

9TH-ANNUAL



**AUTOMOTIVE
COMPOSITES
CONFERENCE
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World's Leading Automotive Composites Forum

**SOCIETY OF PLASTICS ENGINEERS
AUTOMOTIVE & COMPOSITES DIVISIONS**

Plug in to Composites

SEPT 15-16, 2009



The 100 MPG Bright IDEA

By

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- 2006 – PHEV Program originated at Rocky Mountain Institute
- Program initially focused on 1000 lb payload of U.S. Postal Service vehicle
- 2007 Research Consortium included Alcoa, Google.org, Johnson Controls and the Turner Foundation
- 2008 – Bright Automotive, Inc. launches from RMI and develops vehicle named IDEA
- 2009 – International reveal of IDEA at EVS-24!



Bright Automotive Hypothesis



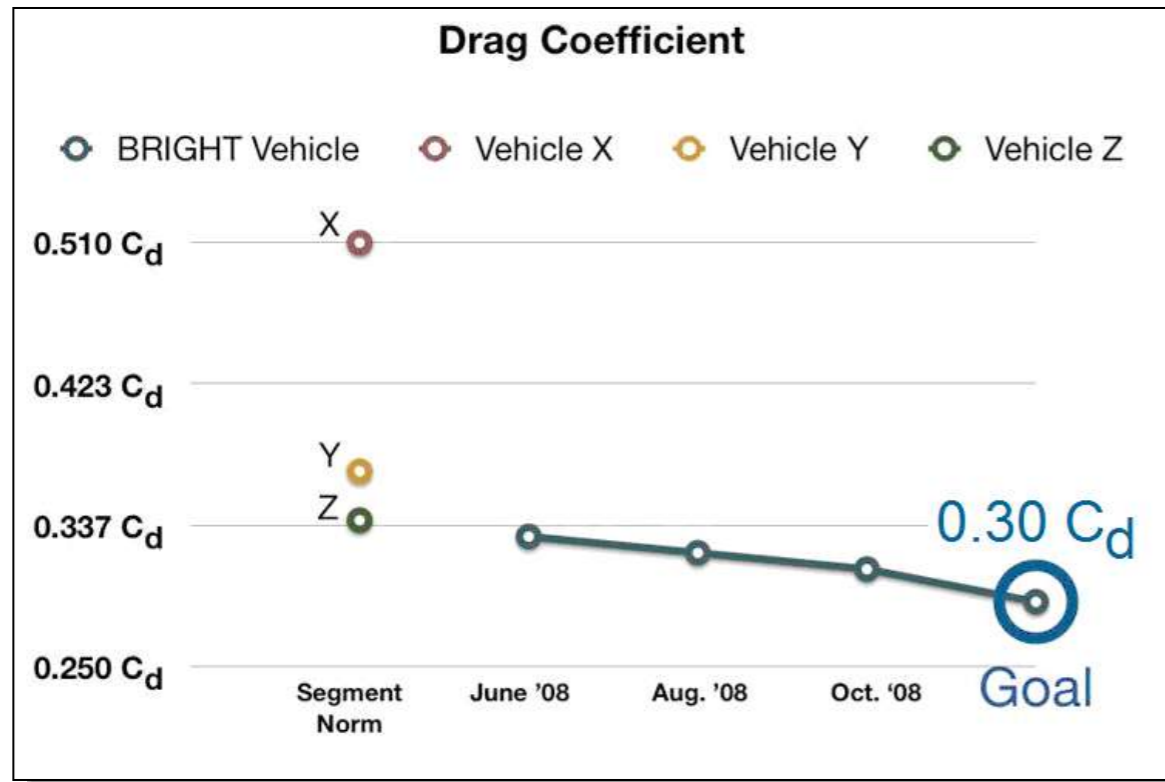
“A purpose-built, lightweight, aerodynamic plug-in hybrid will achieve superior market viability in the commercial van market.”



