The Electricity Journal 30 (2017) 22–30

Contents lists available at ScienceDirect

The Electricity Journal

journal homepage: www.elsevier.com/locate/tej

Do coal and nuclear generation deserve above-market prices?

Amory B. Lovins

Rocky Mountain Institute, Basalt, CO, United States

ARTICLE INFO

Keywords:
Coal
Nuclear
Carbon
Competition
Efficiency
Renewables

ABSTRACT

All 14 current rationales for mandating or subsidizing uncompetitive coal and nuclear plants lack technical merit or would favor competitors instead. Subsidizing distressed nuclear plants typically saves less carbon than closing them and reinvesting their saved operating cost into severalfold-cheaper efficiency. Carbon prices, not plant subsidies, best recognize decarbonizing attributes. Grid reliability needs careful integration of diverse, distributed demand-side and renewable resources, using competitive market processes and resilient architectures, but does not require 'baseload' plants.

1. Introduction

The new federal administration faces an unusual dilemma in forming a coherent electricity strategy. Its Secretary of Energy, Rick Perry,[1] has said that coal and nuclear power plants too costly to clear in competitive markets must be kept running anyhow for "national security," even if doing so requires overruling state regulation and (by implication) ISO/RTO practices.[2] The Secretary ordered a quick staff study to seek an analytic basis for his policy, but finding credible support won't be easy. Without clear statutory authority to execute his policy, his evidence—and the transparency, objectivity, and stakeholder participation of his study's process—would need to persuade judges to set aside the conclusive, consistent, and empirically validated findings of virtually all prior expert studies by his own Department[3] and its National Laboratories,[4] the grid reliability regulator,[5] grid operators like PJM,[6] MISO,[7] WECC,[8] SPP,[9] ERCOT,[10] and CAISO,[11,12] trade associations,[13] the International Energy Agency,[14] many foreign and academic experts, and leading global electricity-industry firms.

This evidentiary challenge is compounded by the policy's internal contradictions. Efficient end use is steadily shrinking the electricity

E-mail address: ablovins@rmi.org.

[1] Bade, G. Updated: Perry orders DOE review of clean energy impacts on baseload generation. 17 Apr 2017. http://www.utilitydive.com/news/updated-perry-orders-doe-review-of-clean-energy-impacts-on-baseload-genera/440578/.

[2] Pyper, J. How the Trump Administration could pre-empt state policeis to shore up baseload power. May 4, 2017. https://www.greentechmedia.com/articles/read/how-the-trump-administration-could-preempt-state-policies-to-shore-up-basel. Sec. Perry's quoted video is at https://about.bnef.com/summit/event/new-york/.

[3] Department of Energy. *Quadrennial Energy Review: Second Installment*. Jan. 6, 2017. https://energy.gov/epsa/quadrennial-energy-review-second-installment.

[4] National Renewable Energy Laboratory. *Renewable Electricity Futures Study*. 2012. http://www.nrel.gov/analysis/re_futures/.

[5] North American Electric Reliability Corporation. *2016 Long-Term Reliability Assessment*. Dec. 2016. http://www.nerc.com/pa/rapa/ra/reliability%20assessments%20dl/2016%20long-term%20reliability%20assessment.pdf.

[6] PJM Interconnection. *PJM's Evolving Resource Mix and System Reliability*. Mar 30, 2017. http://www.pjm.com/~/media/library/reports-notices/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx.

[7] Schuerger, M. Grid integration of wind & solar. U. Minn. Workshop, Apr 16, 2016. http://cusp.umn.edu/assets/Mpls_2016_RWorkshop/Matt_Schuerger.pdf.

[8] NREL. Western wind and solar integration study. https://www.nrel.gov/grid/wwsis.html.

[9] Southwest Power Pool, *2016 Wind Integration Study*, Jan. 2016, https://www.spp.org/documents/34200/2016%20wind%20integration%20study%20(wis)%20final.pdf.

[10] The Brattle Group. Integrating renewable energy into the electricity grid. Advanced Energy Economy. 2015. http://info.aee.net/integrating-renewable-energy-into-the-electricity-grid.

[11] Loutan, C. & Gevorgian, V. Using renewables to operate a low-carbon grid. 2017. http://www.caiso.com/Documents/UsingRenewablesToOperateLow-CarbonGrid.pdf.

[12] California ISO. What are we doing to green the grid? Accessed May 6, 2017. http://www.caiso.com/informed/Pages/CleanGrid/default.aspx.

[13] American Wind Energy Association. Wind energy helps build a more reliable and balanced electricity portfolio. 2015. http://awea.files.cms-plus.com/AWEA%20Reliability%20White%20Paper%20-%202-12-15.pdf.

