



Fact v. Fiction - Learnings from service and repair experiences of real-life BEV owners

October 2024

These materials are intended to supplement a discussion with L.E.K. Consulting. These perspectives will, therefore, only be meaningful to those in attendance. The contents of the materials are confidential and subject to obligations of non-disclosure. Your attention is drawn to the full disclaimer contained in this document.



Background and Objectives



Although sales growth in BEVs has slowed, it is continuing to rise and BEVs are comprising a larger and larger part of the car parc



Most research suggests BEVs will require less aftermarket service compared to ICE counterparts, but much of the work to date has focused on theoretical service needs



We are reaching an inflection point where a sufficient volume of BEVs have been on the road and data on real-world experiences is starting to emerge

Key Objectives of this Study

1. How do actual owner experiences with BEV service and repair needs compare to the expectations that are being set?
2. What does real-life data on aftermarket service, repair, and replacement of common components look like as the first ~5M+ BEVs age?
3. What are the potential implications for automotive service spend as BEVs become a larger proportion of the VIO?

Large scale data on BEVs is beginning to emerge and show trends, but we are in the early innings – it will remain important to keep an eye on how these trends evolve as platforms mature

While sales growth of BEVs has slowed and forecasts have been revised down, BEVs are still expected to represent ~50% of new sales in 2035

EV Sales Are Slowing. Tesla's Are Slumping
2024

The New York Times

5-Figure EV Discounts Emerge Amid Bloated Inventories
2024

Automotive News

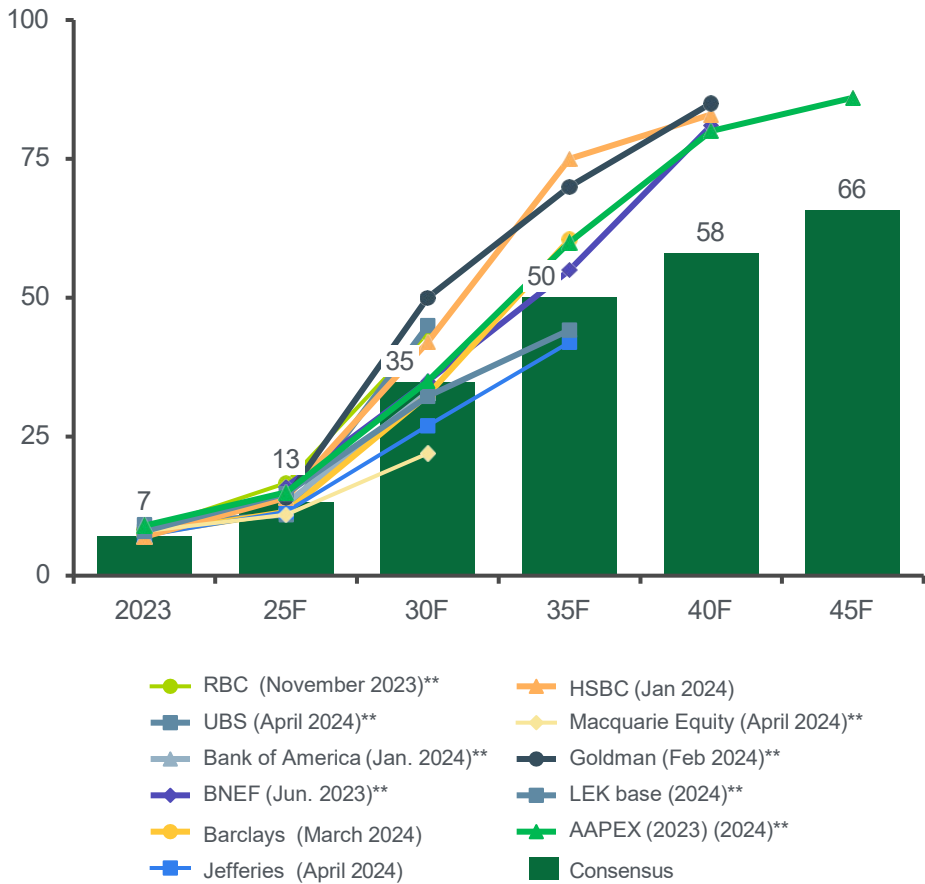
Electric Cars Sold At Record Discounts As Demand Plunges
2024

