Tahoe-Truckee Plug-in Electric Vehicle (PEV) GHG Reductions – Methodology Description

ICF developed PEV GHG reduction estimates for TRPA based on the methodology outlined below. The corresponding calculation spreadsheet was submitted to TRPA and is entitled - Tahoe-Truckee PEV GHG Reductions_10-11-16 alt.xls.

The purpose of this exercise was to provide TRPA with GHG reduction estimates to use for their Sustainable Communities Strategy planning and SB375 calculations.

Our estimates calculate the GHG emission reductions attributable to increasing the miles that plug-in hybrid electric vehicles (PHEVs) travel using electricity, or so called eVMT. This is the approach that we developed for the Metropolitan Transportation Commission (MPO of San Francisco) – and has effectively been copied by most other MPOs. In this case, we assume an increase from 40% eVMT to 80% eVMT, which one can attribute to some planning/policy intervention focused on charging infrastructure deployment. This errs on the conservative side in the sense that we do not assume any induced EV deployment as a result of charging infrastructure availability. Rather, we are effectively assuming that the increased availability of charging infrastructure enables more frequent charging for PHEVs, and therefore more electric miles, and that it has no measureable impact on EV deployment. This is an important distinction for CARB because it is in-line with the focus of sustainable community strategy planning.

The first step in estimating the potential PEV GHG reductions attributable to TRPA's planning/policy intervention was to establish PEV projections for the study region. We split these out by residents and visitors, as described below.

Resident PEV Projections

PEV projections for residents of the study region were developed out to 2040 based on ARB's EMissions FACtor (EMFAC) model vehicle populations for TMPO and Truckee. This assumes a so-called "fair share" PEV adoption in Tahoe-Truckee Region consistent with likely compliance scenario for Zero Emission Vehicle (ZEV) program, which is built into the EMFAC database. ICF used the same proportion of sales included in the EMFAC model to distinguish between PHEVs and BEVs. The ZEV Program extends through 2025 and the EMFAC model is linked to existing policies that have been adopted. The model is not designed to be predictive in a post-2025 world. As such, the percentage of ZEVs sold annually post-2025 is fixed at around 15 percent.

Visitor PEV Trip Projections

ICF developed projections for PEV visitor trips using data on regional travel patterns, vehicle purchasing trends, and likely compliance for regulations that are driving growth in PEV ownership (especially in California, slightly less so in Nevada). The following steps describe the methodology and data sources used to develop these projections:

- **Step 1–Determine the number of vehicle trips made by visitors to the study region.** ICF used data outputs from TRPA and the Town of Truckee's travel demand models to determine the number of

vehicle trips made by visitors to the Tahoe-Truckee region during the peak summer season. In both of these models, visitors represent around 35 percent of total regional vehicle trips.

- **Step 2–Estimate the geographical origin of visitor vehicle trips.** Since driving distance is a limiting factor in whether a trip can be made by a BEV, it is important to understand the geographical origin of visitor vehicle trips. Through a third-party data aggregator, AirSage, TRPA collects information about population mobility throughout the study region. AirSage analyzes anonymous location and movement of mobile devices, which is derived from wireless signaling data, to provide insight into where populations, are, were, or will be, and how they move about over time. AirSage collected visitor device arrival and departure data over 13 days in July 2014. By analyzing the movement patterns of these devices, AirSage is able to determine the "home" or origin county of the 600,000+ visitor devices detected in the region during that time period. ICF applied the percentage breakdown of visitor devices by county origin to the visitor vehicle trip data from Step 1 above to estimate the number of visitor trips coming from various regions in California and Nevada.
- **Step 3–Estimate the percentage of a visitor trips that will likely be made by a PEVs.** ICF assumed that visitor trips originating in a California county would be representative of that county's forecasted light-duty vehicle population, as included in the EMFAC model (state-wide, the model assumes that ZEVs comprise 15.7% of new light-duty vehicle sales by 2025). Note that since Nevada is not a ZEV state and modeling efforts similar to EMFAC are not available, ICF estimated PEV ownership for visitor trips originating in Nevada counties using historic hybrid vehicle sales patterns from IHS Automotive DMV registration data.

PEV Emissions Reductions

Once we had projections for the number of PEVs owned by residents and the number of trips made by PEVs to the region by visitors, we estimated the emissions reductions of the baseline scenario (reflecting existing ZEV policy) and the TRPA SCS scenario (reflecting the increase in PHEV miles traveled in electric mode due to the deployment of charging infrastructure). As noted earlier, the only variable that changed between the two scenarios is the eVMT for PHEVs – for the baseline scenario eVMT was set to 40% (EMFAC assumption) and for the TRPA SCS scenario, eVMT was set to 80%.

To get from resident vehicle populations to miles, ICF applied the average vehicle mileage accumulation from EMFAC (12,000 miles/year or 34.6 miles/day) to the PEV vehicle populations that were extracted from the model. To get from visitor trips to miles, we applied the average visitor VMT per trip (20.8 miles/trip) sourced from the TRPA Travel Demand Model.

ICF used a lifecycle approach to the emission reduction calculations – sourcing carbon intensities from the Low Carbon Fuel Standard for reformulated gasoline and the GREET model for electricity (see Assumptions and EFs tab of spreadsheet). We projected the carbon intensity of electricity supplied by NV Energy and Liberty Utilities through each entities relative Renewable Portfolio Standard (RPS) requirements. The percentage of electricity generated by different sources was then run through the GREET model, and the lifecycle carbon emissions factors were added to the spreadsheet – as shown in the GREET analysis tab. For years post RPS requirements, we assumed the carbon intensity would remain the same as the last year of the RPS.