ATTACHMENT A

Mid-Project Technical Analyses Progress Report Memo

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INTRODUCTION

This memo summarizes the process, interim findings, and planned next steps for the technical analyses conducted to date by the National Laboratory of the Rockies (NLR) for the Energy Access, Resilience, and Capacity Study (Energy ARC). NLR's work includes three analyses related to infill solar photovoltaic (PV) and battery storage installations in the San Diego region: baseline of existing buildout; maximum potential capacity; and installation barriers and impacts on local communities. These analyses are being informed by the ongoing coordination between County of San Diego (County) Office of Sustainability and Environmental Justice (OSEJ) and NLR staff, as well as input from both of the region's Community Choice Aggregators, San Diego Gas & Electric, and other interest-holders to ensure that local context is considered and reflected in the study's analytical methodologies and results.

BASELINE OF EXISTING BUILDOUT

Renewable energy generation and storage is in-use across the San Diego region and in all five Supervisorial districts. NLR compiled data on historical renewable energy generation and storage installations across the San Diego region using the Tracking the Sun (TTS) dataset maintained by Lawrence Berkeley National Laboratory (LBNL). The TTS dataset was selected for its superior spatial resolution and inclusion of battery storage records.

Through 2024, the region has roughly two gigawatts (GW) of cumulative installed PV capacity, roughly the same amount generated by the Hoover Dam. Additionally, the region has more than 200 megawatts (MW) of existing battery storage capacity, enough to power up to 400,000 homes for one hour. Though existing PV installations include a wide range of applications for residential, commercial, and some industrial uses, the residential sector accounts for the majority of renewable energy generation: One-in-five homes (approximately 287,000 buildings) are currently equipped with rooftop PV. The utility sector accounts for the majority of installed battery storage.

Figure 1 shows the distribution and estimated capacity of PV and battery storage installations by census tract across the San Diego region. Most of the PV installations are in suburban often-affluent communities or in rural areas, with the latter associated with large grid-scale PV installations. While battery storage installation is lower than PV installation, more battery storage systems have been installed in recent years in tandem with PV installations.

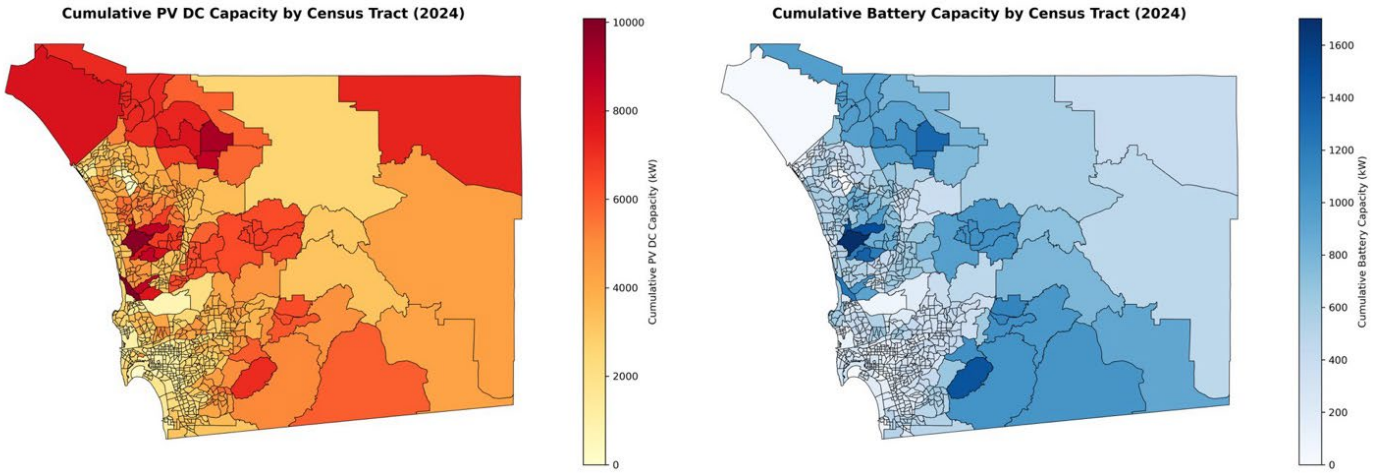

Figure 1. Census tract-level map of estimated cumulative PV and battery capacity. Source: Tracking the Sun (LBNL)

MAXIMUM POTENTIAL CAPACITY

NLR is in the process of developing a comprehensive analysis to quantify the maximum potential capacity for infill PV installations, which will identify how much additional infill PV is possible in the region to supplement existing PV buildout. The analysis will include three infill components: rooftop PV, parking lot PV canopies, and community PV on public lands (i.e., lands owned by local or regional government agencies or districts like parks, government buildings/campuses, and school grounds). Tribal lands within the San Diego region are also included in the scope of this analysis, and will be coordinated directly with Tribal Governments to ensure findings reflect data sovereignty principles.

