South Coast AQMD Staff Responses to So Cal Gas Comments dated 12/4/2020

Issue 1: Differences in results between running a specific climate zone on its own vs. evaluating the entire Basin and focusing in on a specific climate zone in the results section

These differences are expected. As mentioned in the "Getting Started" documentation, average technology mix parameters representing the entire South Coast Air Basin are used when "All" is selected for the climate zone. However, running a specific climate zone uses the default technology parameters for that specific climate zone. The units of energy consumption and the penetration of appliances will vary from climate zone to climate zone. When NEAT is run for all climate zones, this nuance is lost. However, the rest of the parameters used to compute the cost effectiveness are specific to each climate zone, even when running all climate zones.

There are cases where the emission changes are fairly close to zero and using the Basin average penetration and UEC will result in a different sign of the emission changes than using the climate zone specific penetration and UEC. It is also likely that there will be differences in the number of homes meeting the selected criteria due to differences in penetration as only homes with the appliance to be changed out will show up in the results. This behavior is evident in the example provided by Ramboll. In order to discourage users from running all climate zones simultaneously, we added a warning message when these options are used saying the following:

> "Selecting a housing category of **Aggregate** and/or a climate zone of **All** uses South Coast Air Basin average UEC and penetration parameters as a default. Since these parameters can vary significantly across climate zones and housing categories, average UEC and penetration parameters may introduce errors when evaluating the results in specific climate zones or housing categories."

To confirm our assertions, we set up the following runs:

1. Climate zone 6 with aggregate housing category using default technology mix parameters. Replace conventional water heaters with electric water heat as in the Ramboll example.
2. All climate zones with aggregate housing category using the technology mix parameters representing climate zone 6 and aggregate housing category. Replace conventional water heaters with electric water heat as in the Ramboll example. Filter the results to focus solely on climate zone 6.

Note that all of the discrepancies identified in issue 1 do not occur in these runs. The number of homes represented are identical, the cost effectiveness plots are identical, and the change in NOx and CO2e subject to infinite incentive funds are identical. See figures 1 and 2.

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Figure 1: Running NEAT for all climate zones and selecting climate zone 6 in the results using the input data for climate zone 6. Unlimited funding results in NOx change of -0.208 TPD and CO2e change of -204 TPD.

Figure 2: Running NEAT for climate zone 6. Unlimited funding results in NOx change of -0.208 TPD and CO2e change of -204 TPD.

Issue 2: Some cost effectiveness metrics are missing or invalid in the table.

We appreciate the close look at this table. Some rows should not have values for the mean, median, min, and max because there were no homes in that "region" (red, yellow, green). In order to avoid confusion, we updated the code to fill cells that were previously blank or NaN due to an absence of homes in that region with an "<undefined>" label. A couple of numbers were incorrectly blank on the table and one number was presented in the wrong units. We fixed this bug. The revised table for this scenario is presented below.

Figure 3: Cost effectiveness results for scenario where conventional NG water heaters were replaced with electric water heaters in all climate zones and housing categories.

Issue 3: Inconsistencies between the "Apply Prescribed Funding" tab and the "Select Cost Effectiveness Subset".

We found a bug in the code used to calculate the change in CO2e emissions on the "Apply Prescribed Funding" tab. The change in emissions from natural gas production was not factored into the calculation on this tab only. This term was added to the calculation on 12/4/2020. This bug only affected the "Apply Prescribed Funding" tab.

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Issue 4: Out of Memory Error

NEAT is a memory intensive program and the Solar PV module is particularly memory intensive. Running the calculation on a computer with more memory, closing other open programs, or running each climate zone individually are the only options for avoiding this error.