Volkswagen Environmental Mitigation Trust

APPENDIX D-4
Beneficiary Eligible Mitigation Action Certification

State of Alaska Project 002 – FY19 Public Transit Bus Replacement

Prepared by

ALASKA ENERGY AUTHORITY

BENEFICIARY ELIGIBLE MITIGATION ACTION CERTIFICATION

Beneficiary Alaska

Lead Agency Authorized to Act on Behalf of the Beneficiary Alaska Energy Authority
(Any authorized person with delegation of such authority to direct the Trustee delivered to the Trustee pursuant to a Delegation of Authority and Certificate of Incumbency)

Action Title:	**FY19 Public Transit Bus Replacement**
Beneficiary's Project ID:	**34033**
Funding Request No. *(sequential)*	**002**
Request Type:	✓ **Advance**
Payment to be made to:	✓ **Beneficiary**
Funding Request & Direction:	✓ **Attached to this Certification (Attachment A)**

SUMMARY

Eligible Mitigation Action Action Type	· **Appendix D-2 item (specify): EMA 2 Class 4-8 Transit Bus** · Item 10 - DERA Option (5.2.12):

Detailed Description of Mitigation Action Item Including Community and Air Quality Benefits (5.2.2):

AEA will use VW Trust funds for the replacement of a MY 2006 New Flyer diesel transit bus owned and operated by the City and Borough of Juneau (CBJ) with an all-electric Proterra Catalyst 35-foot bus and associated charging infrastructure. The CBJ buses are assigned to all routes to ensure even distribution of miles among the fleet so replacing this aging diesel bus with an all-electric vehicle will be a benefit to all 32,000 residents throughout Juneau.

Juneau has been a national leader in the adoption of electric vehicles, ranking in the top communities in the nation in terms of per capita electric vehicle ownership. Capital Transit is striving to convert their fleet of diesel buses to clean hydroelectric charged battery electric buses. Capital Transit provides transportation alternatives which helps reduce harmful emissions and supports the economic vitality at the regional level. More than 1 million cruise ship passengers visit Juneau each year and there is a sizable older diesel bus fleet that operates in Juneau during the cruise ship season. These diesel buses operate throughout the city, transporting tourists to various excursions. By demonstrating that electric buses are economical and practical in the Juneau climate, CBJ hopes to see new private investment in renewable energy transportation. This will improve quality of life for all Juneau residents as air quality improves.

Estimate of Anticipated NOx Reductions (5.2.3):

The estimated lifetime reduction in NOx emissions is 2.214 short tons over the estimated 5 years of remaining life of the existing bus.

Identification of Governmental Entity Responsible for Reviewing and Auditing Expenditures of Eligible Mitigation Action Funds to Ensure Compliance with Applicable Law (5.2.7.1):

Alaska Energy Authority

Describe how the Beneficiary will make documentation publicly available (5.2.7.2).

AEA will follow the guidance set forth in Appendix D-3. AEA will make records related to the VW Trust publicly available on AEA's website (http://www.akenergyauthority.org/programs/vwsettlement). Any VW Trust

