NC STATE UNIVERSITY

SUSTAINABLE FLEET TECHNOLOGY CONFERENCE & EXPO 2021

Session #6: Innovative Charging Solutions

September 30, 2021

NC CLEAN ENERGY TECHNOLOGY CENTER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

SUSTAINABLE FLEET TECHNOLOGY
WEBINAR SERIES 2021

Sessions through December 09, 2021

SUSTAINABLE FLEET TECHNOLOGY
CONFERENCE & EXPO 2021

Sessions September 09, 2021 – October 19, 2021

https://www.sustainablefleetexpo.com/

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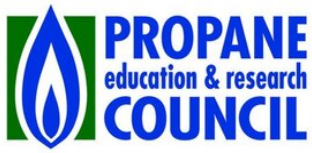
SFT Conference Series Upcoming Sessions

- 10/05: Total Cost of Ownership--Comparisons of Alternative Fuel Vehicles versus Conventional Fuel Vehicles
- 10/07: Propane Applications and Success Stories
- 10/09: Funding Sources & Creative Financing for Sustainable Fleet Deployment
- 10/12: Funding Sources and Creative Financing for Sustainable Fleet Deployment
- 10/14: Hydrogen as a Transportation Solution
- 10/19: Future Proofing Electric Vehicle Charging Infrastrure

2021 SFT Conference Series Sponsors




XLFleet
TM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STATE OF NORTH CAROLINA
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Format

- Q&A at the end
- Submit questions and comments to “Panelists”
- Scheduled for 2:00p-3:30p
- Handout
- Recording

Innovative Charging Solutions
September 30, 2021

2:00-2:07 **Rick Sapienza, NCCETC--**Introduction and Welcome

2:07-2:19 **Robert Mount, Renewable Innovations**—Leading the Renewable Revolution

2:19-2:25 **Rafael Gaspar, EVgo**—Powering the Transition to Electrified Fleets

2:25-2:37 **Desmond Wheatley, Beam** —The World's Fastest EV Charger Deployment

2:37-2:49 **Himanshu Sudan, eCAMION**—Universal Energy Hub

2:49-3:01 **Sean Larkin, AMPLY Power**—Charge Management/Charging-As-A-Service

3:01-3:13 **Justin Scalzi, Wave**—Wave Solution Overview

3:13-3:30 **Q&A**

Driving Clean Air & Renewable Energy
CleanTransportation.org
Supported by the NC Clean Energy Technology Center with funding from the North Carolina Department of Transportation

North Carolina State University
NC Clean Energy Technology Center
Clean Transportation Program
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NC CLEAN ENERGY TECHNOLOGY CENTER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Robert Mount
bob@renewable-innovations.com
385-330-2145

- Founder & CEO of Renewable Innovations
- 35 years of dynamic, entrepreneurial, and driven results-oriented leadership
- Strong track record as the originator, facilitator, and builder of world-class technology in the power industry
- Industry involvement: Fuel Cell & Hydrogen Energy Association (FCHEA), Director; Center for Hydrogen Safety (CHS), Member; US Hydrogen Roadmap; US Department of Energy; Intermountain Western Alternative Fuel Corridor, Member; and New Zealand Hydrogen Association, Member

RENEWABLE INNOVATIONS
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Clean
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Power

Fabrication & Production
1551 South 400 E
American Fork, UT 84003

Engineering, Sales & Marketing, Admin
588 West 400 South
Canopy 3
Suite 110
Lindon, UT 84042

SFT Innovative Charging

Live Session

Robert L Mount

September 30th, 2021

Leading the Renewable Revolution

Renewable Innovations Proprietary

Growing to serve you better

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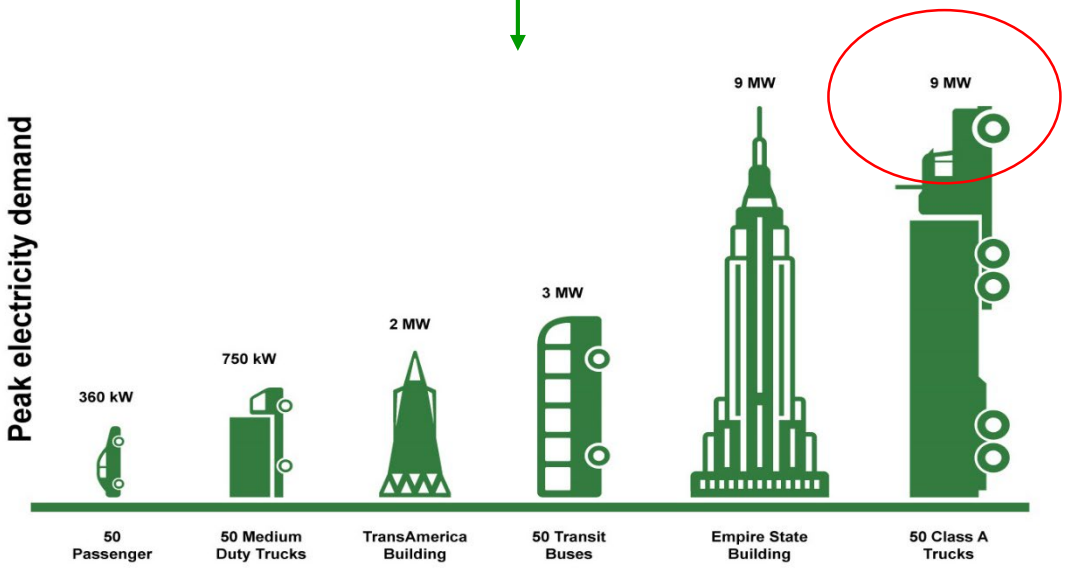
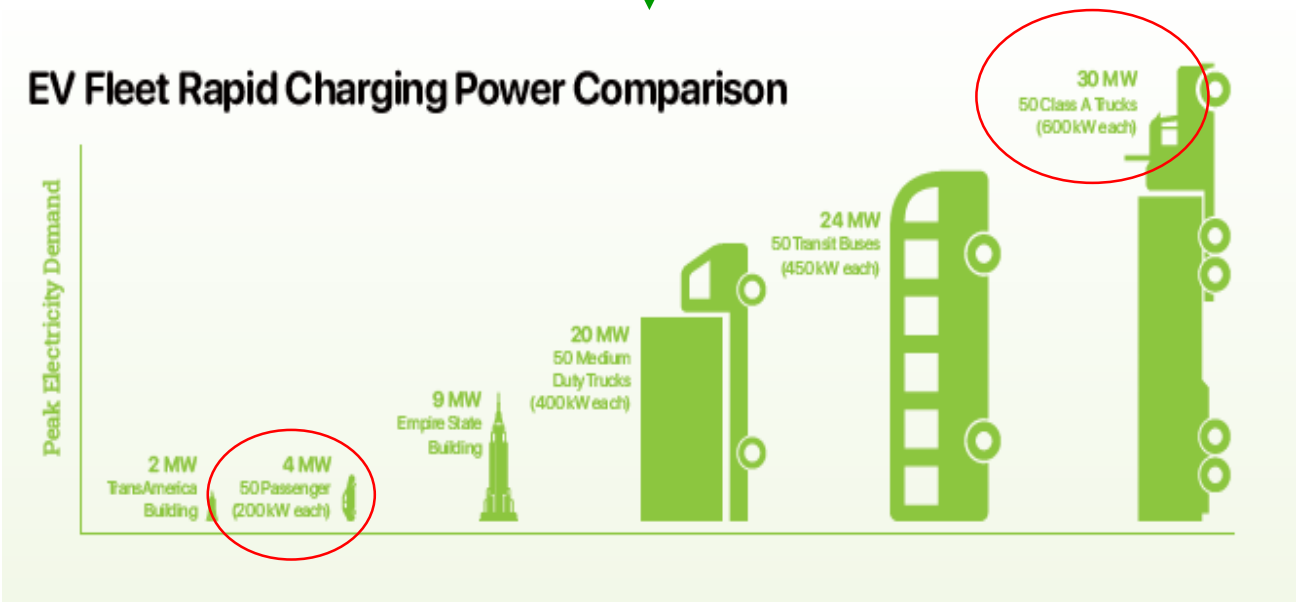
Realizing and Addressing Grid Gap

EV GRID Requirements in Perspective

- Grid **Ability**
- Grid **Availability** (Location, location, location)
- Demand / Power Magnitude (Charge requirements)
- **Cost** (Immediate & Long Term)
- **Timing**





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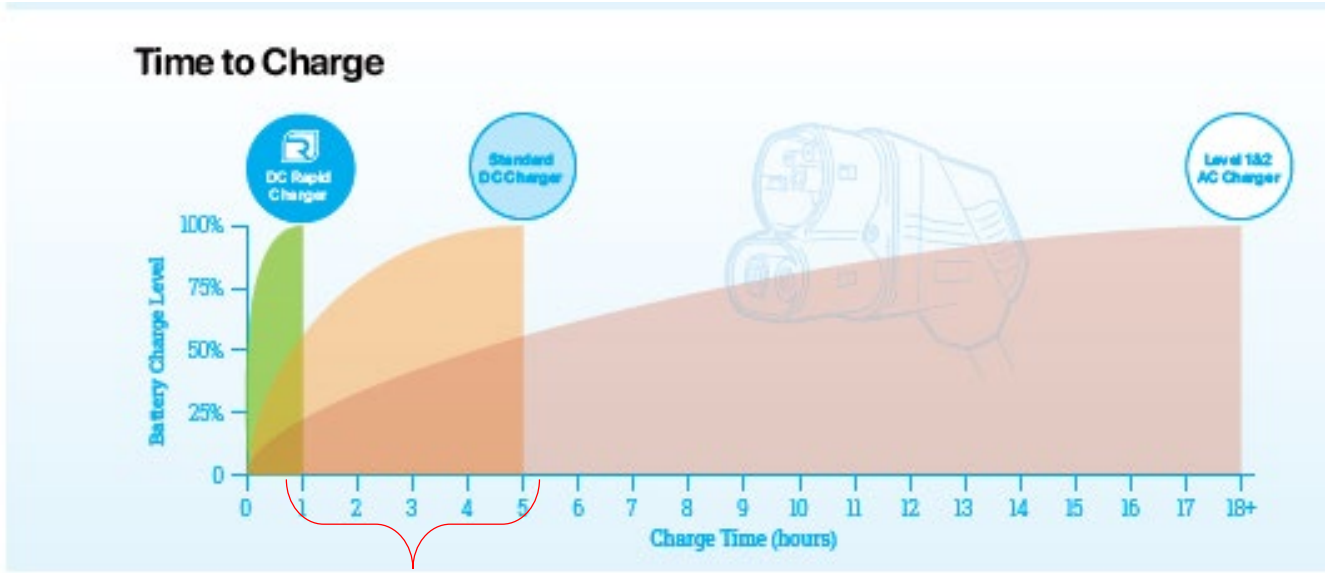
Realizing and Addressing Grid Gap



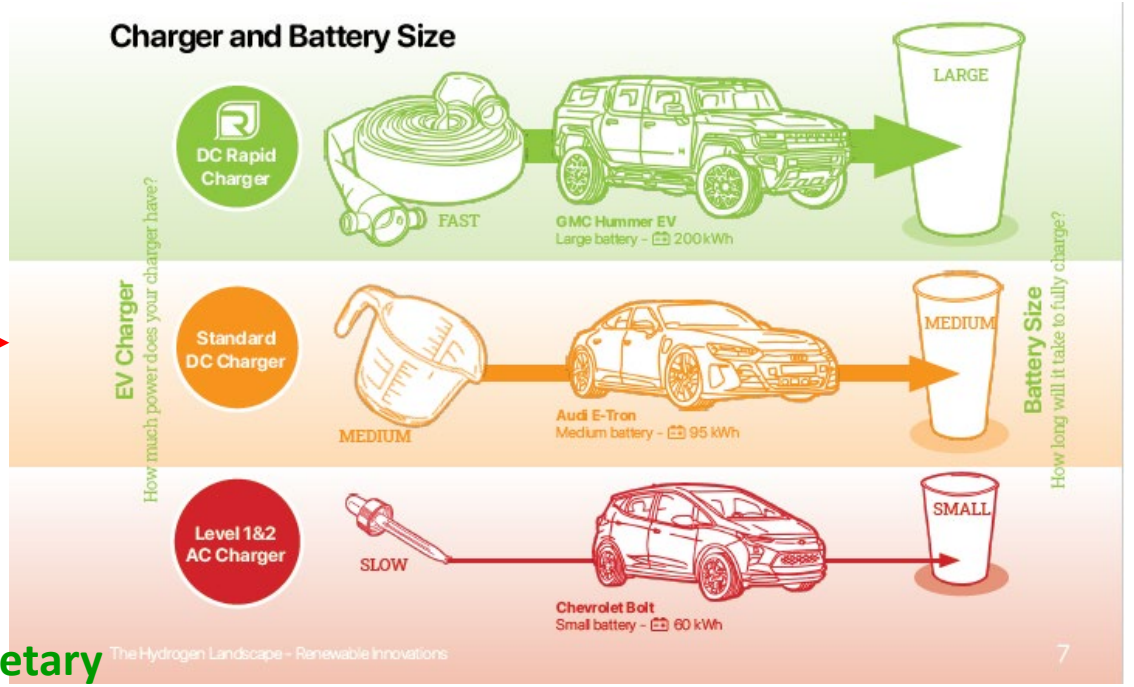
Most Commercial Chargers

If BEVs are to replace combustion vehicles there are three items that need to be considered for Charging

- Rate of Charger
- Time to Charge
  - (Gas/Diesel 3 to 10 minutes)
  - BEV (Traditionally hours)
    - Goal – 20 minutes or less
- Availability

Understanding BEV Charging

- Level 1 (AC)
- Level 2 (AC)
- DC Fast Charging (What really is DC Fast Charging)



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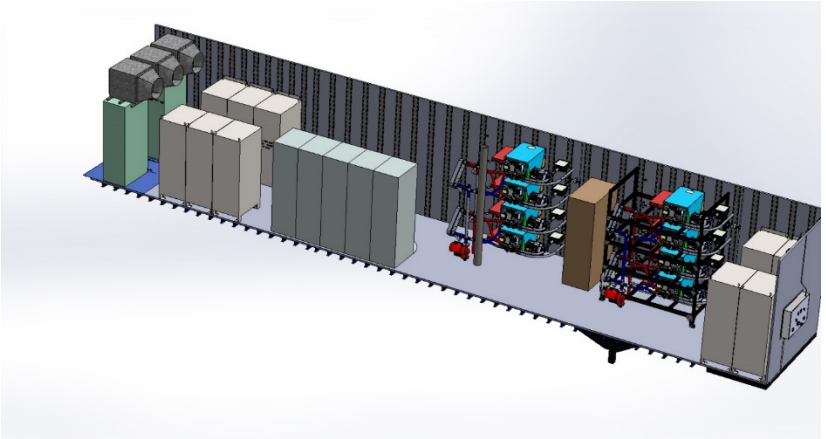
Renewable Innovations – Rebelle Rally MEC-H2RC



Mobile Energy Command- H2 Rapid Charging

- 250kW H2 Power (Fuel Cells)
- 500 kW Scalable Inverter Power
- 700 kWhr Battery Storage
- Dual 180- kW DC Rapid Chargers (4 Charge Ports)
- Advanced local and remote Power management & control

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Clean Scalable Power

Renewable Innovations MPGS (Mobile Power Generator System)

Designed to go anywhere with a truck or car. Recharge vehicles at an event or activity.
The MPGS can also serve as a tradition backup generator for emergencies or remote projects.

