

## The Cost of Existing Versus New Sources of Electricity

June 2019

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America's Power (or ACCCE) and the Institute for Energy Research (IER) released a study last week that analyzes the levelized cost of electricity (LCOE) for coal, natural gas, nuclear, wind, solar and hydro.<sup>i</sup> For purposes of this blog, we'll call it the "2019 LCOE Study." Levelized costs are calculated by summing all of the costs associated with an electricity source over its lifetime and dividing those costs (dollars) by the electricity the source is expected to generate (megawatt-hours). In general, the electricity source with the lowest LCOE is preferable.

Levelized costs can be used to compare different types of electricity sources, as well as compare new sources and existing sources. Thus, LCOE is a useful tool to help determine whether to replace an existing power plant with a new one. This is analogous to deciding whether to buy a new car or continue driving the car you have. If you buy a new car, you have to pay for the car (monthly payments or perhaps cash), as well as pay for such expenses as gasoline, insurance and maintenance. If you've already paid off your car, your only expenses are gasoline, insurance and maintenance.

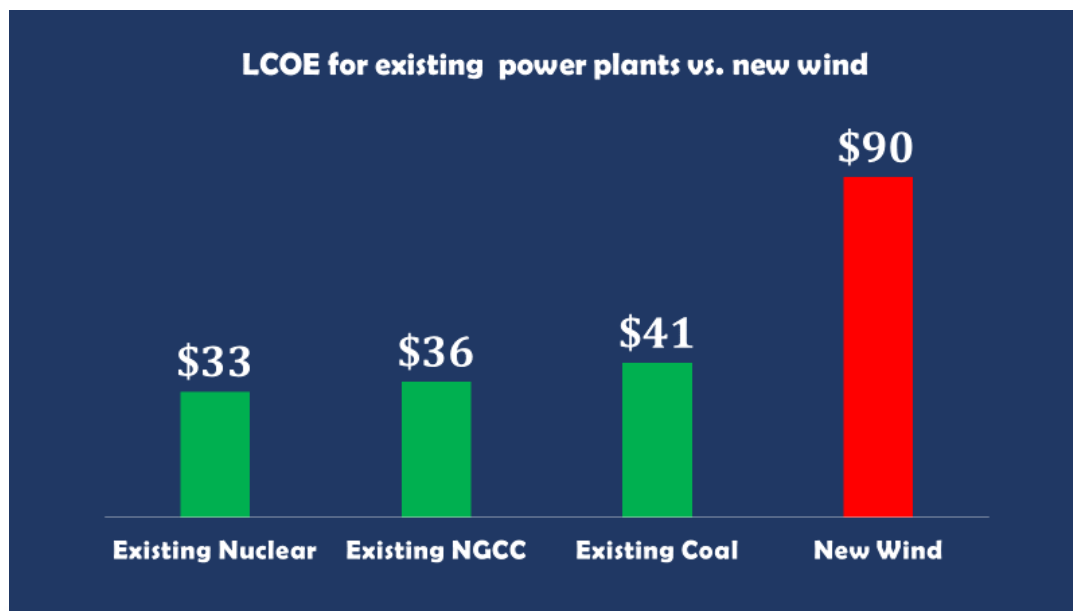
The 2019 LCOE Study was commissioned to evaluate whether it makes sense to continue operating existing power plants—coal, nuclear and natural gas combined cycle (NGCC)—rather than replace them with new electricity sources. The study shows that existing nuclear, coal-fired and NGCC power plants have lower levelized costs, on average, than new NGCC, new wind and new solar. We hope that public utility commissions and other decisionmakers will pay careful attention to the levelized costs of existing plants—if they're not already—when decisions are being made to retire and replace them.

We were careful to point out that the study is based on national averages derived from publicly available data and that levelized costs will be different for each existing plant and each new one.<sup>ii</sup> Despite these caveats, the American Wind Energy Association (AWEA) was perturbed. AWEA posted a blog that characterized the 2019 LCOE Study as "garbage in, garbage out," a phrase the blog used three times.<sup>iii</sup>

IER [responded in detail](#) to the AWEA blog.

Rather than exchange insults or catalogue every instance where we might differ with AWEA, we thought it would be more constructive to highlight just a few points that are relevant to comparing **existing** coal to **new** wind. We've highlighted these terms because the AWEA blog seems to confuse the two at times by mentioning the cost of new coal and by comparing new wind to other new sources of electricity.