records not posted on AEA's website will be made available to the public under the Alaska Public Records Act (AS 40.25) and the Act's implementing regulations (2 AAC 96), unless one of the following applies: (1) the records are not "public records," as defined in AS 40.25.220(3); (2) the records are protected under state or federal law or otherwise exempt from disclosure under AS 40.25.120(a); (3) the records are excluded from the Act under another state statute; or (4) the records are readily available for public inspection—e.g., available on the Internet or "during state business hours in an agency's office or in a public library," 2 AAC 96.100(b). (The Alaska Public Records Act does not require AEA "to compile or summarize" records or "to manipulate its data to create new records." 2 AAC 96.210.)
Describe any cost share requirement to be placed on each NOx source proposed to be mitigated (5.2.8). Although not required by the VW State Trust Agreement, Alaska required government applicants to provide 80% match to the VW State Trust funds for the non-administrative cost of the replacement of public transit buses. The cost of a new all-electric bus, associated charging infrastructure, installation of EV infrastructure and destruction of the 2006 diesel bus will be funded by 5339 grants from the FTA (64%), CBJ Capital Transit (10%), and VW State Trust (26%). A detailed budget is included in Attachment D.
Describe how the Beneficiary complied with subparagraph 4.2.8, related to notice to U.S. Government Agencies (5.2.9). Pursuant to subparagraph 4.2.8, within 30 days of the filed Notice of Beneficiary Designation listing Alaska as a Beneficiary of the State Trust, the Alaska Energy Authority provided a copy of the State Trust agreement to all federal agencies that have custody, control, or management of land within or adjacent to Alaska (National Park Service, US Forest Service, US Fish and Wildlife Service, Bureau of Land Management) via certified mail.
If applicable, describe how the mitigation action will mitigate the impacts of NOx emissions on communities that have historically borne a disproportionate share of the adverse impacts of such emissions (5.2.10). The CBJ buses are assigned to all routes to ensure even distribution of miles among the fleet so replacing this aging diesel bus with an all-electric vehicle will be a benefit to all 32,000 residents throughout Juneau.

ATTACHMENTS
(CHECK BOX IF ATTACHED)

✓	**Attachment A**	Funding Request and Direction
✓	**Attachment B**	Eligible Mitigation Action Management Plan Including Detailed Budget and Implementation and Expenditures Timeline (5.2.4).
✓	**Attachment C**	Detailed Plan for Reporting on Eligible Mitigation Action Implementation (5.2.11).
✓	**Attachment D**	Detailed cost estimates from selected or potential vendors for each proposed expenditure exceeding $25,000 (5.2.6). [Attach only if project involves vendor expenditures exceeding $25,000.]
NA	**Attachment E**	DERA Option (5.2.12). [Attach only if using DERA option.]
NA	**Attachment F**	Attachment specifying amount of requested funding to be debited against each beneficiary's allocation (5.2.13). [Attach only if this is a joint application involving multiple beneficiaries.]

CERTIFICATIONS

By submitting this application, the Lead Agency makes the following certifications:

1. This application is submitted on behalf of Beneficiary **Alaska**, and the person executing this certification has authority to make this certification on behalf of the Lead Agency and Beneficiary, pursuant to the Certification for Beneficiary Status filed with the Court.
2. Beneficiary requests and directs that the Trustee make the payments described in this application and Attachment A to this Form.
3. This application contains all information and certifications required by Paragraph 5.2 of the Trust Agreement, and the Trustee may rely on this application, Attachment A, and related certifications in making disbursements of trust funds for the aforementioned Project ID.
4. Any vendors were or will be selected in accordance with a jurisdiction's public contracting law as applicable. (5.2.5)
5. Beneficiary will maintain and make publicly available all documentation submitted in support of this funding request and all records supporting all expenditures of eligible mitigation action funds subject to applicable laws governing the publication of confidential business information and personally identifiable information. (5.2.7.2)

DATED: 7/22/19

Betsy McGregor
Preliminary Design and Environmental Manager

Alaska Energy Authority
[LEAD AGENCY]

for

Alaska
[BENEFICIARY]

ATTACHMENT B
Project Management Plan

Schedule and Milestones

School Bus Replacement Milestone	Date
Lead Agency (AEA) provides Notice of Availability of Mitigation Action Funds for Transit Bus Repower/Replacement Program	April 24, 2019
AEA hosts two webinars to explain application process and use of the EPA Diesel Emission Calculator tool	May 2, 2019 May 16, 2019
Project Sponsors (School Districts) submit proposals to AEA	April 24 – June 14, 2019
AEA provides written approval of Project Sponsors' proposals	July 2019
AEA submits Project Certification (D-4) to Trustee for advance funded projects	July 2019
Trustee acknowledges receipt of D-4 and funding direction	July 2019
Trustee allocates share of funds to AEA for approved projects	August 2019
Grant/Contract agreements between AEA and CBJ signed for approved project	August 2019
CBJ procures new buse s; new buses delivered and on-boarded; old buses scrapped in approved manner	September 2019
Delivery of new bus to CBJ	May 2020
Scrap old diesel bus	June 2020
CBJ certifies project completion through submittal of evidence of old bus scrapping, invoices and other documents required for reimbursement	June 2020
AEA reviews submissions, requests corrections if necessary, and provides reimbursement	Within 30 days of submittal and no later than September 2020
AEA reports to Trustee semi-annually on status of mitigation actions completed and expenditures and reports project completion.	January 2020, July 2020, January 2021

