

# Proterra's Experience in Supporting University Transit University of Montana



Presentation to **APTA Public Transportation and University Showcase**

Dale Hill - Founder Proterra

June 26, 2018

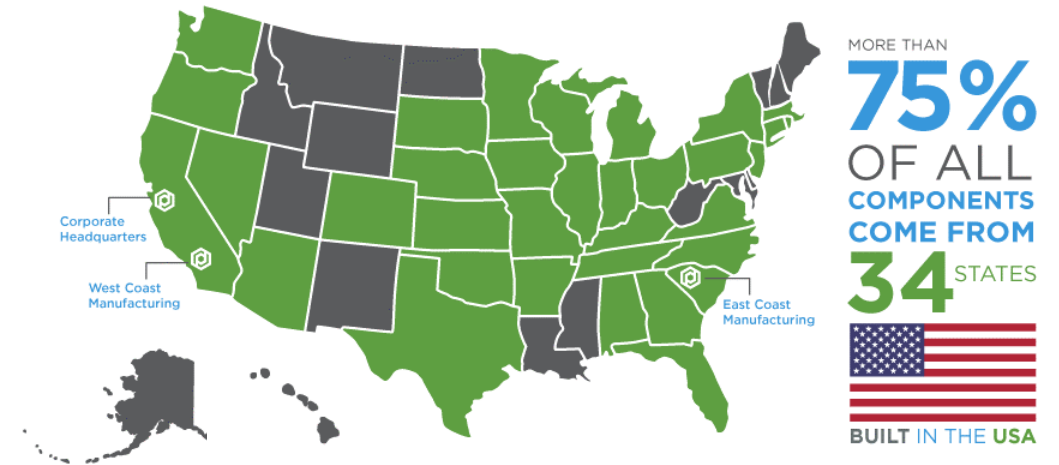
Jordan Hess - Dir Transportation - University of Montana



## Proterra's Mission

Advancing electric vehicle technology to deliver the world's best-performing heavy-duty vehicles

- Offices and manufacturing in CA and SC
- 400+ employees, with strong transportation expertise
- >70 customers; >600 vehicles sold
- >200 vehicles delivered; >5,000,000 service miles
- >32,000,000 pounds of CO2 emissions avoided



