



Selecting and Managing Cost-Effective Charging

August 8, 2023



DEPOTS Electric Truck Bootcamp Series

1. Best Practices for Utility-Fleet Relationships (April 25th) ✓
2. Grants and Incentives for the Trucks and Infrastructure (May 16th) ✓
3. Electric Truck Developments (May 30th) ✓
4. Faster Charging — Opportunities and Challenges at 350KW and higher (June 13th) ✓
5. Opportunities to Extend BEV Range (June 27th) ✓
6. Electricity Resiliency and Availability (July 11th) ✓
7. Current and Future Regulations for Zero Emission Trucks (July 25th) ✓
8. Managed Charging to Improve Availability, Cost and Range (August 8th)
9. Scaling Charging Infrastructure Equipment (August 22nd)
10. Electric Depot Site Planning and Construction (September 5th)

2021 Bootcamp is still available at: <https://runonless.com/electric/bootcamp-electric/>

Up Next: Scaling Charging Infrastructure Equipment

August 22, 2023 1:00p ET



Danny Marquez

*Director of Products and
Services - Xos Energy
Xos Trucks*



Devin Sclater

*Business Development
Manager - Fleet and Transit
Solutions
ABB*



Paul Stith

*AVP, Global Transportation
Initiatives
Black & Veatch*



Rob Wozny

*Product Manager – EV
Charging
Shell*

2023 DEPOT Fleets

Update from The Run Planning...



To watch the full video go to:
<https://runonless.com/roled-profiles/ok-produce/>

Today's Bootcamp Sponsor



Quiz for Today's Session

Completing Today's Quiz:

- Go to runonless.com and click back into the session
- Click 'Take Quiz' button
- Create username and password to keep track of your progress
- Spend a few minutes answering the questions and receive your 2023 RoLE - DEPOT badges



What You Should Know

Q&A

Submit your questions to the host using the Q&A box in the upper right-hand corner

Recording

A recording of today's webinar will be available on act-news.com and runonless.com

Technical Issues

Contact Stephane Babcock at sbabcock@trccompanies.com



Today's Bootcamp Speakers

Selecting and Managing Cost-Effective Charging



Charlotte Argue

*Senior Manager, Sustainable
Mobility
Geotab*



Mark Braby

*Chief Commercial Officer
Synop*



Joshua Goldman

*General ConsVice President of
Mobilityultant
Xendee*



Sean Larkin

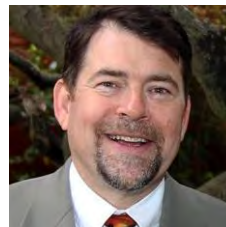
*Senior Director, Medium &
Heavy-Duty Fleets
bp pulse*



Hosted by:

Rob Graff

Senior Technical Advisor





Electrify fleets with confidence.

Run on Less Bootcamp #8 Selecting & managing cost-effective charging

Charlotte Argue, Sr. Manager, Sustainable Mobility, Geotab

GEOTAB

Global leader in IoT and telematics

15+ years working with OEMs to support advanced EV signals

300+ supported EV models, twice that of other fleet telematics solutions

47k+ customers, 3.6M+ connected vehicles across 130+ countries

What is telematics?

Connected data from vehicles, GPS and external devices, turned into actionable insights



Productivity

- Customer service times
- Identify unexpected stops
- Accurate arrival and departure times
- True trip miles



Fleet Optimization

- Increase fuel efficiency
- Decrease idle time
- Track speeding
- Record engine diagnostics
- Vehicle maintenance



Safety

- Collision notifications
- Risk management reports
- In-vehicle coaching
- Seat belt use
- Driving in reverse



Sustainability

- Reduce fuel consumption
- Track CO2 emissions
- Fleet electrification
- EV performance monitoring and reporting
- GO Recycling



Compliance

- Electronic driver logs
- Tax reporting
- Vehicle inspection reports



Expandability

- Flexible technology
- System integration (Software Development Kit)
- Hardware Add-Ons & Software Add-Ins

Going Electric: A new journey for fleet managers

Evaluate EVs

How many of my vehicles could be replaced with an EV?

Which EV models satisfy my range needs all year round?

Will I be saving money, and how much?

By how much can I reduce my fleet's emissions?

Evaluate Charging

How many chargers will I need?

Where should I install chargers?

What are the power implications per site?

How do I future-proof my infrastructure investment?

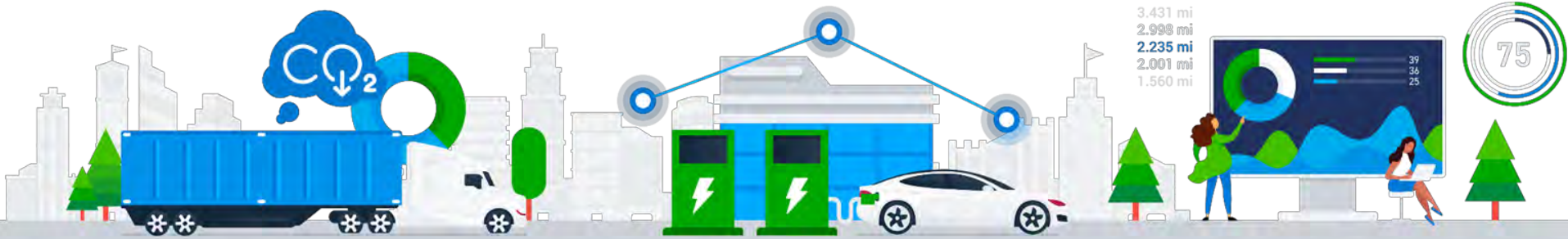
Operate Electric Fleet

Which routes can I put EVs on?

Are my vehicles adequately charged when needed?

How can I optimize energy at my facility?

Am I minimizing costs?



Matching charging with vehicle needs

Right-size charging

Where? How many? What power level?

Consider how the vehicles are used today to determine how EVs will need to be charged:

- Daily driving distance & driving conditions
- Dwell/stop analysis:
 - Location
 - Time
 - Duration
 - Variability
- Congregation analysis

Matching charging with vehicle needs

Right-size charging

Where? How many? What power level?

Consider how the vehicles are used today to determine how EVs will need to be charged:

- Daily driving distance & driving conditions
- Dwell/stop analysis:
 - Location
 - Time
 - Duration
 - Variability
- Congregation analysis

Optimize charge management

Who needs to charge? How much? When?