Budget

Alaska Project 002 Period of Performance: 9/1/2019 - 12/31/2020			
Budget Category	**Total Approved Budget**	**Share of Total Budget funded by VW Trust**	**Cost Share**
Equipment Expenditure	$1,132,925	$233,660	$899,265
Contract Support	$35,597	$0	$35,597
Subrecipient Support	$1,500	$300	$1,200
Administrative (7.5%)	$87,751	$87,751	$0
Project Totals	**$1,257,774**	**$321,711**	**$936,063**
Percentage		**26%**	**74%**

Projected Trust Allocations

	2019	2020	2021	2022	2023
1. Anticipated annual project funding request to be paid through the Trust	$321,711				
2. Anticipated annual cost share	$936,063				
3. Anticipated total project funding by year (line 1 plus line 2)	$1,257,774				
4. Cumulative Trustee payments made to date against cumulative approved beneficiary allocation	$497,449				
5. Current beneficiary project funding to be paid through the Trust (line 1)	$321,711				
6. Total funding allocated to beneficiary, inclusive of current action by year (line 4 plus line 5)	$819,160				
7. Beneficiary share of estimated funds remaining in Trust	$7,627,551				
8. Net beneficiary funds remaining in Trust, net cumulative beneficiary funding actions (line 7 minus line 6)	$6,808,391				

ATTACHMENT C
Detailed Plan for Reporting on EMA Implementation

The Alaska Energy Authority (AEA) will provide detailed reporting on the Public Transit Bus replacement project (Project 002) on its public VW website and will fulfill its reporting obligations to Wilmington Trust.

AEA's VW website (http://www.akenergyauthority.org/programs/vwsettlement) was created specifically to provide information related to the Trust, settlement documents, and Alaska's plans for disbursement, funding opportunities and implementation information. In order to provide transparency and accountability, AEA will post timely updates on information, including but not limited to:

- General information on the Partial Consent Decrees and State Trust Agreement
- Alaska Beneficiary Mitigation Plan
- Request for Applications (RFAs) as funding opportunities arise
- All public records supporting funding requests AEA submits to the Trustee and all public records supporting all expenditures of the trust Fund, subject to confidentiality laws and until the Termination Dates of the State Environmental Mitigation Trust Agreement.
- Contact information

AEA will periodically evaluate the implementation of the Beneficiary Mitigation Plan and EMAs to determine if revisions to the plan are necessary to achieve the goals outlined in the plan. Any changes to the plan will be posted on AEA's VW website for at least 30 days prior to implementation.

In addition, the State will also comply with the reporting requirements listed in the Environmental Mitigation Trust Agreement for State Beneficiaries in subparagraph 5.3:

> *For each Eligible Mitigation Action, no later than six months after receiving its first disbursement of Trust Assets, and thereafter no later than January 30 (for the preceding six-month period of July 1 to December 31) and July 30 (for the preceding six-month period of January 1 to June 30) of each year, each Beneficiary shall submit to the Trustee a semiannual report describing the progress implementing each Eligible Mitigation Action during the six-month period leading up to the reporting date (including a summary of all costs expended on the Eligible Mitigation Action through the reporting date). Such reports shall include a complete description of the status (including actual or projected termination date), development, implementation, and any modification of each approved Eligible Mitigation Action. … These reports shall be signed by an official with the authority to submit the report for the Beneficiary and must contain an attestation that the information is true and correct and that the submission is made under penalty of perjury. To the extent a Beneficiary avails itself of the DERA Option described in Appendix D-2, that Beneficiary may submit its DERA Quarterly Programmatic Reports in satisfaction of its obligations under this Paragraph as to those Eligible Mitigation Actions funded through the DERA Option. The Trustee shall post each semiannual report on the State Trust's public-facing website upon receipt.*