yahoo!finance

Ford Delays Launch of New EV to Let Market Further Develop
2024

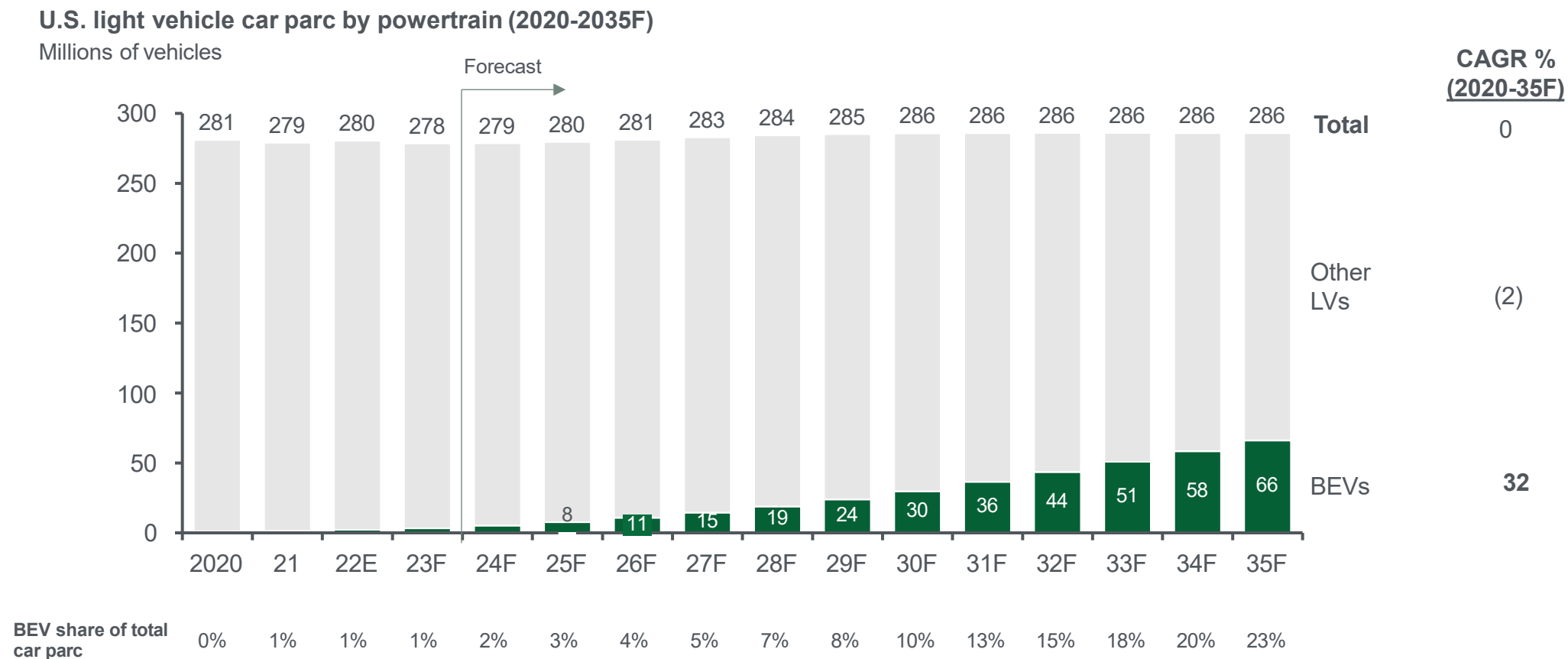
THE WALL STREET JOURNAL.

N.A. BEV sales penetration forecasts* (2023-2045F)^
Percent of new light-duty sales



Note: "Consensus" forecasts have been extended out to 2045 using most recent relevant growth rates of respective forecasts
Source: RBC; Barclays; Jefferies; HSBC; Macquarie, Appex; J.D. Power; NREL; IEA; BP Energy Outlook; L.E.K. IP, research, and analysis

If BEV adoption approaches forecast levels, BEVs are expected to comprise ~25% of the U.S. VIO in 2035



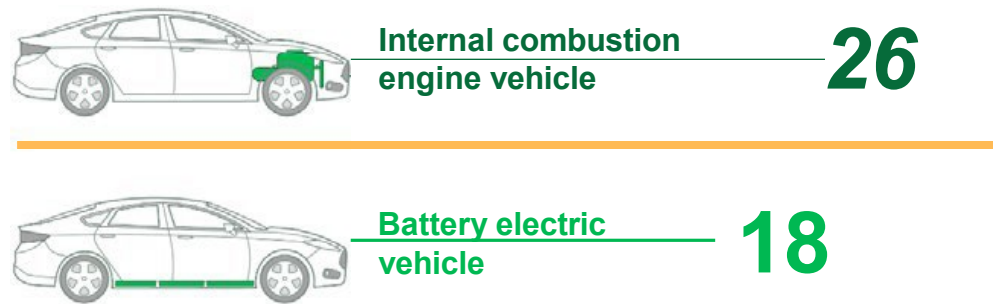
Source: L.E.K. 2024 BEV Penetration Forecast



The potential impact on the magnitude of aftermarket service spend is material as BEVs gradually increase in share of VIO

Recent market estimates on the potential reduction in aftermarket service needs for a BEV

~30% less recommended service visits over the first 150k miles



~25-40% less maintenance and upkeep costs over a lifetime

Relative cost of maintenance and upkeep for a BEV relative to an ICE (2022)



Notably, most initial estimates of the impact of BEVs on aftermarket service opportunity are often based on theoretical scheduled services, exclude potential unexpected failures, and exclude collision repair

Note: Note:* Based on AAA cost of ownership calculator, average comparison of electric vs. ICE versions of three models (Hyundai Kona / Kona Electric, Ford F 150 / F 150 Lightning, and Kia Niro / Niro Electric), each assumed to drive 20,000 miles annually

Source: L.E.K. research and analysis, AAA, McKinsey, Consumer Reports

While BEVs should theoretically drive lower maintenance and repair costs compared to ICEs, the experience of owners and fleet operators has been decidedly varied

Hertz reverses course on electric vehicles

The company, which once said EVs would account for a quarter of its rental fleet by 2025, is selling some 20,000 electric vehicles and replacing them with gas-powered cars.

Hertz is ditching 20,000 electric cars, citing expensive repairs. Here's how much it can cost to service an EV.

Report: EV Repair Costs 28% Higher than ICE Vehicles

EV maintenance costs remain high, frustrating buyers and automakers as sales lag expectations

BY DYLAN SLOAN
June 6, 2024 at 4:03 PM EDT



Electric Vehicles Are Less Reliable Than Conventional Cars

Hybrids are the most reliable cars and PHEVs the least reliable in CR's most recent survey; Tesla's Model Y is newly recommended

EV Maintenance Costs Are 30% Lower Than Gas Vehicles At 3 Years, New Study Finds

Pay Less for Vehicle Maintenance With an EV

CR research shows that EVs cost less to maintain than gasoline-powered vehicles

By Benjamin Preston
September 26, 2020

Electric cars can cost 40% less to maintain than gasoline cars

Electric vehicles have fewer parts to service, so they're generally less expensive to repair and maintain than conventional cars.

