OCTOBER 2020

LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS—VERSION 14.0

LAZARD

Introduction

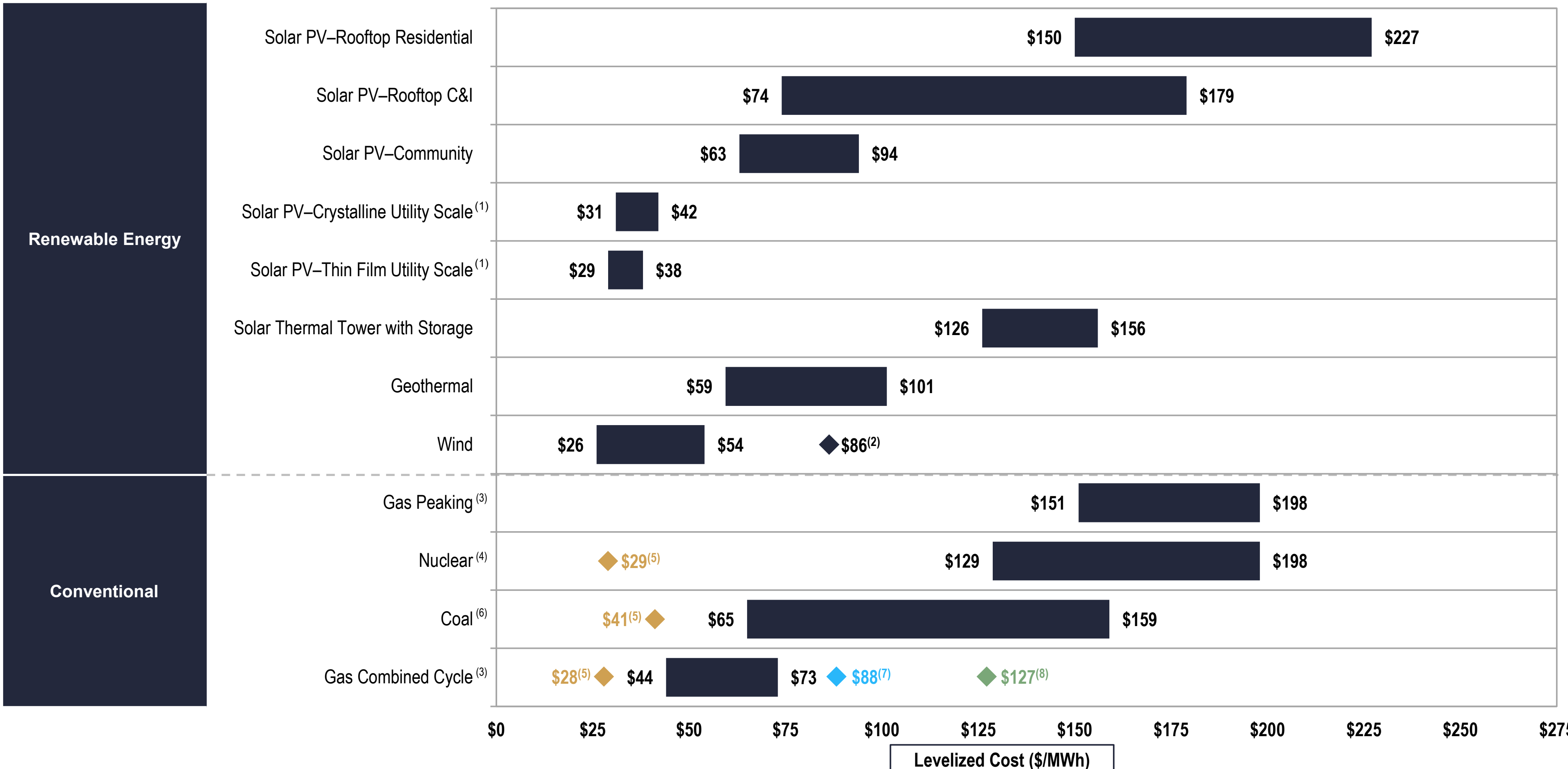
Lazard's Levelized Cost of Energy ("LCOE") analysis addresses the following topics:

- **Comparative LCOE analysis for various generation technologies on a $/MWh basis, including sensitivities for U.S. federal tax subsidies, fuel prices, carbon pricing and costs of capital**
- **Illustration of how the LCOE of onshore wind and utility-scale solar compare to the marginal cost of selected conventional generation technologies**
- **Historical LCOE comparison of various utility-scale generation technologies**
- **Illustration of the historical LCOE declines for wind and utility-scale solar technologies**
- **Illustration of how the LCOEs of utility-scale solar and wind compare to those of gas peaking and combined cycle**
- **Comparison of capital costs on a $/kW basis for various generation technologies**
- **Deconstruction of the LCOE for various generation technologies by capital cost, fixed operations and maintenance expense, variable operations and maintenance expense and fuel cost**
- **Overview of the methodology utilized to prepare Lazard's LCOE analysis**
- **Considerations regarding the operating characteristics and applications of various generation technologies**
- **Summary of assumptions utilized in Lazard's LCOE analysis**
- **Summary considerations in respect of Lazard's approach to evaluating the LCOE of various conventional and renewable energy technologies**

Other factors would also have a potentially significant effect on the results contained herein, but have not been examined in the scope of this current analysis. These additional factors, among others, could include: capacity value vs. energy value; network upgrades, transmission, congestion or other integration-related costs; significant permitting or other development costs, unless otherwise noted; and costs of complying with various environmental regulations (e.g., carbon emissions offsets or emissions control systems). This analysis also does not address potential social and environmental externalities, including, for example, the social costs and rate consequences for those who cannot afford distributed generation solutions, as well as the long-term residual and societal consequences of various conventional generation technologies that are difficult to measure (e.g., nuclear waste disposal, airborne pollutants, greenhouse gases, etc.)

Levelized Cost of Energy Comparison—Unsubsidized Analysis

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



Source: *Lazard estimates.*

Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at 8% interest rate and 40% equity at 12% cost. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities. These results are not intended to represent any particular geography. Please see page titled "Solar PV versus Gas Peaking and Wind versus CCGT—Global Markets" for regional sensitivities to selected technologies.

(1) Unless otherwise indicated herein, the low case represents a single-axis tracking system and the high case represents a fixed-tilt system.

(2) Represents the estimated implied midpoint of the LCOE of offshore wind, assuming a capital cost range of approximately $2,600 – $3,675/kW.

(3) The fuel cost assumption for Lazard's global, unsubsidized analysis for gas-fired generation resources is $3.45/MMBTU.

(4) Unless otherwise indicated, the analysis herein does not reflect decommissioning costs, ongoing maintenance-related capital expenditures or the potential economic impacts of federal loan guarantees or other subsidies.

(5) Represents the midpoint of the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper- and lower-quartile estimates derived from Lazard's research. Please see page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation" for additional details.

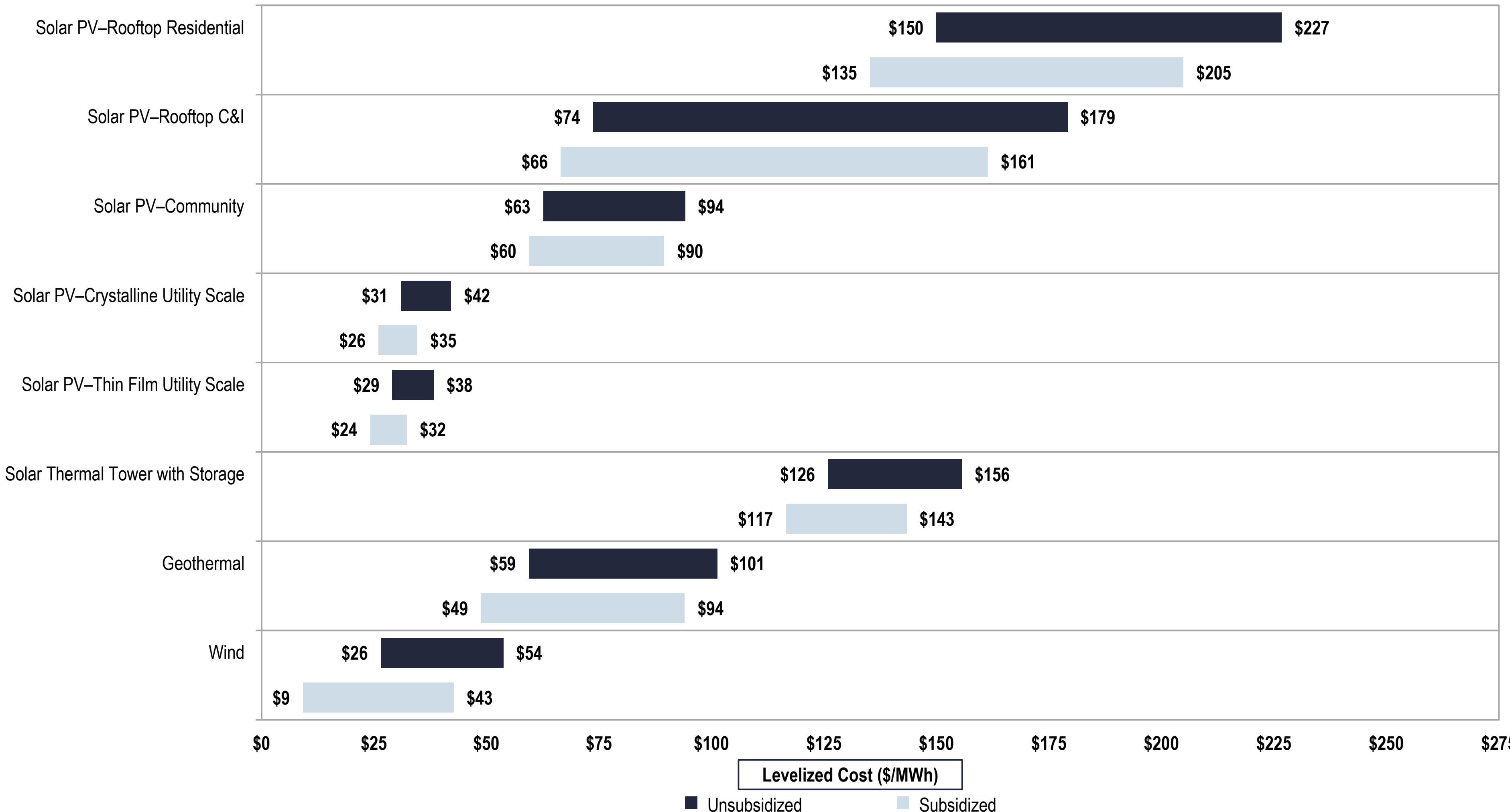
(6) High end incorporates 90% carbon capture and storage. Does not include cost of transportation and storage.

