

Energy Infrastructure: Supporting Global Economic Growth and Decarbonization

Energy is a vital component of daily life and a cornerstone of economic growth. As global energy demand surges to support expanding economies, it has also driven carbon emissions to unprecedented levels. Consequently, the focus of decarbonization efforts is increasingly on balancing economic growth with the reduction of carbon emissions.

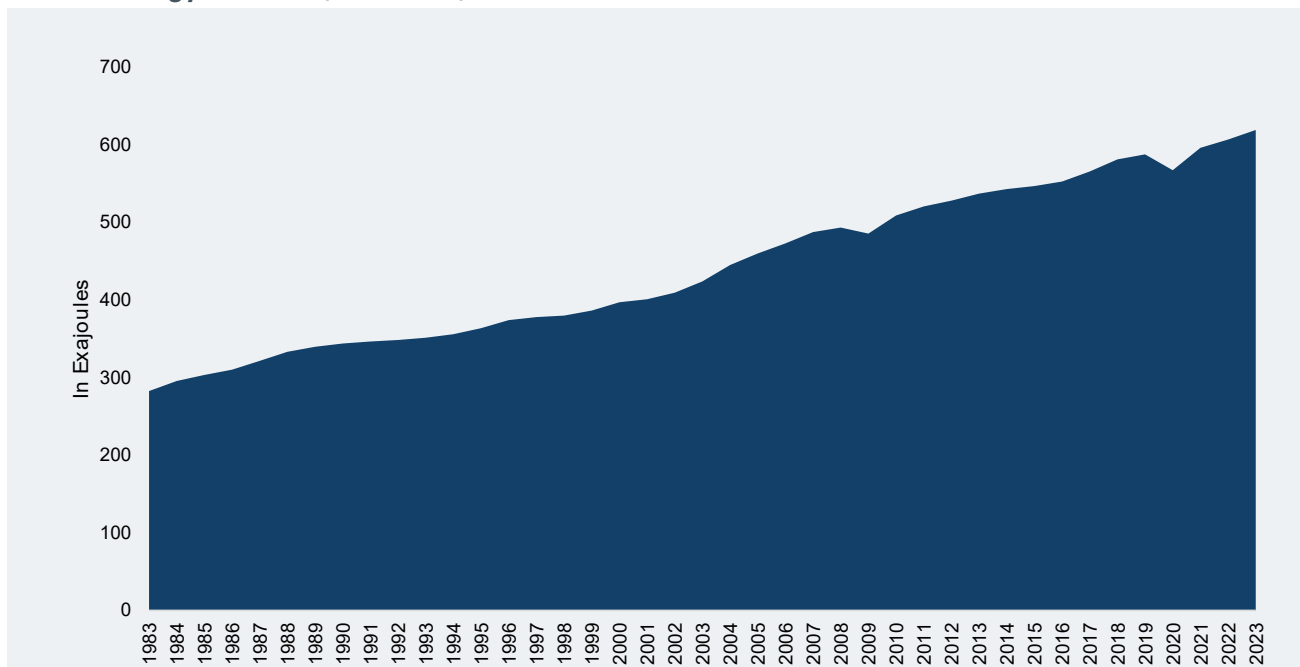
At Tortoise Capital, we believe that decarbonization can be achieved through an all-of-the-above approach. This strategy entails leveraging proven low and zero- carbon energy sources such as natural gas and renewables, while also investing in emerging technologies like carbon capture and sequestration and hydrogen.

Energy Infrastructure is the critical link in our view, that ensures sustained economic growth while advancing towards decarbonization goals.

The world needs more energy

As illustrated below, global energy demand has increased in 38 of the past 40 years, according to data from the Energy Institute Statistical Review of World Energy.

Global Energy Demand (1983-2023)



Source: Energy Institute Statistical Review of World Energy 73rd edition June 2024

There is a clear and well-established link between economic growth and energy consumption. As economies expand, their energy needs typically increase to support industrial activities, transportation, and household consumption.