Integrate fleet data with charge management systems

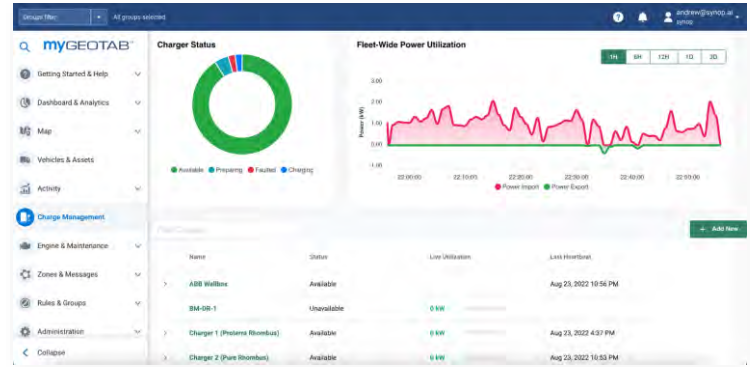
- How full is the battery (state of charge)?
- When does the vehicle need to be ready?
- How much energy will it need?
- Who else needs to charge?



Charging partners building solutions with Geotab



...more coming soon



Let's Stay Connected:

@GEOTAB



GEOTAB

Charlotte Argue
charlotteargue@geotab.com

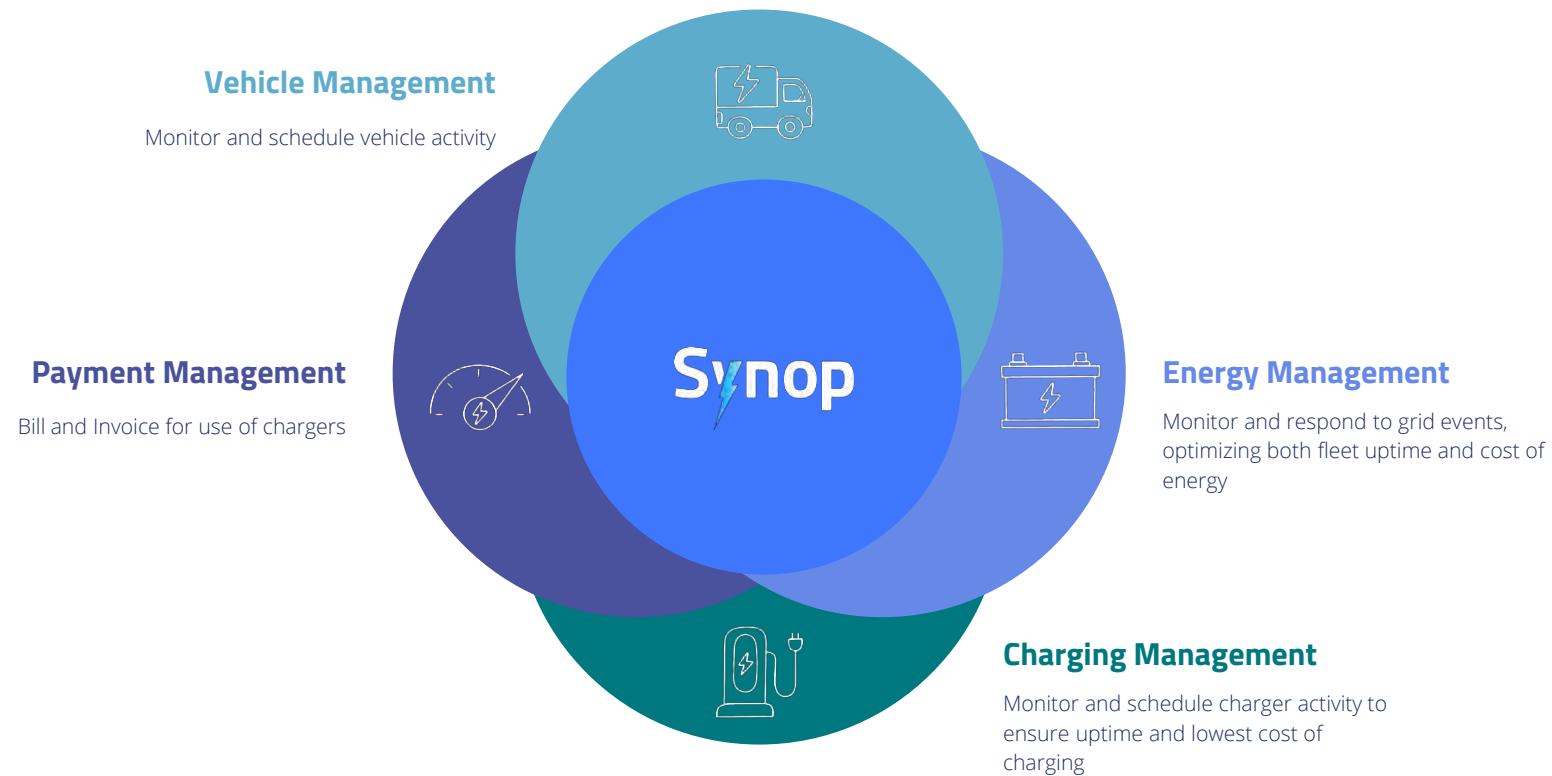
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OPTIMIZED CHARGING & ENERGY MANAGEMENT
FOR EV FLEETS

Run on Less Webinar 08.08.23





Synop provides an enterprise software platform that is purpose built to scale commercial EV fleets.



Success Stories

Utilizing Managed Charging for Cost Savings

Location:

Port of Long Beach

Utility

SCE

Partners

Forum Mobility

Zerova/Tellus

Volvo

Case Study: Port of Long Beach

Utility Rate:

No demand charges

Off- peak = \$0.23/kWh

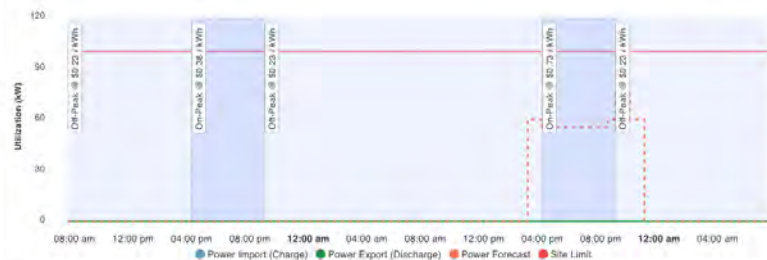
On-peak = \$0.73/kWh

Without CMS

Site Utilization

From 07:31 am on 08/06/23 to 07:31 am on 08/07/23

1H 6H 12H 1D 3D

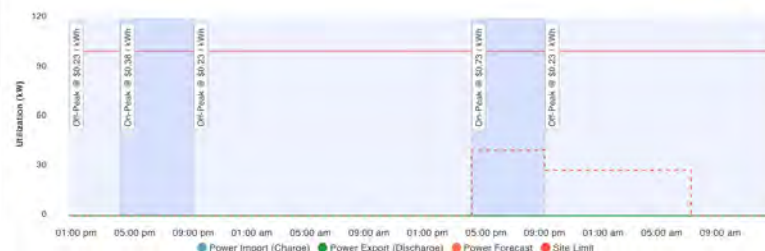


With CMS

Site Utilization

From 12:30 pm on 08/06/23 to 12:30 pm on 08/07/23

1H 6H 12H 1D 3D



Savings of 44%

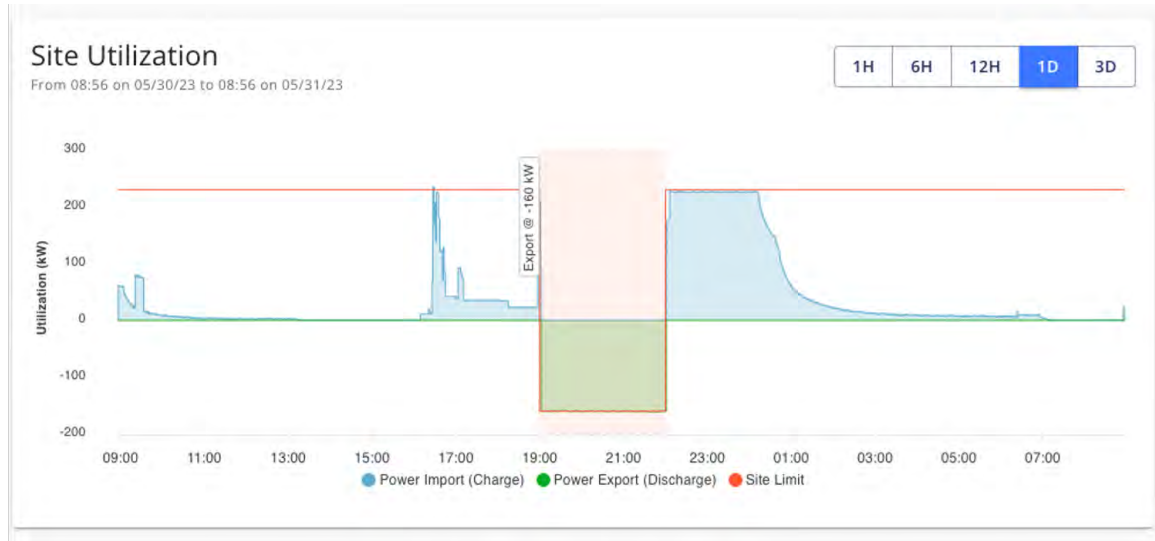
Case Study: South Burlington, VT

Utility Rate:

Off-peak = \$0.14/kWh

On-peak = \$0.20/kWh

V2G compensation: \$10-\$50/kWh



Savings of 67% (includes revenue generation from V2G)



Mark Braby, Chief Commercial Officer
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XENDEE

Modeling Managed Charging and Demand Charges


An LA Case Study with Zeem Solutions

Presented by: Joshua Goldman
VP of MOBILITY
jgoldman@xendee.com

Run on Less Bootcamp #8| August 2023

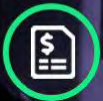


Microgrid & Distributed Energy Resource (DER) Deployment in One Platform to Support the Future of EV Charging




DISCOVER

Analyze thousands of sites in minutes to identify opportunities matching investor priorities.




PROPOSE

Submit permit-ready, winning proposals ten times faster (with low risk and high quality).



DESIGN

Model power, energy flow, and financial constraints to ensure risk-free deployment.



OPERATE

Control and optimize runtime to reduce energy cost by 30%, maximize resilience and profit.

Zeem Solutions

Mission - Transform the way fleets operate by providing an affordable zero emission solution that improves air quality within our communities

All-in Monthly Price Includes...



A fully charged electric vehicle every day



On-site staff at all times



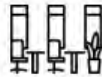
Service & maintenance, including one set of brakes & tires



Supervised overnight EV parking



Two vehicle washes per month



Shared office space



Daily vehicle inspection



Personal vehicle parking

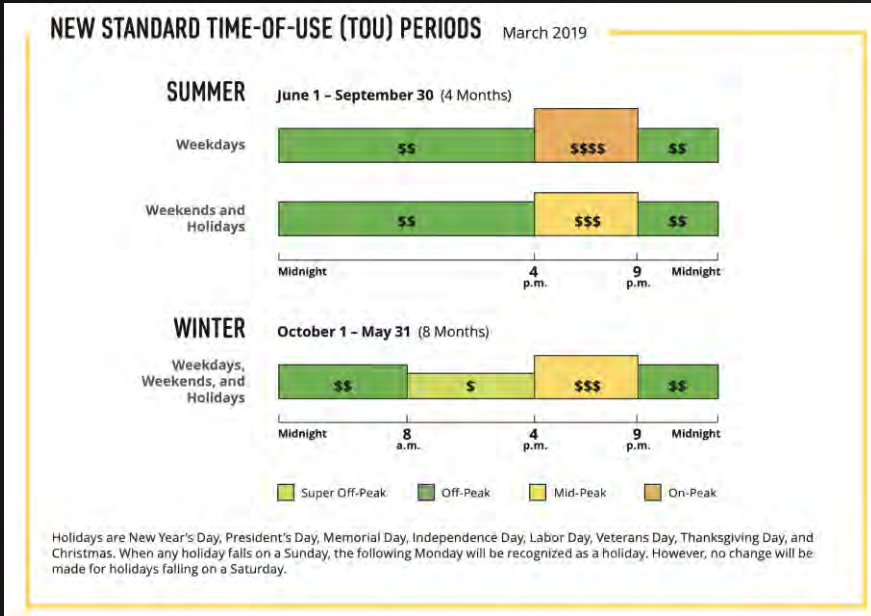


Lounge access with Wi-Fi, restrooms & driver amenities



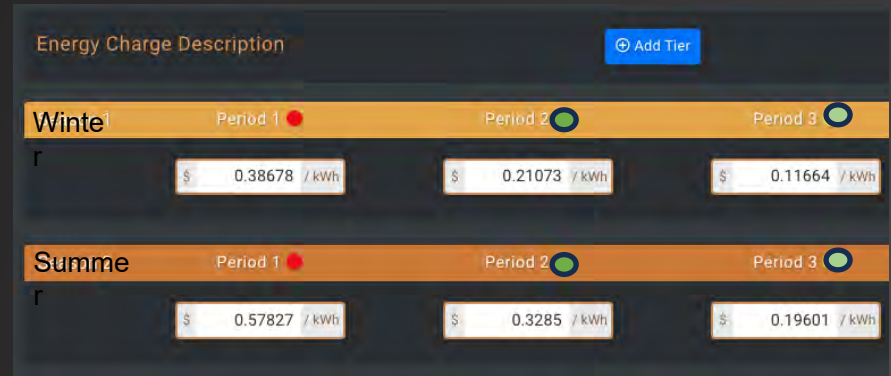
Understanding your Utility Bill / Tariff