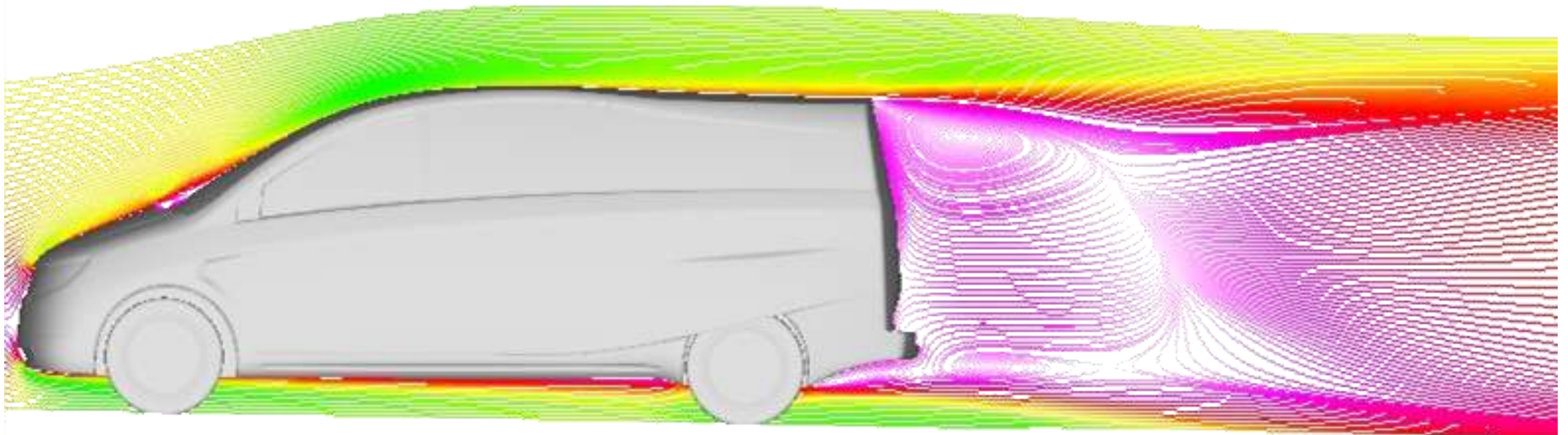
Our Answer



- Parallel “road coupled” hybrid system that reduces complexity and maximizes efficiency.
- Customer focused features like the “office.”
- Great platform physics (aerodynamics, mass reduction) to reduce battery loads.



- Breakthrough aerodynamic design helps achieve fuel economy
- Overall drag area leads class by 30%
- Detailed drag modifications:
 - A-pillar shaved, windscreen curvature increase, nose contour, underside panels, boat tail, roof contour adjusted



