Outlook for Electric Vehicle Sales Under the Inflation Reduction Act

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BEV Teardown Series: What We Tore Down

- **Tesla Model Y** - Source: A2Mac1; Wells Fargo Securities, LLC
- **Hyundai Ioniq 5** - Source: A2Mac1; Wells Fargo Securities, LLC
- **XPeng P7** - Source: A2Mac1; Wells Fargo Securities, LLC
- **BYD Han** - Source: A2Mac1; Wells Fargo Securities, LLC
- **Ford Lightning** - Source: A2Mac1; Wells Fargo Securities, LLC
- **Rivian R1T** - Source: A2Mac1; Wells Fargo Securities, LLC
1) Battery Raw Material Cost Spiked Materially

- Spike in critical BEV raw materials have severely impacted BEV economics (Nickel & Lithium)
- Raw material costs rose from $64/kWh to $87/kWh | Sub-$100/kWh targets unlikely

**Mass Market EV Small SUV Cost**

<table>
<thead>
<tr>
<th>Size (kWh)</th>
<th>Curr. Battery Cost/kWh</th>
<th>Total Battery Cell Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 kWh</td>
<td>$112/kWh</td>
<td>$6,720</td>
</tr>
<tr>
<td>60 kWh</td>
<td>$136/kWh</td>
<td>$8,160</td>
</tr>
</tbody>
</table>

**Full-Size Pickup EV Cost**

<table>
<thead>
<tr>
<th>Size (kWh)</th>
<th>Curr. Battery Cost/kWh</th>
<th>Total EV Powertrain Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>135 kWh</td>
<td>$112/kWh</td>
<td>$15,120</td>
</tr>
<tr>
<td>135 kWh</td>
<td>$168/kWh</td>
<td>$18,360</td>
</tr>
</tbody>
</table>

Source: Company Reports; Wells Fargo Securities, LLC estimates

**Tesla NCA Battery Cost Trend ($/kWh)**

- 2021: Raw Mat Cost $48, Other Cost $64
- 2022, Peak: Raw Mat Cost $130, Other Cost $130
- June 2023: Raw Mat Cost $49, Other Cost $87

Source: A2Mac1; Wells Fargo Securities, LLC estimates

**Tesla Model Y Raw Materials In Lbs**

- Nickel: 140 Lbs
- Copper: 120 Lbs
- Lithium: 5 Lbs
- Cobalt: 1 Lbs
- Aluminium: 1 Lbs

Source: A2Mac1; Wells Fargo Securities, LLC estimates
ICE vs. BEV Cost Parity Still Far in the Distance

- Pack & E-Powertrain Also Add Cost
- All-In NMC-based BEV powertrain is ~$7.6k more costly than ICE
- Average global OEM profit ~$4k per vehicle.
- We estimate cost parity will not occur until after 2030

Source: A2Mac1; Wells Fargo Securities, LLC

BEV vs. ICE Cost Analysis for NMC

- BEV Current (NMC): $14,700
  - Battery Cells: $4,260
  - Power Electronics: $7,380
- ICE: $7,100
  - eDrive & Inverter: $5,650

Source: A2Mac1; Wells Fargo Securities, LLC

EV to ICE Upfront Cost Parity Outlook for Mass Market

Source: A2Mac1; Wells Fargo Securities, LLC
Pickup Profits at Risk

- BEV Economics Worse for Pickups
- Full-Size Pickups Account for Most of GM & Ford Profits
- Pickups are ~3% of Global Unit Sales, But are ~14% of Global Profits & ~41% of N America Profits

### Rivian R1T vs. Ford Lightning BEV Powertrain Cost

- **Rivian R1T**
  - $32,000
  - $4,660
  - $19,460

- **Ford Lightning**
  - $26,690
  - $2,950
  - $2,950
  - $3,600
  - $17,180

- **ICE F-150**
  - $8,000
  - $6,385

### Full-Size Pickups Estimated Percent of Auto Profits

- **GM**
  - 76%
  - 70%

- **Ford**
  - 72%
  - 69%

Source: A2Mac1; Wells Fargo Securities, LLC

Source: Company websites; Wells Fargo Securities, LLC
2.) BEV Raw Material Supply Chain Is Not Ready for Demand

