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Gary C Matteson Comments on Draft SB100 Joint Agency Report

Additional submitted attachment is included below.

Gary C. Mattson
43134 West OaksidE Place
Davis, CA 95618
gcmattson@ucdavis.edu
T. 530-219-6777

December 22, 2020

California Energy Commission
Docket Office, MS-4
Re: Docket No. 19-SB-100
1516 Ninth Street
Sacramento, CA95814-5512
docket@energy.ca.gov

Re: Comments on the California Energy Commission Docket No.19-SB-100: Senate Bill 100 Draft Report Workshop

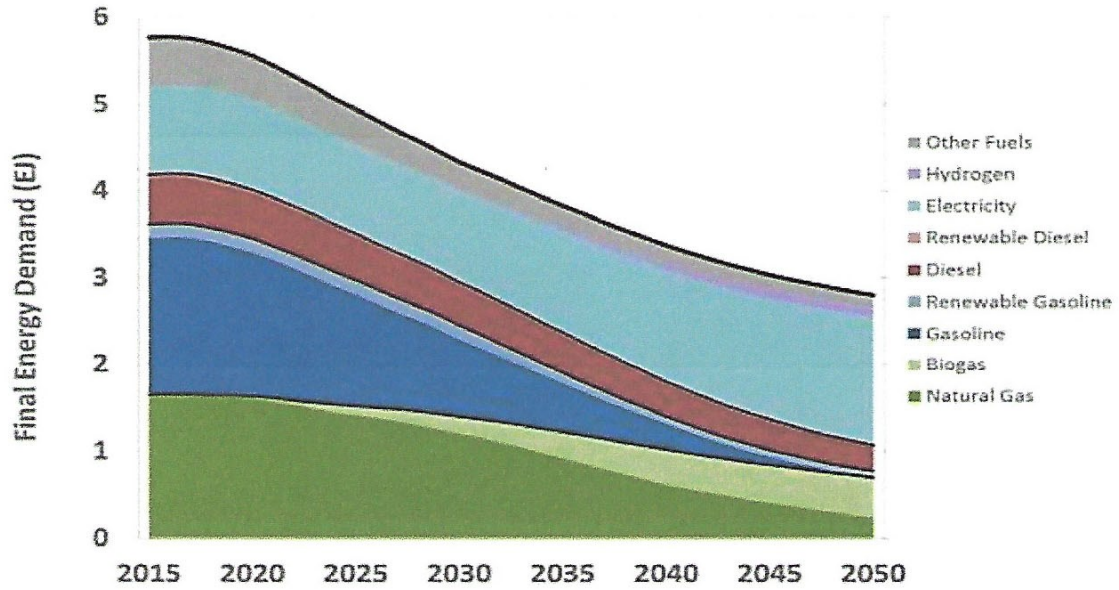
Dear Commissioners:

On December 4, 2020, the California Energy Commission (CEC), the California Public Utilities Commission (CPUC), and the California Air Resources Board (CARB) (Joint Agencies) conducted the *Senate Bill 100 Draft Report Workshop*. Staff presented an overview of the draft report, including modeling results, key takeaways from the assessment, next steps for analytical work, and recommended actions. I appreciate the opportunity to submit comments on the Workshop for consideration by the Joint Agencies as they finalize the *SB 100 Joint Agency Report*. I generally agree with and support the analyzed scenarios and findings of the draft report along with the associated 13 recommendations and opportunities for further analysis. I offer four additional recommendations for inclusion in the Senate Bill 100 Report.

Recommendation #1: Define the amount of energy California will need in 2045.

Though the draft *SB 100 Joint Agency Report* uses demand forecasts from the CEC's Deep Decarbonization in a High Renewables Future, which extends to 2050, Searching this CEC document, I find only a graph indicating the amount on "non-electric generation energy consumption" for California's energy out to 2050. See below:

