer to a major exporter. In 2024, U.S. natural gas production was 1,033.0 billion cubic meters (bcm).[21] Production has increased by 46.6% over the decade, rising from 704.7 bcm in 2014 to 1,033.0 bcm in 2024—an absolute increase of 328.3 bcm.[22] During the same time, the U.S. share of global production increased from approximately 20.5% to 25.0%, transforming the country into a net exporter and enhancing its energy independence.

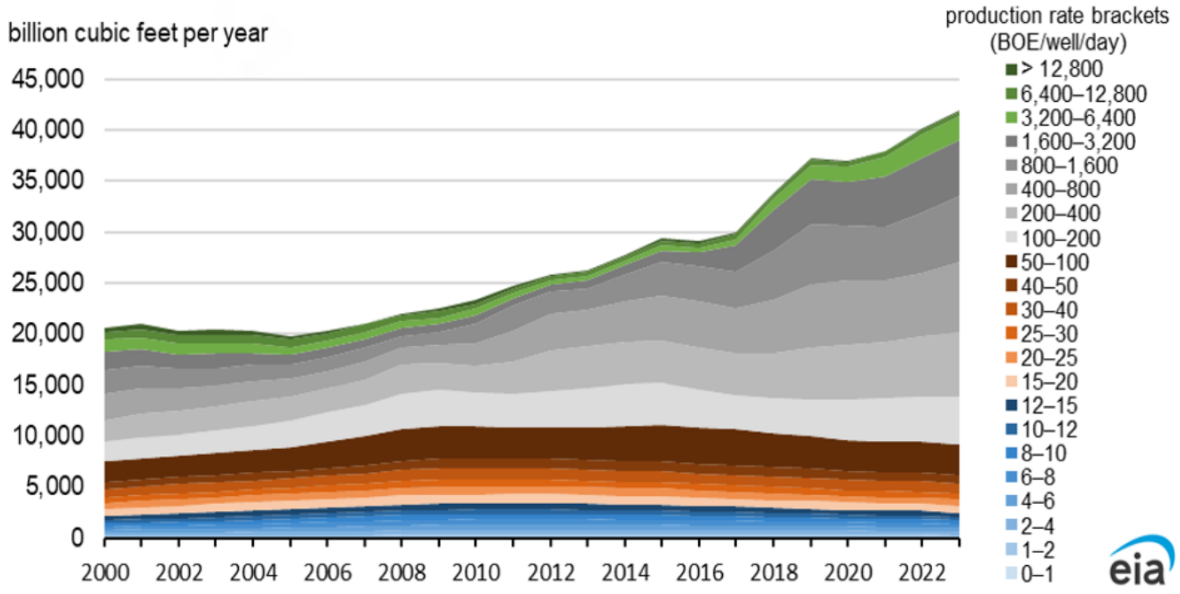
Market incentives drive technological innovation and optimal drilling and extraction practices, minimizing the land and resource footprint of extraction. Oil and natural gas companies are increasingly adopting new technologies such as artificial intelligence, electronic hydraulic fracturing, and automated drilling to enhance efficiency and productivity while relying on fewer rigs.[23]

Over the past 15 years, advances in drilling and completion technology have driven significant growth in U.S. oil and natural gas production. By December 2023, U.S. oil production averaged 13,300 thousand barrels per day and natural gas production averaged 128.8 billion cubic feet per day (Bcf/d), with particularly strong gains in the Permian region.[24] Despite this growth, the total number of producing wells has declined since its 2014 peak of 1,031,086 wells, falling to 918,068 wells by the end of 2023.[25] Technological changes, particularly horizontal drilling, have reshaped well types, with the use of horizontal wells growing from 8% to 21% of the total between 2013 and 2023. The efficiency trends are demonstrated in the figures below.

FIGURE 15: OIL AND NATURAL GAS PRODUCTION FROM U.S. WELLS BY PRODUCTION RATE BRACKETS



Data source: U.S. Energy Information Administration and Enverus
Note: Oil production includes crude oil and lease condensate; BOE=barrels of oil equivalent



Data source: U.S. Energy Information Administration and Enverus
Note: BOE=barrels of oil equivalent

This boom, largely on private lands, underscores the pivotal role of private mineral rights in incentivizing efficient, innovative extraction practices. Market-driven incentives have minimized waste, reduced environmental disruption, and fostered technological progress in energy extraction. As a result, the United States has achieved sustained energy growth, robust economic expansion, and notable environmental improvements.