- 80kW Fuel Cell
- 180kW Inverter
- 180kWh Li Battery array
- Up to 70 kg H2
- 180 kW DC Fast Charger
- Can Connect to a facility for backup Power
- Can connect to Utility for Grid Services
- Outputs can be paralleled

DC Fast Charger
100kW to 600kW

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Power

Renewable Innovations H2 Rapid Charging System

Designed to Recharge up to 8 Vehicles without Utility Connections.
Can be used anywhere and can be connected to a facility for backup Power and to the Utility for Peak Shaving

- 700 kg H2 Min
- 700 BAR
- 500kW up to 700kW Power
- (4) Dual Port DC Fast Chargers with Point-of-Sale Option
- Utility Interface for Backup or Bi-Directions Utility Connection
- Optional Canopy
- Optional Lighting Package

DC Fast Charger
100kW to 600kW

Transport to Location

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The Path to a Zero Carbon Future

RI and GM Solutions for a Green and Energy Independent Future

The Green Economy

H2 BEV Rapid Charging

Telematics
- Service
- Payment
- POS

Fuel Cells, Inverters, & Batteries
- 500kW min
- 300kWh Battery min

H2 Storage
- 500kg up to 700kg

Utility / Facility Connection
- Backup Power
- Grid-tie
- Connection Optional

DC Rapid Charge Stations
- Scalable - Up to 600kW per station
- Point of Sale

Modular H2 Storage
- **Up to 1000kg per 20’ module**

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The Path to a Zero Carbon Future

RI and GM Solutions for a Green and Energy Independent Future

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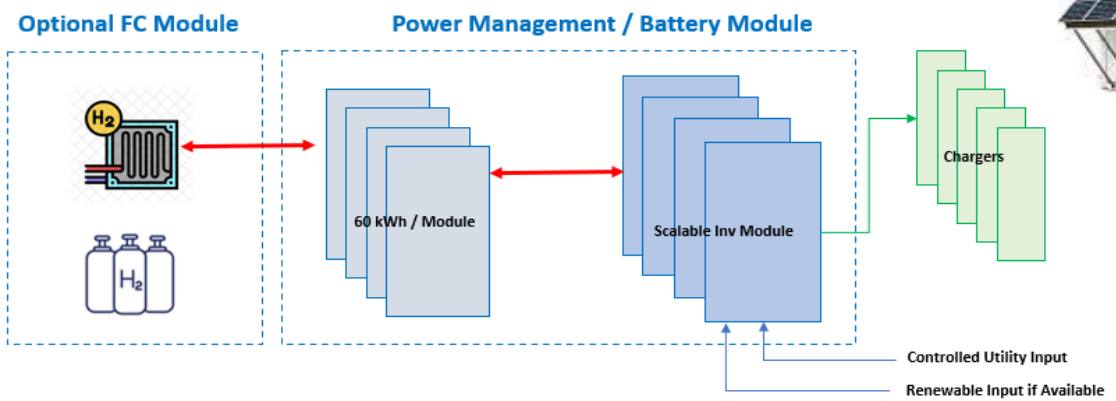
Renewable Innovations BEV Energy Management System

20’ 500kW / 1,250kWh

40’ 800kW / 5,000kWh



Scenarios

		Inv Pwr
50kW	1 to 10 Chargers	500kW
75kW	1 to 10 Chargers	750kW
100kW	1 to 5 Chargers	500kW
180kW	1 to 3 Chargers	750kW

250 kW Pilot System

Inv	256kW
Battery	1,000kWh
Container	
Total	$576,323
Act / Watt	$1.15

500kW System

Inv	500kW
Battery	1,250kWh
Container	
Total	$788,000
Act / Watt	$1.58

800kW System

Inv	800kw
Battery	5000kWh
Container	
Total	$1,445,800
Act / Watt	$1.81

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1551 South 400 E
American Fork, UT 84003

Engineering, Sales & Marketing, Admin
588 West 400 South
Canopy 3
Suite 110
Lindon, UT 84042

Leading the Renewable Revolution

Renewable Innovations Proprietary

Justin Scalzi
justin@waveipt.com
(949) 220 - 6491

- Head of Transit Sales for WAVE
- Extensive knowledge and experience guiding transit agencies to zero-emission fleets
- Has done so with some of the industry's earliest and most successful battery-electric bus transitions
- Previous experience with BYD, US Director of Business Development for Transit

WAVE
by Ideanomics

WAVE Solution Overview

Justin Scalzi | Head of Transit Sales

Company Overview

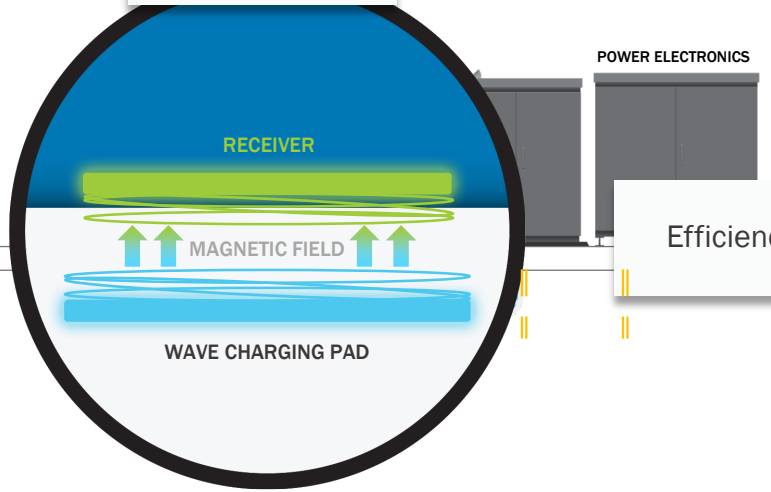
- Global leader in high-power wireless charging for medium- and heavy-duty EVs
- Founded 2011 | Utah, USA.
- Longest running inductive fleet in the US/World
- Largest inductively charged fleet in the US/World
- Solutions for mass transit, ports and long-haul shipping
- 250kW, with 500kW and U.S. Department of Energy project for 1MW
- Scaling to North America via capital investment from acquisition by Ideanomics (NASDAQ: IDEX) in January 2021

Powering the largest electric mass transit fleet in the U.S. with the largest, high-power, wireless charging deployment in the world.

How wireless charging works

20 Miles

INPUT POWER FROM GRID



Energy transferred via magnetic field

Efficiency equal to or better than plug-in.

Single-pad design=large alignment window.

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WAVE Wireless delivers greater range through Opportunity Charging

On-route, wireless charging provides meaningful financial benefits

- Extended operating time/range
- Reduction in batteries/cost
- Increase in carrying capacity

VEHICLE RANGE

Cannot complete daily route

Electric Bus + Overnight Plug — 80 - 120 miles

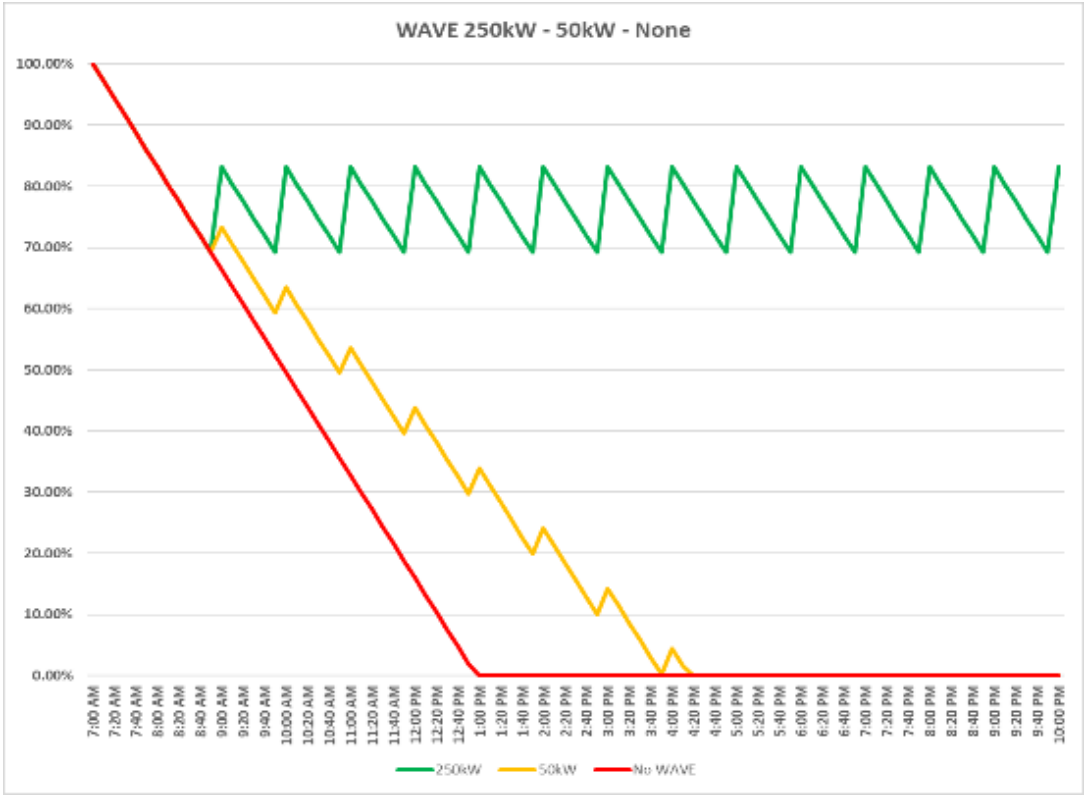
Extends operating time

Electric Bus + WAVE 50kW — 100+ added miles

Reduces battery size and CAPEX

Electric Bus + WAVE 250kW — Infinite miles

Source: Company Estimates



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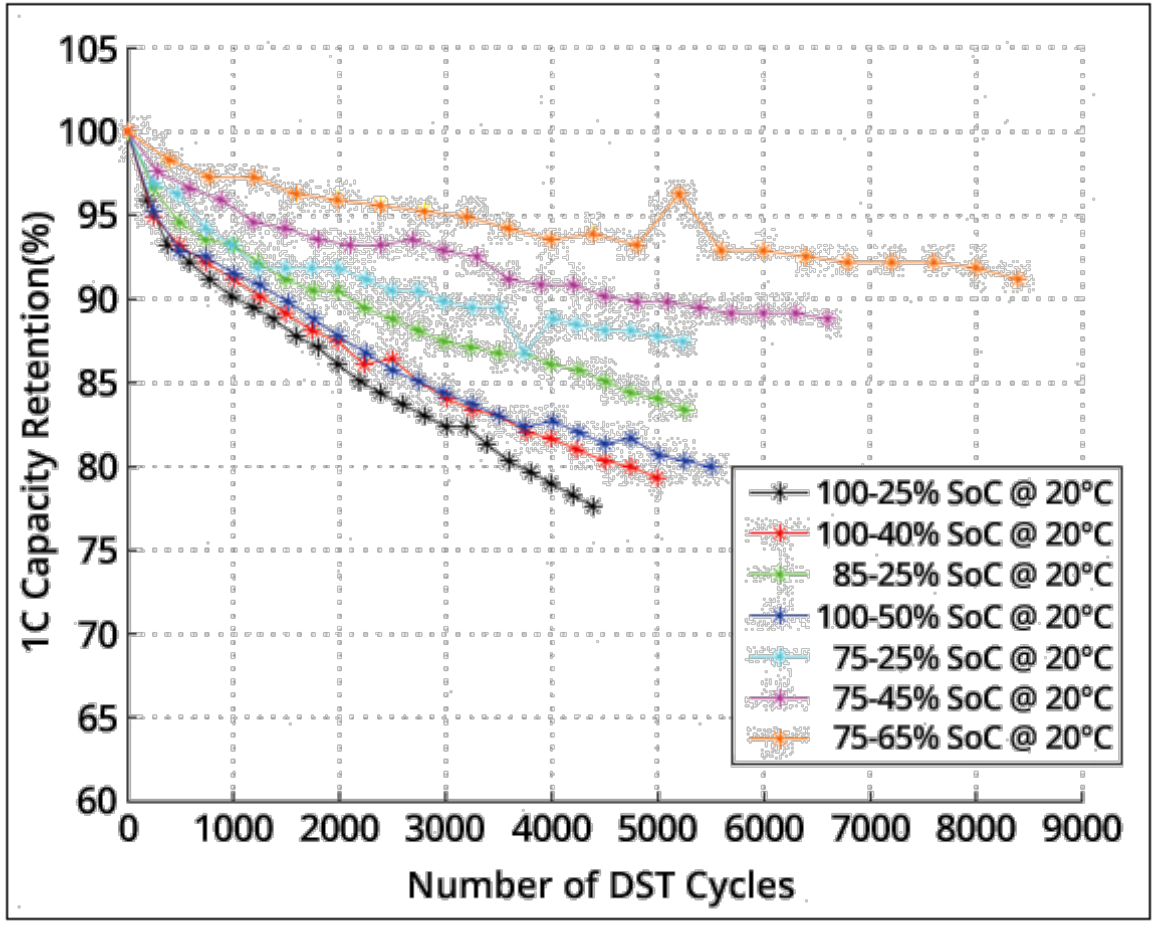
Opportunity charging extends battery life

Capacity loss of Li-ion as a function of charge and discharge cut-off points



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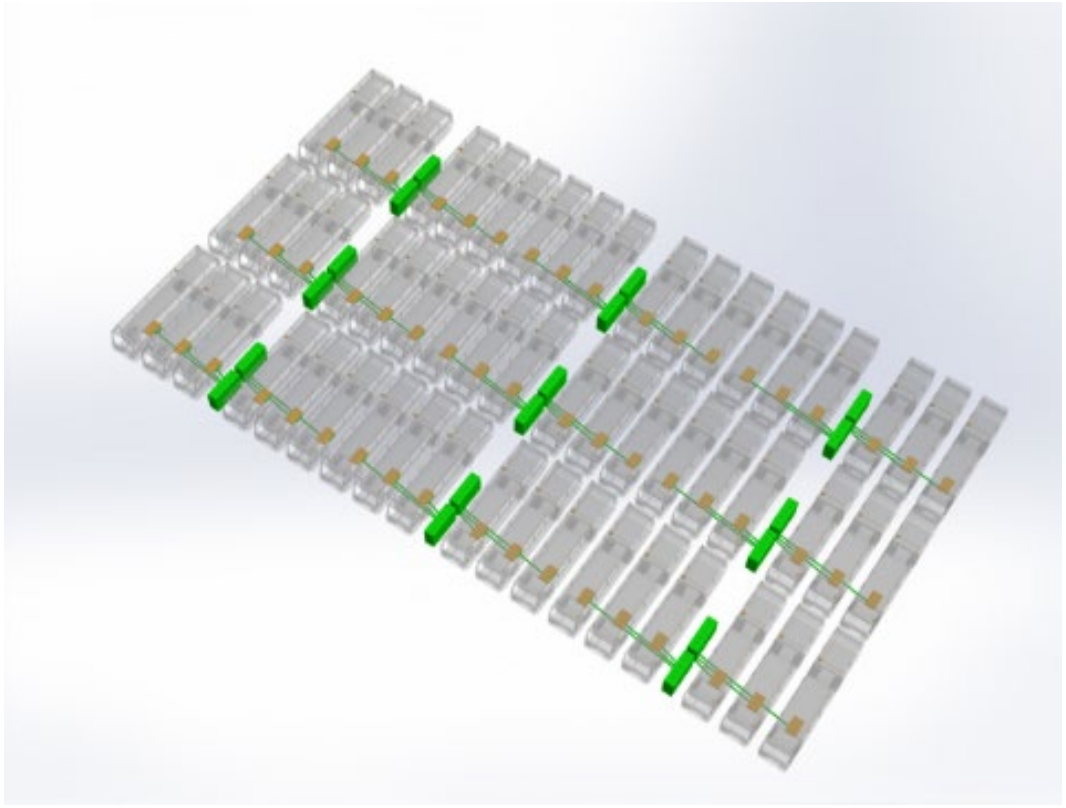
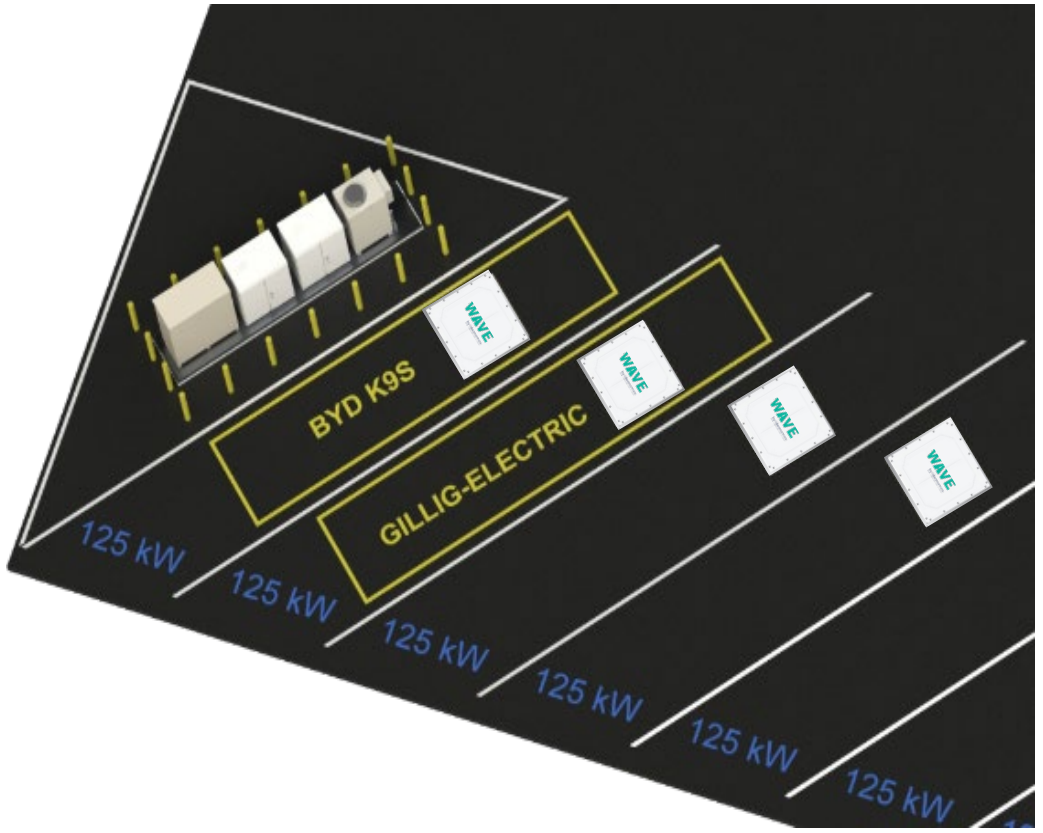
Space Saving with Wireless Depot Charging