[14] International Energy Agency (Paris). The Power of Transformation. 2014. https://www.iea.org/publications/freepublications/publication/The_power_of_Transformation.pdf.

http://dx.doi.org/10.1016/j.tej.2017.06.002

Available online 04 August 2017

sales for which all generators compete,[15] and that shrinkage will intensify.[16] Coal and nuclear plants have both done poorly in capacity auctions meant to favor them,[17] losing mainly to gas and casting doubt on their reliability claims. Coal and nuclear are also uneasy yokemates: they compete toe to toe. Illinois's new long-term nuclear subsidy drove down regional capacity prices 98% in a year, making Dynegy move to close most or all of its Illinois coal capacity.[18] Its Vice President Rob Hardman called[19] nuclear operating subsidies the "new front in the War on Coal," while his colleague David Onufer said state-by-state policies "have turned markets from a competition to produce the lowest-cost electricity to a competition for [nuclear] subsidies".[20] Claiming, as EPA Administrator Scott Pruitt did,[21] that coal plants' avoidance of vulnerabilities in the natural-gas pipeline network confers a national-security advantage also undermines the case for fracking—the main actual market threat to coal and nuclear plants,[22] but another strong administration favorite.

Pricing CO_2 emissions as Republican elder statesmen urge[23] would hurt both coal and gas, help nuclear against gas, but not help nuclear beat renewables, which increasingly beat coal, gas, and nuclear wherever allowed to compete. Renewables also enjoy strong bipartisan political support; California rooftop solar adoption was found to be five times greater in Republican- than in Democratic-leaning areas,[24] over four-fifths of U.S. windfarms are in Republican congressional districts, and the top six windpowered states voted for Donald Trump. Red-state sentiment is bolstered by outstanding commercial successes like Texas windpower, whose 25,000 jobs, 15% of electricity, and record-low 2016 wholesale electricity prices culminated under Energy Secretary Perry's leadership as governor. In Iowa, the first state to become more than one-third windpowered (now 37%), Senator Chuck Grassley said[25] the tax credits he authored could be attacked "over my dead body," and trenchantly added[26] that many in favor of "all of the above" energy policies are "really for none of the above and all of the below"—i.e., not for renewables but for dug-up fuels.

Across the country and across party lines, state regulators and states' rights advocates will fiercely guard their prerogatives. ISO/RTOs will defend the competitive markets that Congress and many states told them to build to provide adequate and reliable electricity at the lowest efficient price. Customers and merchant generators will fight for those markets' benefits. Financiers will shun added risks. The military will continue to lead renewable deployment for its own operational success and mission continuity: it was then-General James Mattis who famously appealed from Iraq in 2003 to "unleash us from the tether of fuel".[27] Over 3 million renewable workers—California has more solar workers than America has coal miners—will defend their jobs. And judges will restrict the executive to reasoned administrative decisions and legally authorized powers.

Amidst the debate trigged by Secretary Perry's statements, the Federal Energy Regulatory Commission convened a lively Technical Conference on May 1–2, 2017, to examine whether the Eastern Interconnect's wholesale energy and capacity markets are properly pricing electrical resources to ensure reliable, resilient, and affordable electricity supply, and how state actions to advantage specific resources may affect those technology-neutral markets. This article adapts, expands, and updates my written comments[28] to FERC for that event.

2. Around-market nuclear subsidies' climate protection rationale

FERC's focus on some state policymakers' efforts to select or advantage specific resources that can't compete in technology-neutral wholesale markets arose mainly from new long-term state subsidies to specific distressed nuclear plants, as recently adopted by Illinois legislators and New York regulators, and together totaling at least $10 billion. There is no competition to obtain the targeted payments, and renewables can't get them. Those bailouts are being litigated[29,30] amidst uncertainties in federal law.[31] Similar bailouts are being considered in Connecticut, New Jersey, Ohio,[32] and Pennsylvania. A Bloomberg study estimated customer costs up to $3.9 billion a year if the 28 GW of Northeast and Mid-Atlantic nuclear plants won New York-level subsidies, so the losers would be customers and competitors. Such subsidies are influenced by local political considerations like jobs and tax revenues, and are sometimes extorted from states under threat of abrupt nuclear shutdowns that would disrupt grid operations. But their main rationale is the climate benefit of prolonging a carbon-free (in operation) resource for as long as safely possible.

