Counterflow

By Steve Huntoon

We See Through a Glass, Darkly

By Steve Huntoon

If you blinked the other day, you may have missed news of an important study. Important on many levels — not least that it's a huge hunk of good news.

The Lawrence Berkeley Lab study is titled "Halfway to Zero: Progress towards a Carbon-Free Power Sector."[1] The "halfway" is power sector carbon emissions in 2020 relative to what EIA had projected for 2020 in its 2005 Annual Energy Outlook.

One might quibble that the halving is relative to a 15-year projection but, still remarkably, 2020 actual carbon emissions were 40% less than 2005 actual carbon emissions.[2] Against the pre-COVID 2019 emissions, the reduction is still 33%. Big stuff no matter how you slice it. (BTW, these power sector percentages should not be confused with the target that the Biden Administration is proposing for 2030, which is economy wide.)

This great graphic tells much of the story.[3]

As one can imagine there are lots of factors, including lower demand than projected, and increased efficiency like LED lighting should take a bow.

The lower demand meant that the huge increase in natural gas generation from low-cost gas production supplanted coal instead of meeting higher demand.[4] So coal plants ran less and some closed. Premature deaths from power sector air pollution fell from 43,000 per year to 3,100 per year. That is incredible.

Other contributors: renewable energy growth was much greater than projected, some from cost reduction and some from state mandates and federal tax subsidies. Nuclear plants continued to run.

Electricity prices stayed the same in real dollar terms. And jobs in the electric generation sector actually increased.

So it's a huge hunk of good news.

What are the lessons learned?

Technology is Key

There were a few regulatory/tax factors at work, but the biggest drivers were technology advancements and associated cost reductions — principally in natural gas and renewables — with an assist from energy efficiency such as LED lighting.

Going forward there is a role for government, but the main focus needs to be on how we help the private sector get us where we need to be.

Fracking Ban Parallel Universe

Imagine a parallel universe in which government — per Bernie Sanders and Elizabeth Warren — banned fracking. Wholesale electricity prices would have doubled, many jobs would have been lost along with global competitiveness, causing a backlash against further climate change measures.[5]

Coal generation would not have been supplanted by natural gas, so carbon emissions would have been greater, making climate change and health deaths and damages worse.

Be careful what you wish for.

It's Tough to Make Predictions, Especially About the Future

It's remarkable how far off the 2005 projection turned out to be. But this is not just an aberrant EIA projection — the study presents a host of studies from roughly the same time period with similar projections that were similarly wrong.[6]