ATTACHMENT D
Detailed cost estimate

Budget Category	Total Approved Budget	VW State Trust	CBJ Cost Share[1]
Equipment			
All-electric Proterra Catalyst 35-foot bus	$739,000	$147,800	$591,200
Duopower drivetrain, extreme cold weather package, configurations	$210,000	$42,000	$168,000
Extended 12 year warranty	$75,000	$15,000	$60,000
Shipping	$5,200	$1,040	$4,160
EV charging infrastructure[2]	$103,725	$27,820	$75,905
Contractual			
EV charging infrastructure installation	$35,597		$35,597
Subrecipient			
Labor for bus scrappage[3]	$500		$500
Bus scrappage fee	$1,000	$300	$700
Administrative			
Administrative (7.5% project cost)	$87,751	$87,751	$0
Project Totals	**$1,257,774**	**$321,711**	**$936,063**
Percentage		**26%**	**74%**

1 CBJ cost share composed of FTA 49 U.S.C. 5339 funds ($397,339); FTA 49 U.S.C. 5339(c) funds; CBJ Capital Transit funds and $500 in-kind

2 EV charging infrastructure will be purchased thought the contractor.

3 CBJ is providing labor for bus scrappage as in-kind cost share.

MORRIS ENGINEERING GROUP LLC

PO Box 210049, Auke Bay, Alaska, 99821, 907-789-3350, 907-789-3360 fax

15-Jun-17

Cost Estimate

Project: Captial City Transit Facility Electrical Bus Power

Description: Power for (4) 62.5 KW, 480V, three phase bus charger stations

Labor wage w/ Benefits: 67
Labor Multiplier 1.5
Material Multiplier: 1.15

Item	*Quantity*	*Unit*	*Cost per unit*	*Total Material*	*Labor per unit*	*Total Labor*
Utility Services						
2-1/2" Conduit	1000	ft.	$ 2.60	$ 2,990	0.03	$ 3,015
2/0 THWN	3000	ft.	$ 1.60	$ 5,520	0.02	$ 4,523
MDP 100/3 C/B	4	ea.	$ 5,000.00	$ 23,000	16.00	$ 6,432
Install Charger	4	ea.	$ 250.00	$ 1,150	24.00	$ 9,648
CT Enclosure & CT	1	ea.	$ 5,000.00	$ 5,750	40.00	$ 4,020
Main Circuit Breaker	1	ea.	$ 12,500.00	$ 14,375	8.00	$ 804
800A I-Line Panel w/ c/bs	1	ea.	$ 40,000.00	$ 46,000	46.00	$ 4,623
4" Conduit	120	ft.	$ 12.60	$ 1,739	0.05	$ 603
500 XHHW	480	ft.	$ 5.80	$ 3,202	0.04	$ 1,930
Subtotal				$ 103,725.40		$ 35,597.10
Total Mat. & Labor				$ 139,322.50		
Contingency (15%)				$ 20,898.38		
Profit (10%)				$ 13,932.25		
Grand Total				***$ 174,153.13***		

125KW POWER CONTROL SYSTEM

SPECIFICATION

PROTERRA

General	
Model	125 kW Power Control System
Part Number	033713
Required system components	Proterra Dispenser CCS Type 1 Cable

Electrical Input		
Nominal Power – Continuous	138 kVA	
Input Voltage	480VAC, 5-Wire WYE (L1, L2, L3, Neutral, Ground)	
Input Current	166A @ 480VAC, 60Hz	
Input Frequency	60 Hz	
Power Factor	>0.995	
Maximum Efficiency	>90%	
THD – Full Power	<3%	
Electrical Output		
Output Power Capability – Continuous	125 kW	
Output Voltage	500-1000VDC	125kW
	270-499VDC	60kW
Output Current	± 200ADC	
Charging Module	Remote dispenser with vehicle interface	
Mechanical		
Cooling	Liquid cooled – closed loop, exchanger integrated	
Weight	2500 lb	
Dimensions	Width	39.5 inches
	Depth	29.75 inches
	Height	115 inches
Environmental Rated	NEMA 3R	
Wall Clearance	Side	6 inches
	Back	1 inch
Adjacent Unit Clearance	Side	1 inch gap
	Back	1 inch gap
Door Clearance	Facing open space	36 inches
	Facing another door	48 inch gap
Environmental		
Operational Temperature Range	-35°C to 55°C	
Humidity	0% to 95%	
Altitude	De-rates over 2000m above sea level	
Communications Protocols		
Remote management	OCPP 1.6 via 4G Cellular	
Vehicle Communication	SAE J1772 CCS	
Certifications		
UL	2202, 2231	

