Transforming Blighted Properties into Electric Vehicle Fast Charging Stations

Evaluating the viability of building EV fast charging infrastructure in Alameda County, California

Project Summary

Community: Alameda County, San Francisco Bay Area, Calif.
Technical Assistance: Economic Analysis
Former Use: Gas Station
Future Use: Electric Vehicle Fast Charging Station

EPA United States Environmental Protection Agency

Building an Electric Vehicle Charging Network

Transforming brownfields into new transportation infrastructure

In 2020 the California Governor's Office set a state goal of having 5 million zero-emission vehicles (ZEVs) on roadways by 2030 and deploying 250,000 electric vehicle (EV) chargers by 2025. To meet this goal, consumer adoption of ZEVs throughout the state will need to increase significantly, as will the EV charging network that supports ZEVs. Broad adoption of ZEVs advances federal and state environmental priorities by reducing greenhouse gas emissions and other air toxics, especially in communities adjacent to freeways. Brownfields, such as abandoned gas stations, are underutilized properties with high potential for being revitalized into EV fast charging stations needed to support a growing ZEV vehicle fleet.

East Bay Community Energy (EBCE) is a nonprofit joint power authority that is helping to meet California's goals by providing renewable energy electricity to customers in Alameda County in the San Francisco Bay Area. In addition, EBCE is assessing the market potential for developing EV charging stations. As a first step in the process, EBCE identified two potential brownfield sites to support charging of light-duty vehicles (for commuters, rideshare users, and renters) and medium-duty commercial vehicles.

Direct-current fast charging (DCFC) stations generate at least 60 miles per 20 minutes of charging. You can find them at public charging stations.

Source: EPA "Green Vehicle Guide."
https://www.epa.gov/greenvehicles/plug-electric-vehicle-charging

East Bay Community Energy's Challenge

Determining the practicality of the project

Before undertaking brownfields redevelopment, EBCE needed to understand the viability of transforming contaminated lands into profitable EV charging stations. This knowledge will help EBCE make the case to purchase the property and better understand funding needs and sources.

Inputs and Outputs to Consider When Evaluating a Potential EV Site

Costs: Inputs/Assumptions

- Environmental cleanup cost
- Station utilization
- Load profile
- Hardware capital expenditure (CapEx)
- Installation CapEx
- Grid infrastructure CapEx
- Electricity cost
- Battery storage CapEx
- Battery storage operation and maintenance (O&M)
- Solar Photovoltaics (PV) CapEx
- Solar PV (O&M)
- Battery charge cost

Revenue: Inputs/ Assumptions

- Electricity pricing
- Low Carbon Fuel Standard and Fast Charging (LCFS) and Fast Charging Infrastructure (FCI) credits

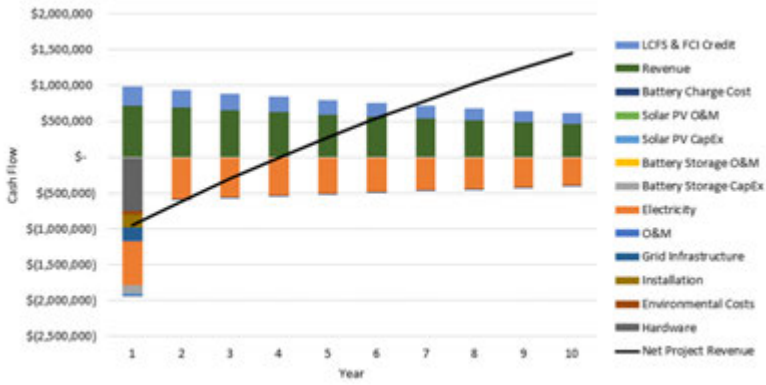
Outputs:

- Net annual costs and revenues

EPA's Land Revitalization Technical Assistance

Development of a financial pro-forma model

In 2021, the U.S. Environmental Protection Agency (EPA) Land Revitalization Program provided contractor technical assistance (TA) to determine the environmental and economic feasibility of redeveloping two brownfield sites along Interstate 880 into flagship fast charging hubs. The analysis involved the development of a financial pro-forma model that anticipated redevelopment costs and benefits under best-, moderate-, and worst-case scenarios. The model considered critical factors such as environmental cleanup costs, EV equipment costs, station utilization rates, electricity pricing, low-carbon fuel credits, and options involving the co-location of solar photovoltaics (PV) and battery storage. The analysis outlined the key variables that EBCE needed to understand to make the charging station profitable. With EPA's technical assistance, EBCE is one step closer to making its EV charging station vision a reality.



A pro-forma model of the light-duty charging station over a 10-year time frame determined that the site would be financially viable. Note that station profitability will vary widely.

What We Learned

- Utilization rates are critical; the greater the utilization, the more financially viable an EV charging station will be.
- EV incentives are constantly changing.
- Using EPA and other grants to assess and clean up polluted sites can help offset capital costs.
- Coupling battery energy storage with solar PV increases the resilience of the site in the form of backup power and provides a critical community benefit if an outage occurs.
- Time-dependent pricing can result in a faster payback period.

From the perspective of developers and investors, this case study demonstrates that EPA resources can reduce the financial risk and uncertainty of blighted and abandoned sites to open a novel supply of potential EV charging station locations.

Economic feasibility of the proposed light-duty charging station over a 10-year timeframe under best-, moderate-, and worst-case cost and revenue assumptions.

Scenario		10-Year Cost and Benefit Best	10-Year Cost and Benefit Moderate	10-Year Cost and Benefit Worst
Scenario 1: Baseline (DCFC only)	Total Cost	$6,258,460	$5,334,660	$3,276,619
	Total Revenue	$10,400,093	$6,037,836	$1,620,941
	Net Project Benefit	$4,141,632	$703,177	-$1,655,678
Scenario 2: Baseline + Solar PV	Total Cost	$6,261,292	$5,334,744	$3,274,413
	Total Revenue	$10,401,576	$6,038,908	$1,622,812
	Net Project Benefit	$4,140,284	$704,164	-$1,651,601
Scenario 3: Baseline + Battery Energy Storage + Solar PV	Total Cost	$6,421,840	$5,476,997	$3,487,333
	Total Revenue	$10,401,576	$6,038,908	$1,622,812
	Net Project Benefit	$3,979,736	$561,911	-$1,864,521
Scenario 4: Baseline + Time-dependent pricing	Total Cost	$5,741,558	$4,944,214	$3,220,990
	Total Revenue	$10,633,599	$6,198,202	$1,641,994
	Net Project Benefit	$4,892,041	$1,253,988	-$1,578,995

How To Conduct Similar Projects in Your Area

EPA offers a host of assessment, cleanup, and multipurpose grants as well as contractor technical assistance to perform projects like this for communities across the country.

For more information

Contact Eric Byous,
EPA Region 9 Brownfields Program.
Byous.Eric@epa.gov.

BROWNFIELDS AND LAND REVITALIZATION