COMMERCIAL VEHICLE PRODUCTIVITY AND EFFICIENCY:
INSIGHTS AND OPPORTUNITIES

Dick Cupka
Sustainability and Qualified Vehicle Modifier Manager
May 17, 2018
Ford Motor Company was built on the belief that freedom of movement drives human progress. It’s a belief that has always fueled our passion to create great cars and trucks. And today, it drives our commitment to become the world’s most trusted mobility company, designing smart vehicles for a smart world that help people move more safely, confidently and freely.
EV strategy plays to our strengths, builds on our brands, leverages scale and innovates across the value chain.

Mach I – Performance BEV

F-150 Hybrid

Transit Plug-In Hybrid

Mustang Hybrid

Ionity
Fast Charging Infrastructure
We will spend over $11 billion on EVs by 2022

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**U.S.**
- Positioned for EV leadership
- HEV offered on all mainstream models

**Europe**
- Strong BEV portfolio
- Mild hybrids

**China**
- BEVs and hybrids with JVs

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**EV Investment (Bils)**

- **Original Investment**:
  - 2015 - 2020: $4.5

- **Revised Investment**:
  - 2015 - 2020: $6.7
  - 2015 - 2022: >$11

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**2015 - 2020**

16 Full Battery Electric Vehicles

40 Electrified Vehicles
There is No Silver Bullet

• Considerations
  • Total Cost of Ownership
  • Range Requirements
  • Power/Payload requirement
  • Fuel Availability & Pricing
  • Infrastructure Support

• “Power of Choice”
  • Gas, Diesel, CNG, LPG
  • BEV, PHEV, HEV, Fuel Cell

Clean efficient ICE engines remain viable in many applications
Electrification is gaining momentum—let’s be clear about Ford’s approach

**Ford IS**

- Market driven
- Focusing on Human-Centric Design where we are strong
- Targeting use-cases which can benefit from electrification
- Prioritizing the elimination of barriers to create a compelling customer proposition

**Ford IS NOT**

- Regulatory driven
- Abandoning conventional powertrains
- Looking for a one-size-fits-all solution
- Flooding the market with EVs as a reaction to competitive announcements
What have we learned?

• Package and payload must never be compromised

• Range anxiety is real

• If charging occurs when the vehicle is naturally dwelling, it can save time and effort over present day fueling

• There are use-cases in which electrification can provide reduced operating/ownership costs one-size-does-not-fit-all

• Electrification attributes can go beyond fuel savings - - simpler maintenance, quieter/unrestricted operation, Green Image ...
EV adoption independent of regulation will rise as barriers come down and will accelerate as range increases.
Projected BEV battery cell cost at scale

Source: Ford internal estimate

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<tr>
<th>Year</th>
<th>Advanced Li-Ion</th>
<th>Post Li-Ion</th>
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Total cost of ownership depends on acquisition cost and usage.

As acquisition costs converge, the crossover point of total ownership costs will occur sooner.
Electrification will reach a tipping point

Anticipated Electrification Mix Rates

- **2015**: Internal Combustion Engine (ICE)
- **2020**: Internal Combustion Engine (ICE) with increasing Hybrid Electric Vehicle (HEV)
- **2025**: Internal Combustion Engine (ICE) with significant Hybrid Electric Vehicle (HEV) and Zero Emissions Vehicle (ZEV)
- **2030**: Predominantly Zero Emissions Vehicle (ZEV) with minimal Internal Combustion Engine (ICE)
Choice of fuel is required due to:

- Range Requirements
- Power / Payload requirements
- Fuel Availability and Pricing
- Infrastructure Support

Clean efficient ICE engines remain viable in many applications.
Ford EV solutions will continue be tailored by demand and infrastructure

- High Volume = OEM
- Small volume = QVM (Qualified Vehicle Modifier)
- Niche = Aftermarket
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<tr>
<th>CV -- Vocations</th>
<th>BEV 'Use Case' Criteria</th>
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**Key**
- ✓ Most Aligned +1
- S Some Aligned +0.5
- X Few Aligned -1
- A Accessory Loads -0.5
- R Risk Averse -3
eQVM – EFFICIENT/CLEAN UP-FIT OPPORTUNITIES

Hybrid Electric

Battery Electric

Battery Electric

Hydraulic Hybrids
Our strategic approach focuses on building a foundation for long term success

- **Play To Our Strengths**: Commercial, trucks, utilities, performance
- **Build Brand and Credibility**: Building on our iconic nameplates; Zero compromise battery electric vehicles
- **Leverage Scale and Technology**: Design, volume, manufacturing and purchasing power
- **Business Model Innovation**: Ecosystem approach (charging, insurance and customer experiences)
To be continued -