## Strong Transportation Expertise



## World-Class Financial Partners



# HIGH-QUALITY, ADVANCED MANUFACTURING FOR RAPID EV ADOPTION AT SCALE



## Burlingame, California

*Battery Manufacturing  
Company HQ*



## Los Angeles, California

*Bus Manufacturing  
West Coast Operation*



## Greenville, South Carolina

*Bus Manufacturing  
East Coast Operation*

## Economics

Best TCO, lowest operating costs, least volatility

## Performance

Highest MPGe, lowest weight, most torque

## Customer Preferences

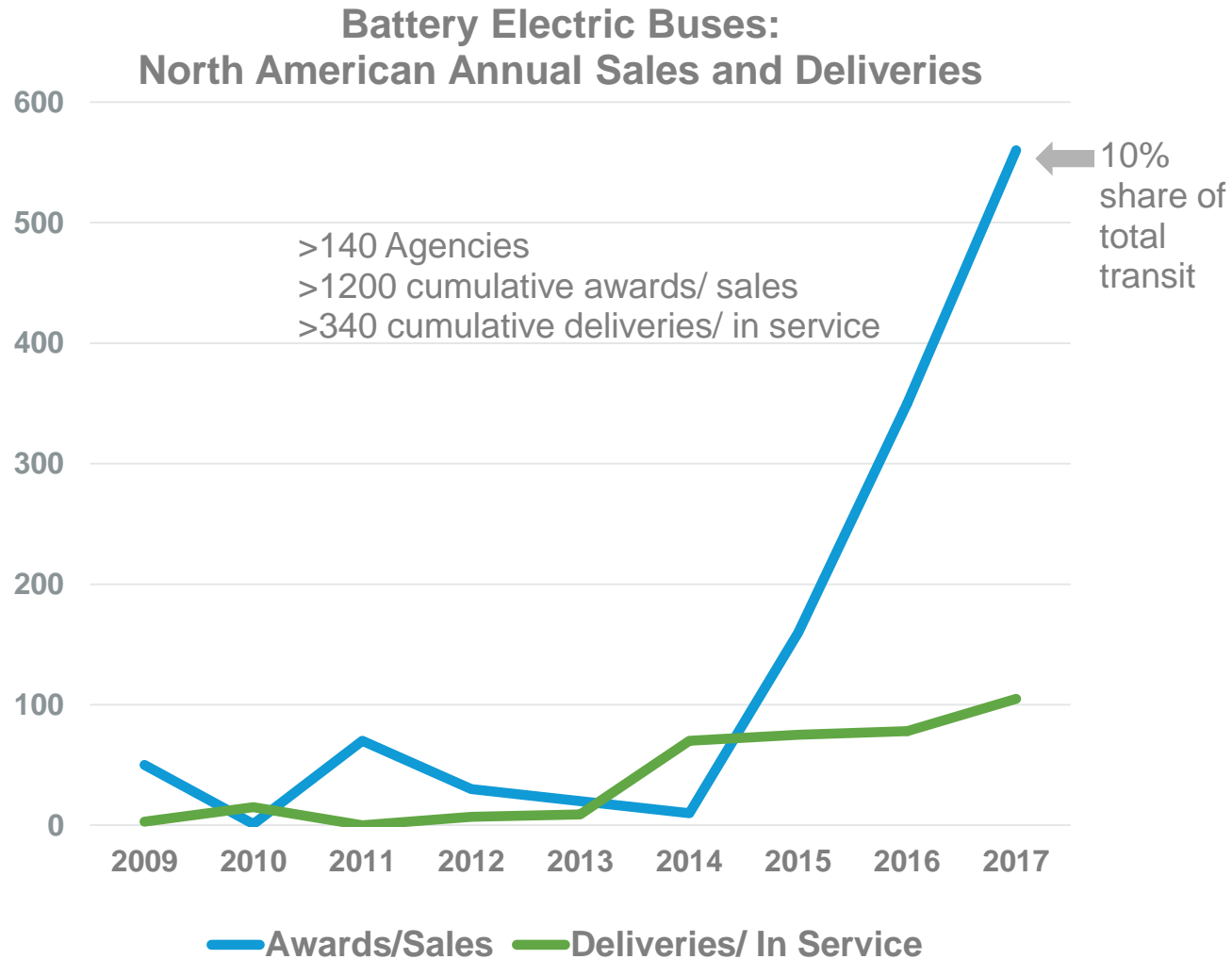
Clean, quiet, safe, modern

## Policy/Regulation

Local health, air quality, climate change

At **Proterra**, we believe that zero-emission **electric vehicles** are the smart choice for heavy-duty transit operations.

We hope you'll agree. Together, we can **eliminate** the need for fossil fuels in **transit**.



Source: CTE Center for Transportation and the Environment

- Moving toward **widespread industry adoption**
- **Purchase barriers eliminated** due to:
  - Improved range
  - Charging standardization
  - Sharp decline in battery costs
  - Service-proven performance

