The Energy Evolution: A Multifaceted Opportunity for Infrastructure Investors

The energy landscape is evolving. More than 130 governments, 1,000 corporations and $5 trillion in global assets under management (AUM) have committed to lowering emissions in an effort to reach net-zero targets by 2050, where emissions produced would equal those eliminated. Decarbonization of the entire energy industry—from generation to transportation—is a tall order that will take years to achieve. We believe a mix of traditional and renewable energy sources is required to accomplish this objective in a reliable and cost-effective way, representing the potential for $100+ trillion in investment. In our view, this energy industry evolution is a multifaceted, multi-decade opportunity for infrastructure investors.

AN EMPHASIS ON RELIABILITY AND AFFORDABILITY—ALONG WITH SUSTAINABILITY—IS KEY FOR NAVIGATING THE ENERGY EVOLUTION

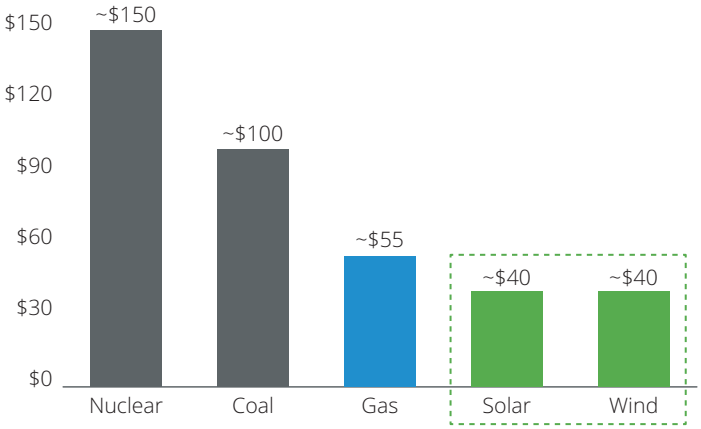
Renewables Adoption Is Poised to Accelerate

Adoption of renewables—wind and solar power assets—is poised to accelerate as we strive for a lower-carbon world. One major reason why: Clean energy sources have become the world's most cost-efficient providers of power generation. Renewables no longer rely on public subsidies and government intervention to compete with conventional power sources. Significant capital deployed into the renewables sector over the last decade has spurred technology innovations that have improved the economics and efficiency of renewables, so that they are now the low-cost power sources. (See the chart to the right.)

We believe we are at an inflection point in renewables adoption, with massive increases ahead. Demand is likely to rise from here as improving technology further drives down renewable costs. Public initiatives are also increasing demand for renewables. Countries representing 53% of the global economy have committed to reaching net-zero emissions targets by about 2050. Against this backdrop, renewables are rapidly disrupting traditional energy sources and are on track to represent the majority of global power generation by 2050.

RENEWABLES ARE NOW THE LOST-COST PROVIDER

2020 Cost of Electricity ($ / Megawatt Hour)



As of September 30, 2020. Source: Bloomberg New Energy Finance, Brookfield Public Securities Group LLC. Reflects the U.S. levelized cost of electricity (LCOE), which is defined as the net present value of the unit-cost of electricity over the lifetime of a generating asset (often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime). See disclosures for additional information.

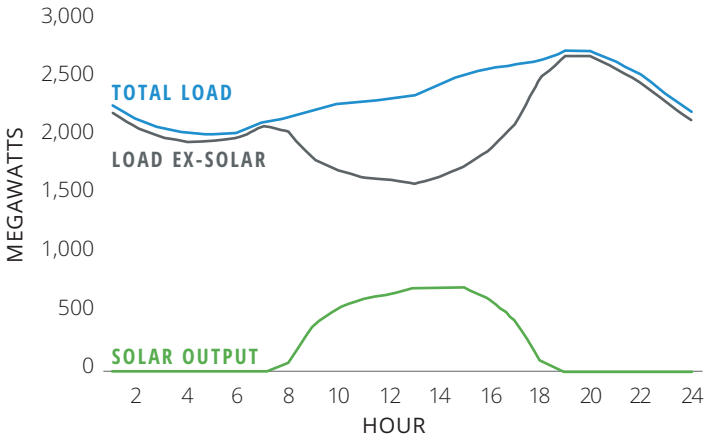
Renewables Need a Partner

As the energy landscape stands today, relying on renewables alone will not get us to net zero in a resilient, reliable and affordable way. Renewables, without meaningful storage solutions, are intermittent power sources that require help from other fuel sources to meet peak energy demand in a cost-efficient way.

The chart to the right provides an example of why this is the case. It shows the "duck curve," illustrating the mismatch between peak energy demand and peak solar supply. Solar power output (the green line) increases in the morning as the sun is rising, but then drops as the sun goes down. The gray line shows the net remaining load needed to meet power demand (the blue line). Net load and energy demand peak around sunset during a typical pre-pandemic day, when people use more electricity. Renewable sources cannot yet be stored and transported in a cost-efficient way to meet peak energy demand without help from traditional power sources. Storing renewable power generation sources at scale is unlikely to be economically feasible for years, meaning other energy sources are still needed to maintain reliable power grids.

INTERMITTENCY LEADS TO A MISMATCH OF SUPPLY AND DEMAND

The 'Duck Curve'



Source: Brookfield research. The duck curve reflects the difference in electricity demand and the amount of available solar energy throughout the day. Represents an illustrative power load profile.