To understand what real-world owners and operators of BEVs are truly experiencing on average, L.E.K. conducted a research exercise leveraging several source of empirical data



Addressable Aftermarket Service Spend Considered

Routine maintenance

Manufacturer-recommended services and inspections as indicated in ownership manuals; excluding state inspections

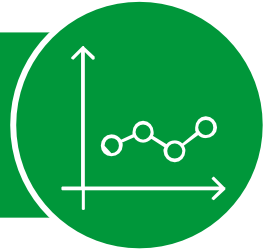
Unexpected repairs

Replacement and repair of mechanical and electrical parts with a focus on components most frequently replaced in years 0-10 of ownership

Collision repair

All body, paint, and other repair work conducted as a result of an auto collision event

Sources of Real-life Data On Total Spend



L.E.K. Consumer Survey

Survey of ~540 vehicle owners, including 300 BEV owners and 140 HEV | PHEV owners

Industry Failure and Replacement Data

Synthesis of research studies on part replacement rate data based on a sample of >100k vehicles

Collision Claims Data

Review of insurance claims data on collision repair costs for BEV and ICE vehicles

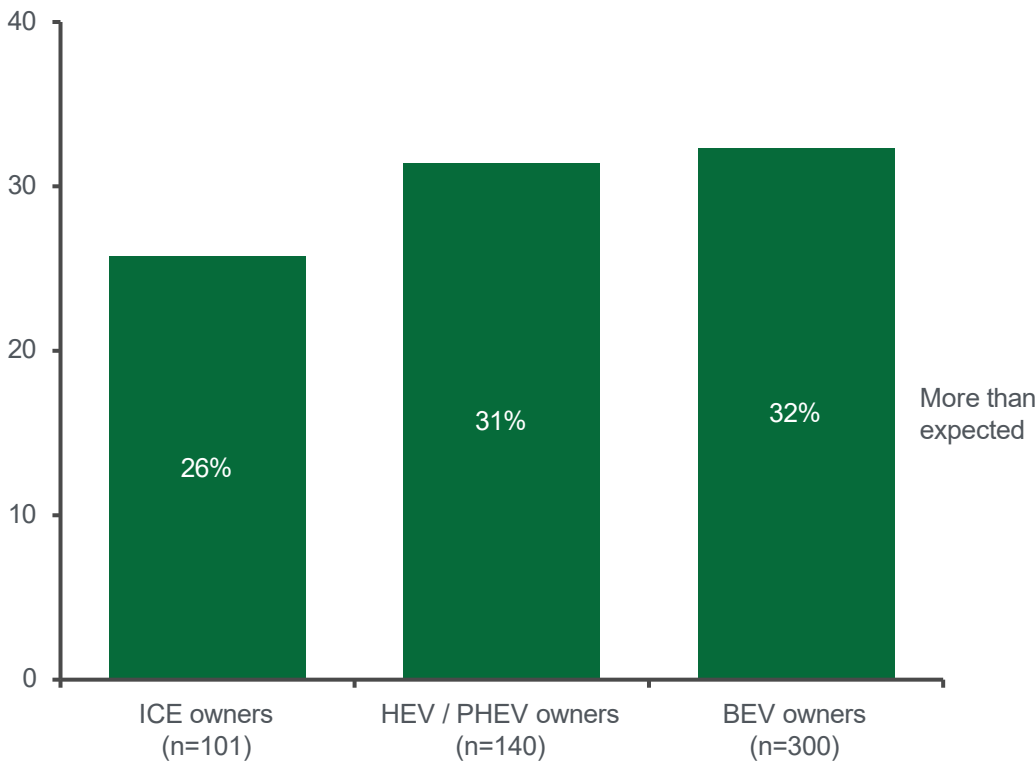
Primary Market Discussions

Interviews with installers and shop operators at dealership service lanes and independent garages

Relative to expectations, owners of both BEVs and HEVs / PHEVs report spending more on aftermarket services than they had originally expected; the large majority try to follow recommended service intervals

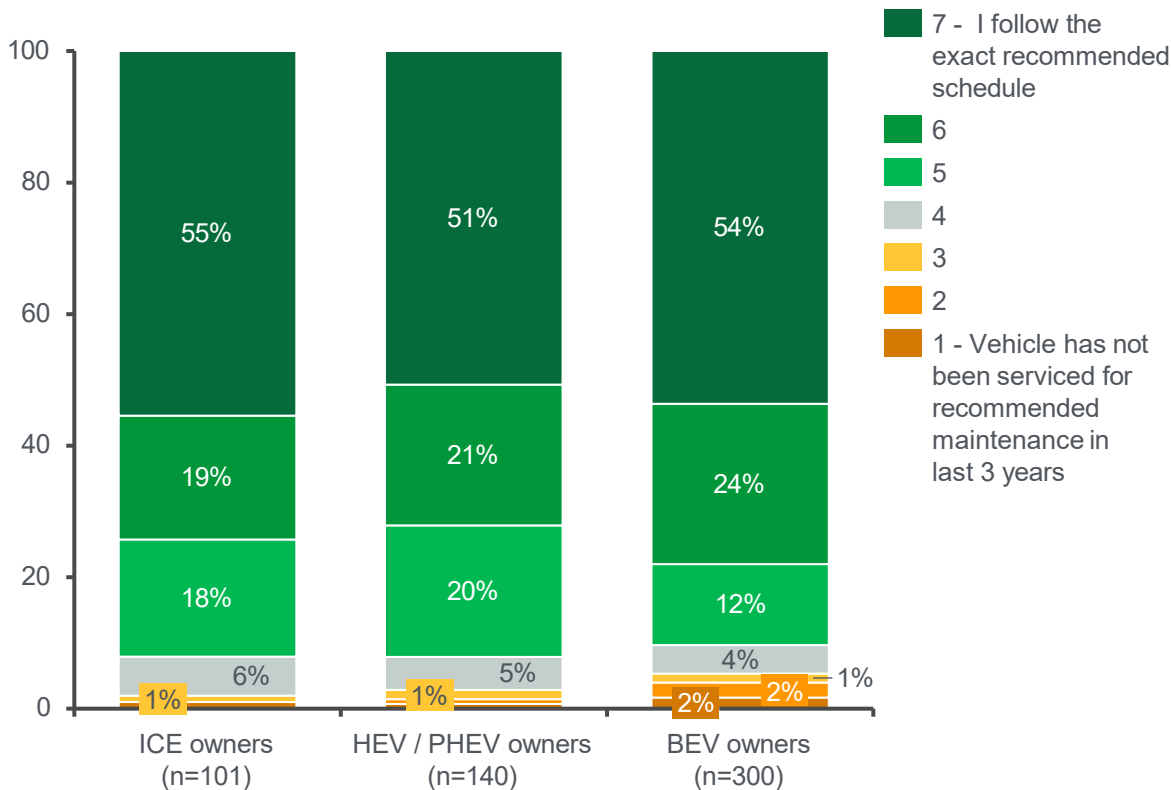
Proportion of vehicle owners experiencing more maintenance and repair spend than initially expected (2024)

