2023

Free Economies *are* Clean Economies

A Correlation of Economic Freedom and Environmental Performance

by Nick Loris and Jeff Luse

CONSERVATIVE
COALITION *for* CLIMATE
SOLUTIONS

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ABUNDANT ENERGY FROM FREE MARKETS

by Chris Wright,
Chief Executive Officer, Liberty Energy

There are two broad approaches to problem solving: top down, or from the bottom up. Top-down approaches include presidential edicts, bureaucratic orders and government intervention. Bottom-up solutions include believing in people, individual empowerment and free market approaches.

With that in mind, I see three significant long-term, global challenges facing humankind:

1. Energy poverty.

2. Lack of a secure supply of reliable, affordable, and clean energy.

3. Climate change.

Notice that all of these revolve around energy: how to generate it, how to deliver it, how to consume it, and what the effects of consuming it will be. By keeping these challenges in mind, we can decide what goals to set, and we can see the danger of setting the wrong goals.

For example, in the year 2023, we are seeing major threats to energy security, reliability, and affordability. This is not due to any shortage of available resources. It is due to years of underinvestment in hydrocarbons and related infrastructure, which is happening because policymakers, operating from the top down, are setting the wrong goals. They are focused on naive political and regulatory pressures as well as a misguided attempt to get to zero carbon emissions without considering the implications of the adverse effects on human prosperity and upward mobility. They are ignoring inevitable tradeoffs. They are, in short, trying to pick winners and losers where there will be many more losers than winners if policies trap people in energy poverty.

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But energy markets are impossible to manage from Washington. Nobody knows when there will be a cold snap, a food shortage, or an outbreak of war in Europe or the Middle East. Any of these events can send energy markets soaring or plunging. Those markets mostly operate from the bottom up. They are the result of millions of people making billions of decisions. Those markets actually work and can respond more quickly to price signals when they are not constrained by government dictate. Market prices reflect current supply and demand dynamics and encourage investment in valuable products. That creates a virtuous cycle delivering more of what we need and less of what consumers no longer value. Market competition drives down prices.

Another problem is that those who want to guide markets are all too eager to underinvest in hydrocarbons, because they say they are concerned about climate change. Such heavy-handed, top-down intervention ignores the importance of reliable energy for everyday life and the fact that higher energy prices disproportionately hurt poor people. Even in wealthy nations, rising energy prices pose significant economic and health threats to lower-income people. Living in poverty is exhausting and we should strive to reduce this condition, not accept it as collateral damage from climate policies.

Things are even worse in poor nations. While media in the wealthy West warn of dramatic threats to human health today from climate change, the World Health Organization estimates that some 3 million people die each year from energy poverty. That is a conservative estimate, as it only considers impacts from a lack of clean cooking fuels which forces billions to suffer copious pollution from burning wood and dung indoors for cooking.

It doesn't need to be this way.

The goal at my company, Liberty Energy, is to bring modern energy to the one-third of humanity that still lacks access, and to help energize the world with a secure supply of affordable, reliable, clean energy. That will be "ESG" done right. When we do that, we can end global poverty, which should be our top 2050 goal.

Ending poverty will require using more hydrocarbons, not fewer. So it is important to note that hydrocarbons, like everything else, have downsides. They deliver air pollution and influence climate change. But their upsides are even larger. They deliver longer, more opportunity-rich lives, preserve forests, reduce the need for cropland, and can be used to provide clean water and basic medical care. Pollution control technologies

can reduce the environmental downsides while preserving the enormous upsides.

Simply put, there is no such thing as "clean" energy or "dirty" energy. All energy sources have positive and negative impacts on humans and the environment. Evaluating the tradeoffs in energy systems requires thoughtful analysis in the context of local conditions, values, and needs. It also requires the application of free markets: allow people to make decisions about their own energy future without subsidizing or constraining one form of energy over another.

The fact is that simply having access to energy is the greenest policy possible. People in Haiti depend on wood for fuel, for example, and this leads to significant deforestation and higher GHG emissions. Meanwhile, the Dominican Republic, its wealthier neighbor with modern energy sources, is covered in a healthy rainforest.

Liberty is working to deliver more clean-burning propane by launching the Bettering Human Lives Foundation, which will support entrepreneurs in expediting availability of clean cooking fuel (propane) to the over 2 billion people who lack it today. Those aspiring to cook with propane are currently burning wood, charcoal, dung, and agricultural waste. Replacing those fuel sources can save millions of lives and free countless women from the drudgery and danger of traditional biomass fuels.

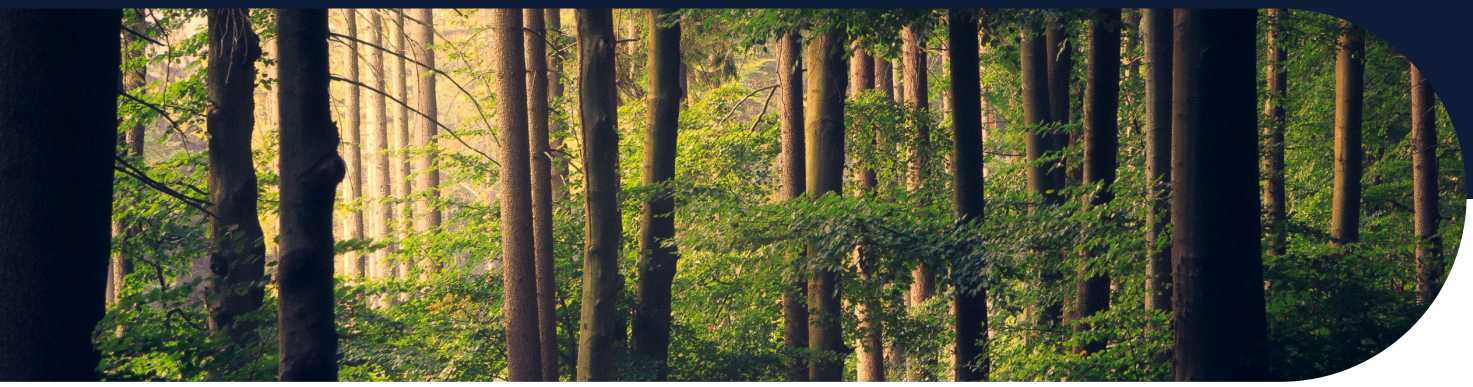
Wealthy nations have pipeline infrastructure that delivers natural gas (methane) to your stove, home heater, clothes dryer, etc. Lower income countries lack this infrastructure, however propane can be a substitute as it can be widely distributed without pipelines. We need more propane, now and in the near future, to save lives and improve human outcomes. Fortunately, Liberty and our colleagues in the shale industry are delivering surging U.S. propane production available to better human lives.

It is not just propane, of course. We need more of every kind of energy to be delivered cleaner and cleaner with the help of innovation. We need more natural gas, nuclear, geothermal, solar, and yes, even coal. Everyone's goal is to reduce energy poverty and reduce emissions in a way that better understands the tradeoffs people around the world face.

Utilizing more energy sources encourages bottom-up innovation. It can eventually deliver everything from propane stoves and small solar arrays for cell phones to next-generation hydropower projects. It allows different communities to employ the right tools for them, like using solar in sunny areas, geothermal where quality resources exist, nuclear in remote locations, and hydro along available streams. There is simply no one size fits all solution.

By preserving and improving millions of lives, new sources of energy and greater use of existing sources such as hydrocarbons can lift people out of poverty, allowing them to go to work or school and earn a better living. All of this unleashes human potential. This is how we can drive human progress to the next level and begin solving problems like climate change. Not by giving things up, but by leveling people up. This will come from markets, not mandates.

Our descendants can live in a richer world, a world free of dire human poverty. They can do so if we allow innovators and entrepreneurs to find cost-effective ways to clean up the environment while energizing the world. Human liberty, bottom-up social organization, and abundant, affordable energy enabled the modern world. The same forces can deliver a brighter future for all.



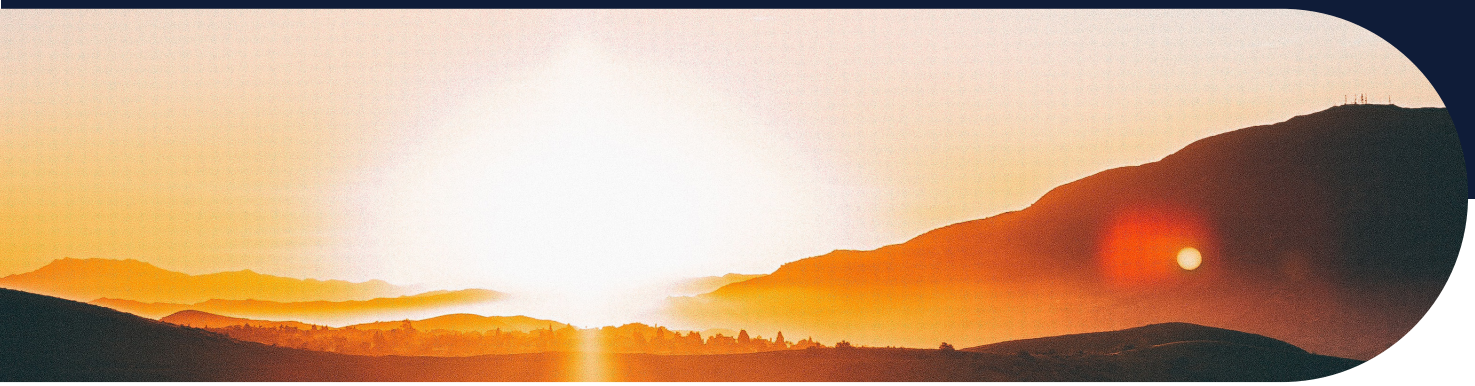
FREE ECONOMIES ARE CLEAN ECONOMIES

Freedom requires individuals to be free to use their own resources in their own way, modern society requires cooperation among a large number of people. The question is, how can you have cooperation without coercion? If you have a central direction you inevitably have coercion. The only way that has ever been discovered to have a lot of people cooperate together voluntarily is through the free market.

Milton Friedman, PBS, October 1, 2000[1]

When shopping at your local grocery store, it is easy to take for granted the many steps it took for the bananas to make their way from Guatemala to your cart. Given the land, people, technology, and transportation involved, it is a marvel that a shopper can purchase a pound of bananas in the United States for less than 75 cents.[2] Through cooperation and voluntary exchange, a system of free enterprise with strong accountable governance empowers people and delivers innumerable benefits every day.

The belief in free, open societies is at its core a belief in people to solve the myriad of challenges that exist in the world today. Whether it is delivering more reliable electricity to homes, providing more access to food and health care, or addressing the world's most complex environmental challenges, harnessing the power of human ingenuity will result in higher levels of economic prosperity and environmental progress. Commitments to individual freedom and economic liberty are instrumental in making the world a cleaner, healthier place to live.