SECTION 03

ENVIRONMENTAL PROGRESS IN THE U.S.

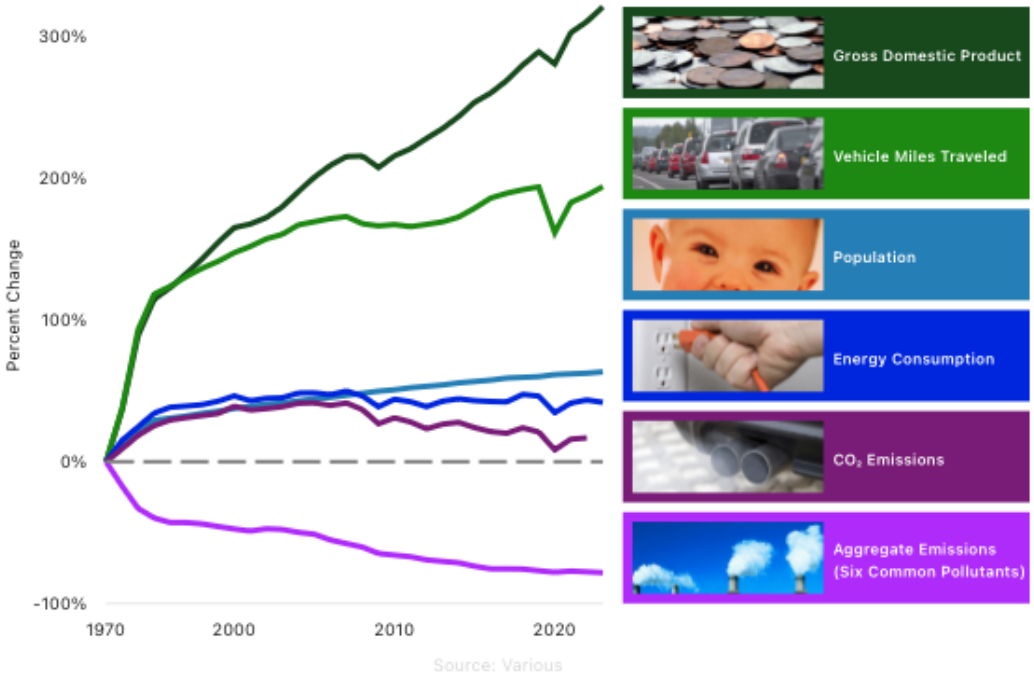
In the U.S., between 1970 and 2023, the combined emissions of the six common criteria pollutants (PM2.5 and PM10, SO2, NOx, VOCs, CO, and Pb) dropped by 78%. This progress occurred while GDP rose 321%, vehicle miles traveled rose 194%, population rose by 63%, and energy consumption rose by 42%.[26] While some attribute this to the EPA's establishment, air quality was improving even before its creation.[27] Steven F. Hayward and Joel M. Schwartz attribute the trend to economic development, the emergence of common-law nuisance lawsuits against polluters, and regulation in lower jurisdictions.[28]

In the U.S., between 1970 and 2023, the combined emissions of the six common criteria pollutants (PM2.5 and PM10, SO2, NOx, VOCs, CO, and Pb) dropped by 78%.

Additionally, since 1990, U.S. air pollutant concentrations have significantly decreased: carbon monoxide (CO) by 79%, lead (Pb) by 87% (since 2010), nitrogen dioxide (NO2) by 62% (annual) and 55% (1-hour), ozone (O3) by 18%, particulate matter (PM10) by 29%, PM2.5 by 37% (annual) and 29% (24-hour) since 2000, and sulfur dioxide (SO2) by 92%.[29]

