

HybriDrive Propulsion Systems

Saving fuel and emissions through platform electrification

NEDC 2015



HybriDrive Solutions



We deliver propulsion and power management performance with innovative electrification products and solutions to advance vehicle mobility, efficiency and capability



Who we are

Electric machine control, design and testing is at our core

We are world-class system integrators

We deliver sustainable solutions, not prototypes



The Leading trans-Atlantic Electric Hybrid Powertrain

Powering the world's largest electric fleets

In the world...NYC

In Canada...Toronto

In the UK....London

In California...San Francisco

In Mainland Europe...Paris, France

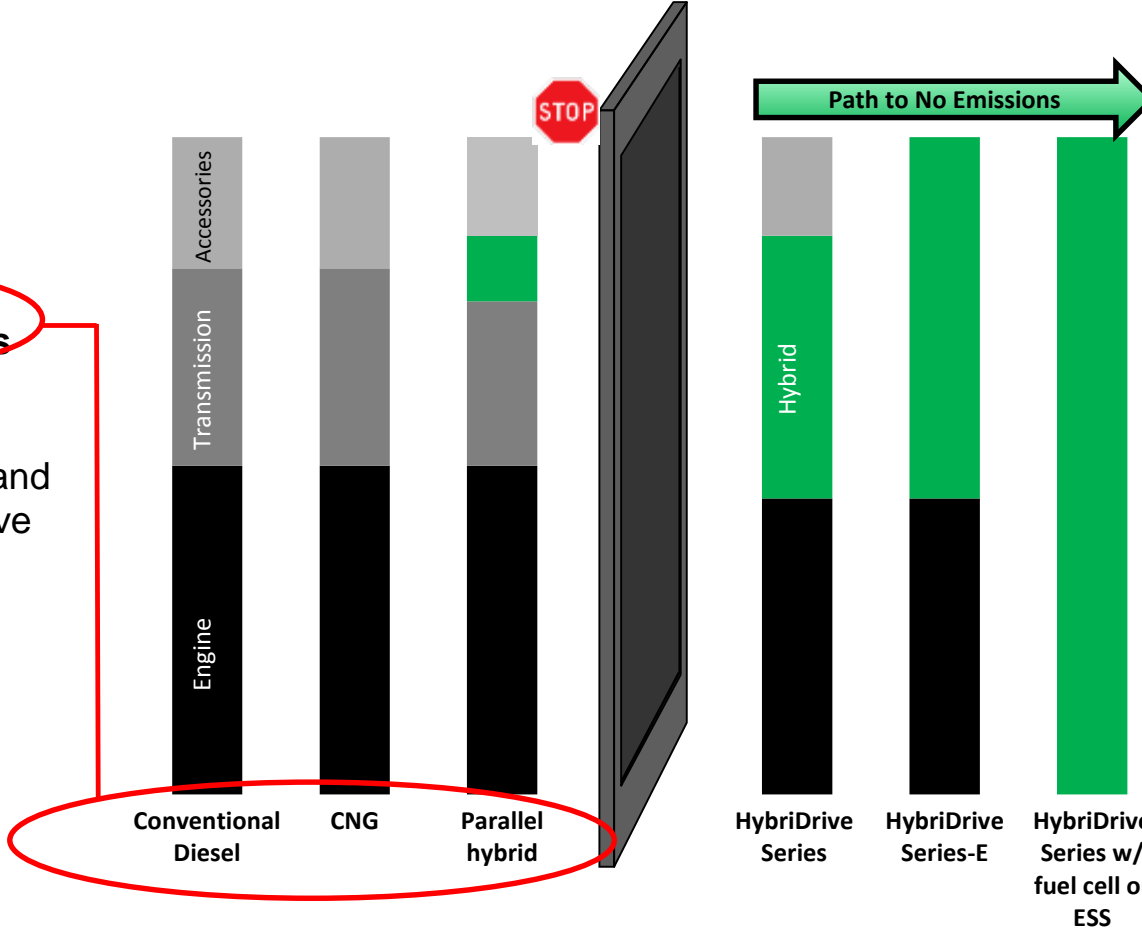


- La Reunion (French island off the coast of Africa)
- Adelaide, South Australia



Delivering the Path to No Emissions

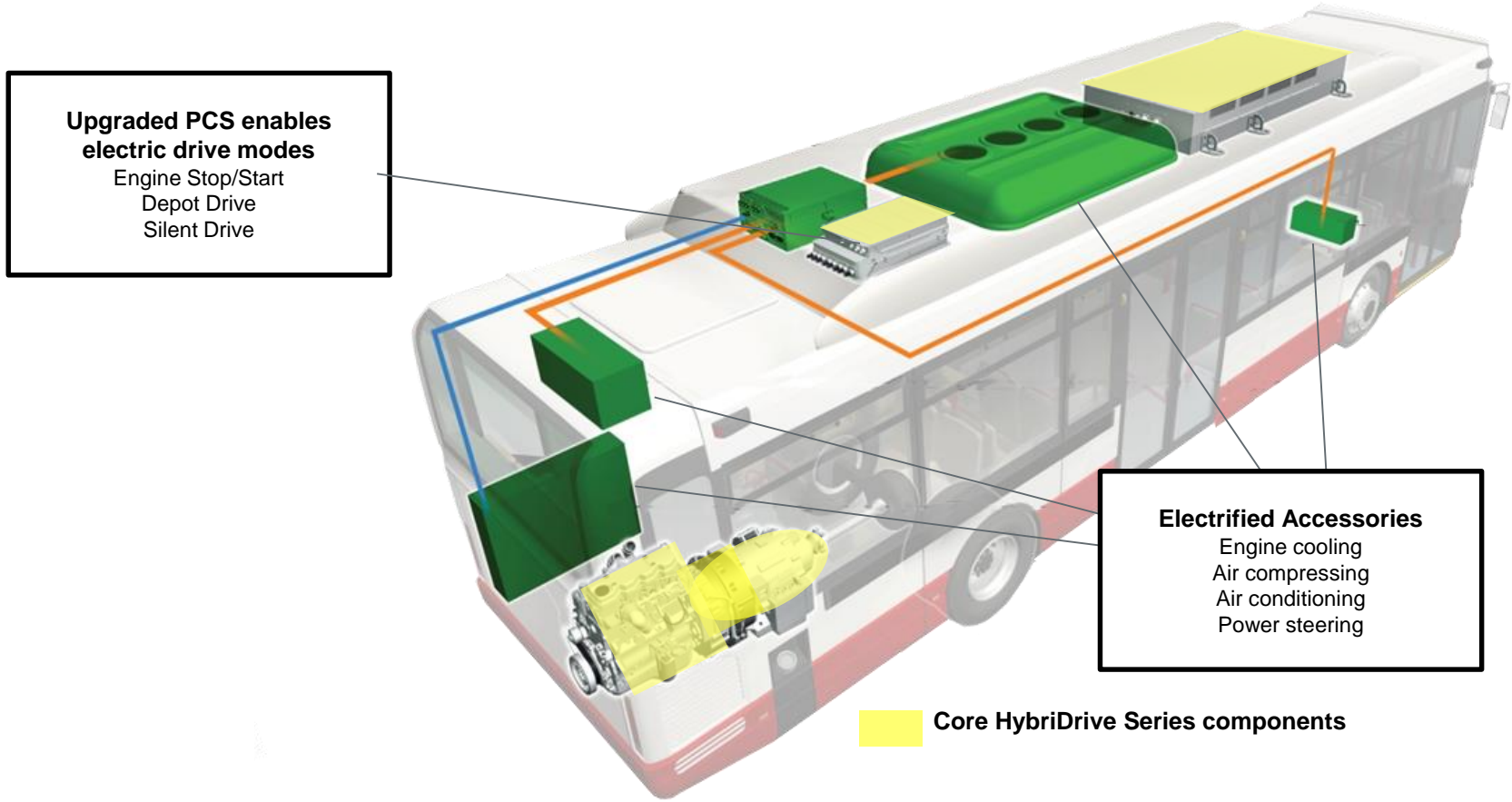
These **powertrain technologies** depend on *mechanical subsystems* and cannot achieve full No Emissions operations