(7) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Blue" hydrogen, (i.e., hydrogen produced from a steam-methane reformer, using natural gas as a feedstock, and sequestering the resulting CO_2 in a nearby saline aquifer). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $5.20/MMBTU.

(8) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Green" hydrogen, (i.e., hydrogen produced from an electrolyzer powered by a mix of wind and solar generation and stored in a nearby salt cavern). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $10.05/MMBTU.

Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies(1)

The Investment Tax Credit ("ITC") and Production Tax Credit ("PTC") remain important components of the levelized cost of renewable energy generation technologies



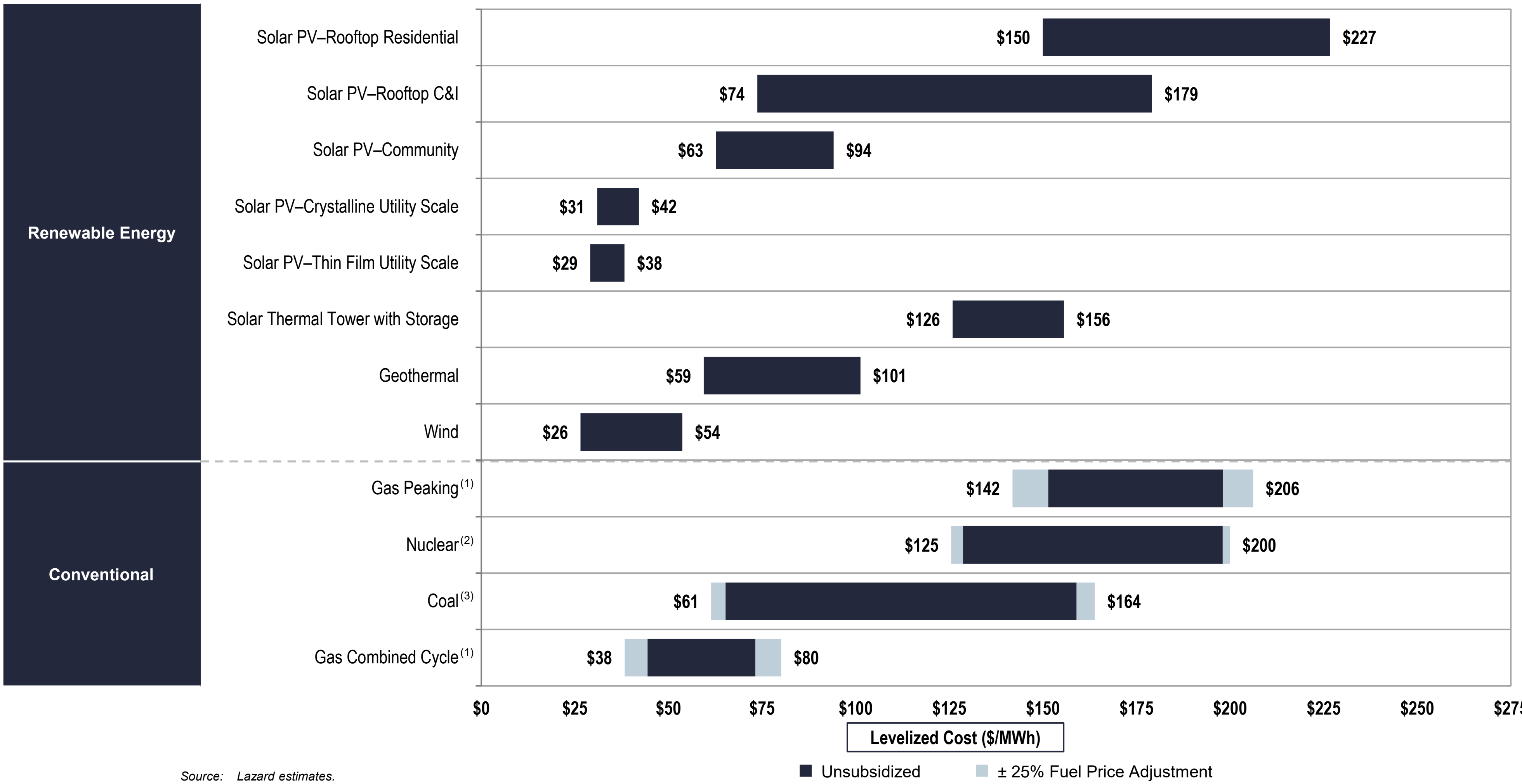
Source: Lazard estimates.

Note: The sensitivity analysis presented on this page also includes sensitivities related to the U.S. Tax Cuts and Jobs Act ("TCJA") of 2017. The TCJA contains several provisions that impact the LCOE of various generation technologies (e.g., a reduced federal corporate income tax rate, an ability to elect immediate bonus depreciation, limitations on the deductibility of interest expense and restrictions on the utilization of past net operating losses). On balance the TCJA reduced the LCOE of conventional generation technologies and marginally increased the LCOE of renewable energy technologies.

(1) The sensitivity analysis presented on this page assumes that projects qualify for the full ITC/PTC and have a capital structure that includes sponsor equity, tax equity and debt.

Levelized Cost of Energy Comparison—Sensitivity to Fuel Prices

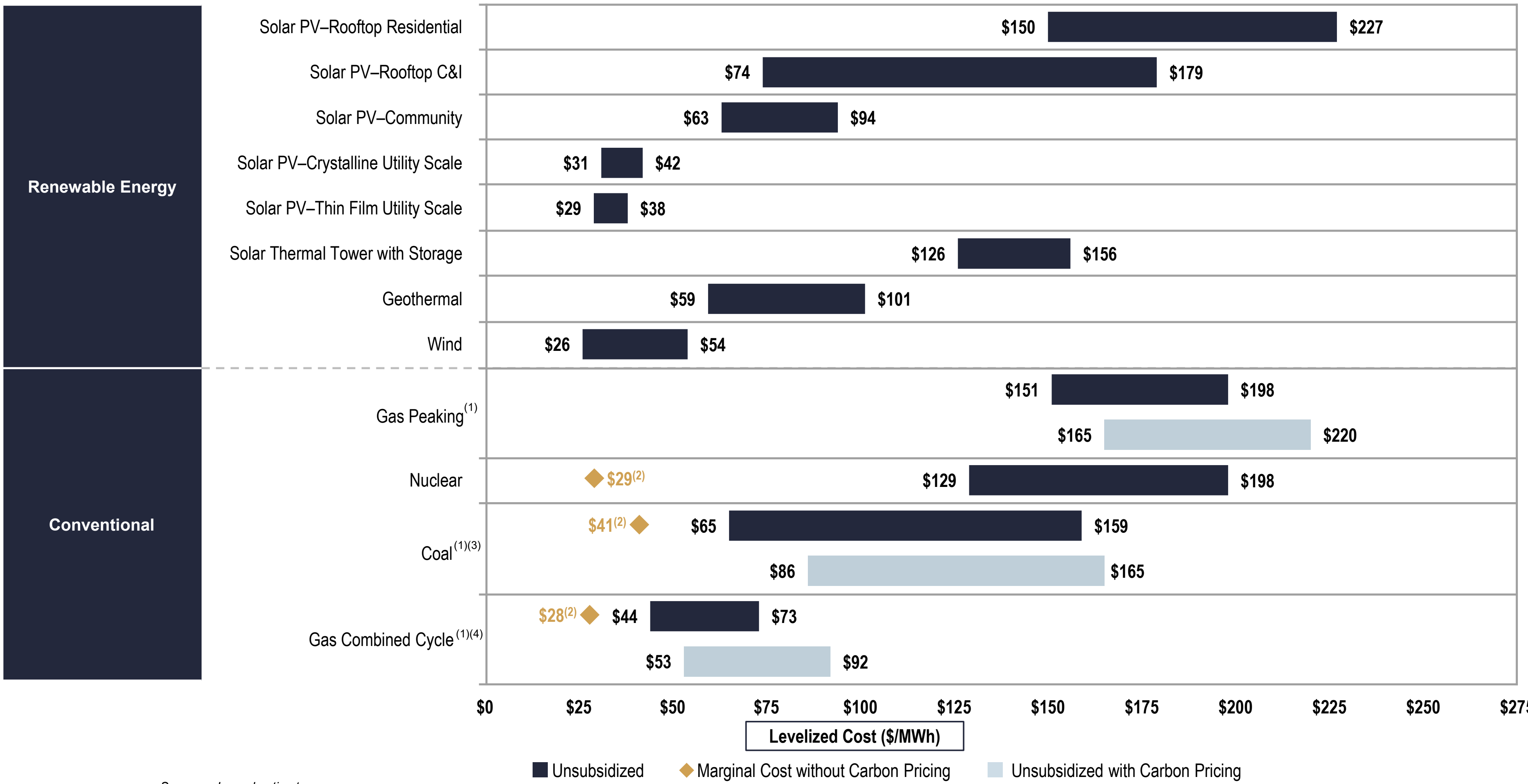
Variations in fuel prices can materially affect the LCOE of conventional generation technologies, but direct comparisons to "competing" renewable energy generation technologies must take into account issues such as dispatch characteristics (e.g., baseload and/or dispatchable intermediate capacity vs. those of peaking or intermittent technologies)