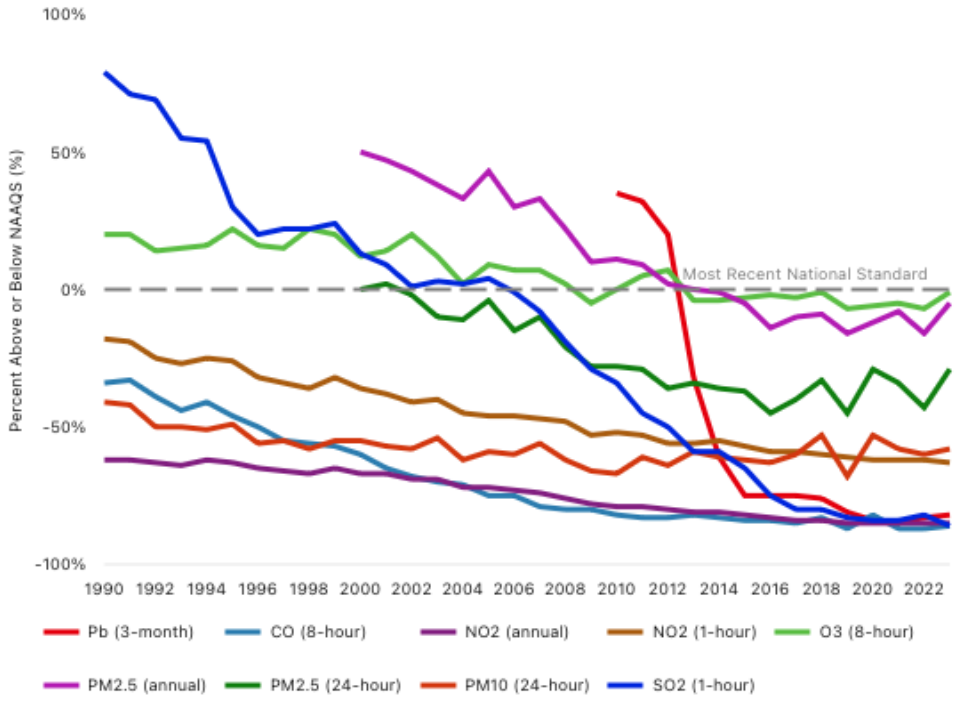
A key factor driving this process is industrial efficiency driven by profit motives. Achieving more with less is integral to profitability, so as firms and industries mature, they improve at maximizing production while minimizing waste.[30] Another factor is human-environmental tolerance and its place in a values hierarchy. The Environmental Kuznets Curve (EKC)

FIGURE 16: COMPARISONS OF GROWTH AREAS AND DECLINING EMISSIONS



Source: Various

FIGURE 17: DECLINING NATIONAL AIR POLLUTANT CONCENTRATION AVERAGES



Source: U.S. EPA Air Quality System

demonstrates that people tolerate environmental degradation early in economic development, but once income meets basic needs — food, clothing, shelter — concerns for environmental quality emerge, initiating restoration efforts.[31] At this point, consumers, with growing wealth, effectively "purchase" cleaner air and more nature preserves.

The Environmental Transition Hypothesis (ETH) mirrors this pattern of rising, peaking, and declining environmental degradation. While the EKC ties this transition to income, the ETH emphasizes technology's role.[32] Abundant data support both the EKC and ETH.[33] These advancements have allowed the global population to surge over the past half-century, while minimizing environmental costs. Innovation has enabled healthier, wealthier lives with reduced impacts on land, water, and air quality compared to earlier generations.

Market-driven incentives have not only minimized waste and environmental disruption but also fostered technological advancements that reduce the ecological footprint of energy development. Concurrently, the correlation between economic freedom and environmental quality, as evidenced by the Cato Institute's Human Freedom Index, highlights how the U.S.'s robust property rights and rule of law encourage responsible resource management. The U.S. demonstrates that energy development and environmental protection can advance hand in hand, setting a global example for resource extraction and environmental quality.

Oil in Venezuela

With proven oil reserves of approximately 303 billion barrels, accounting for 17% of the world's total as of 2024, Venezuela should be one of the wealthiest countries in the world.[34] And yet, decades of political corruption and disastrous economic mismanagement have led Venezuela to the brink of societal collapse. Socialist leadership has led to a corrupt consolidation of power, resulting in a government focused solely on self-preservation at the expense of its own people.

Decades of political corruption and disastrous economic mismanagement have led Venezuela to the brink of societal collapse.