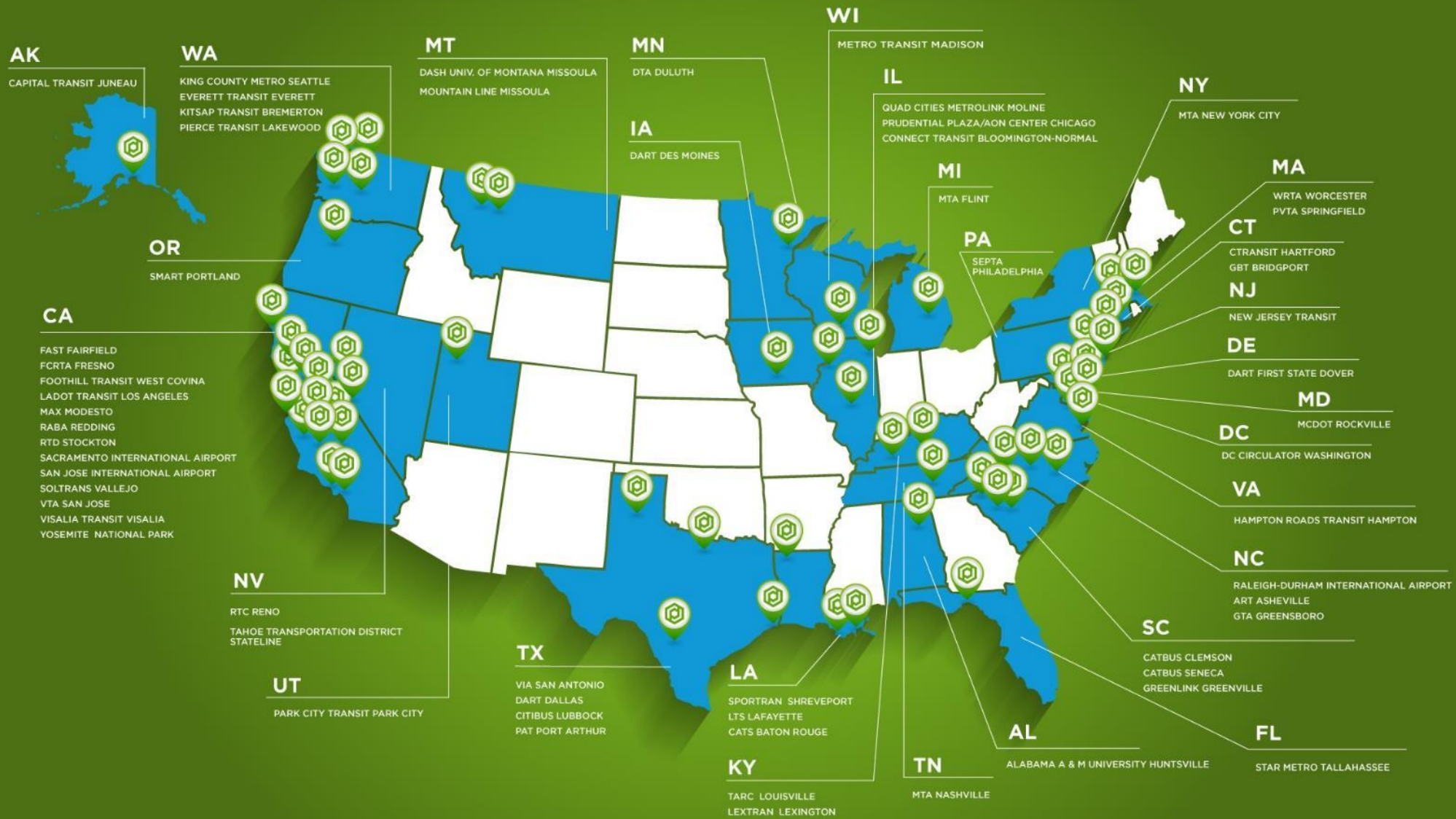
# MAJOR CITIES ALREADY COMMITTED TO CONVERTING BUS FLEETS TO 100% BATTERY ELECTRIC OVER THE NEXT 12 YEARS



- Los Angeles (LA Metro, LA DOT, Foothill Transit)
- New York City
- Boston
- San Francisco
- Seattle
- Reno
- Nation of Canada

***Projections by multiple International Research Firms indicate that by 2025 – 2030 >80% of all bus purchases worldwide will be Battery Electric***