Percent of respondents



Reported adherence to manufacturer recommended maintenance schedules(2024)

Percent of respondents



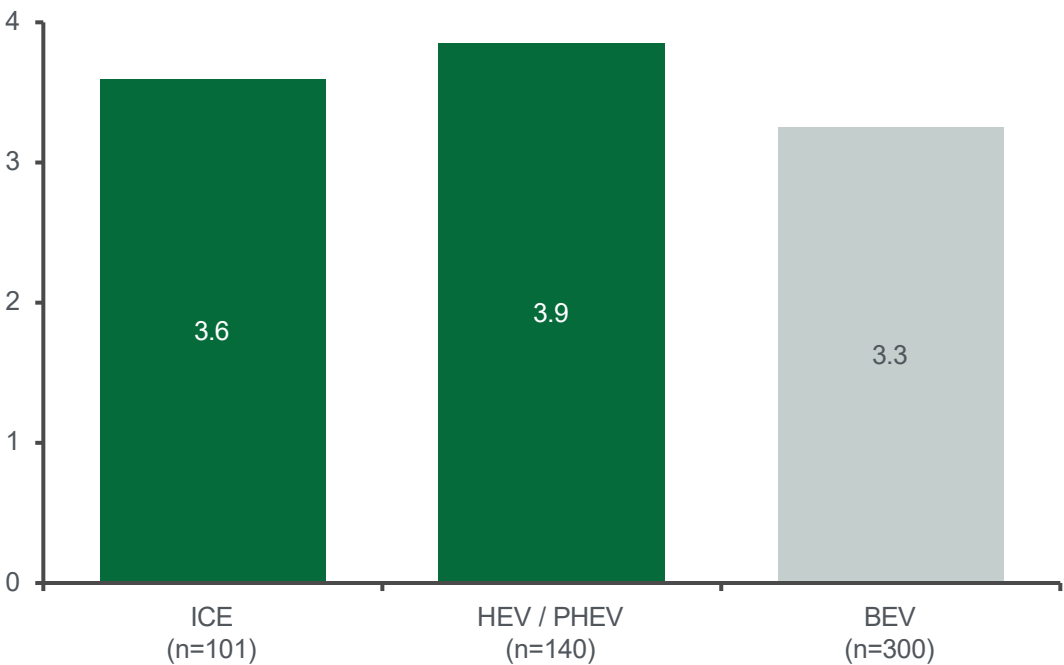
Survey: Q7. In the last 3 years, how diligently did you follow the manufacturer's recommended maintenance and check schedule?; Q13. How did your actual total spend on maintenance in the last 3 years compare to what you anticipated for your vehicle?

Source: L.E.K. 2024 Total Cost of Ownership by Vehicle Type Survey

BEV owners report ~10-15% less routine maintenance visits on average compared to ICE/HEV/PHEV owners, but are more likely to encounter an unexpected failure, particularly compared to ICE owners

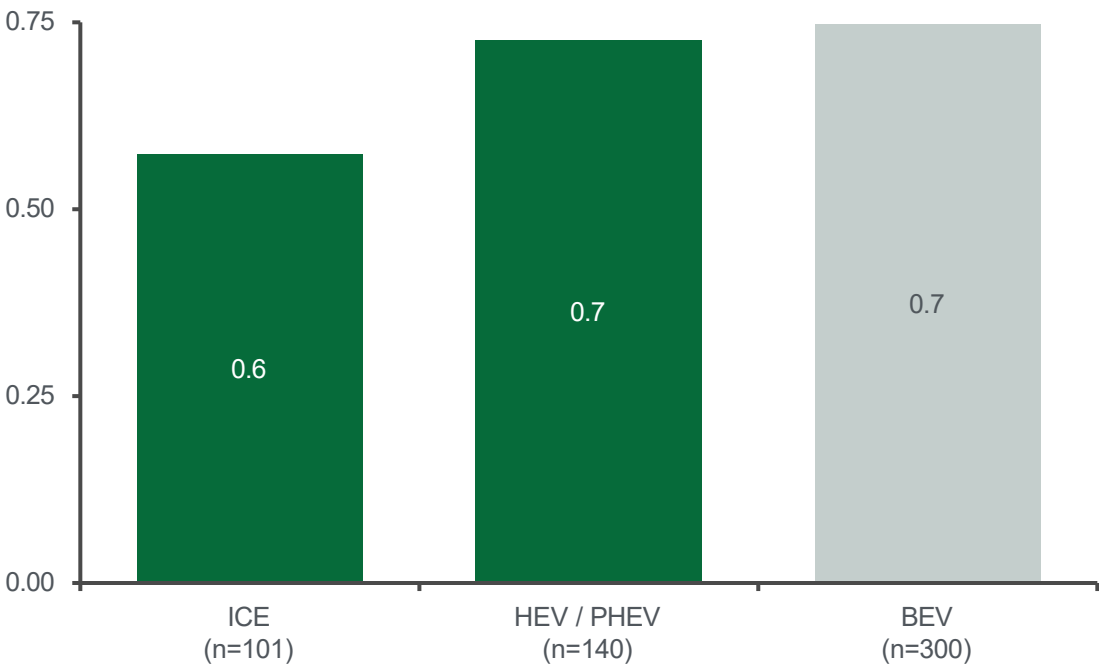
Average annual number of routine maintenance** visits (2024)

