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What is the Impact of Utility Demand Charges on a DCFC Host?

Idaho National Laboratory

June 2015

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Key Conclusions

- Demand charges associated with 50 to 60-kW high power charging of a direct current (DC) fast charger (DCFC) can have a significant impact on a business' monthly electric utility bill.
- The business owner will need to choose whether to power the DCFC on the original business service electrical supply or provide separate service to the DCFC.
- Detailed analysis of potential costs and the electric utility rate schedule options to determine the optimal rate schedule for a DCFC site is important and should be conducted in consultation with the electric utility.
- Some electric utilities provide rate schedules for commercial customers without imposing demand charges. When demand charges are imposed by utilities, they can cause a monthly utility bill to increase by as much as four times.
- DCFC site hosts may be compensated for energy used in DCFC charging through access or use fees imposed on plug-in electric vehicle (PEV) drivers in those states that allow energy billing, but demand charges are typically uncompensated and can be significant.
- The host's monthly DCFC demand charge is based on the single highest power required by the DCFC during the month, regardless of the number of charge events in the month. A higher number of PEV charges in a month reduces the average demand charge cost per PEV charge.

Introduction

The PEV electric vehicle supply equipment delivered by The EV Project included both alternating current Level 2 and DCFC units. Over 100 of these dual-port Blink DCFCs were deployed by The EV Project. These DCFCs were installed in workplaces and in publicly accessible locations near traffic hubs, retail centers, parking lots, restaurants, and similar locations.

The Blink DCFC is capable of charging at power up to 60 kW. Its dual-port design sequences the charge from one port to the other, delivering power to only one of two vehicles connected at a time. The actual power delivered through a port is determined by the PEV's onboard battery management system. Both the power and total energy used to recharge a PEV can represent a significant cost for the charging site host.

Many electric utilities impose fees for power demand as part of their commercial rate structure. The demand charge incurred by a customer is related to the peak power used during a monthly billing cycle. This is in contrast to the cumulative total energy usage that is the more familiar utility charge seen for most residential services. A demand charge is typically assessed for the highest average power over any 15-minute interval during the monthly billing cycle.

One objective of The EV Project was to identify and elucidate the motivations and barriers to potential DCFC site hosts. Application of electric utility demand charges is one such potential barrier.

This subject was introduced in the paper: *DC Fast Charge - Demand Charge Reduction,*[1] where it discussed demand charge impact in general terms in order to focus on potential mitigation actions. This paper identifies specific cases in order to quantify the impact of demand charges on EV Project DCFC hosts.

Background

The EV Project recommended that all DCFC charging site hosts should contact their local electric utility for guidance in selecting the optimum arrangement for providing power to their DCFC. Essentially two options were available: (1) either the DCFC was powered from the existing service to the facility or (2) new service was provided through a separate electric meter. Selection of the best option required consideration of the nature of the business, the proximity of the site's electrical service to the location of the installed DCFC, existing facility power demands, capability of the existing service to add new loads, local permitting requirements, and special rates that may be applied by the local utility.

Fleet and workplace hosts typically absorb the electrical power and energy costs required to recharge PEVs as part of their business expenses. Hosts for publicly accessible DCFCs in The EV Project were compensated for energy used through use fees paid by the PEV driver. Some of the hosts elected to provide DCFC service at no cost to the PEV driver. In this case, the host was responsible for all costs for charging, including compensating Blink for their network services.

Electric utilities provide rate schedules for commercial customers that are usually based on their history of energy and power. Appendix A provides information on the following two electric utilities involved with The EV Project:

- Arizona Public Service Company (APS) – provides service to most of the metropolitan Phoenix area and other parts of the state. Among its schedules, it provides rate schedules for small commercial (i.e., 21 to 100 kW), medium commercial (i.e., 101 to 400 kW), large commercial (i.e., 401 kW+), and extra-large commercial (i.e., 3 MW).
- Portland General Electric (PGE) – provides rate schedules for small non-residential (i.e., 0 to 30 kW), medium and large non-residential (i.e., 31 to 200 kW) and large non-residential (i.e., 31 to 200 kW).

