LAZARD LEVELIZED COST OF ENERGY ANALYSIS 9.0
KEY FINDINGS

Lazard has released the ninth version of its Levelized Cost of Energy Analysis (LCOE 9.0), an in-depth study of Alternative Energy costs compared to conventional generation technologies. The central findings of the study are: 1) the cost competitiveness and continued price declines of certain Alternative Energy technologies; 2) the necessity of investing in diverse generation resources for integrated electric systems for the foreseeable future; and 3) the importance of rational and transparent policies that support a modern and increasingly clean energy economy.

1. Certain Alternative Energy technologies (e.g., wind and utility-scale solar) continue to be cost-competitive with conventional generation technologies in some scenarios, despite large decreases in the cost of natural gas. This analysis does not take into account potential social and environmental externalities (e.g., the social costs of distributed generation, environmental consequences of conventional generation, etc.) or reliability- or intermittency-related considerations (e.g., transmission system or back-up generation costs associated with certain Alternative Energy technologies)

- Despite a sharp drop in the price of natural gas since last year's LCOE, the costs of all forms of utility-scale solar photovoltaic and utility-scale wind technologies continue their dramatic declines (by ~80% and 60% since 2009, respectively). They remain competitive with conventional generation technologies in certain situations, as powerfully illustrated by the proliferation of successful bids by renewable energy providers in open, generation-agnostic power procurement processes

- Currently, rooftop solar PV is not cost competitive without significant subsidies, due, in part, to the small-scale nature and added complexity of rooftop installation. However, the LCOE of rooftop solar PV is expected to decline in coming years, partially as a result of more efficient installation techniques, lower costs of capital and improved supply chains. Importantly, we exclude from our analysis the value associated with certain uses of rooftop solar PV by sophisticated commercial and industrial users (e.g., demand charge management, etc.), which appears increasingly compelling to certain large energy customers

- Community solar, in which members of a single community (e.g., housing subdivisions, rental buildings, industrial parks, etc.) own divided interests in small-scale ground-mounted solar PV facilities, is becoming more widespread and compelling in certain geographies. These projects, which allow participants to receive credits against their electric bills either by state statute or negotiated agreements between the project sponsors and local utilities, provide solar energy access to consumers without the economic means or property rights to install rooftop solar PV. However, while community solar projects benefit from increased

scale and decreased installation complexity as compared to rooftop solar PV, such projects are still expensive compared to utility-scale solar PV

- The pronounced cost decrease in certain intermittent Alternative Energy technologies, combined with the needs of an aging and changing power grid in the U.S., has significantly increased demand for energy storage technologies to fulfill a variety of electric system needs (e.g., frequency regulation, transmission/substation investment deferral, demand charge shaving, etc.). Industry participants expect this increased demand to drive significant cost declines in energy storage technologies over the next five years. Increased availability of lower-cost energy storage will likely facilitate greater deployment of certain Alternative Energy technologies

- Energy efficiency remains an important, cost-effective form of Alternative Energy. However, costs for various energy efficiency initiatives vary widely and may fail to account for the opportunity costs of foregone consumption

- Very large-scale conventional and renewable generation projects (e.g., IGCC, nuclear, solar thermal, etc.) continue to face a number of challenges, including significant cost contingencies, high absolute costs, competition from relatively cheap natural gas in some geographies, operating difficulties and policy uncertainty

2. Despite the increasing cost-competiveness of certain Alternative Energy technologies, advanced economies will require diverse generation fleets to meet baseload generation needs for the foreseeable future. The optimal solution for many regions is to use Alternative Energy technologies as a complement to existing conventional generation technologies

- The U.S. (and integrated electric systems globally) will continue to benefit from a balanced generation mix, including a combination of Alternative Energy and conventional generation technologies

- While some Alternative Energy technologies have achieved notional "grid parity" under certain conditions (e.g., best-in-class wind/solar resources), such observation does not take into account potential social and environmental externalities (e.g., social costs of distributed generation, environmental consequences of conventional generation, etc.), or reliability-related considerations

3. The rapidly changing dynamics of energy costs have important ramifications for the industry, policymakers and the public. In the U.S., a coordinated federal and state energy policy, grounded in cost analysis, could enable smarter energy development, leading to sustainable energy independence, a cleaner environment and a stronger economic base.

- Alternative Energy costs have decreased dramatically in the past six years, driven in significant part by federal subsidies and related financing tools, and the resulting economies of scale in manufacturing and installation. Many of these subsidies have already or are expected to step down or expire for selected Alternative Energy technologies. A key question for industry participants will be whether these technologies can continue their cost declines and achieve wider adoption without the benefit of subsidies

- The public narrative surrounding Alternative Energy technologies remains focused to a large degree on rooftop solar PV, notwithstanding its significantly higher LCOE relative to utility-scale solar PV and wind, and its potentially adverse social effects in the context of existing net metering regimes (e.g., high-income homeowners benefiting from such regimes while still relying on the broader power grid, and related cost transfers to the relatively less affluent). This focus, combined with the availability of government incentives for rooftop solar, distorts intelligent system-wide integrated resource planning and policy