- Critical raw material analysis indicates shortage risk
- Long lead-times of over 10 years on average

Source: USGS; Cobalt Institute; Copper Institute; Bloomberg; Wells Fargo Securities, LLC estimates
3.) US Regulations Force Sales of BEVs

Recent regulations have forced OEMs to build more fuel-efficient and cleaner vehicles

- EPA’s 2023 Rule projects 67% BEV penetration
- NHTSA likely to follow EPA
- CARB targeting 35% ZEV sales in 2026; 68% in 2030; 100% in 2035

Source: Company Reports; Wells Fargo Securities, LLC estimates

Which Technologies Can Help Automakers Reach 2032 Emissions Targets?

Source: Company Reports; Wells Fargo Securities, LLC estimates

US Fuel Economy Actual & Targets for Cars

Source: Wards; EPA; NHTSA; Wells Fargo Securities, LLC estimates

US Fuel Economy Actual & Targets for Light Trucks

Source: Wards; EPA; NHTSA; Wells Fargo Securities, LLC estimates
IRA to the Rescue

**Production Tax Credits**
- $35/kWh credit for battery cells
- $10/kWh credit for battery module
- Made in the US
- No income, price, or sourcing requirements

**Commercial EV Buyer Credits**
- $7,500 Buyer Savings
- Made in N America
- Business must depreciate vehicle on taxes to qualify
- No income, price, or sourcing requirements
- Limited market

**Retail EV Buyer Credits**
- Buyer Income Cap
- Price Cap ($55K car; $80K SUV)
- Foreign Entity of Concern

**Battery Component**
- $3,750 Buyer Savings
- >50% NAFTA before ‘24; 100% by ‘28

**Critical Mineral Sourcing**
- $3,750 Buyer Savings
- >40% US or FTP sourced before ‘24; 80% by ‘28

Source: IRA; Wells Fargo Securities, LLC
IRA Sourcing Challenge

- Only 11% of Nickel and 6% of Cobalt reserves are in the US or with free trade partners.
- China dominates the refining of raw materials –75% cobalt, and 59% Lithium
- Limited refining in US or with FTP; 28% of Lithium with FTP Chile

Source: USGS; Cobalt Institute; Copper Institute; Bloomberg; Wells Fargo Securities, LLC estimates
Economics Better, but Still Worse

ICE vs. BEV Economics for Small SUV

Source: A2Mac1; Wells Fargo Securities, LLC estimates

ICE vs. BEV Economics for Pickup

Source: A2Mac1; Wells Fargo Securities, LLC estimates

ICE vs. BEV Economics w/ IRA Help

Source: A2Mac1; Wells Fargo Securities, LLC estimates
BEV Market Outlook

- Outlook Driven Largely by Regulatory Push
- EPA 67% 2032 Target Likely Lowered Given Supply Chain Limits
- Ford CEO Recently Likely BEV Trajectory by 2030 is ~30%

Source: S&P; BNEF; Wells Fargo Securities, LLC estimates
Impact on Auto Financing

**EV Prices Higher Than ICE**
- Average MSRP of EV greater than average MSRP of ICE vehicle
- Cost of insurance of EV greater than cost to insure ICE vehicle

**More Leasing: IRA Loophole**
- Foreign-made EVs qualify if they are leased (under Section 45W)
- Leases avoid the foreign entities of concern & price cap rules
- Diplomatic approach to allow international OEMs time to localize in the US
  - Hyundai-Kia already taking advantage

**BEV Depreciation Risks**
- BEV battery life unknown (maybe 15 years)
- ICE vehicle lifespan >20 years
- Battery life impacted by many conditions including climate, charging process
- Since BEV market is relatively new, rate of depreciation on BEVs is unknown
- Deprecation is biggest cost of ownership
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