These two electric utility rate structures are used in this paper for comparative analysis.

Data Analyzed

This paper selected the Phoenix metropolitan region served by APS, where demand charges are imposed on all but the extra small commercial customers. PGE was selected because it does not impose demand charges on certain customers. The effects of DCFC charging on monthly utility bills related to demand charges were then identified.

Three months of charge data were selected for analysis, including June, July, and August 2013. The EV Project deployment of DCFC was stable over this time period and PEV drivers were well aware of the location of these DCFC. The fee structure for DCFC access had been in place for approximately 1 year, was stable, and, therefore, had little effect on utilization.

OpenEI provides analyses on renewable energy and energy efficiency and provides load profiles[2] for various sized businesses in each of the major regions of the United States. Those load profiles are used for further analysis in Phoenix and Portland.

This paper uses typical host usage load profiles combined with actual DCFC charge data collected by The EV Project to measure the impact of demand charges. Using the APS and PGE rate schedules, the cost impact of each is identified.

Direct Current Fast Charger Load Analysis

DCFC delivers power at a rate controlled by the PEV's onboard battery management system. Some of the vehicle factors that determine the maximum charge rate (and the greatest power demand) include battery conditions such as state of charge, temperature, age, and condition. The Leaf was the only PEV in The EV Project capable of charging at a DCFC and its highest maximum charge power was limited by the battery management system to 50 kW. In addition, the charge was typically terminated at approximately 80% battery state of charge.

Figure 1 shows the energy delivered per charge time for Phoenix DCFC charge data over the 3-month period identified above.

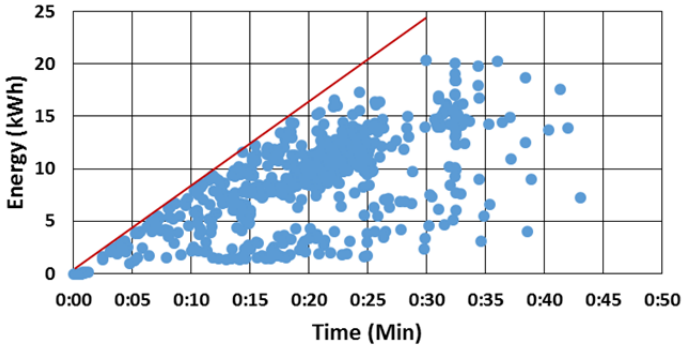

Figure 1. DCFC charge energy vs. time.

The maximum slope in Figure 1 identified by the red line illustrates the maximum charge power of approximately 49 kW. For APS, the peak demand was determined as the average power (kW) demand over a 15-minute period. For charges longer than 15 minutes, the peak demand used for the monthly billing cycle was the maximum power demand of 49 kW. If the charge duration was less than 15 minutes, the peak demand used for the monthly billing is shown in Figure 2.

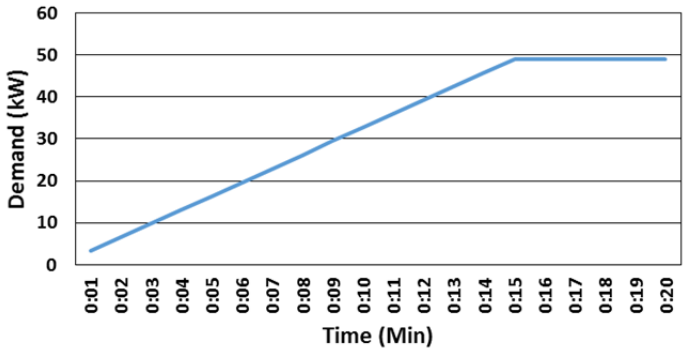

Figure 2. APS DCFC peak demand vs charge time.

The median DCFC connect time in Phoenix was 20 minutes, which results in the maximum demand of 49 kW. The median energy delivered during this typical charge is 9.1 kWh. Because this charge could occur at any time of the day (as was the case identified in the charge data), the worst case scenario for analysis would occur if the DCFC charge is coincident with the business peak demand. Average usage of all DCFC deployed in the Phoenix area over the 3-month period is 18 charges per month. Review of the Portland data revealed that average usage was 78 charges per month. Based on these data, analyses were conducted for 1, 20, and 100 charges per month.