Source: *Lazard estimates.*
Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".
(1) Assumes a fuel cost range for gas-fired generation resources of $2.59/MMBTU – $4.31/MMBTU (representing a range of ± 25% of the standard assumption of $3.45/MMBTU).
(2) Assumes a fuel cost range for nuclear generation resources of $0.64/MMBTU – $1.06/MMBTU (representing a range of ± 25% of the standard assumption of $0.85MMBTU).
(3) Assumes a fuel cost range for coal-fired generation resources of $1.10/MMBTU – $1.84/MMBTU (representing a range of ± 25% of the standard assumption of $1.47/MMBTU).

Levelized Cost of Energy Comparison—Sensitivity to Carbon Pricing

Carbon pricing is one avenue for policymakers to address carbon emissions via a market-based mechanism; a carbon price range of $20 – $40/Ton of carbon would increase the LCOE for certain conventional generation technologies to levels above those of onshore wind and utility-scale solar

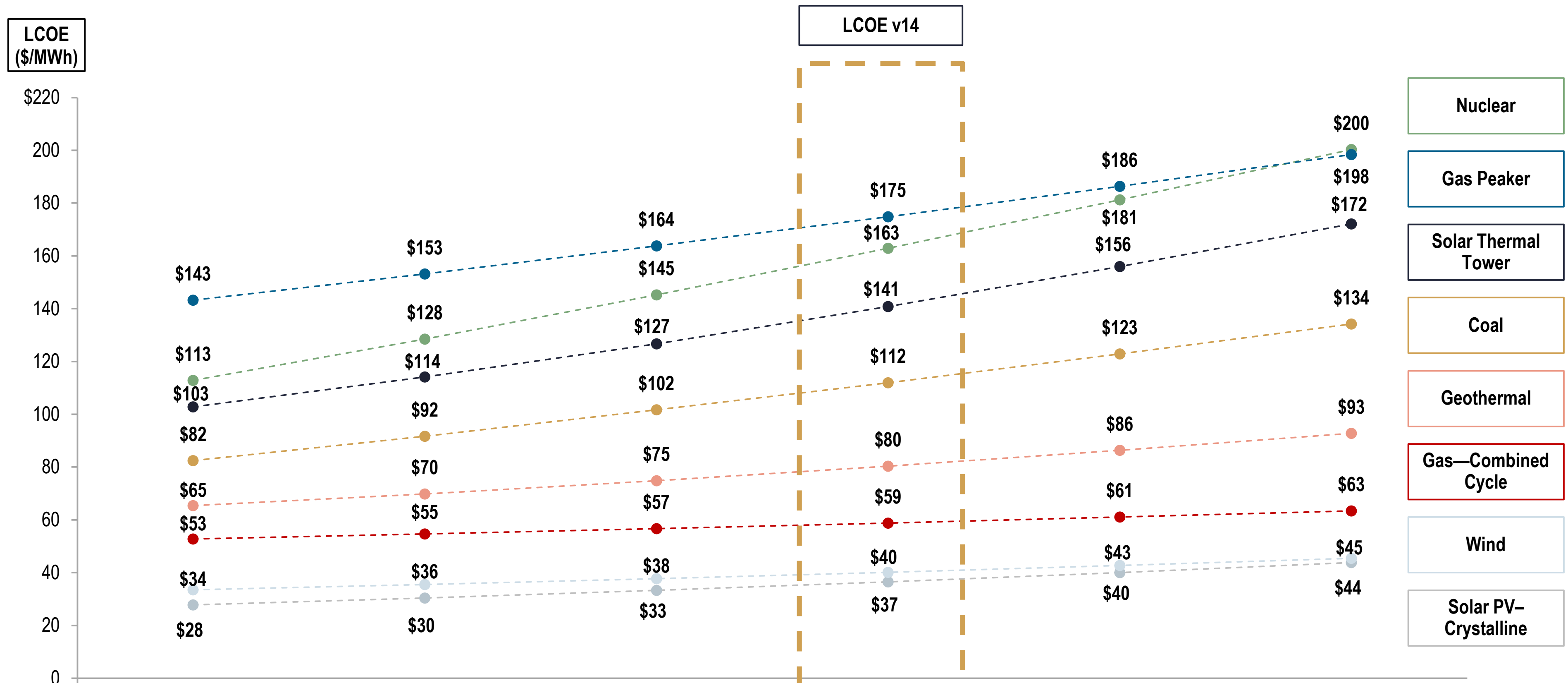


Source: *Lazard estimates.*
Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".
(1) The low and high ranges reflect the LCOE of selected conventional generation technologies including illustrative carbon prices of $20/Ton and $40/Ton, respectively.
(2) Reflects the midpoint of the marginal cost of operating fully depreciated gas combined cycle and coal facilities as shown on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".
(3) The narrow spread between the high end of new build coal with and without carbon pricing results from the incorporation of 90% carbon capture and compression. The midpoint of the marginal cost of operating fully depreciated coal facilities with the illustrative carbon pricing presented herein is $167/MWh. Operating coal facilities are not assumed to employ carbon capture and storage technology.
(4) The midpoint of the marginal cost of operating fully depreciated gas combined cycle facilities with the illustrative carbon pricing presented herein is $59/MWh, reflecting the relatively higher heat rate for existing plants compared to new build facilities.

Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital

A key consideration in determining the LCOE values for utility-scale generation technologies is the cost, and availability, of capital[(1)]; this dynamic is particularly significant for renewable energy generation technologies

Midpoint of Unsubsidized LCOE[(2)]