Figure 7: Final Energy Demand by Fuel Type in the High Electrification Scenario

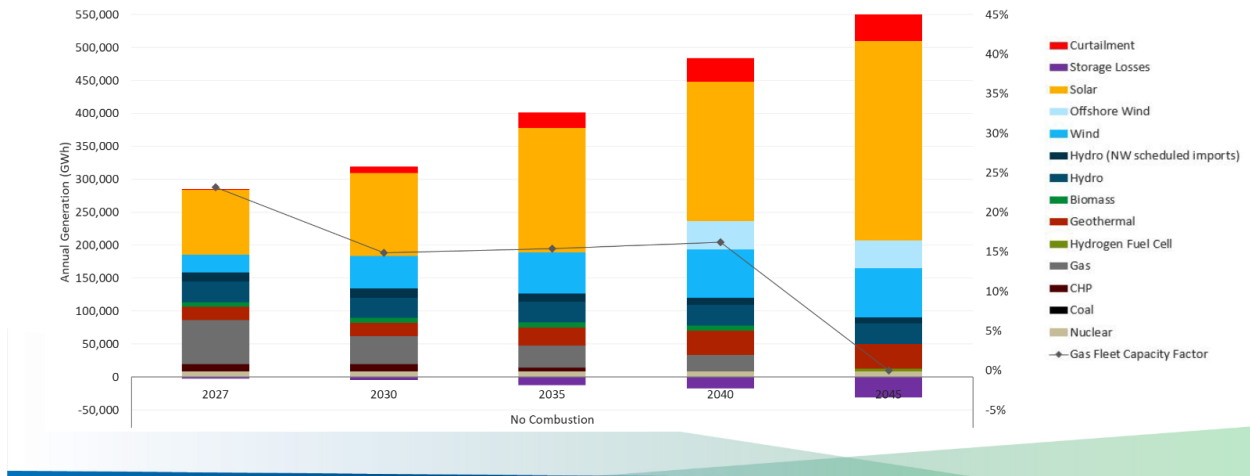


Source: E3

This graph shows energy demand in EJ. One EJ is equivalent to .950 quads. Therefore, the demand for “non-electric generation energy consumption” goes from about 5.4 quads down to 2.8 quads in 2045.



Study: No Combustion Scenario



Here is a CEC forecast for what the annual generation for only electricity in California could look like in 2045 given “no combustion” energy generation. Source: CEC Docket # 19-2B-100, SB 100 Joint Agency Report TN# 234549, Author Liz Gill, 09/02/2020 pp 34. This forecast relies on electrification with Natural Gas, Biomass, combined heat and power, going to zero by 2045. Nuclear is held to present levels. Only Hydrogen for fuel cells is shown. Surprisingly, off shore wind is shown to be making a contribution in and after 2040. Energy Storage losses are shown to be negative. This forecast is counting on significant growth in solar, and wind. Big hydro remains as is. The total annual generation goes from about 280,000 GWh in 2017 to 500,000 GWh in 2045. 500,000 GWh is equal to 1.71 Quads.

Neither of the above graphs show the total energy sources required for 2045. My earlier work determined the level of energy sources to support California’s expanded population in 2040 to be 10.49 Quads and in 2050 to be 11.54 Quads. Source: G.C. Matteson, 2012, Energy Planning for Regional and National Needs, A Case Study- The California Forecast Chapter 5. The new economics Global Cases in Energy, Environment, and Climate Change. Springer ISBN 101461449715. pp 93. The forecast for USA by the US Energy Information Administration is 108 Quads for 2050. Source: US Energy Information Administration #AEO 2019, www.eia.gov/aeo pp 28. Given that California is about 10% of the nation’s energy consumption, this shows my 2040 and 2050 projections to be in the ball park.

Recommendation #2: Define the amount of electrical energy required to meet California’s 2045 needs. As shown in the discussion for Recommendation 1, all of the options for generating electricity are not shown. Given the requirement to meet California’s expanding population, and curtailment of fossil fuel, the options of wider application of hydrogen, nuclear, and big hydro must be considered as sources of electric energy in the *SB 100 Joint Agency Report*.

Recommendation #3: Define the amount of Hydrogen energy required to meet California’s 2045 needs. Again, as shown above in Recommendations 1 and 2, Hydrogen for advance systems, such as fuel cells with electric heat pumps, must be considered for a much greater role in the *SB 100 Joint Agency Report*.

Recommendation #4: Define the amount of funding that will be needed to convert California's present energy infrastructure to the level required to meet California's 2045 energy infrastructure.

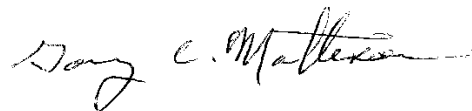
In 2005, I estimated that the citizens of California would have to spend \$44 billion a year (in 2006 dollars) for 45 years to finance just the new sources and modifying old sources of energy. This figure, totaling \$1.98 trillion, did not include needed transmission and distribution of energy (Electric Charging Stations and Hydrogen Fueling Stations), nor did it include any of the decarbonization improvements.

Jeremy Rifkin has recently estimated that the needed investment for the United States to be \$460 billion per year, over a 10 year time period, for his "Green New Deal Infrastructure transition". This figure, totaling 4.6 trillion, includes decarbonization. Given that California's share would be 10%, of the total cost number of \$.46 trillion, Rifkin's estimate appears to be a quarter of the cost developed in my earlier estimate.

It should be noted that the above estimates are not necessarily new dollars. In many cases, the investments in new infrastructure would occur anyway, as companies, organizations, and private citizens replace worn out buildings, facilities and equipment. Sources: Gary C Matteson, *The Next Economics*, ISBN 978-1-4614-4972-0 2013, September 2013 pp 114. Jeremy Rifkin, *The Green New Deal*, ISBN 9781250253200, September 2019, pp 178.

I thank the Joint Agency for consideration of the above comments and looks forward to assessing the SB 100 policy of a carbon-free electricity by 2045. Please do not hesitate to contact me at (530) 219-6777 or gcmatteson@ucdavis.edu with any questions or concerns you may have. I am available to discuss these matters further at your convenience.

Your truly,

A handwritten signature in black ink that reads "Gary C. Matteson". The signature is written in a cursive style with a horizontal line at the end.

Gary Matteson