The chart below is based on the 2019 LCOE Study and compares the average levelized costs of existing nuclear, existing NGCC, existing coal-fired generation and new wind. The levelized cost for wind (red) includes the cost that is imposed by wind on gas-fired generation to enable wind, an intermittent source of electricity, to be as reliable as dispatchable electricity sources. (Gas is typically the backup for renewables.) However, even without imposed costs, the LCOE for new wind is \$66/MWh, still substantially higher than the levelized costs for existing nuclear, NGCC or coal.



Levelized costs for existing coal-fired power plants are consistently low across a number of studies. Here are six examples: \$27/MWh (low end of Lazard, 2018), \$36/MWh (Lazard fully depreciated coal, 2018), \$40/MWh (EVA, 2017; IHS Markit, 2017), \$41/MWh (LCOE, 2019), and \$45/MWh (high end of Lazard, 2018).<sup>iv</sup> If these estimates are averaged for the sake of simplicity, then the average levelized cost for existing coal is slightly more than \$38/MWh.

On the other hand, levelized costs for new wind vary widely. Here are ten examples: \$29/MWh (low end of Lazard, 2018), \$37/MWh (NREL low estimate, 2018), \$39/MWh (EIA low estimate, 2019), \$56/MWh (high end of Lazard, 2018), \$66/MWh (LCOE without imposed costs, 2019), \$67/MWh (EVA, 2017), \$73/MWh (EIA high estimate, 2019), \$82/MWh (IHS Markit, 2017), \$90/MWh (LCOE with imposed costs, 2019), and \$169/MWh (NREL high estimate, 2018).<sup>v</sup> The average of these is almost \$71/MWh.

Certainly, these simple averages do not mean the levelized cost for every existing coal plant is \$39/MWh or that every new wind installation will cost \$71/MWh. Instead, what these numbers really mean is that decisionmakers should think hard before retiring more coal-fired power plants because they are unpopular with some groups.

We also should mention briefly some of the other considerations that affect retirement/replacement decisions. For example, one recent paper claimed that a large portion of the coal fleet should be replaced because wind and solar are cheaper.<sup>vi</sup> However, the capital cost of adding new wind to replace coal that is allegedly uneconomic would be \$156 billion to \$227 billion.<sup>vii</sup> In addition, prematurely retiring coal plants leads to stranded assets, which can be problematic for utility commissions and ratepayers.<sup>viii</sup> Last, more coal retirements risk compromising grid reliability and resilience, reducing fuel diversity and diminishing fuel security.

As always, we welcome feedback.

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<sup>i</sup> “The Levelized Cost of Electricity from Existing Generation Resources,” Tom Stacy and George Taylor, June 2019. [www.americaspower.org](http://www.americaspower.org)

<sup>ii</sup> The authors used data from EIA’s Annual Energy Outlook for 2019 (AEO 2019), EIA Form 860 and FERC Form 1.

<sup>iii</sup> “Wind power remains affordable despite flawed study,” Michael Goggin, American Wind Energy Association, June 6, 2019. [www.aweablog.org](http://www.aweablog.org)

<sup>iv</sup> “Lazard’s Levelized Cost of Energy Analysis Version 12.0,” November 2018. <https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf>. Energy Ventures Analysis, June 26, 2017. IHS Markit, “Ensuring Resilient and Efficient Electricity Generation – The Value of the Current Diverse US Power Supply Portfolio,” September 2017. EIA AEO 2019.

<sup>v</sup> NREL Annual Technology Baseline 2018. <https://atb.nrel.gov/electricity/2018/summary.html>

<sup>vi</sup> “The Coal Cost Crossover: Economic Viability Of Existing Coal Compared To New Local Wind and Solar Resources,” Energy Innovation: Policy and Technology LLS, March 2019. The report estimates that 140,000 MW of coal-fired generation are at “substantial risk” of being replaced by wind or solar.

<sup>vii</sup> According to EIA AEO 2019, the capital cost of new wind is \$1,624/kw. Therefore, the capital cost of replacing 140,000 MW of coal-fired capacity with 140,000 MW of wind would be (140,000 MW)(10<sup>3</sup> kw/MW)(\$1,624/kw), or \$227 billion. Alternatively, Lazard estimates a capital cost of \$1,115-\$1,550/kw. In that case, the capital cost would be \$156 billion to \$217 billion.

<sup>viii</sup> See “Stranded costs mount as coal vanishes from the grid,” Jeffrey Tomich, E&E News, May 29, 2019. According to the article, “... consumers are being asked to pay nearly \$1 billion over the next 20 years to pay off the remaining balance on the [Pleasant Prairie] plant and a return to utility shareholders ... [S]hutting down older generation and replacing it with new, cleaner plants could saddle customers with paying for both at the same time.”