Hamilton Lane

2022 Real Assets Market Oveview

Energy Transition

July 2022 | Peter Udbye, Vice President, Real Assets

The Electric Slide… A cringeworthy and usually regrettable experience mostly reserved for weddings. Although boogying on the dance floor may be a feature of the past (or should be for some of us), there's no doubt that our future will be more electric as the energy transition gains steam. And if you weren't listening to the drumbeat before, now's the time: The magnitude of the energy transition is bound to impact us all in some form, creating opportunities and challenges, winners and losers. Winners will anticipate and 'slide' in the direction of changing currents, whereas others will find that they are unable to keep up with the accelerating beat.

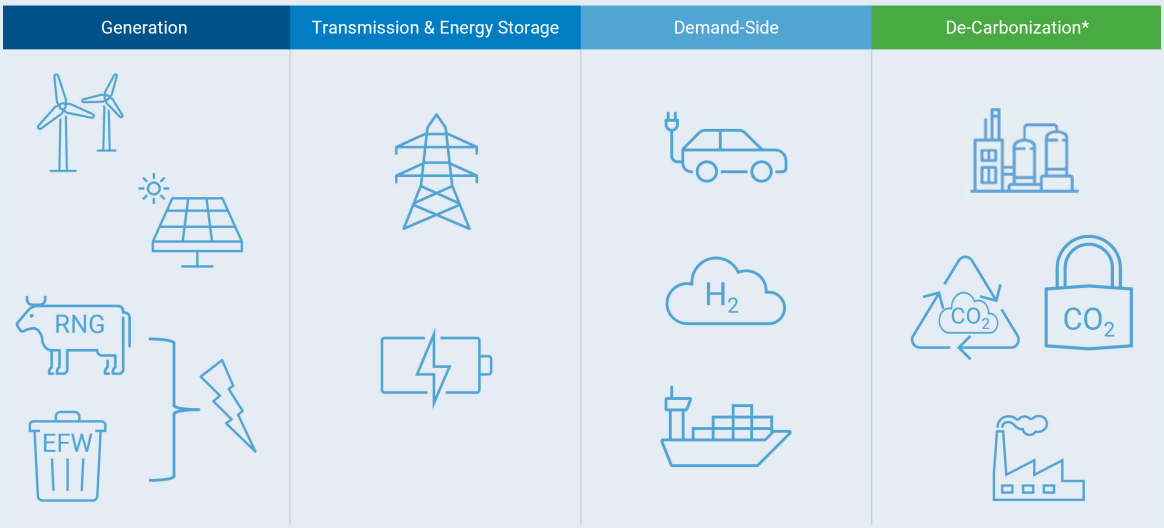
At this point you may be thinking:

Electric Slide = 🤔 💃 🕺

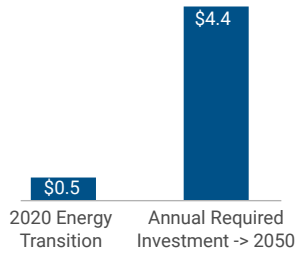
Energy transition = You mean windmills and solar panels?

Well, yes – but we're also thinking about the broader opportunity set that will strengthen as the world transitions away from production and consumption of fossil fuel-based energy. Bull$%@!? Also correct, although we prefer the term "renewable natural gas (RNG)." Beyond generation by renewable means, the energy transition involves a transformational shift in the way power is transported and consumed, creating an immense opportunity set for active investment management.

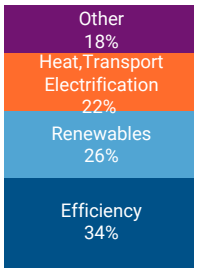
Energy Transition: Beyond Hot Air
The Energy Transition Encompasses a Vast Opportunity Set



Energy Transition Investment
2020 vs. Projected Requirements, $ Trillions



Investment Priorities for 1.5°
Annual Investment Allocation Requirements



Source: Bloomberg New Energy Outlook Dataset, as of July 2021. Accessed via Bloomberg Terminal on December 9, 2021. IRENA World Energy Transitions Outlook June 2021, IEA World Energy Investments 2021

"Wrong place, wrong time, right price and necessary" – an apt description for past attempts at the electric slide, yet also a fitting description for the backdrop associated with increased adoption of wind and solar generation. This theme around evolution and friction across the energy transition landscape is especially evident in the power markets, where conventional forms of generation with significant marginal costs in the form of (inflationary) commodity inputs are forced to compete against intermittent renewables with effective marginal costs of… $0. Although this may fundamentally threaten some existing conventional assets, many will thrive under this new paradigm, creating opportunities and threats.

