Energy Systems and Climate Analysis (ESCA) Perspective

WSJ Opinion by Steve Milloy: "A Quiet Refutation of Net-Zero Carbon Emissions"

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Introduction

In an opinion piece written by Steve Milloy and published on December 29th, 2022 by the Wall Street Journal, EPRI's Net-Zero 2050 report is misconstrued as 'A Quiet Refutation of Net-Zero Carbon Emissions. The article quotes the Net-Zero 2050 report out of context to argue that 'The EPRI report concludes that the utility industry can't attain net zero.' *In truth, the Net-Zero 2050 report draws no such conclusion.* Among other errors, the article's arguments miss the distinction between electric sector and economy-wide emissions and conflate global and U.S. statistics. Below we present a summary of the article's misleading and false claims and what EPRI's report really says.

Comparison of Milloy's Claims and the Actual EPRI Report Text

The EPRI report concludes that the utility industry can't attain net zero. "This study shows that clean electricity plus direct electrification and efficiency . . . are not sufficient by themselves to achieve net-zero economy-wide emissions."

The pull quote here is from the first paragraph of the report's Conclusions section, and in fact this observation is a key motivation for the Low Carbon Resources Initiative (LCRI). Our modeling, and the research of many others, clearly shows the need for additional technologies to achieve **economy-wide** net-zero targets (more on this below). This doesn't imply that the utility industry "can't attain net zero" – it's a statement about **economy-wide** net-zero, which covers activities and emissions sources outside of the electric sector as well (and is attained in our scenarios).

In other words, no amount of wind turbines, solar panels, hydropower, nuclear power, battery power, electrification of fossil-fuel technologies or energy-efficiency technologies will get us to net zero by 2050.

While this is technically true, our report (again consistent with many other studies) notes that some combination of these technologies is necessary (and cost-effective) to achieve **economy-wide** decarbonization, and to help the power sector reach net-zero emissions. They are just not sufficient on their own to achieve **economy-wide** net-zero emissions.

Even to achieve "deep decarbonization"—which isn't net zero—by 2050, EPRI says, "a broad portfolio of options that includes low-carbon fuels and carbon removal technologies will be required."

Our report uses "deep decarbonization" as a synonym for a net-zero target (including in the title), so this is a false distinction. The pull quote about the broad portfolio is from the same paragraph as the quote above and reinforces a key finding in our study, which is one of the first to explore in detail the potential role of low-carbon fuels and other emerging carbon management options in an integrated modeling

analysis. These technologies, including hydrogen, renewable fuels, synthetic fuels, and carbon capture and storage from a range of processes, are key areas of focus for the LCRI.

But "low-carbon fuels"—efficient biofuels—don't exist. "Carbon removal technologies" aren't possible to scale up, and if they were, it would cost about $1 quadrillion—a million billion dollars—at today's prices to remove the 1.6 trillion tons of atmospheric carbon dioxide that U.S. climate envoy John Kerry said needs to be sucked "out of the atmosphere even after we get to net zero."

This statement is not supported by facts. While low-carbon fuels are in early stages of deployment today, the potential for future development and deployment absolutely exists, not least through LCRI's efforts. Similarly, carbon removal technologies can scale up with sufficient investment in RD&D, and advance market commitments hold promise for accelerating their development. The cost calculation ($1 quadrillion) is irrelevant in terms of both the price and quantity it is multiplying. The 1.6 trillion tCO_2 number refers to **cumulative global** atmospheric removals in one unspecified scenario mentioned by Kerry in a completely disconnected context. Our scenarios indicate **annual U.S.** removals by 2050 of 0.3 to 1.1 billion tCO_2. Meanwhile, the implied price of $625/$tCO_2$, which is presumably based on "today's prices" for direct air capture, is much higher than costs assumed in our scenarios by 2050, especially for removal technologies based on bioenergy or terrestrial carbon management (direct air capture costs are projected to decline with technical progress but remain more expensive than other removal options). The bottom line is that our research rigorously demonstrates the potential for low-carbon fuels and carbon removal technologies to contribute to a cost-effective economy-wide net-zero emissions strategy, which is supported by a range of other net-zero studies in the peer-reviewed literature.

There's more. The EPRI report states: "This study does not include a detailed assessment of factors such as supply chain constraints [and] operational reliability and resiliency" of a net-zero electricity grid. How a net-zero grid could be built and function would be an issue worth studying if it were possible in the first place. But it simply isn't.

The pull quote here is from the report's Executive Summary and reflects our commitment to transparency, humility, and technical rigor. US-REGEN, the model used for the analysis, is designed to evaluate trade-offs among electric and non-electric technologies with significant regional and sectoral detail over an extended time horizon under different scenarios regarding the evolution of technology and policy drivers. The model balances hourly supply and demand with a reserve margin for each model region subject to technical, market, and policy constraints. However, with the model's scope it is not possible to include a detailed analysis of resource adequacy, reliability, and resiliency, which are generally conducted by other models suited to the purpose. EPRI is actively working on innovative approaches to linking planning and operational tools, and the report's Conclusions section notes our plans to apply these methods to our net-zero scenarios going forward. With that said, the US-REGEN analysis does provide significant insight into "how a net-zero grid could be built and function," especially with respect to capacity adequacy accounting for hourly variability in intermittent renewable output. A key message throughout the report is the importance of firm capacity and the potential for low-carbon fuels and carbon removal technologies to provide it as part of a net-zero energy system. An evaluation of operational reliability with the capacity and energy mix in the net-zero scenarios described in the report is an important next step, but the report certainly does not imply that maintaining operational reliability in such a scenario is impossible.

So, barring some unforeseen miracle technology, "net zero by 2050" won't happen.

EPRI's report provides a detailed, technically sound assessment of the potential role of low-carbon technologies in cost-effectively achieving deep decarbonization across the economy, which is consistent with EPRI's mission to inform our public and private stakeholders with objective analysis. It makes no claims about what is and what is not possible or what will or will not happen.

The curious thing about the report is that it has largely remained an EPRI secret. There has been no media coverage of it. I found out about it only after I filed a shareholder proposal about net zero with the electric utility Alliant Energy. The company offered the report as a defense against my proposal that management explain how it planned to reach its goal of net zero by 2050.

While EPRI did not issue a formal press statement when the report was released in September, it has been publicly available on our website (linked from the home page) and has been promoted broadly among our members, the research community, and on social media. It was also highlighted in an EPRI press release coinciding with our participation at the COP27 meeting in Egypt in November.

References and Related EPRI Research

Bistline (2021). *Roadmaps to net-zero emissions systems: Emerging insights and modeling challenges.* Joule 5:2551-2563.

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Intergovernmental Panel on Climate Change (2022). *IPCC 6th Assessment WGIII Chapter 6*. Working Paper available at https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_06.pdf.