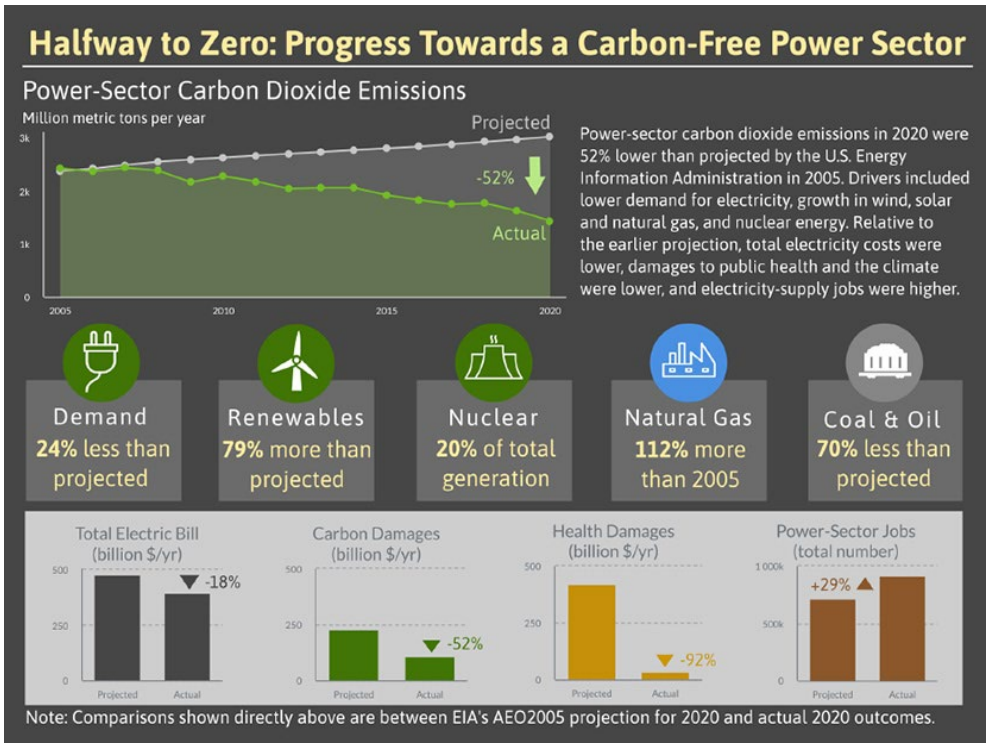
Mass Media Reporting — Zero

Sadly, this study has received zero coverage from the mass media. Perhaps it's not consistent with the climate emergency narrative that the mass media is wedded to, which would be sad because the study is loaded with substance that helps inform the fight against climate change.

Path Forward

The last section of the study addresses "the next half:" what we may need to get to net zero over the next 15 years — by 2035. A number of studies suggest that with the declining cost of solar, wind and battery storage, as much as 70 to 90% of power supply might come from those resources at low incremental cost while preserving reliability. But getting to 100% would be very expensive.[7]

Right now, we're not on track to add enough of these resources to get to that 70 to 90%, but the pace is accelerating. The challenges in terms of preserving reliability, adding sufficient transmission, adapting wholesale power markets, improving siting and permitting,



| *Lawrence Berkeley National Laboratory*

Counterflow

By Steve Huntoon

pursuing more energy efficiency and demand response, facilitating workforce change, etc., seem daunting.

The study closes with "two central lessons" from the past 15 years: "First, policy and technology advancement are imperative to achieving significant emissions reductions. Second, our ability to predict the future is limited, and so it will be crucial to adapt as we gain policy experience and as technologies advance in unexpected ways."

Thoughts, I've Had a Few

We need to be smart. As *The Economist* recently wrote, "Few people in those parts of the world made rich by carbon-dioxide-emitting enterprises are going to volunteer for a cut in living standards."[8] Or for blackouts, BTW.

Here are thumbnails of my past thoughts on getting from here to there as smartly as possible:

1. Optimize the existing transmission grid at no cost before throwing tens of billions at more transmission. How? Require transmission owners/planners to dispatch and plan (including interconnection studies) with discrete emergency (contingency) ratings. Sorry to get into the weeds but this is so important — my column that discussed this and the comments of the engineering firm Tangibl in the FERC rulemaking on transmission line ratings, are here.[9]

2. Ban "proof of work" cryptocurrencies like Bitcoin. These things have no intrinsic value and are consuming electric power — and creating carbon emissions — like entire countries.[10]

3. Support rational wind. Onshore wind costs half as much as offshore wind.[11] Mandating X GW of offshore wind far off your coastline, which isn't really in your state, is environmental malpractice. It means that you'll have half the wind generation you could have had for the same money if you'd supported onshore wind instead.

4. Support rational solar.[12] Grid solar costs 80% less than rooftop solar. So subsidizing rooftop solar with rate devices like net metering means that you'll get one fifth the amount of solar generation you could have gotten if you'd provided the equivalent monetary support for grid solar.[13] Plus, net metering shifts electricity costs from the rich to the poor. Yikes.

5. Develop rational storage. We know from Texas' actual experience with multiday curtailments, German weather patterns, PJM weather patterns and California modeling that 4-hour battery storage is pixie dust.[14] We need economic long-duration storage — but we don't know what that is.[15] Until we do, we need to keep the (cleanest) fossil fuel resources around.