Number of visits for routine maintenance*



Average annual number of unexpected maintenance visits (2024)

Number of visits for unexpected maintenance*



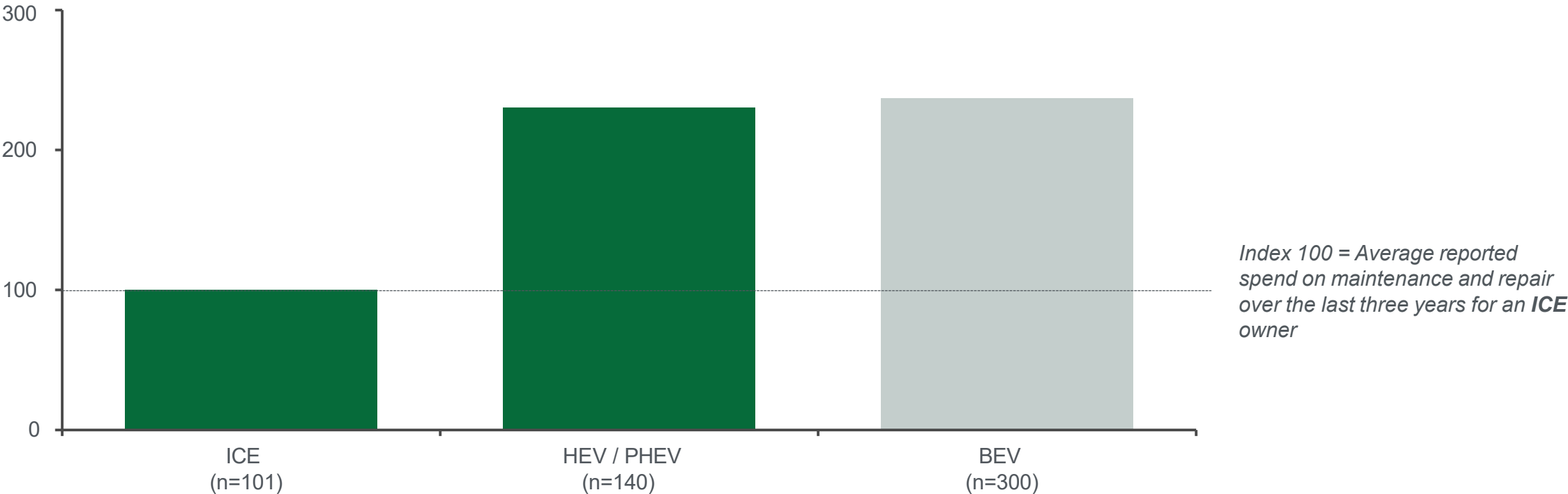
Survey: Q8. In the last 3 years, approximately how many times has your vehicle been serviced (by yourself or professionally) for routine maintenance and checks where you paid for the service yourself, out-of-pocket?; Q9. In the last 3 years, approximately how many times has your vehicle been serviced for routine maintenance and checks where the service was covered by your vehicle warranty / purchase price (e.g., maintenance included for the first 3 years or 36,000 miles)?; Q10. In the last 3 years, approximately how many times has your vehicle been serviced (by yourself or professionally) for unexpected maintenance / repairs?
Note: * Average taken over last 3 years or life of the car if shorter than 3 years, ** Includes routine and scheduled maintenance
Source: L.E.K. 2024 Total Cost of Ownership by Vehicle Type Survey



Based on consumer reported spend, the decrease in routine maintenance visits for BEVs does not offset the higher incidence of unexpected repairs, on average

Consumer reported total annual spend on maintenance** (2024)