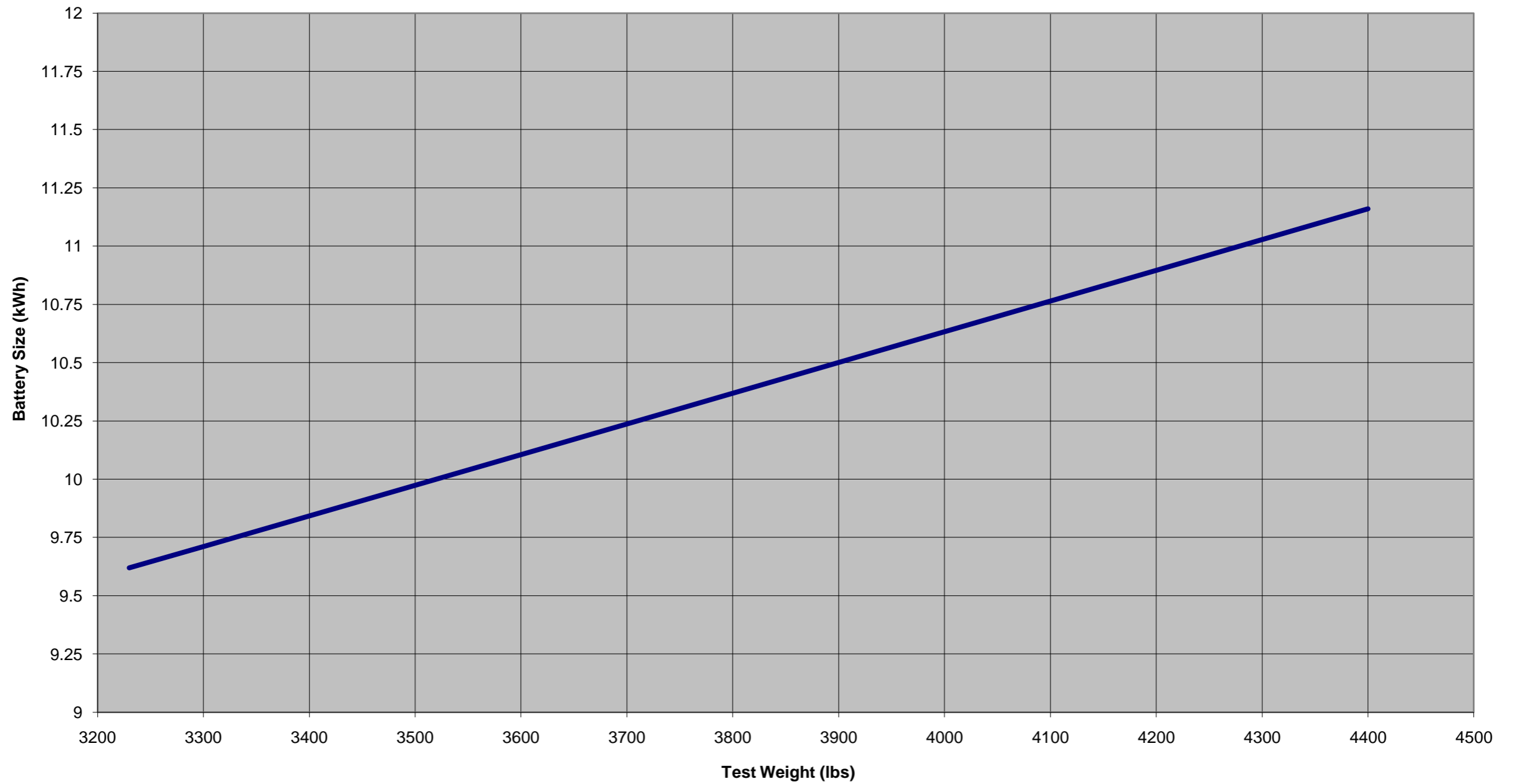


- Reduced vehicle mass saves system costs (e.g., smaller battery, smaller engine, smaller brakes, etc.)
- Battery system is 85% greater (than IDEA) for a vehicle *conversion*, primarily due to mass increase
- IDEA target weight is 36% lighter than competition
- Body and Chassis will be a combination of Aluminum and Composite materials.



Mass and Battery Size

Battery Size Required to Provide 30 miles of Electric-Only Operation
[20 deg C, 80% FTP schedule, 20% US06]