Venezuela relies heavily on oil revenue as its primary source of government funding and has done so without much economic diversification, accounting for 80% of all exports and 17% of GDP.[35] The overreliance on oil revenue was expanded substantially under the presidency of Hugo Chávez (1999-2013), who took advantage of the higher oil prices of the early 2000s to implement a range of socialist policies with the key focus of redistributing wealth and land. Chávez's socialist and authoritarian pursuit was made possible in part due to the decades earlier nationalization of the oil industry in 1976, which saw the creation of the state-owned Petróleos de Venezuela S.A. (PDVSA).[36] Favorable oil prices allowed Chávez to gain initial support with the impoverished; however, his push for power consolidation, especially taking more control of PDVSA, led to the oil strike of 2002-2003, as there was resistance to the amount of authority he was asserting for himself and his political allies. The strike resulted in the dismissal of half of the PDVSA workforce, roughly 19,500 workers, and their replacement with political loyalists, leading to a severe loss of expertise in an already mismanaged and corrupt state-run entity.[37]

At the end of Chávez's presidency, years of socialist programs, mismanagement, and political corruption resulted in a contracted economy, depleted oil reserves, and environmental and debt crises. Between 2000 and 2012, Venezuela's national debt rose from 28% to 58% of GDP.[38] The social program spending that Chávez had undertaken, fueled entirely by present and future oil revenue, led to a temporary lowering of the poverty rate at the expense of long-term financial solvency. By borrowing against future oil revenue, Chávez fell victim to both hubris and what is known as Dutch disease.[39] By becoming over-reliant on one particular sector, all resources, including human capital, were shifted away from other industries, making the entire economy vulnerable to price fluctuations on a single commodity. Furthermore, by failing to diversify the Venezuelan economy or invest oil revenues in long-term assets like a sovereign wealth fund, profits were instead spent on unsustainable social programs, leading people further into poverty, while providing no return on investment.

Instead of altering course in 2013, newly elected President Nicolás Maduro expanded the government's control over the country, placing the people of Venezuela at the mercy of a new authoritarian regime. Consolidating even more authority over PDVSA and printing money to address the debt crisis led to significant inflation, a high unemployment rate, and loss of foreign investment. As a result, PDVSA's oil reserves are at risk of running out by 2034.[40] To counter this, Maduro also began pumping more oil with the nation's aging infrastructure, without regard for the environment or the people taking the risk working in such dangerous conditions.[41]

A key characteristic of state-owned entities is a lack of transparency.[42] In 2016, in the absence of the rule of law, PDVSA stopped providing public information about oil spills. For this reason, information about Venezuela's oil spills generally comes from organizations such as the Venezuelan Observatory of Human Rights Violations, which reported that from 2016 through 2021, there were 199 oil spills.[43] The Observatory of Political Ecology reported that there were at least 86 oil spills in 2022 alone.[44]

Venezuela's nationalization of its oil industry, combined with its centralization of power, created the perfect storm for economic collapse, environmental catastrophe, and widespread human rights violations. These factors also led to the mass exodus of roughly eight million people from the country.[45] This outcome aligns with Venezuela's exceptionally low ranking on Cato's *Human Freedom Index*, where it places at an abysmal 159.[46]

Russian Natural Gas

In theory, Russia operates as a democracy. In practice, however, power is concentrated among the president and the prime minister, and a multi-party system is effectively controlled by the dominant United Russia party, which aligns with President Putin's directives. Since Putin took power in 2000, Russia has now become more akin to an autocracy than a democratic state. Under Putin, the Russian government has severely reduced democratic freedoms and committed numerous human rights violations.

Russia boasts the largest known proved reserves of natural gas in the world at 1,599 trillion cubic feet (Tcf) as of 2023.[47] The majority of Russia's natural gas reserves are located in the West Siberian Super Basin, which accounts for both 90% of its annual production and 78% of its known reserves.[48] Gazprom, Russia's largest state-owned company, controls 70% of all natural gas reserves, which means the industry is effectively nationalized.[49]

When an industry is nationalized, transparency in reporting is always a challenge. Furthermore, with no incentive to be accountable to the Russian people and the need to follow political dogma instead of market demands, Russia's natural gas industry has no reason to conduct effective environmental oversight or ensure that already harsh working conditions are acceptable. For example, in 2021, the International Energy Agency's independent assessment of Russia's emissions was almost three times what Russia had reported.[50]

Dangerous and challenging working conditions and limited workers' rights have plagued Russia for decades. This has only been exacerbated by the war in Ukraine. With Russia's full-scale invasion of Ukraine in 2022, already challenging labor shortages were compounded due to the drafting of thousands of civilians. Therefore, every sector, but especially energy, has been competing with forced military conscription, preventing many employees of state-owned energy companies from leaving the country; a contributing factor to Russia's low ranking of 139 on the Human Freedom Index.[51]

Working conditions in Russia's natural gas industry have consistently been worse than those in other industries because of the resource's importance to the overall economy, leading to a lack of regulatory enforcement. For this reason, complaints by workers, ranging from abysmal living conditions to being fed animal feed, tend to be ignored, despite major companies such as Gazprom providing a corporate ethics complaint hotline.[52] Changes based on complaints are rarely implemented, with many employees too afraid of the repercussions to report wrongdoing. Given that the alternative to harsh working conditions is potential military conscription, many choose to remain silent.