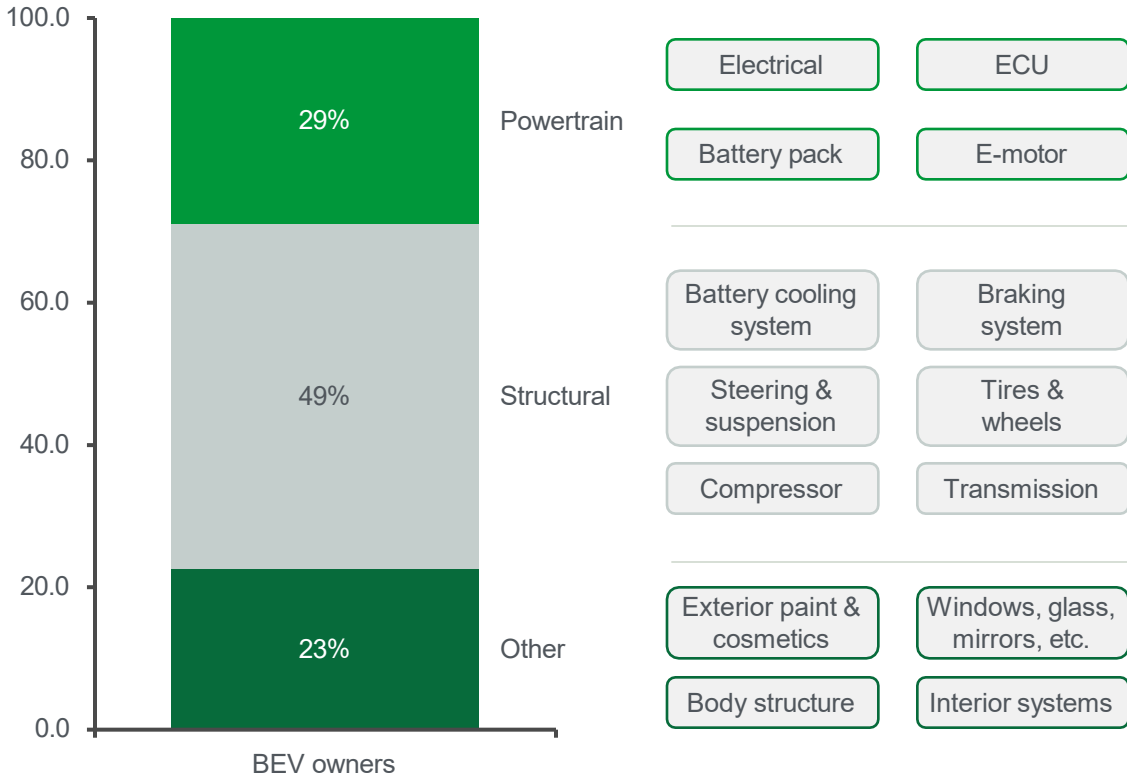
Index = ICE reported



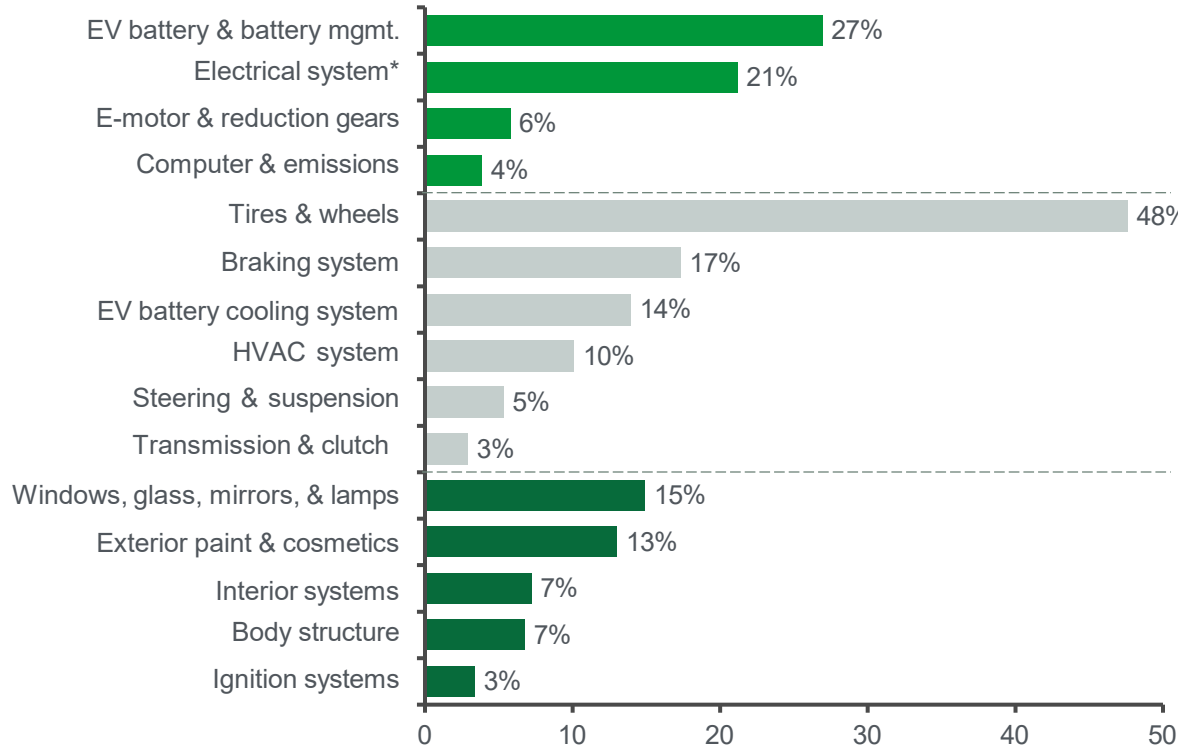
Survey: Q12. In the last 3 years, approximately how much have you spent in total on maintenance and repair for your vehicle (in \$ dollars)?
Note: * Average taken over last 3 years or life of the car if shorter than 3 years, ** Includes routine and scheduled maintenance
Source: L.E.K. 2024 Total Cost of Ownership by Vehicle Type Survey

Amongst BEV owners, the components most often cited as a cause of unexpected repair or replacement are tires and wheels; notably, however, there are a range of other components also cited

BEV components impacted in unexpected maintenance visits, by category (2024)
Percent of responses



BEVs impacted by unexpected maintenance to parts category (2024)
Percent of respondents