Customer Load Profile Analysis

Small Office Evaluation – Phoenix Small Office Analysis

The small office average load profile in the Phoenix area as provided by OpenEI for June through August is shown in Figure 3. The business peak power demand was 17.5 kW. The energy consumed was 289 kWh for this work day. Assuming 21 work days per month, the monthly energy consumed is 6,069 kWh.

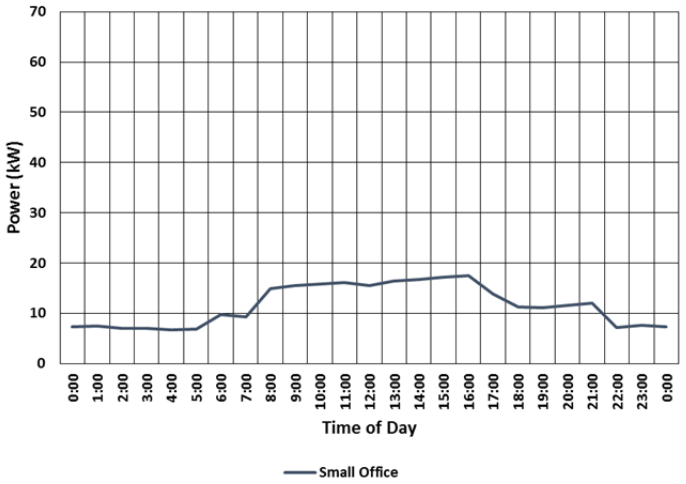

Figure 3. Phoenix small office profile.

If this business owner elected to install a DCFC, they would need to decide whether to add the DCFC to the existing service or to separately meter the DCFC. A separately metered service may allow the DCFC to operate under one of the other rate schedules and keep the business at the existing rate.

When the DCFC was added to the existing service, a new peak demand of 66.5 kW would be reached if the DCFC charged a vehicle at 49 kW (Figure 4) coincident with the business peak. This coincidence is highly likely because the DCFC will be available all afternoon when PEV drivers are likely to desire charge. It is unlikely that the existing service would be able to absorb this added power demand. Thus, new service would be required; therefore, the business owner's decision is whether to put all loads under the new service or to power only DCFC under the new service.

One Service

Prior to addition of DCFC, the business' monthly electric utility statement under APS rate schedule E-32 XS would have been $800. The monthly bill (for energy and power) after the addition is shown in Table 1.

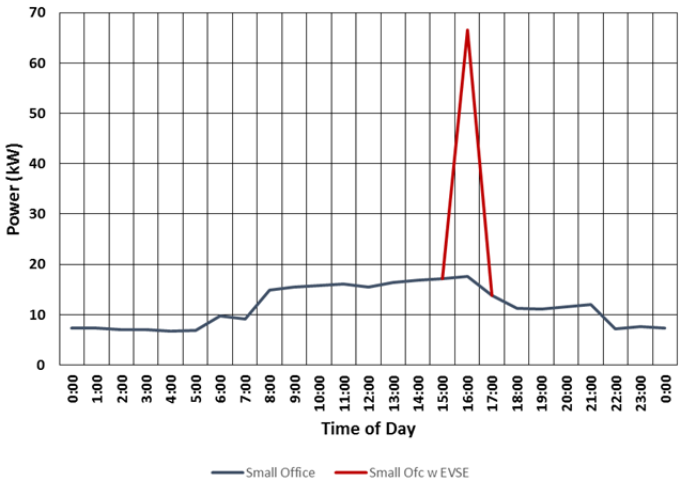

Figure 4. Phoenix small office with DCFC charging.

Table 1. Monthly costs for DCFC and small office.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$482	$0.57	$172	$388	$1,042
20	$482	$11.39	$172	$388	$1,053
100	$482	$56.94	$172	$388	$1,098

Because the demand charge for DCFC was a one-time charge for the peak demand, it did not change over the month. The business energy cost decreased because costs were lower under the E-32 S schedule than under the original E-32 XS schedule.

