

PROSPECTUS &
STUDY SCOPE
OF WORK

CHARGING FORWARD

2020-2040 BEV & FCEV
FORECAST & ANALYSIS

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CHARGING FORWARD: STUDY PROSPECTUS

SUMMARY - Electric-based propulsion systems for commercial vehicles are likely to capture substantial share of the commercial vehicle market over the next two decades, threatening to displace internal combustion engines, today's dominant power source. This constitutes the most revolutionary development for the motor vehicle industry in the last 100 years. The migration to electric power will likely lead to major changes to adapt on the part of current industry participants while opening the door to new entrants. In response, major initiatives have been announced in the last few years by both existing and new players.

The introduction of prototype models in North America, the share gains of electric vehicles in the adjacent light vehicle space, trends for cost reduction and performance improvement, the stream of exciting new product introductions, plus carrot-and-stick incentives and mandates from regulators (along with sustainability interests of business and the public-at-large) give us confidence that electric powered vehicles, in some form, will realize increasing unit sales in the years ahead.

Decision-making executives, product developers, corporate planning and development departments, sales and marketing staff, the investment community, plus regulators and other stakeholders need reliable, well-founded long-term projections of sales potential and share gains for these new power technologies. As internal combustion engines (ICE: diesel and natural gas) and electrification (batteries and fuel cells) battle for customers, the ultimate outcome will depend both on financial benefits in the comparative total cost of operations, and the need to meet compliance goals for current and future environmental regulations.

ACT Research is uniquely positioned to forecast these market developments. Starting as early as 2011 with our first report on natural gas powered commercial vehicles, ACT Research has been at the forefront in analyzing and forecasting the growth of alternative fuels and power in the North American market. This leadership position was affirmed in 2018 with the release of its first commercial electric vehicle report, *Commercial Vehicle Electrification: To Charge or Not to Charge*, a comprehensive review and forecast of sales and share trends for battery electric power within the broader commercial vehicle universe.

Given the progress of the technology, products, and evolution of the competitive arena since the publication of the 2018 report, the time has come to revisit the original study, to refresh the assumptions and the resulting market outlook.

If you and your company want to understand the potential of these technologies, have access to key metrics that spell out in detail where this marketplace is headed, and how those changes could impact your business, purchase of this newly refreshed study is critical for you.

CHARGING FORWARD: STUDY PROSPECTUS

OUTLINE OF STUDY PARAMETERS AND DELIVERABLES:

1) Scope of Study – Definition of Deliverables

A) Unit Sales

- I) Geography - United States & Canada
- II) Timeframe/Horizon – Annually from 2020 to 2030 (10 years), then discrete single year outlooks for 2035 and 2040
- III) Vehicle GVW ranges – Class 8 Truck, Classes 4-7 Truck and Buses
- IV) Market segmentation (see matrix that follows)
- V) Comparison of power sources (see matrix)
- VI) Penetration - % share of total market (Baseline comp is ACT total forecast)

B) Adoption Path – Viability, competitiveness, upfront investment requirements and ongoing operating costs, policy impacts (regulation, incentives, taxes)

- I) Competing ICE (incumbent) alternatives
 - a) Diesel
 - b) Natural gas (tentative)
- II) Competing electrical approaches
 - a) Battery
 - b) Fuel cells

C) Battery and Power Storage Challenges

- I) Battery weight, density and efficiency
- II) Cost elements – purchase, maintenance, battery replacement, electricity, resale value
- III) Recharge cycle times & speed
- IV) Range
- V) Durability and replacement
- VI) Safety
- VII) Cold weather operation
- VIII) Electricity grid and distribution, plus charging infrastructure/installation
- IX) Driver issues including acceptance and productivity impact

D) Fuel Cell Challenges

- I) Cost elements – purchase, maintenance, fuel cost and availability
- II) Hydrogen distribution infrastructure build-out
- III) Scaling challenges (without penetration in LV markets)
- IV) Reliability and durability
- V) Safety
- VI) Driver issues, including acceptance and productivity impact

E) Comparative Total Cost of Operation by Market Segment (see segment matrix below)

2) Regulatory Challenges and Incentives

- A) EPA and CARB GHG2 and clean air regulations & potential future initiatives, and incentives
- B) June 2020 CARB zero emissions mandate
- C) CARB/EPA 2027 Low NOx impact on diesel technology and costs
- D) Treatment of materials recycling and other environmental impacts

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OUTLINE OF STUDY PARAMETERS AND DELIVERABLES:

3) Packaging and Deliverables Description

A) Analysis – An extensive written analysis will provide technology background and context, plus power source commentary across segments. This will build on the expertise ACT Research has gained through years of work with alternative power, plus recent customer projects and interactions with regulators and researchers.

B) Spreadsheets – Our “full transparency” approach to this work means that spreadsheet analytics will be provided to customers. They will have ready access to background assumptions, key metrics, and detailed financial projections for unit sales and market share detail. This enables customers to do their own independent hands-on work with our tool to test alternative assumptions, do sensitivity analysis and run their own what-if’s.

C) High end, low end adoption scenarios – For customers who want to see bracketing alternatives but don’t want to commit to preparing their own deep-dive, in addition to our base case we will also run high adoption and low adoption alternatives for BEVs and fuel cells.

ACT CEV STUDY - SEGMENT COVERAGE		DIESEL	BEV	FUEL CELL
Class 4-5	Step Van			
	Conventional			
	Low Cab Forward			
	RV			
Class 6-7	Step Van			
	Conventional			
	Low Cab Forward			
	School Bus*			
	RV			
Class 8	Yard Spotter*			
	Transit Bus			
	Straight			
	Day Cab			
	Sleeper			

CHARGING FORWARD: STUDY PROSPECTUS

ORDER FORM

FIRST NAME _____ LAST NAME _____

COMPANY _____ JOB TITLE _____

COMPANY ADDRESS _____

ADDRESS LINE 2 _____

CITY, STATE, ZIP CODE _____

COUNTRY _____

EMAIL _____ PHONE _____

Yes! I'd like to pre-order the CV Electrification 2021 Study for:

☐ **Full Study - \$21,000**

☐ **Class 8 - \$12,600**

☐ **Medium Duty - \$12,600**

Specialty Market Selection(s)

☐ **Yard Spotters - \$7,000**

☐ **School Bus - \$7,000**

☐ **Transit Bus - \$7,000**

☐ **Recreational Vehicle - \$7,000**

I understand I will receive the materials and an invoice by email. The invoice will be payable net 30 days.

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