

## **San Diego Tribal Collaborative Climate Pollution Reduction Grant Application:**

### **– Technical Appendix –**

#### **Priority GHG Reduction Measures Emissions Quantification Methodology**

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##### **Pala Band of Mission Indians**

###### **Tribal EV Adoption Program**

In order to calculate the emissions avoided by implementing an EV adoption program, it is essential to refer to the current on-road mobile transportation sector emissions within the boundaries of the Reservation. The Pala Environmental Department (PED) has previously completed a comprehensive inventory of all roadways on the Reservation, including vehicle miles travelled (VMT). The estimated annual VMT for the Pala Reservation is 7,046,453 miles. The Tribal Greenhouse Gas Inventory Tool (TGIT) estimates that this distance travelled in passenger cars would amount to annual emissions of 2,567 MTCO<sub>2</sub>e (EPA, 2010). The Tribe has a goal of achieving 30% EV adoption through the implementation of this measure, which would reduce these emissions by 30%. Assuming 30% adoption of EVs by the Tribal community, the estimated emissions reduction is 770 MTCO<sub>2</sub>e per year. Throughout the five-year grant period, the total emissions reduced would be 3,850 MTCO<sub>2</sub>e. By the year 2050, the implementation of this measure would reduce emissions by 19,250 MTCO<sub>2</sub>e. However, it is likely that this is the minimum amount of emissions that would be reduced by 2050 because EV adoption is forecasted to increase dramatically over the course of that time period.

###### **EV Charging Station Installation**

This GHG reduction measure would include the installation of 10 level-3 chargers and 20 level-2 chargers. In an optimal scenario, these chargers would be utilized 24/7, including overnight charging. Emissions reductions achieved by installing EV charging stations were quantified by estimating the miles charged per year. Assuming each charger is used only 12 hours per day, the chargers combined would be able to provide electricity for 10,512,000 miles per year (according to tesla manufacturer specifications). To use this value to estimate the emissions that would be avoided by the implementation of this measure, it is assumed that this distance would have been travelled annually by gasoline passenger cars if this measure was not implemented. Using the current average fuel efficiency of 24.1 miles per gallon for passenger gasoline-powered vehicles (EPA, 2010), the Reservation could see an annual reduction in emissions of 3,719 MTCO<sub>2</sub>e. This would lead to an emissions reduction of 18,595 MTCO<sub>2</sub>e over the course of the five-year grant period, and 19,250 MTCO<sub>2</sub>e by 2050.

###### **Energy Audits & Retrofits**

This measure is aimed at reducing the electricity and heating demands for tribal homes and facilities. The Tribe aims to enhance energy efficiency of the residential sector through the replacement of liquefied petroleum gas (LPG) heaters on the Reservation. Additionally, this measure would include home energy audits to identify additional applicable retrofits such as window and lighting upgrades, tankless water heaters, electric cooking appliances and more. The emissions inventory estimates that

the residential sector uses a total of 154,117 gallons of LPG per year, resulting in emissions of 923 MTCO<sub>2</sub>e per year (EPA, 2010). The goal of this measure is to install heat pumps, electric stoves, and tankless water heaters in 50 Tribal homes to move away from LPG use. Heat pumps increase energy efficiency in the home by 65% (U.S. Department of Energy, 2024). Under the assumption that, nationally, 52% of electricity used in homes is devoted to heating and cooling (EIA, 2023) the installation of heat pumps alone would reduce emissions by 329 MTCO<sub>2</sub>e. Furthermore, by assuming that 50 home's worth of LPG-related emissions would be eliminated, the installation of these retrofits would reduce GHG emissions by up to 430 MTCO<sub>2</sub>e in total. This would lead to an emissions reduction of 2,150 MTCO<sub>2</sub>e over the course of the five-year grant period, and 10,750 MTCO<sub>2</sub>e by 2050.

