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4 February 2016

Hon. Robert B. Weisenmiller, Chairman
California Energy Commission
Robert.Weisenmiller@energy.ca.gov

Dear Chairman Weisenmiller:

I read the Shellenberger *et al*. letter now docketed in 15-IEPR-12 with interest but no surprise. Having just examined in detail, in a technical paper currently in peer review at a major journal, how most effectively to displace coal-fired (or other fossil-fueled) electricity, I wanted to add for the Commission's consideration an economic point that evidently escaped the letter's authors.

According to the 2–3-year-old aggregate data published by the Nuclear Energy Institute, the average U.S. reactor has an operating cost—fuel, O&M, and Net Capital Additions—of ~4¢/kWh[1], while the top quartile averages 6+¢/kWh[2]. (Plant-specific data are not released by the Electric Utility Cost Group, but should be known to or obtainable by state regulators; just be sure the past, current, and anticipated Net Capital Additions are included.)

LBNL[3], ACEEE[4] , and E Source[5] found that the average utility pays an average of ~2–3¢/kWh to buy end-use efficiency. Therefore, if an operating reactor shuts down *and* the regulator requires the saved operating cost to be respent on buying more efficiency (of which there's an abundant[6] and expanding supply—often at falling cost[7] and with expanding returns if one uses integrative design[8]), then each nuclear kWh *not* generated will save ~2–3 kWh. One of those saved kWh can perform the service that the nuclear electricity was providing, while the other(s) can displace fossil-fueled electricity, resulting in the same carbon saving—or, for the average upper-quartile plant, twice the carbon saving—as if one had closed a coal-fired plant instead. (The efficiency is not instantaneous, but the timing adjustment should be at least an order of magnitude smaller than the time-integrated long-term carbon saving.) Although I've framed this substitution in general terms[9], I'm unaware of any reason the logic shouldn't apply in this instance.

Your staff or the CPUC's will doubtless have the California data to see how those numbers look in the specific case of Diablo. I therefore recommend that your Commission(s) analyze with State-, utility-, and plant-specific data the hypothesis that substituting additional end-use efficiency for continued operation of Diablo Canyon could sustain or increase whatever carbon savings the plant is currently achieving. Naturally, such an analysis would need to include all marginal operating costs that would not be incurred if the plant were closed, such as water, seismic, or safety upgrades. It should also consider the economic effects of closure on grid operation: for example, saved spinning reserve, reduced reserve margin from replacing a big lump of capacity with a more diversified portfolio of smaller units, reduced cycling costs from removing this unusually inflexible resource to which others must adapt, and freeing up associated pumped-storage capacity for renewable integration.

I just tried to e-file this letter in docket 15-IEPR-12, but couldn't because of a problem with your network, so I'd be grateful if you could kindly ask your staff to add it to the docket in the hope the Commission finds it useful.

Sincerely,

Amory B. Lovins
Cofounder and Chief Scientist

cc: Michael Picker, President, CPUC
Ralph Cavanagh, NRDC

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