

DRIVING THE SHIFT TO ELECTRIC TRANSIT IN HOT-WEATHER CLIMATES



Presentation to
AZTA CONFERENCE

November 2021



TOPICS

Introduction & Agenda

Proterra Overview

Hot Weather Considerations

- Hot vs. Cold efficiency
- Planning Planning Planning

Las Vegas Electric Bus Demo results

- July 2021 Demonstration Overview
- Energy usage analysis

Low No Funding 2022

Q&A



Mark Hollenbeck

Regional Sales
Director, West Coast

ELECTRIC IS ALL WE DO



~~Diesel~~
~~Hybrid~~
~~Fuel Cell~~
~~CNG~~
Electric

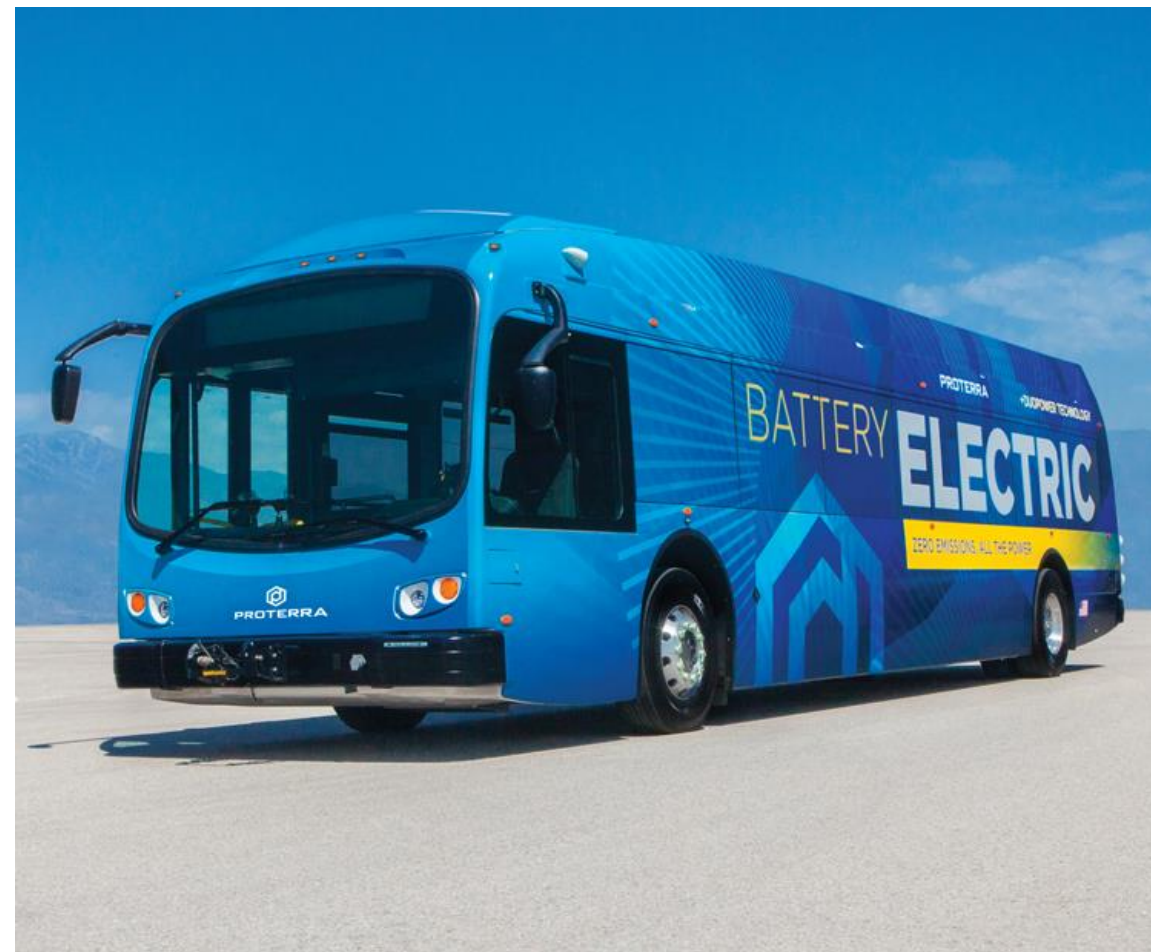


PROTERRA[®] **ZX5**

ZERO EMISSIONS

MAXIMUM RANGE

5TH GENERATION



PROTERRA IS THE LEADER IN THE DESIGN AND MANUFACTURE OF ELECTRIC BUSES



- 1 • Integrated technology ecosystem
- 2 • Best in class range
- 3 • Safest battery design
- 4 • Proven performance
- 5 • Most experienced, dedicated charging & infrastructure team