Developed economies like the U.S. and Europe expect steady growth in energy demand. Emerging economies such as China and India forecast higher growth rates resulting in more significant increases in energy demand. In contrast, many underdeveloped economies, particularly in Africa, suffer from lack of access to energy, which limits economic growth and diminishes quality of life. Addressing this energy access gap could unlock economic potential and provide an additional source of global energy demand.

The need for reliable and secure energy

Reliable energy must be consistently available 24 hours a day, 7 days a week, and affordable to ensure economic stability and growth.

While renewable energy sources such as wind and solar are expanding globally, their availability is intermittent and unpredictable. Their intermittency poses challenges for ensuring a continuous energy supply. Pairing renewable energy with battery storage offers a potential solution for 24/7 reliability, but current battery storage technology has not yet advanced sufficiently to meet this need on a larger scale.

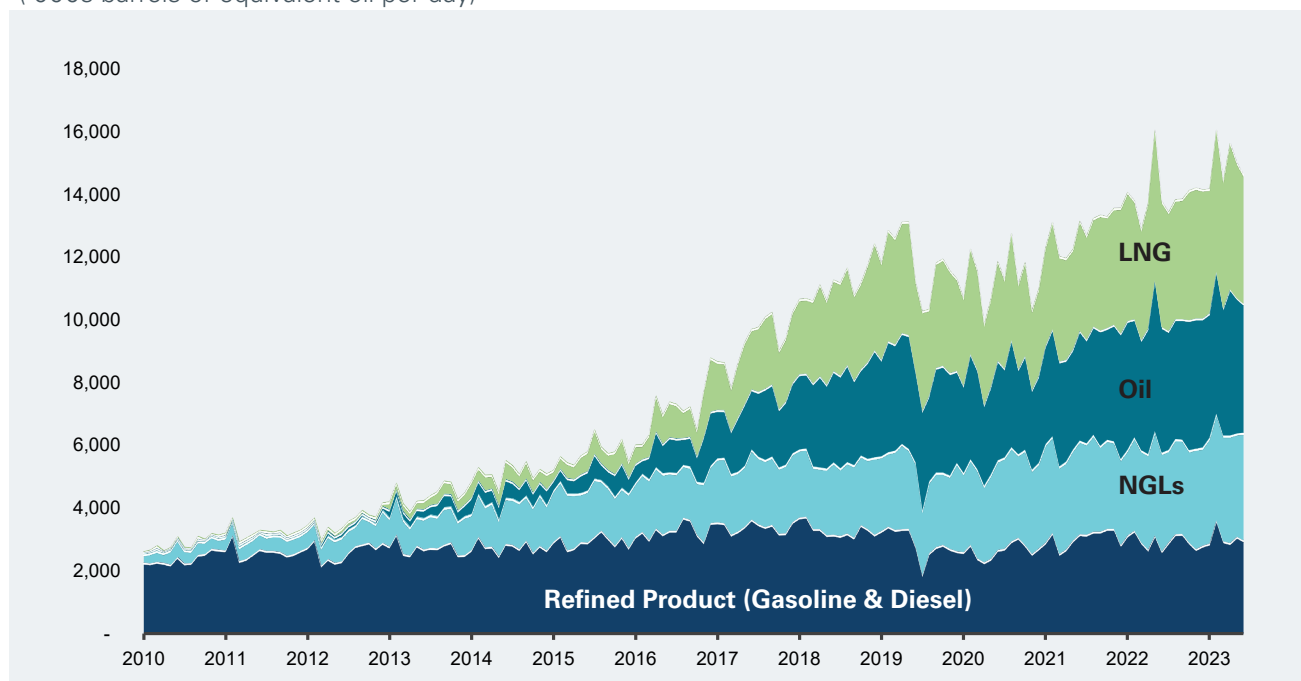
The importance of energy security was underscored after Russia invaded Ukraine, prompting many countries to reassess their energy strategies. Energy security has become just as critical as the energy transition, with nations prioritizing secure access to low-cost energy supplies.

