Electric Vehicle Buses

American Cities Climate Challenge

Electrification Coalition

Webinar Date: May 30, 2019

Hosted by: American Climate Cities Challenge, the Electrification Coalition, Natural Resources Defense Council, Proterra, and BYD North America

Electrification Coalition

The Electrification Coalition (EC) is a nonpartisan, not-for profit group of business leaders committed to promoting policies and actions that facilitate the deployment of electric vehicles on a mass scale in order to combat economic, environmental, and national security dangers caused by our dependence on oil

American Cities Climate Challenge

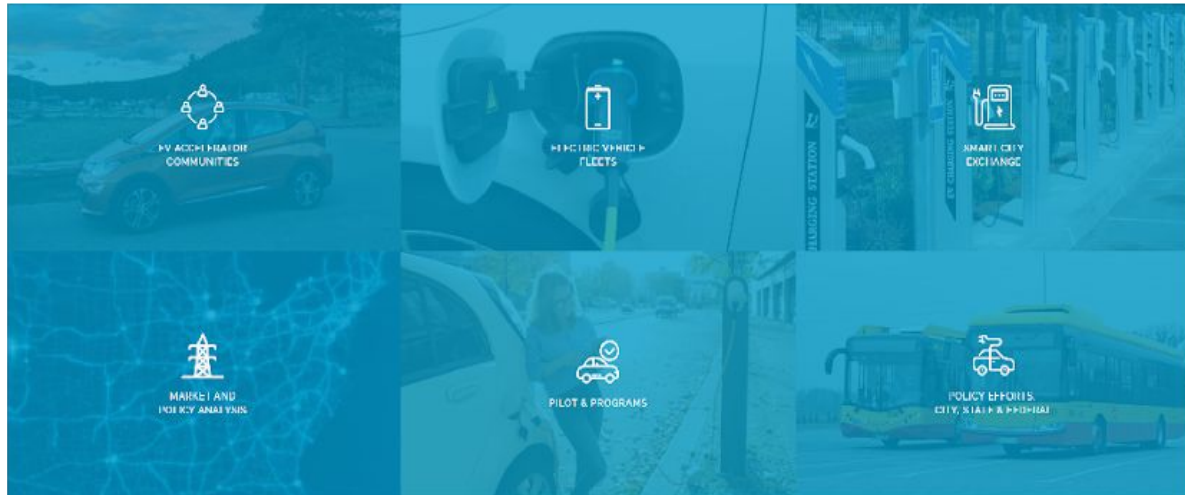
SMART COLUMBUS

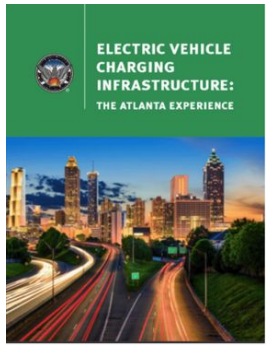
DRIVE electric ORLANDO

DRIVE electric NORTHERN COLORADO Let's Charge Our Community!

fleets for the future

ROCHESTER EV ACCELERATOR





Electrification Coalition Programs

- Technical Lead: Climate Mayors EV Purchasing Collaborative
- Electrification Advisor: American Climate Cities Challenge
- Electrification Partner: Smart Columbus
- Electrification Advisor: City of Atlanta Partnership
- Project Lead: Drive Electric Northern Colorado
- Project Lead: Rochester EV Accelerator

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The Case for Bus Electrification

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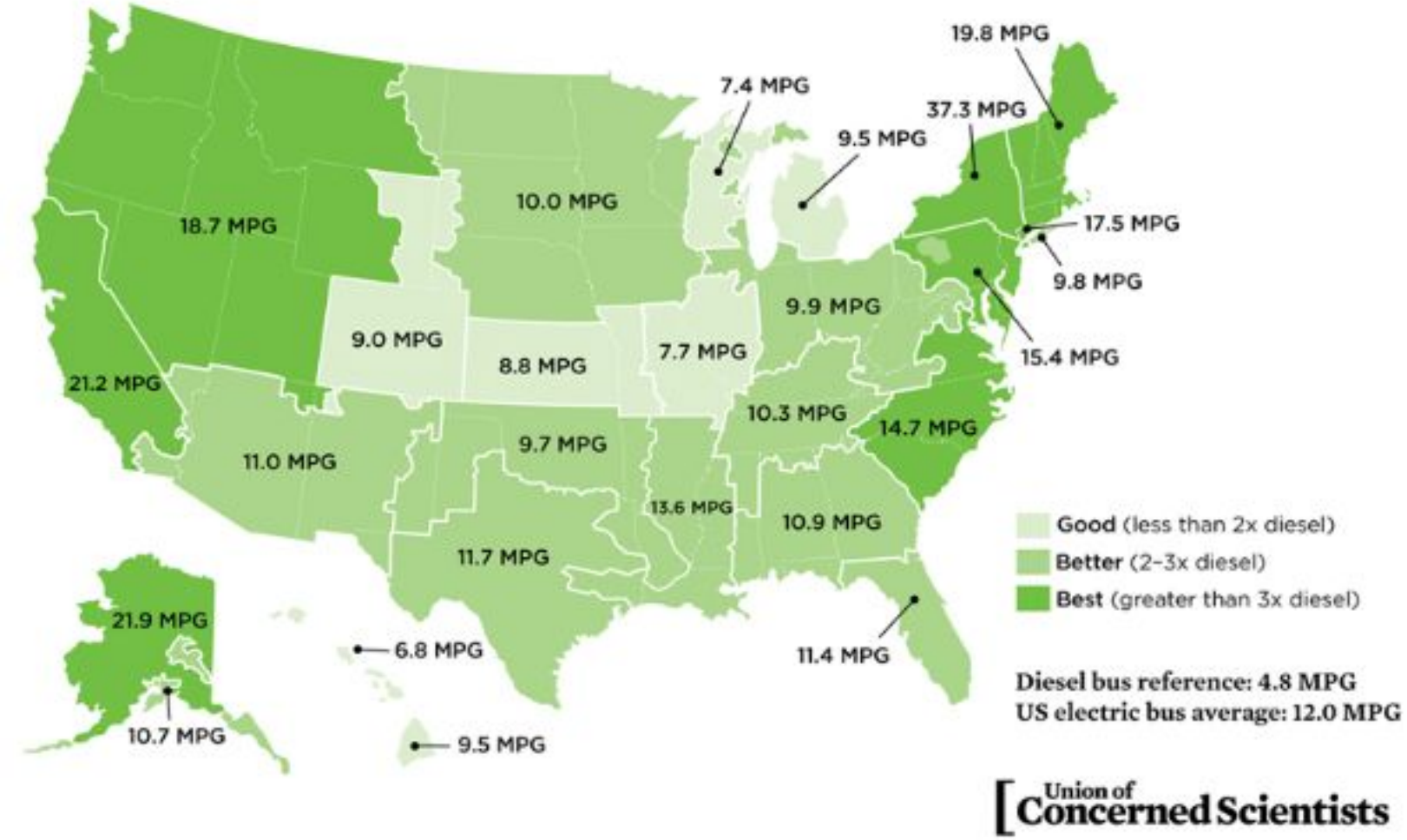
Current Global Bus Market

- More than 70,000 buses on the road in the US.
- The average bus uses more than 9,000 gal of Diesel equivalent per year.
- Worldwide demand for buses is expected to rise 4.9% each year through 2021, reaching 623,000 units.

Comparative Analysis - MPG

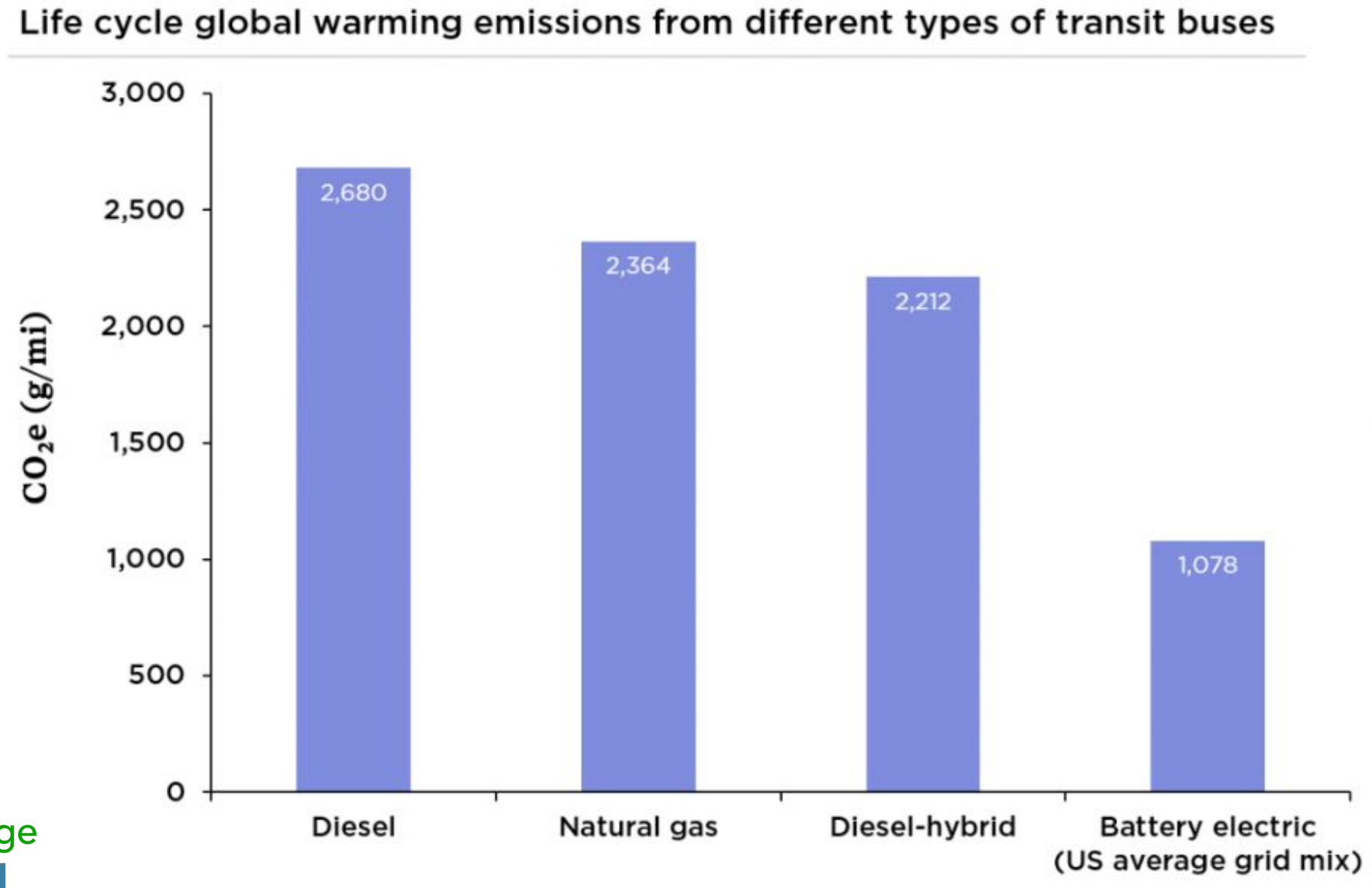
EV vs Diesel Buses (By Region)



Note: **The MPG (miles per gallon, diesel) value listed is the fuel efficiency a diesel bus would need to have the same life cycle global warming emissions as a battery electric bus in each region.** Regional global warming emissions ratings are based on 2016 power plant data in the EPA's eGRID database (the most recent version). Argonne National Laboratory's GREET 2017 model was used to estimate emissions from diesel and electricity fuel production.