Sequential Charging to further extend funding and manage demand charges at the depot



OEM agnostic to future proof your investment



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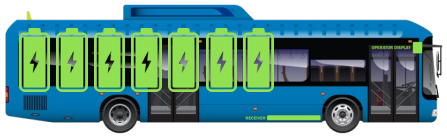
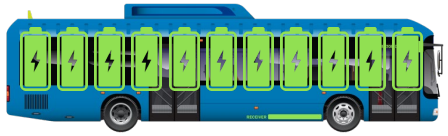
Removing the Barriers to EV Adoption

WAVE by Ideanomics

To achieve more range

	standard-range: 155 mi	extended-range: 200 mi	WAVE range extension: 400 mi	Diesel-like range
			  *subtract 180 kWh of battery*	
Higher battery cost +	$780K	$810K (+30K)	*(-$70K)* than extended BEB	Reduced battery cost
Additional curb weight	32,369 lbs 324 kWh battery	35,419 lbs (+2,350 lbs) 446 kWh battery	32,265 lbs *(-3,154 lbs)* 266 kWh standard battery	Meets axle weight limits

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WAVE
by Ideanomics

Thank You

Questions?

CONTACT:
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HEAD OF TRANSIT SALES
949.220.6491
JUSTIN@WAVEIPT.COM

Rafael Gaspar
rafael.gaspar@evgo.com
(512) 412-2510

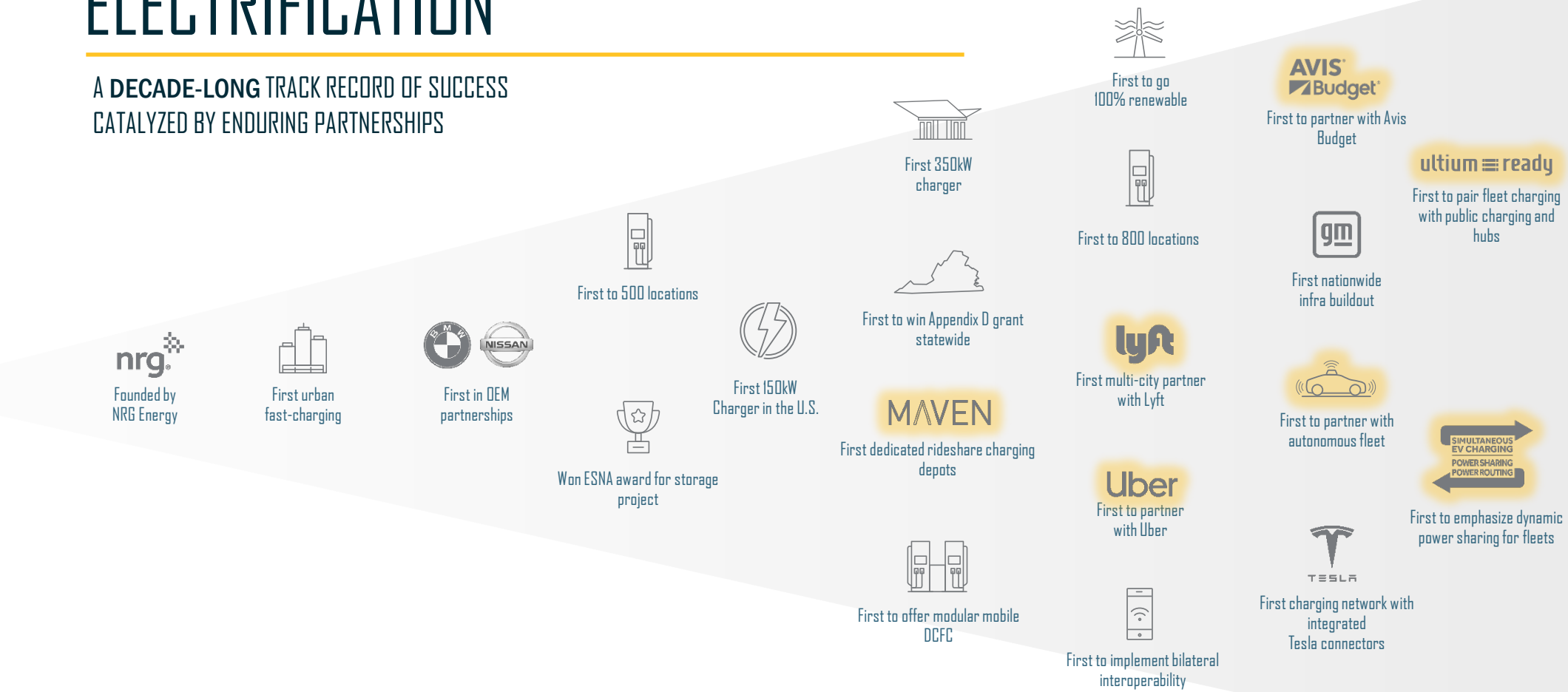
- Business Development Manager for Fleets at Evgo
- Engages with fleet customers and partners to design charging solutions that put fleets on the best path to electrification
- Nearly 10 years global experience in the energy, trading, and agribusiness industries, building and developing new businesses, products, and high performing teams
- Previous experience with Toyota

Powering the Transition to Electrified Fleets

EVgo

EVgo: A **FIRST MOVER** ON FLEET ELECTRIFICATION

A **DECADE-LONG** TRACK RECORD OF SUCCESS CATALYZED BY ENDURING PARTNERSHIPS



818
#1 in DC fast-charging sites

1,412
Current DC Fast chargers

275,000+
Customer accounts

34 States
68 major metropolitan areas

100%
Renewable energy powered

GM Fleet Ultium 360
Preferred charging partner

AV Fleet Hubs
Multiple operational

Merchants Fleet
Fleet Management Partnership

TODAY

1) Based on company estimates of 2020E kWh market share, excluding Tesla. EVgo has 34% market share of urban DC Fast Chargers based on Plugshare public DC Fast Chargers with capacity greater than or equal to 44 kW, including, non-networked chargers and excluding Tesla Superchargers captive to Tesla EVs, as of 9/30/20. "Urban" includes ATL, BAL, BOS, CHI, DC, DEN, DFW, HOU, LA, MIA, NYC, PHIL, PORT, SAN, SD, SEA, SFBA.

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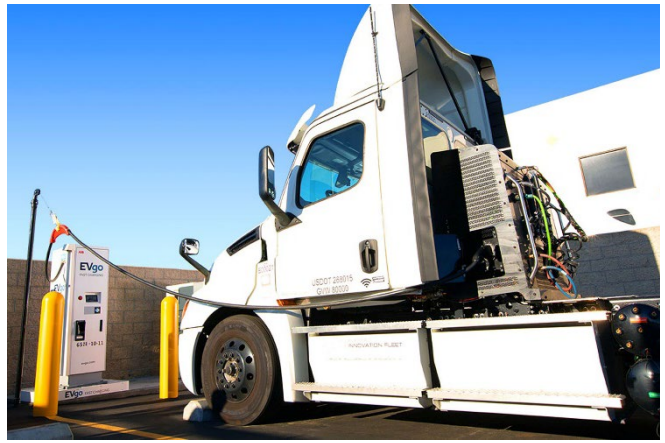
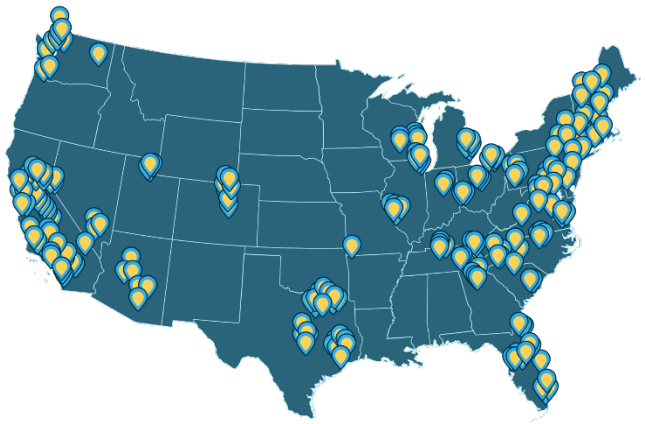
EVgo: POWERING THE TRANSITION TO **ELECTRIFIED TRANSPORTATION**

- **Fleet Depot Solutions**
  For mission-critical fleet charging at your base of operations
- **EVgo Public Network**
  For extending range and resiliency through access to distributed charging
- **Dedicated EV Charger Hubs**
  For those without a depot or who need supplemental capacity away from base





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EVgo FLEET CHARGING SOLUTIONS

INTEGRATED, RELIABLE, AND DEVELOPED TO ACCELERATE FLEET ELECTRIFICATION

EVgo Fleet Solutions

- Fleet Transition Planning
- Equipment Provisioning
- Infrastructure Deployment
- Fleet Software & Networking
- Systems Integration
- Fleet O&M Management

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SOLVING CHALLENGES TOGETHER

CHALLENGES/OPPORTUNITIES FOR FLEET OPERATORS:

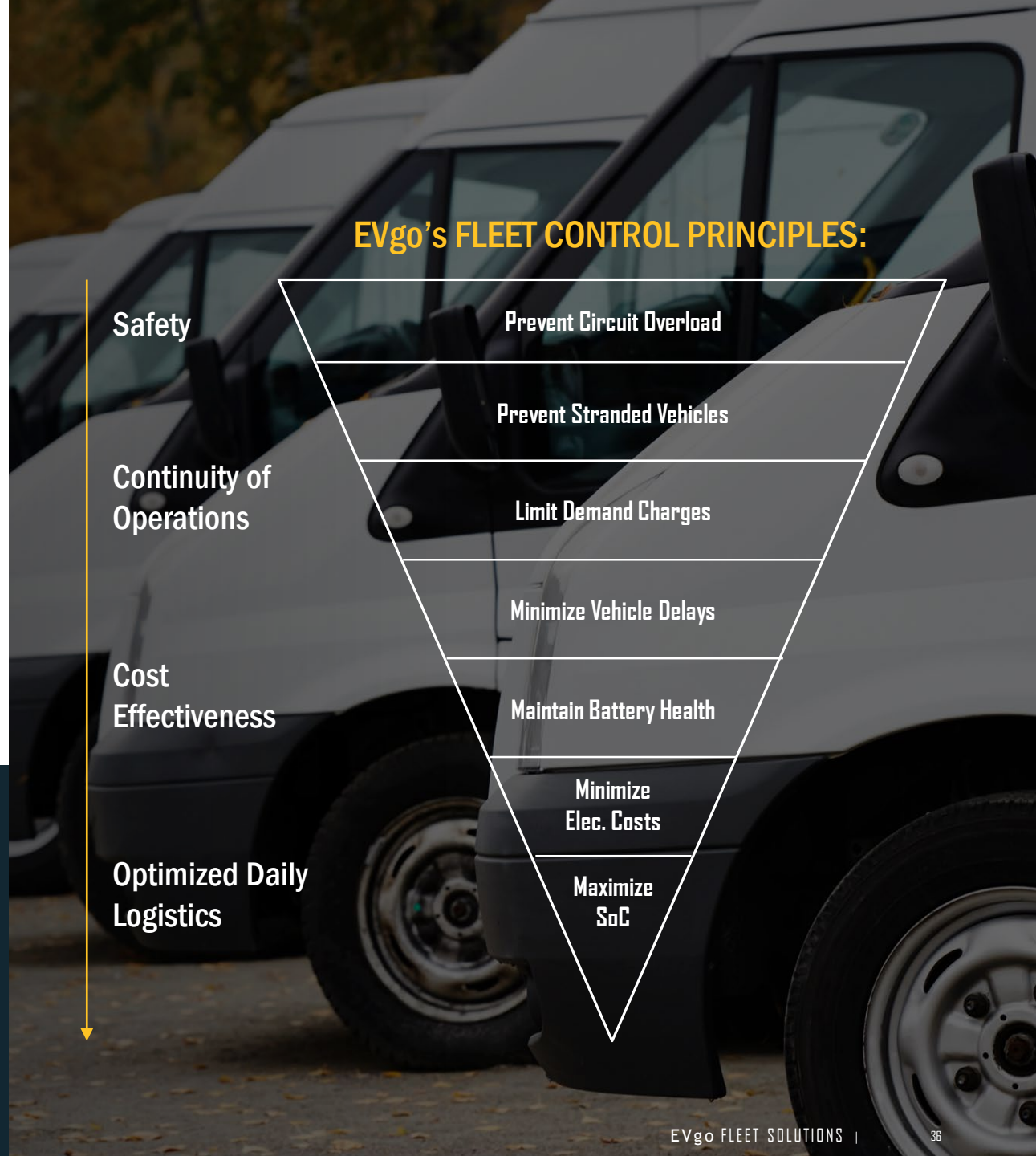
- Total cost of ownership
- Reliability of fuel switching
- Mixed fleet vehicles and providers
- Variable duty cycles and shifts
- Future proofing: from pilots to scale

CASE STUDY:

10x Vehicles

1x 10 hr shift
14 hr max dwell

2x 10 hr shifts
3 hr max dwell



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CO-DEVELOPED **HARDWARE**

DESIGNED FOR RELIABILITY AND UPTIME

7.2kW AC L2

19.2kW AC L2

50kW - 100kW DCFC

200kW - 350kW DCFC

For longer dwell times

EVgo Fleet Hardware Portfolio

For shorter dwell times

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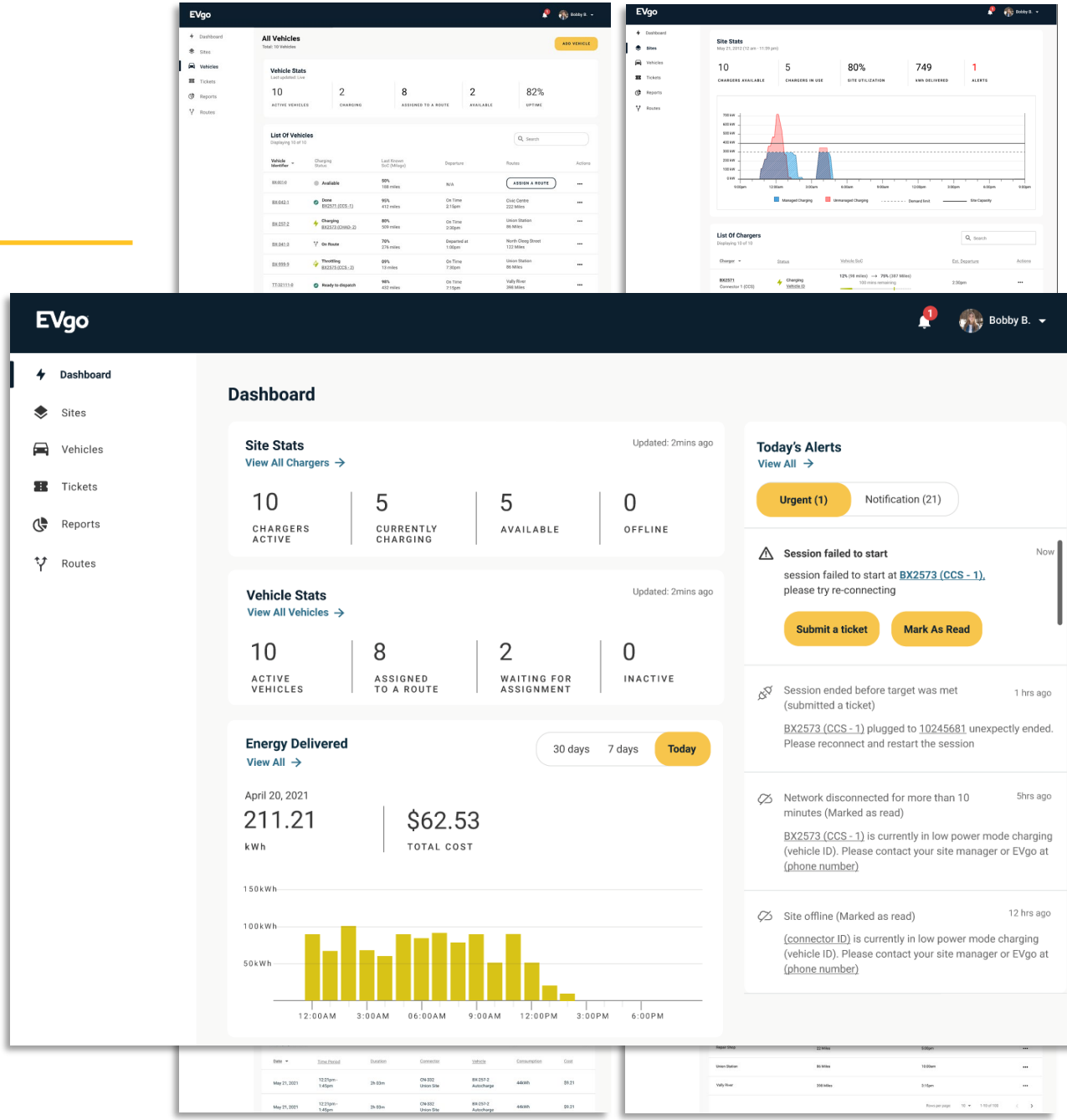
EVgo OPTIMA™

SMART CHARGING SOFTWARE

- Real-Time Monitoring
- Charger & Vehicle Management
- Transaction Management
- Advanced Analytics & Reporting
- Network Uptime & Support
- Energy Management
- Smart Charging & Scheduling
- Systems Integrations



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EVgold™
OPERATIONS & MAINTENANCE

- ✓ **Proactive Monitoring:** continuous monitoring to identify potential problems early
- ✓ **Preventative Maintenance:** regular on-site inspections to ensure reliability
- ✓ **Corrective Maintenance and SLAs:** protocols for emergency repairs
- ✓ **Labor and Parts Warranty for up to 5 years:** reduces unexpected costs
- ✓ **24x7 Driver Support:** available to assist fleet drivers and managers

Results in industry-leading SLA backed ***98% uptime guarantee***

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EVgo OFFERS **FLEXIBLE OWNERSHIP MODELS** TO MATCH CUSTOMERS' FINANCIAL OBJECTIVES

Customer-owned

Upfront cost for hardware and installation

+

$/Stall

Monthly fee for operations

Or

Charging-as-a-Service (ChaaS)

No upfront cost

$/Stall

Or

$/kWh

Monthly fee covers hardware, installation, and ongoing operations by EVgo

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Rafael Gaspar
Business Development Manager for Fleets

rafael.gaspar@evgo.com

Fleet Solutions

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BEAM

- President, CEO & Board Chairman Beam Global
- 20 years executive experience from start-ups to publically traded companies

Desmond Wheatley
Desmond.Wheatley@beamforall.com
BeamForAll.com

BEAM

SFT Electric Vehicle Infrastructure Planning

EV ARC™ 2020

World's Fastest EV Charging Deployment

BeamForAll.com

What to think about

Speed of Deployment

Get EV charging as quickly as you get EVs

Scalability

You are going to get more EVs.

Make sure you can grow your charging without a major project

Total Cost of Ownership

It's not just the charger

Installation Costs

Ongoing Fees

Utility Bills

Grid upgrades

Grid Vulnerability

What are you going to do when the grid goes down?

At least 25% of your charging should be locally generated and stored electricity.

Distributed Charging

Avoid Hub and Spoke

Put charging where you want it – not where the grid or some vendor tells you

Daily Range Replenishment

DRR

Forget Full-Empty-Full-Empty

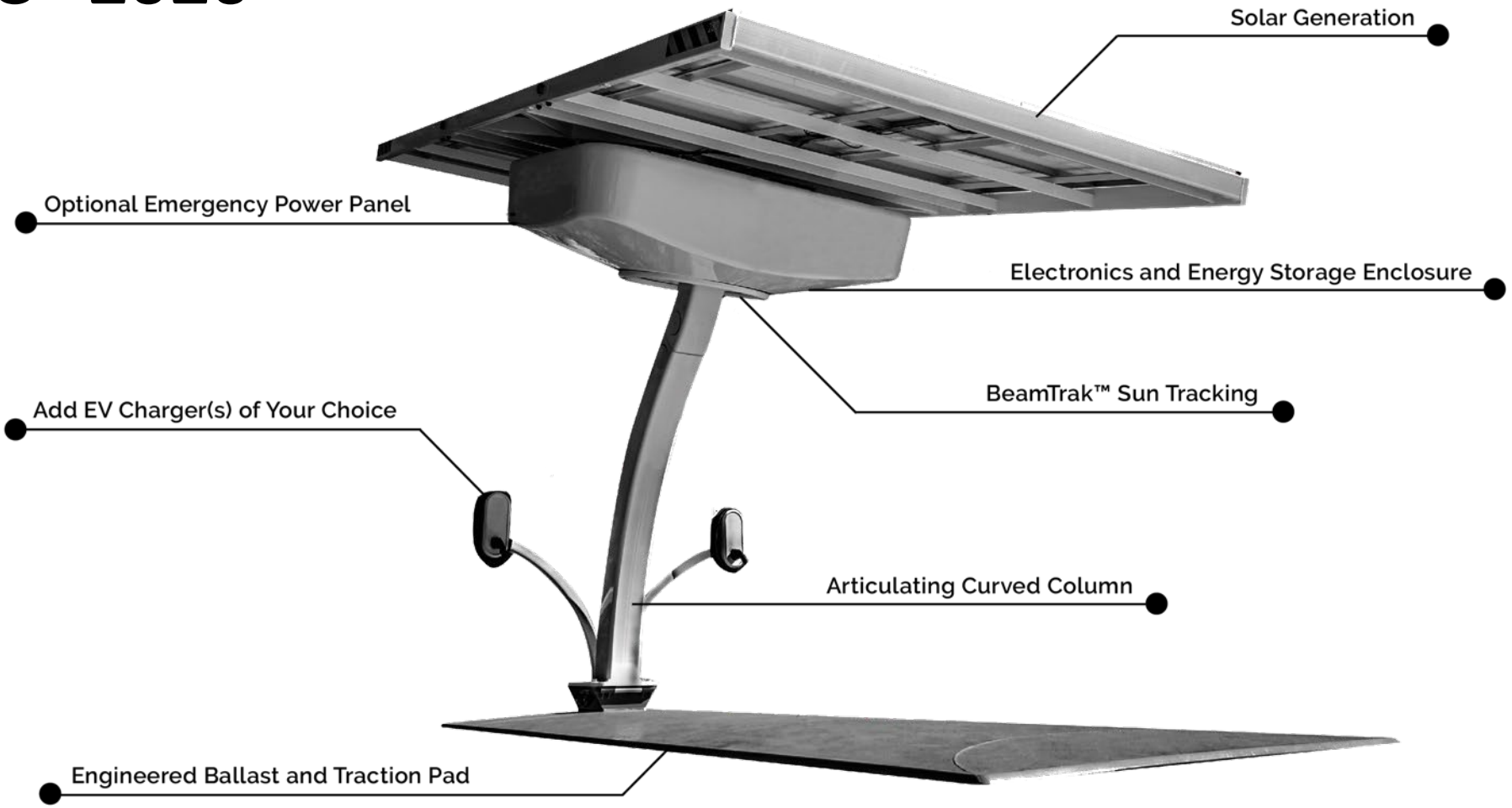
Plug in every time the vehicle is idle

BEAM

Get the EV Charger of Your Choice, Deployed in Minutes not Months

- No Permitting
- No Construction
- No Electrical Work
- $0 No Utility Bill

EV ARC™ 2020



BEAM

EV ARC™ 2020
Solves Your Problems

No Permitting, No Construction, No Utility Bill

- Fastest and easiest to deploy solution on the market
- The EV charger brand and service of your choice
- Deploys in minutes, zero-contact delivery
- Avoided costs = Lowest total cost of ownership (TCO)
- Transportable
- Off-grid EV charging and emergency power
- Highly visible sustainability initiative
- Drive on Sunshine

BEAM

EV ARC™ 2020
Fits in a Standard Parking Spot

- Maintain full parking capacity
- Cars park on the base pad
- ADA compliant
- Reach as many as 12 parking spaces
- Charge up to 6 vehicles at the same time

BEAM

EV ARC™ 2020

Transportability = Flexibility

Drop and charge. Can be moved any time.

- Permanent yet transportable
- Scalable
- Can be moved short distances with a forklift
- Can be moved longer distances with the ARC Mobility™ Trailer, truck or in a 20 ft. container
- Ideal for leased or owned properties

BEAM

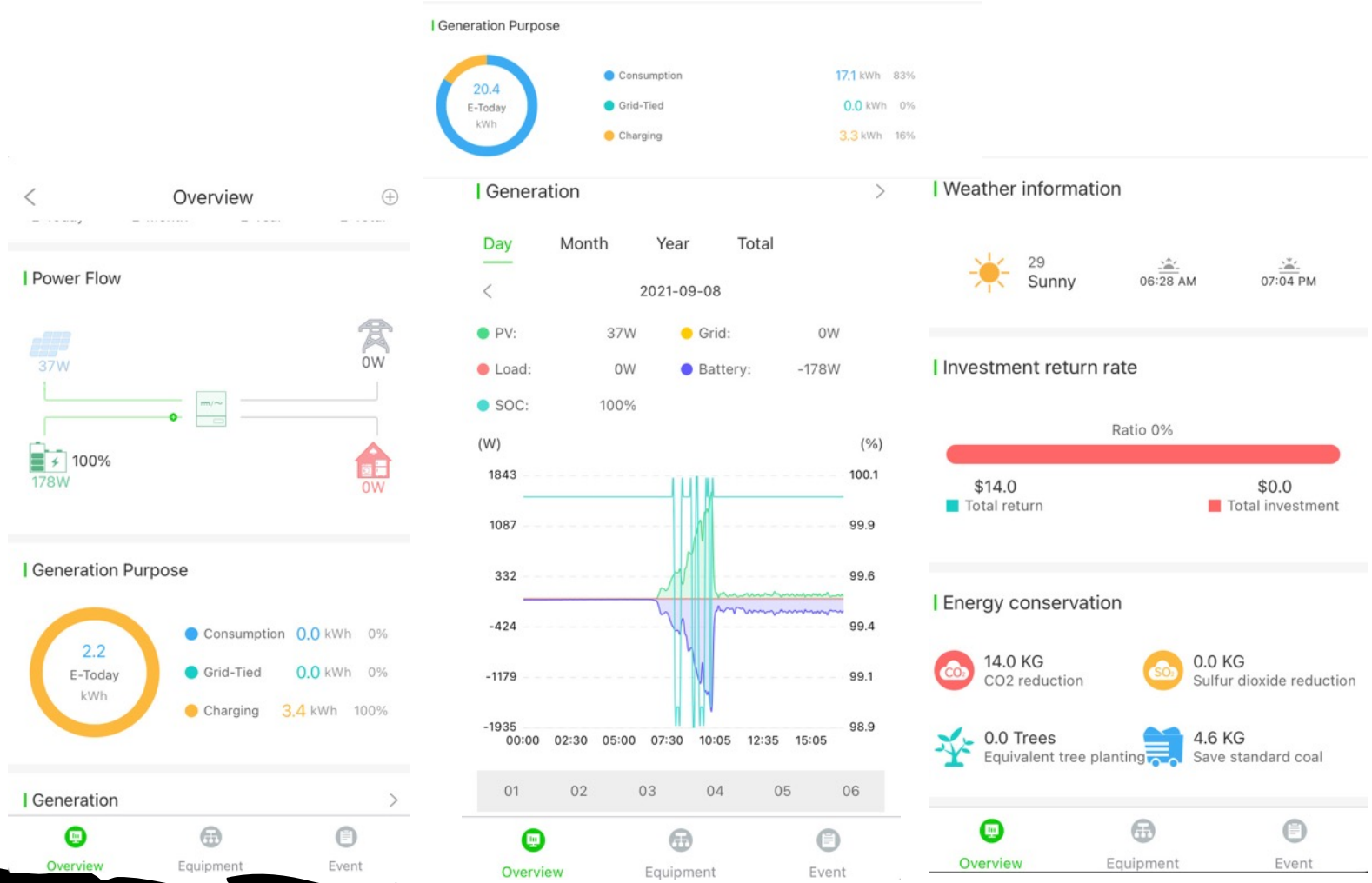
EV ARC™ 2020
Off-Grid Emergency Power

Energy when and where you need…

- Charge during blackouts, utility outages, weather events
- Relocate to high risk locations, hospitals, shelters…
- Wind-rated up to 120mph
- Flood-proof up to 9.5 feet
- Working asset during prosperity and emergencies
- Integrated emergency power panel

BEAM

Real Time Data & Reporting



Standard Reporting

Wireless connectivity transmits real time data for reporting on:

- State of batteries
- State of PV charging
- Rate and amount of energy delivery
- Time and duration of EV charging (approx.)
- Carbon offset

Optional Reporting

Wireless connectivity transmits real time data for reporting on:

- Time and duration of EV charging (exact)
- Time of charge
- Kilowatt hours (kWh) delivered
- Optional billing / access control
- Drive identification

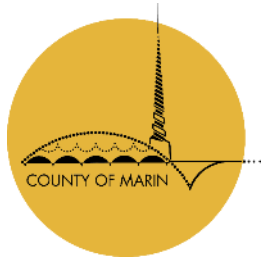
BEAM

BEAM

Clean Mobility For All

- Founded in 2006
- Publicly Traded Company (Nasdaq: BEEM)
- Products manufactured at our facilities in San Diego, California
- We proudly employ combat veterans, disabled workers and other highly motivated individuals

Our Customers Have a Lot to Beam About



BEAM

Drive on Sunshine

Thank You

BeamForAll.com

Matthew Miller
Clean Mobility Practice

O (858)-295-8038
Matt.Miller@BeamForAll.com

ecamion

PRESIDENT

Himanshu Sudan

CPA with a long career in the financial and technology sectors at companies such as PriceWaterhouseCoopers, IBM, and CIBC.