New Service for DCFC – DCFC Schedule E-32 S

The new service included only the DCFC; therefore, the business could be retained on the original service. Table 2 identifies the costs associated with the new service, which would be on rate schedule E-32 S plus the business on the original service under E-32 XS.

Table 2. Monthly costs for new DCFC service.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kWh $	Total Monthly
1	$482	$0.94	$800	$1,283
20	$482	$18.81	$800	$1,300
100	$482	$65.10	$800	$1,347

The DCFC energy charge is higher in this case because energy used is charged at a higher rate as part of the first 200 kWh. However, as seen when comparing these tables, the business would have benefited from using the E-32 S rate instead of E-32 XS.

New Service for DCFC – DCFC and Business E-32 S

Selecting new service for the DCFC and changing the rate to E-32 S for the business results in the monthly costs shown in Table 3.

Table 3. Monthly costs for DCFC and business separately metered on Schedule E-32 S.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$482	$0.94	$172	$388	$1,043
20	$482	$18.81	$172	$388	$1,061
100	$482	$65.10	$172	$388	$1,107

It makes little difference then whether the business selects to individually meter the DCFC or provides power to it from one service if both are on rate schedule E-32 S. In both cases, the utility demand charge affects not only the DCFC but the business costs as well. However, if the business was originally on this schedule, the demand charge for the DCFC increases the monthly cost by 86%.

Small Office Evaluation – Portland Small Office Analysis

The small office average load profile in the Portland area as provided by OpenEI for June through August is shown in Figure 5. The business peak demand was 11.4 kW. The energy consumed was 179 kWh for this work day. Assuming 21 work days per month, the monthly energy consumed was 3,764 kWh. DCFC charging at the business peak is also displayed in Figure 5.

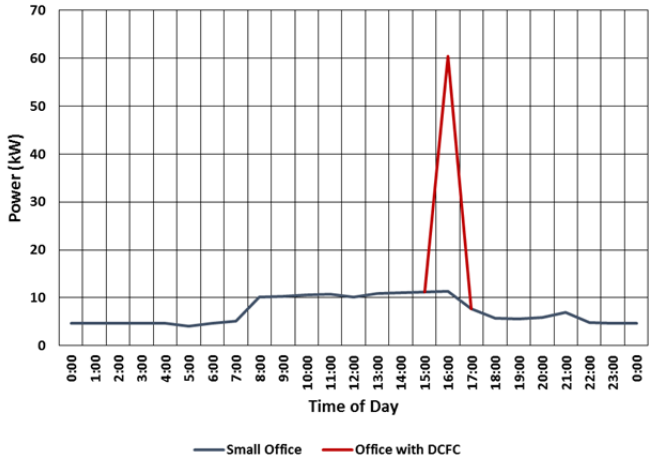

Figure 5. Portland small office profile.

Under Schedule 32, the business' monthly energy cost was $411. When the DCFC was added to the existing service, a new peak demand of 65.1 kW would be reached when the DCFC charged a vehicle at 49 kW (similar to Figure 4). Again, it is unlikely that the existing service would be able to absorb this added power demand. As before, the business owner's decision is whether to put all loads under the new service or to power only the DCFC under the new service.

One Service

The new peak would require Schedule 38 or 83. Both are time-of-use (TOU) rates. Under Schedule 38, on-peak is weekdays from 7 a.m. to 8 p.m. All other times are off-peak. Energy consumed by the business on-peak is 2,549 kWh, with 1,210 kWh at off-peak. Using the PGE summer rate schedule, Schedule 38 costs for this business and DCFC charging are shown in Table 4.

Table 4. Small business with DCFC charging Schedule 38.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$0	$1.22	$0	$491	$493
20	$0	$24.38	$0	$491	$516
100	$0	$121.90	$0	$491	$613

Schedule 83 includes a demand charge. Costs for this business and DCFC charging are shown in Table 5.

Table 5. Small business with DCFC charging Schedule 83.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$248	$0.67	$66	$258	$572
20	$248	$13.38	$66	$258	$585
100	$248	$66.89	$66	$258	$638

Schedule 38 is less costly if both the business and DCFC charging are on one service meter.