The combination of Russia's enormous natural gas reserves and its authoritarian government has led to a disregard for both workers' rights and environmental integrity. Considering that 30-50% of Russia's federal budget has consistently come from oil and natural gas revenue (with that number being 45% in 2021), and that oil and gas account for approximately 20% of Russia's GDP, it is unlikely that conditions will improve.[53] President Putin and his government, like all other authoritarian regimes, are more concerned with political survival and retaining power than truly serving the Russian people.

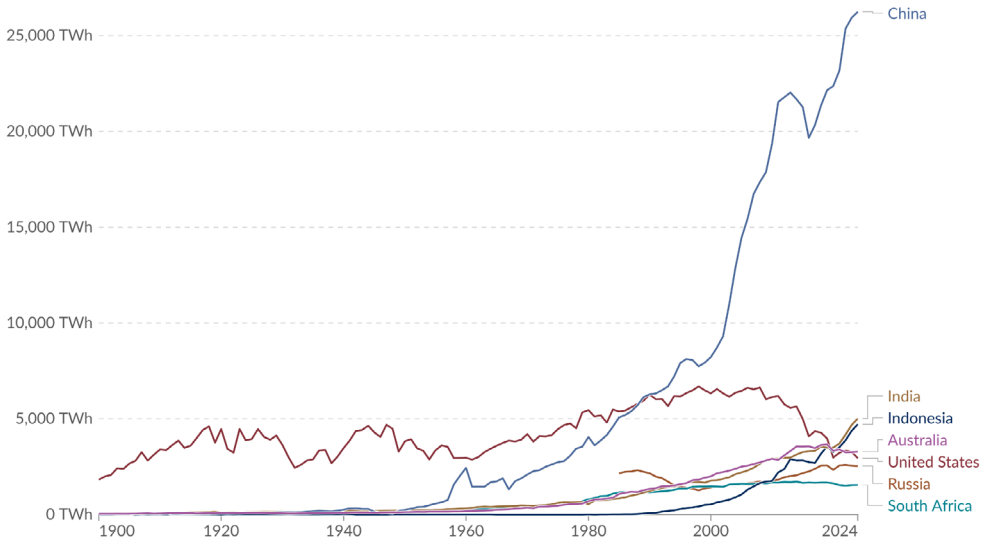
Coal and China

China regularly produces and consumes the most coal in the world. Coal accounts for 62% of all of China's energy consumption, and its growing use comes despite the country's pledge to lower emissions.[54] As of 2021, China holds 14% of the world's proven coal reserves, while Russia holds 15%, Australia 14%, India 11%, and the United States, with the greatest share at an estimated 22%.[55] With such a disparity between the United States and China, two countries with some of the single largest known coal reserves, it is important to note that the U.S. has steadily decreased its coal production, with a peak in 2008, replacing it with a combination of natural gas, solar, and wind for power generation.[56]

In the United States, 37% of the known coal reserves are found in Montana and Wyoming, and 90% of coal's primary market is power production.[57] Given the wealth of coal found in the U.S., and the ability to produce it in a cleaner way and with a far greater record of supporting workers' rights than China, the U.S. is doing the world a disservice by not maximizing coal production. Doing so would provide both lower electricity prices domestically and a cleaner product to the global market.

In 2021, China consumed more than half of the world's

FIGURE 18: COAL PRODUCTION BY COUNTRY (MEASURED IN TERAWATT-HOURS)



Data source: Energy Institute - Statistical Review of World Energy (2025); The Shift Data Portal (2019)
OurWorldinData.org/fossil-fuels | CC BY

1. Watt-hour A watt-hour is the energy delivered by one watt of power for one hour. Since one watt is equivalent to one joule per second, a watt-hour is equivalent to 3600 joules of energy.
Metric prefixes are used for multiples of the unit, usually:
- kilowatt-hours (kWh), or a thousand watt-hours.
- Megawatt-hours (MWh), or a million watt-hours.
- Gigawatt-hours (GWh), or a billion watt-hours.
- Terawatt-hours (TWh), or a trillion watt-hours.