WARM WEATHER CUSTOMERS



PROTERRA



>1000 buses sold to >130 customers across 43 states/provinces

AL

ALABAMA A&M UNIVERSITY
NORMAL

AK

CAPITAL TRANSIT JUNEAU

CA

CITY OF ARTESIA
CITY OF ARVIN
CITY OF DUARTE
FAX FRESNO
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
SAC RT SACRAMENTO
SAMTRANS SAN CARLOS
SAN FRANCISCO INTERNATIONAL AIRPORT
SAN JOSE INTERNATIONAL AIRPORT
SCMTD SANTA CRUZ
SFMTA SAN FRANCISCO
SLO TRANSIT SAN LUIS OBISPO
TRI DELTA TRANSIT ANTIOCH
VTA SAN JOSE
VISALIA TRANSIT VISALIA
YOLO COUNTY REGIONAL TRANSIT WOODLAND
YOSEMITE NATIONAL PARK

CO

TOWN OF BRECKENRIDGE
SUMMIT COUNTY FRISCO
ECO TRANSIT GYPSUM
TOWN OF AVON AVON

CT

GBT BRIDGEPORT

DC

DC CIRCULATOR WASHINGTON

DE

DART FIRST STATE DOVER

FL

STAR METRO TALLAHASSEE
LYNX ORLANDO
MIAMI-DADE COUNTY MIAMI

GA

UNIV. OF GEORGIA ATHENS

HI

JTB HAWAII HONOLULU

IA

DART DES MOINES

ID

VALLEY REGIONAL TRANSIT MERIDIAN

IL

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

KS

WICHITA TRANSIT WICHITA
TOPEKA METRO TOPEKA

KY

TARC LOUISVILLE
LEXTRAN LEXINGTON

LA

SPORTRAN SHREVEPORT

MA

WRTA WORCESTER
PVTA SPRINGFIELD

MD

BGE BALTIMORE
MCDOT ROCKVILLE
THE BUS PRINCE GEORGES COUNTY TRANSIT

ME

BSOBB TRANSIT BIDDEFORD
GREATER PORTLAND METRO PORTLAND

MI

BLUE WATER AREA TRANSIT
PORT HURON
DDOT DETROIT
SMART DETROIT

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
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

NM

ATOMIC CITY LOS ALAMOS

NV

RTC RENO

TAHOE TRANSPORTATION DISTRICT
STATELINE

NY

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

OK

THE CHEROKEE NATION
TULSA TRANSIT TULSA

OR

SMART WILSONVILLE

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
CAPMETRO AUSTIN
BRAZOS TRANSIT DISTRICT BRYAN

UT

PARK CITY TRANSIT PARK CITY
ZION NATIONAL PARK

VA

HAMPTON ROADS TRANSIT NORFOLK

VT

GREEN MOUNTAIN TRANSIT BURLINGTON

WA

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

WI

METRO TRANSIT MADISON
LA CROSSE MTU LA CROSSE
RYDE RACINE

WY

START JACKSON

CANADA

AB

EDMONTON TRANSIT SERVICE
ROAM BANFF

ON

TORONTO TRANSIT COMMISSION

Only announced customers shown. Updated Nov 2020

~50% of Proterra
customers are
repeat customers



1000+

battery electric
buses sold

130+

customers

20 M

miles of zero
emission service

46
MW
90 M

charging
infrastructure
installed

lbs CO2 reduced

Only announced customers shown. Updated Nov 2020

Proterra electric buses perform better in hot weather than in cold.
It takes more energy to heat the bus than it does to cool it.

RTC DEMO RECAP

DEMO DRIVE 07-19-2021



$$607 \text{ kWh} / 2.15 \text{ kWh/mi} = 281 \text{ miles range}$$

Route Information

Route	Demo 07-19-2021
Distance	92.3 miles
Average Speed	17.2 MPH
Maximum Speed	65 MPH
Maximum Grade	2.6%
Average Ambient Temperature	98.7°F