Comparative Analysis - Emissions

EV vs Diesel Buses (US Average)



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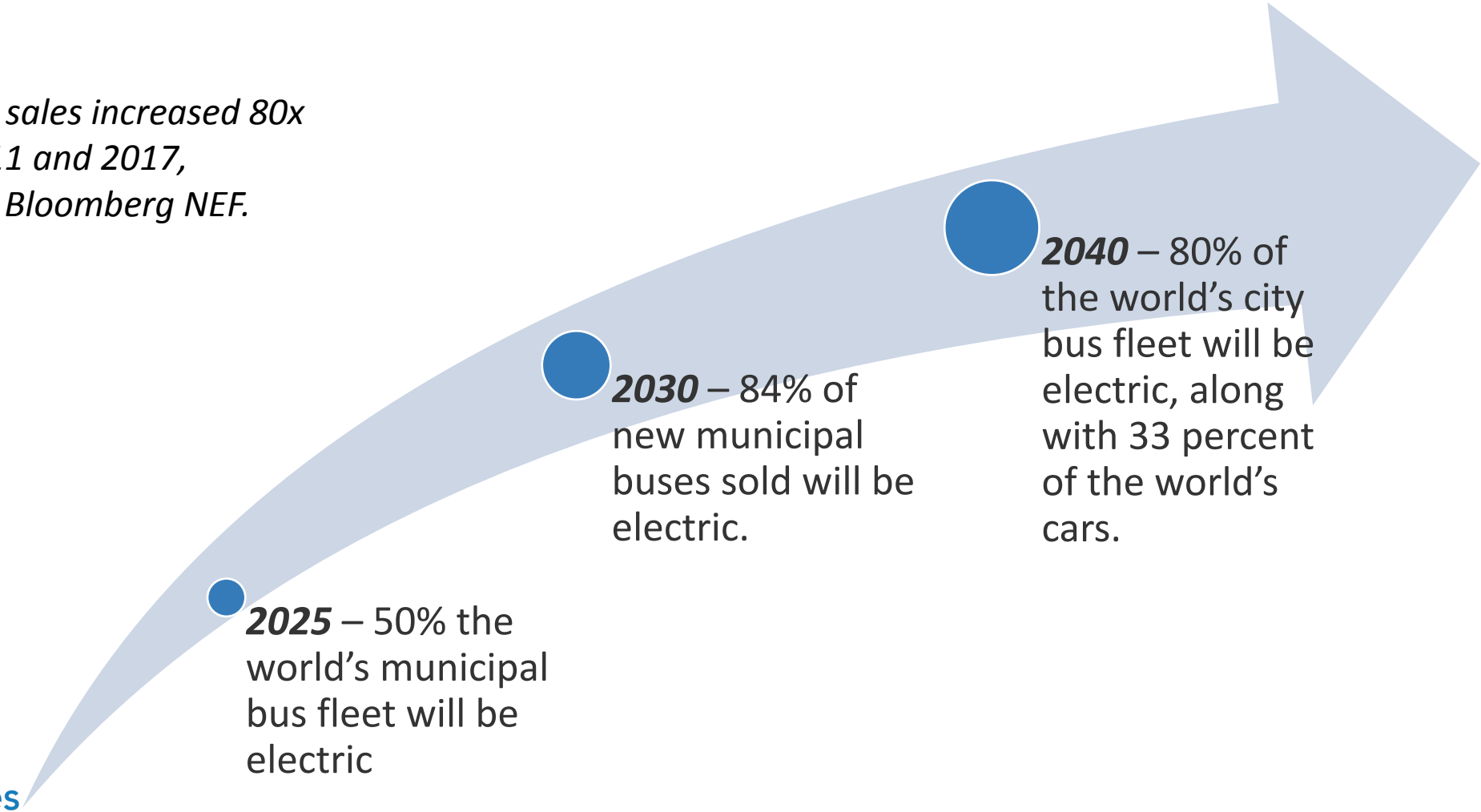
E-Bus Fleets Around the World

Global e-bus sales increased 80x between 2011 and 2017, according to Bloomberg NEF.



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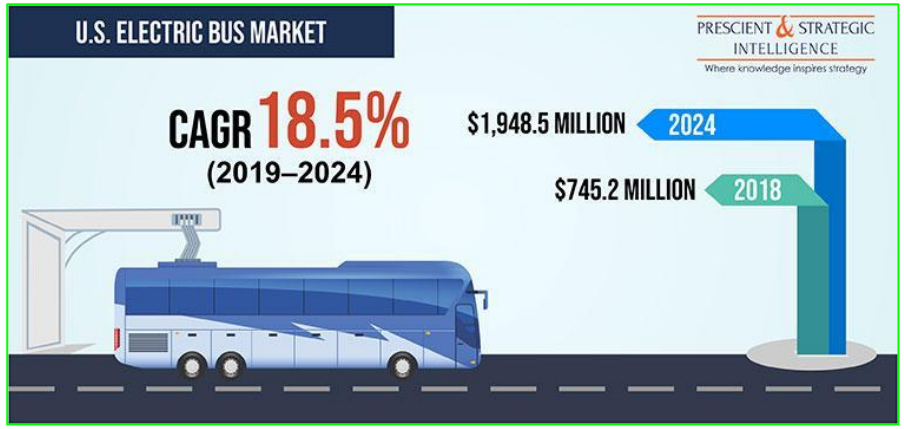
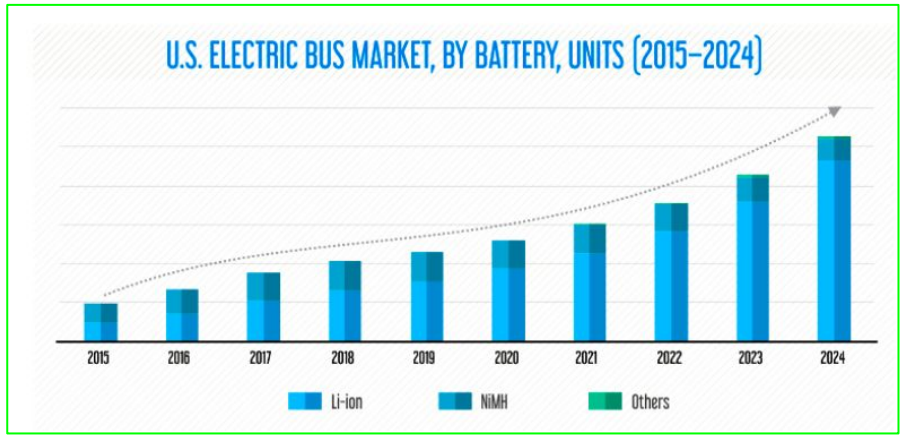
E-Bus Fleets Around the World

China	Europe	U.S.
• Largest producer and user of electric vehicles • 99% of the E-buses sold globally in 2017 were in China • E-buses make up about 17% of the total Chinese bus fleet • Cities like Shanghai and Shenzhen have halted purchases of ICE buses in favor of e-buses	•U.K has the largest e-bus fleet •E-buses made up 1.6% of all municipal buses in Europe in 2017	•There are ~360 electric buses in the US, representing less than 0.1% of the global fleet. •E-buses contribute about 0.5% of the total municipal fleet of 70,000 buses •California is the first state to require E-buses, starting in 2029

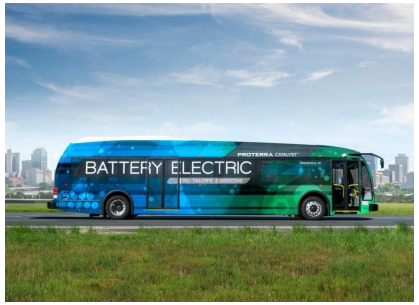
US E-Bus Fleet





- The US E-Bus market was worth $45 M in 2018, and will reach $1.9 B by 2024 – a compound annual growth rate of 18.5%.
- At the end of 2017, 9% of US transit agencies had E-Buses ordered or on the road.
- Only a few hundred of the 480,000 US school buses are electric.

Available E-Bus Models

 **BYD** K7	 **BYD** K9S	 **GreenPower** EV250-400 All-Electric Transit Bus	 **GreenPower** Synapse 72 All- Electric School Bus	 **Motiv Electric** EPIC 6 series Chassis
 **Lion Electric** LionA Electric Mini School Bus	 **Lion Electric** LionC Electric School Bus	 **Lion Electric** LionM Electric Transit Bus	 **Proterra** Catalyst Bus	 **Thomas Built** Saf-T-Liner C2 Jouley

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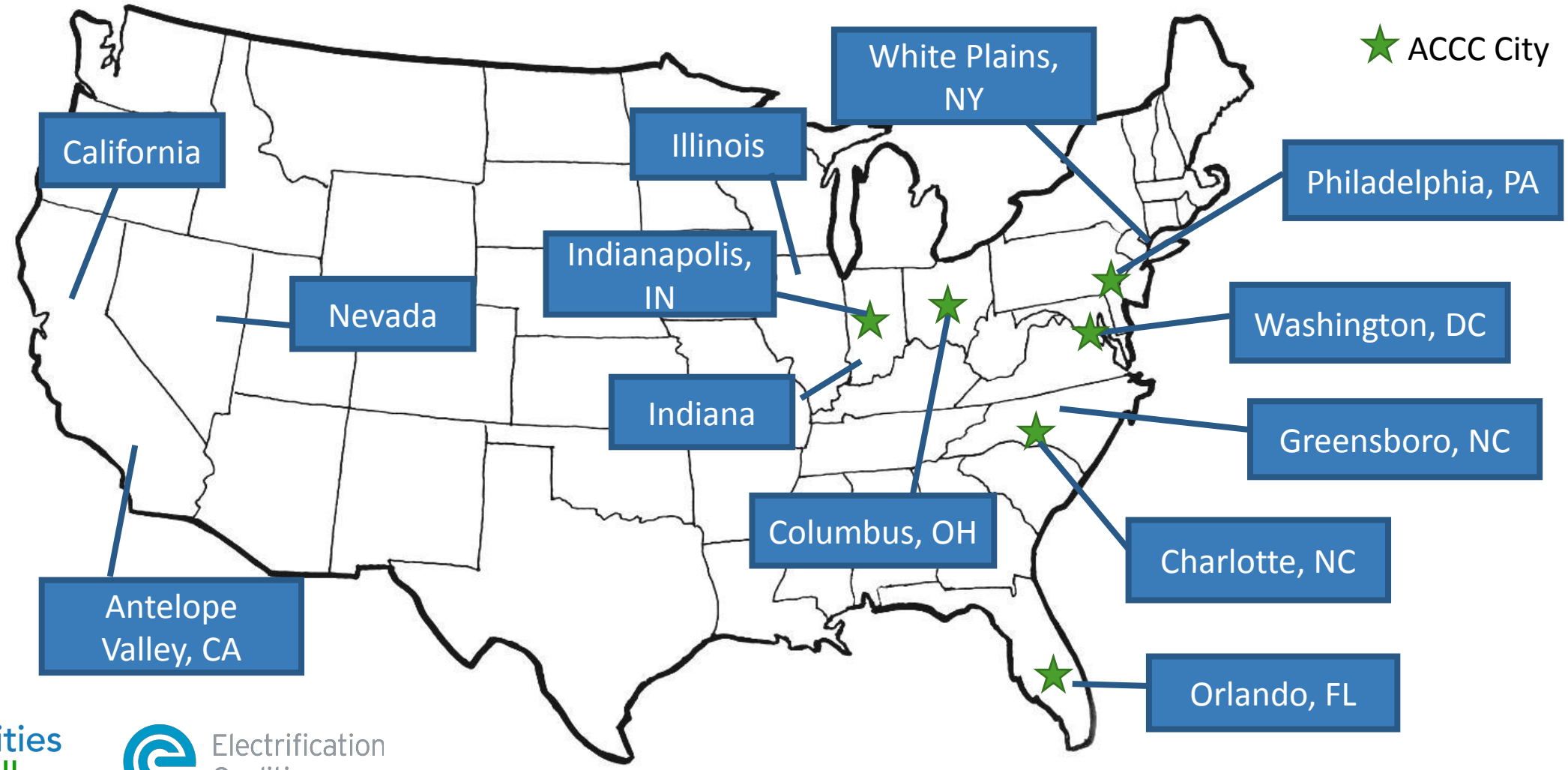
City Leadership

- The majority of buses operate in cities.
- Momentum for bus electrification is centered in metropolitan areas
- Bus electrification helps cities meet internal, state-wide, and international fuel and emissions reduction goals
- In the C40 Fossil-Fuel-Free Streets Declaration, 13 cities committed to procure only zero-emissions buses

Communities Leading the Way on Bus Electrification



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E-Bus Savings

- Lower fuel costs
- Lower maintenance costs
- World Resource Institute created a **Costs and Emissions Appraisal Tool for Transit Buses** to help transit agencies evaluate E-Bus cost savings

Barriers and Considerations

- Higher upfront costs
- Associated infrastructure
- Misconceptions of technology readiness
- Customer uncertainty with electricity as a fuel
- Standardization and scalability
- Underdeveloped supply chains
- Long procurement and sales cycles

E-Bus Infrastructure

- E-Bus charging can range from 60 – 500 kW and utilize J1772-CCS and/or overhead charging connections.
- Overhead charging is meant to be done on route, to limit vehicle down time.
- Plug-in charging best suited for depot charging, such as overnight, during service or shift changes.