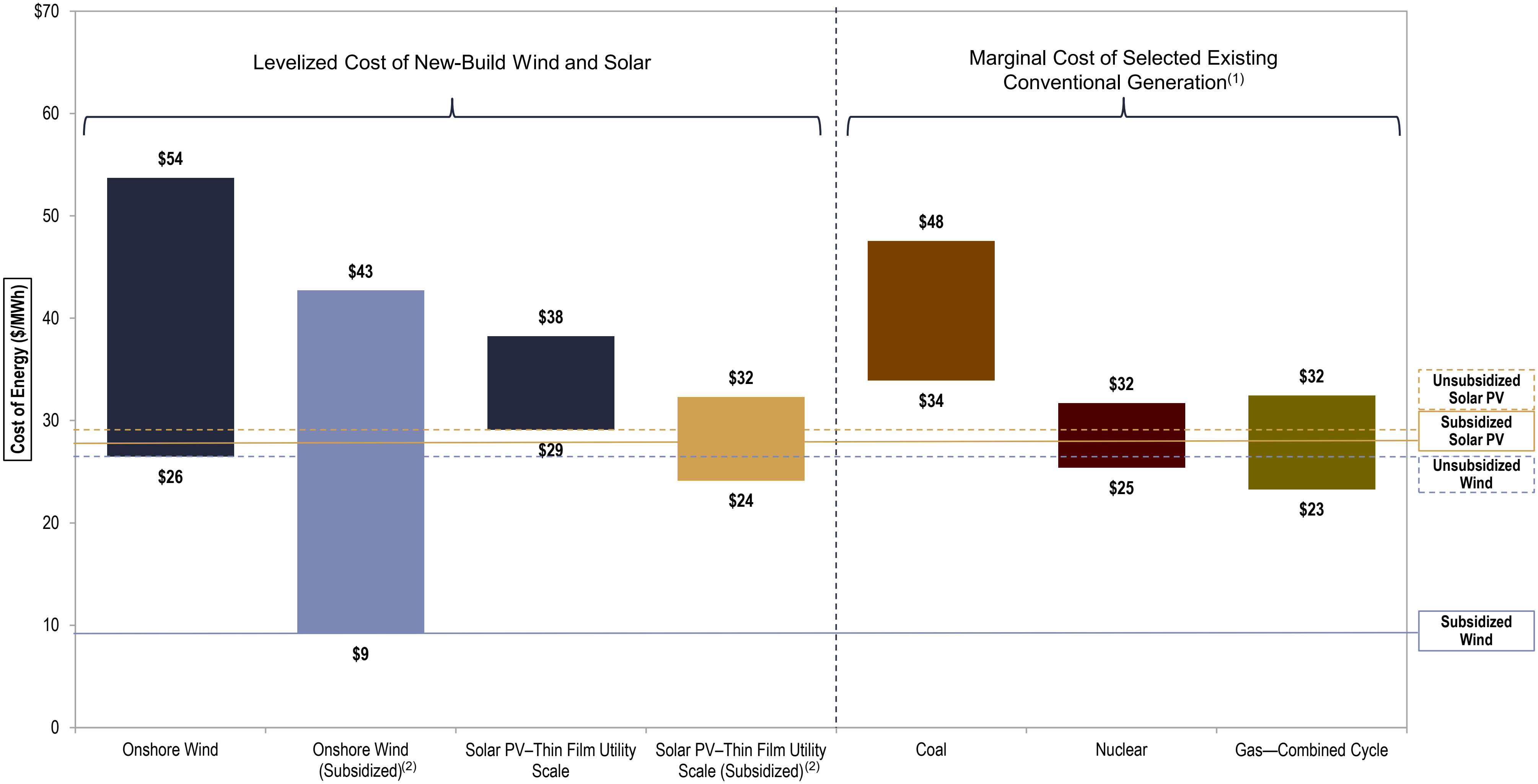


After-Tax IRR/WACC	4.2%	5.4%	6.5%	7.7%	8.8%	10.0%
Cost of Equity	6.0%	8.0%	10.0%	12.0%	14.0%	16.0%
Cost of Debt	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%

Source: *Lazard estimates.*
Note: Analysis assumes 60% debt and 40% equity. Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".
(1) Cost of capital as used herein indicates the cost of capital applicable to the asset/plant and not the cost of capital of a particular investor/owner.
(2) Reflects the average of the high and low LCOE for each respective cost of capital assumption.

Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation

Certain renewable energy generation technologies have an LCOE that is competitive with the marginal cost of existing conventional generation



Source: Lazard estimates.

Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".

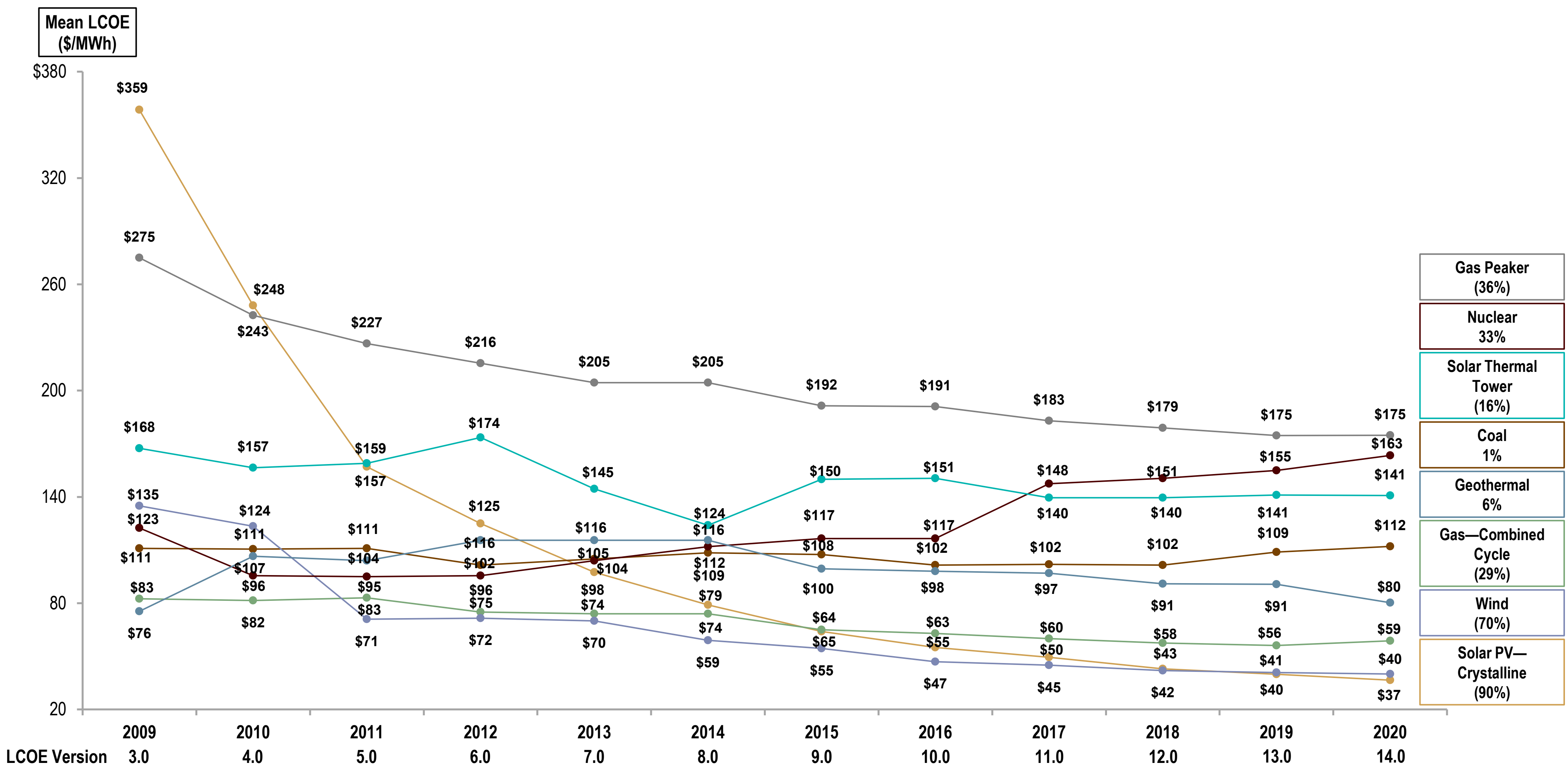
(1) Represents the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper and lower quartile estimates derived from Lazard's research.

(2) The subsidized analysis includes sensitivities related to the TCJA and U.S. federal tax subsidies. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies" for additional details.

Levelized Cost of Energy Comparison—Historical Utility-Scale Generation Comparison

Lazard's unsubsidized LCOE analysis indicates significant historical cost declines for utility-scale renewable energy generation technologies driven by, among other factors, decreasing capital costs, improving technologies and increased competition

Selected Historical Mean Unsubsidized LCOE Values[(1)]



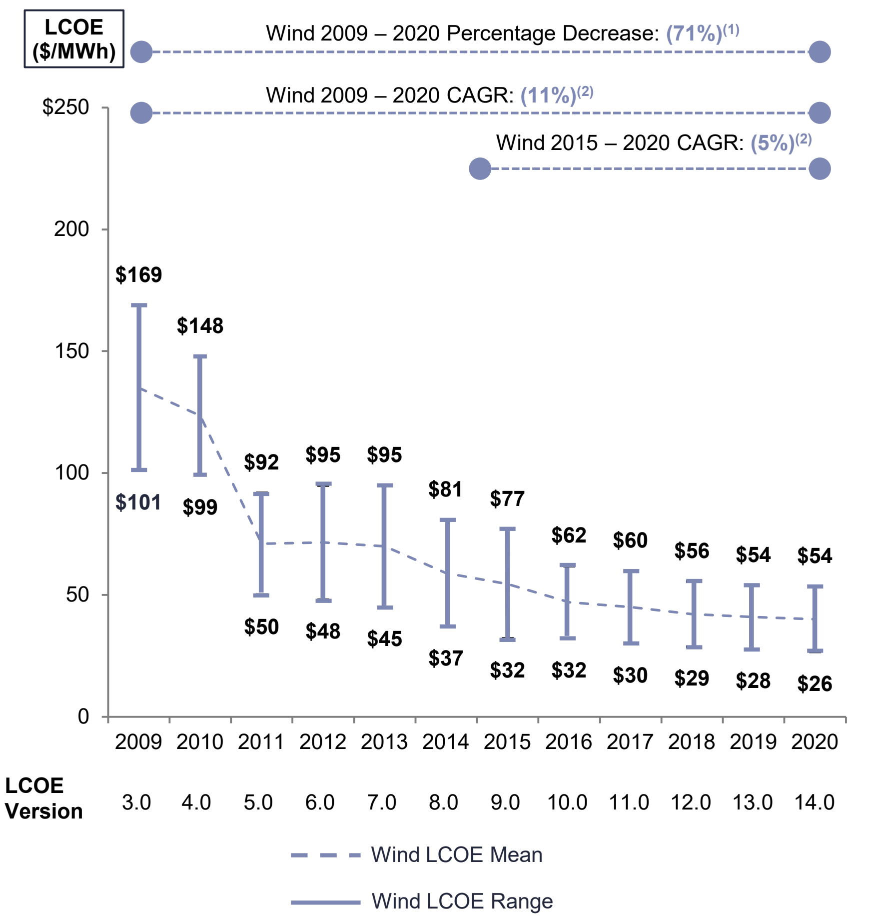
Source: Lazard estimates.