New Service for Direct Current Fast Charging

These options are identified on the PGE Schedule 32. However, the DCFC charge would exceed the kW limit of this schedule and Schedule 38 or 83 would apply. Because there is no demand charge, Schedule 38 is selected and the only added cost is the energy consumed by the DCFC. The monthly utility statement with the business separately metered on Schedule 32 and DCFC separately metered under Schedule 38 is identified in Table 6.

Table 6. Monthly costs for Portland small business with separate DCFC service and with different rate schedules.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$0	$1.22	$0	$411	$412
20	$0	$24.38	$0	$411	$435
100	$0	$121.90	$0	$411	$533

This would be the least costly alternative for this small business.

While the business energy charge and the DCFC charge is similar between Phoenix and Portland, the demand charges imposed by APS result in a monthly bill that is more than two times higher.

Full-Service Restaurant Analysis – Phoenix Full Service Restaurant Analysis

The full-service restaurant average load profile in the Phoenix area as provided by OpenEI for June through August is shown in Figure 6; it also includes the DCFC charging event previously identified. The peak power demand increased from 72 to 121 kW. Because this is a restaurant, the daily load profile is assumed for all days of the week.

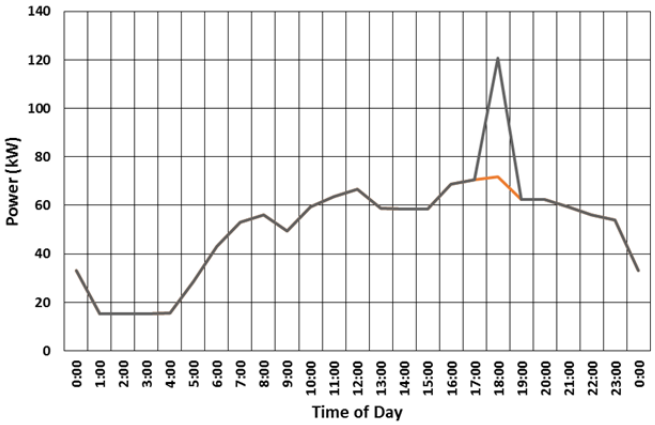

Figure 6. Phoenix full-service restaurant with DCFC profile.

This customer typically would have been assigned rate schedule E-32 S. Because the new peak was above 100 kW, the business was placed in the new schedule E-32 M. The business owner then needed to evaluate whether the DCFC should be placed on a separate meter under schedule E-32 S or the original service upgraded to service both the business and the DCFC charging.

One Service

With both the business and DCFC charging on the same meter on Schedule E-32 M, monthly costs are shown in Table 7.

Table 7. Phoenix full-service restaurant with DCFC E-32 M.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$401	$0.55	$734	$2,250	$3,386
20	$401	$11.09	$734	$2,250	$3,396
100	$401	$55.43	$734	$2,250	$3,441

New Service for Direct Current Fast Charging

Providing new service for DCFC allows both the business and DCFC to be on Schedule E-32 S, but on separate meters. Costs for this arrangement are shown in Table 8.

Table 8. Phoenix full-service restaurant on E-32 S.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$482	$0.94	$705	$2,312	$3,500
20	$482	$18.81	$705	$2,312	$3,518
100	$482	$65.10	$705	$2,312	$3,564

Because there is little difference between the two options, the business owner will likely base the choice on other factors, such as installation costs involved with routing power to the DCFC. The demand charge on the DCFC adds approximately 15% to the utility bill.

While both Schedule E-32 S and E-32 M have TOU alternatives, most of the restaurant demand and DCFC charging is on-peak and there is little opportunity to shift any loads to off-peak. Therefore, these rates are not evaluated here.

Full-Service Restaurant Analysis – Portland Full Service Restaurant Analysis

The full-service restaurant average load profile in the Portland area as provided by OpenEI for June through August is shown in Figure 7; it also includes DCFC charging events previously identified. The peak power demand increased from 50 to 99 kW.