# OUR CUSTOMERS



**546 buses**  
sold to  
**67 customers**  
across  
**30 states**

Additional  
**118 orders**  
not yet announced

# PROTERRA VEHICLES OPERATING ON CAMPUSES

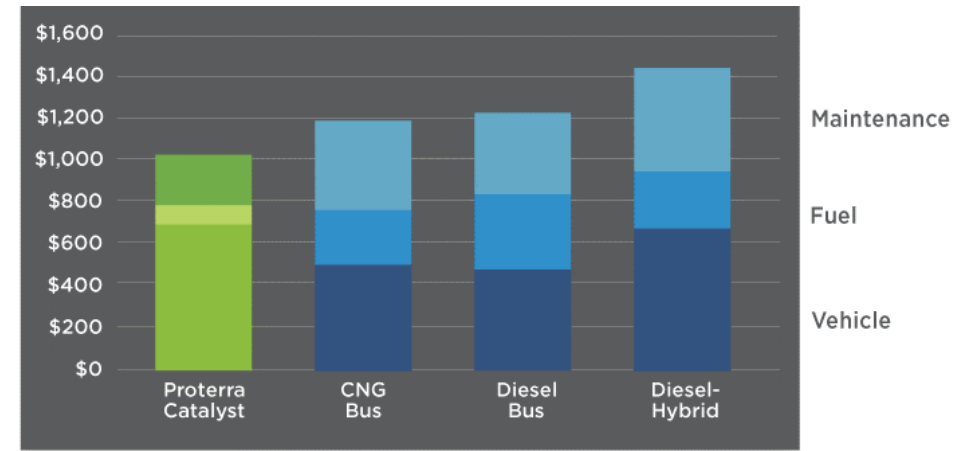




# CATALYST 40 FT. TOTAL COST OF OWNERSHIP ADVANTAGE



	Proterra EV	CNG Bus	Diesel Bus	Diesel Hybrid
Vehicle	\$649	\$470	\$454	\$650
Energy/Fuel	\$81	\$294	\$378	\$302
Maintenance	\$238	\$432	\$389	\$475
TCO	\$967	\$1,196	\$1,221	\$1,428
TCO \$'s/Mile	\$2.24	\$2.77	\$2.83	\$3.30



est. over 12 year lifetime / \$ in thousands, except TCO \$'s/mile

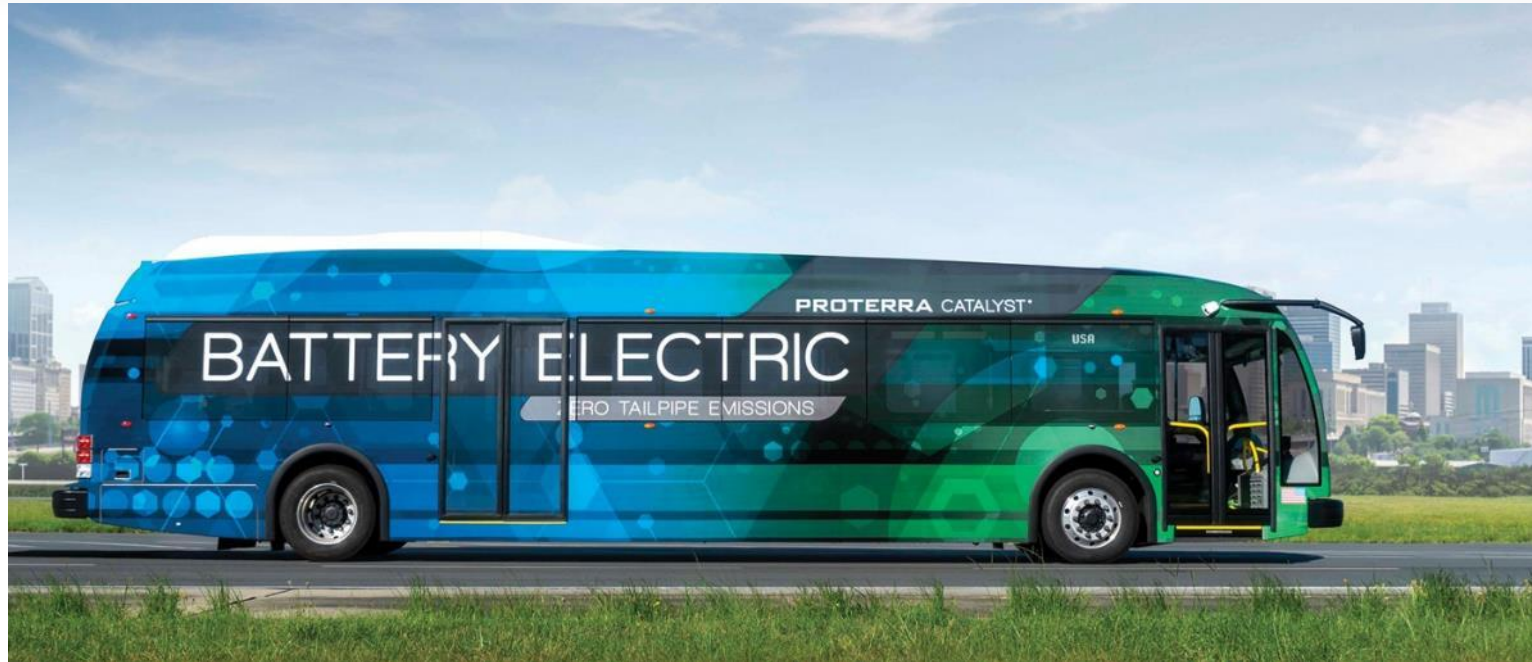
- **Battery-electric vehicles** have the **lowest operational lifecycle** cost:
  - High EV energy efficiency, low electricity rates, and high annual vehicle mileage combine to create significant fuel savings
  - **30% fewer parts** dramatically reduce maintenance and operating costs
  - Electricity prices far **more stable** and predictable than volatile fossil fuel prices