CATALYST® : 35 FOOT BUS

PERFORMANCE SPECIFICATIONS

PROTERRA

		FC Series		XR Series		E2 Series
	Description	FC	FC+	XR	XR+	E2
CATALYST VEHICLE WITH DUOPOWER™ DRIVETRAIN						
Total Energy	kWh	94	126	220	330	440
Operating Efficiency*	kWh/mile	1.21-2.02	1.28-2.08	1.15-1.95	1.21-2.02	1.28-2.08
	MPGe	18.7-31.0	18.1-29.5	19.3-32.7	18.7-31.0	18.1-29.5
Nominal Range	Miles; Total energy/ projected Altoona efficiency	67	86	163	235	302
Operating Range*	Miles; Usable energy/Operating efficiency	37-62	49-79	90-153	131-218	169-276
Top Speed (Proterra-governed)	mph (per tire rating)	65	65	65	65	65
Acceleration (at SLW, seconds)	0 to 20 mph	4.5	4.5	4.5	4.5	4.5
	20 to 50 mph	15.5	15.5	24.5	15.5	15.5
Gradability (top speed at % grade, at SLW, mph)	5%	59	57	40	59	57
	10%	40	37	23	40	37
	15%	27	26	16	27	26
Max Grade (at SLW)		27%	25%	28%	27%	25%
Horsepower	Peak	360	510	240	360	510
	Intermediate	360	426	240	360	426
	Continuous	225	257	150	225	257
Motor	Dual independent 190 kW motors	•	•	•	•	•
Gearbox	Proterra 2-speed auto-shift EV gearbox	•	•	•	•	•
Curb Weight	lbs	28,925	30,500	27,350	28,925	30,500
Max Gross Vehicle Weight Rating	lbs	39,500	39,500	39,500	39,500	39,500
CATALYST VEHICLE WITH PRODRIVE DRIVETRAIN						
Total Energy	kWh	94	126	220	330	440
Operating Efficiency*	kWh/mile	1.45-2.26	1.53-2.33	1.38-2.19	1.45-2.26	1.53-2.33
	MPGe	16.7-25.9	16.2-24.7	17.2-27.3	16.7-25.9	16.2-24.7
Nominal Range	Miles; Total energy/ projected Altoona efficiency	55	72	136	193	251
Operating Range*	Miles; Usable energy/Operating efficiency	33-52	43-66	81-127	117-182	151-231
Top Speed (Proterra-governed)	mph (per tire rating)	65	65	65	65	65
Acceleration (at SLW, seconds)	0 to 20 mph	6.7	6.7	6.7	6.7	6.7
	20 to 50 mph	32.8	32.8	32.8	32.8	32.8
Gradability (top speed at % grade, at SLW, mph)	5%	26	25	26	26	25
	10%	22	22	23	22	22
	15%	17	16	16	17	16
Max Grade (at SLW)		21%	20%	23%	21%	20%
Horsepower	Peak	295	295	245	295	295
	Continuous	181	181	150	181	181
Motor	Single 220kW permanent magnet drive motor	•	•	•	•	•
Gearbox	Proterra 2-speed auto-shift EV gearbox	•	•	•	•	•
Curb Weight	lbs	28,925	30,500	27,350	28,925	30,500
Max Gross Vehicle Weight Rating	lbs	39,500	39,500	39,500	39,500	39,500
CHARGING						
Max Plug-in Charge Rate at 200A (kW)	Standard J1772-CCS plug-in chargers	70	130	70	130	130
Max Overhead Charge Rate at 500A (kW)	Standard J3105 overhead fast-chargers	163	325	163	325	325
Overhead Charging	Miles replenished per 10 minutes **	19	37	9	13	17
	Fastest time Empty to Full***	2.4 hrs.	2.4 hrs.	2.4 hrs.	2.4 hrs.	2.4 hrs.
Plug-in Charging	Est. time Empty to Full***	< 1 hr	< 1 hr	< 2.5 hr	< 2.5 hr	< 3 hr