THE RELATIONSHIP BETWEEN ECONOMIC FREEDOM AND ENVIRONMENTAL PERFORMANCE

For nearly three decades, the Washington D.C.-based Heritage Foundation has published an Index of Economic Freedom. The Index measures economic freedom by scoring each country in the following categories.

1. **Rule of law:** property rights, judicial effectiveness, and government integrity;
2. **Government size:** fiscal health, government spending and tax burden;
3. **Regulatory efficiency:** business freedom, labor freedom, and monetary freedom; and
4. **Open markets:** trade freedom, investment freedom, and financial freedom.

Heritage compiles publicly available data from sources such as the African Development Bank, the Asian Development Bank, the European Commission, the Economist Intelligence Unit, the International Monetary Fund, the World Bank, various U.S. government agencies, Oxford University's World Economic Outlook, and the World Economic Forum.[3]

Countries earn aggregate scores and fall into one of five categories:

1. Free (scores of 80 to 100)
2. Mostly Free (70 to 80)
3. Moderately Free (60 to 70)
4. Mostly Unfree (50 to 60)
5. Repressed (50 and below).

In the 2023 Index, only four countries (Singapore, Switzerland, Ireland and Taiwan) received the most elite designation of "Free" nations[4] while 23 others fall into the "Mostly Free" category, including the United States. Another 56 countries are "Moderately Free." The most fleeting connections to economic freedom are found in the 65 "Mostly Unfree" countries and the 28 "Repressed" countries.

The principles that make a country economically free are also critical to a cleaner environment. One of the most comprehensive measurements of a country's environmental performance is Yale University's Environmental Performance Index (EPI). Produced every other year, the EPI similarly scores a country on a 0-100 scale and includes 180 countries in its 2022 report.[5]

Figure 1.

ENVIRONMENTAL PERFORMANCE AND ECONOMIC FREEDOM

There is a strong correlation (0.61) between a country's EPI and IEF index scores.

The EPI gives a country a score based on 40 environmental indicators broken down into eleven issue categories. These fall into three broader categories consisting of:

1. Climate change: climate change mitigation;
2. Environmental health: air quality, sanitation & drinking water, heavy metals, and waste management;
3. Ecosystem vitality: biodiversity & habitat, ecosystem services, fisheries, water resources, acid rain, and agriculture.

The report's technical appendix details how the authors weigh each of the eleven issue categories and how the authors weigh each of the 40 environmental indicators.[6]

When correlating the Index of Economic Freedom and the Environmental Performance Index, one finds a strong, positive relationship between economically free economies and clean economies.

Using these two indices, we can explore the importance of economic freedom on environmental performance. When correlating the Index of Economic Freedom and the Environmental Performance Index, one finds a strong, positive relationship between economically free economies and clean economies.[7]

Yale's report emphasizes:

> *Considering the strong association between EPI and Index of Economic Freedom (IEF) scores, the 2022 EPI drivers analysis suggests that democratically-elected governments and free markets are best positioned to respond to environmental challenges and adopt policy preferences that drive countries toward a more sustainable future.*

Free economies are clean economies for many reasons. Well-defined and legally protected property rights incentivize environmental stewardship. Free, competitive markets empower producers to meet the needs of consumers, including consumer demand for environmentally friendly services and products. Open markets are conduits for investment, innovation, and technological advancement, which generates significant economic and environmental efficiencies. Indeed, freer economies are wealthier, providing more private and public resources for environmental protection.

MORE PROSPERITY, MORE ENVIRONMENTAL PROGRESS

A primary explanation of why economic freedom has a positive correlation with other important human and societal quality metrics is because economically free countries have higher levels of economic growth and more investment. People are wealthier and poverty rates are lower.[8]

Higher levels of income are imperative to better environmental outcomes. After higher priorities like food, water and shelter are met, greater wealth provides more resources to dedicate to environmental protection. Richer countries have more funds to invest in public services such as sanitation, garbage collection, and pollution abatement. Through policies, accumulation of knowledge and technological progress, public and private sectors reduce unwanted environmental byproducts.

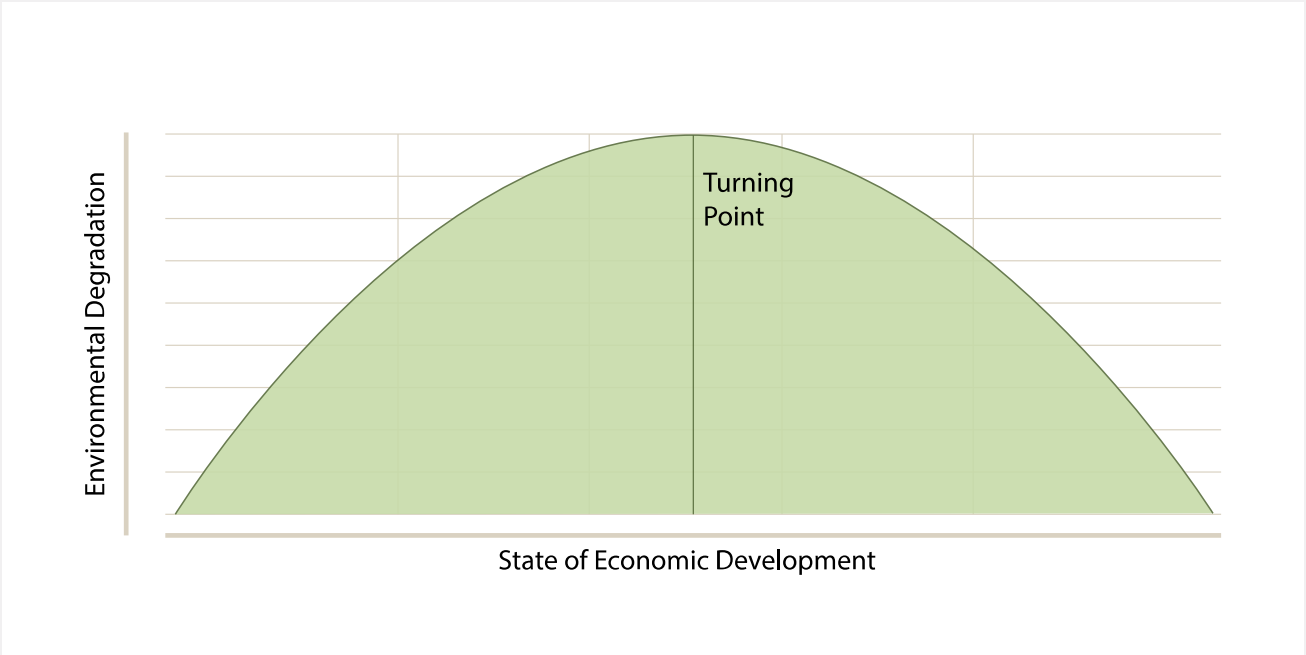
As Yale's report emphasizes, "wealth, which enables investments in environmental protection, leads to higher EPI scores by allowing countries to upgrade environment-related infrastructure and adopt better pollution-control technologies."[9] The report goes on to say that "a consistent finding across Environmental Performance Index reports and other environmental analyses is that wealthy democracies rise to the top of rankings."[10]

The visual depiction of wealth's positive impact on the environment is the environmental Kuznets curve (EKC).[11] The EKC is an inverted-U relationship between both pollution and economic development where growth from industrialization initially results in higher levels of pollution. Over time, however, people spend their incomes on cleaning up the environment and can more easily afford the compliance costs of environmental policies.

Figure 2.

THE ENVIRONMENTAL KUZNETS CURVE

The environmental Kuznets curve (EKC) is a hypothesized relationship between various indicators of environmental degradation and per capita income.



Greater wealth also spurs investment in cleaner, more efficient processes as well as products. A cousin of the EKC, called the environmental transition curve, emphasizes the role of innovation and technology in bending pollution curves backward.[12] In effect, technological progress more quickly offsets the higher emissions from economic growth, resulting in cleaner, stronger economies. These investments will help turn green premiums into economic advantages and will help developing countries bend pollution curves back faster than it historically took more developed countries.

Peer reviewed literature has demonstrated the EKC exists for several ecological variables such as waste, waste emissions, sulfur dioxide and suspended particulate matter.[13] Other literature has found insufficient evidence of an EKC for certain environmental indicators.[14] The moment when the inverted U in the Kuznets curve starts bending downward depends on many factors and does not uniformly apply to all emissions or to all countries.

ECONOMIC FREEDOM BREEDS INNOVATION

Every day, people around the world innovate to make the world a better place. Whether it be breakthroughs in clean power generation, a new vaccine to combat illness, or artificial intelligence to improve business operations, technological advancements provide countless benefits to society and consumers. Whether those ideas start in someone's garage or in a multi-billion-dollar research facility, the policy conditions that protect and enable an idea to flourish in the market are essential to the process. Economically free countries set the stage for innovators to innovate. Business freedom, property rights, and government integrity drive innovation, research and development, and technological breakthroughs. Innovation leads to cleaner sources of energy, more efficient modes of transportation, and more cost-effective emissions reductions.[15] These benefits in turn lead to higher levels of prosperity, fewer pollution related deaths, and more efficient and sustainable land use and management.

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In comparing the Index of Economic Freedom with the World Intellectual Property Organization (WIPO)'s Global Innovation Index (GII),[16] one finds a strong, positive correlation (0.757). Furthermore, a country's GII score has a strong, positive relationship with Yale's Environmental Performance Index (0.741).

The strong and positive relationship between these two indices makes sense. The policies that make a country economically free are also the ones that encourage entrepreneurial activity.

Figure 3.