### **Community Compost Program**

This measure aims to reduce the amount of compostable waste that is sent to the landfill by the Tribe. Using a 2012-13 City of San Diego Waste Characterization Study, it was found that 37% of potentially compostable waste was landfilled (City of San Diego, 2014). On the Pala Reservation, an estimated 2,180 tons of solid waste is generated per year (Section **Error! Reference source not found.**). Using the average proportion of food scraps from solid waste generation in San Diego County (37%), it is estimated that the Reservation sends 806.6 tons of compostable food waste to the landfill per year. The EPA Waste Reduction Model (WARM) was utilized to calculate the emission that would be avoided by composting this amount of waste instead of landfilling it (EPA, 2024). Composting this amount of food waste instead of landfilling it would reduce annual emissions by 495 MTCO<sub>2</sub>e. This would lead to an emissions reduction of 2,475 MTCO<sub>2</sub>e over the course of the five-year grant period, and 12,375 MTCO<sub>2</sub>e by 2050.

## **Jamul Indian Village of California**

### **EV Charging Station Installation**

Expansion of EV charging infrastructure on the Jamul Indian Village of California (JIVoC) Reservation is proposed to meet the increasing demand of its visitors. The Tribe currently has eight (8) Level-2 chargers located at the Jamul Casino. This GHG reduction measure includes installing an additional 10 Level-2 chargers for Jamul Casino Hotel when it opens in 2025. The expansion of the EV charging infrastructure on the Reservation aims to reduce fuel consumption and encourage the shift from gasoline and diesel-powered vehicles to EVs. Quantified emissions reductions achieved by installing EV charging stations were estimated by utilizing miles charged per year. Assuming each charger is used 12 hours per day, the chargers combined would be able to charge 65,700 miles per year (according to manufacturer specifications). To use this value to estimate the emissions that would be avoided by the implementation of this measure, it is assumed that this distance would have been travelled annually by gasoline passenger cars if this measure was not implemented. Using the current average fuel efficiency of 24.1 miles per gallon for passenger gasoline-powered vehicles (EPA, 2010), the Reservation could see an annual reduction in emissions of 233 MTCO<sub>2</sub>e. This would lead to an emissions reduction of 1,163 MTCO<sub>2</sub>e over the course of the five-year grant period, and 5,813 MTCO<sub>2</sub>e by 2050.

### **Jamul Casino Microgrid**

This measure aims to deploy a microgrid for the Jamul Casino. This deployment involves installing solar panels on the roof of the Casino and on a 4-acre parcel of undeveloped land nearby the Reservation that was recently purchased by the Tribe. Given an average annual plane of array (POA) irradiance of approximately 214 kWh per square feet per year for this location (NREL, 2024) and assuming 20% of solar panel efficiency (Enel X, 2024), solar panels installed on the Casino roof would generate approximately 4,819 MWh of electricity per year. Assuming 80% of the 4-acre land parcel is dedicated to solar panels, this area would produce approximately 5,963 MWh of electricity per year. In total, these two sources of solar power will reduce the Reservation's grid-delivered electricity use by 10,782 MWh per year. With these two sources powering the Casino instead of traditional grid electricity, the Tribe stands to reduce emissions by approximately 2,485 MTCO<sub>2</sub>e per year (EPA, 2010). This would lead to an emissions reduction of 12,425 MTCO<sub>2</sub>e over the course of the five-year grant period, and 62,125 MTCO<sub>2</sub>e by 2050.

## **Viejas Band of Kumeyaay Indians**

### **Energy Audits & Retrofits**

The Tribe aims to enhance energy efficiency of the residential sector through energy audits and retrofits. As many as 200 Tribal homes would be retrofitted with triple-pane windows, tankless water heaters, air source heat pumps, electric cooking appliances, and other electric alternatives to propane. This differs slightly from the brief program description in the PCAP. Since the submission of the PCAP, the Viejas Tribe has opted to revise this GHG reduction measure to nullify residential propane use completely. The base year 2022 estimate for residential propane use accounted for annual emissions of 538 MTCO<sub>2</sub>e. Therefore, the estimated reduction in GHG emissions from the implementation of this measure is 538 MTCO<sub>2</sub>e. This would lead to an emissions reduction of 2,690 MTCO<sub>2</sub>e over the course of the five-year grant period, and 13,450 MTCO<sub>2</sub>e by 2050.