*Operating range and efficiency will vary with route conditions, vehicle configuration and driver behavior. | ** DuoPower powertrain efficiencies | *** Charge time will vary depending on charger type

CATALYST® : 35 FOOT BUS

PLATFORM SPECIFICATIONS

PROTERRA

	Description
VEHICLE DIMENSIONS	
Length	36'11"
Height	11'4"
Wheelbase	20'3"
Approach Angle	8.6°
Breakover Angle	8.5°
Departure Angle	8.7°
Turning Radius	36'
INTERIOR	
Seating Capacity	28
Door Width	Front 43.2", Rear 49.1"
Lighting	LED interior lighting system
Handles	Stainless-steel stanchion system
Stop Request	ADA pull cord or touch tape stop request
Doors	Senstive edges on both front and rear door
Wipers	Electric wipers and washers
HVAC	Overhead integrated system
EXTERIOR	
Bus Body	Carbon-fiber-reinforced composite material
Tires	Standard: Michelin 305/70R22.5
Exterior Lights	LED
BRAKES & SUSPENSION	
Braking System	Regenerative braking; front & rear air disk brakes
Traction	4-wheel ABS with optional traction control
Suspension	Multi-Link Air Ride rear suspension
ELECTRICAL SYSTEM	
Battery System	Integrated battery management system
Low Voltage	Two, Group 31 700 CCA 12v batteries
Charge Ports	J1772 CCS: One port standard at curb-side rear, 2nd port optional at street-side rear
Overhead Charging	Optional
ADA	
	Two ADA locations, one on each side of the aisle directly behind the front wheel
	ADA securement system
	Front ADA power wheelchair ramp (4:1, 6:1 slope)
	Rear door modesty panels
	Aisle width between front wheel wells: 35.5"
WARRANTY	
Vehicle	Complete Bus - 1 year or 50,000 miles Extended warranties and service contracts available upon request
Batteries	12 years / unlimited miles, materials and workmanship

PROTERRA DESIGNS AND BUILDS THE WORLD'S BEST PERFORMING HEAVY-DUTY, ZERO-EMISSION TRANSIT VEHICLES FOR ALL CLIMATES.

The Proterra® Cold Weather Package keeps your fleet rolling safely and comfortably in winter. Choose from Standard and Extreme options to get the winter coverage you need.

ENHANCE RIDER COMFORT AND SAFETY. Heated ramps, rear exit floors and auxiliary heat maximize comfort while minimizing slipping risks.

IMPROVE THE DRIVING EXPERIENCE. Heated mirrors keep sightlines clear. Front door defogger allows maximum visibility for loading and unloading passengers. Auxiliary heat helps riders and drivers stay comfortable.

MORE DRIVE TIME. LESS DOWN TIME. Heated charge blades, belly pans and integrated chains keep your fleet rolling when everything else freezes. That means fewer hazards and liabilities that impact revenue-service downtime.

PROTERRA

www.proterra.com

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COLD WEATHER PACKAGE

TURN UP THE HEAT
ON COMFORT AND SAFETY

KEEP YOUR DRIVERS AND RIDERS COMFORTABLE AND SAFE DURING WINTER WEATHER CONDITIONS WITH THE PROTERRA® COLD WEATHER PACKAGE.

Choose from two different configurations, depending on the severity of your climate. For regions with occasional snow and below-freezing temperatures, our Standard Cold Weather Package offers a front door and ADA ramp diffuser to remove ice and minimize slipping. Heated mirrors ensure better visibility. And a heated charge blade and scoop on the roof of the vehicle ensure consistent charging all winter.

