

DC FAST CHARGING INVESTMENT

CASE STUDY FOR THE STATE ROUNDTABLE ON ELECTRIC VEHICLE INFRASTRUCTURE

INTRODUCTION

A third-party electric vehicle (EV) infrastructure company, Charge&Go, that provides and owns charging infrastructure just received \$720,000 in funding for new DC fast charging (DCFC) infrastructure in the Metro City region. As a Regional Planning Manager for Charge&Go, you must decide what types of locations to serve.

CHARGING LANDSCAPE

The U.S. EV market continues to grow each year with national sales of EVs – both plug-in hybrid electric and battery electric – totaling 874,000 EVs through June 2018. Most EV charging currently happens at home, but the pattern of charging may shift soon due to EV adoption by drivers without dedicated charging infrastructure (e.g., apartment building residents), longer range EVs that benefit from higher power charging, and the use of EVs for ride-hailing. When EVs are parked for extended periods of time, such as at home, at a workplace, or during a shopping trip at a retailer, Level 1 (110 V) or Level 2 (240 V) charging is often sufficient. Providing these charging services is easier for the grid to accommodate and is cheaper to deploy and use. DCFC is best for EV drivers who do not have reliable access to home charging, are on longer road trips, or who need access to quick charging during the day, like EV drivers on ride-hailing platforms.

The current fast charging landscape is still emerging and not yet ready to satisfy the anticipated increasing number of long range all-electric vehicles. Most fast charging sites today are single units, which can lead to a frustrated driver if the equipment is being used or is otherwise unavailable. Additionally, fast charging is supported by three different plug types, making it more challenging to deploy charging for all EVs.¹ Developing and promoting interoperability of charging infrastructure will increase the availability of charging for all EV drivers. Finally, current DC fast charging stations typically operate at 50 kilowatts, but new EV models will raise consumers' expectations for the charging experience since they will have larger batteries and accommodate power levels of 150 kilowatts and up to 350 kilowatts in the not too distant future.

¹ American, European, and some Asian automakers support the SAE 1772 Combo standard, Nissan and Mitsubishi support the Japanese CHAdeMO standard, and Tesla has a proprietary connector.

DC FAST CHARGING FOR METRO AREAS

Metro City, a medium sized metro area, has a population of 600,000 people and a burgeoning market for EVs. Currently, there are over 200 Level 2 ports and 30 DCFC ports in the area. The state has recently approved a tax credit for EV purchases that is expected to increase the number of EVs in the state, especially in Metro City. Charge&Go has identified Metro City as an attractive market and was able to secure funding from a private investor to spend \$720,000 on public, fast charging at 150 kilowatts. The investor does not expect an immediate profit and is gaining a stake in the company to have a say in decisions and influence over the strategy to achieve long-term profitability.

Charge&Go has a simple fee structure that is based on the energy used at the stations you own and operate. For the Metro City project, Charge&Go will own and operate all the DCFC in which you are investing.

As the Regional Planning Manager, you are working with other charging infrastructure investors and interested parties to leverage existing efforts and develop partnerships that could generate new sources of revenue for the company. Entities looking to invest in DCFC in Metro City include the local investor-owned utility and ride-hail service providers. The utility has their EV program, including \$45 million for DCFC investment in “make-ready” installations,² approved by the state’s public utility commission less than six months ago. Additional revenue could come from partnerships and revenue sharing opportunities that capture value for the charging service.

THE CHALLENGE

As the Regional Planning Manager, you must decide how to invest the \$720,000 and make the case to your higher ups. As part of a private company, your decision must reflect the company goal of achieving profitability over the 10-year anticipated life of the equipment with the expectation that future projects will earn a return more quickly. Your company has decided that the stations should be publicly accessible, include at least three dual-port charging stations per site (6 ports total); you also have the option to site a station near the highway entrance or within the metro area.

How will you, as the Regional Planning Manager, invest the money and what partnerships will you pursue? You can choose either a highway or urban location for the charging infrastructure, the total cost to Charge&Go must be under \$720,000, and you can only enter into one partnership, if any.