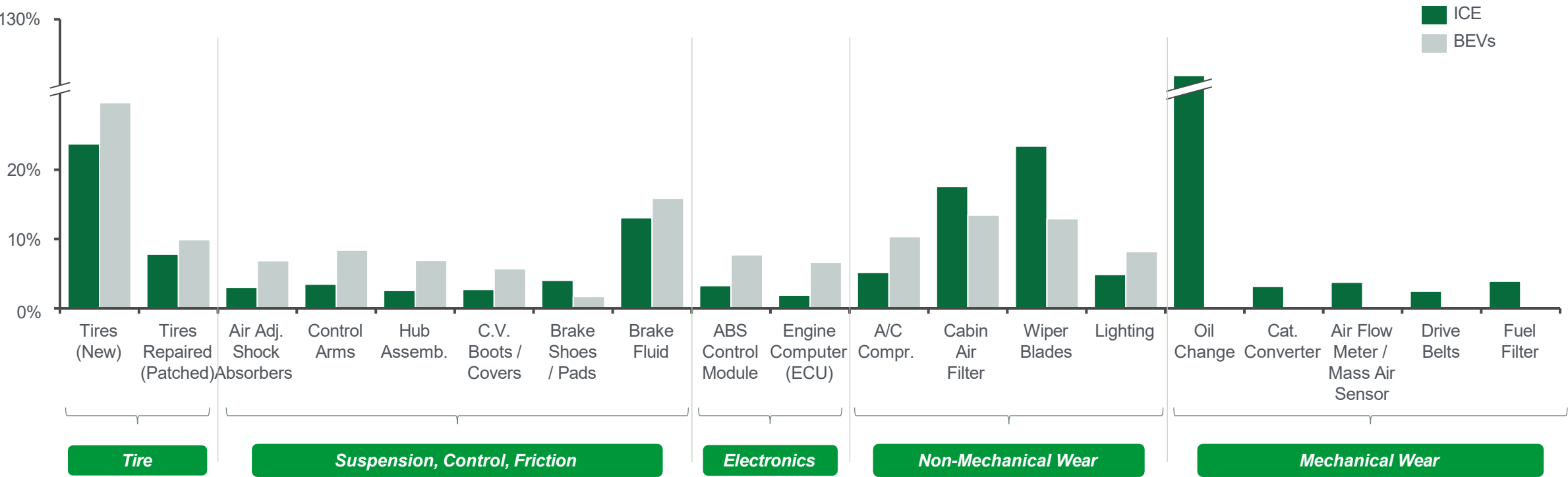


Survey: Q11. You indicated your vehicle had unexpected maintenance, which parts / system categories were impacted (required repair or replacement)? Select all that apply.
Note: * Electrical system excluding EV battery
Source: L.E.K. 2024 Total Cost of Ownership by Vehicle Type Survey

Industry data on component replacement rates reinforces consumer-reported experiences - in the early years of ownership, BEVs are demonstrating a higher incidence of failure on a wide range of components

Replacement rates for select BEV and ICEV components – vehicles 0-3 years old (2024)

Percent of installed vehicles

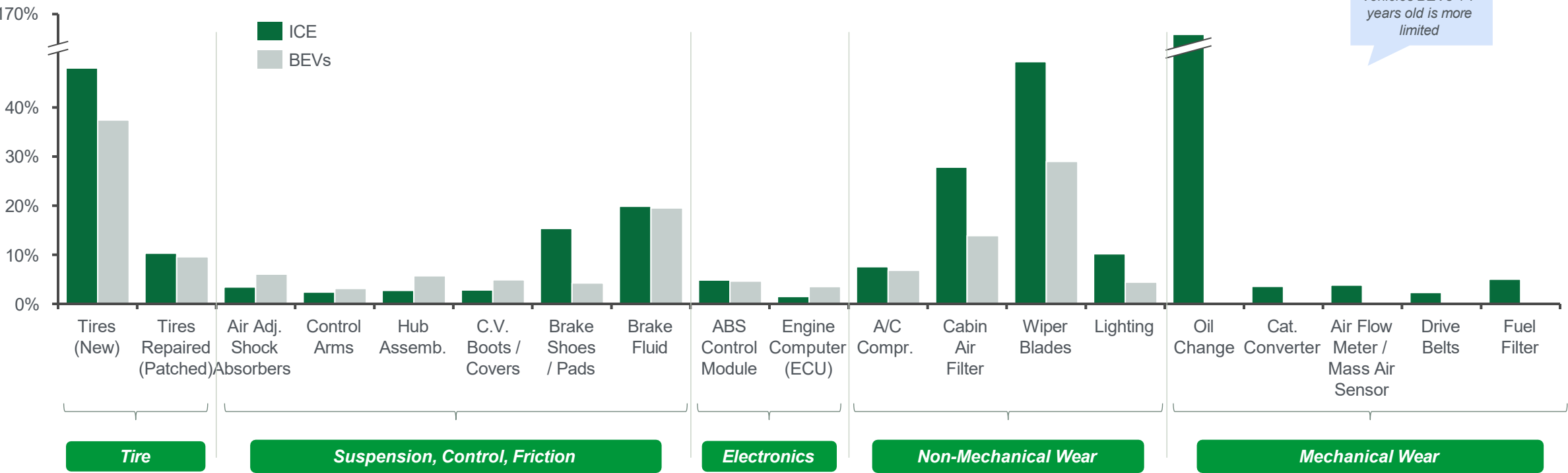


Source: L.E.K. analysis; IMR

Component replacement rates for ICE and BEVs do begin to converge later in ownership