For more extreme winter weather in northern or mountain climate zones, the Extreme Cold Weather Package offers the features of the Standard Package, with additional auxiliary heat for sub-zero conditions to keep riders and drivers comfortable. In addition, a heated rear exit floor prevents ice buildup. Optional features, including integrated chains and heated belly pans, add an extra layer of safety and operational reliability.

Whether you're dealing with a little cold or a lot, the Proterra Cold Weather Package has you covered for all your winter driving challenges.

EXTREME STANDARD

STANDARD COLD-WEATHER PACKAGE

- HVAC system maintains comfortable passenger compartment temperature in most winter conditions
- Heated charge blade and scoop enable all-weather charging
- Front door/ADA ramp diffuser keeps entry clear of ice
- Front door defogger ensures passenger loading visibility
- Heated mirrors maintain consistent visibility

EXTREME COLD-WEATHER PACKAGE

INCLUDES STANDARD PACKAGE PLUS:

- Auxiliary heat insures rider and driver comfort in all weather
- Heated rear exit floor prevents ice buildup
- Integrated chains eliminate downtime for installation and removal
- Heated belly pans prevent snow and ice buildup around drivetrain

PROTERRA®

40 FOOT BUS

DRIVETRAIN PERFORMANCE

PERFORMANCE COMPARISON	Catalyst® E2 with ProDrive Drivetrain	Catalyst® E2 with DuoPower™ Drivetrain
ENERGY (kWh)	440	440
OPERATING RANGE* (miles) Usable energy/Operating efficiency	UP TO 204	UP TO 230
OPERATING EFFICIENCY* (MPGe)	UP TO 22	UP TO 25
PEAK HORSEPOWER	335	510
ACCELERATION TIME @ SLW (seconds)		
0-20 MPH	6.4	5
20-50 MPH	23.5	12.3
MAX HILL CLIMB	21%	27%

*Operating range and efficiencies approximated from simulations based on UDDS cycle Altoona testing results at SLW, and will vary with route conditions, weather, vehicle configuration and driver behavior.

PROTERRA IS POWERING
TRANSIT INNOVATION
AND CREATING CLEAN, QUIET
TRANSPORTATION FOR ALL.
THIS IS OUR VISION AND
OUR JOURNEY.
JOIN US.