(1) Reflects the average of the high and low LCOE for each respective technology in each respective year. Percentages represent the total decrease in the average LCOE since Lazard's LCOE—Version 3.0.

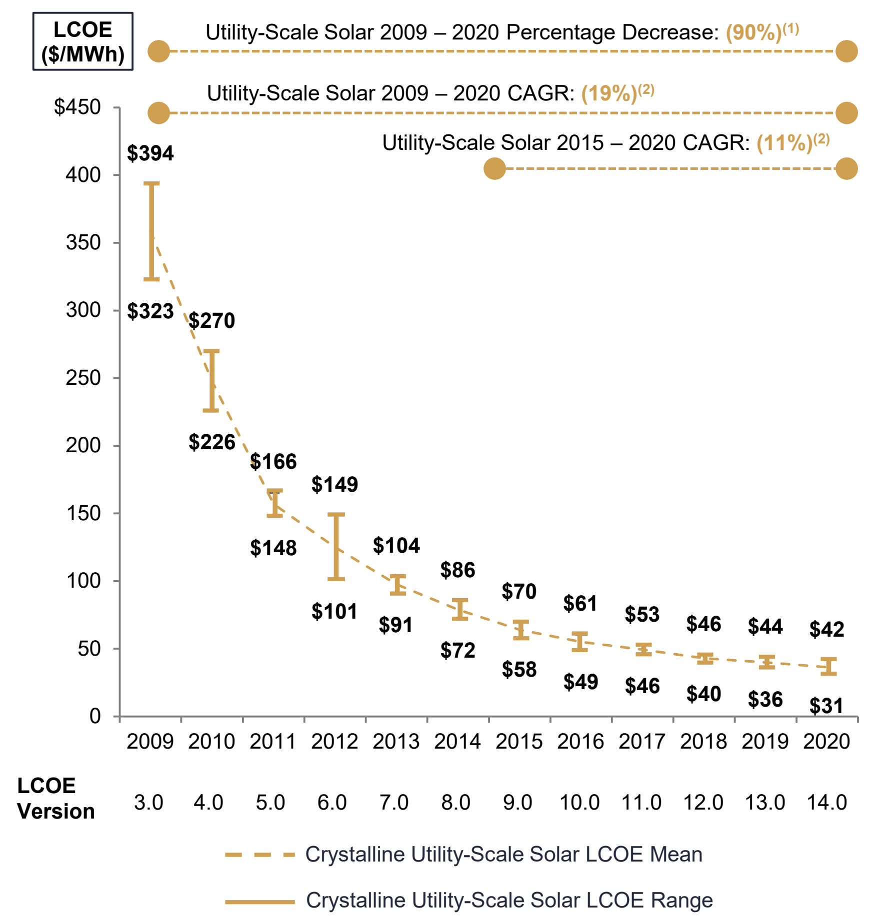
Levelized Cost of Energy Comparison—Historical Renewable Energy LCOE Declines

In light of material declines in the pricing of system components and improvements in efficiency, among other factors, wind and utility-scale solar PV have exhibited dramatic LCOE declines; however, as these industries have matured, the rates of decline have diminished

Unsubsidized Wind LCOE



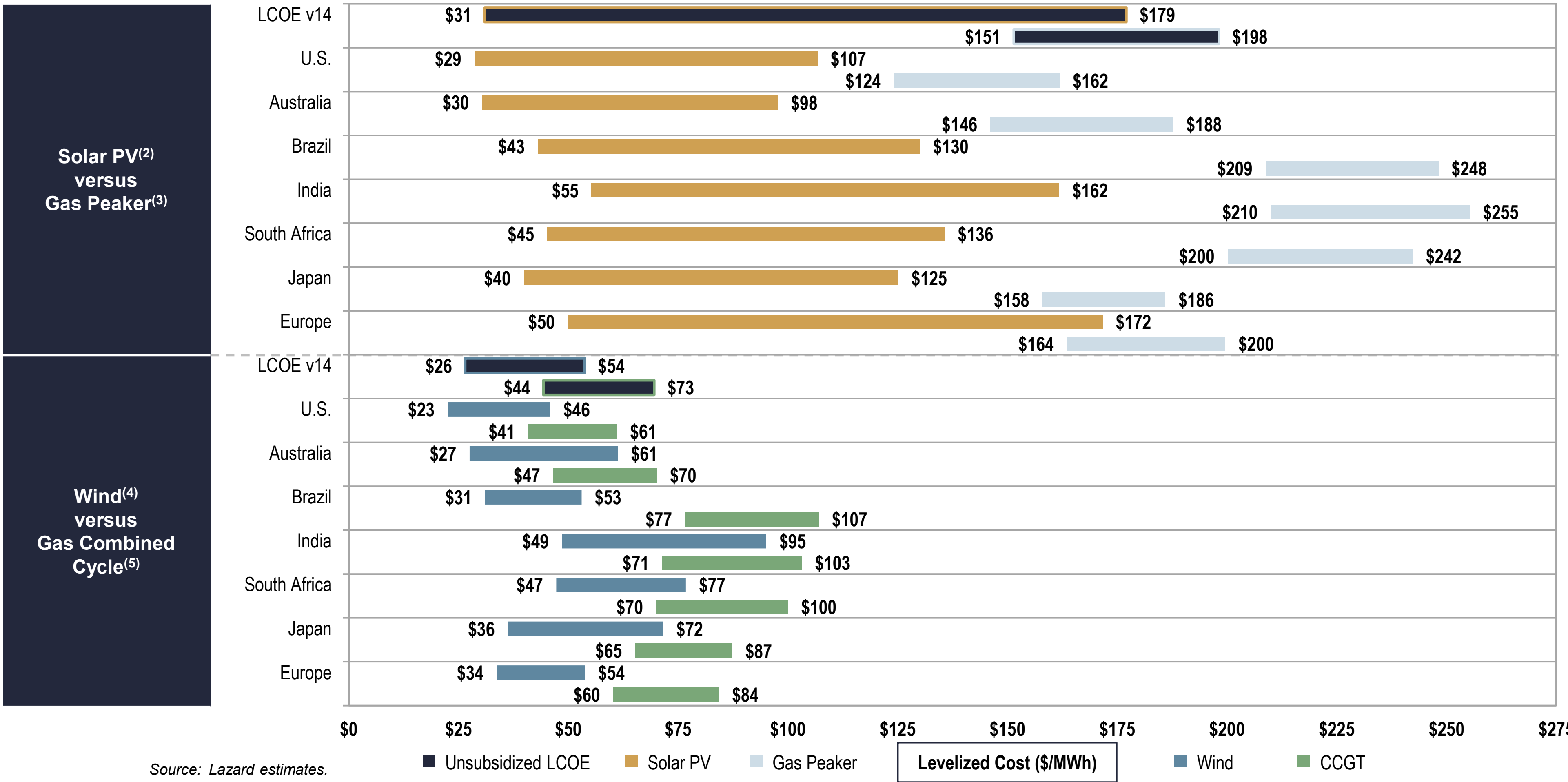
Unsubsidized Solar PV LCOE



Source: Lazard estimates.
(1) Represents the average percentage decrease of the high end and low end of the LCOE range.
(2) Represents the average compounded annual rate of decline of the high end and low end of the LCOE range.

Solar PV versus Gas Peaking and Wind versus CCGT—Global Markets(1)

Solar PV and wind have become increasingly competitive with conventional technologies with similar generation profiles; without storage, however, these resources lack the dispatch characteristics, and associated benefits, of such conventional technologies



Source: Lazard estimates.

Note: The analysis presented on this page assumes country-specific or regionally applicable tax rates.

(1) Equity IRRs are assumed to be 10.0% – 12.0% for Australia, 15.0% for Brazil and South Africa, 13.0% – 15.0% for India, 8.0% – 10.0% for Japan, 7.5% – 12.0% for Europe and 7.5% – 9.0% for the U.S. Cost of debt is assumed to be 5.0% – 5.5% for Australia, 10.0% – 12.0% for Brazil, 12.0% – 13.0% for India, 3.0% for Japan, 4.5% – 5.5% for Europe, 12.0% for South Africa and 4.0% – 4.5% for the U.S.

(2) Low end assumes crystalline utility-scale solar with a single-axis tracker. High end assumes rooftop C&I solar. Solar projects assume illustrative capacity factors of 21% – 28% for the U.S., 26% – 30% for Australia, 26% – 28% for Brazil, 22% – 23% for India, 27% – 29% for South Africa, 16% – 18% for Japan and 13% – 16% for Europe.

