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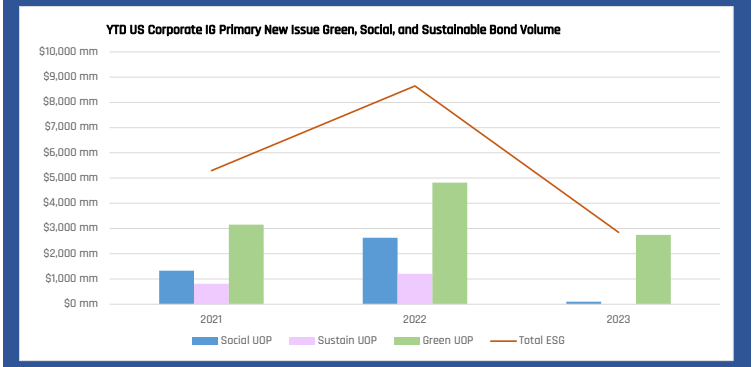
Energy Security: Where are we now?

It's possible that we're seeing the first signs (since the 1970s) of an impending global energy crisis as increases in the cost of energy exacerbate inflation and threaten the success of the economic recovery and investor/consumer confidence. Unfortunately, Europe has been ground zero for much of this with a year-on-year average power generation cost increase of over 40%.

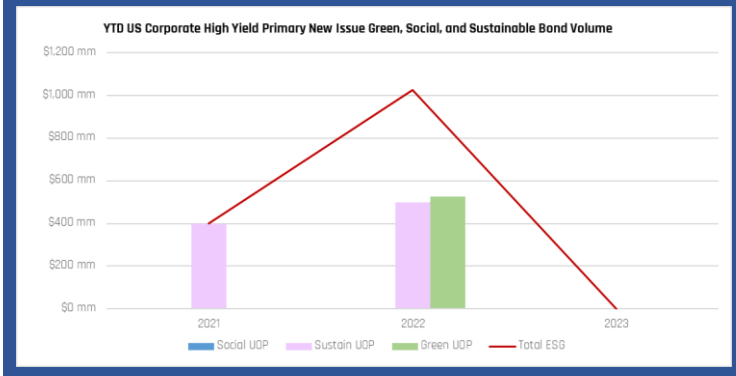
In the 1970s, like today, geopolitics was a critical catalyst for energy prices. However, the conversation then was focused a lot more on oil and reducing demand, compared to the current environment where prices are being driven by not just geopolitics but also post-Covid demand, extreme weather, and underlying investment dynamics. In addition to oil, the conversation has grown to include natural gas, renewables, biofuels, and nuclear as well.

Using the IEA's recent World Energy Outlook, this report asks, "what does the future of energy look like (especially considering both geopolitical and environmental concerns) and what are the opportunities as well as challenges that investors might face?"

2023 U.S. Green, Social, and Sustainable Debt Volume



Investment Grade: U.S. IG Green, Social, and Sustainable Bond Issuance for 2023 remains muted compared to previous years. This year PNC (Academy Co-manager) issued $1.25bn , its second green bond. Alexandria Real Estate came to market with its 4th green bond, while Comcast priced $1bn in its Inaugural Green Issuance (Academy Joint Bookrunner). Source: Bloomberg.



High Yield: No new high yield offerings to report. Source: Bloomberg.

What Does the Future of Energy Look Like?

Future energy markets are expected to be more disjointed and prone to further geopolitical friction and imbalance compared to "pre-Covid" times. This is why enhancing resiliency and diversification remain a focus in addition to affordability and reducing demand.

By 2050, the IEA expects that demand for electricity will increase by 75-150% with the share of electricity as part of global energy consumption rising from approximately 20% today to 50% by 2050. Industrial and hydrogen production (along with light duty vehicles) are the chief contributors to global demand growth. In the near-term, given the cost of energy, the IEA anticipates lower energy demand relative to last year's outlook. Regardless of the scenario used by the IEA, APAC (more than any other region in the world) is expected to have the greatest demand over the next 25+ years, which doubles from 24,700 TWh today to almost 50,000 TWh by 2050.

In addition to more long-term future demand, the IEA also anticipates that electricity generation will be more diverse than it is today. Unabated coal and natural gas currently make up the lion's share of global power production. However, by 2050, the share of the mix represented by coal and natural gas will be noticeably reduced (even in the most generous of scenarios) as the IEA anticipates that total fossil fuel demand will peak in the mid-to-late 2020s before plateauing. It then declines steadily by 2 EJ a year (equal to 1 mboe/d every year) until 2050. However, there are 8,000 coal plants across 90 countries that employ over 2mm people. It is more feasible for remaining coal generation to incorporate carbon capture. As for natural gas, it is expected to be reduced by 7%.

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With respect to renewables, the IEA's scenarios show noticeably more renewable generation (primarily solar and wind), but except for the more aggressive 2050 scenarios, there is no massive change to 2021's hydrocarbon base. Instead, it is new capacity going forward that will utilize renewables and other alternative energy sources. For instance, they expect another 210 GW of wind and 370 GW of solar. Nuclear will also play a key role and is expected to double, but in terms of its share of global capacity, it will be reduced from 10% to 8%. A lot of nuclear' s continued role remains dependent on whether the lives of existing reactors are extended. Meanwhile sectors like transport (ships, planes, HDVs), which are harder to decarbonize, should see increased deployment of hydrogen capacity (between 18-30 exajoules).

