ESG EXPLAINED

INVESTING IN THE ENERGY INFRASTRUCTURE OF THE FUTURE

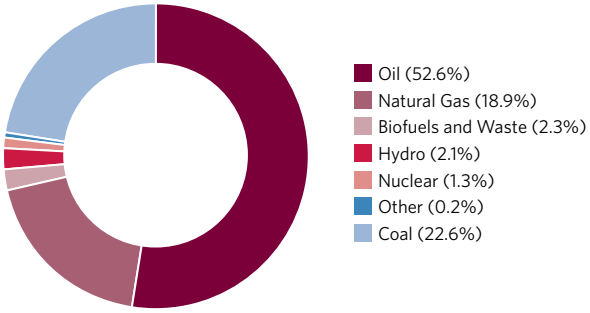
As society's dependence on fossil fuels declines, renewable energy sources are increasingly becoming an essential pillar of a low-carbon economy. As a result, renewable energy projects have gained increasing popularity as a means of combating climate change, while also offering high-quality, long-term investment opportunities.

This paper briefly discusses the transition towards a low-carbon economy and the investment opportunities arising from the renewable-energy infrastructure of the future.

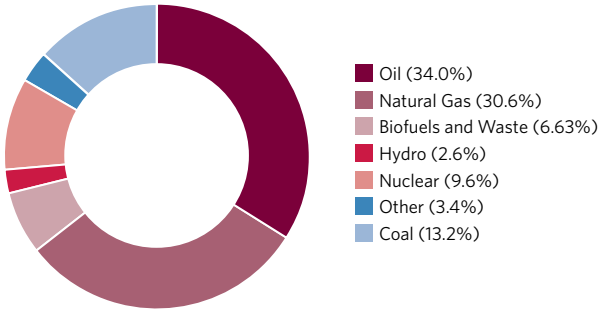
A transitioning global energy mix

Fossil fuels currently represent over 75% of the world's energy supply. However, dependence is expected to decline over time as more renewable energy sources come to market; this is illustrated by comparing the global energy consumption of 1973 with that of 2020 **(Chart 1)**.

Chart 1: World Total Energy Supply Source, 1973



World Total Energy Supply Source, 2020



Other includes: geothermal, solar, wind/tide/wave ocean, heat & other sources.

Source: IEA, Key World Energy Statistics. August 2021

As shown in **Chart 1**, over the nearly 50-year period, oil has declined from fulfilling more than 50% of the world's energy needs to fulfilling only slightly more than a third of those needs. Furthermore, coal, a high-carbon-dioxide-emitting fossil fuel, has lost significant prominence as a global energy source. Although many experts believe that fossil fuels, such as natural gas, will remain a part of the global energy mix for the foreseeable future, their share of total power generation is expected to wane over time.

Mainstream renewable-energy generation has increased over time, growing from below 5% in 1973 to above 12% of global energy usage in 2020. However, the intermittency of renewable resources, and the energy they provide, means that electrical-grid operators will need to incorporate multiple forms of energy generation and storage to deliver on the dependable- electrical-grid expectations of today's society.

The following table outlines the positives and negatives of both traditional and renewable energy sources, noting the efficacies and externalities of each.

Traditional power sources	Positives	Negatives
Nuclear	• No CO_2 Emissions. • Baseload capacity	• Nuclear waste produced. • Always on, not dispatchable. • Complicated to build and operate. • Cost variability predicated on price of uranium.
Coal	• Baseload capacity. • Inexpensive generation, if fuel source is easily accessible.	• Produces 2x the CO_2 as gas generation. • Produces other emissions and residual waste. • Cost variability predicated on the price of coal.
Gas	• Dispatchable, latest technology can ramp up production within 15 minutes.	• Produces CO_2, but is relatively clean-burning compared to coal. • Cost-variability predicated on the price of natural gas.

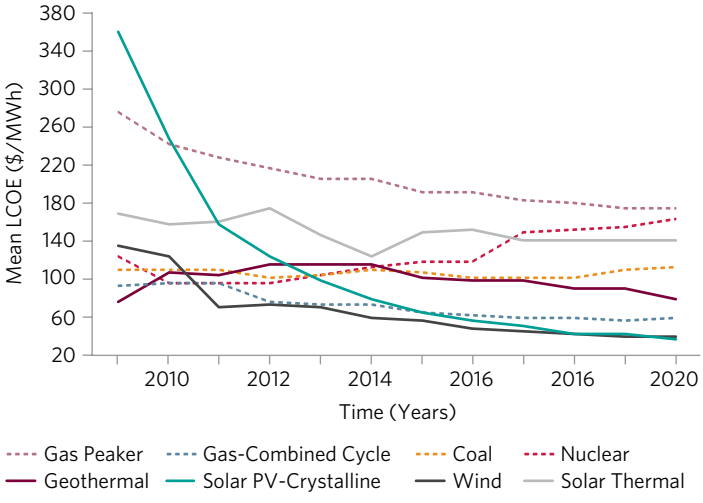
Renewable power sources	Positives	Negatives
Hydro (Reservoir)	• Non-carbon generation. • Dispatchable, turbines can be ramped up using reservoir water to meet needs of grid. • Low production cost.	• Difficult to permit new facilities due to environmental impact of up-river flooding to accommodate reservoir.
Hydro (Run-of-river)	• Non-carbon generation. • Low production cost.	• Subject to resource variability.
Wind (Onshore)	• Non-carbon generation. • Easy to construct.	• Subject to resource variability.
Wind (Offshore)	• Non-carbon generation. • Much more consistent power generation profile than onshore wind.	• Subject to resource variability. • Large-scale, capital-intensive deployment
Utility-Scale Solar	• Generation profile (during sunlight hours) aligns to peak needs of the grid. • Non-carbon generation.	• Subject to resource variability. • Uses significant land for amount of power produced.