Incentives for Bus Electrification

- Volkswagen Settlement Funding
- EPA Grants (Federal and State)
- FTA Low-No Funding
- FTA Bus and Bus Facility Funding

Funding Opportunities

VW Settlement

- $2.9 billion nationwide in Trust to invest in technologies that reduce harmful emissions
- Each state has a disbursement plan
- Funds could used as local match

Additional USDOT Funding Opportunities

- FY19 Bus and Bus Facilities
- Over $427 million for FY19
- 12 electric bus projects selected in FY18 program (approximately 10% of projects)
- Notice of Funding likely released in Spring/Summer 2019

FY19 BUILD (formally known as TIGER)

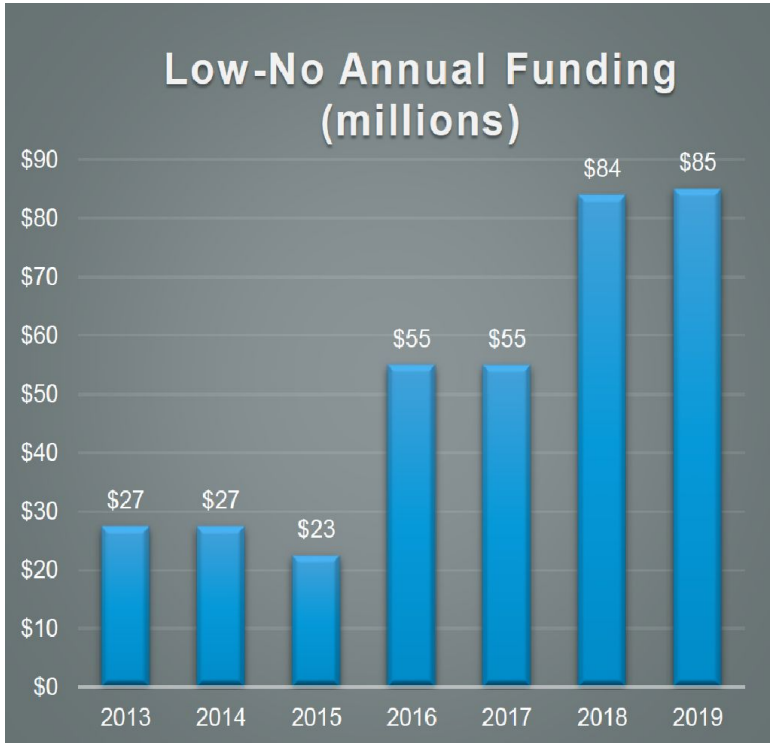
- 900 million available for FY19
- 50% Urban/50% Rural Split
- Notice of Funding Opportunity likely to be released Spring/Summer 2019

Low or No Emission FY 2019

Notice of Funding

Overview of Notice of Funding:

- $85 million total funding available from The Federal Transit Administration (FTA) for FY 2019.
- Provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. Under the FAST Act, $55 million per year is available until fiscal year 2020.
- Support national transit fleet transition to the lowest polluting and most energy efficient transit vehicles



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https://www.transit.dot.gov/funding/grants/lowno

Timeline

- **Notice of Funding Opportunity Posted:** 3/18/2019

- **Registration Details Announced:** 2-3:30 PM Eastern Time, 4/11/2019 via webinar

- **Proposals Due:** 11:59 PM Eastern Time by 5/14/2019 via electronic submission to www.grants.gov

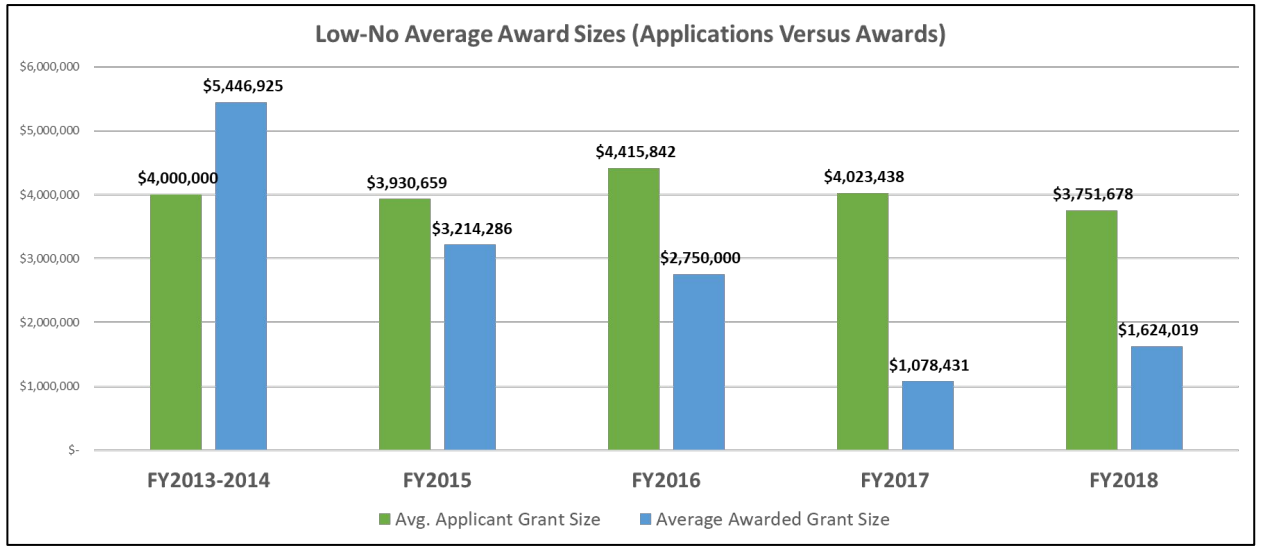
Eligibility

Eligible Projects

- Purchasing or leasing low- or no-emission buses
- Acquiring low- or no-emission buses with a leased power source
- Construct or lease related facilities and equipment (including intelligent technology and software)
- Rehab or improving existing public transportation facilities to accommodate low- or no-emission buses
- Construct new public transportation facilities for low- or no-emission buses

Eligible Applicants

- Public transit agencies
- State transportation departments
- Tribes
- Direct recipients of FTA grants under the Section 5307 Urbanized Area Formula program



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Grants for Buses and Bus Facilities Program:

(49 U.S.C. Section 5339 / FAST Act Section 3017)

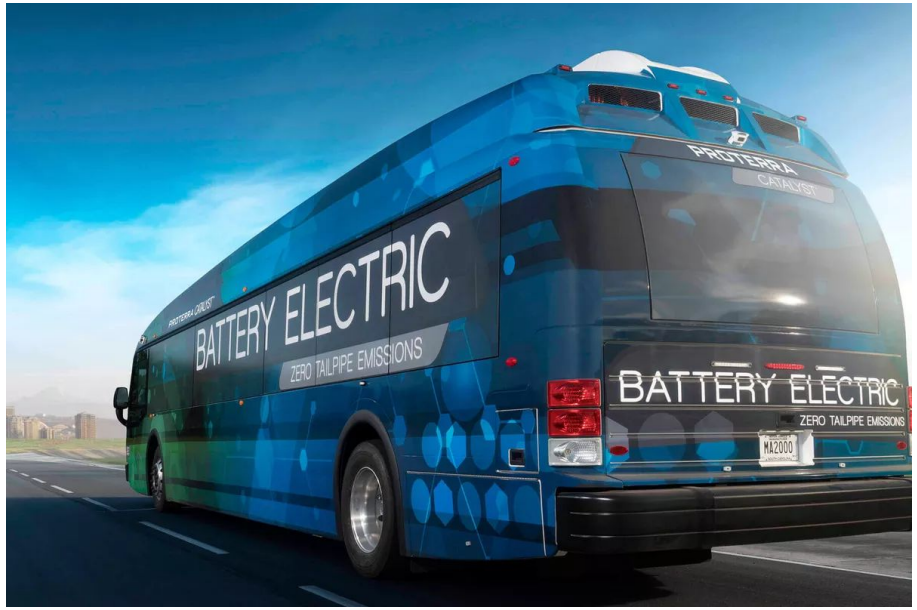
Notice of Funding

Overview:

- **$423.3 total funding available** from the Federal Transit Administration (FTA) for FY 2019.
- Award Ceiling (per project) = **$42,335,024**

Available to states and direct recipients to:

- Replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities including technological changes or innovations to modify low or no emission vehicles or facilities.



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Grants for Buses and Bus Facilities Program:

FY 2018 - Previous Selections

Key Highlights: (FY 2018)

- **$366.2 million - 107 projects in 50 states**
- Total # of EV Bus Projects Receiving Funds = 17 out of 107 (~16%)
- Total Funds Received for EV Bus Projects (FY 2018) =$61,709,507 (~17%)

Expected FY 2019: (Based on FY 2018 %)

- **~20 EV Bus projects**
- Total funding amount **~$72 million**

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Timeline

- **Notice of Funding Opportunity Posted:** 5/15/2019

- **Proposal Due:** 11:59 PM Eastern Time by June 21, 2109 via electronic submission to https://www.grants.gov/web/grants/view-opportunity.html?oppId=316003

Discussion

Questions and Answers

American Cities Climate Challenge

Electrification Coalition

The Electrification Coalition

Revolutionizing Transportation and Achieving Energy Security

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ELECTRIFICATIONCOALITION.ORG

PROTERRA: REVOLUTIONIZING TRANSIT

American Cities Climate Challenge

PRESENTED BY

Eric J. McCarthy
SVP, Government Relations, Public Policy and Legal Affairs

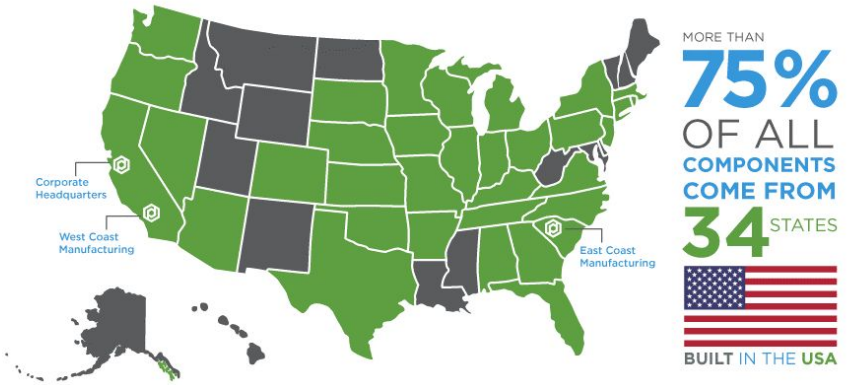
PROTERRA

ABOUT PROTERRA

Proterra's Mission

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

- Offices and manufacturing in CA and SC
- 500+ employees, with strong transportation expertise
- >90 customers; >700 vehicles sold
- >265 vehicles delivered; >7,000,000 service miles
- >39,000,000 pounds of CO2 emissions avoided