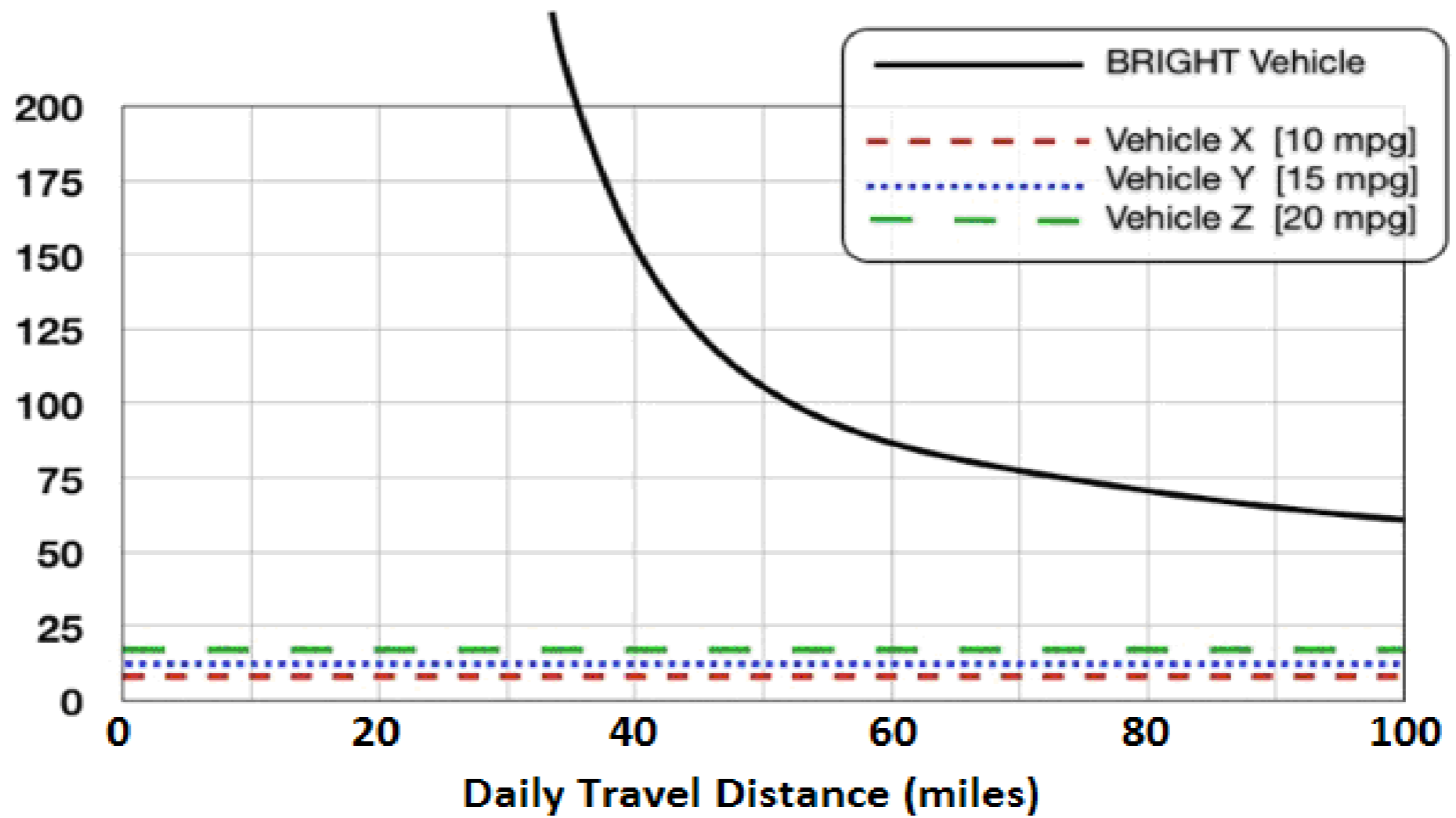
Mass Reduction – The Challenge!

- Due to the expense of batteries, mass reduction plays a very important role in the cost of ownership. PHEV's provide a new business opportunity for the composites industry.
- Bright Automotive would like to use as much composite material as possible if costs are less than \$5/pound saved relative to aluminum.
- We have found only a few areas in the body and chassis that have met this metric so far. We need more!!!
- We have no legacy manufacturing processes that deter us from investigating new material solutions.
- Entrepreneurial funding methods are needed to help keep initial investments low.



The Result - Fuel Economy

Cumulative Fuel Economy (mpg, gasoline usage)



SIMULINK vehicle model results, 80% FUDDS, 20% US06, 21C, hot-start

The Result - Vehicle Performance

- Parallel, road-coupled architecture (PRCA) can apply torque at both front and rear axles
- Front engine produces 170 Nm, rear electric axle produces 190 Nm
- Electric axle capable of constant, full torque up to 40 mph
- Combination results in 0-60 mph acceleration time of 8 seconds
- Maximum forward acceleration = 0.7 g



Dynamometer Test Lab



IDEA Cargo Area

Summary



WE NEED YOU TO -



Questions & Answers



Make the future BRIGHT!

Contacts

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