INNOVATION AND ECONOMIC FREEDOM

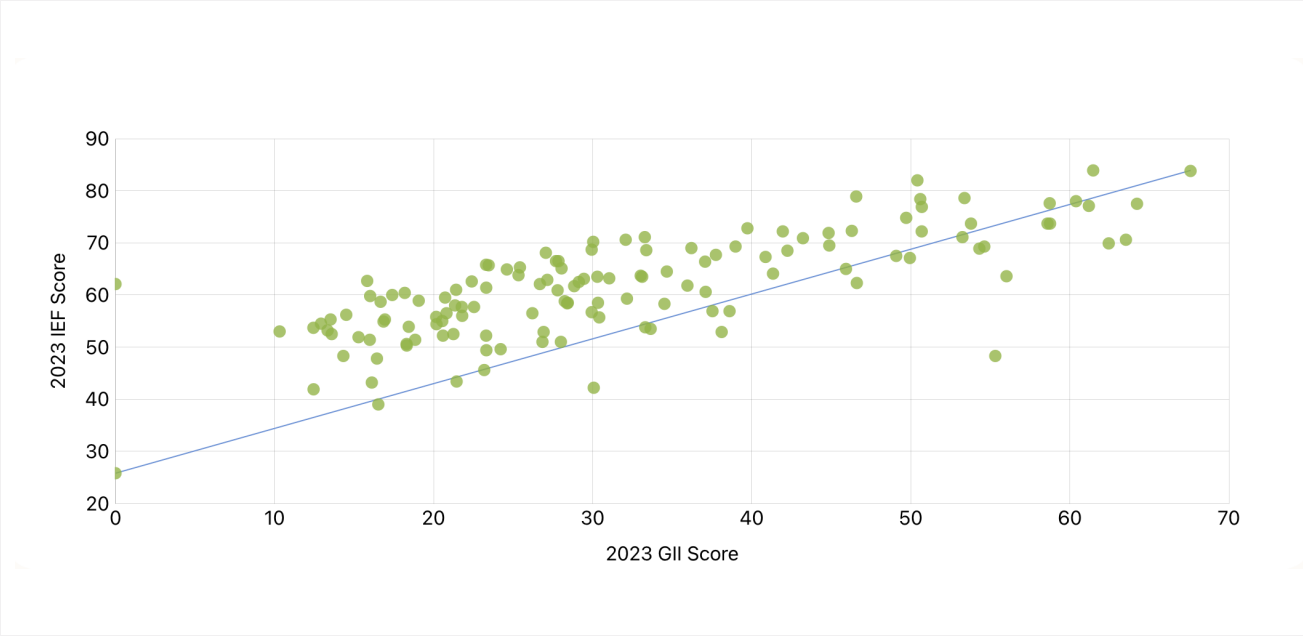
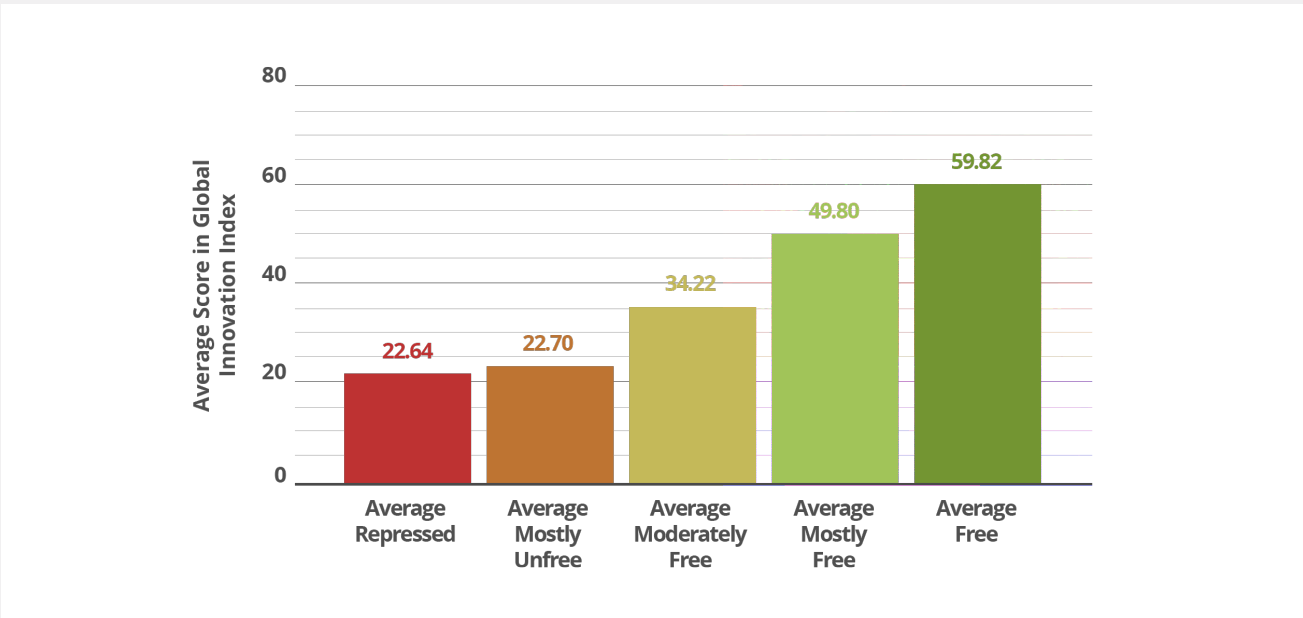


Figure 4.

INNOVATION BY ECONOMIC FREEDOM SCORE



Intellectual property rights,[17] are critical for private sector innovation and breakthroughs in research and development. Intellectual property rights create opportunities for developers to protect their investment in emerging technologies, gain a competitive advantage, and generate revenue from charging for their use of intellectual property. This revenue can then be used to fund future research and investments, creating a positive feedback loop for innovation.[18] *The Journal of Advanced Pharmaceutical Technology & Research* summarizes the importance of intellectual property rights (IPR):

The policies that make a country economically free are also the ones that encourage entrepreneurial activity.

> *There has been a quantum jump in research and development (R&D) costs with an associated jump in investments required for putting a new technology in the market place. The stakes of the developers of technology have become very high, and hence, the need to protect the knowledge from unlawful use has become expedient, at least for a period, that would ensure recovery of the R&D and other associated costs and adequate profits for continuous investments in R&D...Thus IPR, in this way aids the economic development of a country by promoting healthy competition and encouraging industrial development and economic growth.*[19]

Digging deeper into the relationship between R&D and economic freedom, the IEF's Government Integrity (0.762) and Property Rights (0.732) subindices show a strong, positive relationship to the GII's R&D measurement. Further, a country's per capita GDP has a 0.727 correlation coefficient to its R&D score.

When countries are freer and wealthier, businesses have more resources to fund new technologies, cutting edge research, and to invest more in people through education and scientific institutions. Empirical measurements have estimated that a "one percent change in research and development expenditure will increase GDP per capita by 5 percent."[20] Encouragingly, in 2022, private sector research and development expenditures topped $1 trillion for the first time ever.[21]

Conversely, weak protections for a person's or institution's intellectual property discourage research and development activities. Why invest money and resources if the product or process could be easily stolen or replicated? Weak private property protections cause underinvestment in R&D because "firms do not appropriate all of the returns to innovation, causing the social returns to R&D to be substantially higher than the private returns."[22] In some instances, higher social returns may be welcome, but a system with weak property rights that disincentivizes R&D could ultimately lead to lower public and private returns.

Open markets and government integrity are important to a country's knowledge and technology outputs, with correlations of 0.743 and 0.753, respectively.[23] Business freedom is also a central driver for companies to produce and export technology, ideas, and research. They can expand their customer base and attract the best talent. Efficient and open business operations allow markets and industries to invest in cutting edge software, file patents for emerging technologies, and improve high-tech manufacturing.

Restricting free-flowing commerce, however, drives up the cost to enter the market, shrinking competition, and entrenching leading businesses in industry. Furthermore, while public investment in innovation incubators is beneficial and can generate significant positive economic spillovers, overzealous government spending can stymie innovation. Federal expenditures on research and development, for instance, can reach deprecating gains and crowd out private investment in the space.[24] It can also result in significant opportunity costs where

politicians allocate taxpayer dollars to their preferred interests rather than what may be a necessary, effective, or legitimate function of the federal government. Cronyism and preferential treatment between agencies and private contractors, or poor oversight on spending can lead to fraud, mismanagement, and abuse. This not only stalls economic progress but also erodes public confidence in institutions and misallocates precious resources that could be spent more productively elsewhere in the economy.

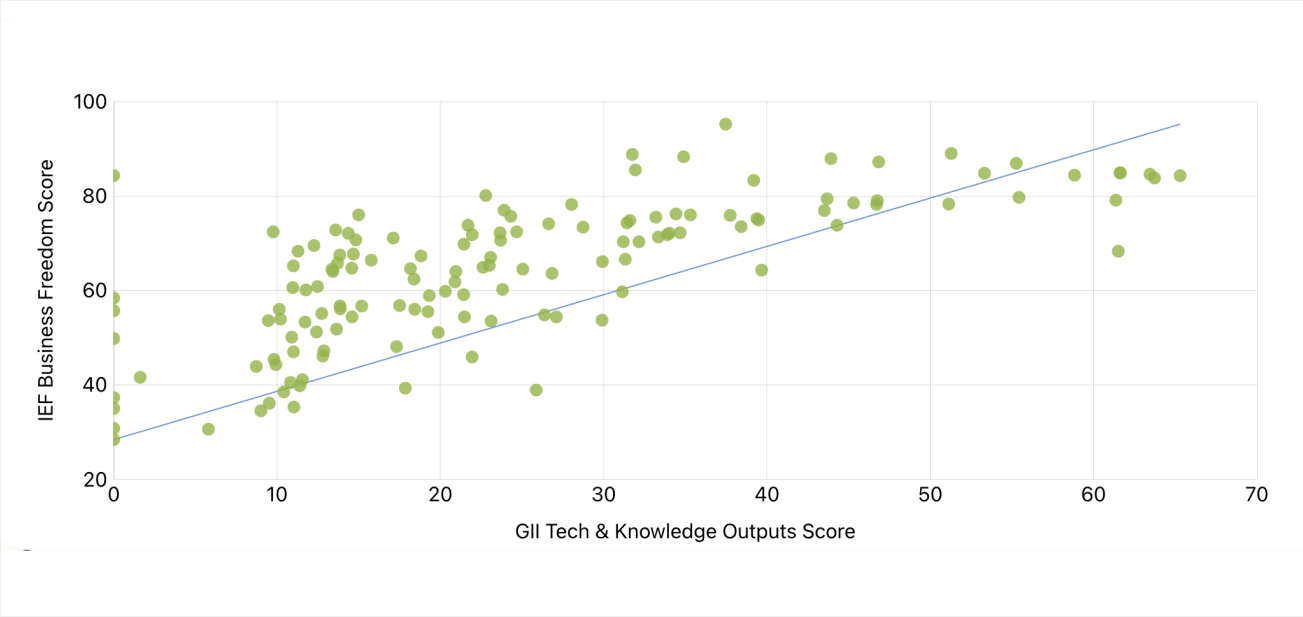
Additionally, poor fiscal policy (low monetary freedom according to the IEF) can lead to higher interest rates and more expensive burrowing costs which can discourage financial backing for startups, hamstring venture capital funding, and make it more costly to deploy clean energy systems.[25] In November 2023, advanced nuclear company NuScale canceled its power plant in Idaho due to high costs and inflation.[26]

The concern over high interest rates is highlighted in GII's report which states, "Global government R&D budgets are expected to grow in real terms in 2022, while R&D expenditure by top corporate spenders rose substantially. But it is unclear whether this can compensate for surging inflation." Recently, renewable energy companies have been particularly hit hard by high interest rates.[27]

Yet another problem that can discourage innovation, and the export of innovation abroad, is government restrictions on business freedom by way of subsidies. Preferential treatment allows the government to pick winners and losers – with the winners often being large corporations that do not need support from taxpayers.[28] Entrenching special interests shields industries from disruption by making it more expensive and difficult for new companies and entrepreneurs to enter the market or reach a larger customer base.

Figure 5.

