ATTACHMENT B

PASADENA WATER AND POWER

MEMORANDUM

April 26, 2022

To: Cynthia J. Kurtz
Interim City Manager

From: Jeffrey Kightlinger
Interim General Manager

Re: **City Manager Newsletter Item**

Pasadena Water and Power (PWP) Questions Related to the proposed Building Electrification Ordinance

The following information is in response to questions raised by City Council members at the regular meeting of the City Council on April 4, 2022, regarding the Building Electrification Ordinance presented by the City's Planning Department. The three questions that were asked of Pasadena Water and Power (PWP) related to the ordinance, are as follows:

Question 1: What would be the rate impact for a family of four if the Building Electrification Ordinance is adopted?

Response: A modeling exercise was done for a typical Pasadena multifamily residential unit using new all-electric appliances for cooking, clothes drying, water heating and space heating. Appliance efficiencies are based on federal recommendations, which include certain Energy Star certified products. The illustration below (Fig. 1) shows two different technologies for all-electric appliances (resistance and heat pump), compared to its natural gas counterpart. While building electrification can be achieved in different ways, the model shows that all-electric appliances using heat pump technologies are more efficient and has the potential to match the total annual operating costs of natural gas appliances.

End Use	Water Heating*	Space Heating**	Cooking ***	Clothes Drying ****	Total Annual Costs ($)
Standard Gas	$301 Gas Tank Water Heater	$194 Gas Furnace	$39 Gas Oven & Range	$193 Gas Dryer	$727
Heat Pump Electric	$198 Electric Heat Pump Water Heater	$262 Electric Heat Pump HVAC	$94 Electric Oven & Range	$172 Electric Heat Pump Clothes Dryer	$726
Standard Electric	$719 Electric Resistance Water Heater	$262 Electric Heat Pump HVAC	$94 Electric Oven & Range	$281 Electric Resistance Clothes Dryer	$1,356

All assumptions based on res. rate of $0.20/kWh & $1.60/therm, HH size of 4 people. **Estimates only, actual operating costs may differ**
*Water Heating EF: Gas (Tank)=0.62/Electric (Resistance)=0.95/HPWH=3.45
** Space Heating: 92% AFUE Furnace, HP HVAC: 15 SEER/8.5 HSPF 2
***Cooking:20 minutes use, 6 days/week (Oven + 2 burners). ****Clothes Drying:10 loads/week, 520 loads/year

Fig. 1: Annual Utility Bill Comparison (Natural Gas vs. Electric) for a Typical Multifamily Residential Unit.

<u>Question 2:</u> What is the grid impact to the Power System of the Building Electricaton Ordinance?

Response: PWP's power distribution system is designed to deliver the anticipated peak demand (MW), which normally occurs in the summer. PWP models the anticipated peak load with known factors (anticipated building constuction, efficiency code changes, new customer solar, electric transportation, etc). This forecast is an element of the PWP's Power Delivery Master Plan (Plan).

Based on the efficient residential electrification model presented in Question 1 and the construction activities anticipated by the City's Planning Department, PWP has determined that at a system level, the contribution to the peak by the Building Electrification Ordinance is typically 1.5-kW per residential building unit and approximately 2.0 watts per square foot of a commercial building unit. Overlaying building electrification's anticipated contribution to the Plan's peak load projection below (Fig. 2) shows that the contribution of Building Electrification in nominal and can easily be accomodated by PWP power system without modification to the Plan.