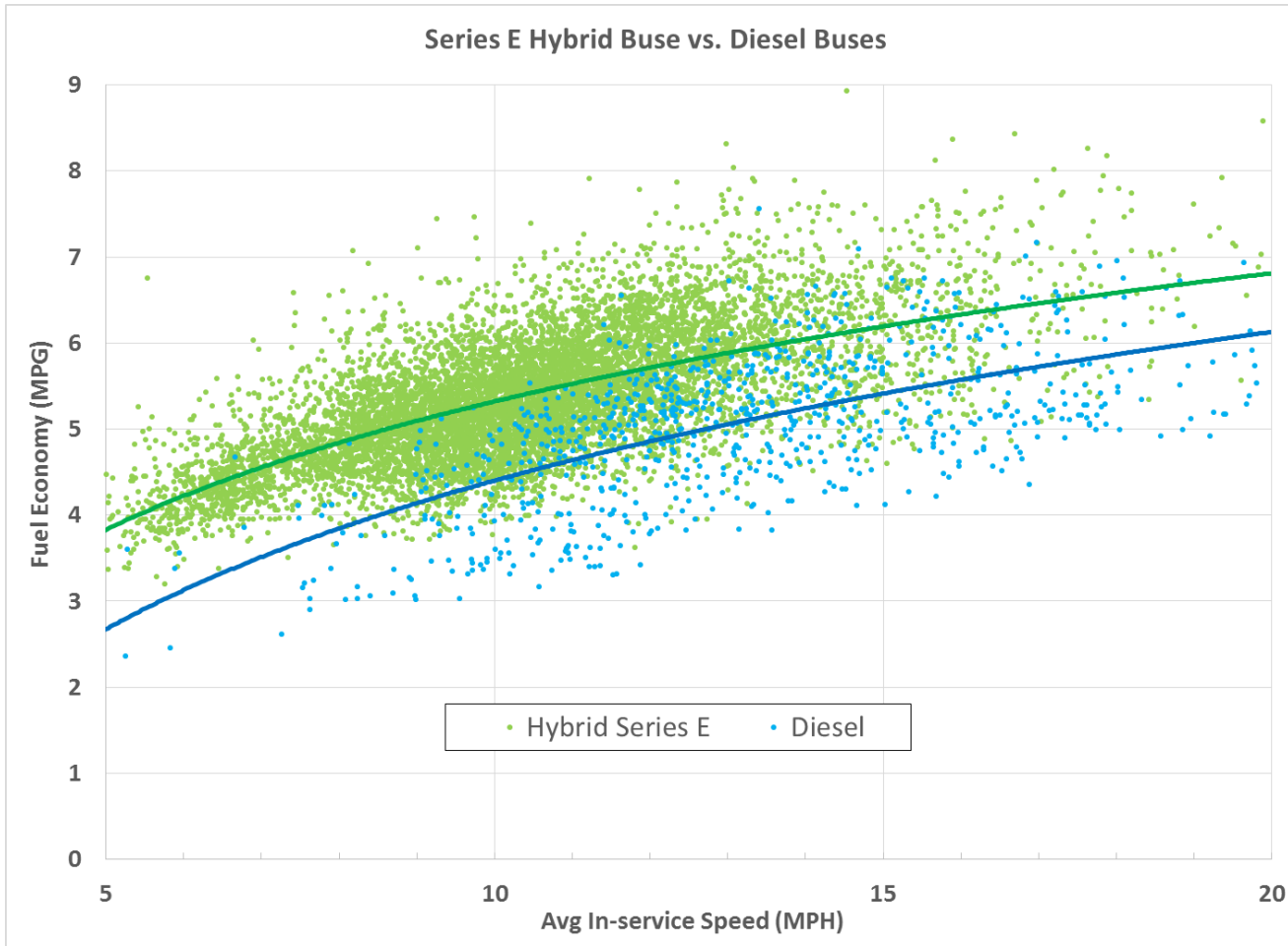
HybriDrive Series is **the core system architecture** enabling bus electrification, eliminating mechanical subsystems and delivering solutions on the Path to No Emissions

HybriDrive Series-E: The “Smart” Electric Drive

HybriDrive Series-E: Electrifying More



HybriDrive Series-E Delivers Superior Fuel Economy



- 8,600 bus-days of in-service data from Boston, San Francisco, Minneapolis, Baltimore, and Lancaster, PA
- MPG vs MPH over a full day in service
- On average, Series E buses delivering 0.7 – 1.1 MPG increase compared to diesel, across all real world transit duty cycles