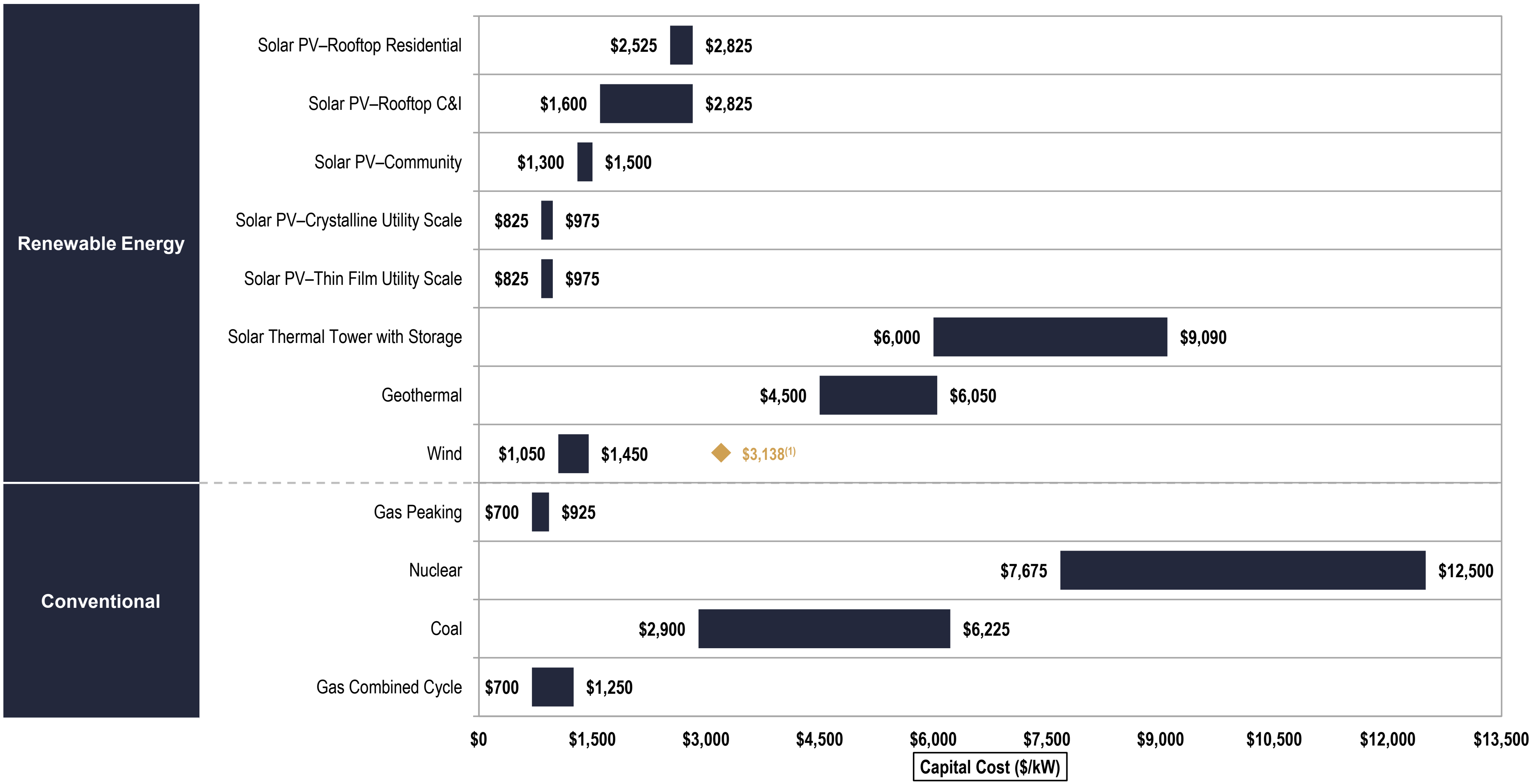
(3) Assumes natural gas prices of $3.45 for the U.S., $4.00 for Australia, $8.00 for Brazil, $7.00 for India, South Africa and Japan and $6.00 for Europe (all in U.S.$ per MMBtu). Assumes a capacity factor of 10% for all geographies.

(4) Wind projects assume illustrative capacity factors of 38% – 55% for the U.S., 29% – 46% for Australia, 45% – 55% for Brazil, 25% – 35% for India, 31% – 36% for South Africa, 22% – 30% for Japan and 33% – 38% for Europe.

(5) Assumes natural gas prices of $3.45 for the U.S., $4.00 for Australia, $8.00 for Brazil, $7.00 for India, South Africa and Japan and $6.00 for Europe (all in U.S.$ per MMBtu). Assumes capacity factors of 55% – 70% on the high and low ends, respectively, for all geographies.

Capital Cost Comparison

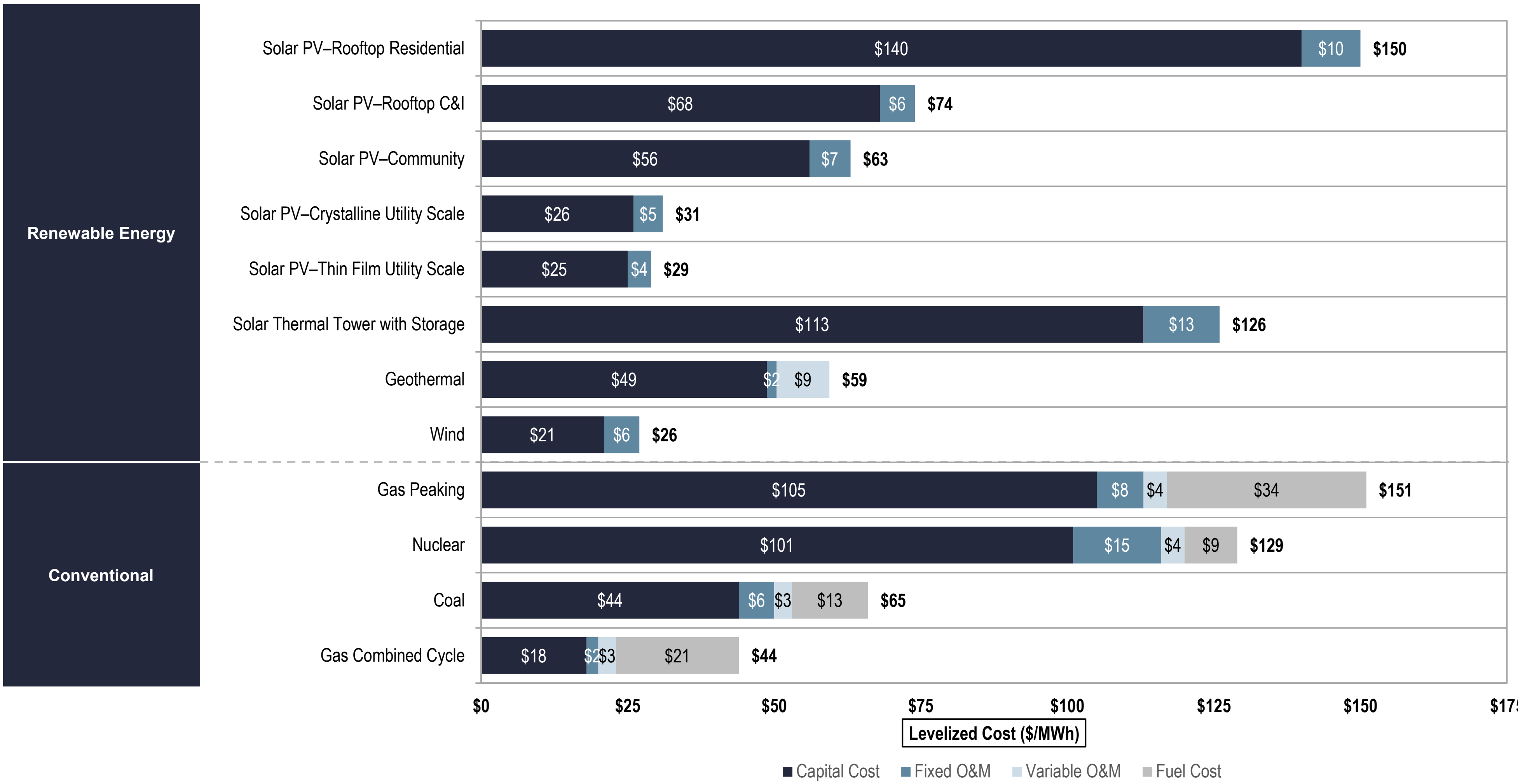
In some instances, the capital costs of renewable energy generation technologies have converged with those of certain conventional generation technologies, which coupled with improvements in operational efficiency for renewable energy technologies, have led to a convergence in LCOE between the respective technologies



Source: Lazard estimates.
(1) Represents the estimated midpoint of the total capital cost for offshore wind.