Each utility has various rates of general loads, and often EV specific rates



Components of the Tariff

- Time of Use Energy Charges
- Taxes
- Multiple Periods (Summer, Winter, more)
- Export Rates
- Demand Response Programs
- Demand Charges

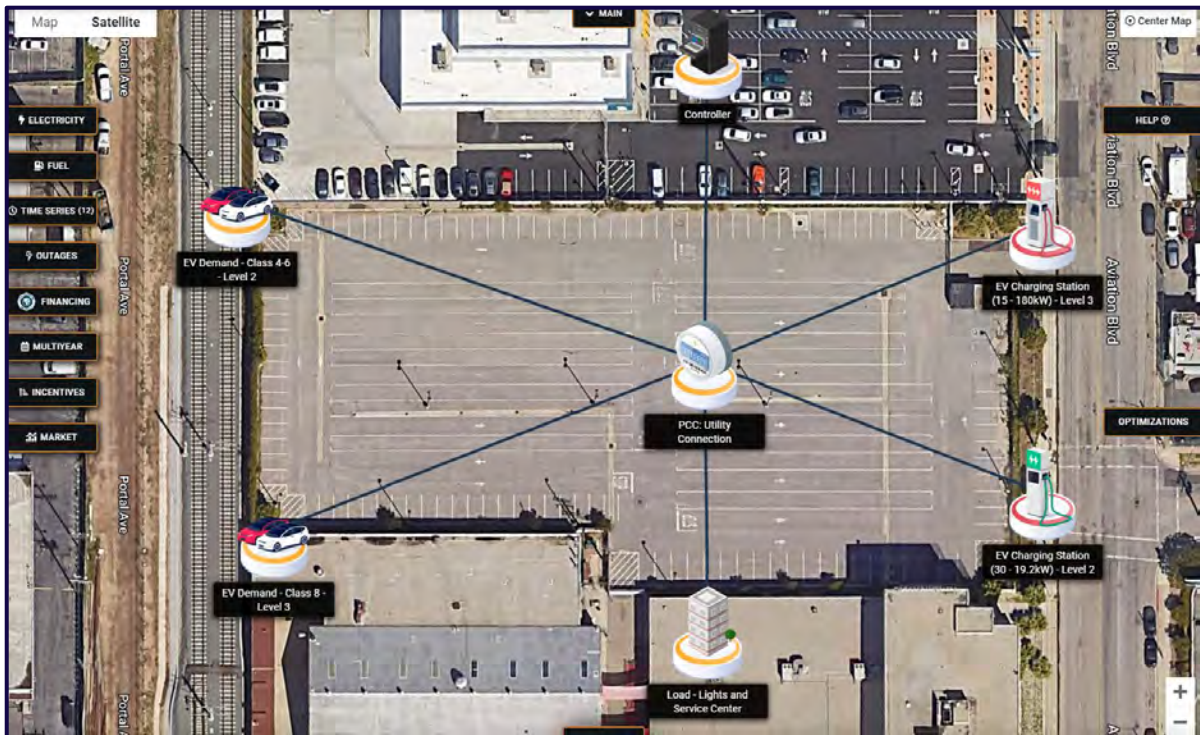


EXAMPLE: Zeem's Southern California Edison's Rates of Business Customers Charging Electric Vehicles:

NOTE: Includes Demand Charge Holiday

Zeem Solutions - Xendee Case Study

Managed vs. Unmanaged Charging



Fleet:

- 30 MD (Class 4-6) EV's, needing 200 - kWh Daily Energy
 - Using Level 2 - 19.2 kW chargers
 - 10 hr Battery Charging Time
- 15 - HD Class 8 Semi's needing 450 kWh Daily Energy
 - Level 3 – 180kW chargers
 - 3 hour Battery Charging Time

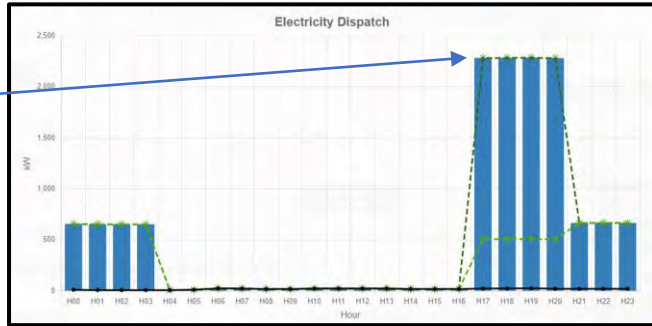
Chargers (one per truck):

- 30 - 19.2kW Level 2
- 15 - 180 kW DC Fast Level 3

Three Versions of Charging Strategy

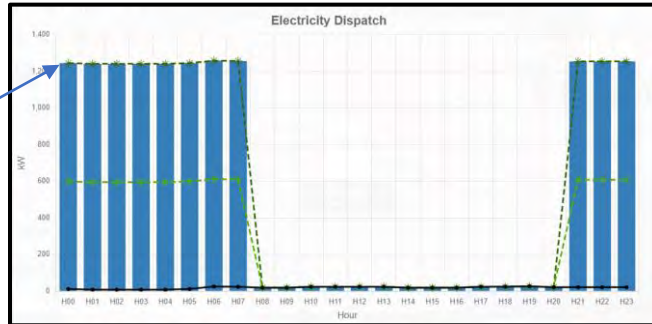
Unmanaged Charging vs Managed (Overnight and 24 Hours)

2300 kW
Peak



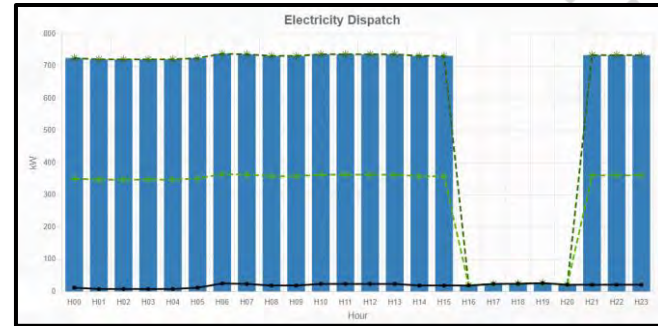
Hourly Power / Load - Unmanaged Charging