As CoFounder - Leads eCAMION's business strategy and market development and company expansion.

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Our mission is to be a Market Leader in electric charging and energy management by providing fast, accessible charging anywhere on the electric grid

Founded in:

Toronto, 2009

Customers Served in: **Pipeline** of over **$50 M**

Electric Vehicle Fast-Charging

Electric Bus Charging

Heavy Duty Fleet Charging

Battery Energy Storage

Grid & Energy Management Software

Problem

EV charging **infrastructure** is **impractical** and **inefficient** to install due to **grid constraints** and **lack of power** - with these barriers.

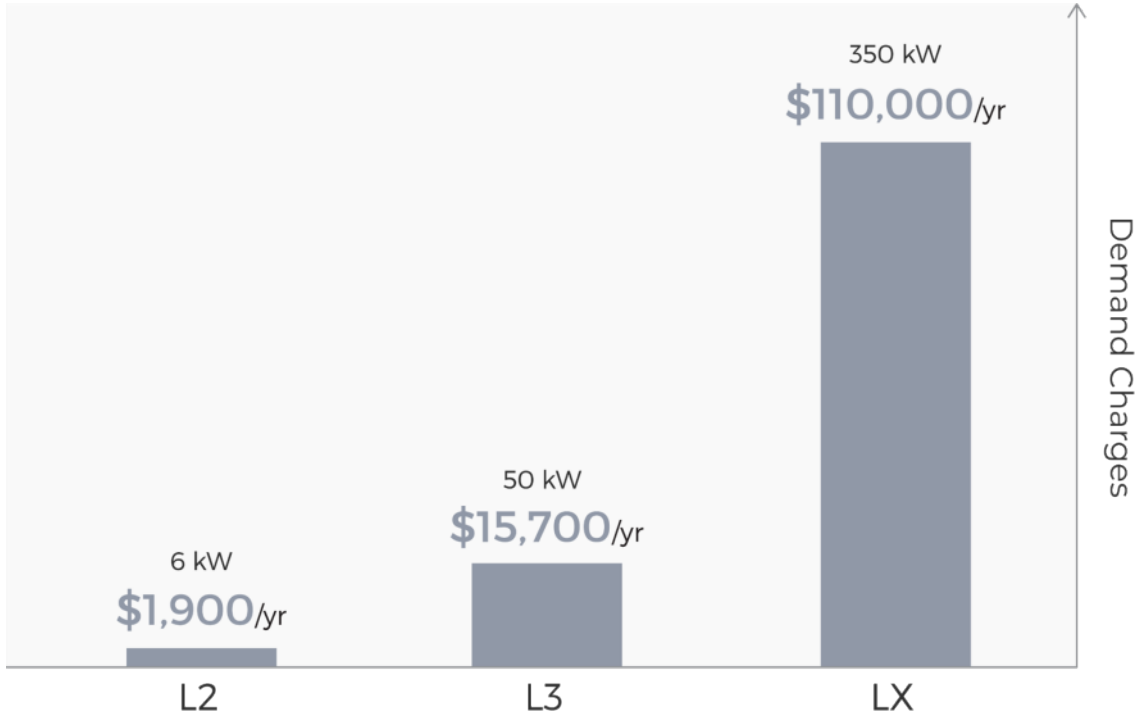
1 **Insufficient Infrastructure**

2 **Demand Charges**

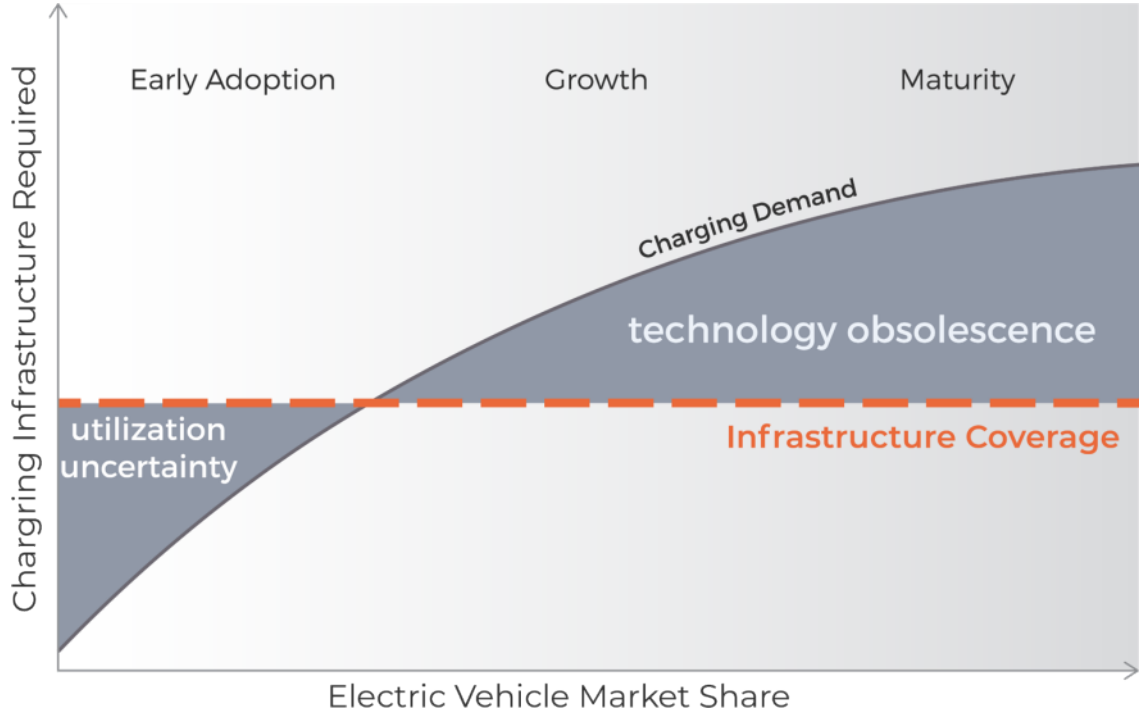
3 **Utilization Uncertainty** (short-term)

4 **Technology Obsolescence** (long-term)

Cost-Based



Time-Based



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Solution: Our Technology

Universal Energy Hub

Cost-Effective, Accessible Green Energy

Zero Make-Ready Needed

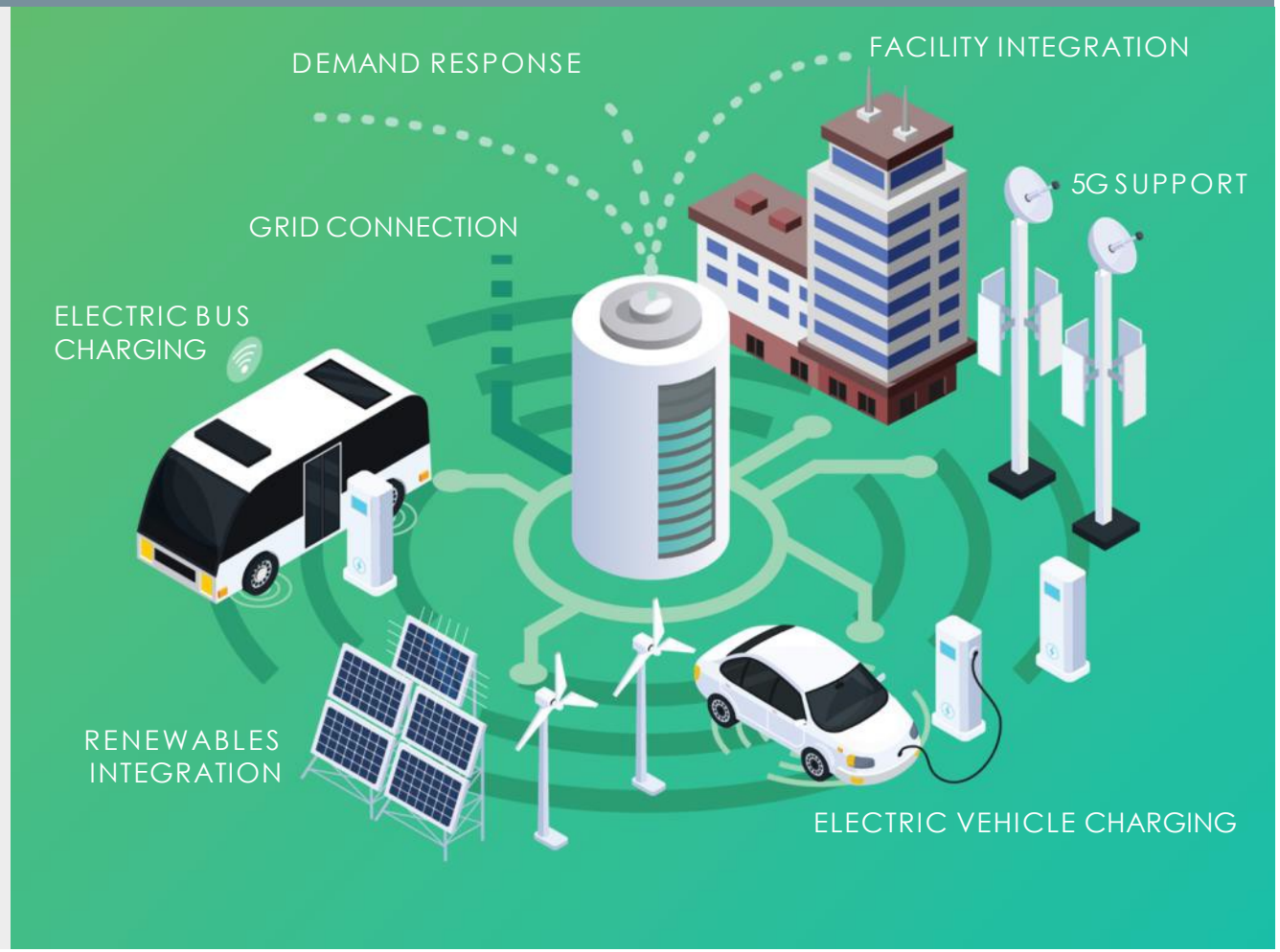
Low Cost Installation and Operation

Benefit Stacking

Multiple Revenue Streams

Versatile & Future-Proofed

Enables Carbon Reduction



Battery-based universal charging makes widespread **fast-charging**
technologically possible and financially viable

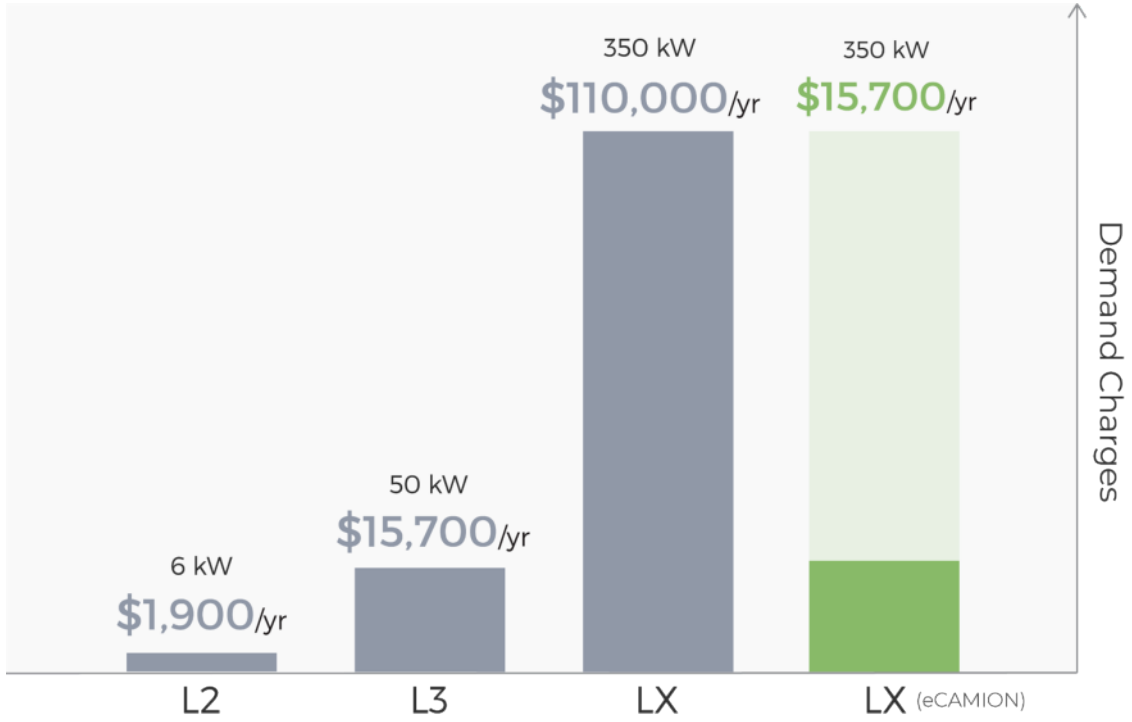
1 **No Additional Infrastructure Needed**

2 **Demand Charge Mitigation**

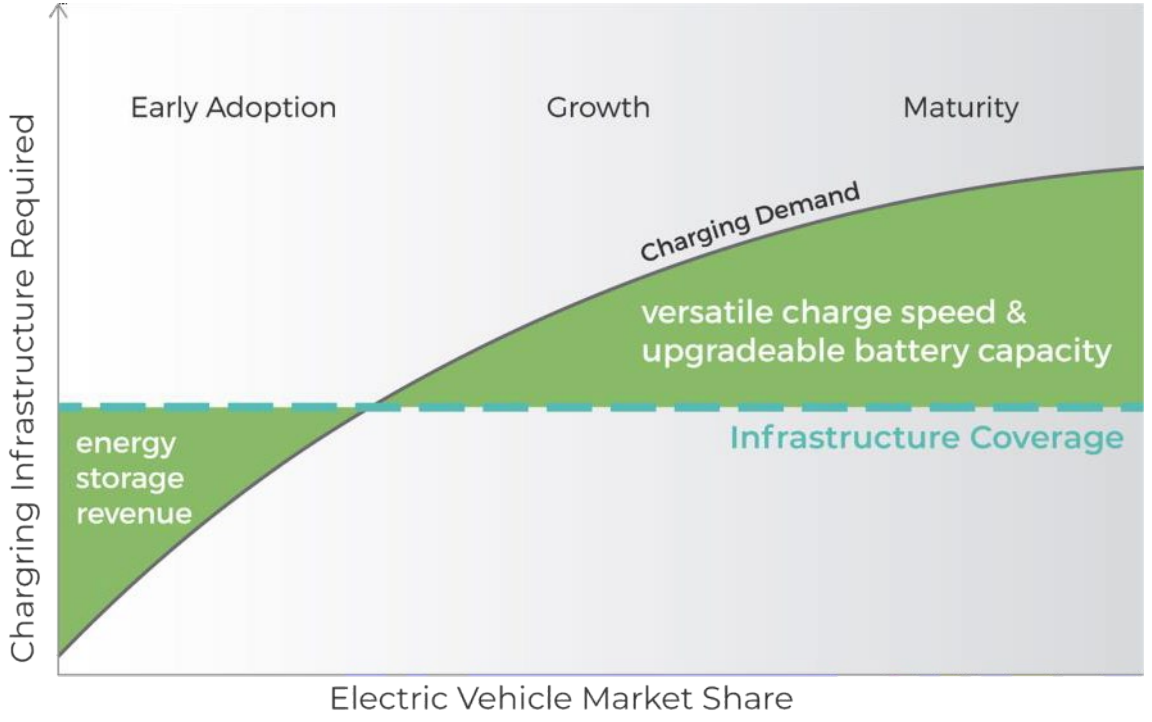
3 **Revenue Stability** (short-term)

