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BIOENERGY AUSTRALIA SUBMISSION – SUPPLEMENTARY INFORMATION

Inquiry into Renewable Energy Innovation in the ACT

Following our submission to the Inquiry into Renewable Energy Innovation in the ACT, we were invited to appear at a hearing for this inquiry. In this occasion, we were asked to provide supplementary information on the comparison between gas and electricity for residential heat usage.

The following points will be analysed below:

- **economic issues related to the upgrading of the electricity network**
- **temperature-dependent efficiency of heat pumps**

As mentioned in our submission, from an economic perspective, a full-electrification approach is not the best strategy because switching all customers to electricity would significantly increase demand on the network, which would consequently need to be upgraded, resulting in a high cost to consumers. According to the Deloitte report [“Decarbonising Australia’s gas distribution networks”](#), renewable gas is currently the cheapest option for decarbonisation of energy provided by gas networks. AGIG has recently undertaken a study with Deloitte on [Decarbonising Victoria’s Gas consumption](#), and it was found that using renewable gas to decarbonise natural gas consumption in Victoria is 40% less expensive than full electrification. Similar results can be achieved in the ACT.

In terms of efficiency, heat pumps are certainly a good solution for residential heat usage; however, renewable gas can play a complementary role, especially in cold regions, like the ACT, because the efficiency of heat pumps reduces as ambient temperatures get cooler.

It is important to note that the Coefficient of Performance (CoP) of the heat pumps often used in stakeholder reports appears particularly high, but it often does not take into account the efficiency reduction in colder conditions. For example, the CoP’s used in the “Trajectory for Low Energy Homes: Stage 2 Draft Report” range between 3.31 to 4.81 for hot water heat pumps and between 3.92 and 5.22 for reverse cycle air conditioners, which are significantly higher than the actual performance of those appliances during colder months, when those appliances will need to provide additional heating. Using incorrect CoP leads to inaccurate calculations of the energy required for the home and may bias the results.

Advocates of heat pumps would suggest that connecting them to solar PV allows households to use surplus solar generation to heat their water, reducing the operating cost by avoiding gas or electricity charges. However, it is not that simple. Space heating and hot water are generally used during colder times (e.g., at night) when the solar rooftop PV panels do not generate electricity. This will lead to additional peak energy demand to be supplied by the grid, requiring additional grid augmentation and

strengthening. This is often not considered in the simplified pay back calculation leading to a biased result favouring heat pump technology. Overall, installing heat pump hot water units in areas with low average temperatures is not recommended. Energy Matters notes that the average ambient yearly temperature for heat pumps should be equal to or greater than 19°C, which is well above the average winter temperature in the ACT. This is because the efficiency of heat pumps reduces as ambient temperatures get cooler. It is indeed a dilemma that heat pumps work better at transferring heat into a home when it is hot outside. Data from the Bureau of Meteorology indicates that the ambient average temperature in most of southern Australia is below 18 degrees. This indicates that heat pump technology for hot water works best in Australia's subtropical, tropical and arid regions.

In colder and more humid climates, the outside coils of the heat pump may ice up and this requires additional electrical heating before the unit can be operational. This additional electricity is generally not included in efficiency estimates. The performance of a heat pump reduces when it is most needed, i.e., in cold weather. The energy scenarios should therefore be recalculated by adopting realistic – rather than theoretical - performance metrics of heat pumps for hot water and space heating, and by considering the broader system costs required to manage the intermittent nature of rooftop solar PV.

We invite the ACT Government to check the following publicly available position statements that may be of interest around this topic:

<https://www.energynetworks.com.au/resources/reports/energy-networks-australia-response-to-low-energy-homes-modelling/>

<https://www.energynetworks.com.au/news/energy-insider/staying-warm-this-winter-and-keeping-bills-down/>

<https://www.energynetworks.com.au/news/energy-insider/2020-energy-insider/delivering-net-zero-emissions-at-half-the-cost/>

<https://www.energynetworks.com.au/news/energy-insider/electrify-the-gas-should-we-or-shouldnt-we/>

<https://www.energynetworks.com.au/news/energy-insider/2020-energy-insider/heating-electrification-robbing-peter-to-pay-paul/>

Thank you for the opportunity to provide this supplementary information.



Yours sincerely
Shahana McKenzie, CEO Bioenergy Australia