1200 kW
Peak

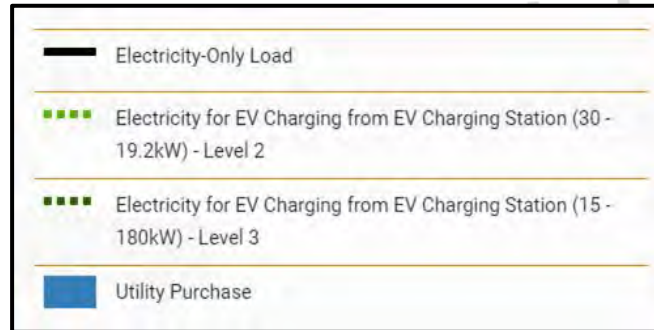


Hourly Power / Load - Managed Charging (Overnight)

700 kW
Peak



Hourly Power/Load - Managed Charging [24 Hours]

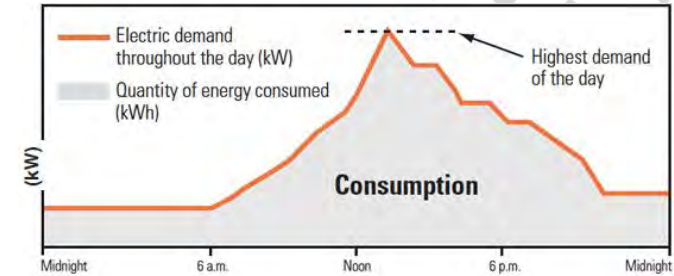


Demand Charges Explained

“Convenience of Power Costs”

- Electricity demand charges are fees imposed by utility companies based on the highest amount of electricity consumed within a specific time period.*
- Often these are measured in peak demand in a 15 min window of any given month that can create a monthly fixed demand charge that sets the rate for the next 12 months
- These charges are separate from energy charges and are designed to cover the cost of maintaining the electrical grid to meet peak demand.*

*source chatgpt.ai

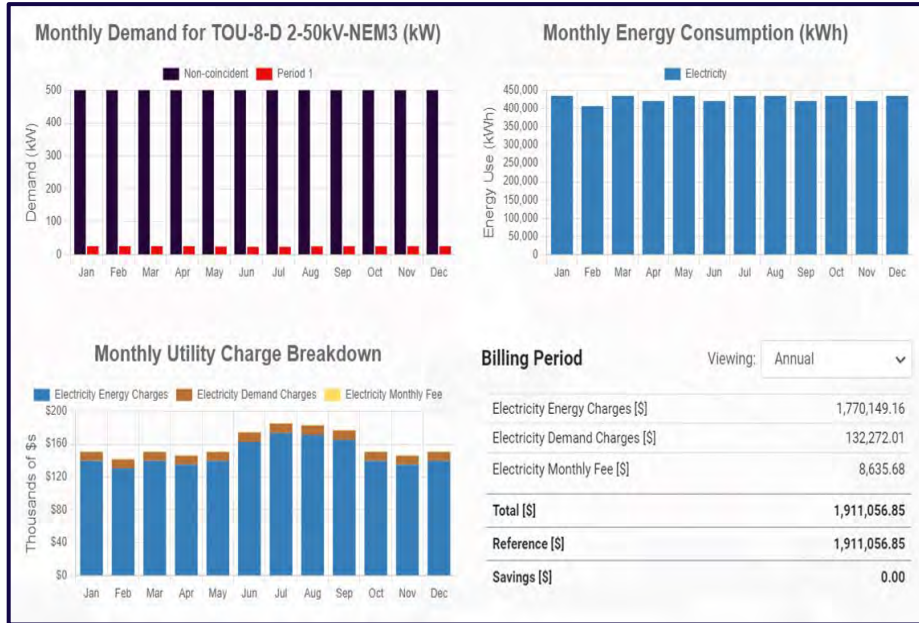


Bill details	
PREVIOUS BILLING PERIOD	May 16, 2019 to Jun 14, 2019
Previous bill	\$20,482.60
Payment received	Jun 12, 2019.....-\$20,482.60
BALANCE FORWARD	\$0.00
ELECTRICITY CHARGES	
Based on Large General Service Rate 1610 May 16, 2019 to Jun 14, 2019	
Basic Charge 30 days @ \$0.2673 /day.....	\$8.02*
ENERGY CHARGES	
168,006 kWh @ \$0.0606 /kWh.....	\$10,238.98*
DEMAND CHARGES	
874 kW @ \$12.3400 /kW.....	\$10,785.16*
Owner Transformer discount.....	-\$218.50*
POWER FACTOR	
Power factor of 90% - Surcharge of 0% on electricity charges.....	\$0.00
TAXES ON ELECTRICITY CHARGES	
* GST 5% on \$20,813.66.....	\$1,040.68
ELECTRICITY CHARGES SUBTOTAL	\$21,854.34
TOTAL DUE	\$21,854.34