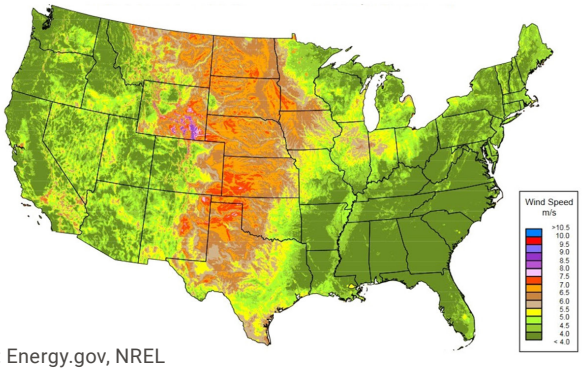
Wrong place?

Well suited locations for renewables tend to be located away from population centers, in contrast to conventional fossil fuel-based generation, which tends to be co-located or proximate to demand centers. Accordingly, continuing growth in renewable generation will require substantial investment in new transmission capacity and technology to connect supply and demand centers. Although a requirement for increased transmission holds, the energy transition will continue to challenge and disrupt the status quo. Delivery and generation are centralized under the sole control of a grid operator/utility with a singular responsibility for meeting demand, with demand adjusted as a last resort (i.e., rolling blackouts). A continued rise in distributed generation (e.g., rooftop solar and other "distributed" generation resources closer to end users) is forcing grid operators/utilities to adapt to an increasingly de-centralized and complex power grid, as two-way power flows have become a reality. As an aside, new

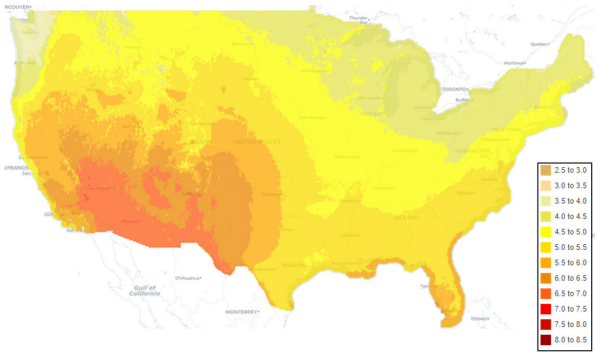
technologies such as smart thermostats and smart appliances are in the early innings of enabling consumers and utilities to provide a real-time, demand-side response to changing supply.

Wind and Solar Penetration[1] vs. Energy Curtailed[2]- CAISO

United States - Average Wind Speed
Miles per Hour at 30 Meters



United States - Solar Radiation
Solar PV (KWh/M²/Day)