BUSINESS FREEDOM AND TECH & KNOWLEDGE OUTPUTS



Protectionist laws inhibit innovation and global clean energy progress. To allegedly remain competitive and appease constituencies, policymakers in industrialized nations are increasingly turning to protectionist policies and centralized planning to subsidize and reshore manufacturing and construction for green technologies such as solar cells and electric vehicles. Research from the European Central Bank (ECB) regarding the subsidies for domestic clean energy production in the Inflation Reduction Act found that:

> *Green sectors in America, unsurprisingly, benefit. But producers in other countries lose out so much that 'the IRA could slow the green transition at global level'. That is an astonishing result. Add in the subsidies and domestic-content requirements implemented by other countries and the drag could be even bigger.*[29]

On the other hand, free trade allows results in more specialization of environmentally-friendly goods. For instance, iron smelters have the choice to purchase metallurgical coke from Argentina instead of Australia, where coke production is three times as dirty. Businesses also have the ability to buy Finnish lumber which emits about one-thirtieth the carbon, per dollar produced, of wood from Indonesia.[30]

Policymakers should resist the temptations of central planning and protectionism and instead empower the private sector to meet peoples' needs and address environmental priorities. Property rights, government integrity, and business freedom are integral to unleashing innovation and making breakthroughs that are necessary to reduce global emissions and accelerate human prosperity.

ECONOMIC FREEDOM PROVIDES A BREATH OF FRESH, CLEAN AIR FOR THE WORLD (LITERALLY)

Air pollution is one of the highest causes of premature death in the world. It accounts for more fatalities than alcohol use, unsafe water, and unsafe sanitation, combined.[31] The World Health Organization estimates that ambient air pollution and household air pollution cause 6.7 million premature deaths annually.[32] Importantly, these mortalities disproportionately occur in the developing world where access to energy is less readily available.[33] For instance, a lack of clean cooking infrastructure contributes to 3.7 million premature deaths annually, 60% of which occur in Africa.[34]

Reducing ambient and indoor air pollution will require expanding electricity access in the developing world and transitioning away from the use of charcoal, dung, and coal to meet heating, cooking, and energy needs. Resolving this challenge has proven to be difficult. Economic freedom helps by generating more wealth, which results in more public and private investment in cleaner fuels, more efficient technologies, and pollution abatement. Strong institutions reduce cronyism and hold polluters accountable.

When comparing the air quality index of Yale's Environmental Performance Index, which "consists of seven indicators: PM2.5 exposure, household solid fuels, ozone exposure, nitrogen oxides exposure, sulfur dioxide exposure, carbon monoxide exposure, and volatile organic compound exposure,"[35] and The Heritage Foundation's Index of Economic Freedom, one finds a strong positive correlation (0.636).

Figure 6.

AIR QUALITY AND ECONOMIC FREEDOM

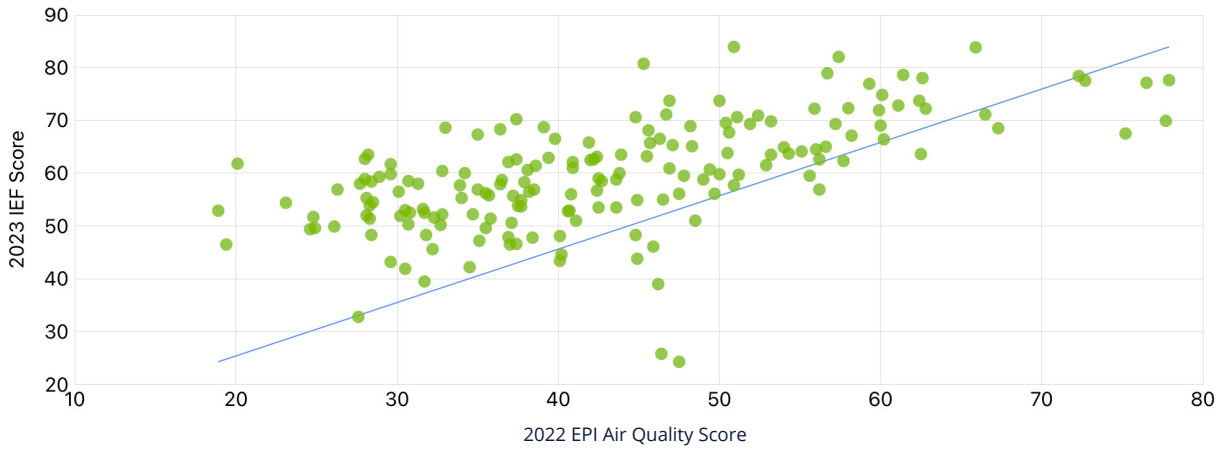
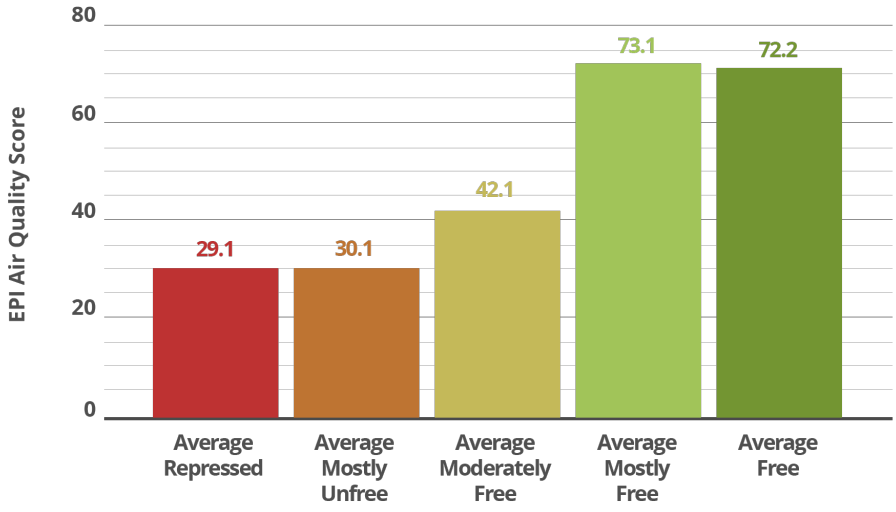


Figure 7.

AIR QUALITY AND ECONOMIC FREEDOM



The relationship between economic freedom and air pollution has been explored by previous literature. Writing for the Fraser Institute in 2014, Joel Wood and Ian Herzog find, "a permanent one-point increase in the Economic Freedom of the World index results in a 7.15% decrease in concentrations of fine particulate matter in the long-run, holding all else equal."[36]

Figure 8.

AIR QUALITY AND GOVERNMENT INTEGRITY

IEF's Government Integrity subindex[37] plays a pivotal role in countries' air pollution scores as evidenced by the two indices' strong, positive correlation (0.786). One example where the role of high-quality institutions has had an impact on energy access and air pollution is the electricity sector. Privately-owned electricity utilities are unique to the U.S. and Western countries. In much of the developed world, electricity utilities are owned and operated by the central government, as the private market is not well-enough established to provide electricity to consumers.[38] Furthermore, a lack of adequate grid infrastructure and low activation rates, especially in rural areas, borne by high upfront investment costs disincentives private companies from entering emerging markets.[39] Because of these factors, the impetus of expanding access to electricity falls on the government.

This strategy can prove successful in countries whose governments are not corrupt. However, in countries where fraud is rampant, a publicly owned electricity system can lead to blackout and a lack of access to electricity (especially in rural areas). Without reliable power or a functional grid, families must heat and power their homes with high-polluting energy sources such as biomass, wood, and agricultural waste.

One notable instance is in South Africa, which ranks 144 out of 175 in Yale's Air Quality rankings and low on

the IEF's rule of law scores. Corruption at state-owned Eskom has led to rolling blackouts and higher energy costs for consumers. As Paul Burkhardt of *Bloomberg* reported:

> *On a late Thursday afternoon last November, in the midst of rolling blackouts implemented by South Africa's state-owned electricity company, a contractor at a power station in the eastern Mpumalanga province pulled a plug connected to one of the site's main generation units.*
>
> *The unit subsequently broke down, ensuring yet another day of nationwide outages.*
>
> *The worker later confessed that he had intentionally sabotaged the machinery — resulting in $1 million in damages and almost $6 million in lost revenue — so his employer would be hired to make the repairs, according to a statement and report presented to lawmakers by Eskom Holdings SOC Ltd.*
>
> *This wasn't an isolated event — rather, it was one of more than 760 criminal incidents targeting Eskom operations over a 90-day period ending in December. At every step of its supply chain, the utility, which is responsible for producing 90% of South Africa's energy, has had to defend itself against armed robbery, fuel theft, sabotage and corruption — all of which are increasing the risk of a complete power outage that could devastate a country teetering on the brink of recession.*[40]

As the most industrialized nation on the continent, South Africans enjoy near universal availability of electricity. However, government corruption may lead to recession and less adequate power. The impact of corruption in countries that are not as industrialized is far more realized, as they do not have the existing grid infrastructure and energy resources that South Africa uses.

PROSPERITY AND CLEAN AIR

Another relevant factor for a country's air quality is its economic well-being. Returning to the concept of the Environmental Kuznets Curve, higher levels of economic growth increases air pollution but equips countries with the resources necessary to do something about it. One way to measure this is to examine the relationship between prosperity and air quality. The Atlantic Council's Freedom and Prosperity Indexes provides an annual empirical snapshot of the current distribution of freedom and prosperity around the globe. The Atlantic Council's Freedom Index evenly weighs a country's Legal Freedom,[41] Economic Freedom,[42] and Political Freedom.[43]

The Prosperity Index has six indicators, all of which receive equal weight.[44] A country's score on the Freedom Index and Prosperity Index are closely correlated, (0.80 correlation coefficient), meaning that as a nation becomes more prosperous, it tends to become freer and vice versa.

A similarly significant positive relationship exists between the Atlantic Council's Prosperity Index and Yale's Air Quality subindex (0.872).

The result of this relationship is not surprising. Countries will prioritize meeting the basic needs of citizens before addressing the environmental byproducts created by meeting those needs. Higher living standards will allow citizens and governments to invest in cleaner cooking systems, reliable infrastructure, and more innovative technologies. Countries with strong institution and property rights protections pass laws and

regulations to reduce environmental degradation.

Increasing a country's level of prosperity is integral to reducing indoor and outdoor air pollution-caused deaths. Research from Our World In Data shows that as per capita GDP increases, death rates from outdoor pollution increase before falling dramatically—which further lends credence to the EKC.[45] Wealthier people living in more prosperous countries have much lower death rates from indoor air pollution.[46] Climbing the economic ladder is one of the most effective ways to reduce air pollution-related deaths in the developing world.

The world's Least Developed Countries (LDCs), which the United Nations defines as "low-income countries confronting severe structural impediments to sustainable development [that] are highly vulnerable to economic and environmental shocks and have low levels of human assets," are a testament to this. As seen in the chart below, 22 LDCs are heavily reliant on biomass and waste, such as dung and crop waste (which are large contributors of indoor air pollution) and oil to meet their energy needs.[47]

The heavy use of biomass and waste is particularly troubling because it is primarily used to cook meals or heat and power small spaces.[48] Burning these sources produces particulate matter that either worsen underlying health conditions or create new problems.[49] The use of these materials also contributes to deforestation, which further reduces air quality in regions.