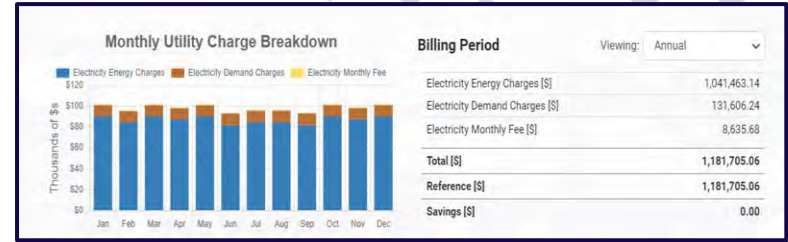
*source BC Hydro

Utility Purchase: Year 2024 No Demand Charges

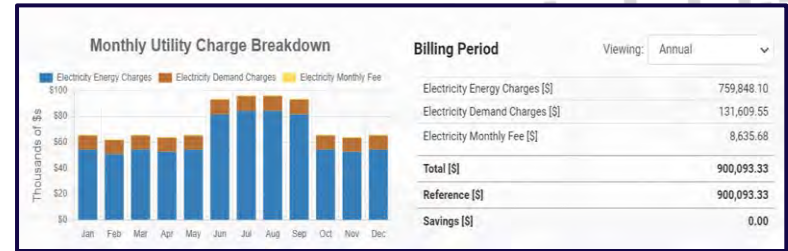
Managed vs. Unmanaged Charging



Utility Purchase - Unmanaged Charging
Peak of \$184k in July



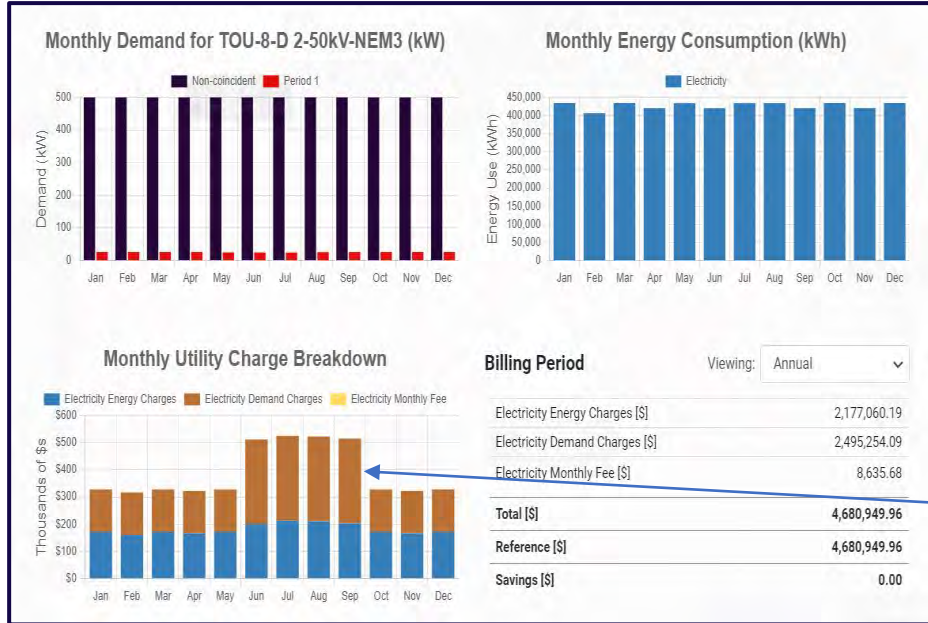
Utility Purchase - Managed Charging [Overnight]
Peak of \$101k in January and December



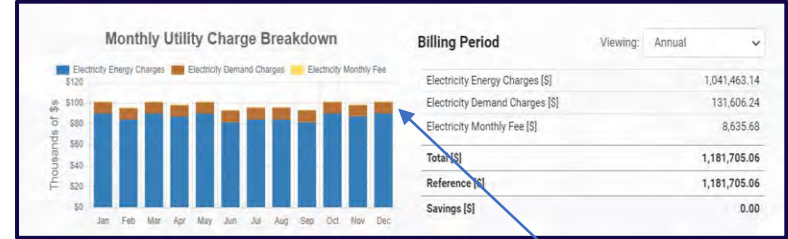
Utility Purchase - Managed Charging [24 Hours]
Peak of \$95k July

Utility Purchase: Year 2031 Incl. Demand Charges

Managed vs. Unmanaged Charging



Utility Purchase - Unmanaged Charging
Peak of \$524k in July



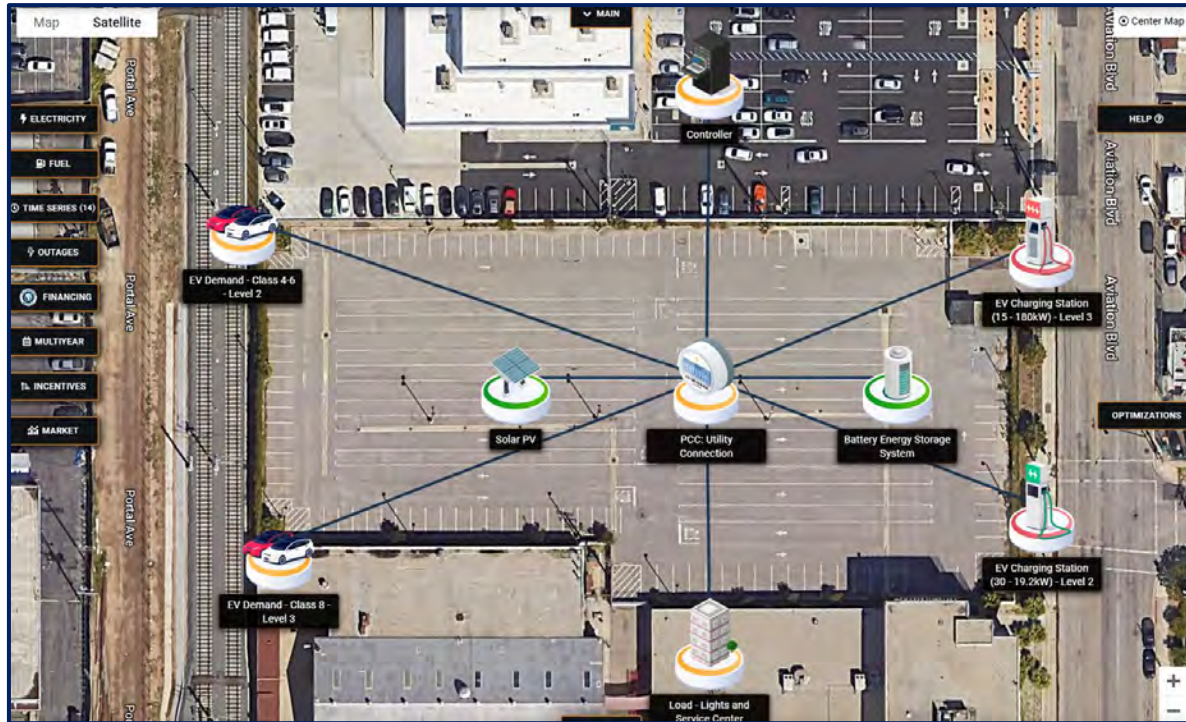
Utility Purchase - Managed Charging [Overnight]
Peak of \$172k in January and December

Now Demand Charges are a Significant, >50%, portion of the annual bill, and especially high during summer months

Monthly Demand Charges are reduced to <15% of the bill by leveling overall demand through managed charging

Zeem Solutions: Year 2031 with Solar and Battery

Managed vs. Unmanaged Charging with Distributed Energy Resources (DERs)



Fleet:

- 30 MD (Class 4-6) EV's, needing 200 - kWh Daily Energy
 - Using Level 2 - 19.2 kW chargers
 - 10 hr Battery Charging Time
- 15 - HD Class 8 Semi's needing 450 kWh Daily Energy
 - Level 3 – 180kW chargers
 - 3 hour Battery Charging Time

Chargers (one per truck):