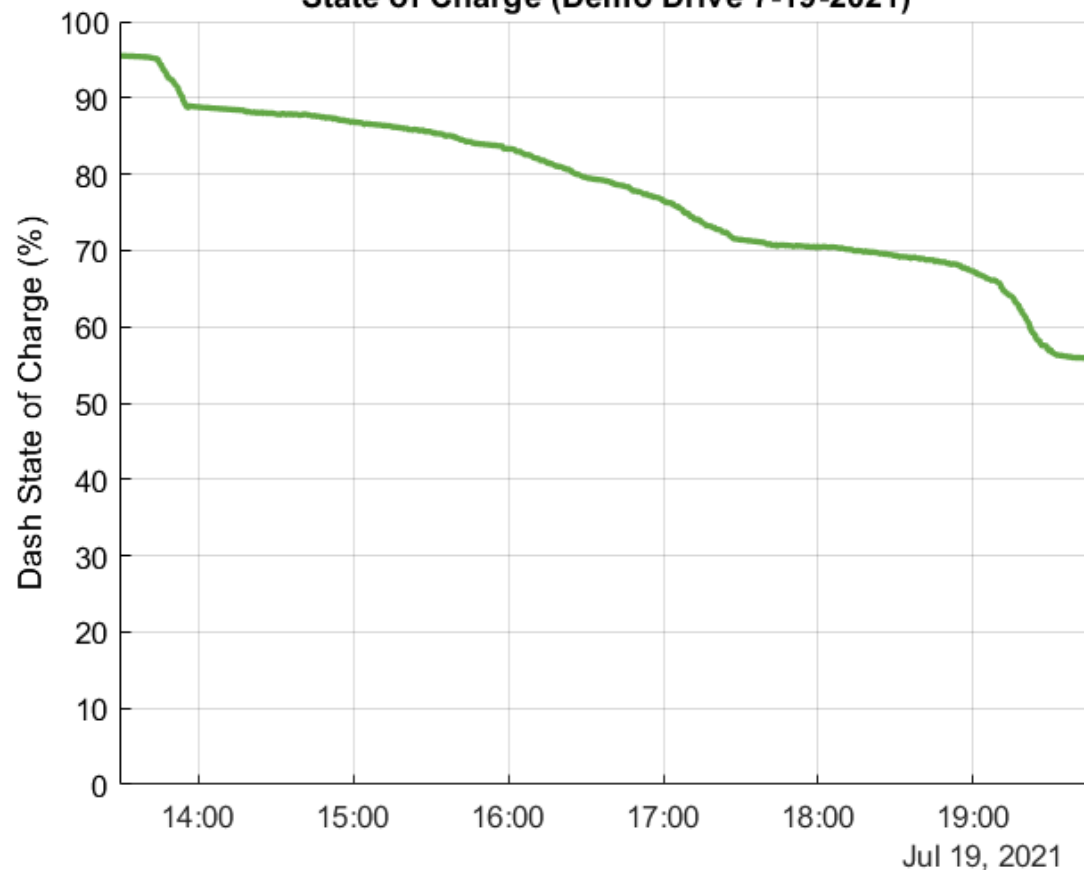
Vehicle Performance

Overall Energy Consumption	2.15 kWh/mi
Driving Energy Consumption*	1.88 kWh/mi
Diesel Equivalent Fuel Economy	17.5 MGPe
Starting Dash State of Charge	95.5%
Ending Dash State of Charge	55.9%
Net Energy Consumed	198.1 kWh
Estimated Range with Full Charge**	281 miles

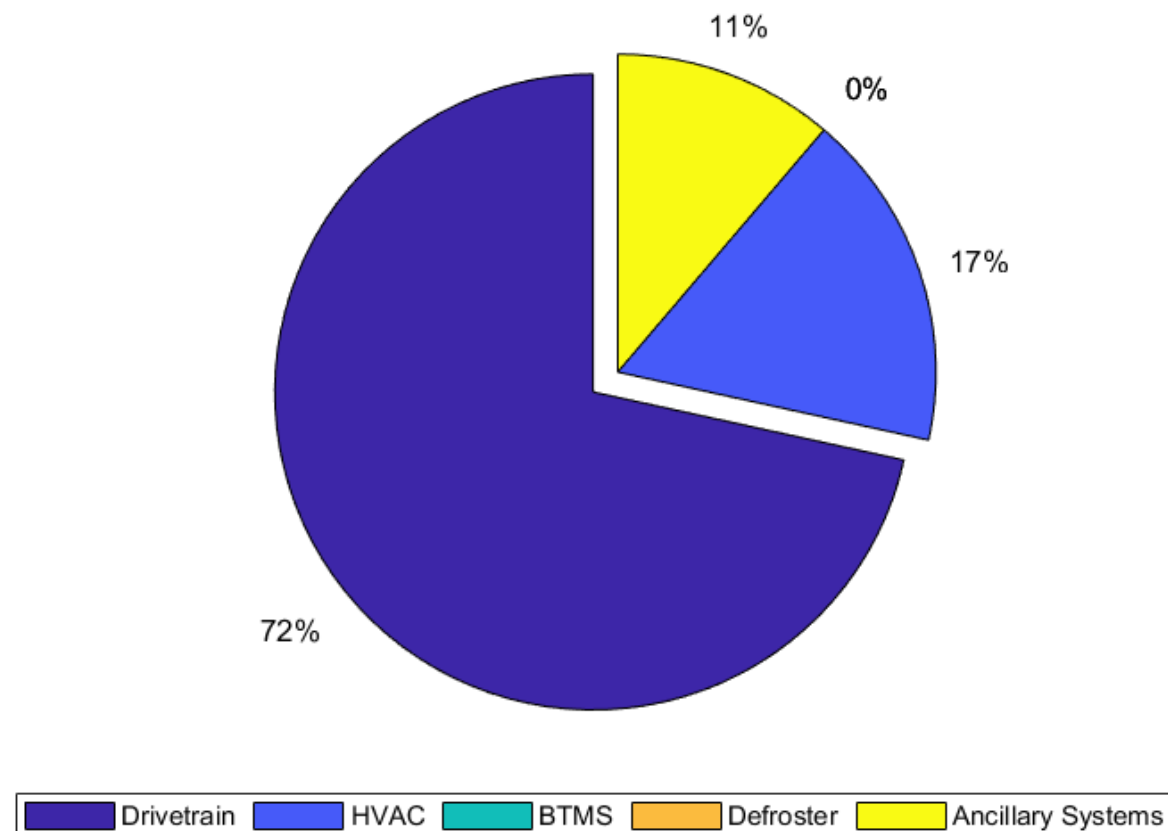
**Driving Energy Consumption only considers energy consumed while the bus is in motion*