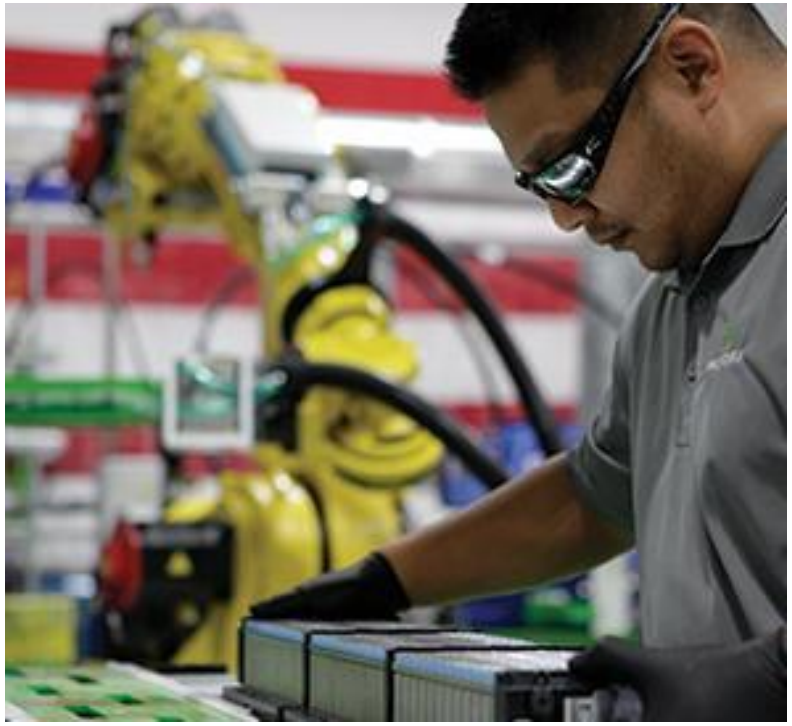
Strong Transportation Expertise

TESLA, BMW, MICHELIN, Ford, TOYOTA, NISSAN, METRO, cta Chicago Transit Authority, GM, FREIGHTLINER, ROUSHYATES, Federal Transit Administration, CHRYSLER, Foothill Transit, WRTA Worcester Regional Transit Authority, VW

World-Class Financial Partners

BMW i, Constellation. An Exelon Company, DAIMLER, EDISON INTERNATIONAL, FRANKLIN TEMPLETON INVESTMENTS, GM VENTURES, generation, KPCB

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

OUR CUSTOMERS

>700 buses sold to **>90 customers** across **41 states/provinces**

AL
ALABAMA A&M UNIVERSITY NORMAL

AK
CAPITAL TRANSIT JUNEAU

CA
CITY OF ARVIN
CITY OF DUARTE
FCRTA FRESNO
FAST FAIRFIELD
FOOTHILL TRANSIT WEST COVINA
HUMBOLDT TRANSIT AUTHORITY EUREKA
LADOT TRANSIT LOS ANGELES
MAX MODESTO
RABA REDDING
RTD STOCKTON
SACRAMENTO INTERNATIONAL AIRPORT
SAMTRANS SAN CARLOS
SAN JOSE INTERNATIONAL AIRPORT
TRI DELTA TRANSIT ANTIOCH
VTA SAN JOSE
VISALIA TRANSIT VISALIA
YOSEMITE NATIONAL PARK

CO
TOWN OF BRECKENRIDGE
SUMMIT COUNTY FRISCO
ECO TRANSIT GYPSUM

CT
GBT BRIDGEPORT

DC
DC CIRCULATOR WASHINGTON

DE
DART FIRST STATE DOVER

FL
STAR METRO TALLAHASSEE

GA
UNIV. OF GEORGIA ATHENS

HI
JTB HAWAII HONOLULU

IA
DART DES MOINES

IL
QUAD CITIES METROLINK MOLINE
JLL CHICAGO
CONNECT TRANSIT BLOOMINGTON - NORMAL
CHICAGO TRANSIT AUTHORITY

KS
WICHITA TRANSIT WICHITA

KY
TARC LOUISVILLE
LEXTRAN LEXINGTON

LA
SPORTRAN SHREVEPORT

MA
WRTA WORCESTER
PVTA SPRINGFIELD

MD
BGE BALTIMORE
MCDOT ROCKVILLE

ME
SH-ZOOM TRANSIT BIDDEFORD
GREATER PORTLAND METRO PORTLAND

MI
BLUE WATER AREA TRANSIT PORT HURON

MN
DTA DULUTH

MT
DASH UNIV. OF MONTANA MISSOULA
MOUNTAIN LINE MISSOULA

NC
RALEIGH-DURHAM INTERNATIONAL AIRPORT
ART ASHEVILLE
GTA GREENSBORO
DUKE UNIVERSITY DURHAM
GO TRIANGLE DURHAM

NV
RTC RENO
TAHOE TRANSPORTATION DISTRICT STATELINE

NY
MTA NEW YORK CITY
TOMPKINS CONSOLIDATED AREA TRANSIT ITHACA
PORT AUTHORITY OF NY & NJ

OH
LAKETRAN PAINESVILLE

OK
THE CHEROKEE NATION

OR
SMART PORTLAND

PA
SEPTA PHILADELPHIA

RI
RIPTA PROVIDENCE

SC
CATBUS CLEMSON
CITY OF SENECA
GREENLINK GREENVILLE
CITY OF ROCK HILL
CARTA CHARLESTON

TN
MTA NASHVILLE

TX
VIA SAN ANTONIO
DART DALLAS
CITIBUS LUBBOCK
PAT PORT ARTHUR

UT
PARK CITY TRANSIT PARK CITY
UTA SALT LAKE CITY

VA
HAMPTON ROADS TRANSIT NORFOLK

WA
KING COUNTY METRO SEATTLE
EVERETT TRANSIT EVERETT
KITSAP TRANSIT BREMERTON
PIERCE TRANSIT LAKEWOOD

WI
METRO TRANSIT MADISON
LA CROSSE MTU LA CROSSE

WY
START JACKSON

CANADA

AB
EDMONTON TRANSIT SERVICE

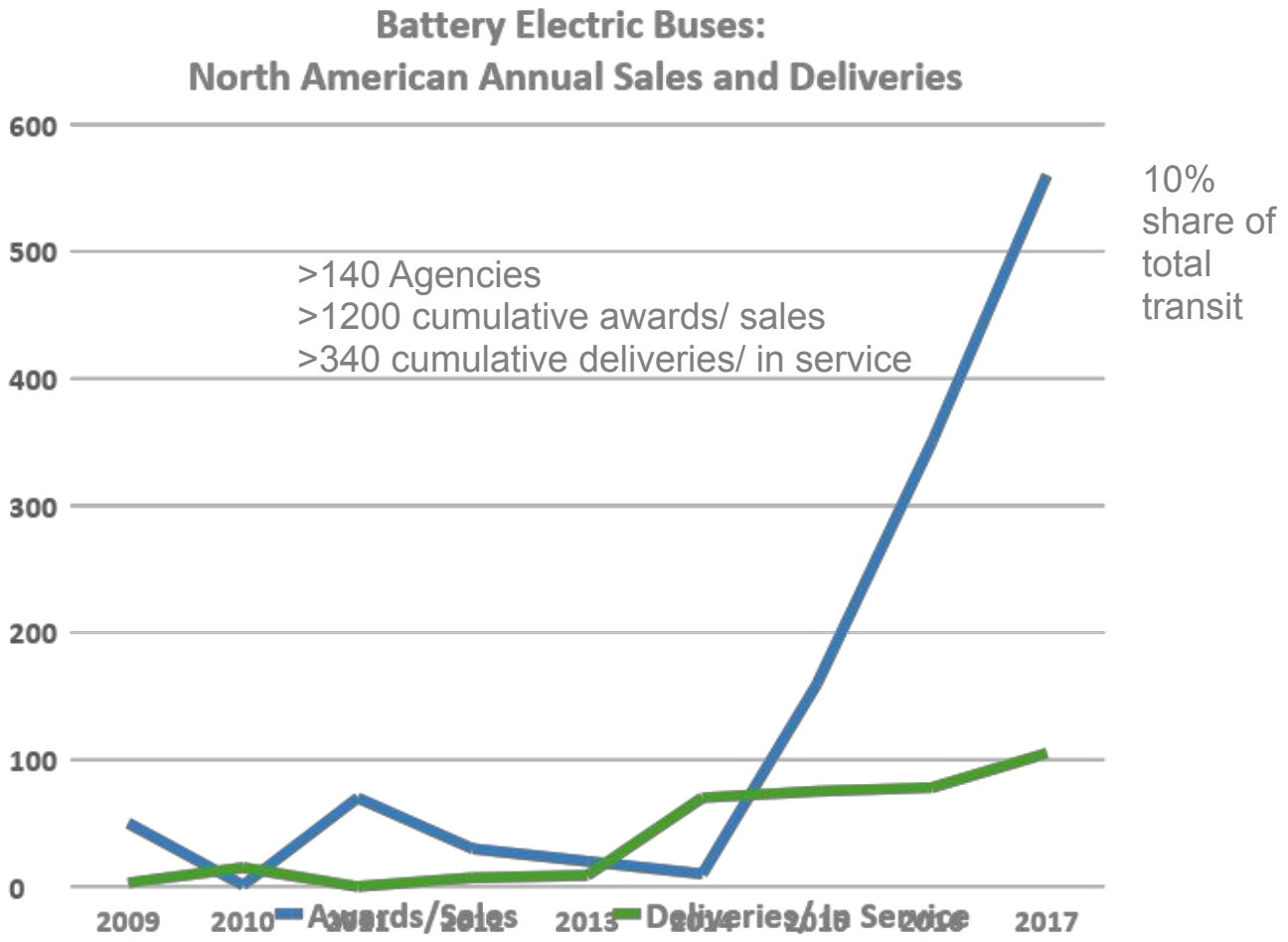
ON
TORONTO TRANSIT COMMISSION

Only announced customer names shown. Updated May 2019

ACCC PROTERRA CUSTOMERS

- **Hawaii**
  - JTB Hawaii Honolulu
- **Texas**
  - VIA San Antonio
  - Capital Metro Austin
- **Washington**
  - King County Metro Seattle
- **Washington, D.C.**
  - DC Circulator Washington
- **Illinois**
  - JLL Chicago
- **California**
  - LADOT Transit Los Angeles
  - San Jose International Airport
  - VTA San Jose
- **Pennsylvania**
  - SEPTA Philadelphia