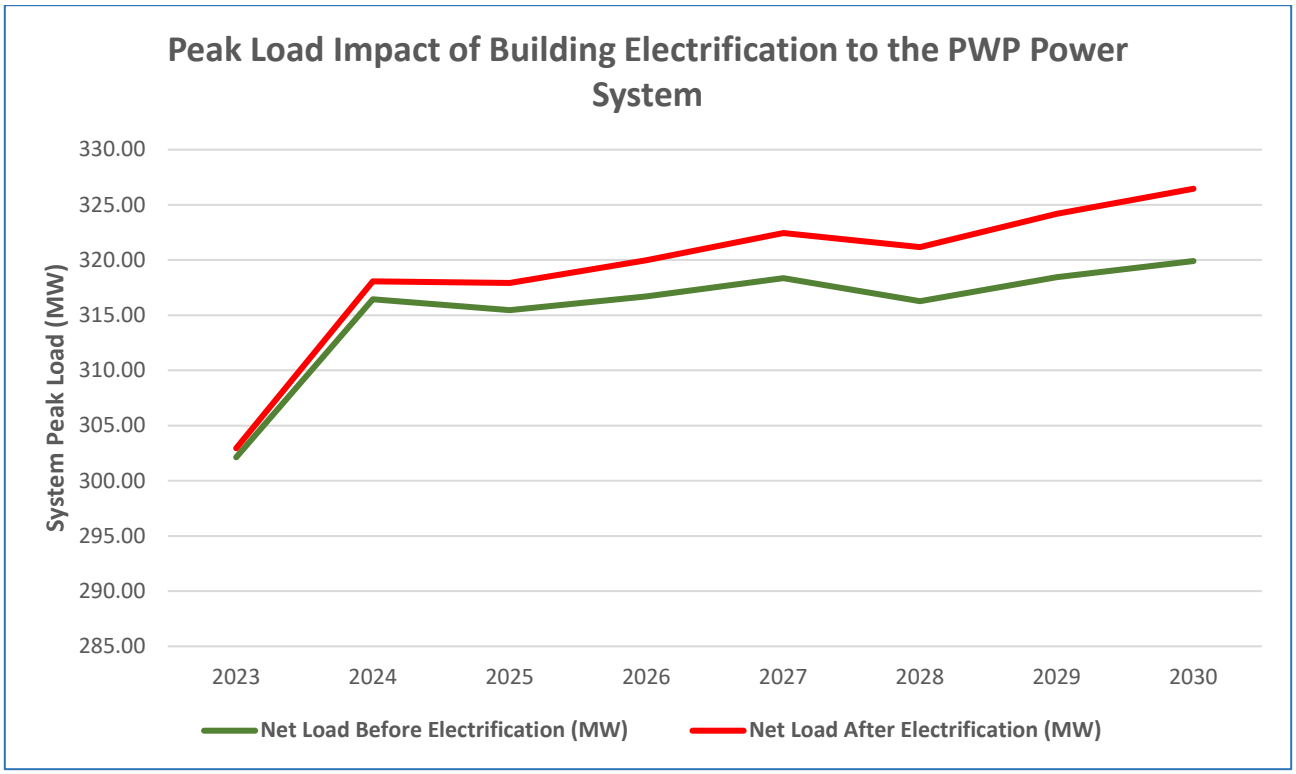

Fig. 2: Peak load impact of Building Electrication to the PWP Power System

<u>Question 3:</u> What will be the change in Greenhouse Gas Emmissions (GHG) if we adopt this Ordinance? Is there a risk we could be swapping natural gas usage for electricity generated by natural gas with little or no benefit?

Response: While natural gas will always have the same carbon content (CO2/Therm), PWP's electric grid is continually getting greener and less carbon intensive as more zero emission generation sources are adopted and existing fossil fuel generation sources are retired. PWP's power system current GHG emissions is approximately 50% lower than 1990 levels and continuing to decline.

The illustration on the next page (Fig. 3) compares the anticipated, cummulative annual GHG emissions between natural gas appliances and efficient all-electric appliances (this graph includes multi-family, single family, ADUs and commercial). This is based on the City's Planning Department estimates for new construction activities and the shrinking carbon content of PWP's energy mix over time (PWP's Integrated Resource Plan). The illustration shows that the GHG reductions for efficient building electrication are significant compared to the status-quo use of natural gas appliances and will continue to decrease as the grid gets cleaner. Proactively adopting building electrification for new residential and commercial construction ensures that all-electric appliances will collectively become cleaner with the evolving grid, as opposed to retroactively replacing gas appliances at a later date.

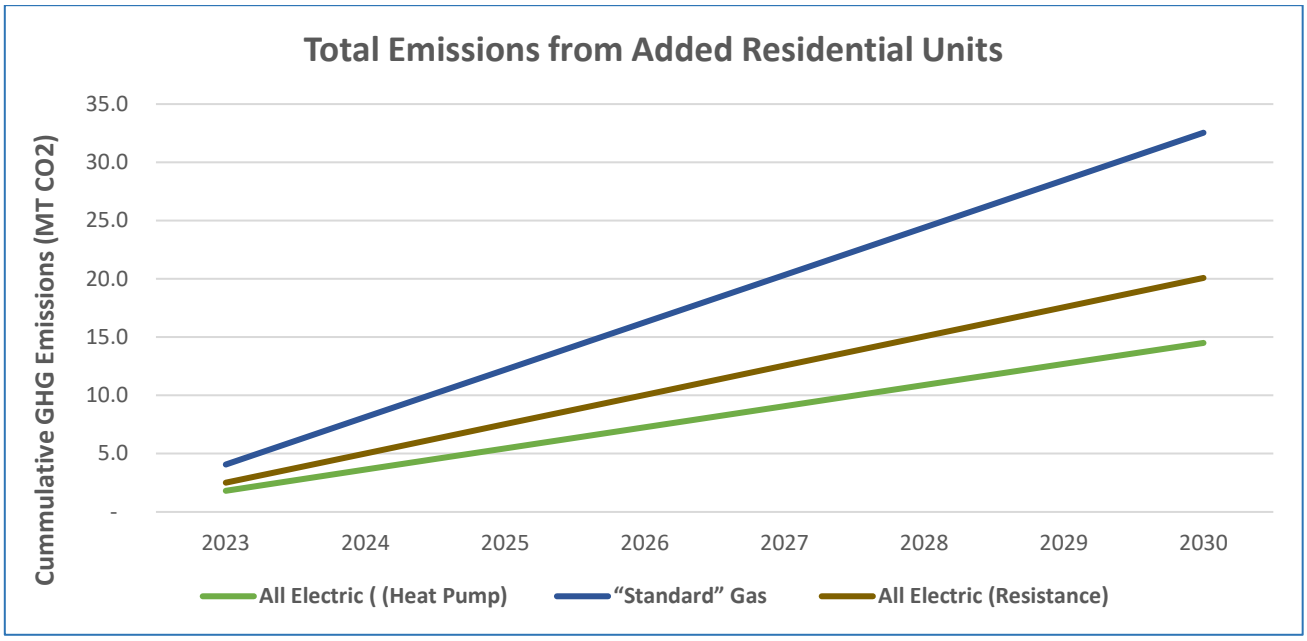

Fig. 3: GHG comparison of Natural Gas appliances and Efficient Electric Appliances

For more information about PWP's Green Power Program, visit https://www.PWPweb.com/GoGreen or call (626) 744-4005.