Our World in Data

coal, approximately 54%.[58] Additionally, despite regular pledges to lower emissions and to work toward cleaner coal production and use, China has taken no genuine steps to change its behavior, as they have regularly contributed around 20% of total global CO2 emissions over the past decade.[59] China's coal plant construction peaked in 2024, accounting for 93% of all new coal plant construction globally for that year.[60]

Furthermore, given China's purported push for wind and solar energy, it is ironic that the increased manufacturing of solar technology, in particular, is driven by its massive fleet of coal power plants. This symbiotic relationship highlights the hypocrisy of renewable energy, given that the infrastructure itself cannot be produced at scale without the reliable energy production of conventional fuels, such as coal. China's goal in using solar energy seems to be to provide a cover for its heavy reliance on coal, and to demonstrate to the world that it is more committed to reducing emissions than it truly is. Such action falls directly in line with the need for an authoritative regime to maintain face and appear capable.

Like other autocratic countries, China is plagued by human rights violations, with a particular focus on forced labor by ethnic minorities such as the Uyghurs, subjecting people to severely dangerous working conditions under the threat of political intimidation.[61] Although China has regulations and legislation intended to protect workers, ensure their safety and rights, and promote stewardship of the environment, similar to Russia, these protections and restrictions are often weakly enforced and generally ignored to ensure maximum output.

SECTION 04

HOW ECONOMIC FREEDOM SHAPES ENERGY AND ENVIRONMENTAL SUCCESS

Economic freedom and robust political institutions play a decisive role in shaping how societies manage natural resources, balance environmental quality, and promote sustainable economic growth. In repressive regimes, property rights are often curtailed and state control dominates resource management, creating incentives to prioritize short-term production over long-term sustainability. By contrast, private ownership, particularly of mineral rights in the United States, encourages responsible stewardship, technological innovation, and efficient extraction practices, which minimize waste and reduce environmental disruption.

Economic freedom and robust political institutions play a decisive role in shaping how societies manage natural resources, balance environmental quality, and promote sustainable economic growth.

The Cato Institute's Human Freedom Index illustrates this relationship. Countries in the top quintile of human freedom average an EPI score of 59, while environmental performance generally declines as freedom diminishes. The United States, ranking 17th in human freedom, contrasts sharply with major oil and gas producers like Saudi Arabia, which ranks 155th, and Russia, which ranks 139th, as well as coal producers such as China, at 150th, and India, at 110th. Limiting

U.S. energy production risks transferring wealth, influence, and environmental burdens to countries with weaker governance, poorer human rights records, and lax environmental standards.

In the United States, most oil and natural gas production occurs on private and state lands, underscoring the pivotal role of private mineral rights in fostering efficiency, innovation, and environmental improvements. Market incentives, combined with technological advances in drilling and extraction, have driven U.S. energy production to record levels while simultaneously reducing air pollutant emissions. These trends demonstrate that economic growth, energy development, and environmental quality can advance together when institutions support property rights, the rule of law, and market accountability.

By contrast, countries such as Venezuela, Russia, and China illustrate the consequences of centralization and authoritarian control. Decades of mismanagement, corruption, and resource nationalization have led to economic collapse, environmental degradation, and human rights abuses, despite vast energy reserves. Venezuela's nationalized oil sector, Russia's state-controlled natural gas industry, and China's energy system exemplify how political structure shapes incentives, often with severe environmental and social costs.

Ultimately, restricting energy production in the U.S. is self-defeating. It shifts production and associated environmental impacts to nations with lower environmental standards and weaker human freedoms while diminishing global energy security and economic resilience. The U.S. experience demonstrates that well-defined property rights, the rule of law, and market-driven innovation can simultaneously enable high levels of energy production, economic prosperity, and environmental stewardship. In short, the United States is a global model for energy development and resource management.

Ultimately, restricting energy production in the U.S. is self-defeating. It shifts production and associated environmental impacts to nations with lower environmental standards and weaker human freedoms while diminishing global energy security and economic resilience.