THE TRANSIT MARKET IS RAPIDLY SHIFTING TO EV



Source: CTE Center for Transportation and the Environment

- Moving toward **widespread industry adoption**

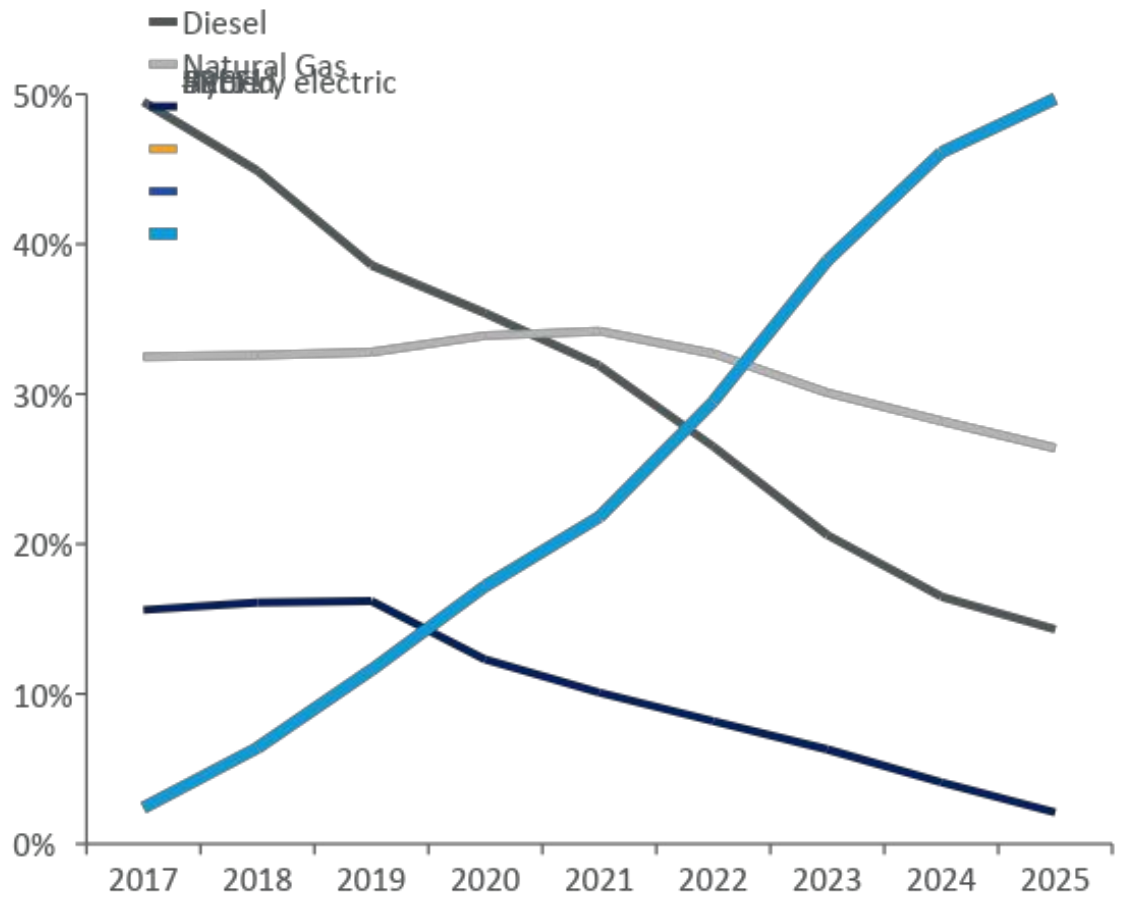
- **Purchase barriers eliminated**

due to:

  - Improved range
  - Charging standardization
  - Sharp decline in battery costs
  - Service-proven performance
  - Increased total cost of ownership
  - Environmental stewardship
  - Rising health costs associated with fossil fuels
  - Government programs (e.g., grants)
  - Urbanization

MAJOR COMMITMENTS TO 100% EV TRANSIT

EV Transit Bus adoption continues to increase



Source: Frost & Sullivan Heavy Duty Transit Bus North America Powertrain Adoption Forecast

Major cities adopting EV technology for transit buses

New York
100% EV by 2040
4,700 buses

Chicago
Piloting since 2014
2,100 buses

Washington D.C.
100% EV by 2045
1,900 buses

Seattle
100% EV by 2034
1,500 buses

Philadelphia
Piloting since 2017
1,500 buses

Miami
50% EV by 2035
800 buses

California mandates 100% electric transit buses by 2040

New purchase mandates

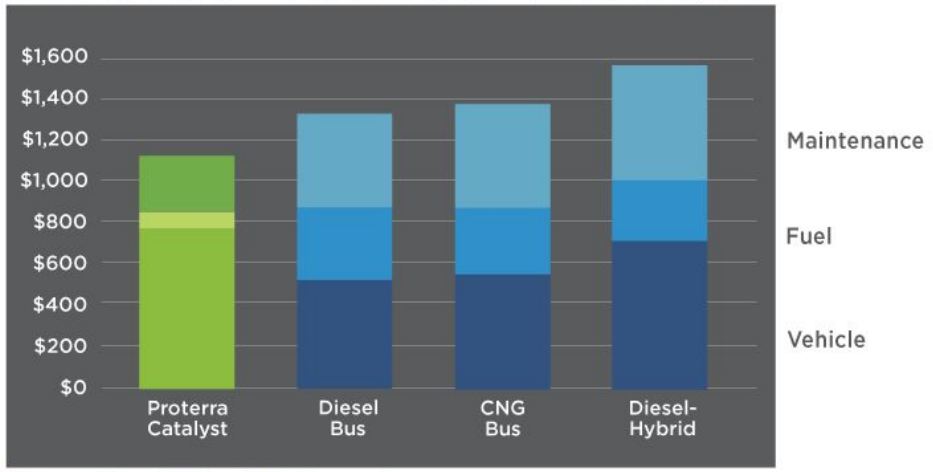
25% by 2023 ☐ **50%** by 2026 ☐ **100%** by 2029

12,000 buses across California
(17% of nationwide fleet)

Source: National Transit Database; agency websites; 2017 American Public Transportation Association Fact Book

CATALYST 40 FT. TOTAL COST OF OWNERSHIP ADVANTAGE

	Proterra EV	Diesel Bus	CNG Bus	Diesel Hybrid
Vehicle	$749	$493	$531	$712
Energy/Fuel	$94	$381	$336	$297
Maintenance	$275	$450	$500	$550
TCO	$1,118	$1,324	$1,367	$1,559
TCO $'s/Mile	$2.24	$2.65	$2.73	$3.12



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

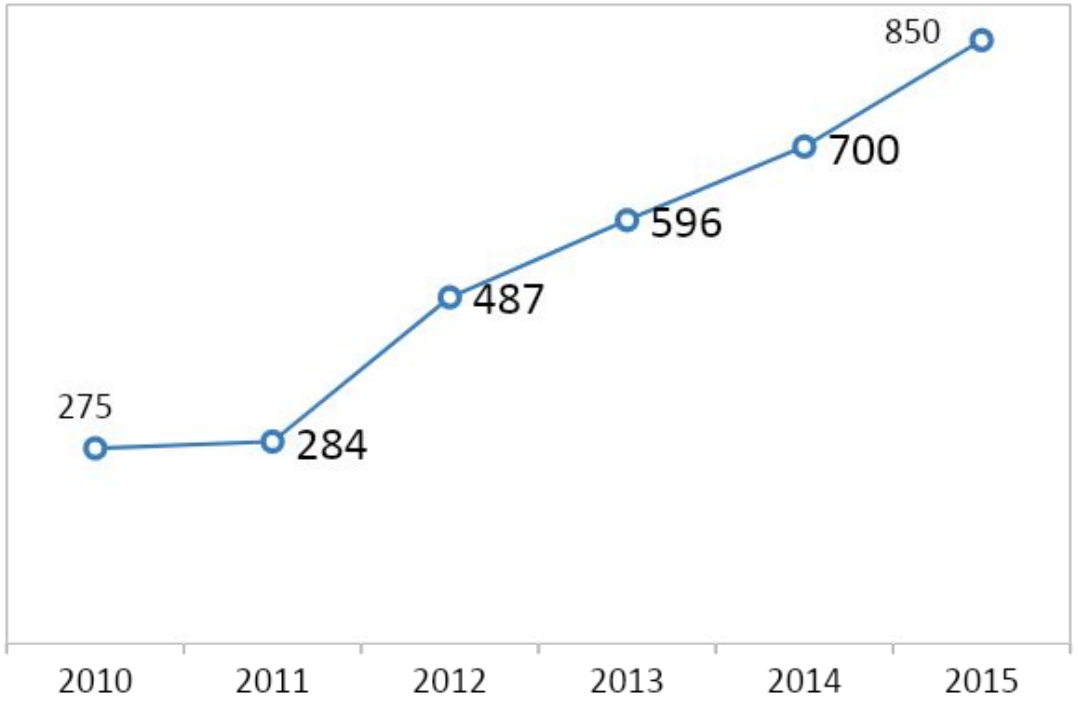
$462k vs. Diesel

$467k vs. CNG

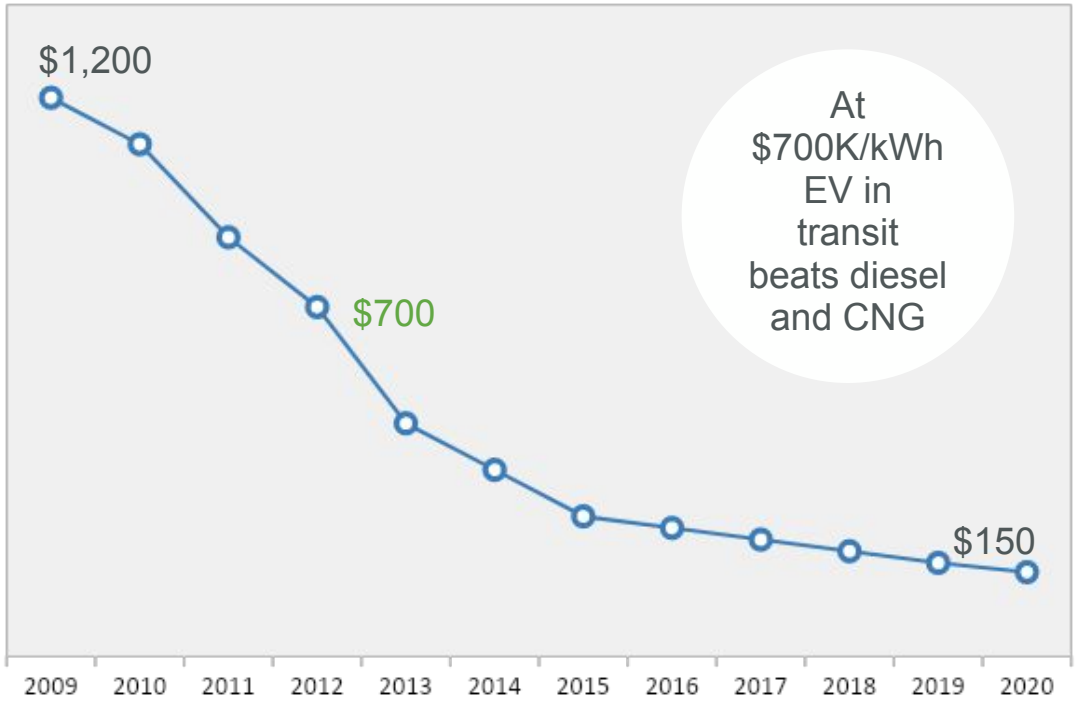
$479k vs. Hybrid

EV ECONOMICS IMPROVING RAPIDLY

U.S. Electric Vehicle Sales (000s Units)



Proterra Battery Cost ($/kWh)