**12-yr Operational Savings per Bus**

**\$448k vs. Diesel**  
**\$459k vs. Hybrid**  
**\$408k vs. CNG**

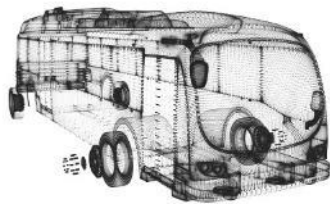
# PROTERRA CATALYST®—DIFFERENT BY DESIGN

## INTRODUCING THE PROTERRA CATALYST PLATFORM



Built from the ground-up as a battery-electric bus, the Proterra 35 and 40-foot Catalyst platform is designed to deliver a turn-key system to meet the needs of the most demanding transit routes.

### Proterra Catalyst



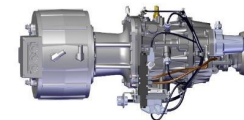
Highest Performance

### Energy Systems



Ultimate Flexibility

### Drivetrains



Best horsepower, acceleration and efficiency

### Standardized Charging Options



Meet Every Route Need

# THE PROTERRA CATALYST'S RANGE



**CATALYST FC+**  
79 kWh

**CATALYST FC**  
105 kWh

**CATALYST XR**  
220 kWh

**CATALYST XR+**  
330 kWh

**CATALYST E2**  
440 kWh

**CATALYST E2+**  
550 kWh

**CATALYST E2 max**  
660 kWh

**FC SERIES** For 24-hour circulator routes  
12-15 miles recharged per 5 min  
55-72 miles nominal range\*

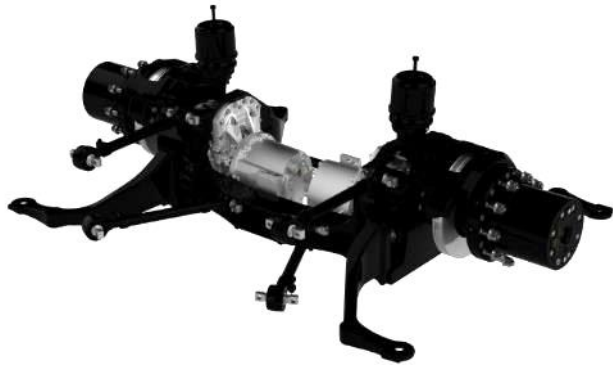
**XR SERIES** For low daily mileage  
< 2.5 hrs. charge time  
136-193 miles nominal range\*

**E2 SERIES** For longest routes  
< 4.5 hrs. charge time  
251-350 miles nominal range\*

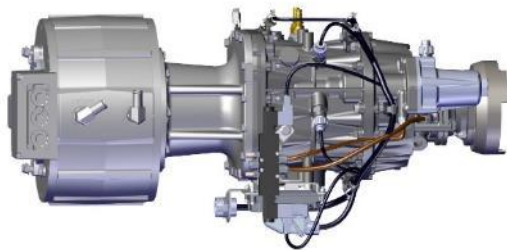
\*Depending on model. Nominal range = total energy/ projected Altoona efficiency. Actual range will vary with route conditions, battery configuration and driver behavior.