Since 2019 the U.S. has been able to produce most of the energy it consumes, ensuring its own energy security.

As shown in the chart below, the U.S. is one of the most reliable energy supply sources in the world. Offering a diverse set of energy products, the U.S. has become the largest energy exporter globally, helping other countries ensure their energy security.

U.S. Energy Exports

('000s barrels of equivalent oil per day)



Source: EIA June 2024

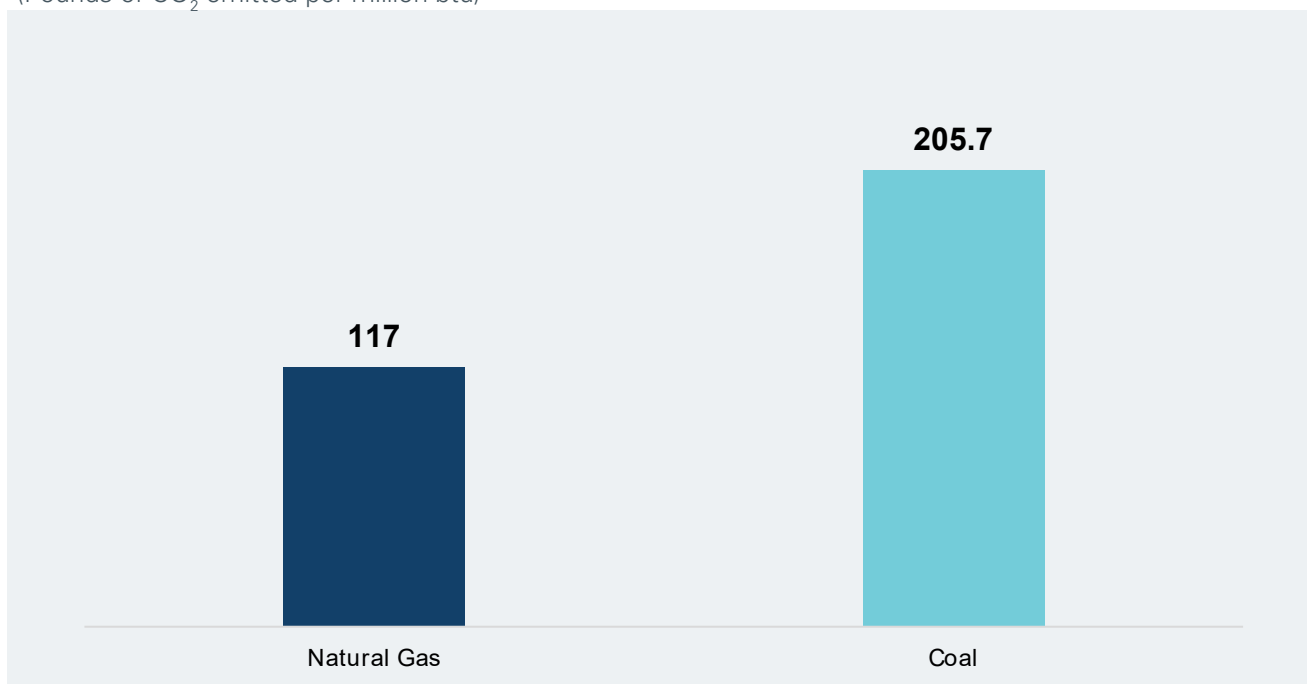
The world needs cleaner forms of energy

While fossil fuels have significantly contributed to rising carbon emissions, they continue to dominate the global energy supply. This dominance is largely due to the inconsistent performance of renewable energy sources and the considerable economic challenges those sources face, including high initial capital costs and the ongoing need for investment in technology and storage improvements.

According to the Energy Institute's Statistical Review of World Energy, fossil fuels and nuclear energy sources represented approximately 85% of the global energy supply in 2023. In contrast, renewables, including hydro, accounted for roughly 14% of the global energy supply.