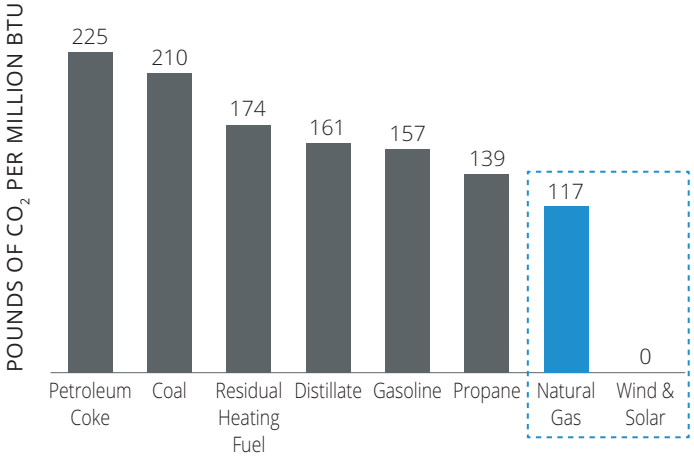
Renewables and Natural Gas Together Are a Practical and Powerful Combination

Renewables need a partner, given their intermittency and lack of feasible storage solutions—and we believe natural gas should play that role. Natural gas is the cleanest alternative from a traditional energy perspective, and renewables and natural gas together represent the cleanest generation mix, as the chart to the right shows.

Natural gas emits 45% less carbon dioxide than coal and is readily available. While natural gas is not as clean as renewables and its environmental benefits are reduced if there are methane leaks, industry efforts to reduce this risk are underway. Plus, natural gas infrastructure already exists, and natural gas can be stored and transported cost effectively. In our view, natural gas and renewables together form the most practical combination for cleaner and reliable energy.

RENEWABLES AND NATURAL GAS FORM THE CLEANEST GENERATION MIX

Carbon Emissions By Fuel Source



As of February 28, 2021. Source: U.S. Energy Information Agency. See disclosures for additional information. BTU stands for British thermal unit.

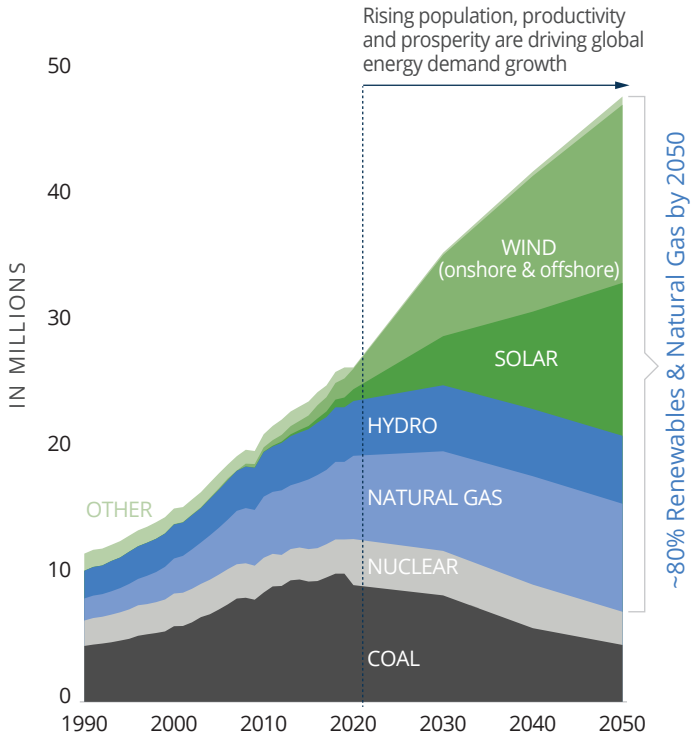
Companies Are Recognizing Voltaire's Wisdom: 'Perfect Is the Enemy of the Good'

Transitioning fully to renewables today may perfectly lower emissions, but it would also create reliability and affordability issues, given the current limitations with renewables storage. Related industries recognize this. Utilities companies are openly embracing natural gas as their source of reliability in the absence of "perfection," while energy infrastructure companies are making investments in renewables and trying to reduce the emissions of their traditional energy production.

We view the U.S. as a road map for where global power generation is heading. After hitting a peak in 2007, U.S. carbon emissions fell 12% by 2018, despite energy demand remaining virtually unchanged. The U.S. did this partly by increasing its production of natural gas, helping to make that fuel more cost effective than coal, its dirtier and most direct competitor. We believe the drive to reduce emissions as quickly as possible without also raising power costs and outage risks will result in natural gas and renewables together representing the majority of global power generation by 2050. (See the chart to the right.)

RENEWABLES AND NATURAL GAS TOGETHER ARE EXPECTED TO BE THE FUTURE OF POWER GENERATION

Global Electricity Production by Fuel Type (Gigawatt hours)



As of February 28, 2021. Source: International Energy Agency, World Energy Council. Forward-looking statements are hypothetical in nature and not guaranteed. See disclosures for additional information.

ACTIVE MANAGEMENT CAN HELP INVESTORS CAPITALIZE ON THE ENERGY EVOLUTION

The entire electrical grid—from power generation capacity to transmission & distribution capabilities to storage solutions—is evolving to meet growing renewables demand. This energy evolution will take decades, it will not be linear and it will require substantial investment. The International Renewable Energy Agency estimates that the total sum needed for investment in this grid of the future could be as much as $100 trillion globally over the next three decades.

We believe active management is key for capitalizing on this energy evolution. The transition represents a far-reaching and global opportunity set, and an active approach can potentially help capture the investments with the best growth and income potential.

At Brookfield, we have expertise across the energy landscape—our diversified infrastructure team, our dedicated renewables and sustainable infrastructure team, and our dedicated energy infrastructure team have long-term track records, years of experience, and strategies and products designed to meet investors' varied needs. Our institutional expertise coupled with our owner/operator heritage enables us to access the energy evolution's unique and well-positioned opportunities.

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