Charge&Go’s investment funds can be spent on infrastructure (charging equipment and installation) or could be used for complementary programs, such as marketing and outreach or a siting analysis. Investing in one of these complementary programs is expected to boost your charging equipment’s utilization by 10 to 12 percent over the baseline.

Partnering with a ride-hail service company to provide exclusive use of the charging stations at urban locations is expected to improve utilization by 20 percent over the baseline. The ride-hailing company will not partner for highway-based stations. The exclusive use of the charging station would limit Charge&Go’s customer base and is an important consideration for the long-term growth of a charging network.

² For the purposes of this case study, “make-ready” indicates that the utility will cover the electrical infrastructure that supports the EV charging, short of the equipment.

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Charge&Go could also partner with the regional utility. The utility is offering to cover the costs for electrical grid upgrades, grid interconnection, host site identification, screening, design, and property transactions at a total value of \$64,500. However, if Charge&Go partners with a utility, you will lose your ability to choose the location for the station. Charge&Go would then forego the potential benefit of a 10 percent increase in utilization from the company's siting analysis.

See Appendix A for the cost, use, and revenue assumptions. The project financial performance and discounted cashflow is presented in Appendix B.³ See Appendix C to understand how increasing utilization can improve the project's profitability.

DISCUSSION QUESTIONS

- What are the challenges to achieving near-term profitability for this investment in charging infrastructure?
- Should the company choose to participate in a ride-hailing service or utility partnership? What are the trade-offs with choosing one partnership over another?
- With limited funds, how should the company prioritize marketing & outreach and the siting analysis? What do they potentially sacrifice by not investing in these programs?
- Given that the investor is looking for long-term profitability in its investment, does one partnership provide better long-term prospects than another? What about no partnership?
- What are some ways not mentioned here that could lower the installation or operating costs of the charging stations? What about ways to improve charging station utilization?
- How would the decision change if you were to account for the uncertainty in the estimates? Which numbers would you want to be sure of to support your decision?

³ Profit and cashflow were estimated using the [EV Charging Financial Analysis Tool](#) developed by Atlas Public Policy.

APPENDIX A: COST, USE, & REVENUE ASSUMPTIONS

TABLE 1: EQUIPMENT AND INSTALLATION COSTS

	Highway & Urban
Electric utility upgrades and grid interconnection (per site)	\$30,000
Host site identification, screening, design and property transaction costs (per site)	\$34,500
Construction and equipment installation (per port)	\$25,000
Charging Equipment (per port)	\$80,000
Total, one port per site	\$169,500
Total, six ports per site	\$694,500

TABLE 2: OPERATING COSTS

	Highway & Urban
Energy Costs (\$/kWh)	\$0.10
Demand Costs (\$/kW/month)	\$5.00
Fixed Costs (\$/month)	\$50.00
Operating Expenses (\$/month)	\$6,650