CO₂ Emissions Per Unit of Energy

(Pounds of CO₂ emitted per million btu)

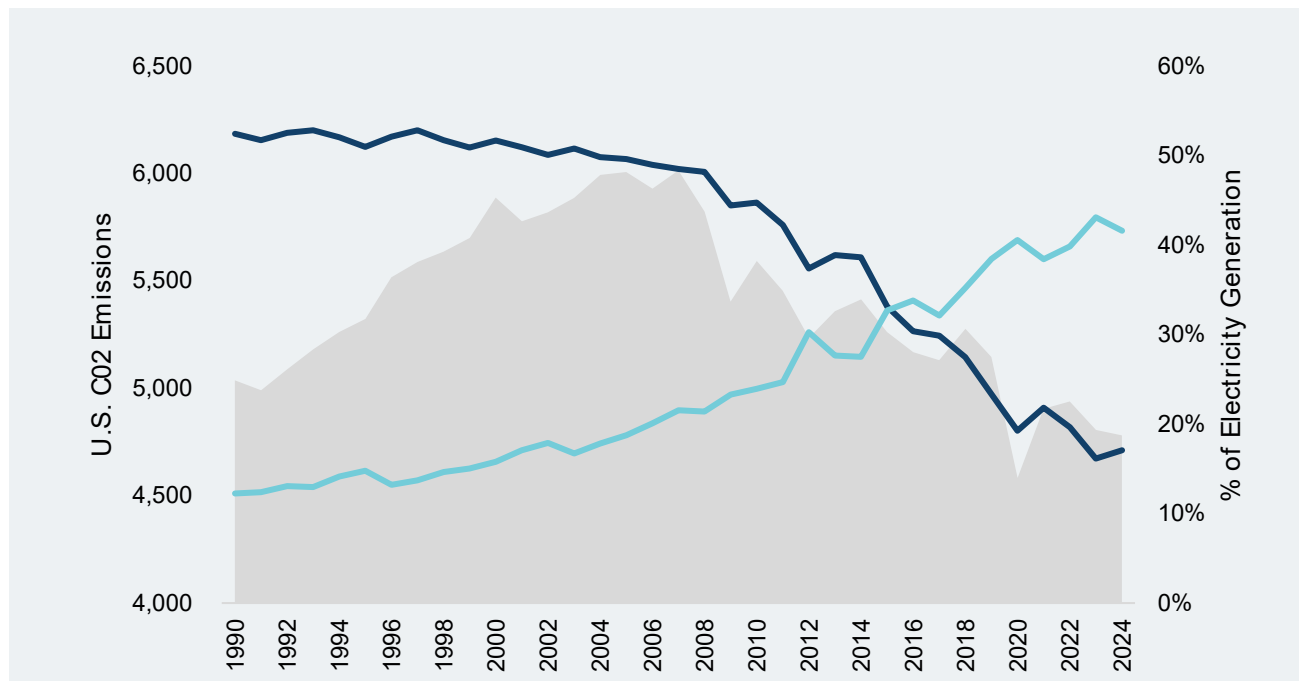


Source: EIA

However, not all fossil fuels are created equal in terms of carbon emissions. As seen in the chart above, coal is one of the most damaging fossil fuels to the environment, emitting nearly twice as much carbon as natural gas.

On the other hand, natural gas is a low carbon energy source with a proven track record of decreasing carbon emissions when it replaces coal. The chart below highlights a 20% decline in U.S. carbon emissions since 2005. This significant drop is primarily due to the decline in the percentage of electricity generated using coal, from 50% to below 20%, and the corresponding increase in electricity generated from natural gas, which rose from 20% to over 40%.

U.S. Emissions Declining as Natural Gas Generation Rises



Source: EIA

Energy consumption in China and India is rising with coal representing over 60% of their energy supply for electricity generation. Consequently, these countries have been significant contributors to the rise in global carbon emissions due to their heavy reliance on coal. U.S. exports can help reduce global carbon emissions as natural gas typically displaces coal to generate electricity in China and India.