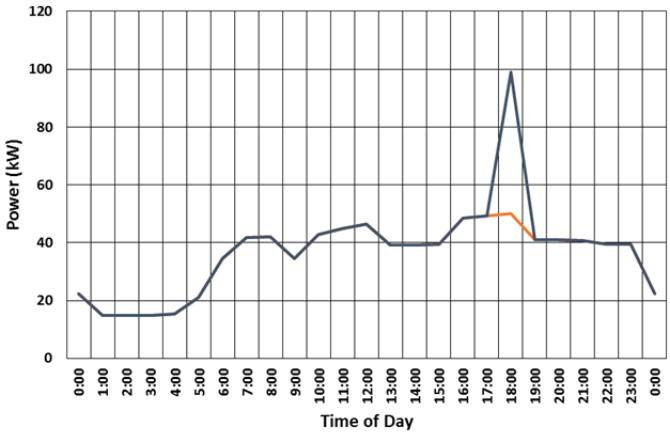

Figure 7. Portland full-service restaurant with DCFC charging.

Rate Schedules 38 TOU and 83 may apply to the business and DCFC charging. Because the original business demand exceeded 30 kW, Schedule 32 does not apply.

One Service – Schedule 38 Time of Use

For Schedule 38 TOU, on-peak is defined as 7 a.m. to 8 p.m. Monday through Friday and off-peak is all other times. Using the PGE summer rate schedule and assuming that all DCFC charging occurs on-peak, the total monthly utility cost for this business is shown in Table 9

Table 9. Portland restaurant with DCFC charging Schedule 38 TOU.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$0	$1.22	$0	$3,439	$3,440
20	$0	$24.38	$0	$3,439	$3,463
100	$0	$121.90	$0	$3,439	$3,561

One Service – Schedule 83

Schedule 83 contains on-peak times from 6 a.m. to 10 p.m. Monday through Friday and off-peak at all other times. It also imposes demand charges. Assuming all DCFC charging occurs on-peak, the total monthly utility cost under this schedule is shown in Table 10.

Table 10. Portland restaurant with DCFC charging Schedule 83.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$277	$0.67	$286	$1,848	$2,412
20	$277	$13.38	$286	$1,848	$2,424
100	$277	$66.89	$286	$1,848	$2,478

In this case, the utility rate schedule imposes demand charges but reduces energy costs, resulting in lower monthly costs with the DCFC charges. The contribution of demand charges for DCFC adds $277 to the monthly bill.

New Service for Direct Current Fast Charging

Based on the costs shown Tables 9 and 10, the business owner would likely have elected Schedule 83 for the business before adding the DCFC, even though it imposed demand charges. However, the DCFC added under new service could be added under Schedule 38 with no demand charge. The resulting monthly cost is shown in Table 11.

Table 11. Portland restaurant with separate service.

DCFC Uses	DCFC kW $	DCFC kWh $	Business kW $	Business kWh $	Total Monthly
1	$0	$1.22	$286	$1,848	$2,135
20	$0	$24.38	$286	$1,848	$2,158
100	$0	$121.90	$286	$1,848	$2,256

In this case, the addition of DCFC had no impact on the business demand costs.

The Phoenix restaurant consumes more energy and requires higher power than the Portland restaurant during these summer months. The demand charges in Phoenix of $1,135 compare to the demand charges in Portland of $286.

Separately Metered Service

Cost for installation of separately metered service is the customer's responsibility. This cost is dependent on site conditions and varies with each installation. Each utility assesses the basic costs for providing service through a meter, which is typically $25 to $30 per month. The separately metered service includes this monthly service cost. The previous analyses do not include these costs because they do not significantly impact the monthly service cost.

In most cases, installation practice for The EV Project provided DCFC charging through new electrical service, because sufficient electrical capacity to add the DCFC load to an existing service was rarely available. In most cases, this was also advantageous in maintaining the lowest monthly cost. Prior consultation with the electric utility was used to identify the best choice for the DCFC host.

As noted above, PGE requires that when PEV charging is separately metered, "… Such service must be metered with a network meter as defined in Rule B (30) for the purpose of load research, and to collect and analyze data to characterize electric vehicle use in diverse geographic dynamics and evaluate the effectiveness of the charging station infrastructure."[5] The cost of this networked meter is the responsibility of the DCFC host.