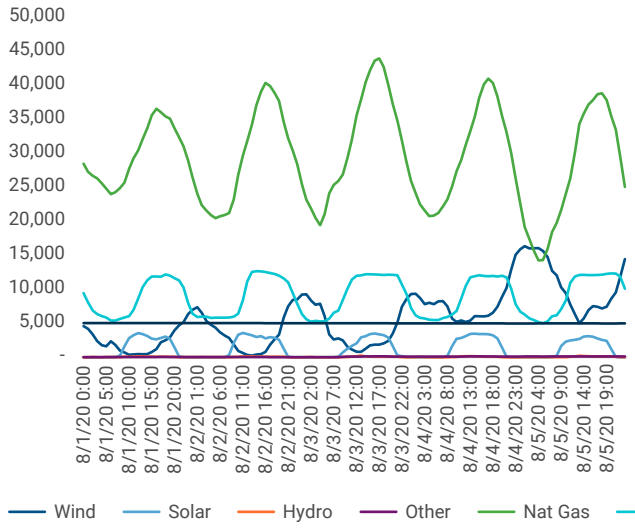


Source: Energy.gov, NREL

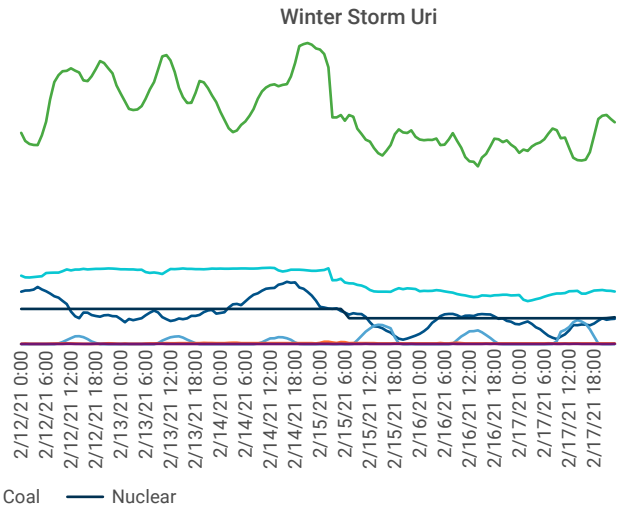
Wrong time?

A key feature of most renewable power sources is intermittency, i.e., what happens when the wind doesn't blow, or sun doesn't shine. Places such as California, Texas and the UK have firsthand experience of the compounding effects associated with intermittency in times of stress on the grid. On the opposite end of the spectrum, increased renewables adoption can also result in supply outpacing demand, prompting curtailment by economic, voluntary or forced means. With a marginal generation cost of $0, renewable generation generally sits at the top of the pecking order in liberalized power markets, although as California has demonstrated, can also be on the receiving end of curtailment amid increased renewables adoption.

ERCOT Hourly Generation by Source
8/1/20 - 8/5/20: MWh

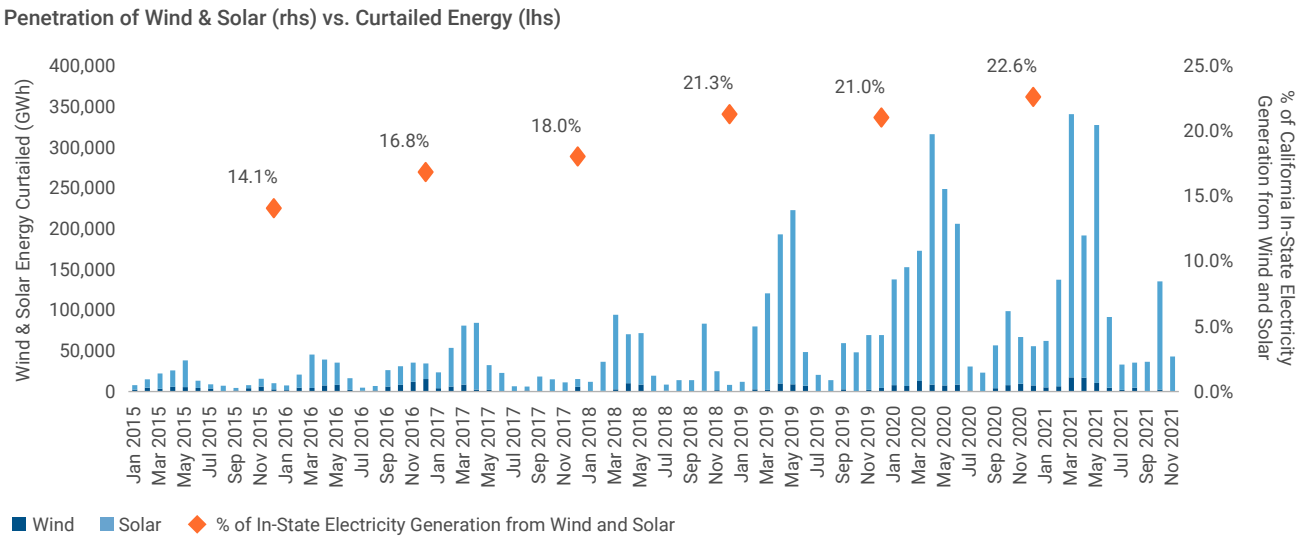


ERCOT Hourly Generation by Source
2/12/21 - 2/17/21: MWh



Wind — Solar — Hydro — Other — Nat Gas — Coal — Nuclear

Source: U.S. EIA. Data through August 5, 2020 and data through February 17, 2021. Accessed January 2022