4 **Versatility & Future-Proofing** (long-term)

Cost-Based



Time-Based



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The **7 building blocks** of the eCAMION **Energy Hub**

Technology Components

Battery Energy Storage

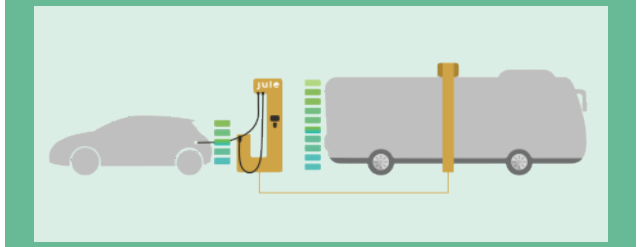
High Power
Compact Footprint
Up to 5C Discharge
UL 9540 Compliant

Patent Community Energy Storage

Power Electronics

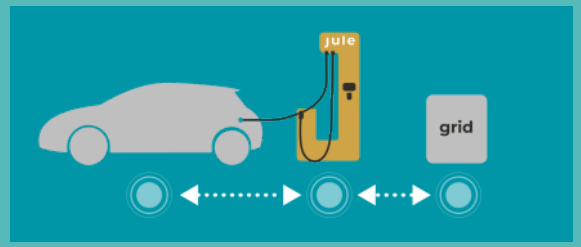
High Power On Demand
Response to Load Requirements
UL 1972 Certified

Patent Protected



Vehicle-To-Grid (V2G)

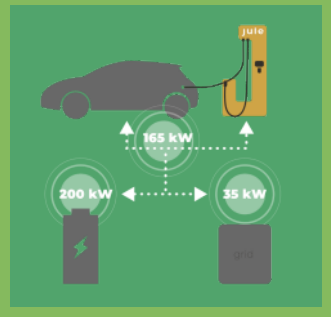
BiDirectional Flow
Vehicle MicroGrid
Scheduling
Capability
Bus to Grid Controls
Patent Pending



Grid Interface (CPPM)

Control Protection & Power Management
Unified MW-SW Architecture
AC-DC Micro Grid
Real-Time & High-Resolution Power Flow Management & Coordination

Patent Protected



Renewables Integration (CPEM)

Overall Allocation of Energy Resources
Manages Flow

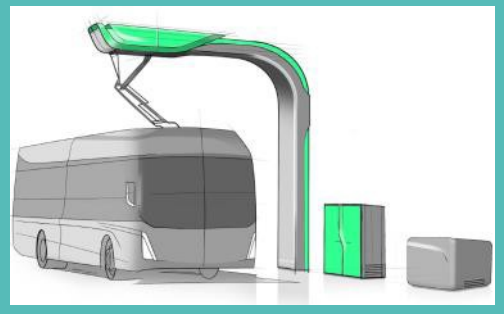
Patent Pending

Charging Station Networking

OCPP Compliant
Ease of Use
Energy Management

Bus Charging

Overhead Pantograph & CCS
J 3105 Compliant
Facility Integration
On route or Depot



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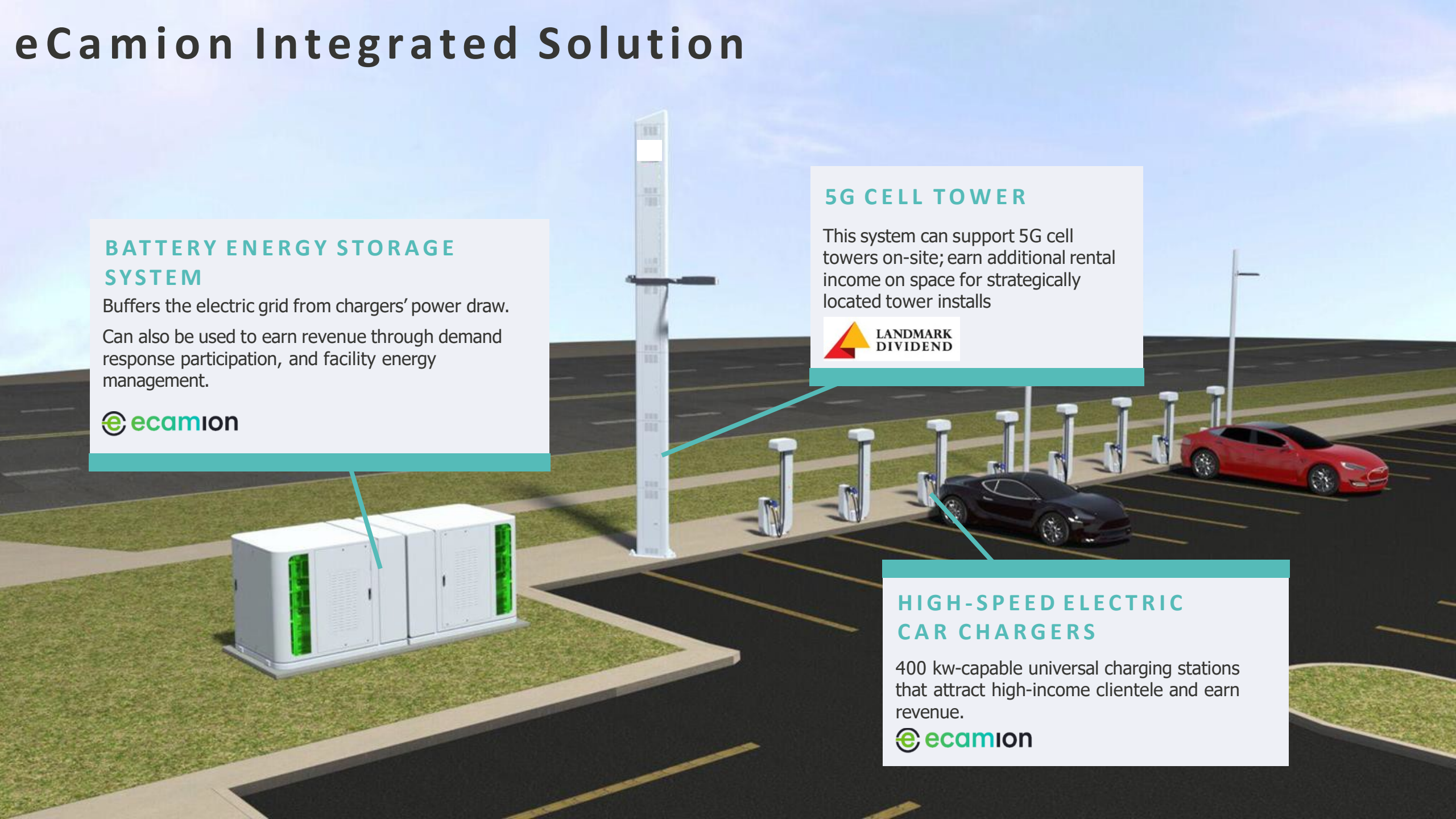
eCamion Integrated Solution



BATTERY ENERGY STORAGE SYSTEM

Buffers the electric grid from chargers' power draw.

Can also be used to earn revenue through demand response participation, and facility energy management.

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5G CELL TOWER

This system can support 5G cell towers on-site; earn additional rental income on space for strategically located tower installs

LANDMARK DIVIDEND

HIGH-SPEED ELECTRIC CAR CHARGERS

400 kw-capable universal charging stations that attract high-income clientele and earn revenue.

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Technology Aggregation

Multi-Hub Network

Linked together across the electric grid, multiple energy hubs provide **utility-scale storage benefits** using decentralized resource pooling and intelligent controls.

Virtual Power Plant

Links multiple hubs together, allowing for inter-hub communication and pooling of resources

Grid Support

Linked hubs can be controlled together to provide electric grid support

Control & Optimization Algorithms (CPEM)

Directs energy transactions between energy hub components

The Ideal Solution for Fleets and Mass Transit

1

Uses Existing Infrastructure

The proposed **Overhead Pantograph Depot Charging** solution uses a low-power grid connection to the eCAMION Energy Storage System, and can be set up easily at the bus depot at the end of **Route**

No additional infrastructure investments are needed to install 500kW bus pantographs using this configuration.

2

Estimated 50% OPEX Reduction

Cost of (2x) 500kW bus pantograph system is signifiacntly lower

In addition, this solution would reduce OPX significantly, due to saved electricity bills and demand charges.

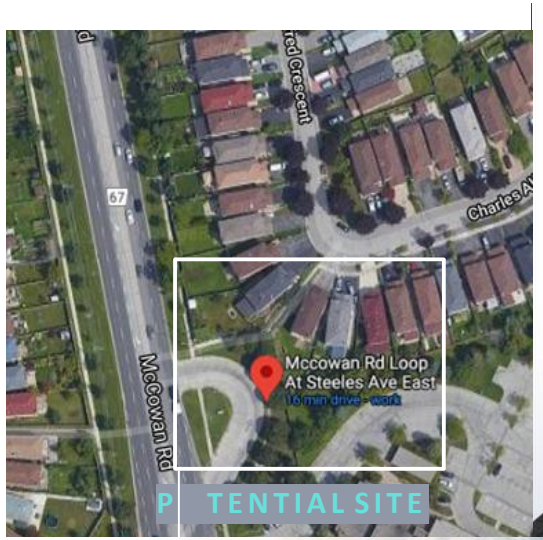
3

Additional Benefit Versatility

eCAMION's **Universal Energy Hub** technology features the integration of high-power energy storage units that support vehicle charging and provide ancillary benefits such as *demand response participation* and *facility energy management*.

Application

Enroute



POTENTIAL SITE

INVERTED PANTOGRAPH CHARGER

Charging arm with positional control automation

ENERGY STORAGE

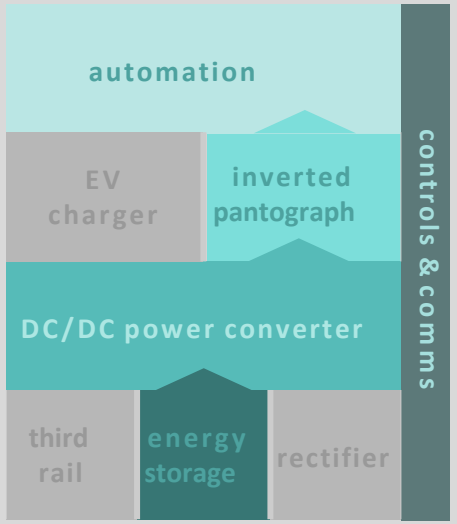
High-power, modular energy storage that supports on-demand fast-charging anywhere on the grid

Can be located up to 200 ft from pantograph

Technology Specifications

Charging Speed	X * 150 kW (up to 600 kW)
Power Input	10 kW + (any voltage)
Weight	< 10,000 lbs
Battery Size	120 kWh +
Energy Storage Dimensions	Variable

Architecture Components



Application

Depot Charging

INVERTED PANTOGRAPH CHARGER

Charging arm with positional control automation

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CHARGING MANAGEMENT

Software that directs charging speed and duration to meet the requirements of the site

INDEXING RAIL

Automated rail that enables charging of two buses with one inverted pantograph

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BUS POSITIONAL CONTROL

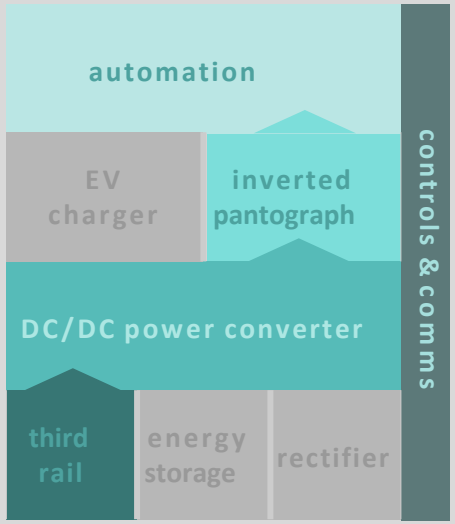
Automation technology guides the driver where to stop vehicle

The depot charging application utilizes **third-rail DC power** to charge buses in a centralized location

Technology Specifications

Charging Speed	X * 150 kW (up to 600 kW)
Charging Standard	J-3105 (Type 1)
Power Input	600 V
Weight (pantograph & charging equipment)	~400 lbs
Communication	Wi-Fi

Architecture Components



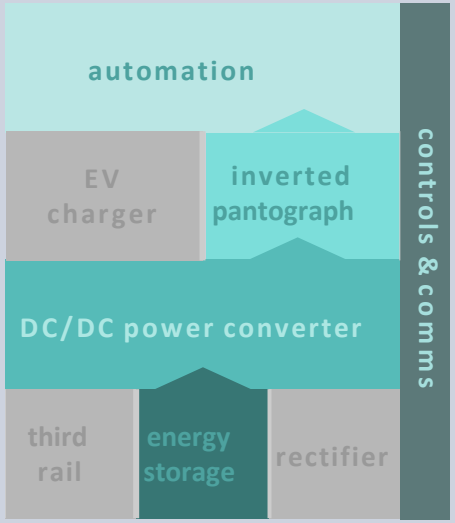
Energy Assessment - Calstart

Foothill Transit Electric Bus Charging

Technology Specifications

Charging Power Rate	Up to 500 kW
Charge Speed	8.4 min (roundtrip)
Power Input	40 kW or 200 kW (grid)
Charging Management	Site-specific

Depot Charging Architecture Components



END-OF-ROUTE PANTOGRAPH CHARGING

High-power charging stations at the bus depot that can charge electric buses at 600 kW rates

Foothill Transit e-bus route map, courtesy of Foothill Transit

Needs & Assumptions:

ONE CHARGING STATION AT ONE END OF THE ROUTE

Needs

16mi route with one charging system located at the **end-of-round** (32 mi) trip route depot

SCENARIO A: 2 BUSES

2 buses charged every 3h for 18 hours
(6:00-0:00)

SCENARIO B: 8 BUSES

8 buses charged every 3h for 18 hours
(6:00-0:00)

Assumptions

540 kWh
battery capacity

70 kWh
energy required per charge per bus, once every 3h

SCENARIO A:
2 buses charged every 3h
= 140 kWh required per 3h
= **46.67 kWh/hour**

SCENARIO B:
8 buses charged every 3h
= 560 kWh required per 3h
= **186.67 kWh/hour**

grid feed:

40 kw or **200 kW**

40 kWh energy inflow
46.67 kWh energy outflow
per hour

200 kWh energy inflow
186.67 kWh energy outflow
per hour

Grid Feed

40 kWh

600 kW | 600 kW

23.33 kWh

23.33 kWh

Net Storage Change PER HOUR

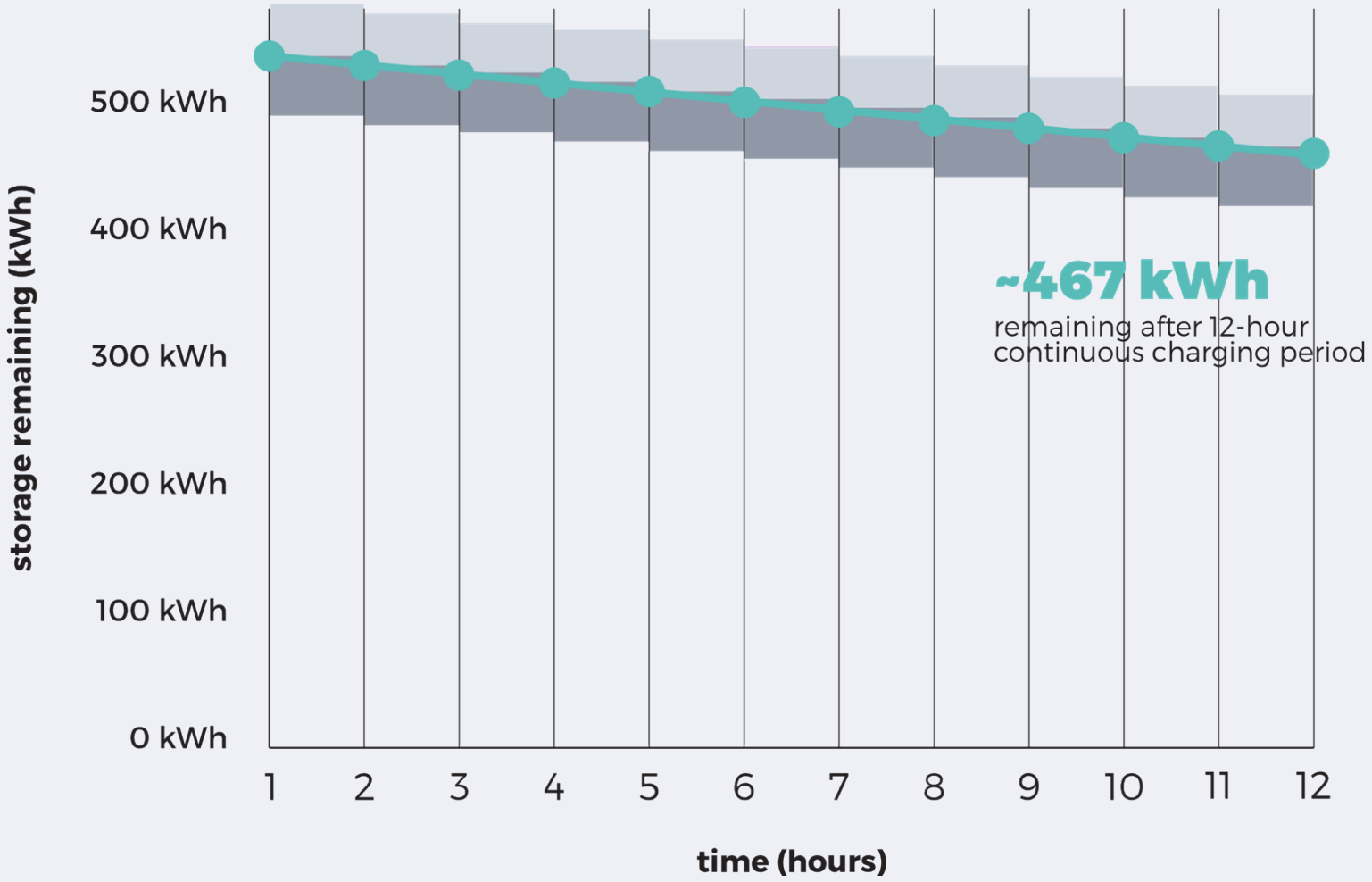
+40
-46.7

Energy Flow Over Time

SCENARIO A - 2 BUSES

Starting capacity

540 kWh



~467 kWh

remaining after 12-hour continuous charging period

Energy Flow Over Time

SCENARIO B - 8 BUSES

Grid Feed

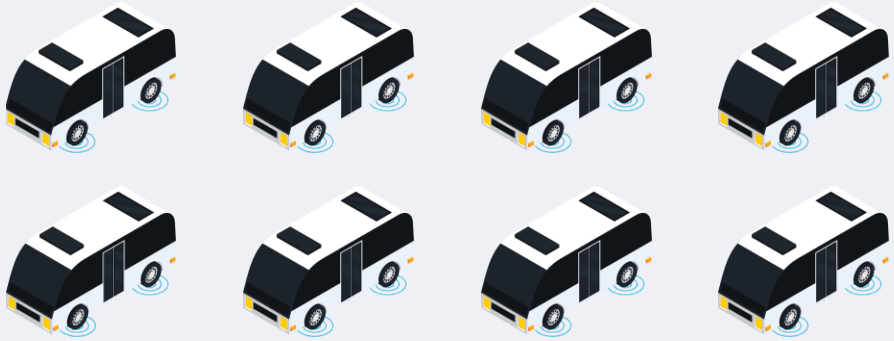
200 kWh

1200 kW

600 kW

600 kW

23.33 kWh each



Net Storage Change **PER HOUR**

+200

-186.67

The battery will not be depleted by bus charging activities!

Operating Advantage

Pricing Model

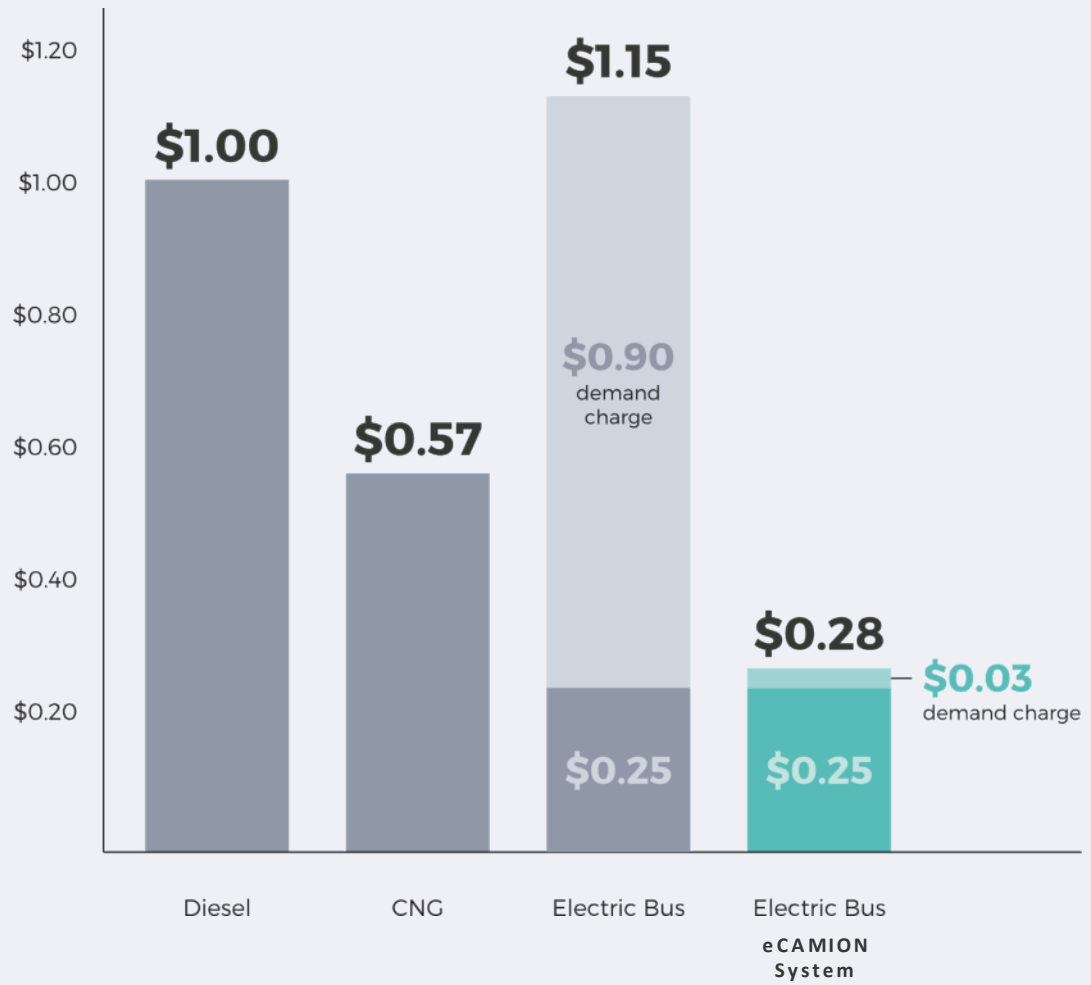
eCamion Technology compared to existing Charger Models

Operating Cost and Capital Cost are Significantly Lower

Infrastructure Cost
(battery storage, charging equipment, and additional)

Pay per Use model - per mile

Fuel Cost per Mile for Various Bus Types
(demand charge @ $20/kW) For 2 Bus Scenario



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Sean Larkin
slarkin@amplypower.com
(503) 298.8191

- National Director of Sales and Business Development for AMPLY Power
- Goal-driven sales executive with over 20 years' experience building and leading world class organizations in enterprise sales, B2B, channel, and sales leadership
- Previous experience with Volta Charging, Tesla and SolarCity

Sustainable Fleet Technology - Innovative Charging

9/30/2021

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Our Vision

AMPLY Power was founded to solve the major problems holding back fleet electrification:

Buying power & managing costs

Choosing the right charging equipment

Managing the new functions of EV technology

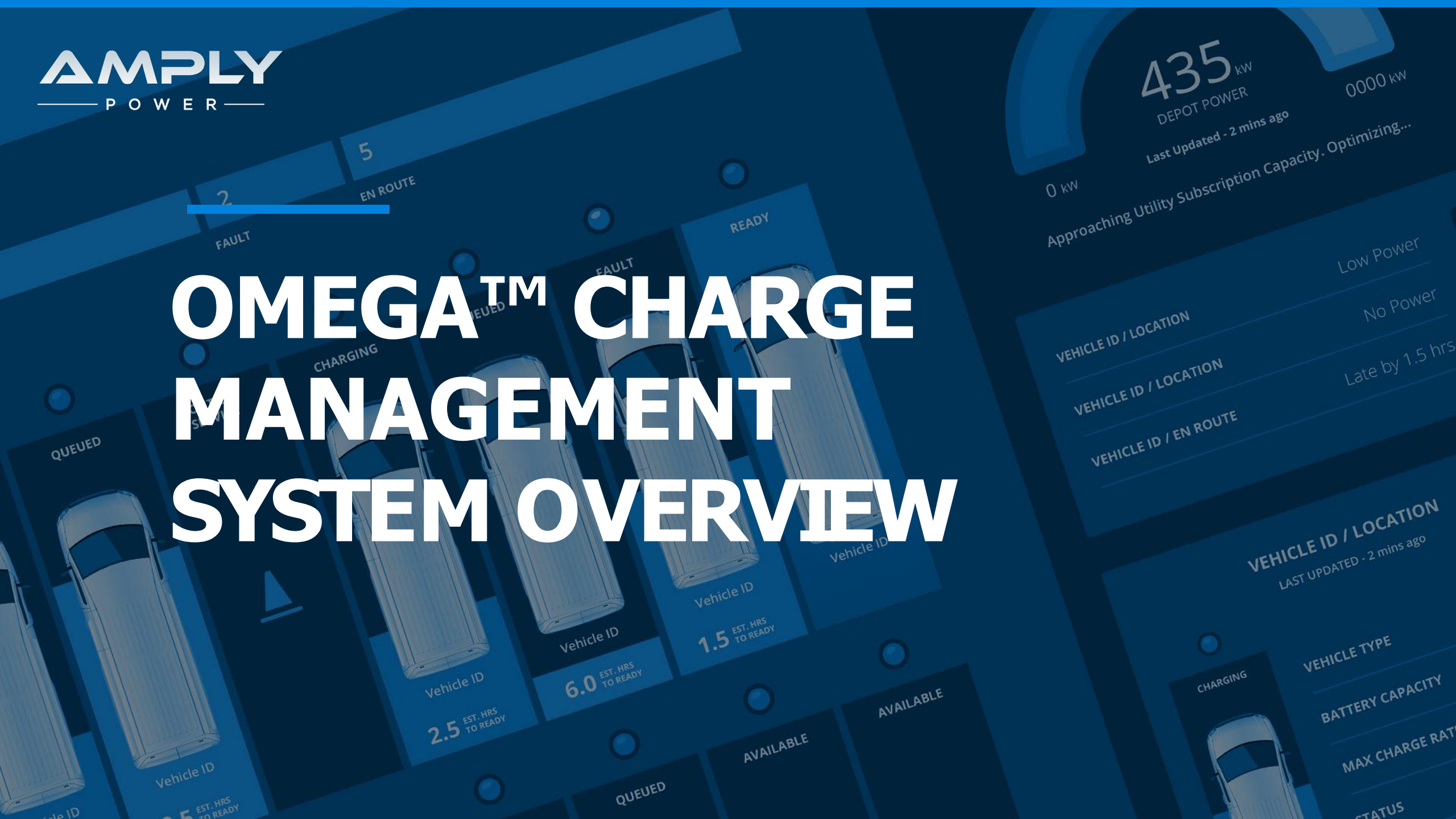
Paying for & constructing charging infrastructure

Our intelligent **charge management software, OMEGA™**, optimizes charging for lowest cost energy, while offering improved resilience and reliability, all in a user-friendly dashboard.

Paired with our **Charging-as-a-Service model**, our vehicle and charger agnostic approach allows us to handle all the details of charging a fleet's EVs, guaranteeing performance and dramatically reducing upfront capital.