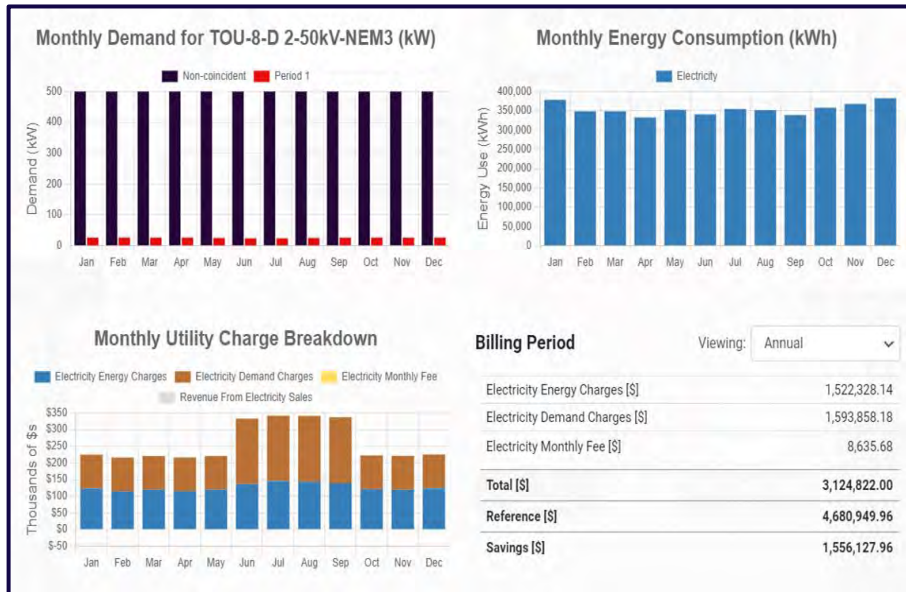
- 30 - 19.2kW Level 2
- 15 - 180 kW DC Fast Level 3

DERs to Consider:

- Solar Carport covering parking lot
 - 82.6 kW Initially + 678 kW in 2029
- Battery Energy Storage (BESS)
 - 2 MWh Initially, + 2 more MWh in 2029
- Financing for DERs in 2023 + 2029

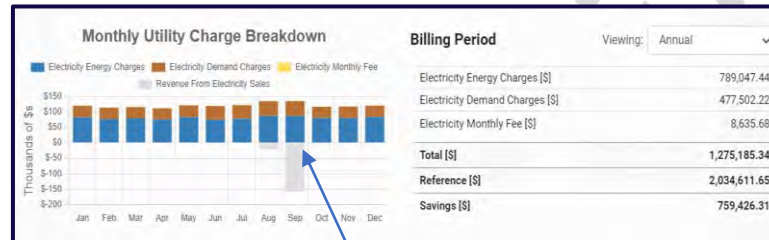
Utility Purchase: Year 2031 Incl. Demand Charges

Managed vs. Unmanaged Charging - Solar and Battery Included



Utility Purchase - Unmanaged Charging

Peak of \$341k in July vs. \$524k with no DERs



Utility Purchase - Managed Charging [Overnight]

Peak of \$134k in September vs. \$172k with no DERs

Solar and Battery save on peak demand AND can also generate revenue through demand response events. These are times where the utility requests for load generation during the hottest months. Example from 2022 Demand Response Events:

Month	Start Time	Duration (Hours)	Date
June	4:00 PM	1	June 28 (Fri)
August	6:00 PM	1	August 16 (Fri)
September	5:00 PM	3	September 5 (Thu) September 6 (Fri) September 9 (Mon) September 10 (Tue)

Levelized Cost of Energy

Managed vs. Unmanaged Charging

Levelized Cost of Energy (\$/kWh)			
	2024; No Demand Charges	2031; Full Demand Charges	2031; Full Demand Charges; with DER's including loan costs
Unmanaged Charging	\$0.36	\$0.96	\$0.68
Managed Charging [Overnight]	\$0.21	\$0.42	\$0.30
Annual Total OPEX Cost (Utility + Charger Investment or Utility + Charger Investment + DER finance costs)			
	2024; No Demand Charges	2031; Full Demand Charges	2031; Full Demand Charges; DER's
Unmanaged Charging	\$1,724,300	\$4,622,200	\$3,296,900
Managed Charging [Overnight]	\$993,600	\$2,013,700	\$1,469,200
Total Savings	\$730,700	\$2,608,500	\$1,827,700

Conclusions

Benefits of a Charge Management System (CMS) as Part of the Overall Energy Management System (EMS)

Managed EV Charging with DERs

- Grid Optimization / Interconnection Load Leveling
- Operating Cost Reduction – Especially Evening California, 4-9PM Demand Charges (Where applicable)
- Renewable Energy Integration
- Demand Response – Revenue Generation
- Resiliency to ride out a brief outage
- Battery Health and Longevity
- Environmental Benefits
- Manage Grid Upgrade Timelines and Costs

#GotMegaWatts?



XENDEE

Thank You

Presented by: Joshua Goldman
VP of MOBILITY
jgoldman@xendee.com



Scan for vCARD



Scan to connect on LinkedIn



Scan to book a meeting

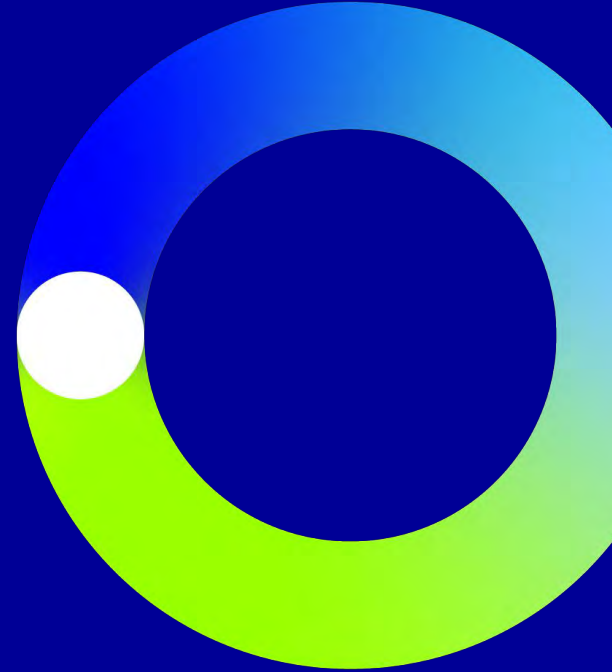


NACFE Run On Less e-Depot



Sean Larkin
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Sr Director
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Miami/Fort Lauderdale