Delivering the Path to No Emissions

Route-specific electric drive



On-Route Charging



On-Route Charging



Plug-in & Fast Charging



HybriDrive Series



Path to No Emissions



HybriDrive Series-E

On-Route Charging



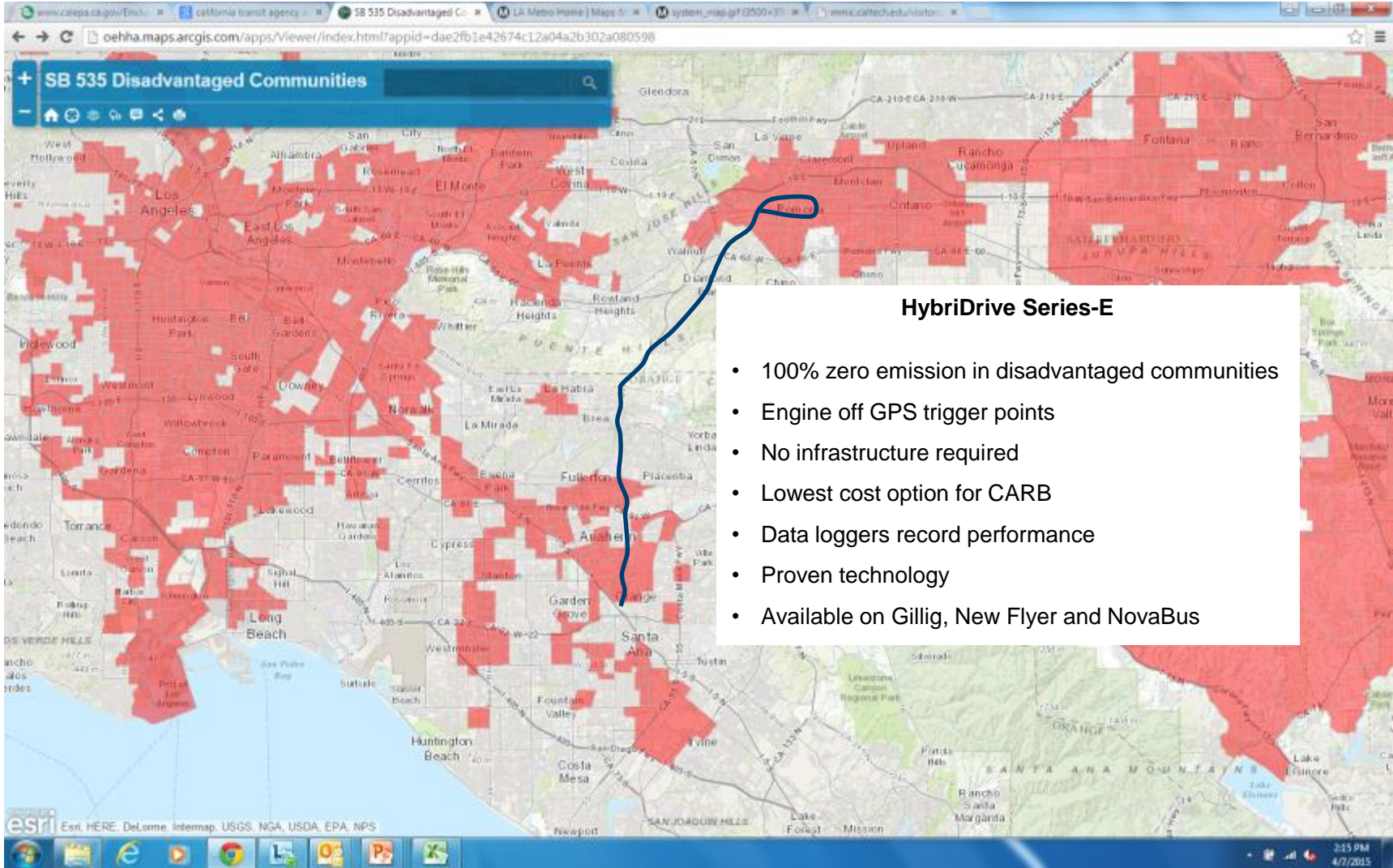
Enhanced Energy Storage System (ESS)