Wealthier people living in more prosperous countries have much lower death rates from indoor air pollution. Climbing the economic ladder is one of the most effective ways to reduce air pollution–related deaths in the developing world.

Industrialized countries must allow emerging economies to develop. Restricting energy access with top-down policies will trap people in poverty and poor living conditions, exposing them to higher levels of pollution. Policies rooted in economic freedom will people in developing countries achieve higher levels of prosperity, greater public health, and healthier environments.

Figure 9.

PROSPERITY AND AIR QUALITY

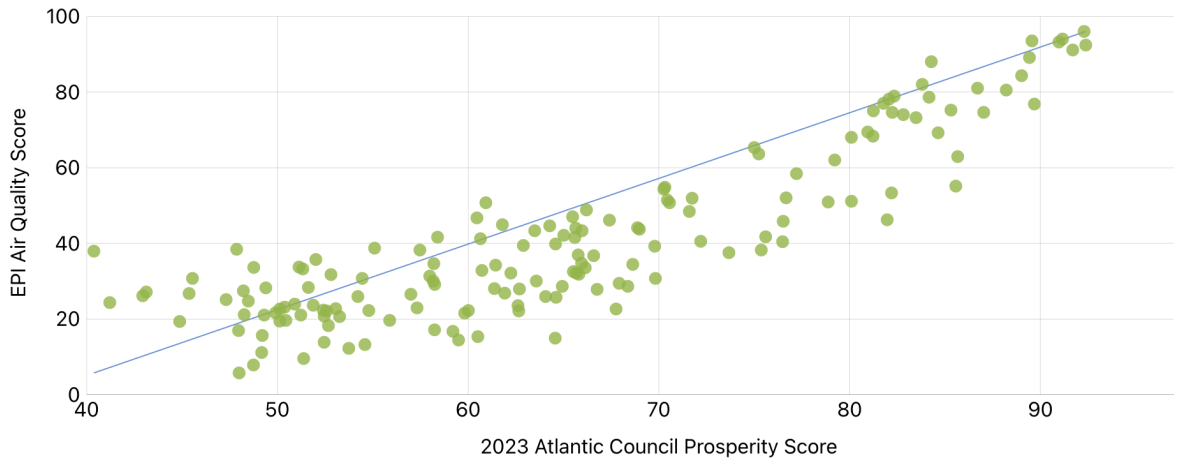


Figure 10.

PROSPERITY AND AIR QUALITY (LEAST TO MOST PROSPEROUS)

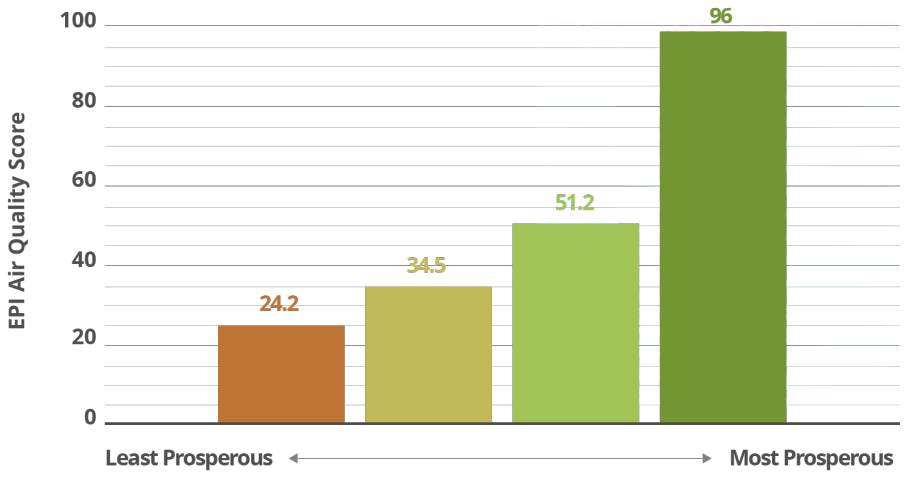


Figure 11.

DEATH RATE FROM INDOOR AIR POLLUTION VS. GDP PER CAPITA

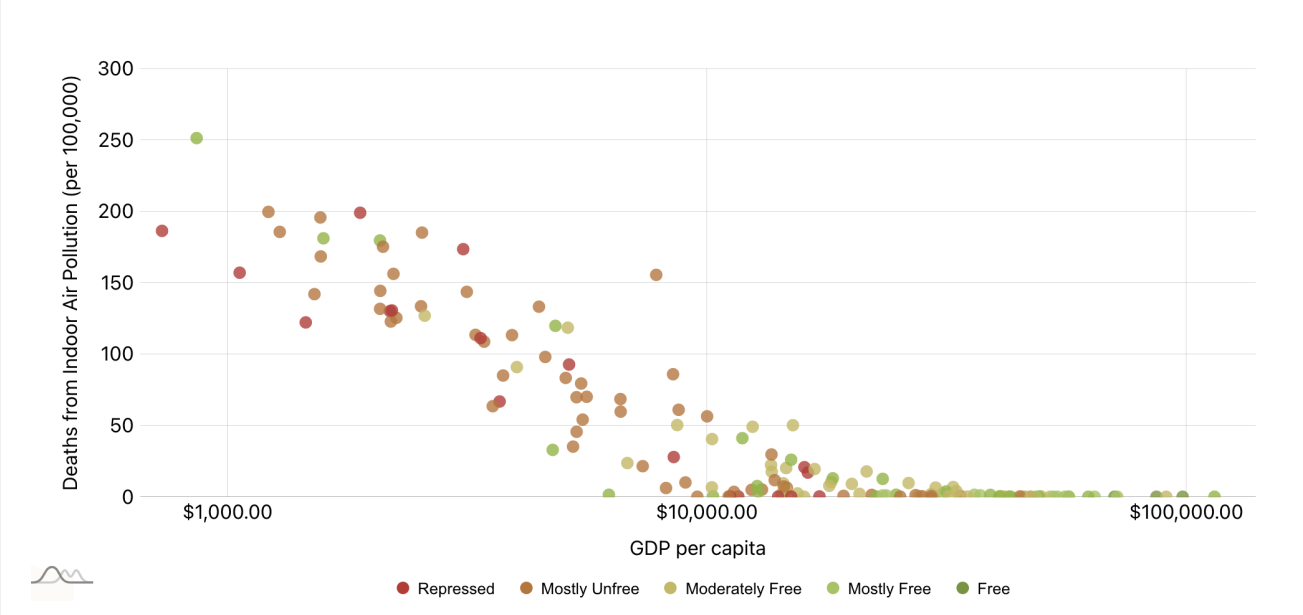


Figure 12.

DEATH RATE FROM OUTDOOR AIR POLLUTION VS. GDP PER CAP

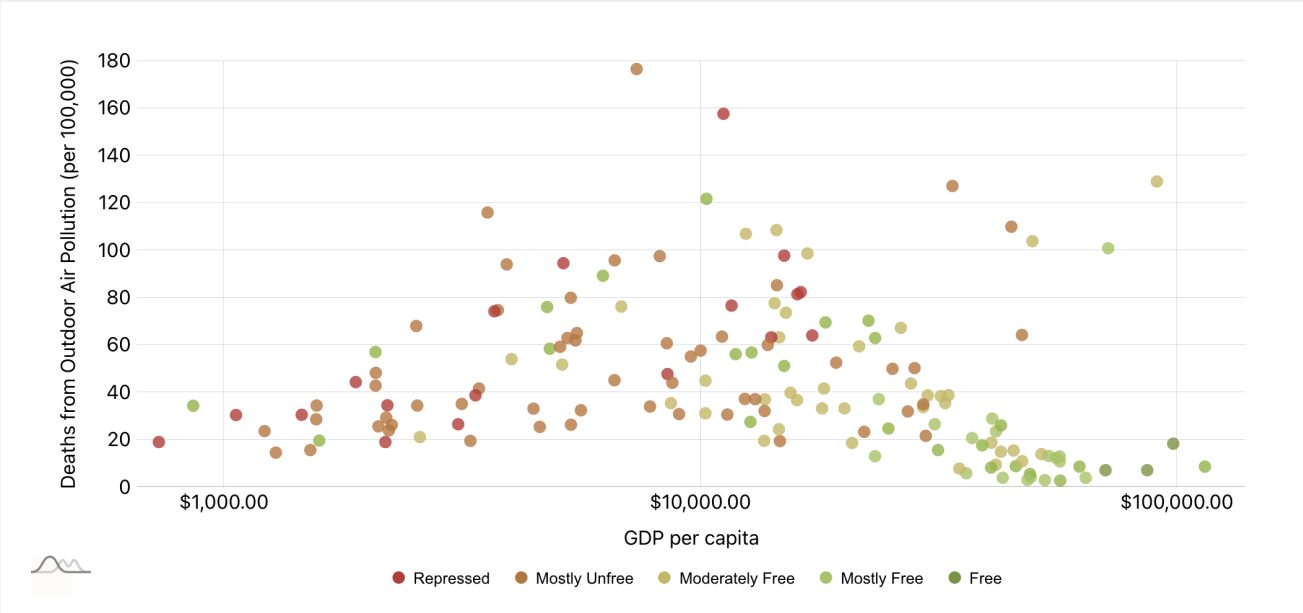
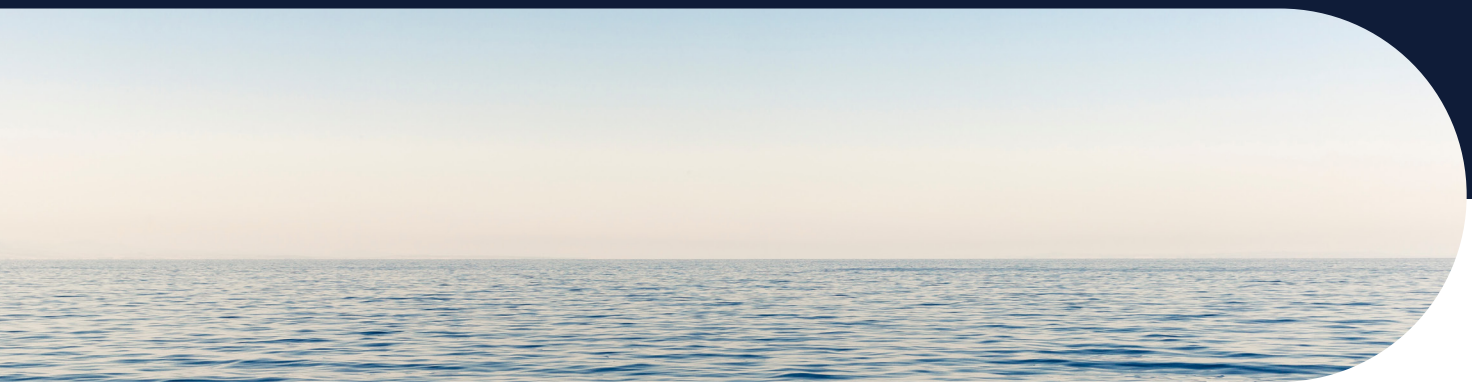


Figure 13.