PROTERRA

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THE PROTERRA®

DUOPOWER™ DRIVETRAIN

PROTERRA

POWERING TRANSIT INNOVATION

WITH THE DUOPOWER™ DRIVETRAIN

FASTEST ACCELERATION

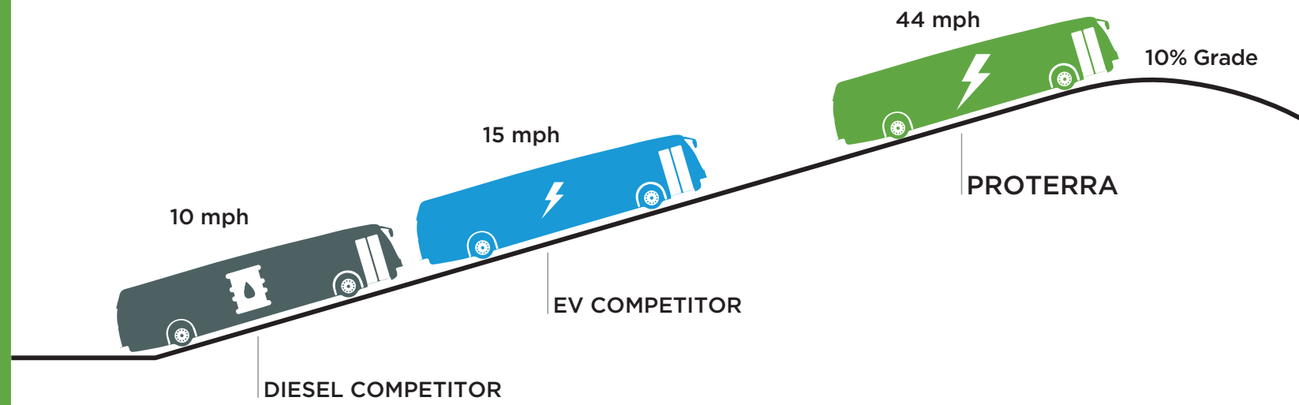
5X MORE EFFICIENT THAN A DIESEL BUS

GREATEST HORSEPOWER

By combining the DuoPower drivetrain with Proterra's market-leading battery technology and lightweight composite bus body, the Proterra Catalyst® vehicle provides unparalleled performance, accelerating 1.5 times faster than a standard diesel bus, with nearly twice the horsepower. With this high-performance electric drivetrain, the Proterra Catalyst E2 vehicle delivers up to 25 MPGe—over five times more fuel efficient than a diesel bus.

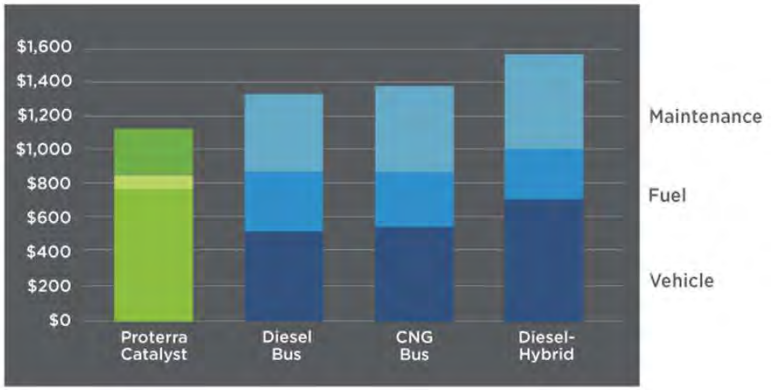
HILL CLIMB

PERFORMANCE COMPARISON	Diesel Competitor	Electric Competitor	Proterra Catalyst® E2 Bus with DuoPower™ Drivetrain
TOP SPEED ON HILLS			
5%	35 mph	33 mph	65 mph
10%	10 mph	15 mph	44 mph
15%	n/a	1 mph	31 mph
MAX HILL CLIMB	12.4%	15.1%	27%



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

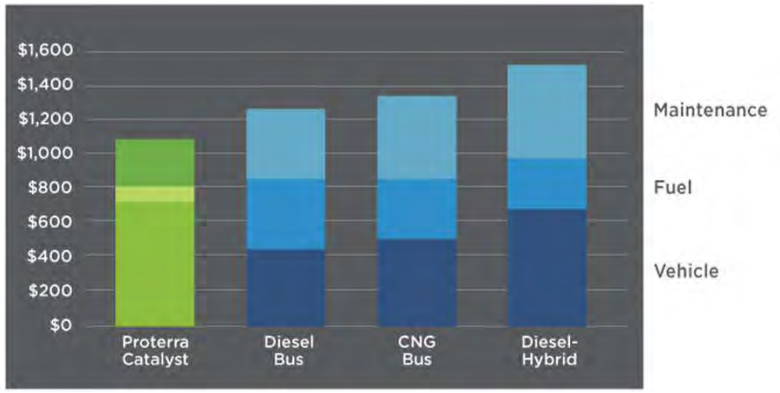
- Battery-electric vehicles have the lowest operational lifecycle cost:
  - High EV energy efficiency, low electricity rates, and high annual vehicle mileage combine to create significant fuel savings
  - 30% fewer parts dramatically reduce maintenance and operating costs
  - Electricity prices far more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

12-yr Operational Savings per Bus

$462k vs. Diesel
$467k vs. CNG
$479k vs. Hybrid

CATALYST 35 FT. TOTAL COST OF OWNERSHIP ADVANTAGE

	Proterra EV	Diesel Bus	CNG Bus	Diesel Hybrid
Vehicle	$709	$437	$486	$672
Energy/Fuel	$94	$381	$336	$297
Maintenance	$275	$450	$500	$550
TCO	$1,078	$1,268	$1,322	$1,519
TCO $'s/Mile	$2.16	$2.54	$2.64	$3.04



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