# DRIVETRAIN OPTIONS: DUOPOWER and PRODRIVE

Designed for **efficiency, power** and **durability**, Proterra's drivetrains deliver unparalleled performance.



DuoPower



ProDrive

PERFORMANCE COMPARISON	Catalyst® E2 with ProDrive Drivetrain	Catalyst® E2 with DuoPower™ Drivetrain
ENERGY (kWh)	440	440
NOMINAL RANGE (miles) Total energy/projected Altoona Efficiency	251	305
EFFICIENCY (MPGe)	21.5	26.1
PEAK HORSEPOWER	295	510
ACCELERATION TIME @ SLW (seconds)		
0-20 MPH	6.7	4.5
20-50 MPH	32.8	15.5
MAX HILL CLIMB	20.0%	26.0%

# SMARTER CHARGING

## COMPATIBLE WITH INDUSTRY-STANDARD CHARGING SYSTEMS



### OVERHEAD CHARGERS

Catalyst® vehicles can be configured to charge with Proterra overhead fast-chargers, as well as other standard overhead chargers

Proterra Overhead Chargers:

- Enable 24/7 circulator operations on-route
- Provide opportunity charge boost for longer routes
- Facilitate automated depot charging at scale
- Are simple and safe, with highly accurate, assisted automatic docking
- Low maintenance costs
- High availability
- On-route or in-depot



Proterra overhead charger



OppCharge inverted pantograph



Pantograph system

### PLUG-IN CHARGERS

Charging your Catalyst vehicle at the depot is easy. Simply plug in a standard J1772 CCS charger.

- Industry standard SAE J1772 CCS chargers are offered by several suppliers, with easy plug-in functionality
- Enables interchangeable charging of buses, cars and utility vehicles
- Catalyst vehicles can be configured with two charge ports, for faster charging of high-energy batteries
- This charging standard is adopted by many major OEMs, including:



Proterra is a core member of CharIN e.V., helping to drive heavy-duty EV standards



Compliant with SAE standards



Proterra works closely with customer to recommend the [appropriate charging solution](#) for fleets and facilities planning for scale as the demand for charging increases.

Proterra technologies enable:

- Efficient charge speed
- Dynamic power sharing
- Driver-friendly stations
- Cost-effective operations
- Universal compatibility
- Serviceability
- Low maintenance costs
- High availability

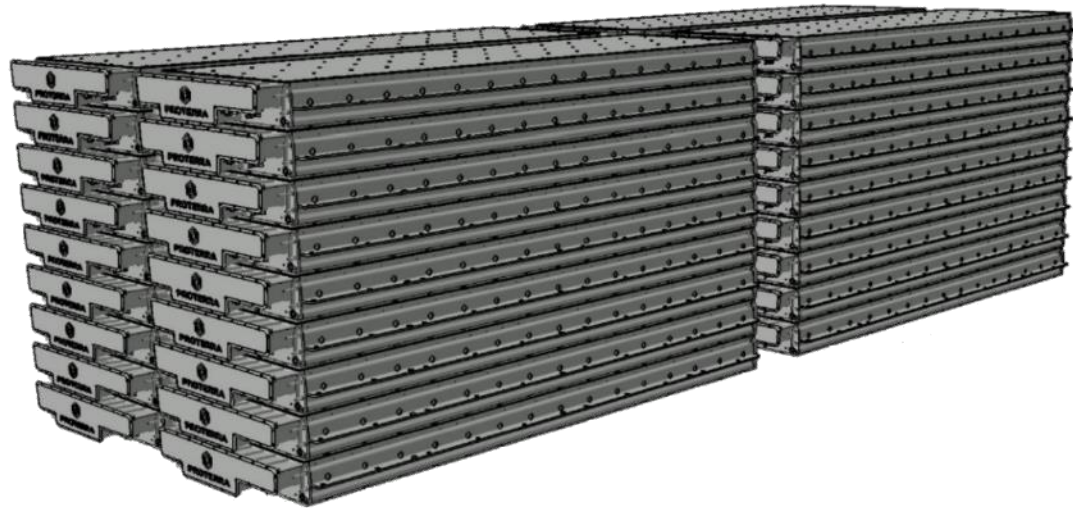
Our experts provide counsel on:

- Site layout
- Energy management
- Real-time energy monitoring
- Site configurations

**2 ACRES OF SOLAR WITH ENERGY STORAGE CAN POWER 6-8 BUSES PER DAY IN TX**

*When there's a huge  
solar energy spill,  
it's just called a "nice day."*



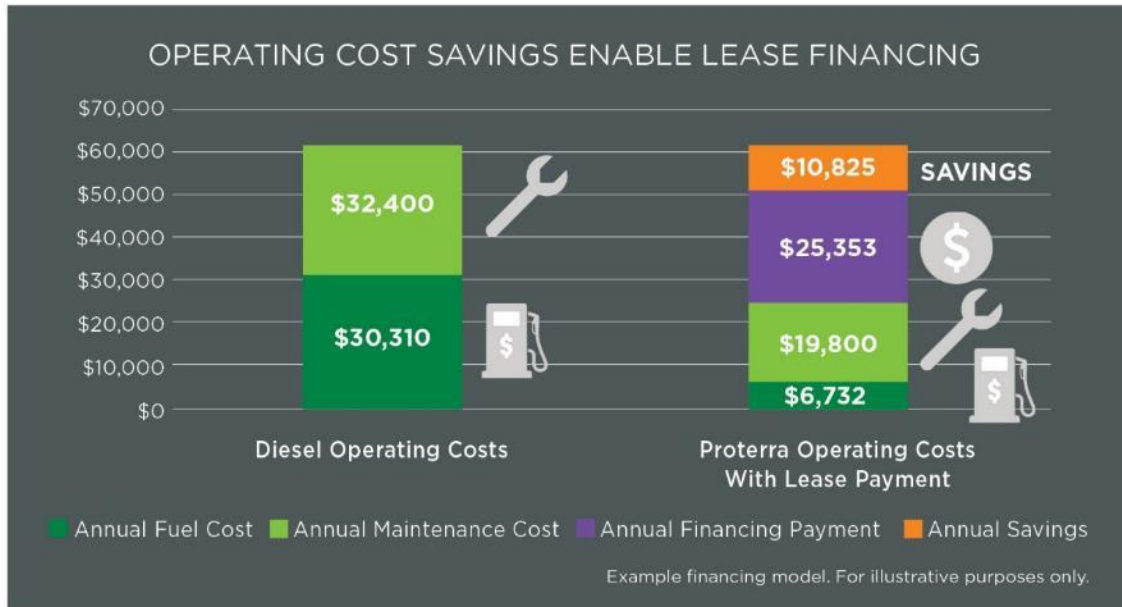


~4 MWh shown

- Batteries will retain significant energy storage capability long after their first life in a transit bus
- Stackable design, retaining interface and safety features
- Hardware designed to exist >12 years in outdoor environmental conditions
- Capable of serving multiple storage requirements for renewable energy, grid services, demand management and emergency backup



Proterra can help you find the right combination of financing tools that map to your procurement plans



## Battery Lease

A battery lease enables you to buy a Catalyst vehicle for roughly the same price as a diesel bus, putting the operating savings toward the battery lease. Proterra is responsible for the performance of the batteries through the life of the lease, removing operator risk.

## Municipal Capital Lease

A generally low-cost financing tool for local governments with investment-grade credits. Can be paid for with FTA funds. Offers structured ownership that enables you to own a Proterra bus at the end of the lease term.

## Operating Lease

Operating leases allow you to pay for the use of a bus over time, with the option to permanently transition the bus into your fleet. No upfront capital costs.

## Bus Rental Program

For fleet operators looking to “test drive” a Catalyst® bus before making a long-term commitment, Proterra offers the option to rent a bus for up to 12 months before making a long-term purchasing decision.



PROTERRA

THANK YOU.