TOTAL ENERGY USE BY SOURCE IN LEAST DEVELOPED COUNTRIES

Country	Fossil Fuels (% of total energy supply)	Biomass & Waste (% of total energy supply	Clean energy sources (Hydropower, Renewables, etc)
Angola	41.93%	50.18%	7.89%
Bangladesh	81.94%	18.06%	0.00%
Benin	46.04%	53.95%	0.01%
Cambodia	53.34%	42.07%	4.59%
Dem. Rep. Congo	2.52%	94.19%	3.30%
Eritrea	21.15%	78.71%	0.14%
Ethiopia	10.02%	87.17%	2.80%
Haiti	20.02%	79.76%	0.22%
Madagascar	9.99%	88.85%	1.16%
Mozambique	18.99%	68.87%	12.14%
Myanmar	48.53%	47.49%	3.98%
Nepal	26.84%	69.54%	3.62%
Niger	21.20%	78.74%	0.06%
Rwanda	9.12%	90.84%	0.03%
Senegal	56.07%	42.80%	1.13%
South Sudan	74.56%	25.32%	0.12%
Sudan	32.52%	62.95%	4.53%
Tanzania	16.79%	82.06%	1.15%
Togo	15.07%	84.56%	0.37%
Uganda	9.82%	88.13%	2.05%
Yemen	93.95%	4.60%	1.46%
Zambia	18.97%	70.95%	10.08%



FREER ECONOMIES DELIVER CLEANER WATER TO CONSUMERS

Access to clean water and sanitation are two fundamental human rights,[50] yet billions of people around the world are living without them.[51] In 2021, more than 2 billion people lived in water-stressed countries (defined as areas where demand for clean water outpaces supply either because supplies are insufficient or infrastructure is inadequate). In 2022 at least 1.7 billion people used a contaminated drinking water source.[52] Relying on dirty, contaminated water leads to outbreaks of several waterborne diseases including cholera, dysentery, and hepatitis A. The World Health Organization estimates that each year some 1 million people die from diarrhea because of unsafe drinking water, sanitation, or hygiene.[53]

The world has made impressive progress in making safe drinking water more readily available. From 2015 to 2022, some 687 million people gained access to safely managed drinking water.[54]

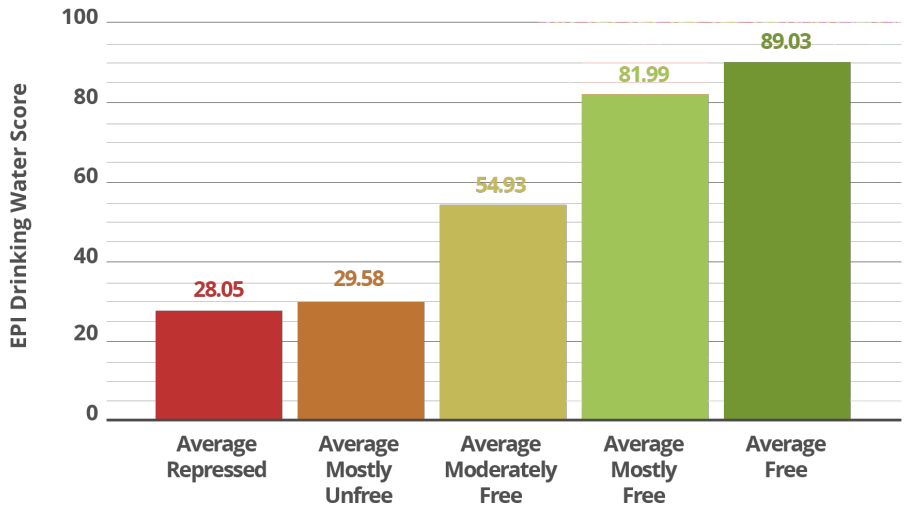
Expanding greater access to clean drinking water will require a suite of solutions. Economic freedom can help to deliver meaningful progress by increasing levels of wealth. Governments and private entities will have more resources to expand water infrastructure and households to spend additional resources to hook up water lines to their homes. Competitive and open markets will empower entrepreneurs to develop new methods of water filtration and strong institutions would provide oversight to ensure that water is being used sustainably and equitably.

There is a strong, positive correlation (0.669)[55] between Heritage's Index of Economic Freedom and the Environmental Performance Index's Unsafe Water Index.

Several other studies have identified the relationship between safe drinking water and economic prosperity. One recent and comprehensive analysis comes from Kokou Dangui and Shaofeng Jia in their study, "Water Infrastructure Performance in Sub-Saharan Africa: An Investigation of the Drivers and Impact on Economic Growth."[56] In this report, Dangui and Jia investigate how socioeconomic factors impact water access in Sub-Saharan Africa. The authors also explore the relationship between water infrastructure investment and economic growth.

Figure 14.

SAFE DRINKING WATER AND ECONOMIC FREEDOM



Dangui and Jai find a "positive statistically significant relationship between water infrastructure, GDP per capita, and population growth, and a negative statistically significant relationship between human capital and regulatory quality."[57] Specifically, the study finds that for every 1% increase in per-capita income growth, water infrastructure increased by 0.2%. As the authors summarize their findings:

> *The consistent positive association between water infrastructure and per-capita GDP implies that the richer the country is getting, the more successful its water infrastructure performance. This is mainly because countries have more economic resources to invest in water infrastructure and management expertise as they become richer.*

In much of the developing world, it is the responsibility of women and children to collect water. Because clean water access can be miles away, water collection takes women and children away from school, education, and other productive activities, all of which are critical to economic growth.[58] Improving the levels and accessibility of clean water is not only important for the physical health of citizens, but for the economic and environmental health of countries as well.

PROPERTY RIGHTS AND CLEAN DRINKING WATER

There is a very strong, positive correlation (0.770) between IEF's Property Rights subindex and the EPI's Unsafe Drinking Water measurement.

As seen in the chart above, countries with the greatest property rights protections have safe drinking water scores that are nearly quadruple that of countries with the weakest property rights protections. Expanding water infrastructure is essential to reducing water-borne illness and disease, but unclear roles and inconsistent enforcement of laws can lead to a lack of ownership among governments and communities, stymie investment, and reduce community-level upkeep and buy-in.

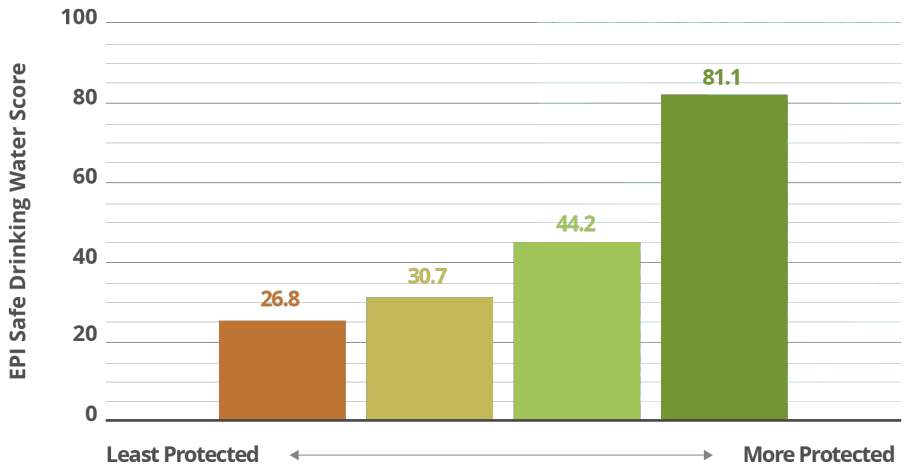
A real-world example of the importance of property rights for clean water is Uganda. In an article published in the *International Journal of Commons*, the authors point to weak property rights protections as one of many factors that prohibit adequate water access in the country.[59]

Conversely, Switzerland, which has high scores in Yale's Unsafe Drinking Water subindex and Heritage's Property Rights subindex, attributes its robust water infrastructure to its strong property rights protections.

Countries with the greatest property rights protections have safe drinking water scores that are nearly quadruple that of countries with the weakest property rights protections.

Figure 15.

PROPERTY RIGHTS PROTECTIONS AND CLEAN DRINKING WATER



Only where the right to own (i.e. sell/buy) is guaranteed, are people willing to invest time and money for the improvement of a common water supply. Thus, the consistent and stable property laws provided a solid framework, not so much for private profit but for common enterprises such as water supply networks.[60]

The importance of property rights and community ownership is understood not only by the Swiss government, but by the private sector as well. Water4 leverages the power of markets and price signals to expand clean water access in Africa. The company installs water pumps in rural villages and offers training the community to operate, maintain, and fix the pumping technology. Water4 also charges a small fee for the clean water that communities receive which is used to pay for infrastructure upgrades and training programs.[61] This not only provides a revenue source, but it also ensures that the community has ownership of the water infrastructure, which incentivizes upkeep and repairs.

Weak property rights protections can also deplete natural resources and lead to water pollution. Because no one oversees and manages the land, no one is incentivized to take care of it, a phenomenon that is often referred to as the tragedy of the commons. Weak property rights encourage resource depletion and weak institutions allow polluters to go unregulated (and potentially violate the rights of other property owners). In Venezuela, which has the lowest possible ranking for property rights protections in the IEF,[62] the state-owned oil company PDVSA has freely polluted and drained the land's natural resources. Despite plans for the federal government to clean up the country's degradation, at least 200,000 barrels of oil have leaked in recent years, heavily polluting lakes and water resources.[63]

Similarly, more deforestation occurs with weak property rights and can be detrimental to clean water access. As more land is cleared for agricultural practices, more waste can seep into water supplies and reach consumers. Fewer trees also mean fewer naturally occurring systems to filter out pollutants before they reach water access points. Researchers studying deforestation in Malawi found that "a 1 percentage point increase in the forest ratio increases the probability of access to clean drinking water by 1.06 percentage points."[64]

CLEAN WATER AND STRONG INSTITUTIONS

For much of the world, water is a public good, and as such its planning and distribution is handled by either the federal, state, or local government. For this reason, government integrity is integral to clean water access. A strong, positive correlation (0.752) exists between Government Integrity and Unsafe Drinking Water.