Leaning into the US convenience and mobility sector

Delivering value today
through disciplined
investment and integration



Growing a distinctive network
to advance our transition
growth engines tomorrow



Resilient

Growing

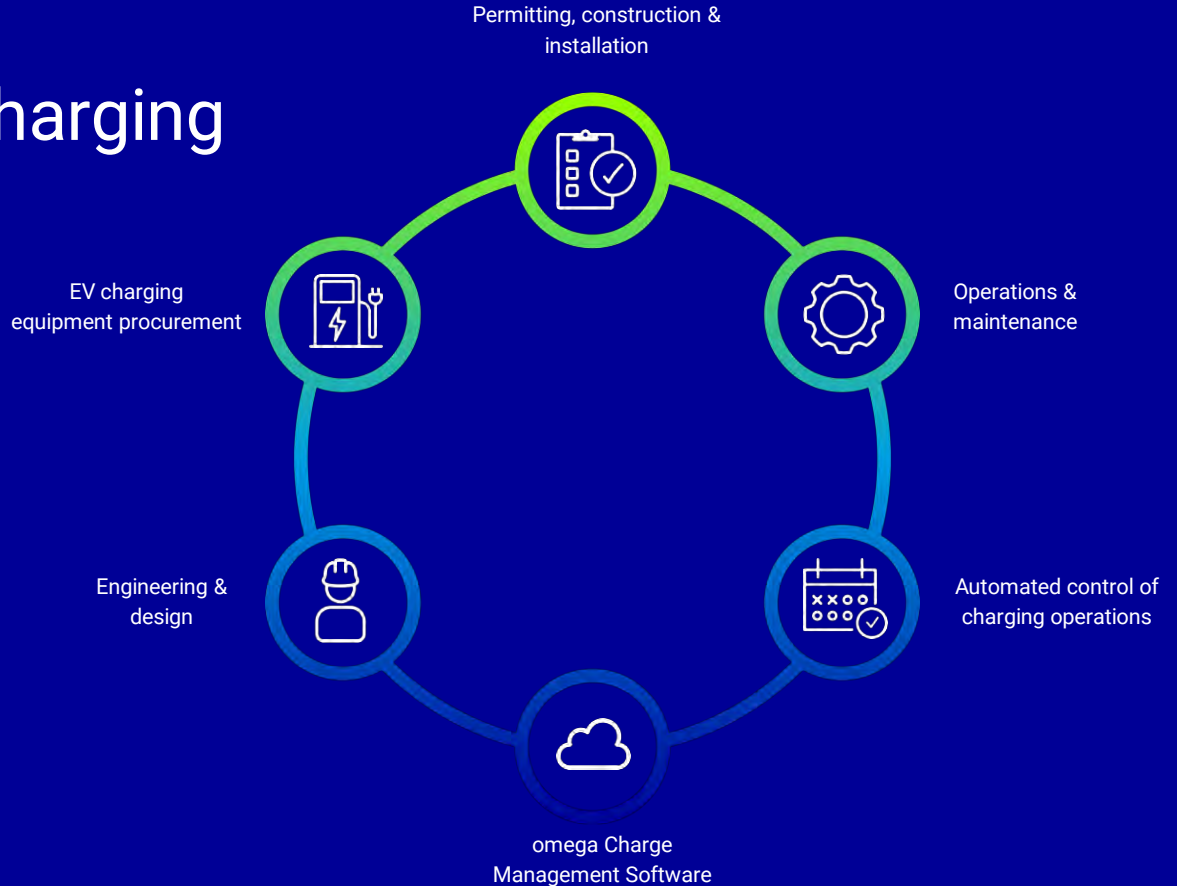


Decarbonising

Our solutions

bp pulse's turnkey charging solution

bp pulse **de-risks fleet electrification**, allowing the fleet operator to stay focused on their business of delivering people or goods.



Topics

- Interoperability
- Maximizing uptime

Interoperability

“basic ability of different products or systems to readily connect and exchange information with one another without restrictions”

Mixed Fleets

- Day cab, Box truck, yard tractor

Mixed Chargers

- DC and AC
- 50kW / 75kW / 150kW

Multiple operations platforms

- Telematics, Routing, Maintenance software



Customer case study



lean green produce machine

OK Produce operates one of the largest distributors of fresh fruit and vegetables based out of Fresno California.

Overview

OK Produce is developing multiple phases to support the deployment of 37 class-8 all electric trucks. OK Produce engaged bp pulse from the beginning to design, deploy, and operate the multiple charging depots while delivering critical uptime through our charge management software, omega.

Project features

bp pulse delivers a turn-key solutions from design, deploy, operate and maintenance of multiple DC fast charging depots.

Omega integrates with local utility, vehicle telematics, DC chargers, and operational scheduling.

Interoperability through omega for two (2) different truck manufactures, and two (2) different EV chargers

Partners



Interoperability

Lessons learned:

- Agnostic Charge Management Software
- OEM / utility approved chargers
- Multiple points of truth (Chargers + Trucks)
- Any charger to any truck to match operations



Maximizing uptime

*"Uptime is paramount in truck operations
understanding the problem is half the solution"*

Critical to operational success

- CMS – manage and monitor charging
- Standard operating procedure for issues
- Charger warranty / spare parts



**Issue Identification &
Resolution**



**Predictive Maintenance &
Repair**



**Managing Warranties &
Equipment Reserves**



**Cost-Effectively Prolonging
Equipment Lifespan**

Customer case study



Red Hook Terminals operates the largest fleet of heavy-duty electric yard tractors on the US East Coast, with two facilities in the Port of NY/NJ complex.

Overview

Red Hook purchased ten BYD 8Y electric yard tractors. As the tractors were getting ready to deploy at Red Hook's intermodal yard in Port Newark, NJ, Red Hook engaged bp pulse for charge management services to optimize the charging of their fleet.

Project features

bp pulse is deploying its patent-pending Charge Management System, omega, for five years to automate all aspects of charging.

omega integrates with the local utility, the chargers provided by BYD, and Red Hook's telematics software.

Through the various integrations, **omega responds dynamically in real-time**, nearly eliminating the time Red Hook operators need to spend managing charging schedules and energy costs.

Partners



Maximizing uptime

Lessons learned:

Uptime Statistics:

- 95% fleet readiness / vehicle uptime
- 81% charger uptime

Fault Statistics:

- Auto resolved total: 716
- Auto resolution Percentage (under 1 minute): 79%
- Avg resolution time (hours) post email alert notification: 45.32 (hrs)
- *Critical failures: 18*



(9 months of operational data)



NACFE Run On Less e-Depot



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Sean Larkin

*Senior Director, Medium &
Heavy-Duty Fleets
bp pulse*



Hosted by:

Rob Graff

Senior Technical Advisor





CCS1



CCS2



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... And charged up!



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