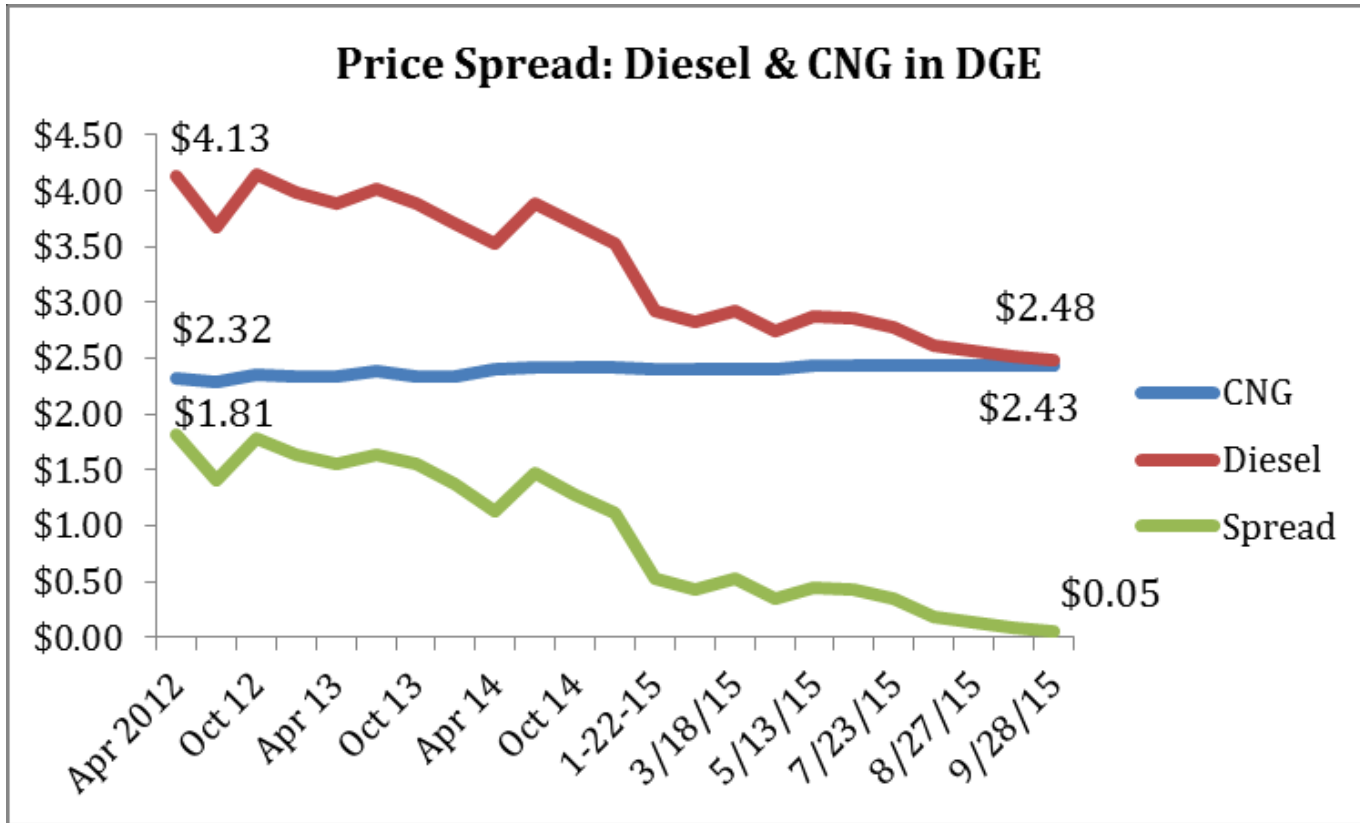
Battery Dominant Fuel Cell Bus



CARB's Zero Emission Bus Program



CNG and Diesel pricing



When the 'spread' <\$1.00, moving to CNG for a transit agency doesn't make financial sense

HybriDrive Delivers the Greatest Environmental Benefits

- Compared to new diesel buses, 246 HybriDrive Series E-equipped buses at RIPTA (Providence) will deliver savings up to:

	Annual	Life-Time
Fuel savings (gallon)	233,436	2.8 million
GHG reduction (ton)	3,342	40,105

- Compared to new CNG buses, 246 HybriDrive Series E-equipped buses at RIPTA (Providence) will deliver savings up to:

	Annual	Life-Time
Fuel savings (diesel-equivalent gallon)	450,927	5.4 million
GHG reduction (ton)	5,084	61,014

Based on 14.4 MPH average in-service speed, 38,735 miles per year and 12 year bus life. GHG savings are wells-to-wheels

Thank you

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