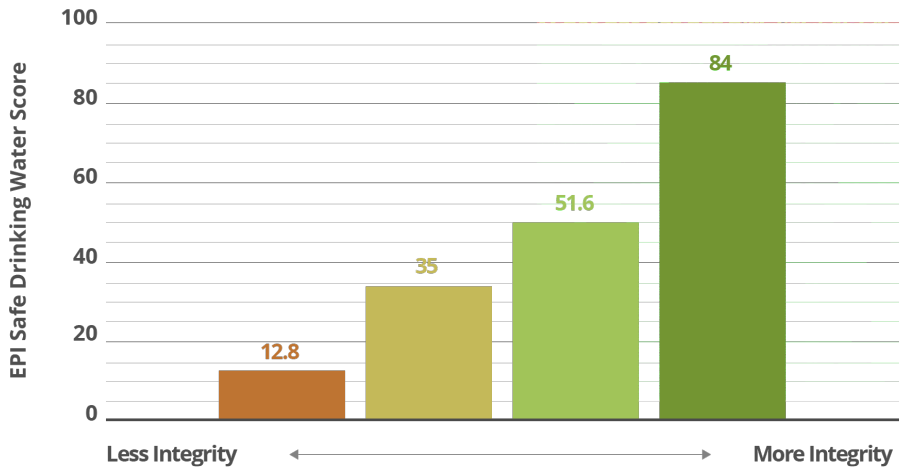
As countries look to build out key infrastructure to reduce water-related deaths and disease, governments must be able to act effectively and honestly to prevent corruption and the misallocation of resources. Government effectiveness is also essential to the planning of critical water infrastructure especially in population dense, developing countries. Dangui and Jia's findings support this conclusion:

Weak property rights encourage resource depletion and weak institutions allow polluters to go unregulated.

Further, the consistent negative and significant impact of population density across all income groups supports that the fast increase in the population density is the strongest determinant of water infrastructure underperformance in the

Figure 16.

GOVERNMENT INTEGRITY AND CLEAN DRINKING WATER



> *[Sub-Saharan Africa] SSA region. Indeed, the impact of population density is lowest in higher-income countries compared to lower-and middle-income groups. These results support the hypothesis that countries with stronger economies may be associated with greater governance effectiveness, allowing for sustainable planning of the increase in population density.*[65]

To decrease the rate of water-borne illness and disease, embracing policies rooted in economic freedom can be a matter of life and death. Specifically, implementing strong protections for property rights and eradicating government corruption will lead to safer and healthier societies.

To decrease the rate of water-borne illness and disease, embracing policies rooted in economic freedom can be a matter of life and death. Specifically, implementing strong protections for property rights and eradicating government corruption will lead to safer and healthier societies.

WHAT DOES ECONOMIC FREEDOM MEAN FOR CLIMATE?

When considering the effect of free economies on greenhouse gas emissions and climate resiliency, several factors come into play. In truth, the effectiveness of economic freedom on climate mitigation and adaptation will depend on which policy lever that increases or decreases economic freedom lawmakers use. More efficient tax policy or improving permitting processes could increase economic freedom, which could improve technological innovation[66] and therefore increase economic and environmental efficiencies. That would result in fewer emissions per dollar of GDP. On the other hand, imposing regulations on power plants to reduce CO2 emissions would decrease economic freedom. One recent paper discusses the optimal and efficient level of economic freedom for prosperity and environmental protection.[67]

Several studies have examined the causal effects of economic freedom on CO2 emissions and environmental degradation using CO2 as a proxy, and the results have been mixed. Like other byproducts of industrial activity, it stands to reason that if higher levels of economic freedom result in higher levels of economic growth, it will also lead to higher levels of greenhouse gas emissions.

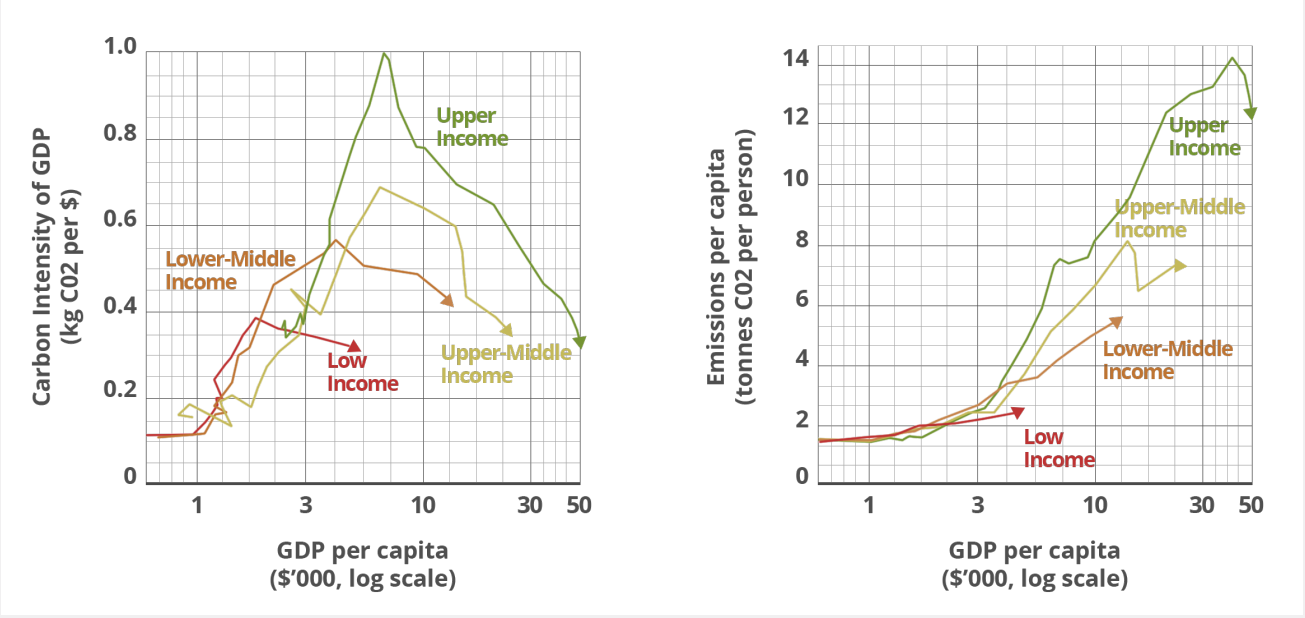
Research confirms this intuition. For instance, one analysis published in *Environmental Science and Pollution Research* in 2022 looked at the environmental outcomes of G-20 economies from 2000–2016. The authors found that the higher levels of investment and economic opportunity resulting from economic freedom put greater strains on countries' ecosystems.[68] The analysis from the Fraser Institute found no statistical significance between increases in economic freedom and CO2 emissions reductions.[69]

While it stands to reason that emissions increase as a country uses more energy and grows, it is also important to consider if the Environmental Kuznets Curve exists for CO2 emissions. If so, free market policies can help decouple and drive down emissions. A 2020 *Research of Industrial Economies* paper found encouraging results. The paper combines emissions growth, GDP per capita and rankings on the Fraser Institute's Economic Freedom of the World Index to find that "available data from 155 countries observed in five-year periods between 1975 and 2015 indicate that economic freedom not only reduces overall CO2 emissions but also shifts the top point of the EKC to the left. As such, the evidence suggests that the transition to lower emissions technology appears at an earlier stage in economically free societies."[70]

Figure 17.

ENERGY TRANSITION CURVE

Energy transition path of countries in each wave of economic development, between 1800 and 2019.



Source: Financial Times

If cleaner technologies, processes, and products are more cost-effective, developing countries will have the incentive to pursue those technologies as opposed to their higher-emitting counterparts. To the extent mature, clean energy sources (as well as all energy technologies) are unsubsidized, they will likely have greater chance of long-term economic success because there will be more transparency regarding the price at which these technologies are competitive in the market.

A 2019 study in the *Journal of Developing Areas* measured how various subcomponents of economic freedom (trade freedom, business freedom, freedom from corruption and fiscal freedom) affected CO2 emissions using panel data in 24 African countries from 1995-2013.[71] The paper found that economic freedom increased environmental quality as measured by reductions in CO2 emissions, with fiscal freedom having a negative effect on CO2 emissions for all country-income levels, freedom from corruption and business freedom having a negative impact on CO2 emissions on upper-middle income countries, and trade freedom having a negative impact on CO2 emissions for lower-income middle countries.[72]

Other research has shown economic freedom's positive impact on clean energy generation. A July 2023 study in *Environmental Science and Pollution Research* looked at the relationship between economic freedom and CO2 emissions in 138 countries from 1995–2018 and found "economic freedom has a direct and indirect

negative effect on carbon emissions and that renewable energy consumption mediates the effect of economic freedom on carbon emissions."[73]

Many of the variables that measure a country's economic freedom are also an indication of the size of government for a given country. That includes tax rates, spending levels, and the size of the regulatory state. As previously discussed, policy changes will sometimes create "win-win" scenarios, where reducing onerous, ineffective regulations and improving tax efficiencies will spur economic growth while improving the environment. Other regulations will restrict economic growth to reduce pollution, emphasizing the need for rigorous and transparent cost-benefit analyses.

There is not extensive literature measuring government size and CO2 emissions, but research published in the *International Journal for Social Economics* in May 2022 examined the relationship between economic freedom and CO2 emissions in several South Asian countries. The study found smaller government size and more market-oriented economies could reduce CO2 emissions by increasing green growth, arguing, "the role of the government needs to be redefined if not necessarily truncated."[74] Similarly, Environmental *Science and Pollution Research* found larger government increased CO2 emissions in Brazil, India, and China but a negative impact in Russia.[75]

Another article, published in the *International Journal of Environmental Research and Public Health* in July 2022, found mutual interplay between government size and CO2 emissions when looking at European Union countries between 2000-2018.[76] The authors performed a causality analysis of economic freedom, education and CO2 emissions and found that market-oriented economies and education can be significant contributors to improving the environment. By looking at the EU as a whole and specific member states, the authors concluded:

> *Both panel and country-level causality analyses point out that economic freedom, government size, international trade freedom, and education are significant determinants of environmental degradation proxied by CO2 emissions, although country-level findings partially differ depending on country-specific characteristics in line with the theoretical expectations. Therefore, reforms toward market-oriented economic structures and education can be used effectively to combat environmental degradation by using market-based environmental instruments, raising environmental awareness, and developing green or energy-efficient technologies.*[77]

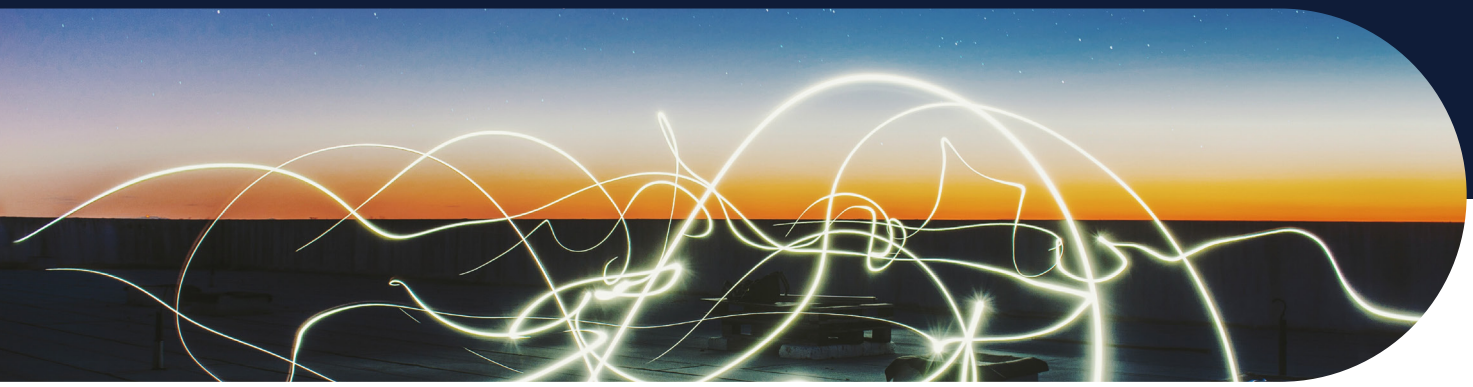
Granted, determining what constitutes a "market-based" policy can sometimes be a matter of political debate. Furthermore, the unique attributes of a country's economy, its policies, and its level of economic well-being may determine which policy reforms respective governments must prioritize.