AMPLY POWER

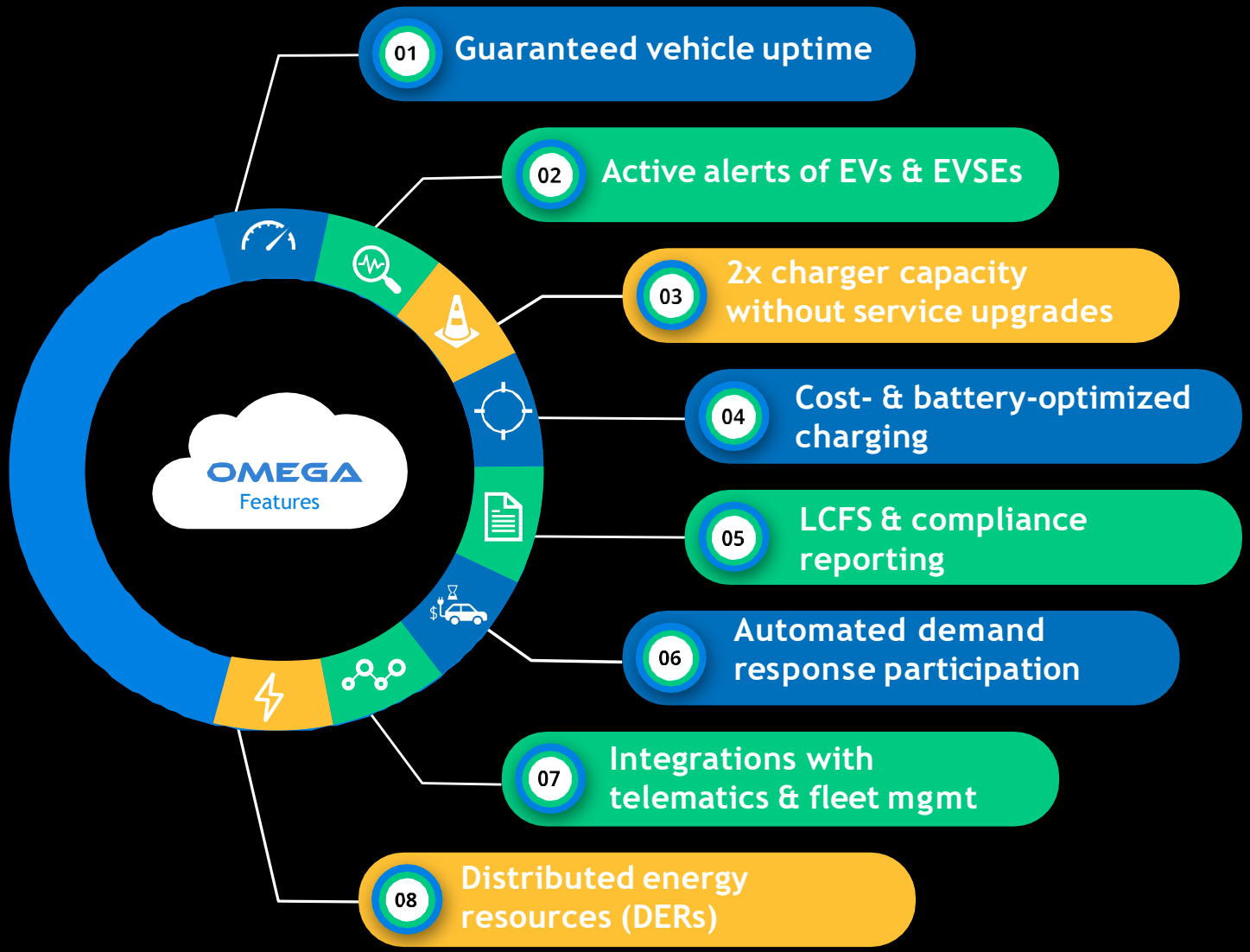
OMEGA™ CHARGE MANAGEMENT SYSTEM OVERVIEW



AMPLY POWER

OMEGA™ Charge Management System

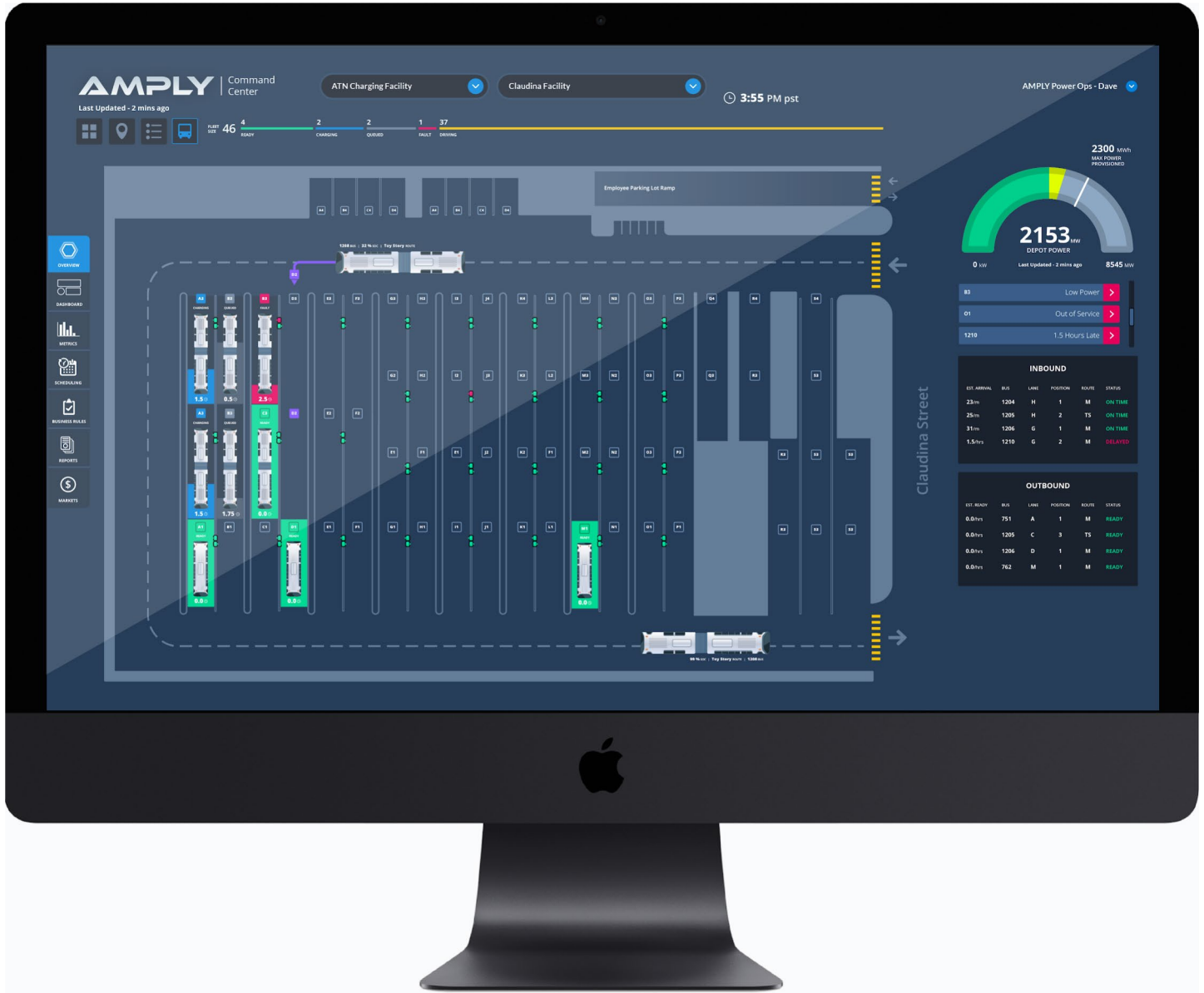
AMPLY's patent-pending cloud-based charge management software leverages machine learning and artificial intelligence to provide everything a fleet operator needs to effectively manage and optimize their EVs.



The OMEGA™ Command Center

The Command Center provides customers a user-friendly dashboard that enables:

- 24/7 network operations center
- Fleet management & telematics integration
- Reporting for compliance & energy programs
- Accessible & optimized for mobile
- Multi-device alerts & notifications in real-time

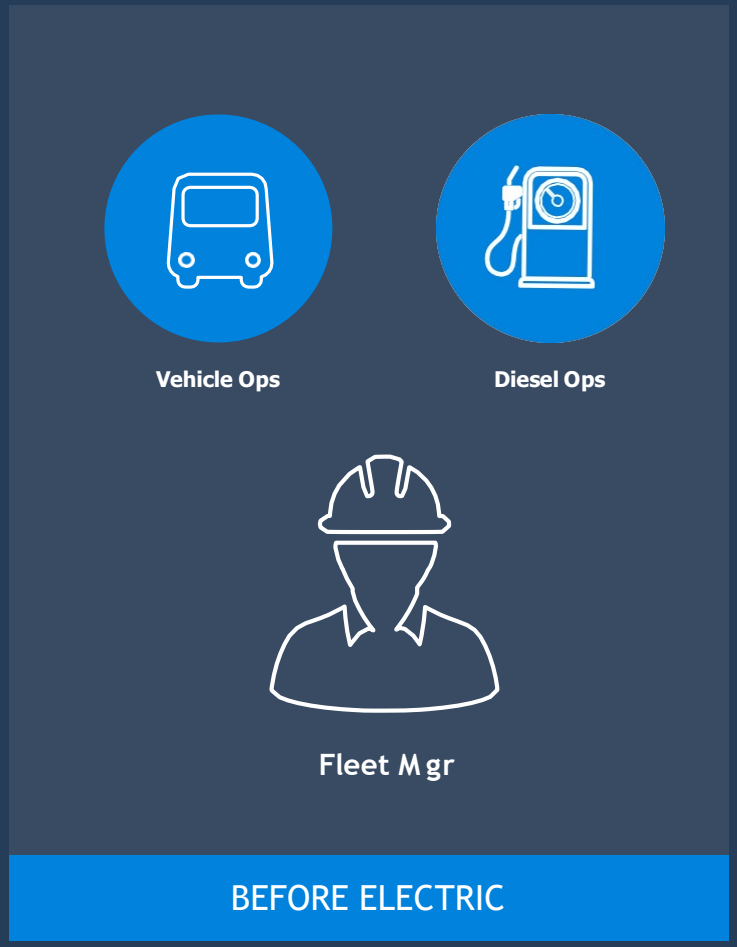


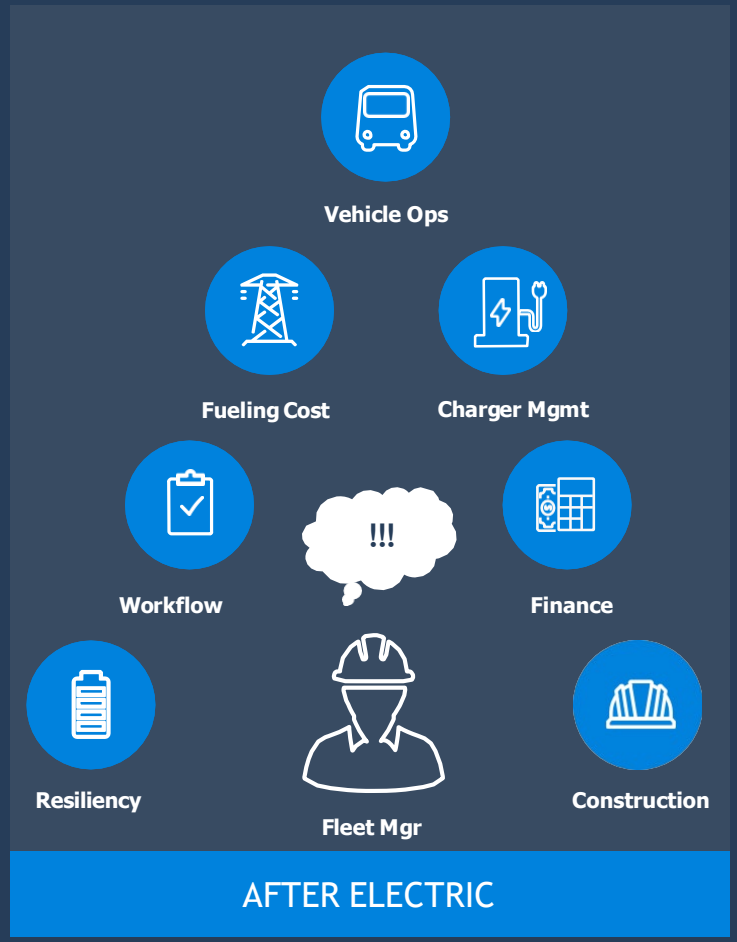
AMPLY POWER

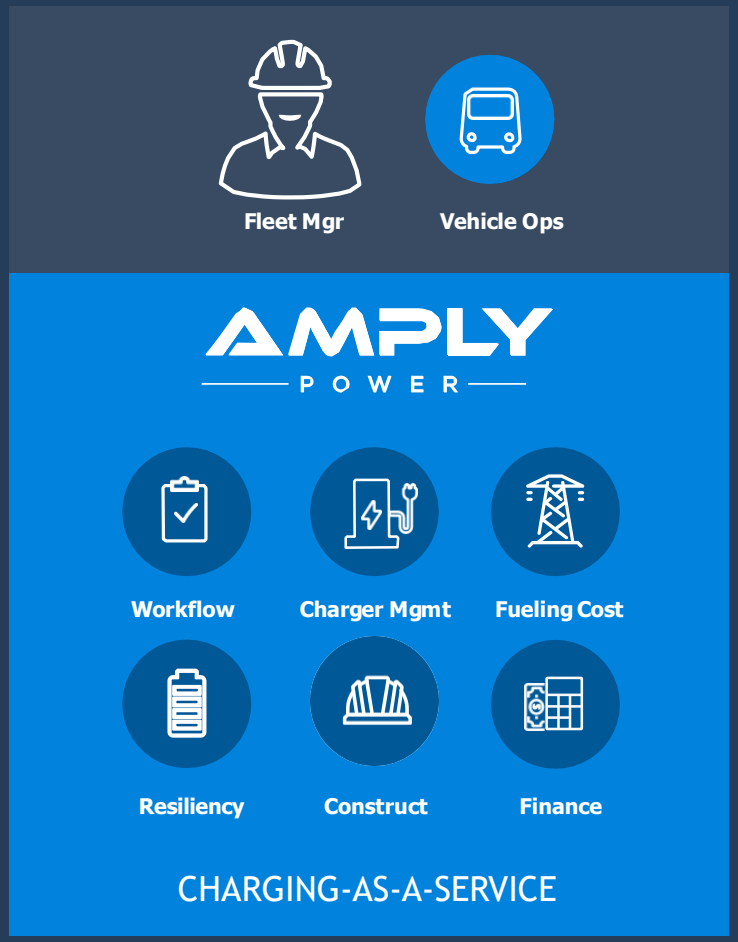
CHARGING-AS-A-SERVICE OVERVIEW

Charging-as-a-Service

Our Charging-as-a-Service (CaaS) model assumes responsibility for all charging aspects of an EV fleet—from EVSE procurement and installation, to operations and maintenance.







Support Models for e-Fueling Lifecycle

Project Phase:
Design
Engineering Services Agreement (ESA)

Includes:
- Infrastructure Site Analysis & Design
- Vehicle & Route Analysis
- Charging Strategy Analysis
- EVSE Recommendation & Selection
- Engineering Drawings
- Permitting Process

Payment Terms: Lump Sum Payments at Milestones

Project Phase:
Deploy
Engineer, Procure, & Construct (EPC)

Includes:
- Comprehensive Project Management
- Licensed Subcontractor Selection
- Electrical & Charging Equipment Procurement
- Customer Liaison
- Safety & Security Procedures
- AHJ Approvals, Utility PTO, & As-Built Drawings
- Equipment Commissioning

Payment Terms: Lump Sum Payments at Milestones

Ongoing:
Operate
Charge Management Software (CMS)

Includes:
- OMEGA™
- Charging Strategy Analysis
- Unlimited Configurations (Telematics, Fleet Mgmt, etc.)
- Training (Drivers, Facilities, Fleet Mgmt)
- Charging & Load Management / Optimization
- Service Level Guarantees
- Charging Equipment Monitoring & Notifications
- Reporting & Compliance

Payment Terms: Lump Sum + Annual Subscription to OMEGA™

Ongoing:
Maintain
24/7 Support & Maintenance

Includes:
- Preventative Maintenance
- Triage, Troubleshooting & Problem Isolation
- Remote & On-Site Repair or Replacement
- Charging Equipment Warranty Claims & Costs
- Charging Equipment Updates (Hardware & Firmware), Replacements & End-of-Life Mgmt

Only Available with CaaS

Support Models for e-Fueling Lifecycle

Project Phase: Design	Project Phase: Deploy	Ongoing: Operate	Ongoing: Maintain
Engineering Services Agreement (ESA)	*Engineer, Procure, & Construct (EPC)*	*Charge Management Software (CMS)*	*24/7 Support & Maintenance*

Charging-as-a-Service (CaaS)

Our CaaS model offers a turnkey solution that encompasses everything in the e-fueling lifecycle.

By bundling CapEx, OpEx, energy costs, and incentives into a fixed rate, fleet operators are able to manage costs long-term and see significant savings. In addition, we offer performance guarantees so fleets can rest assured that their vehicles are ready to go at the start of every shift.

Payment Terms: $/kWh Fixed Rate Term

AMPLY POWER

Customer Case Study

Logan Bus COMPANY INC.

Logan Bus is the largest school bus operator for the New York City Department of Education, with over 2,500 school buses.

OVERVIEW

Logan Bus and AMPLY partnered on a demonstration project, funded by NYSERDA, to showcase innovative concepts for EV charging infrastructure and accelerate the use of electric school buses.

PROJECT FEATURES

- AMPLY is providing **Charging-as-a-Service**, assuming responsibility for all charging aspects of the Logan Bus EV fleet.
- UES is converting five existing Class C diesel school buses to electric, leveraging their 7-step process for **repowering vehicles**.
- Rhombus Energy is providing a **vehicle-to-grid (V2G)** EV charging system.
- A partnership between CPower and AMPLY is offering the local transmission and distribution grids flexibility to integrate the EV chargers as a **distributed energy resources** (DER).

PARTNERS:

NEW YORK STATE OF OPPORTUNITY. NYSERDA | UES | CPower | Rhombus Energy Solutions | ConEdison

THANK YOU

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