Levelized Cost of Energy Components—Low End

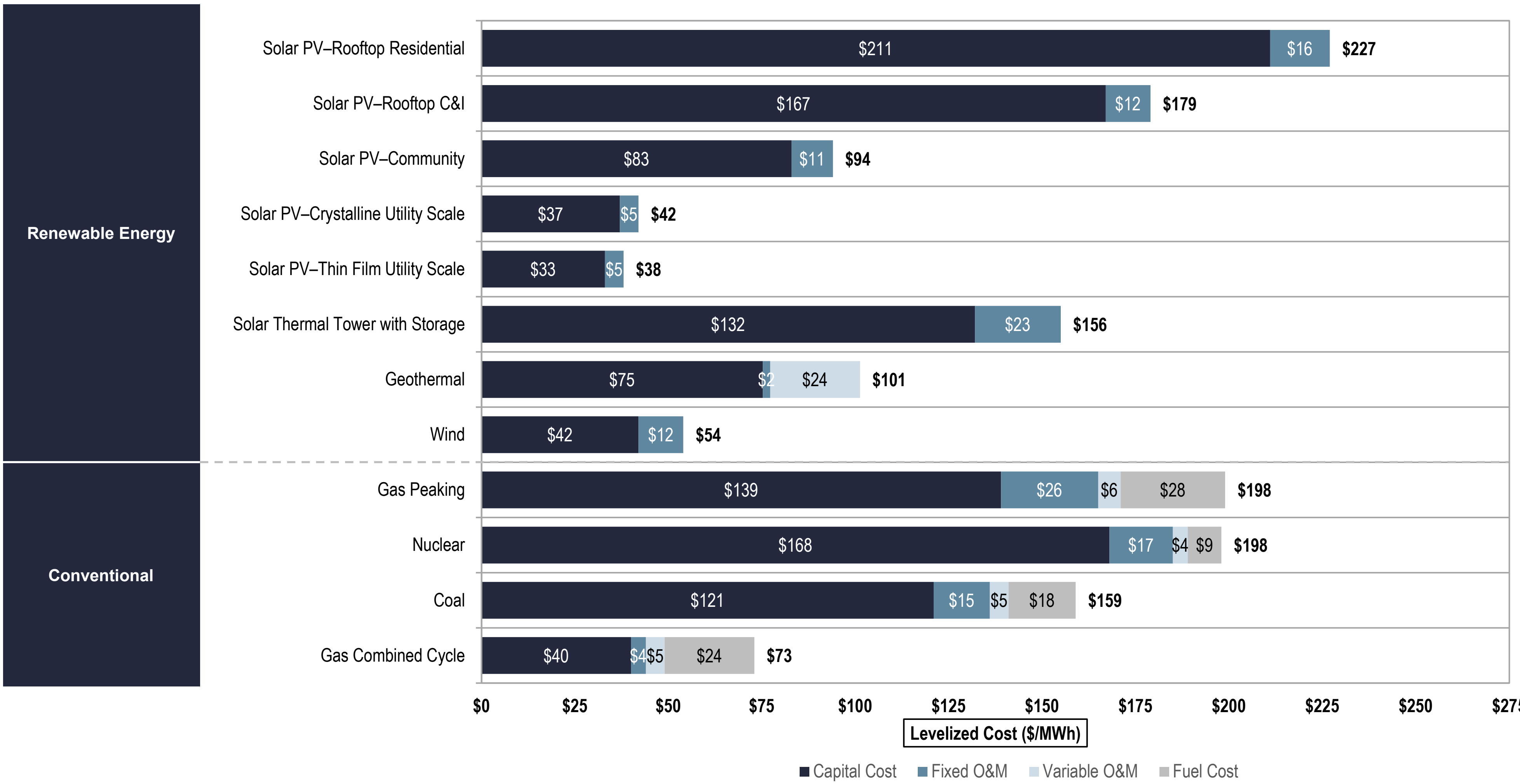
Certain renewable energy generation technologies are already cost-competitive with conventional generation technologies; a key factor regarding the continued cost decline of renewable energy generation technologies is the ability of technological development and industry scale to continue lowering operating expenses and capital costs for renewable energy generation technologies



Source: Lazard estimates.

Levelized Cost of Energy Components—High End

Certain renewable energy generation technologies are already cost-competitive with conventional generation technologies; a key factor regarding the continued cost decline of renewable energy generation technologies is the ability of technological development and industry scale to continue lowering operating expenses and capital costs for renewable energy generation technologies



Source: Lazard estimates.

Levelized Cost of Energy Comparison—Methodology

($ in millions, unless otherwise noted)

Lazard's LCOE analysis consists of creating a power plant model representing an illustrative project for each relevant technology and solving for the $/MWh value that results in a levered IRR equal to the assumed cost of equity (see subsequent "Key Assumptions" pages for detailed assumptions by technology)

Unsubsidized Wind — High Case Sample Illustrative Calculations

Year[1]		*0*	*1*	*2*	*3*	*4*	*5*	*20*
Capacity (MW)	(A)		175	175	175	175	175	175
Capacity Factor	(B)		38%	38%	38%	38%	38%	38%
Total Generation ('000 MWh)	(A) x (B) = (C)*		583	583	583	583	583	583
Levelized Energy Cost ($/MWh)	***(D)***		***$53.7***	***$53.7***	***$53.7***	***$53.7***	***$53.7***	***$53.7***
Total Revenues	**(C) x (D) = (E)***		**$31.3**	**$31.3**	**$31.3**	**$31.3**	**$31.3**	**$31.3**
Total Fuel Cost	(F)		--	--	--	--	--	--
Total O&M	(G)*		6.9	7.0	7.2	7.3	7.5	10.7
Total Operating Costs	**(F) + (G) = (H)**		**$6.9**	**$7.0**	**$7.2**	**$7.3**	**$7.5**	$10.7
EBITDA	**(E) - (H) = (I)**		**$24.4**	**$24.3**	**$24.1**	**$23.9**	**$23.8**	**$20.6**
Debt Outstanding - Beginning of Period	(J)		$152.3	$149.2	$146.0	$142.4	$138.6	$14.1
Debt - Interest Expense	(K)		(12.2)	(11.9)	(11.7)	(11.4)	(11.1)	(1.1)
Debt - Principal Payment	(L)		(3.0)	(3.3)	(3.5)	(3.8)	(4.1)	(14.1)
Levelized Debt Service	(K) + (L) = (M)		($15.2)	($15.2)	($15.2)	($15.2)	($15.2)	($15.2)
EBITDA	**(I)**		$24.4	$24.3	$24.1	$23.9	$23.8	$20.6
Depreciation (MACRS)	(N)		(50.8)	(81.2)	(48.7)	(29.2)	(29.2)	--
Interest Expense	(K)		(12.2)	(11.9)	(11.7)	(11.4)	(11.1)	(1.1)
Taxable Income	**(I) + (N) + (K) = (O)**		**($38.5)**	**($68.9)**	**($36.3)**	**($16.7)**	**($16.5)**	**$19.4**
Tax Benefit (Liability)[2]	**(O) x (tax rate) = (P)**		**$15.4**	**$27.6**	**$14.5**	**$6.7**	**$6.6**	**($7.8)**
After-Tax Net Equity Cash Flow	**(I) + (M) + (P) = (Q)**	**($101.5)**[3]	**$24.6**	**$36.6**	**$23.4**	**$15.4**	**$15.2**	**($2.4)**
IRR For Equity Investors		**12.0%**						

Key Assumptions[4]	
Capacity (MW)	175
Capacity Factor	38%
Fuel Cost ($/MMBtu)	$0.00
Heat Rate (Btu/kWh)	0
Fixed O&M ($/kW-year)	$39.5
Variable O&M ($/MWh)	$0.0
O&M Escalation Rate	2.25%
Capital Structure	
Debt	60.0%
Cost of Debt	8.0%
Equity	40.0%
Cost of Equity	12.0%
Taxes and Tax Incentives:	
Combined Tax Rate	40%
Economic Life (years)[5]	20
MACRS Depreciation (Year Schedule)	5
Capex	
EPC Costs ($/kW)	$1,450
Additional Owner's Costs ($/kW)	$0
Transmission Costs ($/kW)	$0
Total Capital Costs ($/kW)	$1,450
Total Capex ($mm)	$254

Technology-dependent

Levelized

Source: *Lazard estimates.*
Note: Wind—High LCOE case presented for illustrative purposes only.
* Denotes unit conversion.
(1) Assumes half-year convention for discounting purposes.
(2) Assumes full monetization of tax benefits or losses immediately.
(3) Reflects initial cash outflow from equity investors.
(4) Reflects a "key" subset of all assumptions for methodology illustration purposes only. Does not reflect all assumptions.
(5) Economic life sets debt amortization schedule. For comparison purposes, all technologies calculate LCOE on a 20-year IRR basis.

Energy Resources—Matrix of Applications

Despite convergence in the LCOE of certain renewable energy and conventional generation technologies, direct comparisons must take into account issues such as location (e.g., centralized vs. distributed) and dispatch characteristics (e.g., baseload and/or dispatchable intermediate capacity vs. those of peaking or intermittent technologies)

- **This analysis does not take into account potential social and environmental externalities or reliability-related considerations**

		Carbon Neutral/ REC Potential	Location			Dispatch			
			Distributed	Centralized	Geography	Intermittent	Peaking	Load-Following	Baseload
Renewable Energy	Solar PV[1]	✓	✓	✓	Universal[2]	✓	✓		
	Solar Thermal	✓		✓	Rural	✓	✓	✓	
	Geothermal	✓		✓	Varies				✓
	Onshore Wind	✓		✓	Rural	✓			
Conventional	Gas Peaking	✗	✓	✓	Universal		✓	✓	
	Nuclear	✓		✓	Rural				✓
	Coal	✗		✓	Co-located or rural				✓
	Gas Combined Cycle	✗		✓	Universal			✓	✓

Source: Lazard estimates.
(1) Represents the full range of solar PV technologies.
(2) Qualification for RPS requirements varies by location.