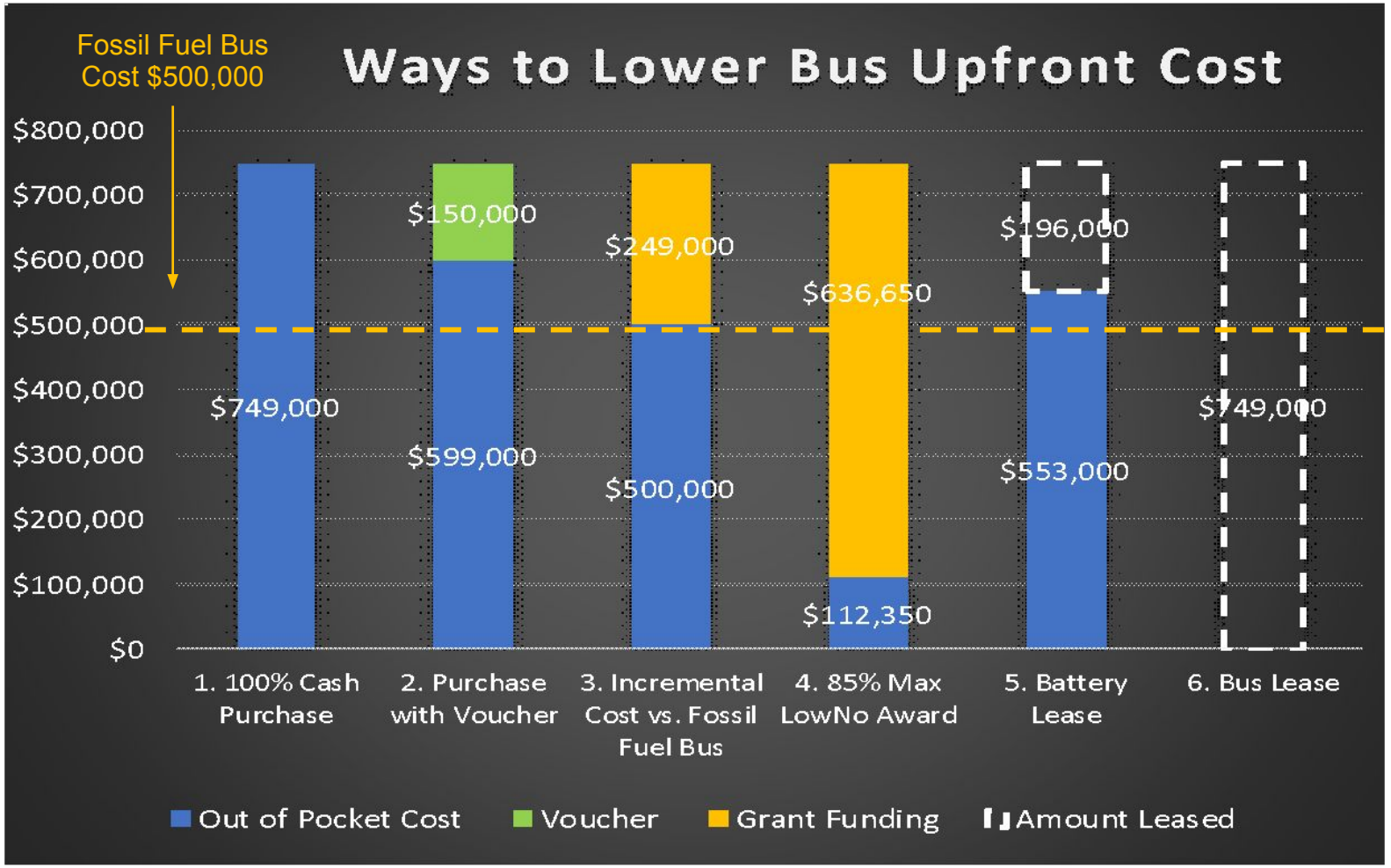


Advanced battery technology cost has declined to the point of replacing fossil fuels in the transit market.

Sources: Navigant Research, green.autoblog.com, Electric Drive Transportation Association. xEV = PHEV, HEV, EREV and BEV.

WAYS TO LOWER UPFRONT COSTS

1. $749,000 Electric Bus vs. $500,000 Fossil Fuel Bus
2. Local vouchers reduces electric bus price
3. Incremental cost required over Fossil Fuel Bus
4. Max Low-No Award Reduces Bus Cost
5. Battery Lease - Electric Bus Cost Fossil Fuel Bus
6. $0 Out of Pocket Cost for Bus/Charger Capital Lease



COMBINING FUNDING SOURCES

Grant "applicants may choose to combine formula and Low-No funding" – ***FTA Low-No FAQ***

1. Use formula funds budgeted for replacement fossil fuel bus for electric bus
2. Reduce up-front capital cost by leasing battery
3. Leverage small Low-No Award to purchase many electric buses

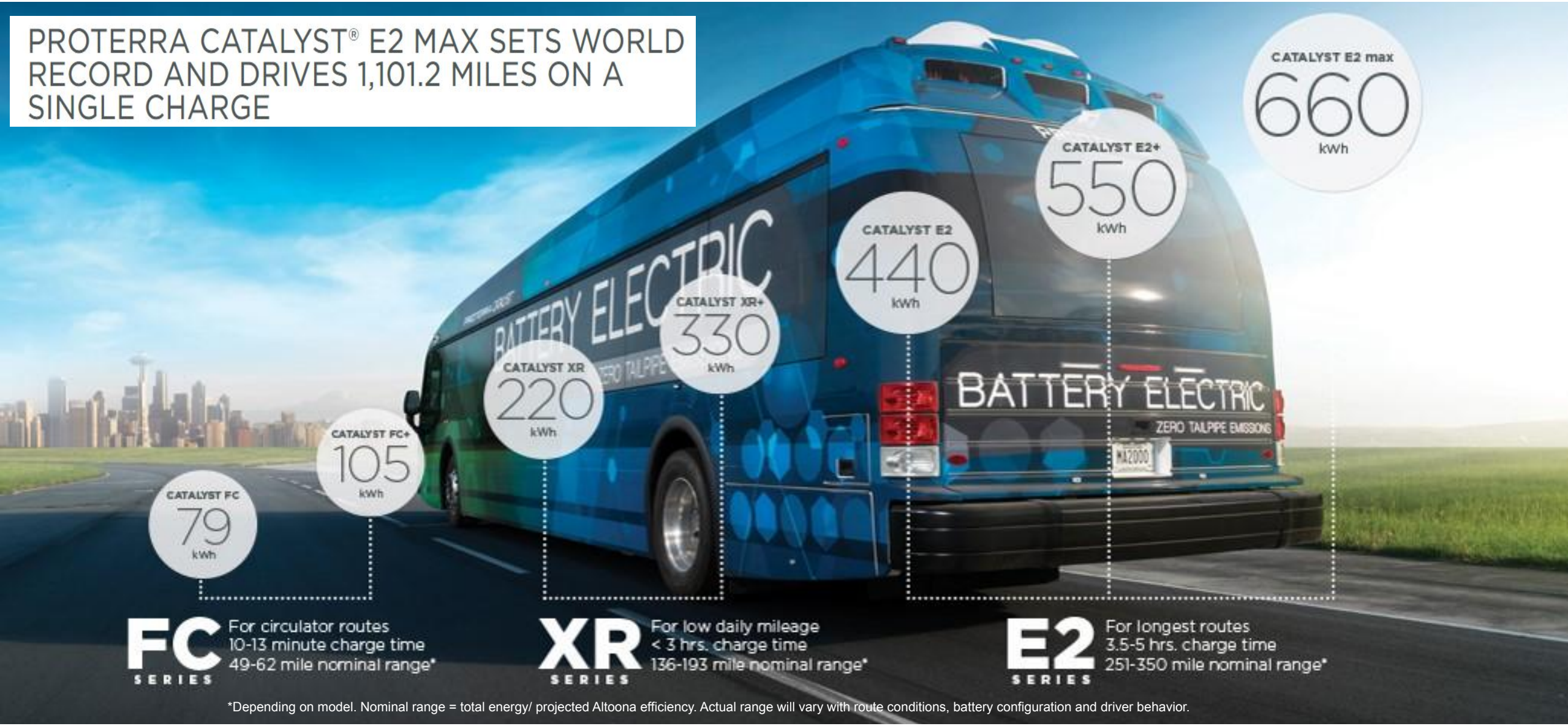
** VW settlement dollars are also now available to use

Case Study: Jackson, Wyoming

- **8 buses with 2018 Low-No Award of $2,290,000**

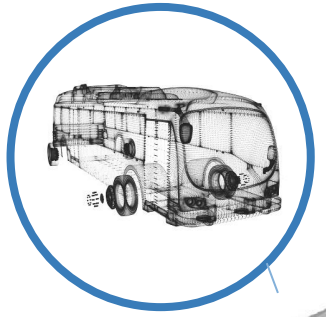
JACKSON, WY 2018 low-no sources of funds

THE PROTERRA CATALYST'S RANGE



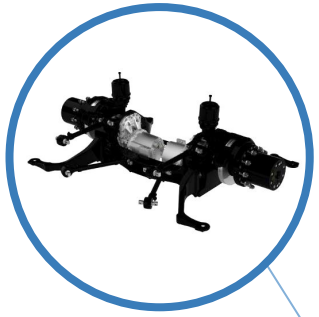
Advanced Composite Body

Lightweight and durable carbon-fiber-reinforced composite



Heavy Duty Battery Pack

High energy density, ruggedized battery packs purpose built for commercial vehicles



High Efficiency Drivetrain

2x horsepower
5x efficiency of diesel

Universal Charging

Industry standard plug-in and overhead high power Level 3 charging

THE DUOPOWER™ DRIVETRAIN

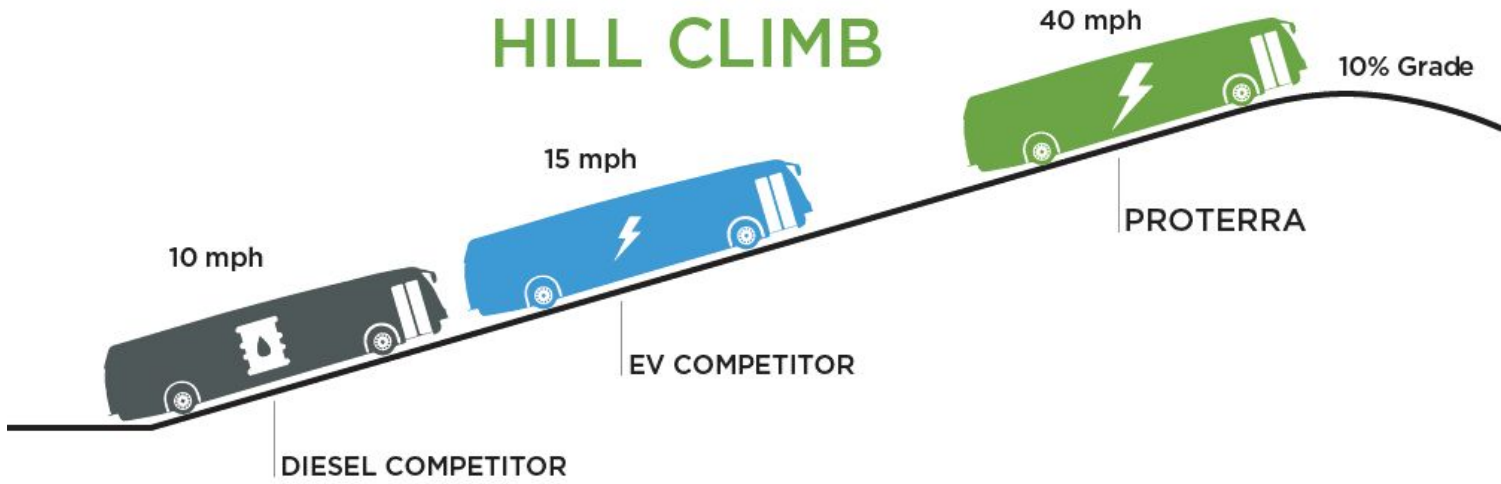
By combining the DuoPower drivetrain with Proterra's battery technology and lightweight composite bus body, the Catalyst delivers up to 29 MPGe—over 5X more fuel efficient than a diesel bus.