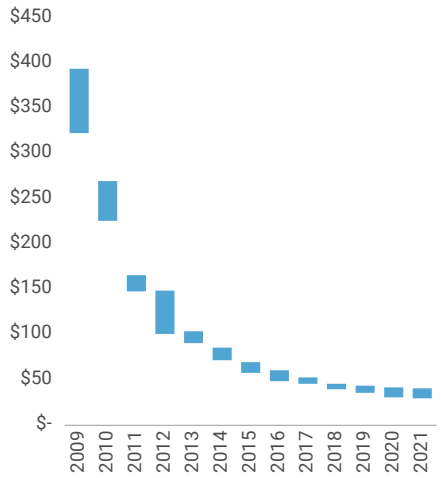


Source 1: California Energy Commission, California Electrical Energy Generation 2001 –Current. 2: California Independent System Operator, Monthly Renewables Performance Report

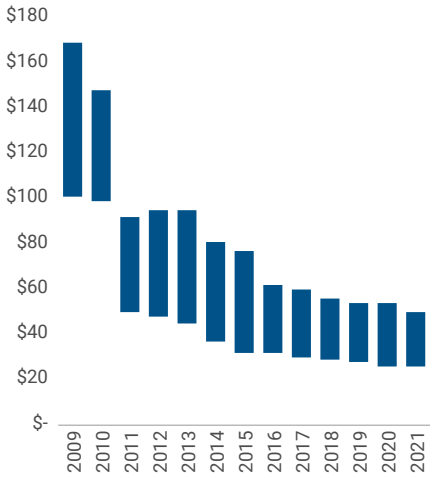
As existing fossil fuel-based generation is forced to compete against increasingly economic renewable generation, is this the beginning of the end for coal and natural gas? We don't believe so – we'd be 5–15 years late in drawing this conclusion for coal, where the beginning of the end has been long anticipated yet not fully realized. Gas is a more complex story. Although the deployment and utilization of CCGTs in meeting baseload supply requirements will diminish amid increased penetration of renewables, the role of natural gas in providing flexible capacity and dispatchable generation will become increasingly important in solving for intermittency, particularly over longer durations. Questions around the go-forward revenue model for natural gas generation may become ever more relevant over time, as battery storage could limit the role of natural gas in addressing less frequent requirements for longer-duration dispatchable generation; a solution batteries cannot effectively provide.

As governments strive to meet commitments to address climate change through incentives and policy action, the energy transition has really come of age as rapid improvements in technology and efficiencies of scale have made investments in renewable energy generation and storage cost-competitive and compelling on an non-subsidized basis. Beyond tailwinds from transitioning existing energy infrastructure, a broad push towards electrification, particularly in transportation and heating sectors, is expected to reverse years of relatively stagnant growth for electricity demand, providing an additional tailwind for the sector.

Solar Unsubsidized LCOE
LCOE ($MWh)

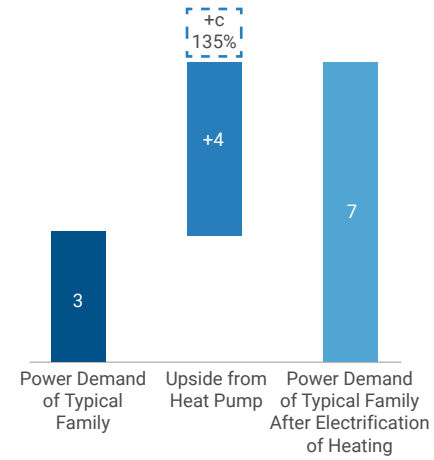


Wind Unsubsidized LCOE
LCOE ($MWh)



Source: Lazard Levelized Cost of Energy and Levelized Cost of Storage – 2021. Published October 2021

Heat Pump Increases the Annual Power Consumption of Typical European Household from 3 MWh to 7 MWh
Power Demand (TWh)



Source: Goldman Sachs Global Investment Research

So, where do we see opportunities to invest in the energy transition exciting enough to get us out on the dance floor? We see them across the risk/return spectrum and have invested across a range of transactions in the space, including in offshore wind, battery storage, solar, enabling technology for distributed generation and directly in distributed generation, to name a few. Although we're energized about the continued opportunity set, for us, sector expertise, discipline and an active approach to assessing an evolving opportunity set are key determinants of success in the sector.

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