Over the next 7-10 years, we will be finding solutions for future energy demand that incorporate renewables (compared to a complete rip & replace strategy). All of the scenarios that the IEA mentions require flexibility and the rest of the grid needs to adjust to accommodate demand patterns and variability. Some examples include power plants (renew and non-renew), demand side responses, and energy storage. However, if nations want to remove the existing energy infrastructure today and start replacing it without any flexibility, it could result in a massive market impact and/or lives lost.

Challenges & Opportunities

Opportunity 1: There will be a massive benefit for the suppliers of renewable energy tech and for energy cost advantaged nations which can power steel, cement, and industrial capacity with renewables. Battery storage should see strong interest and deployment in solar rich geographies.

Opportunity 2: While there is likely to be no shortage of oil, two of the IEA's scenarios show a plateau and steep drop in fossil fuel demand which will put pressure on refiners. However, those who manage the volatility and look to invest in emissions reduction will survive. There is a massive opportunity for companies that develop technology that helps reduce methane flaring and carbon emissions (without contributing to future water stress).

Opportunity 3: This brings us to our third point, tech innovation and efficiency. Efficiency will be critical and while we've made advancements, one area that needs the most improvement is cooling. Air conditioning compared to lighting is less standardized, especially in emerging nations where according to the IEA cooling demand is expected to exceed 2,800 terawatt hours (equivalent to the entire EU's usage). Electricity demand (without end use and efficiency savings) will see an increase of 10,000 extra TWh and result in hundreds of billions of dollars in wasted energy. Recycling is another component of technology. 90% of both wind turbines and solar PVs are recyclable, while EV batteries retain ~80% of their charge.

Challenge 1: The first challenge, especially for climate tech innovation start-ups, will be the increased rate environment relative to two years ago. Newer companies looking to raise debt and equity capital will do so at higher costs and reduced valuations compared to their counterparts in 2020. There is however some good news, and that is last year saw $40bn in climate tech VC investment (with $64bn in dry powder this year). Tax advantages and subsidies included in legislation (like the IRA) will also provide some support.

Challenge 2: That was a good segway to the second challenge facing future energy security and diversity. Both the IEA and IPCC have indicated that over a trillion dollars of investment is needed (per year) for the next 7-10 years. To overcome this hurdle and attract investor capital, projects will have to show proof of supply chain reliability, as well as secured permitting. The challenge here is that it can take years before a generator goes online (and over a decade for mineral extraction sites to be ready). Depending on the region, the transparency of the process could also be a concern, which is why permitting is one of the leading indicators for energy/renewable energy.

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Challenge 3: Supply chains and geopolitics are another area of significant vulnerability. Russia for instance is a chief supplier of global enriched uranium and produces 20% of global Class 1 nickel. This could be a significant challenge for the EV & battery industry where despite innovation and reductions in use of cobalt by 75-90%, these industries use twice as much nickel. China also has a massive critical mineral interest and a downstream advantage. It currently refines about 68% of global nickel, 40% of copper, 59% of lithium, and 73% of cobalt. Its classification as a strategic competitor and concerns surrounding their due diligence processes for mineral refining have drawn the ire from investors and world leaders resulting in the re-evaluation of Chinese suppliers. As for upstream, countries like Peru & Chile (which extract more than 40% of the world's copper) have recently experienced political upheaval, adding another layer of uncertainty surrounding the reliability of critical minerals supplies.

Bottom Line

- Investments in energy efficient technology will be just as critical to future energy demand as investment in energy generation. Not only does it help to keep growth in check, but it also helps reduce the raw materials needed. In 2021 there was over $250bn in energy efficiency investment across real estate and industrial processes here in the United States, and over $500mm of VC capital was invested in 2022 related to energy management/efficiency.
- Hydrocarbons are not going away any time soon. However, there is expected to be a continued focus on its ability to reduce emissions and the negative environmental impacts in the production and refining process. To maintain relevancy, producers and refiners of hydrocarbons will likely have to install technologies that mitigate emissions and reduce methane flaring/water use. Capital markets participants and stakeholders should consider how the hydrocarbon industry can develop Green, Social, and Sustainable financing frameworks and attract capital to fund such future projects given the critical flex role that hydrocarbons have in the energy transition.
- As demand for critical minerals like copper, nickel, graphite, and lithium are expected to increase 100-300% by 2050, supply chain concerns will remain in focus and price hikes/disruption will continue. Russia's & China's role in both the upstream and downstream aspects of new energy tech along with political uncertainty in other nations (i.e., in South America) will continue to drive supply chain concerns and the exploration for raw materials both domestically and internationally.

Further Resources

IEA: https://www.iea.org/data-and-statistics/charts/energy-efficiency-investment-2015-2021
US EIA: https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf
IEA: https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf
Brookings: https://www.brookings.edu/wp-content/uploads/2022/08/LTRC_ChinaSupplyChain.pdf

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