SECTION 05

CALIFORNIA: A CASE STUDY IN ENERGY RESTRICTION

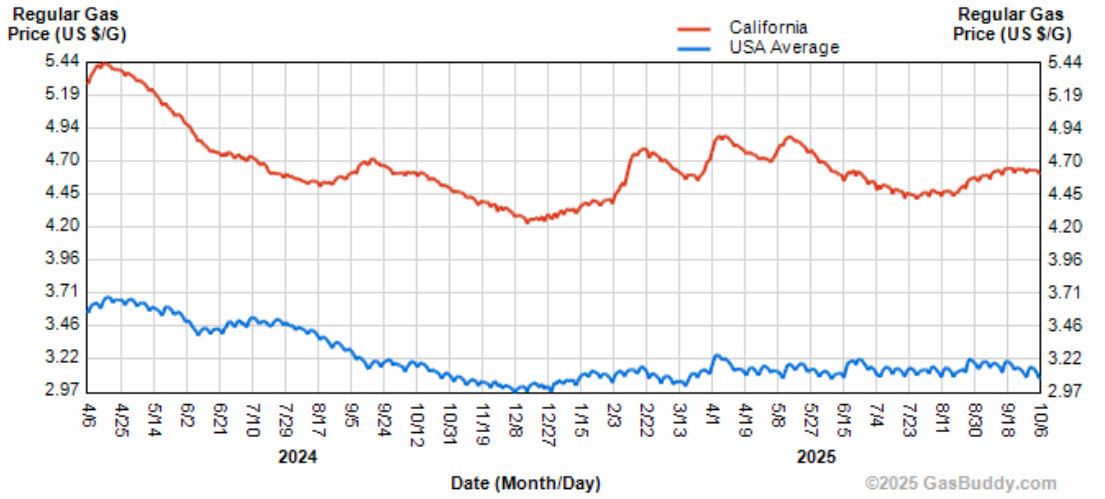
In 2024, the State of California was ranked eighth in the United States for crude oil production and third in refining capacity. Yet, it faces some of the highest gas and oil production costs due to restrictive energy policies, including strict emissions standards, high taxes, unique fuel specifications, and permitting policies that limit pipeline connectivity. California's geographical constraints, combined with these regulatory burdens, have turned it into an "energy island," reliant on imports and existing in-state production.[62]

The state's proven oil reserves are estimated at 1.716 billion barrels, with potential reserves as high as 30 billion barrels, but a hostile regulatory environment discourages exploration. Kern County, particularly the San Joaquin Valley, dominates onshore production, while offshore drilling is limited due to regulations. The state currently imports 63.5% of its crude oil from overseas, with 23.3% from in-state sources, and 13.3% coming from Alaska.

California's geographical constraints, combined with these regulatory burdens, have turned it into an "energy island," reliant on imports and existing in-state production.

Currently, California's 13 refineries produce 1.6 million barrels daily. However, two refineries in the state - the Phillips 66 Wilmington refinery and Valero's Benicia facility, are scheduled to close within the next year. These closures stem directly from new refinery mandates enacted by Governor Gavin Newsom in 2024 and will reduce refining capacity by up to 20%, further cementing California as an "energy island."[63]

FIGURE 19: CALIFORNIA AND U.S. 18-MONTH AVERAGE RETAIL GASOLINE PRICE



In May 2025, several refineries in California experienced outages, offering a glimpse into California's energy future. California's fuel imports surged to a four-year high of 279,000 barrels per day (bpd), the highest since June 2021, as refiners relied on traditional Asian suppliers and explored unconventional sources to address shortages in the nation's second-largest oil-consuming state.[64] Nearly 70% of May's imports, or 187,000 bpd, came from South Korea and other Asian exporters. These countries are historically key suppliers to California and other West Coast states, which, due to policy decisions, are cut off from major U.S. Gulf Coast refining hubs. California's restrictive policies, while aimed at environmental protection, inadvertently shift production to countries with lower environmental performance. South Korea is ranked 58th on Yale's Environmental Performance Index with an EPI score of 50.6, compared to the United States, which is ranked 35th with an EPI score of 57.2.