I believe this argument is fundamentally mistaken and the claimed climate benefits are illusory, because of climate opportunity cost: avoiding and properly reinvesting nuclear operating cost (opex) could save even more carbon. Using 2013 $ throughout, the argument is:

1. Distressed nuclear plants' high opex makes them uncompetitive in wholesale markets. Estimates of the number of such plants vary widely but seem to trend upward, because their economic challenges are rising, and so are proposals for subsidies that would

[15] Chediak, M. U.S. power demand flatlined years ago, and it's hurting utilities. Apr 24, 2017. https://www.bloomberg.com/news/articles/2017-04-25/u-s-power-demand-flatlined-years-ago-and-it-s-hurting-utilities.

[16] Lovins, A. "Why Are We Saving Electricity Only Half As Fast As Fuels?," Forbes blog, Apr 25, 2017, https://www.forbes.com/sites/amorylovins/2017/04/25/why-are-we-saving-electricity-only-half-as-fast-as-fuels/.

[17] Gilbert, A. Addressing the plight of existing nuclear retirements, Part 1. Jul. 14, 2016. https://sparklibrary.com/addressing-plight-existing-nuclear-part-1/.

[18] Maloney, P. Pressed by nuke subsidies, Dynegy to decide by year-end whether to leave Illinois market. May 5, 2017. http://www.utilitydive.com/news/pressed-by-nuke-subsidies-dynegy-to-decide-by-year-end-whether-to-leave-il/441994/.

[19] @taykuy tweet at https://twitter.com/taykuy. May 4, 2017.

[20] Kuykendall, T. Trump environmental order does little to change coal retirement plans. Mar 30, 2017. https://www.snl.com/web/client?auth=inherit#news/article?id=40042063&KeyProductLinkType=4&cdid=A-40042063-13113.

[21] Walton, R. EPA chief Pruitt: Coal plants necessary to ensure grid reliability. May 5, 2017. http://www.utilitydive.com/news/epa-chief-pruitt-coal-plants-necessary-to-ensure-grid-reliability/442049/.

[22] Goggin, M. Low natural gas prices, not wind energy, primarily responsible for coal's troubles. Apr 5, 2017. http://www.aweablog.org/low-natural-gas-prices-not-wind-energy-primarily-responsible-coals-troubles/.

[23] Schwartz, J. Republican group calls for carbon tax. *N.Y. Times*, Feb 7, 2017. https://www.nytimes.com/2017/02/07/science/a-conservative-climate-solution-republican-group-calls-for-carbon-tax.html. Pricing carbon was the only consensus at the 1–2 May 2017 FERC Technical Conference: Bade, G. The carbon consensus: Generators, analysts back CO2 price at FERC technical conference. May 3, 2017. http://www.utilitydive.com/news/the-carbon-consensus-generators-analysts-back-co2-price-at-ferc-technical/441862/.

[24] Fragoso, A. California Republicans have more solar panels than Democrats. Sep 30, 2016. https://thinkprogress.org/california-republicans-buy-more-solar-panels-than-democrats-81ff9ceb28d.

[25] Henry, D. Grassley: Trump will attack wind energy 'over my dead body." *The Hill*. Aug 31, 2016. http://thehill.com/policy/energy-environment/293924-grassley-trump-will-attack-wind-energy-over-my-dead-body.

[26] Little, A. Will conservatives finally embrace clean energy? *The New Yorker*. Oct 29, 2015. http://www.newyorker.com/tech/elements/will-conservatives-finally-embrace-clean-energy.

[27] Douquet, G. "Unleash Us From the Tether of Fuel." Jan 11, 2017. http://www.atlanticcouncil.org/blogs/defense-industrialist/unleash-us-from-the-tether-of-fuel.

[28] Lovins, A. Letter to Acting Chairman C. LaFleur, FERC, 23 Apr 2017 for FERC Technical Conference, May 1–2, 2017, Docket AD17-11-000, accession #20170428-4001, https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14575878.

[29] PJM *amicus* brief, Apr 24, 2017, http://www.pjm.com/Media/documents/other-fed-state/20170424-1-17-cv-01164.pdf.

[30] Knauss, T. NY nuclear subsidies kick in Saturday, but high-stakes legal challenge looms. Mar 27, 2017. http://www.syracuse.com/news/index.ssf/2017/03/ny_nuclear_subsidies_kick_in_saturday_but_high-stakes_legal_challenge_looms.html.

[31] Bullock, J. With energy law federalism under construction, state policymaking may be delayed. *NYU Envtl. Law J.*, Nov 2016, http://www.nyuelj.org/2016/11/with-energy-law-federalism-under-construction-state-policymaking-may-be-delayed/.

[32] Knox, T. FirstEnergy asking for 'zero-emission' subsidies for its Ohio nuclear plants. Feb 22, 2017. http://www.bizjournals.com/columbus/news/2017/02/22/firstenergy-asking-for-zero-emission-subsidies-for.html.