Demand Cost per Plug-In Electric Vehicle

As seen in the tables above, the demand charge is a single monthly charge to the business regardless of the number of PEVs charging. Thus, the cost per charge is reduced if more PEVs are charged. For example, the demand cost for DCFC charging shown in Table 8 in Phoenix is $482. If one PEV is charged in the month, the cost per charge is $482. If 20 PEVs are charged in the month, the cost per is $24. If 100 PEVs are charged in the month, the cost per charge is $4.82.

Some revenue sharing plans provide compensation to the host at rates higher than the energy cost to assist in offsetting the demand charge. While significant, the demand charge is easier to absorb with higher DCFC utilization. Higher utilization will also mean more opportunities to attract customer traffic for the business.

Observations

Power demanded by DCFC has a more significant impact on electric utility costs for smaller commercial businesses than for larger ones. Each electric utility defines commercial businesses and their rate schedules based on its own needs and as regulated by the local Public Utility

Commission or municipal rules. These rate schedules vary widely among utilities and each business needs to evaluate its options. Consultation with the electric utility is essential when adding PEV charging to an existing business; this is especially true when considering the high demand of a DCFC. Separately metered service for the DCFC may allow the customer to avoid demand charges in some cases.

DCFC access fees charged to PEV drivers during The EV Project were based on energy costs. This revenue sharing plan partially compensated the DCFC host for the cost of energy consumed for charging. However, any demand charges were not reimbursed by these fees and may be a significant impact to the host.

About The EV Project

The EV Project was the largest PEV infrastructure demonstration project in the world, equally funded by the United States Department of Energy (DOE) through the American Recovery and Reinvestment Act and private sector partners. The EV Project deployed over 12,000 alternating current Level 2 charging stations for residential and commercial use and over 100 dual-port DCFC in 17 U.S. regions. Approximately 8,300 Nissan LEAFs™, Chevrolet Volts, and Smart ForTwo Electric Drive vehicles were enrolled in the project.

Project participants gave written consent for EV Project researchers to collect and analyze data from their vehicles and/or charging units. Data collected from the vehicles and charging infrastructure represented almost 125 million miles of driving and 4 million charging events. The data collection phase of The EV Project ran from January 1, 2011, through December 31, 2013. Idaho National Laboratory is responsible for analyzing the data and publishing summary reports, technical papers, and lessons learned on vehicle and charging unit use.

Company Profile

Idaho National Laboratory is one of DOE's 10 multi-program national laboratories. The laboratory performs work in each of DOE's strategic goal areas: energy, national security, science, and the environment. Idaho National Laboratory is the nation's leading center for nuclear energy research and development. Day-to-day management and operation of the laboratory is the responsibility of Battelle Energy Alliance.

For more information, visit avt.inl.gov/evproject.shtml and avt.inl.gov/chargepoint.shtml.

References

[1] http://avt.inl.gov/pdf/EVProj/DCFastCharge-DemandChargeReductionV1.0.pdf [accessed March 14, 2015].

[2]Open EI load profiles, http://en.openei.org/datasets/files/961/pub/.

[3]APSBusiness Electric Rate Schedules, http://www.aps.com/en/ourcompany/ratesregulationsresources/serviceplaninformation/Pages/business-sheets.aspx.

[4]PGERate Schedules, https://www.portlandgeneral.com/our_company/corporate_info/regulatory_documents/tariff/rate_schedules.aspx.

[5]ibid.

Appendix A
Electric Utility Overview

Arizona Public Service[3]

APS rate schedules are provided in Reference 3. While all contain basic service charges and fees, the charges of interest are for energy and power demand. Summer and winter rates are provided. Summer rates are of interest in this analysis. Schedules E-32 XS, E-32TOU XS, E-32 S, and E-32TOU S offer rates for bundled and unbundled service. Bundled service is used in this analysis.

Several schedules offer TOU options. Time periods are on-peak weekday from 11 a.m. to 9 p.m. and off-peak time periods are all remaining hours.

Monthly maximum demand is based on the highest average kW supplied during the 15-minute period during either the on-peak or off-peak hours of the billing period, as determined from readings of the company's meter.