6. Keep existing nuclear generation. Perhaps the greatest displays of environmental malpractice are the closings of the Indian Point nuclear plant in New York and the Diablo Canyon nuclear plant in California.[16]

7. Redouble energy efficiency efforts. As I've said before, LED lighting has reduced carbon emissions twice as much as rooftop solar, and over the next 20 years could provide four times the carbon emission reduction as is projected for rooftop solar.[17] And, unlike rooftop solar, LED lighting is actually economic.

8. Don't ignore potential low-hanging fruit in methane reductions. *The Economist* estimates that one quarter of global warming is caused by methane emissions.[18] Unlike carbon, methane itself is valuable. So much could be captured at little to no net cost.

9. Last, even though it makes too much sense to actually happen: a carbon tax.

Well, that's all folks! ■

[1] https://eta-publications.lbl.gov/sites/default/files/halfway_to_zero_report.pdf.

[2] https://eta-publications.lbl.gov/sites/default/files/halfway_to_zero_figures.pptx, slide 3.

[3] https://eta-publications.lbl.gov/sites/default/files/halfway_to_zero_figures.pptx, slide 2.

[4] I've discussed this phenomenon in PJM in prior columns. http://energy-counsel.com/docs/Scary-wrong.pdf; http://energy-counsel.com/docs/NRDC-Prescribes-More-Carbon-Emissions.pdf.

[5] http://energy-counsel.com/docs/getting-berned.pdf.

[6] https://eta-publications.lbl.gov/sites/default/files/halfway_to_zero_figures.pptx, slide 16.

[7] One study finds a system average cost of $73/MWh under optimal design. https://www.sciencedirect.com/science/article/abs/pii/S2542435120305572.

[8] https://www.economist.com/science-and-technology/2021/04/03/those-who-worry-about-co2-should-worry-about-methane-too.

[9] http://energy-counsel.com/docs/waste-not-what-not.pdf; https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15740097.

[10] My column on Bitcoin and similar cryptocurrencies is here, http://energy-counsel.com/docs/The-New-Technoking-and-His-Bitcoin-Crown.pdf.

[11] https://www.lazard.com/media/451419/lazards-levelized-cost-of-energy-version-140.pdf, slide 3. $40/MWh for onshore wind (midpoint of the range) versus $86/MWh for offshore wind. My column criticizing subsidies/mandates for offshore wind is here, http://energy-counsel.com/docs/Offshore-Wind-Edifice-Complex.pdf.

[12] Same Lazard analysis as preceding footnote. $35/MWh for grid solar (average of the ranges) versus $188.50/MWh for residential rooftop solar (average of the range).

[13] My past criticism of net metering is here, http://energy-counsel.com/docs/just-ducky-fortnightly-april-2016.pdf.

[14] http://energy-counsel.com/docs/No-Carb-California.pdf; http://energy-counsel.com/docs/German-La-La-Land.pdf; http://energy-counsel.com/docs/Cue-the-Pixie-Dust.pdf.

[15] S&P Global says that the cost of green hydrogen might get down to $100/MWh by 2030. https://www.spglobal.com/ratings/en/research/articles/210422-the-hydrogen-economy-storage-is-paramount-for-utilities-in-the-long-term-11915188.

[16] My column on why closing Indian Point will cost New Yorkers $830 million/year is here, http://energy-counsel.com/docs/New-Yorks-Surreal-New-Deal.pdf. My column on the insanity of closing Diablo Canyon is here, http://energy-counsel.com/docs/Helter-Skelter-September-Fortnightly.pdf.

[17] http://energy-counsel.com/docs/LED-Kills-the-Edison-Star-2017-01-24%20RTO-Insider-Individual-Column.pdf.

[18] https://www.economist.com/science-and-technology/2021/04/03/those-who-worry-about-co2-should-worry-about-methane-too.