Enables the longest range

- Operating range up to 390 miles
- Tested at the Navistar Proving Grounds, achieving a world record range for an EV, traveling 1,101.2 miles on a single charge

Designed for best performance

- Propels a bus up a 26% grade, making it an ideal option for transit agencies with steep hills
- Enhances performance in extreme weather



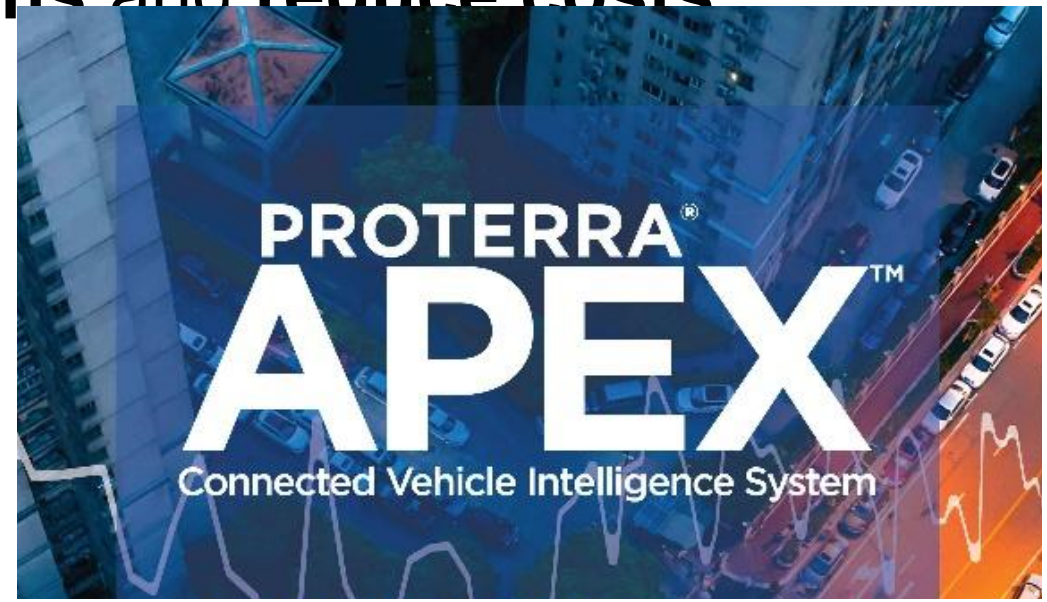
PERFORMANCE COMPARISON	Diesel Competitor	Electric Competitor	Proterra Catalyst® E2 with DuoPower™ Drivetrain
TOP SPEED ON HILLS			
5%	35 mph	33 mph	59 mph
10%	10 mph	15 mph	40 mph
15%	n/a	1 mph	27 mph
MAX HILL CLIMB	12.4%	15.1%	26.0%

2X The Horsepower, 2X The Acceleration, 5X More Efficient Than a Diesel Bus

PROTERRA APEX

The **Proterra APEX™** connected vehicle intelligence system is a cloud-based data platform, offering historical and real-time performance information about your battery electric vehicle fleet, to **optimize bus and charging operations** and **reduce costs**.

- **VEHICLE MONITORING**
  - Real-time information and historical charts on vehicle performance.
- **REMOTE DIAGNOSTICS**
  - Reduce on-site visits and solve problems remotely with alerts for vehicles and chargers.
- **PREVENTATIVE MAINTENANCE**
  - Notifications and recommendations for preventative maintenance.
- **CHARGER MANAGEMENT**
  - Monitor charger status, control charging remotely, and receive real-time updates.



THE SOLUTION: REVOLUTIONARY APPROACH TO TRANSPORT

THE ONLY TRANSIT PLATFORM DESIGNED SPECIFICALLY FOR EV PERFORMANCE

- Clea
- liable
- Qui
- icient
- De nstr
- Flexi eandscalable

%
Less Tailpipe emissio

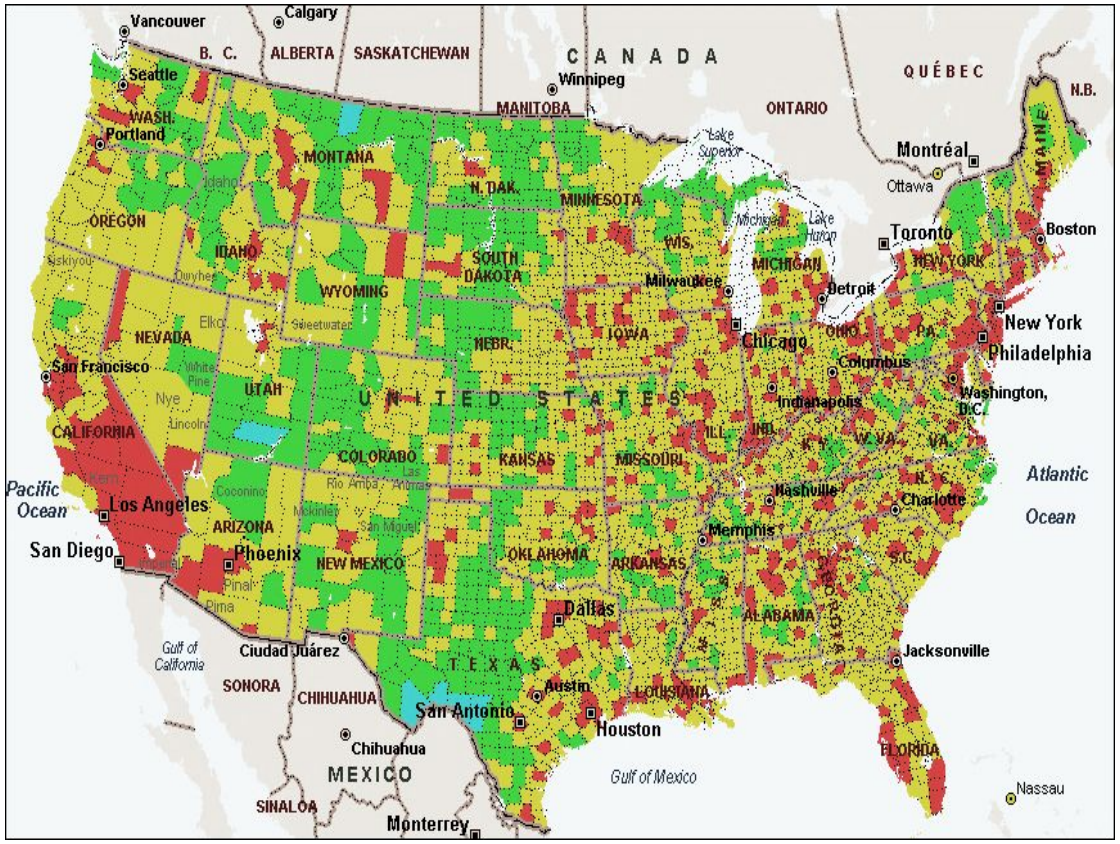
25+ %
Quieter

%
More fuel efficien

%
Lower lifetime fuel

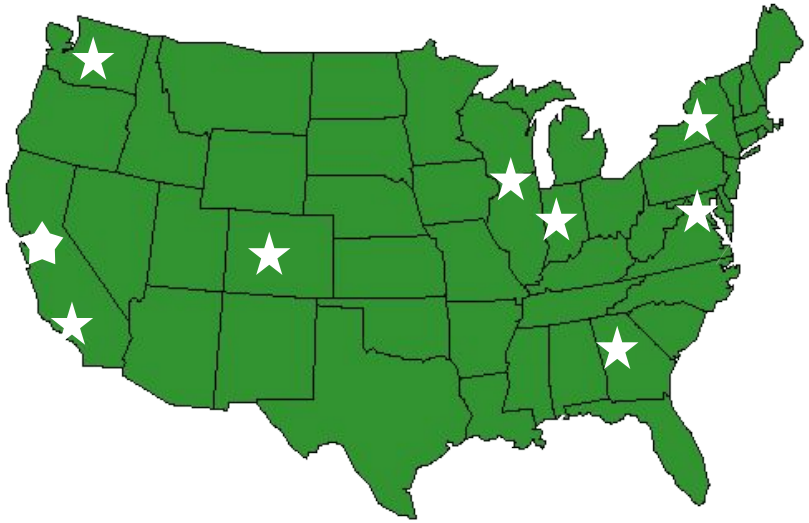
THE HEALTH COSTS OF FOSSIL FUELS

Annual Diesel Health Impacts in the US (Number of cases in 2010)	
Premature Deaths	21,000
Lung Cancer Deaths	3,000
Hospital Admissions	15,000
Emergency Room Visits for Asthma	15,000
Non-fatal Heart Attacks	27,000
Asthma Attacks	410,000
Chronic Bronchitis	12,000
Work Loss Days	2,400,000
Restricted Activity Days	14,000,000



TRANSIT ELECTRIFICATION POLICY DEVELOPMENTS

- New York's Truck Voucher Incentive Program offers $150k per Proterra bus
- FAST Act: $55M annually for LowNo Program; introduction of innovative procurement methods and leasing options
- Maryland Freedom Fleet Voucher program offers $20k per heavy duty vehicle; BG&E used to purchase 2 Proterra buses



- LA Metro Board passed resolution to convert its entire bus fleet to all-electric by 2030; LA DOT also moving to 100% zero emission by 2030; December 2018 passage of Innovative Clean Transit Reg
- Colorado now funds up to $35k per vehicle for Class 8 vehicles
- Stockton, CA announced the nation's first all-electric bus rapid transit (BRT) route
- Georgia now offers EV public transit buses on master state contract; CA will soon follow
- Chicago's Drive Clean Truck Voucher Program offers $150k per Proterra bus
- King County announced the purchase of 120 electric buses by 2020; 100% EV by 2034

SMARTER CHARGING

60KW
For fleets with longer available charge times.

Catalyst E2 charge time:
~6 hours, w/ J1772-CCS plug-in

125KW
For fleets with high uptime requirements

Catalyst E2 charge time:
~3 hours, w/ J1772-CCS plug-in

500KW
For fleets with extended operating hours and high mileage requirements

Catalyst FC+ charge time:
~38 miles per 10 minutes, w/ J3105 overhead

Open source communications protocol

V2G Bi-directional V2G capability

Smart grid ready

Telematics-enabled

INTELLIGENT

Automated and rules-based vehicle charging

UNIVERSAL

Standards-based, OCPP 1.6 open communications protocol-compatible

REMOTE

Can be located up to 492 feet from dispenser

SCALABLE

Can be installed side-to-side and back-to-back for high-density charger banks

CHARGING AT SCALE

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

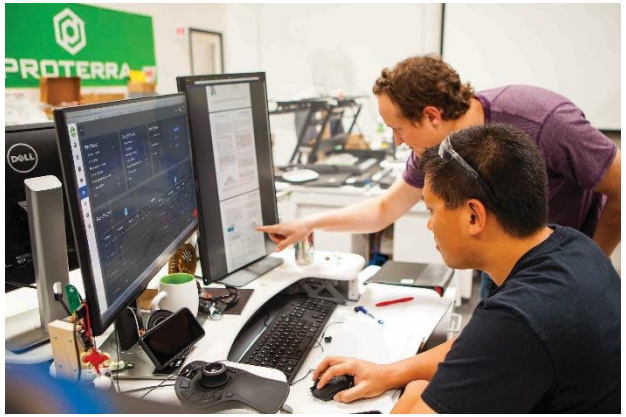
Our experts provide counsel on:

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

SOLUTIONS

PROTERRA
ENERGY™
FLEET SOLUTIONS

ENERGY FLEET SOLUTIONS



By providing a full suite of Proterra products and services in-house, we offer **a comprehensive solution** to help you meet your electrification goals.

- **SOPHISTICATED PLANNING**
- **TURNKEY INFRASTRUCTURE INSTALLATION**
- **SMART ENERGY MANAGEMENT**
- **ADVANCED ENERGY STORAGE**
- **PAY-AS-YOU-GO**

Proterra has helped **more than 45** fleet operators throughout North America install high-power charging systems.

Engagement

What Can Utilities Do?

- Customers are confused and unsure about large scale charging solutions; easing the customer experience through utility support can facilitate vehicle adoption
- Establish a transportation electrification group
- Support electrification efforts with lower TOU rates for charging and addressing demand charges
- Rate basing infrastructure build-out
- Utilities can identify steps in interconnection and local permitting processes that can be streamlined and made more uniform

Why Beneficial?