Energy infrastructure: supporting global economic growth and decarbonization

Energy infrastructure is fundamental to both global economic growth and the advancement of decarbonization efforts. The U.S. energy infrastructure network, the largest in the world, comprises millions of miles of small-diameter gathering lines and large-diameter pipelines. This extensive network is crucial for the transportation and distribution of energy supplies, which are vital for economic activities both domestically and internationally.

The regulatory challenges associated with expanding the U.S. energy infrastructure network create a significant economic moat for the publicly traded companies that operate high-quality infrastructure. These assets are integral in transporting U.S. energy supplies that support domestic economic growth. Many U.S. energy infrastructure companies also manage assets essential for U.S. energy exports, which contribute to global economic growth by providing reliable and affordable energy to international markets.

Energy infrastructure companies play a key role in facilitating decarbonization. Publicly traded energy infrastructure companies make the transition to natural gas from coal more efficient and cost-effective, both in the U.S. and globally. They operate infrastructure that supports the development of lower-carbon biofuels such as renewable natural gas. Additionally, these companies own the infrastructure necessary for the efficient transportation of CO₂ and hydrogen, which is mandatory for the advancement of carbon capture and sequestration and hydrogen technologies.

Investment Opportunity

Energy infrastructure is crucial for supporting economic growth and advancing decarbonization efforts. The most critical energy infrastructure assets are operated by publicly traded companies that deliver high free cash flow yields through operating essential assets with wide economic moats. These companies provide steady earnings, which are converted into cash and distributed to shareholders through high dividends and share buybacks.

Despite the strong fundamentals that make the energy infrastructure sector attractive to investors, it remains one of the few sectors trading at a discounted valuations. The sector's enterprise value-to-EBITDA multiple is currently lower than its historical norms and below that of the S&P 500. We believe the combination of discounted valuations, high free cash flow yields, and robust shareholder returns makes the energy infrastructure sector a compelling investment opportunity for those seeking exposure to the evolving energy landscape.

About Tortoise Capital

With approximately \$8 billion in assets under management as of July 31, 2024, Tortoise Capital's record of investment experience and research dates back more than 20 years. As an early investor in midstream energy, Tortoise Capital believes it is well-positioned to be at the forefront of the global energy evolution that is under way. Based in Overland Park, Kansas, Tortoise Capital Advisors, L.L.C. is an SEC-registered fund manager that invests primarily in publicly traded companies in the energy and power infrastructure sectors from production to transportation to distribution. For more information about Tortoise Capital, visit www.tortoiseadvisors.com.

Disclosures

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Past performance is no guarantee of future results. It is not possible to invest directly in an index.

The Alerian Midstream Energy Index is a broad-based composite of North American energy infrastructure companies. The capped, float-adjusted, capitalization-weighted index, whose constituents earn the majority of their cash flow from midstream activities involving energy commodities, is disseminated real-time on a price return basis (AMNA) and on a total-return basis (AMNAX). The S&P 500® Index, an unmanaged market-value weighted index of stocks that is widely regarded as the standard for measuring large-cap U.S. stock market performance.

Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) is a non-GAAP measure used to provide an approximation of a company's profitability. This measure excludes the potential distortion that accounting and financing rules April have on a company's earnings; therefore, EBITDA is a useful tool when comparing companies that incur large amounts of depreciation expense because it excludes these non-cash items which could understate the company's true performance. Free Cash Flow is the cash a company produces through its operations, less the cost of total capital expenditures (growth and maintenance).

Liquefied Natural Gas (LNG) is a natural gas that has been cooled to a liquid state for shipping and storage - the volume in this state is about 600 times smaller than in its gaseous state, able to transport for much longer distances when pipeline transport is not feasible. Enterprise value (EV) measures a company's total value, often used as a more comprehensive alternative to market capitalization. EV includes in its calculation not only the market capitalization of a company but also short-term and long-term debt and any cash or cash equivalents on the company's balance sheet.