***Calculated from maximum usage energy at BOL with maximum charge to 0% state of charge*

State of Charge (Demo Drive 7-19-2021)

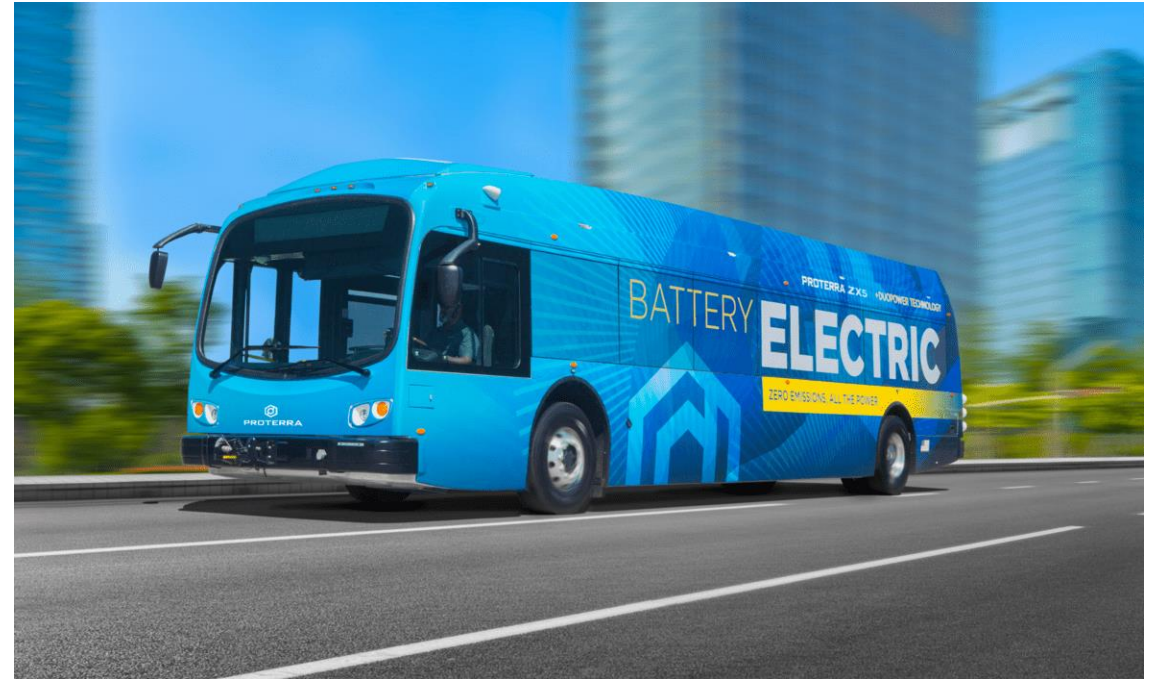


Energy Consumption Distribution



The Low- or No- Emission Grant Program

- Allows transit agencies to buy and lease zero-emission transit buses, as well as to acquire, construct, and lease recharging and maintenance facilities
- The Infrastructure Investment and Jobs Act (known as the bipartisan infrastructure deal”), which authorizes additional funding for Low-No 2022, “**require(s) the applicant to submit a zero-emission transition plan**” to be submitted as part of a qualified Low-No application.
- Low-No allows applicants to partner with specific vehicle manufacturers and satisfy requirement for competitive procurement if selected for funding



THANK YOU.