The declining cost of renewable energy

As outlined in the previous table, one of the glaring benefits of utilizing renewable energy is its low production cost. Headline environmental occurrences like uncontrollable wildfires and the melting of the polar ice cap remind us of the challenges posed by climate change. They also highlight the societal need to transition to low-carbon energy sources. The low capital-expenditure associated with building renewable energy resources has resulted in expansive growth of the sector. Furthermore, the regulatory landscape for renewable energy development is experiencing phenomenal change, as governments and corporations alike are funding initiatives aimed at advancing renewable-energy technological innovation. The support of government, combined with technological advancements, has led to lower renewable-energy-generation costs and improved economies of scale for manufacturers.

Over the past decade, renewable-energy manufacturers have continuously improved the efficiency of their equipment through aggressive research and development, resulting in material reductions in the cost-per-megawatt of renewable-energy generation. This has led to increased adoption of renewable utilities among varying stakeholder groups. As detailed in **Chart 2**, the cost associated with renewable-energy is now significantly lower than that of energy from fossil fuels.

Chart 2: Levelized Cost of Energy Comparison (LCOE) – Historical Utility-Scale Generation Comparison



Source: Lazard Levelized Cost of Energy Analysis, Version 14.0. October 2020.

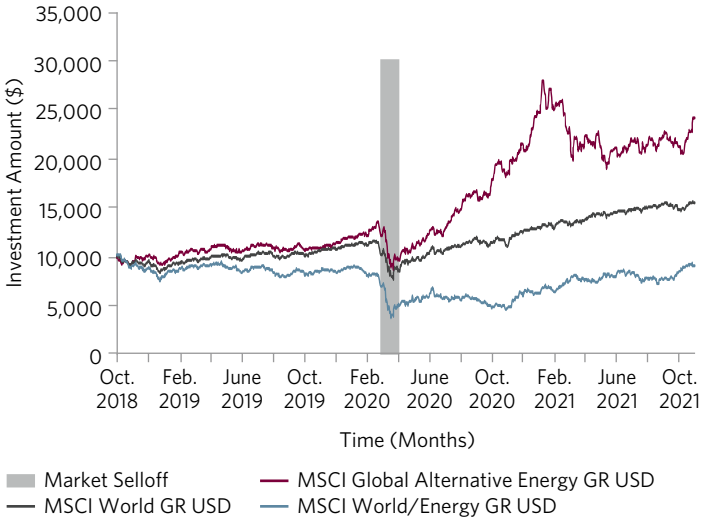
Investing in renewable energy

The supportive regulatory environment for renewable-energy projects has made it an attractive arena for innovative thinkers and entrepreneurial minds. As reported by the International Renewable Energy Agency (IRENA), 2019 investment in new renewable energy power capacity was US$297 billion[1]. When new equity raised from public markets, corporate and government research and development spending, venture capital and private equity investment are added to this amount, global investment in renewable energy in 2019 totaled USD 317 billion[2].

The influx of capital and government support in renewable-energy development has helped it achieve exponential growth in a relatively short period, resulting in the creation of an industry that has a deep investable universe across many sectors. **Chart 3a**, shows that the performance of the MSCI Global Alternative Energy Index—a proxy for the performance of the investable renewable-energy equity universe—has been stellar over the past three years.

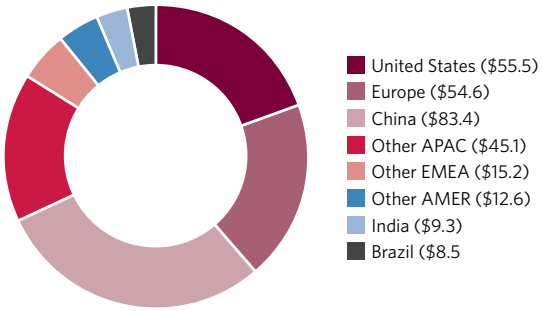
As mentioned previously, the investable universe of renewable-energy opportunities is global in nature, **Chart 3b** shows the leading regions for renewable-energy investment in 2019.

Chart 3a: 3-Year Comparison of $10,000 invested in the MSCI Global Alternative Energy Index, MSCI World Index and MSCI World Energy Index, October 2018 to October 2021



Source: Morningstar Direct, October 2021

Chart 3b: Investment in Renewable Energy Capacity by Region Year: 2019. Amounts in Billions USD.



Source: Frankfurt School. Global Trends in Renewable Energy Investment 2020.

As illustrated in **Chart 3b**, investment opportunities in renewable energy exist within developed and developing markets alike. Although developed economies, such as the United States and Europe, have made significant capital contributions towards establishing the renewable energy ecosystem that currently exists, it is the adoption and further innovation spurred by emerging and developing economies that will propel it forward.

For investors, renewable energy presents a spectrum of established and emerging opportunities from which to choose. It also allows investors to participate in the growth of a societally important industry while contributing to the betterment of the environment.

Conclusion

As the world transitions to a low-carbon economy, investors are presented with an opportunity to participate in innovations that will usher in a new energy ecosystem. For investors who are concerned with the future and sustainability, or who merely want to hedge against the volatility present within fossil-fuel-producing industries—investing in the renewable energy industry could lead to beneficial portfolio outcomes, while also supporting the climate transition for a more sustainable economy.

Bibliography

International Renewable Energy Agency. (2020). Mobilising institutional capital for renewable energy. Abu Dhabi: International Renewable Energy Agency.

[1] (International Renewable Energy Agency, 2020)
[2] ibid