- Potential to drive down average rates through infrastructure investment in high utilization projects
- Opportunity to strengthen utility service through a smarter grid
- Optimize the load profile on the grid through smart charging and using vehicles as distributed storage devices
- More load on the grid will potentially lead to lower electricity rates or the stabilization of such rates. EVs lead to increased throughput on utility distribution assets and more balanced loads in the generation market.
- Utilities can demonstrate their support for improving air quality and local health benefits, particularly in disadvantaged communities

SAF-T-LINER® EC2™ SCHOOL BUS POWERED BY PROTERRA

ZERO EMISSIONS

- 100% battery-electric with no tailpipe emissions

FAST CHARGING

- DC charging enables a full charge in ~ 3 hours using Proterra's 60 kW PCS

HIGH PERFORMANCE

- Efficient, smart, safe drivetrain technology for optimal performance in any climate

PROVEN TECHNOLOGY

- Proterra batteries and drivetrains proven in more than 7,000,000 service miles on transit buses

Proterra Gives Fleet Operators More Reasons To Go Electric With New Line Of Charging Stations — CleanTechnica

Emphasizing Connectivity at Scale, Proterra Introduces the APEX™ Vehicle Intelligence System for Heavy-Duty Transit Fleets — L.A. BIZ

Proterra launches energy ecosystem — electrive.com

Daimler invests in electric bus company Proterra; exploring electrification of Daimler's Thomas Built school buses — Green Car Congress
Energy, technologies, issues and policies for sustainable mobility

Proterra and Michelin Collaborate to Develop New Low Rolling Resistance Tire Optimized for Battery-Electric Buses — CISION PR Newswire

Proterra and Mitsui & Co., Ltd. Create $200 million Credit Facility to Scale Proterra Battery Leasing Program — MASS TRANSIT

AMERICAN CITIES CLIMATE CHALLENGE

| Opportunities for Bus Electrification |

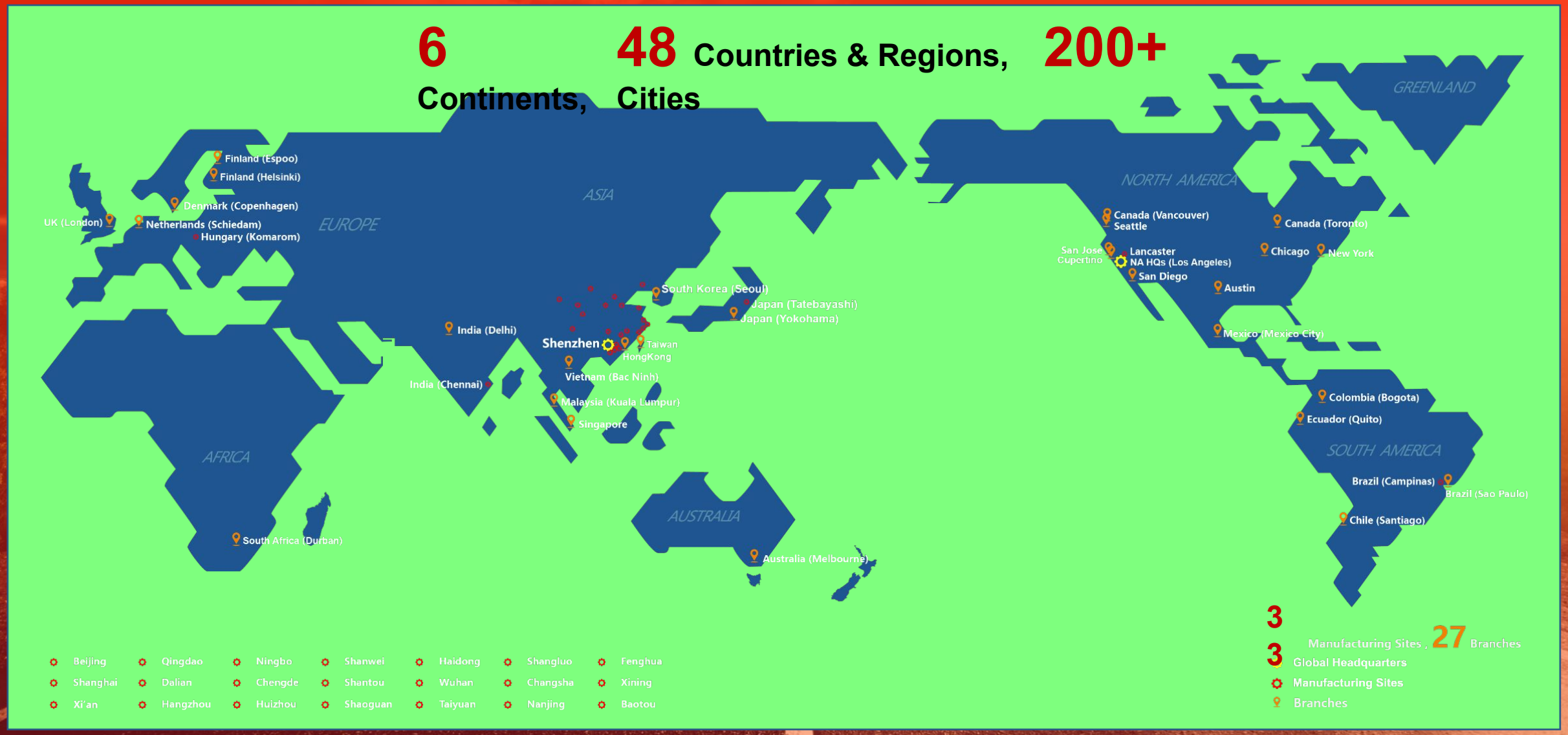
May 30, 2019

A pioneer in providing a new energy ecosystem: from **Power Generation** to **Storage** to **Electrified Transportation**

Company Overview

- Over **240,000** employees and **33** industrial parks worldwide
- 2018 Group revenue: **US $19 billion**
- A pioneer in achieving a Zero Emission Energy Ecosystem: Solar Power, Energy Storage & Electric Transportation.
- **20,000 Engineers**, with over 15,000 Patents
- Over 23 years developing advanced battery technologies
- World-leading Solar & Energy Storage Manufacturer
- Delivered over 50,000 Electric Buses
- Delivered over 2,000 Electric Trucks

GLOBAL REACH



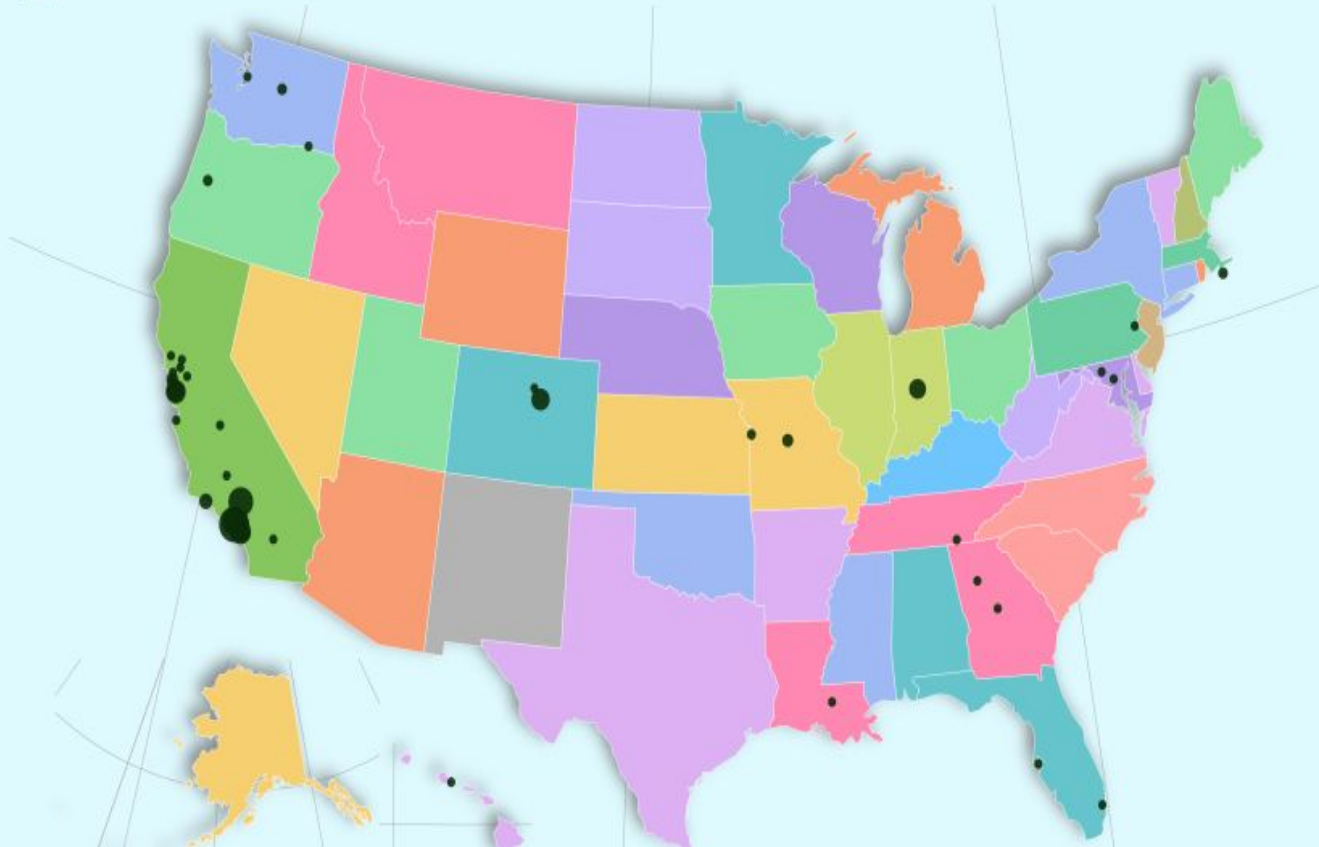
NORTH AMERICAN CUSTOMERS

AVTA Antelope Valley Transit Authority
CARTA
COMO connect Your Public Transit Connection
TRI DELTA TRANSIT
TRANS
HOWARD COUNTY MARYLAND
Kern Transit
marin transit
Metro
MST MONTEREY-SALINAS TRANSIT
MTD Santa Barbara
PSTA
LADOT Moving Los Angeles Forward
LTD
LINK TRANSIT
LONG BEACH TRANSIT
RTD
SANTA CRUZ METRO
SolTrans
SonomaCountyTransit
Stanford University
SunLine TRANSIT AGENCY
UCIRVINE
UCLA
UCSF
SANTA CATALINA ISLAND COMPANY
FCRTA Fresno County Rural Transit Agency
StAT
KANSAS CITY INTERNATIONAL AIRPORT
CATS CAPITAL AREA TRANSIT SYSTEM

BYD Buses Across the U.S.

From Sea to Shining Sea

Buses made by BYD in Lancaster, Calif. are at work in communities across the nation. Many more are on order.



U.S. BASED MANUFACTURING

550,000 Square-Foot EV Manufacturing Space

Lancaster, CA

U.S. JOBS

More than 775 manufacturing jobs

900+ U.S. employees

ZERO IS TODAY

4 Reasons to Electrify Your Bus Fleet

1. It makes financial sense to electrify
   - Fuel Savings
   - Maintenance Savings
   - Total Cost of Ownership
   - Innovative Financing
2. Environmental Benefits
   - Air Quality
   - Climate Change
3. Quality of Life
   - Quiet & Smooth Transit Experience
4. Support Disadvantaged Communities

4 Challenges to Fleet Electrification (and lessons learned)

1. Higher upfront costs
   - State/federal funding for incremental costs are available
   - Innovative financing
2. Infrastructure
   - Engage early with utility and public utility commission
   - FTA & state funding available
   - Create an electrification plan
3. Rate Design
   - Again, utility engagement & planning will save time & money
   - Think about how best to charge your buses from both operational & financial perspectives
4. Incumbency Bias
   - Get buy in from mgmt, ops, & maintenance

ZERO IS TODAY

ELECTRIFICATION OPPORTUNITIES IN OUR COMMUNITIES

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