APS has no special distinction related to businesses charging PEVs.

Table A-1 shows basic differences between rate schedules for energy usage and demand.

Table A-1. APS rate schedules for commercial customers.

Schedule	Max kW	Energy	Demand
E-32 XS	20	$0.14258/kwh first 5,000 kWh plus $0.08148 for additional kWh	NA
E-32TOU XS	20	$0.17033/kWh for the first 5,000 kWh on-peak plus $0.08564/kWh for all additional on-peak plus $0.12686/kWh for the first 5,000 kWh off-peak plus $0.04755 per kWh for all additional off-peak kWh.	NA
E-32 S	100	$0.10337 per kWh for first 200 kWh plus $0.06257 for additional kWh	$9.828 per kW for the first 100 kW plus $5.214 for all additional kW

Table A-1 (continued). APS rate schedules for commercial customers.

Schedule	Max kW	Energy	Demand
E-32TOU S	100	$0.07367 /kWh during on-peak plus $0.05873/kWh off-peak	$14.303/kW for the first 100 kW on-peak plus $9.713/kW for all additional on-peak kW plus $5.484/kW for the first 100 kW off-peak plus $3,054 for all additional kW off-peak
E-32 M	400	$0.09884/kWh for the first 200 kWh plus $0.06091/kWh for all additional kWh	$10.235 for the first 100 kW plus $5.385 per kW for all additional kW

Portland General Electric[4]

PGE rate schedules are provided in Reference 4.

Schedule 32 applies to small (i.e., less than 30-kW service) non-residential customers. It provides the two energy charge options involving either standard service or TOU. A PEV TOU option applies for those businesses that wish to charge electric vehicles. They may do so with the existing service of either standard service or TOU. If the customer chooses to separately meter the PEV charging, it will be billed under the TOU option. All costs associated with the second meter are the customer's responsibility. Basic, transmission, and related services and distribution charges will apply to the second meter and the initial meter.

The PGE TOU rates are set at on-peak, off-peak, and mid-peak and are set as the following for the summer months:

- On-peak 3:00 p.m. to 8:00 p.m. Monday through Friday

- Mid-peak 6:00 a.m. to 3:00 p.m. and 8:00 p.m. to 10:00 p.m. Monday through Friday; 6:00 a.m. to 10:00 p.m. Saturday
- Off-peak is set at 10:00 p.m. to 6:00 a.m. all days; 6:00 a.m. to 10:00 p.m. Sunday and holidays.

Schedule 38 applies to large (i.e., less than 200-kW service) non-residential customers with no monthly demand exceeding 200 kW more than once in the preceding 13 months. It provides for one standard rate that includes energy charges for on-peak and off-peak periods. On-peak is weekday 7 a.m. to 8 p.m. Off-peak is all other times. This rate also includes the electric vehicle time-of-day option that may be billed directly under the basic schedule or as a separately metered service billed under the TOU option.

The separately metered PEV circuit is required to meet special conditions that allow for load research and to collect and analyze data to characterize PEV use.

Schedule 83 applies to large (i.e., less than 200-kW service) non-residential customers with no monthly demand exceeding 200 kW more than six times in the preceding 13 months and not more than 4,000 kW more than once. Electric vehicle supply equipment charging may occur under this service or through a separately metered option on Schedules 32 or 38.

Table A-2 summarizes these rate schedules.

Table A-2. PGE rate schedules for commercial customers.

Schedule	Max kW	Energy	Demand
Schedule 32 Standard Service	30	$0.10914/kwh first 5,000 kWh plus $0.08228 for additional kWh	NA
Schedule 32 TOU	30	$0.15615/kWh on-peak, $0.10914/kWh mid-peak, $0.08357 off-peak for first 5000 kWh. Reduced by $0.02686 above 5000 kWh.	NA
Schedule 38 TOU	200	$0.13396 per kWh on peak, $0.12396 per kWh off-peak	NA
Schedule 83	200	$0.07351 per kWh on peak, $0.05851 per kWh off-peak	$2.83/kW for first 30 kW and $2.73/kW for over 30 kW plus $2.92/kW for on-peak kW