The temporary refinery closures in California underscored how transportation policies, particularly the Jones Act, have also limited energy development. In May, California's fuel imports from the Bahamas, an unusual source for West Coast refiners, hit a record 38,000 barrels per day (bpd), up from 29,000 bpd in March, per Kpler data. Before this year's outages, Caribbean imports averaged only 6,000 bpd. The Jones Act restricts cargo movement between U.S. ports to domestically built and crewed ships, with only 55 such petroleum tankers available as of early 2024.[65] Lacking refineries, the Bahamas serve as a pass-through and export fuel and blending components originally shipped from the U.S. Gulf Coast, bypassing Jones Act restrictions to supply places like California and the Northeast when pipeline deliveries are insufficient.[66]

California's restrictive regulations create a hostile environment for energy development. These policies discourage exploration of the state's substantial oil reserves and limit production efficiency. This regulatory burden stifles market-driven innovation and efficiency, leading to higher production costs and reduced domestic output. As a result, the average retail price for gasoline in California is $4.62 per gallon compared to the national average, which is $3.08 per gallon.[67]

Restrictive environmental policies, taxes, and regulations create a paradox: a state rich in natural resources is forced to import nearly two-thirds of its crude oil from abroad, much of it from nations with lower environmental standards. Policies meant to protect the environment have instead offshored emissions and weakened California's energy security. The looming closure of two major refineries will further constrain in-state capacity, deepen reliance on overseas suppliers, and increase exposure to global market volatility. California's reliance on imports from countries like South Korea and the Bahamas underscores how regulation and the Jones Act distort supply chains, forcing refiners to seek costly and inefficient alternatives. These policies collectively raise prices, limit innovation, and reduce resilience during supply disruptions. Ultimately, California demonstrates that restricting domestic energy production does not eliminate environmental risk; it merely transfers it elsewhere.

Restrictive environmental policies, taxes, and regulations create a paradox: a state rich in natural resources is forced to import nearly two-thirds of its crude oil from abroad, much of it from nations with lower environmental standards.

CONCLUSION

IER's *2026 Environmental Quality Index* demonstrates that economic freedom and environmental quality are not opposing goals, but mutually reinforcing ones. Nations that embrace market-driven growth, secure property rights, and limited government intervention consistently achieve higher environmental performance and enhance human freedom. The United States exemplifies this relationship. As the world's largest producer of oil and natural gas, it maintains environmental standards that far exceed those of other major energy-producing nations — often by 20% or more on key performance metrics. This success stems not from top-down mandates, but from institutions that align economic incentives with environmental stewardship.

Restricting U.S. energy production in pursuit of "net-zero" targets does not eliminate global emissions; it merely transfers production, wealth, and influence to nations with weaker environmental protections and lower human freedom. Countries such as China, Russia, and Venezuela demonstrate the dangers of centralized control: economic mismanagement, environmental neglect, and repression of human rights. Conversely, the U.S. model, grounded in private mineral ownership, competitive markets, and technological innovation, has led to both unprecedented energy output and steady environmental improvement.

Restricting U.S. energy production in pursuit of "net-zero" targets does not eliminate global emissions; it merely transfers production, wealth, and influence to nations with weaker environmental protections and lower human freedom.

This report should not be used to justify trade restrictions, as such measures would undermine the economic freedom and market incentives that drive both environmental stewardship and energy production and innovation.[68] Imposing trade barriers on other countries invites retaliatory actions that will shift production to nations with lower environmental standards and weaker human rights protections, exacerbating global environmental degradation. Instead, promoting open markets and robust property rights, as exemplified by the U.S., fosters efficient resource use and technological advancements that align economic growth with environmental progress.[69]

Over the past half-century, the U.S. has cut air pollution by more than three-quarters even as its economy has more than tripled in size. This decoupling of growth from pollution proves that prosperity enables progress. Market incentives have driven technological efficiency, allowing producers to do more with less, while citizens, freed from material scarcity, demand and can afford a cleaner environment. The Environmental Kuznets Curve and the Environmental Transition Hypothesis both capture this reality: economic development and innovation are the foundation of environmental recovery.

California's energy policies illustrate the opposite dynamic. By imposing restrictive regulations that discourage domestic production, the state has increased dependence on imported fuels from nations with lower environmental standards. This approach raises costs, exports emissions, and undermines the very environmental goals it seeks to achieve.

The path to a cleaner, more sustainable future lies not in limiting growth, but in expanding the freedom and prosperity that enable true environmental stewardship.

The evidence is clear: prosperity, freedom, and environmental progress go hand in hand. Policies that constrain energy production in high-performing, free economies shift global production to less efficient, less free, and more polluting regimes. To improve global environmental quality, nations should promote economic freedom, strengthen property rights, and harness market incentives to drive innovation. The path to a cleaner, more sustainable future lies not in limiting growth, but in expanding the freedom and prosperity that enable true environmental stewardship.

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