### **Solarize Tribal Homes**

This reduction measure was quantified by calculating the number of solar panels necessary to offset all emissions related to residential electricity use. Given an annual average plane of array (POA) irradiance of 215 kWh per square foot per year (NREL, 2024) and a solar conversion efficiency of 20% (Enel X, 2024), it is estimated that twelve (12) solar panels installed on each roof, each covering 17.5 sq ft, would suffice to meet and exceed the residential sector's energy needs. Because the total estimated electricity use from the Viejas Reservation residential sector results in emissions of 397 MTCO<sub>2</sub>e, the implementation of this measure would reduce emissions by 397 MTCO<sub>2</sub>e annually. This would lead to an emissions reduction of 1,985 MTCO<sub>2</sub>e over the course of the five-year grant period, and 9,925 MTCO<sub>2</sub>e by 2050. If sufficient battery storage capacity and net metering were to be incorporated, the installation of additional solar panels would generate supplemental energy. The surplus could be sold to SDG&E to further reduce *Scope 2* emissions linked to off-Reservation electricity generation.

### **Establish a Recycling Program**

The City of San Diego Waste Characterization Study found that approximately 33% of solid waste was recoverable in the residential sector and 37% was recoverable in the commercial sector (City of San Diego, 2014). The total estimated solid waste from Viejas Reservation is 661.7 tons for the commercial sector and 138 tons for the residential sector. This measure would make it possible to recycle all recyclable materials from both the residential and commercial sectors. With active engagement, the program can diminish the amount of waste sent to landfills by up to 147 and 792 short tons, for the residential and commercial sector, respectively. In total, 939 short tons of recyclables may be diverted, resulting in emissions reductions of 290 MTCO<sub>2</sub>e annually (EPA, 2024). This would lead to an emissions reduction of 1,450 MTCO<sub>2</sub>e over the course of the five-year grant period, and 7,250 MTCO<sub>2</sub>e by 2050.

## **La Posta Band of Mission Indians**

### **Implement Erosion Controls for Wetland Restoration**

La Posta is proposing to restore wetlands and enhance carbon sequestration to offset its GHG emissions. Due to a culvert that increases the flow of water from interstate highway 8, 7.41 acres of riparian creek habitat on the Reservation is being degraded from sedimentation. Erosion controls are needed to inhibit sediment from discharging into the wetland. Restoring the wetland will require planning, erosion mitigation, construction, and revegetation activities. The site assessment will be conducted by environmental professionals, who will identify potential methods for mitigating this habitat destruction. Methods to reduce flow such as the installation of riprap underneath the outlet of the culvert may be pursued. Additional restoration techniques such as invasive species removal and native species planting will also be employed when funding allows. Assuming freshwater wetland carbon sequestration is approximately 1.43 tons per acre per year (Lal, et al., 2018), if this area is restored to its fullest potential, it will sequester an estimated 9.6 MTCO<sub>2</sub>e per year, decreasing La Posta Reservation's net GHG emissions. This would lead to an emissions reduction of 48 MTCO<sub>2</sub>e over the course of the five-year grant period, and 240 MTCO<sub>2</sub>e by 2050.

### **Solarize Tribal Homes & Facilities**

This reduction measure was quantified by calculating the number of solar panels necessary to offset all emissions related to residential and commercial electricity use. While this may sound like a lofty goal, it is actually very reasonable considering the extremely small size of the La Posta Reservation. Given an annual average plane of array (POA) irradiance of approximately 214 kWh per square foot per year for this location (NREL, 2024) and assuming 20% solar panel efficiency (Enel X, 2024), each Tribal home would need to install approximately 201 square feet of solar panels (12 solar panels) on their roof to offset all residential emissions (26.2 MTCO<sub>2</sub>e). Tribal facilities would have to install approximately 6,276 square feet of solar panels (358 solar panels) across all buildings to offset all commercial emissions (61.9 MTCO<sub>2</sub>e) for a total reduction of 87.6 MTCO<sub>2</sub>e per year for this measure. This would lead to an emissions reduction of 440 MTCO<sub>2</sub>e over the course of the five-year grant period, and 2,200 MTCO<sub>2</sub>e by 2050.

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