Another consideration is how economic freedom can help countries better adapt to climate change. Free economies are wealthier, more innovative and have access to advanced technologies that enable people to better adapt to climate change. Having the economic means to construct stronger levees, sea walls, and more resilient infrastructure have helped save lives and protect communities. Advanced technologies such as early detection systems, visualization tools, up-to-date flood maps, computer modeling, satellite, and radar are several tools that scientists employ to track weather and storms. Affordable, reliable heat in the winter and air conditioning in the summer offer protection against extreme weather. Researchers are developing crops that better withstand heatwaves and droughts.[78] These investments are not costless but can be a cost-

effective solution to reduce the risks and costs of extreme weather.

One helpful tool that measures a country's resiliency is the Notre Dame Global Adaptation Initiative's Country Index. The index "uses 20 years of data across 45 indicators to rank over 180 countries annually based on their level of vulnerability, and their readiness to successfully implement adaptation solutions."[79] Given the connection between economic freedom and wealth, there is also a strong, positive correlation between those countries that are most economically free and those countries that are the most resilient.[80]

CHAPTER 7.



FOR A BETTER LIFE AND A CLEANER ENVIRONMENT, THE WORLD NEEDS ENERGY ACCESS

While this report is largely an analysis of what policy principles improve the environment, an important undertone throughout the report is that economic freedom improves the human condition. Moreover, access to affordable, reliable energy is fundamental to bettering human lives. Dependable power heats homes for families and powers schools, hospitals, farms, and the industrial processes that make the products consumers rely on every day. Energy significantly enhances productivity by doing work for humans so they can be productive elsewhere. Moving from manual labor to mechanized equipment saves time, effort, and money.

Energy allows people to commute to work and thereby enables people to live in more affordable areas. Energy empowers people to travel the world and see things our ancestors could only read about. It keeps people safe in innumerable ways, from powering modern defense systems to lighting streets to reduce criminal activity.[81] In short, energy is paramount to our way of life.

And yet, while many people take energy access for granted, it is a luxury or simply unavailable for far too many people. More energy is necessary to lift people out of poverty and improve living standards around the world. Encouragingly, the number of people without access to electricity has declined, from 1.3 billion people in 2012 to 774 million in 2022.[82] However, energy poverty in emerging and developed countries remains unacceptably high. In fact, 2.3 billion people in 128 countries rely on open fires or cookstoves that use wood, charcoal, agricultural waste, and animal dung for fuel.[83] Alleviating economic and energy poverty (inadequate supplies at unaffordable costs) will be particularly challenging in parts of Africa, where poverty is highest, and populations are set to grow. More than 600 million people in Africa do not have access to electricity and the population on the continent may nearly double to 2.5 billion people by 2050.[84]

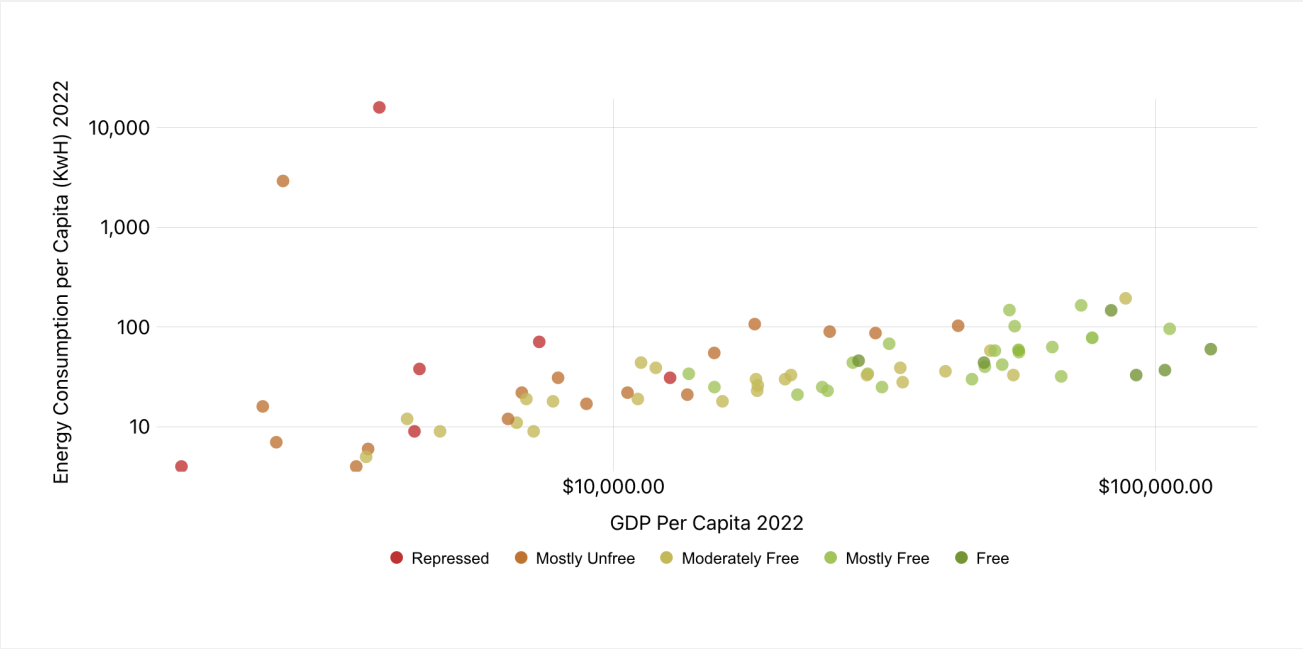
Policymakers set on improving environmental conditions and reducing climate risks cannot dismiss the priority of reducing poverty and improving economic well-being. The two goals do not need to be mutually exclusive,

but in some instances they may be. The tradeoff of rising emissions from the use of conventional sources is greater energy access and better living conditions. Providing families with electric or propane cookstoves may increase greenhouse gas emissions but significantly reduce indoor air pollution that prematurely kills millions.[85] Trapping people in poverty and constraining economic growth are not viable options.

As indicated in its latest International Energy Outlook, the U.S. Energy Information Administration projects that clean energy will grow faster than fossil fuel use.[86] Globally, energy transition investments totaled $1.1 trillion in 2022, which is the first time these investments equaled the amount invested in fossil fuels. Whether it is renewables, batteries, geothermal or nuclear, making these energy sources cost-competitive will be essential to their wide scale global deployment. Nevertheless, fossil fuels will still be the predominant energy source.[87] The International Energy Agency projects relatively steady oil and natural gas consumption through 2050, with a rapid decline of coal use (which may or may not happen).[88] 100 percent renewable adoption, or even 100 percent clean energy adoption in emerging countries within the next few decades is unrealistic.[89] Even with improved energy efficiencies, it appears that the world is headed for an energy expansion that includes a variety of energy sources rather than an energy transition.

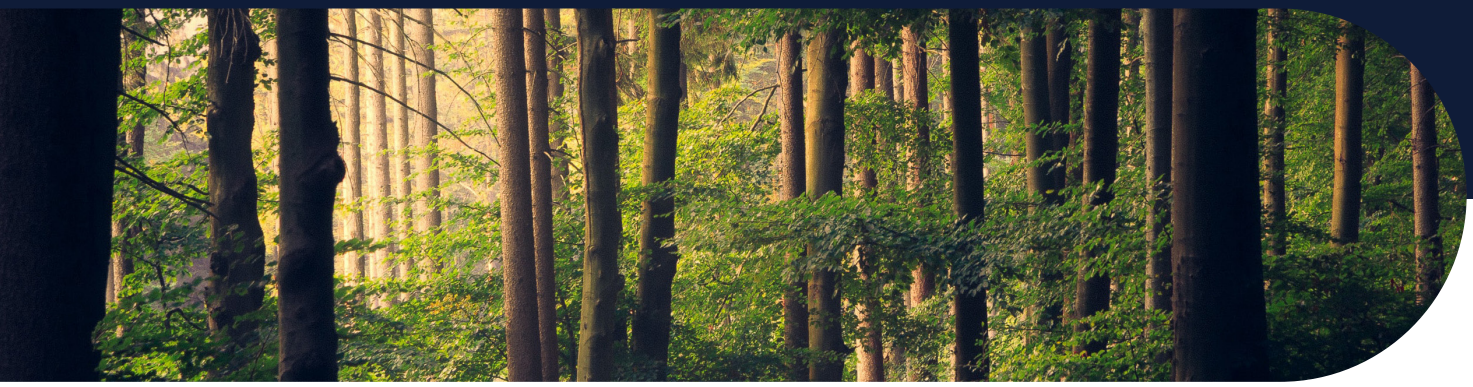
Figure 18.

GDP PER CAPITA VS. ENERGY USE



Free enterprise and strong institutions play a significant role in reducing energy poverty, improving peoples' lives, and ultimately improving the environment. One recent study in *Finance Research Letters* analyzed the effects of economic freedom on human wellbeing in Africa and, unsurprisingly, found that "free market economies with adequate supplies of electricity significantly improves the quality of life in the region."[90] In what is effectively a plea to inject more policies rooted in economic freedom, the authors stress that, "The effectiveness of economic freedom policy and access to electricity is more noticeable among countries with a lower quality of life, which suggests that if the qualities of institutions in poor African countries were strengthened and there were a constant supply of energy, the vast majority of Africans would prosper."[91]

This is true not just of African nations but countries around the world that suffer from poverty because of totalitarian regimes, corrupt institutions, weak and poorly protected property rights, and economies that are largely closed to the world. It is a moral imperative for policymakers to protect and expand the personal and economic liberties so that the people they serve can have a higher quality of life.



ECONOMIC FREEDOM: FOR PEOPLE, PROSPERITY, AND THE PLANET

Open markets, rule of law, protected property rights, lower tax burdens, and regulatory efficiency are the economic conditions that empower people to live freely and prosper. Whether it be global poverty, human rights, health care access, doubling down on the policies and principles that empower people is the most promising strategy.

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