The analysis will account for some building characteristics including roof orientation, shading, and solar resource availability; unique building attributes such as structural suitability and electrical panel capacity are excluded. Because the intent of the study is to understand how much of our regional demand *could be met* through infill PV installations, economic factors such as installation costs, electricity rates, or policy incentives are not factored into the maximum potential capacity analysis. These details will be addressed in the forthcoming analysis that will focus on barriers to adoption and impacts on local communities.

The analysis of the first infill component, rooftop PV, uses the Microsoft Building Footprints dataset and unique parcel geometries from the Lightbox parcel database. The Lightbox parcel data was cross-validated against the County's SanGIS parcel database, achieving 97% overlap across matched records. Sector classifications derived from the Lightbox parcels were further validated against the San Diego Community Power Building and Housing Stock Analysis conducted by the Building Electrification Institute (BEI) in 2024, with close alignment in residential and commercial shares, confirming consistency across independent datasets.

Initial draft outcomes of this analysis are shown in Table 1, which approximates the percentage of total rooftop capacity on existing residential, commercial, and industrial buildings in each Supervisorial District; this includes both existing rooftop PV buildout and future potential rooftop installations. Across the region, single-family homes have the most capacity available. Multi-family and commercial buildings may also significantly contribute to regional energy goals, while industrial properties account for the remaining regional potential.

Table 1. Preliminary Approximate Percentage of Total Rooftop Capacity by Supervisorial District

Supervisorial District	Approximate Percentage of Total Rooftop Capacity			
	Residential		Commercial	Industrial
	Single-Family	Multi-family		
District 1	55%	20%	20%	5%
District 2	65%	15%	15%	5%
District 3	60%	20%	15%	5%
District 4*	60%	25%	15%	<5%
District 5	60%	15%	20%	5%
Approximate Average for San Diego Region*	60%	20%	20%	5%

*Note: Values may not total 100 percent due to rounding to the nearest 5% increment

These estimates are a first step for calculating maximum potential capacity. Further analysis will include building-level rooftop characteristics and location-specific capacity factors to build on these high-level insights. Findings from the completed analysis will provide more specific projections of PV installation potential to inform future recommendations that support renewable energy generation and storage installation and provide the greatest benefits to residents.

In addition to rooftop PV, NLR is actively developing maximum potential capacity estimates for the other two infill components, parking lot PV canopies and community PV on public lands. Results from both assessments will be incorporated into upcoming deliverables.

INSTALLATION BARRIERS AND IMPACTS ON LOCAL COMMUNITIES

A central objective of this study is to consider resiliency from power outages, economic benefits and costs, and local community context. NLR has initiated the analysis of installation barriers and impacts on local communities by starting with overlays of CalEnviroScreen 4.0 data from the California Office of Environmental Health Hazard Assessment (OEHHA). The data overlays include pollution burden scores, poverty rates, linguistic isolation, and other exposure, environmental effect, sensitive population, and socioeconomic factor indicators that NLR has, so far, cross-referenced with census tract-level data from both the baseline of existing PV and battery storage buildout analysis and the preliminary maximum potential capacity analysis for the rooftop infill component.

Early findings from this preliminary research suggest that while the physical potential for rooftop PV exists across communities of all income levels and environmental burden profiles, translating that potential into actual installations will require attention to the specific barriers facing underserved communities – including financing access, building suitability, and language-accessible outreach.

NEXT STEPS

The remaining study period will focus on completing the maximum potential capacity analysis and identification of the installation barriers and impacts to local communities, and then translating findings into actionable recommendations. A summary of next steps for the technical analyses include:

1. Adoption Modeling: Using NREL's Distributed Generation Market Demand (dGen) model, NLR will project potential infill PV and battery storage installations across the region under multiple policy and market scenarios through 2050. These scenarios bracket a range of conditions including technology cost trajectories, electricity rate changes, and selected policy incentives.

2. Cost-Benefit Analysis: NLR will assess the potential for ratepayer savings from infill PV and battery storage installations, including analysis of avoided costs and bill impacts across different customer segments.
3. Affordability Analysis: NLR will model potential installation outcomes under scenarios designed to test the effects of improved financing access and focused incentives in underserved communities.
4. Installation Strategies: NLR will incorporate findings from stakeholder engagement into an analysis of infill PV and battery storage installation barriers and impacts on local communities, with a focus on recommendations actionable by the Board.
5. Utility Data Integration: NLR will continue ongoing coordination with local utilities and agencies to procure data on interconnection capacity, feeder-level data, and customer load profiles as it becomes available.