How Much Will It Cost Pasadena Residents To Have 100% Carbon Free Electricity By The End Of 2030?*

PASADENA 100 Coalition

Oct. 7, 2023

The cost increase for the average ratepayer of PWP going carbon free by 2030 is likely less than the cost increases PWP ratepayers actually saw in 2023.

Using information provided by PWP in the agenda for the Oct. 10, 2023 Municipal Services Committee meeting on three scenarios to achieve 100% Carbon free electricity by 2030, and assuming that these scenarios and input data are correct*, we estimate the cost for the average ratepayer to be an additional 8% for scenario 1, 17% for scenario 2, and 16% for scenario 3. For an average ratepayer using 500 kWh per month, this corresponds to an additional $7.30, $15.00, and $13.92 per month in 2023 dollars.

The recent history of PWP charges shows that the cost for its electricity, which comes largely from fossil fuels at present, are already volatile at a similar level. This year, PWP made “Power Cost Adjustments” because of higher than expected prices for natural gas, and a corresponding projected shortfall in PWP’s contribution to the City of Pasadena budget. For an average ratepayer using 500 kWh per month, these adjustments made the bill $13.46 higher for March 2023 than for March 2022, with the increase steadily growing to $24.22 for September 2023 compared to September 2022.

*PWP includes the cost of rooftop solar in scenarios 2 and 3, even though that cost is normally paid by the property owner, **not ratepayers**. There are other issues with the design of the scenarios and the costing and these issues remain unresolved.

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Details:

An average electric residential customer uses 500 kWh/month. Total billed cost for monthly electric service includes the Energy Charge, Distribution Charge, Monthly Customer Charge, Grid Access Charge, and Taxes. Based on the 2018 IRP, PWP costs for the scenarios (called “IRP Related Costs” in the 2018 IRP, and “Power Supply Costs” in 2023 material) are approximately 57% of the Energy Charge and 31% of Total Billed Electric Cost.

Power Cost Adjustments (PCA's) are monthly changes to the Energy Charge. They are cumulative: As a simple but unrealistic example, if a 200% PCA were applied to January's energy charge (tripling the energy charge compared to December) and a -50% PCA applied to February's energy charge, the result would be an energy charge for February that was one and a half times the December energy charge. All of the PCA's in 2023 so far have been increases. They started at 27% ($0.025/kWh) for March 2023 and continued to grow through September 2023, but with smaller month to month percentage increases ranging from 6% to 1%. PWP made the PCA's because of higher than expected prices for natural gas and a projected shortfall in PWP's net income which would result in a significant reduction to the General Fund Transfer (GFT), an annual contribution from PWP to the City of Pasadena.

In January 2023, the Pasadena City Council unanimously passed Resolution 9977, setting a "goal to source 100% of Pasadena's electricity from carbon free sources by the end of 2030" and to use the 2023 Power Integrated Resource Plan process (IRP) to plan the transition. Pasadena Water & Power (PWP) has estimated costs for three scenarios that achieve the goal, all using significant solar power and battery storage:

1) No Limit on Internal Resources (Results in most Fuel Cell usage)
2) Limit on Internal Resources (Results in largest battery storage)
3) Limit on Int. Res. and Doubled Distributed Energy Resources (DER - Rooftop Solar)

In addition PWP estimated the cost of a reference scenario (4) that only meets the state mandate for 100% Renewable and Zero Carbon by the end of 2045, and a case (5) that adds the social cost of carbon (SCC). Additional information on what these scenarios assume is provided on slides 22 and 23 of Public Townhall #2 Integrated Resource Plan (cityofpasadena.net) and on p. 13, 14, and Appendix C of the MSC material.The details of the SCC are not included in PWP presentations, but as detailed at the end of this document, we estimate the SCC adds at least 5.2 cents (and up to 35 cents) per kWh for coal and at least 2.2 cents (and up to 15 cents) per kWh for gas to the reference scenario, which results in scenario 5 being Wind Heavy. Slide 29 of public townhall #2 suggests the high end SCC was used.

PWP presented a table of "Annual Bill Impacts for Single Family Residential Customers" in Table III on p. 21 of the MSC material. This title is misleading, because the percentages shown in the table are for "Energy Charges," not bills. This gives the impression that bills will increase by the percentages shown in the table. **In fact, the percentage changes in customer bills are much smaller**. This is because the MSC

table shows Energy Charges, which include more than the cost of Power Supply: operations, maintenance, and other charges. Further, Energy Charges are only part of

the customer bill. The figure shown on page 92 of the 2018 IRP shows that PWP costs for the scenarios ("Power Supply" cost in MSC material, or "IRP Related Costs" in 2018 IRP) are approximately 57% of the Energy Charge and 31% of Total Billed Electric Cost.

Column 2 of the MSC table presents Power Supply costs for the 5 scenarios for the period 2023 to 2050 (28 years). We estimate the total power delivery over this period to be 35.5 TWh, from 1.095 TWh in 2022 growing at 1% per year, based on slide 12 of the 2023 Sept. 21 Virtual IRP Community slides. Dividing the $1.937G Power Supply cost for scenario 4 by the total power delivered, this comes to about 5.5 cents per kWh. PWP confirmed during their presentation at the 2023 Sept.12 Environmental Advisory Commission meeting that the Power Supply costs for each scenario are only a fraction of the bill paid by customers. For our estimates, Power Supply costs were assumed to comprise 31% of an average ratepayer bill, which would make the actual bill for scenario 4 (the reference case) about 17.6 cents per kWh. We estimate the actual bill costs of the carbon free scenarios (scenarios 1, 2 and 3) by adding to this 17.6 cents/kWh reference value the difference between the carbon free scenario Power Supply cost and the reference Power Supply cost shown in column 2 of the MSC Table. For example for scenario 1, $2.456G - $1.937G = $519M, and dividing by the 35.5 TWh total power gives an additional total cost of 1.4 cents per kWh, or an 8% increase over the reference cost. Multiplying the 1.4 cents per kWh by 500 kWh per month for an average ratepayer results in an additional $7.30 per month.

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The note on scenario 3 in Table III of the MSC material states that PWP includes the cost of installing additional rooftop solar power (DER), even though individual customers cover these costs, and there are federal and state subsidies. It is also hard to reconcile including DER in the scenario costs with the fact that scenario 2 has *less* DER but a *higher* cost than scenario 3. Without the full IRP draft available, we can not comment further on this puzzling situation.

Social Cost of Carbon: $51 to $340 per metric ton (2205 pounds).
(https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf)
(https://www.resources.org/common-resources/the-us-environmental-protection-agency introduces-a-new-social-cost-of-carbon-for-public-comment/)
(https://www.eenews.net/articles/epa-floats-sharply-increased-social-cost-of-carbon/)
From https://www.eia.gov/tools/faqs/faq.php?id=74&t=11 the Carbon Content of 1kWh is Coal: 2.26 lbs, Gas: 0.97 lbs.

These values give a SCC of 5.2 to 35 cents/kWh for coal, and 2.2 to 15 cents/kWh for gas.