Mapping the Workforce: A Spatiotemporal Analysis of Electrification Labor Gaps in California

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Current Workforce Overview

California's decarbonization goals depend on accelerating building electrification, but success depends on the availability of skilled HVAC, plumbing, and electrical workers. This analysis draws on multiple data sources, including the Bureau of Labor Statistics Occupational Employment and Wage Statistics (2018–2023), CA Employment Development Department projections (2020–2030), and CA State License Board contractor records, to assess regional variation in the size and growth of the workforce in each trade. As of 2023, California had approximately 150,000 workers across these trades, with electricians making up the largest share. Urban areas like Los Angeles and San Francisco had the highest concentration of workers (normalized for population density), while rural and disadvantaged regions had substantially more limited workforce availability. Workforce size, contractor licensing patterns, and average employees per contractor vary widely across regions and trades.

Spatiotemporal Analysis Focus Areas

As part of this analysis, the research team compared the available workforce in each region to the prevalence of attributes that may affect demand for fuel substitution services, support the growth and skill development of the workforce, or impact equitable workforce and electrification outcomes. The research team leveraged data from the US Census Bureau, Clean Investment Monitor, American Community Survey, Department of Labor, Apprenticeship USA, ESCO Institute, and California Energy Data and Reporting System.

- **Fuel Substitution Demand Drivers**. We analyzed factors that suggest high near-term demand for electrification services, including high home values, a high proportion of fuel oil or propane heating, housing stock nearing the age of equipment replacement, and clean energy investments. Central and southern regions scored highest, indicating they may need workforce scale-up first to meet market demand.
- **Workforce Supports and Enablers**. We assessed regional capacity to support and upskill the electrification workforce, including apprenticeship availability, participation in training and certifications, union support, and engagement in energy efficiency programs. HVAC apprenticeships were not common statewide and disadvantaged northern and eastern regions often lacked union presence or training infrastructure.
- **Areas of Opportunity**. Without targeted investment, some areas may be left behind in the transition, particularly those with lower natural demand for fuel substitution due to high

reliance on natural gas or large populations residing in disadvantaged communities or with an aging workforce that may be insufficient to support consumer demand.

Recommendations and Use of Findings

The analysis points to the importance of localized workforce development strategies. Recommendations include expanding apprenticeships and certifications in underserved regions, designing incentives for contractor mobility to fill gaps in high-need areas, and ensuring equity-focused investments in disadvantaged communities. Policymakers, utilities, and program implementers can use these insights to prioritize funding, design targeted interventions, and track progress toward workforce sufficiency for California's electrification goals. Our framework can also be used as a starting point for researchers and policymakers in other regions who are grappling with similar issues.