



## **LAZARD RELEASES ANNUAL LEVELIZED COST OF ENERGY, STORAGE AND HYDROGEN ANALYSES**

NEW YORK, October 28, 2021 – Lazard Ltd (NYSE: LAZ) has released its annual in-depth studies comparing the costs of energy from various generation technologies, energy storage technologies for different applications and hydrogen production.

Lazard's latest annual Levelized Cost of Energy Analysis (LCOE 15.0) shows the continued cost-competitiveness of certain renewable energy technologies on a subsidized basis and the marginal cost of coal, nuclear and combined cycle gas generation. The costs of renewable energy technologies continue to decline globally, albeit at a slowing pace, reflecting reductions in capital costs, increased competition as the sector continues to mature and continued improvements in scale and technology.

While projects reaching commercial operation in 2021 (and thus included in the scope of this study) continue to reflect declining costs (given that capital costs for such projects are generally negotiated 12 – 18 months in advance of project completion), commodity cost inflation, supply chain disruption and accelerating downstream demand for renewable energy generation capacity is putting upward pressure on project capital costs. While not reflected in this year's study due to the retrospective nature of capital costs from projects reaching commercial operation this year, rising capital costs will likely lead to higher LCOE costs in future iterations of this report (albeit not necessarily higher relative costs).

Lazard's latest annual Levelized Cost of Storage Analysis (LCOS 7.0) shows that year-over-year changes in the cost of storage are mixed across use cases and technologies, driven in part by the confluence of emerging supply chain constraints and shifting preferences in battery chemistry.

Lazard's Levelized Cost of Hydrogen Analysis (LCOH 2.0) shows that the cost of hydrogen is still largely dependent on the cost and availability of the energy resources required to produce it. Hydrogen applications that require minimal additional steps (e.g., conversion, storage, transportation, etc.) to reach the end user will most likely achieve cost competitiveness sooner than those that require greater site or application-specific investments.

“Our three studies together document the continued acceleration of the energy transition,” said George Bilicic, Vice Chairman and Global Head of Lazard's Power, Energy & Infrastructure Group. “We're also seeing that the transition will not be dominated by any one solution — rather a new ‘all of the above’ approach, which includes renewable energy, storage, hydrogen and other solutions, will be key to effecting the permanent shift to increased energy efficiency and sustainability.”

### *LCOE 15.0*

- While rates of decline in the LCOE for onshore wind and utility-scale solar have slowed in recent years, the pace of decline for utility-scale solar continues to be greater than that for onshore wind (i.e., five-year compound annual declines of 8% in the average LCOE of utility-scale solar, compared to 4% for onshore wind).

- When U.S. government subsidies are included, the cost of onshore wind and utility-scale solar continues to be competitive with the marginal cost of coal, nuclear and combined cycle gas generation. The former values average \$25/MWh for onshore wind and \$27/MWh for utility-scale solar, while the latter values average \$42/MWh for coal, \$29/MWh for nuclear and \$24/MWh for combined cycle gas generation.
- Regional differences in resource availability and fuel costs can drive meaningful variance in the cost of certain technologies, although some of this variance can be mitigated by adjustments to a project's capital structure, reflecting the availability and cost of debt and equity.

### LCOS 7.0

- Industry preference is increasingly shifting towards Lithium-Iron-Phosphate ("LFP") technology, which is less expensive than competing lithium-ion technologies (especially in shorter-duration applications) and has more favorable thermal characteristics, despite its relatively lower volumetric energy density.
- Upstream cost inflation (due to, among other factors, supply constraints in commodity markets and manufacturing activities) is putting pressure on energy storage capital costs.
- Hybrid applications are becoming more valuable and widespread as grid operators begin adopting Estimated Load Carry Capability ("ELCC") methodologies to value resources. The adoption of ELCC methodologies is driving increasing deployment of hybrid resources (e.g., storage paired with solar) to mitigate resource intermittency.

### LCOH 2.0

- Hydrogen is a versatile energy carrier with the potential to decarbonize a broad array of sectors, although hydrogen is currently more expensive than the fuels it would substitute.
- Applications most readily suited to hydrogen conversion are those that need minimal transport, conversion or storage—these use cases will likely transition towards hydrogen most quickly.
- Key drivers of hydrogen's levelized cost are the cost of electricity, capital expenditures for production equipment and utilization of the electrolyzer.

LCOE 15.0, LCOS 7.0 and LCOH 2.0 reflect Lazard's approach to long-term thought leadership, commitment to the sectors in which we participate and focus on intellectual differentiation. The three studies are posted at [www.lazard.com/perspective](http://www.lazard.com/perspective).

Lazard's Global Power, Energy & Infrastructure Group serves private and public sector clients with advisory services regarding M&A, financing and other strategic matters. The group is active in all areas of the traditional and alternative energy industries, including regulated utilities, independent power producers, alternative energy and infrastructure.

## **About Lazard**

Lazard, one of the world's preeminent financial advisory and asset management firms, operates from 41 cities across 26 countries in North America, Europe, Asia, Australia, Central and South America. With origins dating to 1848, the firm provides advice on mergers and acquisitions, strategic matters, restructuring and capital structure, capital raising and corporate finance, as well as asset management services to corporations, partnerships, institutions, governments and individuals. For more information on Lazard, please visit [www.lazard.com](http://www.lazard.com). Follow Lazard at @Lazard.

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