TABLE 3: CHARGING USE & REVENUE

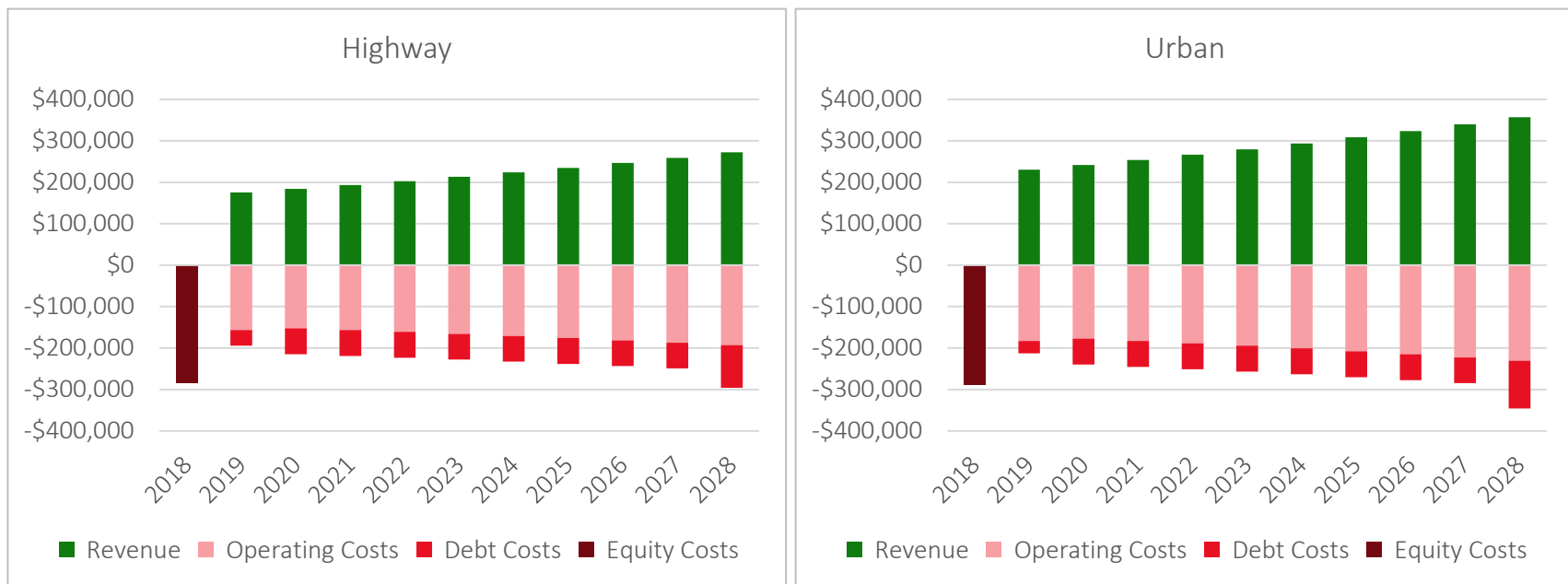
	Highway	Urban
Expected Utilization per Port (charging sessions per day)	5	7
Average Use per Charging Session (kWh)	30	
Max Power Draw per Port (kW/session)	125	
Use Fee (\$/kWh)	\$0.50	

APPENDIX B: FINANCIAL PERFORMANCE AND CASHFLOW

TABLE 4: FINANCIAL PERFORMANCE SUMMARY

	Highway	Urban
Capital Cost (six ports per site)	\$694,500	\$694,500
Expected Utilization per Port (charging sessions per day)	5	7
Net Present Value, 10 years	-\$380,000	-\$156,000

FIGURE 1: DISCOUNTED CASHFLOWS FOR HIGHWAY AND URBAN LOCATIONS



APPENDIX C: PARTNERSHIP OPPORTUNITIES & UTILIZATION SENSITIVITY

TABLE 5: OTHER POTENTIAL INVESTMENTS WITH UTILIZATION BENEFITS FOR ALL STATIONS

Item	Cost per Site	Utilization Improvement
Marketing & Outreach	\$50,000	12%
Siting Analysis (does not apply if partnered with the utility)	\$25,000	10%

TABLE 6: POTENTIAL PARTNERSHIPS WITH BENEFITS

Partnership	Highway	Urban
Ride-Hail/Carshare Users	No partnership available	20% increase in utilization
Utility Partnership	\$64,500 (local grid upgrades, grid interconnection, host site identification, screening, design, and property transactions)	

FIGURE 2: NET PRESENT VALUE OF STATION INVESTMENTS WITH CHANGING UTILIZATION



Percent change in utilization is measured from the initial value of 5 and 7 charging sessions per port per day for a highway and urban station, respectively. Zero percent represents the initial value in the figures. NPV improves with more utilization.



This case study was created by Atlas Public Policy. Atlas is a Washington, DC-based policy tech firm that works with federal and state agencies, private companies, and the advocacy community to develop strategies to advance clean energy technologies. Atlas has extensive experience in research and analysis on plug-in electric vehicles and related charging infrastructure. Atlas is a nationally-known resource on good practices on the role of government and the private sector in advancing the electric vehicle market. More information is available at www.atlaspolicy.com.