Levelized Cost of Energy—Key Assumptions

		Solar PV									
		Rooftop—Residential		Rooftop—C&I		Community		Utility Scale—Crystalline(1)		Utility Scale—Thin Film(1)	
	Units	Low Case	High Case	Low Case	High Case	Low Case	High Case	Low Case	High Case	Low Case	High Case
Net Facility Output	MW	0.005	0.005	1	1	5	5	150	150	150	150
EPC Cost	$/kW	$2,525	$2,825	$1,600	$2,825	$1,300	$1,500	$975	$825	$975	$825
Capital Cost During Construction	$/kW	—	—	—	—	—	—	—	—	—	—
Total Capital Cost	$/kW	$2,525	$2,825	$1,600	$2,825	$1,300	$1,500	$975	$825	$975	$825
Fixed O&M	$/kW-yr	$15.00	$18.00	$11.75	$18.00	$12.00	$16.00	$13.50	$9.50	$9.50	$13.50
Variable O&M	$/MWh	—	—	—	—	—	—	—	—	—	—
Heat Rate	Btu/kWh	—	—	—	—	—	—	—	—	—	—
Capacity Factor	%	18%	13%	23%	17%	21%	17%	34%	21%	36%	23%
Fuel Price	$/MMBtu	—	—	—	—	—	—	—	—	—	—
Construction Time	Months	3	3	3	3	4	4	9	9	9	9
Facility Life	Years	25	25	25	25	30	30	30	30	30	30
CO_2 Emissions	lb/MWh	—	—	—	—	—	—	—	—	—	—
Levelized Cost of Energy	$/MWh	$150	$227	$74	$179	$63	$94	$31	$42	$29	$38

Source: Lazard estimates.
(1) The "Low Case" represents assumptions used to calculate the low end of the LCOE range, representing a project with single-axis tracking. The "High Case" represents assumptions used to calculate the high end of the LCOE range, representing a project with fixed-tilt design.

Levelized Cost of Energy—Key Assumptions (cont'd)

	Units	Solar Thermal Tower with Storage(1)		Geothermal		Wind—Onshore		Wind—Offshore	
		Low Case	High Case	Low Case	High Case	Low Case	High Case	Low Case	High Case
Net Facility Output	MW	110	150	20	50	175	175	210	385
EPC Cost	$/kW	$7,950	$5,250	$3,950	$5,300	$1,050	$1,450	$2,600	$3,675
Capital Cost During Construction	$/kW	$1,150	$750	$550	$750	—	—	—	—
Total Capital Cost(2)	$/kW	$9,090	$6,000	$4,500	$6,050	$1,050	$1,450	$2,600	$3,675
Fixed O&M	$/kW-yr	$75.00	$80.00	$13.00	$14.00	$27.00	$39.50	$67.25	$81.75
Variable O&M	$/MWh	—	—	$9.00	$24.00	—	—	—	—
Heat Rate	Btu/kWh	—	—	—	—	—	—	—	—
Capacity Factor	%	68%	39%	90%	80%	55%	38%	52%	48%
Fuel Price	$/MMBtu	—	—	—	—	—	—	—	—
Construction Time	Months	36	36	36	36	12	12	12	12
Facility Life	Years	35	35	25	25	20	20	20	20
CO_2 Emissions	lb/MWh	—	—	—	—	—	—	—	—
Levelized Cost of Energy	$/MWh	$126	$156	$59	$101	$26	$54	$69	$104

Source: Lazard estimates.

(1) The "Low Case" represents assumptions used to calculate the low end of the LCOE range, representing a project with 18 hours of storage capacity. The "High Case" represents assumptions used to calculate the high end of the LCOE range, representing a project with eight hours of storage.

(2) Includes capitalized financing costs during construction for generation types with over 12 months of construction time.

Levelized Cost of Energy—Key Assumptions (cont'd)

	Units	Gas Peaking		Nuclear (New Build)		Coal (New Build)		Gas Combined Cycle (New Build)	
		Low Case	High Case	Low Case	High Case	Low Case	High Case[3]	Low Case	High Case
Net Facility Output	MW	240	50	2,200	2,200	600	600	550	550
EPC Cost	$/kW	$675	$875	$6,025	$9,800	$2,350	$4,925	$650	$1,150
Capital Cost During Construction	$/kW	$25	$50	$1,650	$2,700	$550	$1,300	$50	$100
Total Capital Cost[1]	$/kW	$700	$925	$7,675	$12,500	$2,900	$6,225	$700	$1,250
Fixed O&M	$/kW-yr	$7.25	$22.75	$119.00	$133.25	$39.75	$83.00	$14.50	$18.50
Variable O&M	$/MWh	$4.25	$5.75	$3.75	$4.25	$2.75	$5.00	$2.75	$5.00
Heat Rate	Btu/kWh	9,800	8,000	10,450	10,450	8,750	12,000	6,150	6,900
Capacity Factor	%	10%	10%	92%	89%	83%	63%	70%	50%
Fuel Price	$/MMBtu	$3.45	$3.45	$0.85	$0.85	$1.45	$1.45	$3.45	$3.45
Construction Time	Months	12	18	69	69	60	66	24	24
Facility Life	Years	20	20	40	40	40	40	20	20
CO_2 Emissions[2]	lb/MWh	1,147	936	—	—	1,839	252[3]	720	807
Levelized Cost of Energy	$/MWh	$151	$198	$129	$198	$65	$159	$44	$73

Source: Lazard estimates.
(1) Includes capitalized financing costs during construction for generation types with over 12 months of construction time.
(2) CO_2 emissions calculated based on U.S. Energy Information Administration estimates of CO_2 emission coefficients by fuel type and the plant heat rates indicated above.
(3) Reflects a coal plant with 2,522 lb/MWh of CO_2 emissions operating with a 90% carbon capture and storage system.

Levelized Cost of Energy—Key Assumptions (cont'd)

	Units	Nuclear (Operating)		Coal (Operating)		Gas Combined Cycle (Operating)	
		Low Case	High Case	Low Case	High Case	Low Case	High Case
Net Facility Output	MW	2,200	2,200	600	600	550	550
EPC Cost	$/kW	—	—	—	—	—	—
Capital Cost During Construction	$/kW	—	—	—	—	—	—
Total Capital Cost	$/kW	—	—	—	—	—	—
Fixed O&M	$/kW-yr	$82.80	$103.10	$23.20	$40.30	$9.40	$11.70
Variable O&M	$/MWh	$2.50	$3.50	$2.70	$6.00	$0.70	$1.50
Heat Rate	Btu/kWh	10,400	10,400	10,075	11,275	6,900	7,475
Capacity Factor	%	97%	89%	35%	65%	69%	45%
Fuel Price	$/MMBtu	$0.70	$0.80	$1.90	$2.50	$2.60	$3.20
Construction Time	Months	—	—	—	—	—	—
Facility Life	Years	40	40	40	40	20	20
CO_2 Emissions[(1)]	lb/MWh	—	—	2,118	2,370	807	875
Levelized Cost of Energy	$/MWh	$25	$32	$34	$48	$23	$32

Source: Lazard estimates.
(1) CO_2 emissions calculated based on U.S. Energy Information Administration estimates of CO_2 emission coefficients by fuel type and the plant heat rates indicated above.

Summary Considerations

Lazard has conducted this analysis comparing the LCOE for various conventional and renewable energy generation technologies in order to understand which renewable energy generation technologies may be cost-competitive with conventional generation technologies, either now or in the future, and under various operating assumptions. We find that renewable energy technologies are complementary to conventional generation technologies, and believe that their use will be increasingly prevalent for a variety of reasons, including to mitigate the environmental and social consequences of various conventional generation technologies, RPS requirements, carbon regulations, continually improving economics as underlying technologies improve and production volumes increase, and supportive regulatory frameworks in certain regions.

In this analysis, Lazard's approach was to determine the LCOE, on a $/MWh basis, that would provide an after-tax IRR to equity holders equal to an assumed cost of equity capital. Certain assumptions (e.g., required debt and equity returns, capital structure, etc.) were identical for all technologies in order to isolate the effects of key differentiated inputs such as investment costs, capacity factors, operating costs, fuel costs (where relevant) and other important metrics. These inputs were originally developed with a leading consulting and engineering firm to the Power & Energy Industry, augmented with Lazard's commercial knowledge where relevant. This analysis (as well as previous versions) has benefited from additional input from a wide variety of Industry participants and is informed by Lazard's many client interactions on this topic.

Lazard has not manipulated the cost of capital or capital structure for various technologies, as the goal of this analysis is to compare the current levelized cost of various generation technologies, rather than the benefits of financial engineering. The results contained herein would be altered by different assumptions regarding capital structure (e.g., increased use of leverage) or the cost of capital (e.g., a willingness to accept lower returns than those assumed herein).

Key sensitivities examined included fuel costs, tax subsidies, carbon pricing and costs of capital. Other factors would also have a potentially significant effect on the results contained herein, but have not been examined in the scope of this current analysis. These additional factors, among others, could include: capacity value vs. energy value; network upgrades, transmission, congestion or other integration-related costs; significant permitting or other development costs, unless otherwise noted; and other costs of complying with various environmental regulations (e.g., carbon emissions offsets or emissions control systems). This analysis also does not address potential social and environmental externalities, including, for example, the social costs and rate consequences for those who cannot afford distributed generation solutions, as well as the long-term residual and societal consequences of various conventional generation technologies that are difficult to measure (e.g., nuclear waste disposal, airborne pollutants, greenhouse gases, etc.).