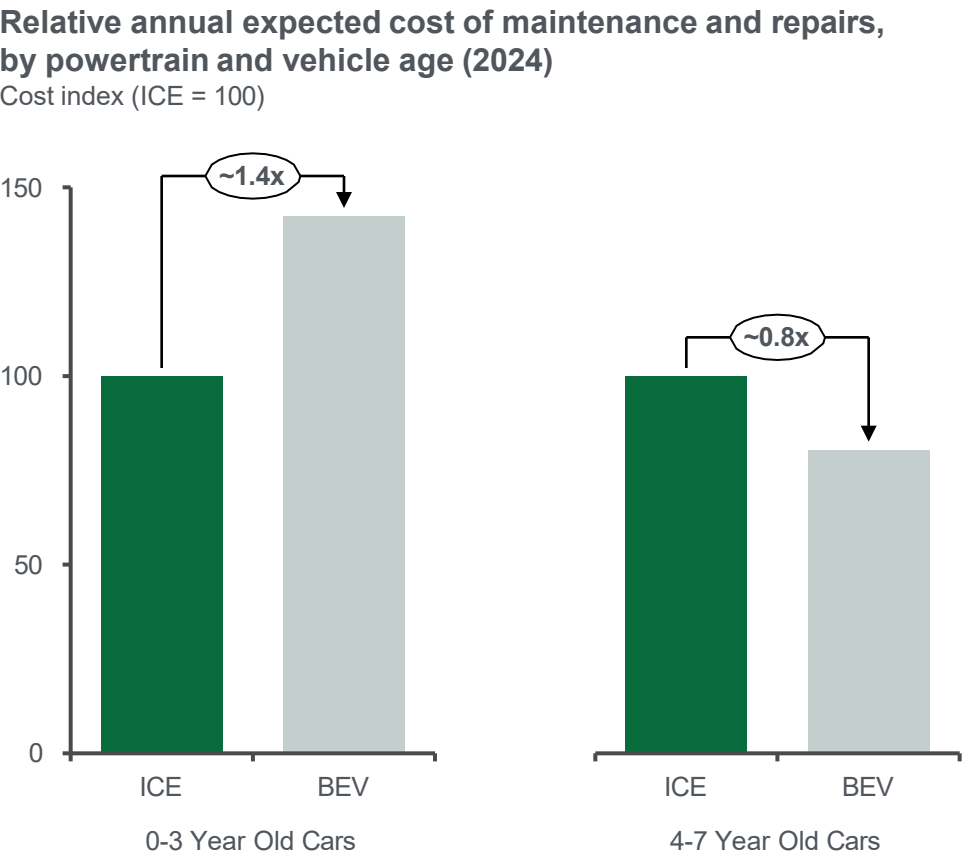
Replacement rates for select BEV and ICEV components – vehicles 4-7 years old (2024)

Percent of installed vehicles



Source: L.E.K. analysis; IMR

Translated to costs, BEVs to-date require an implied ~40% more repair and maintenance costs than ICEs early in ownership (largely driven by unexpected failures), but do incur less spend in later years



Observations

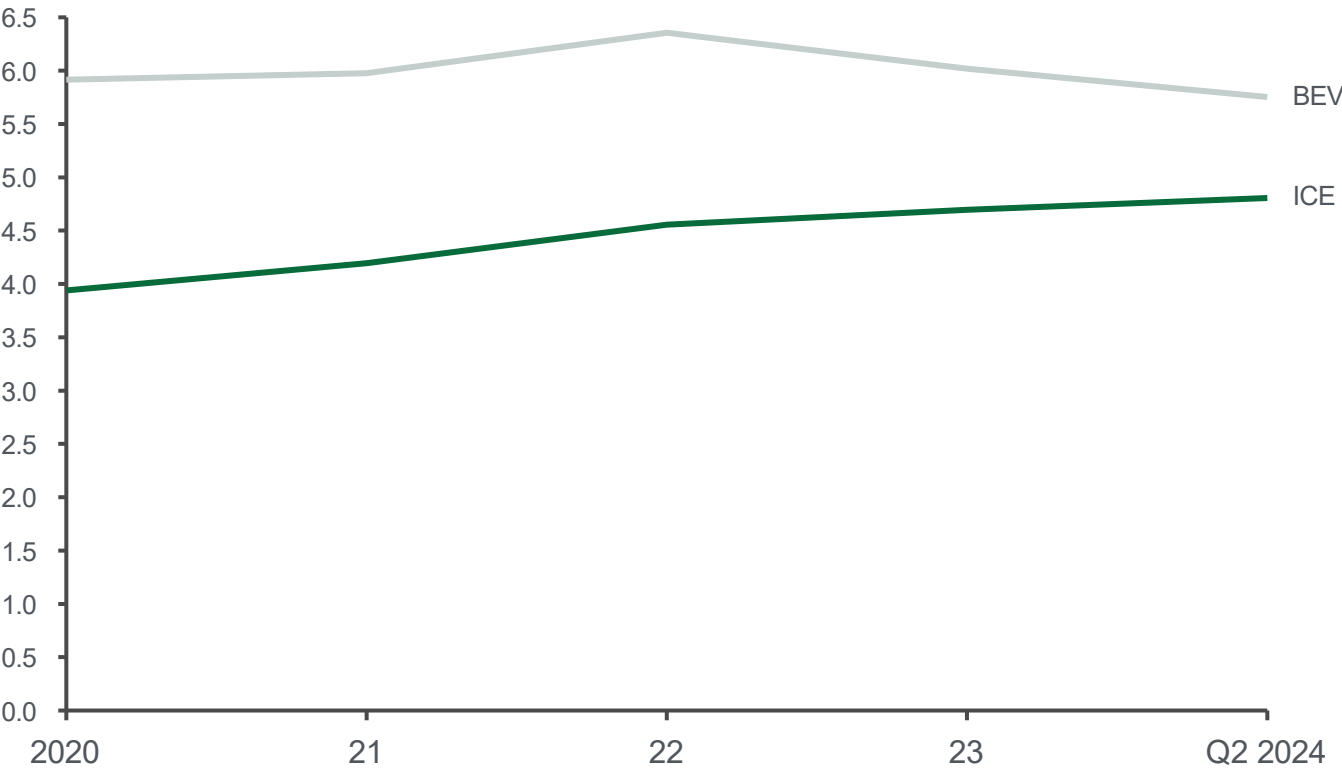
- Periods wherein reported service and replacement rates are higher for BEVs than ICEs are concentrated in periods where vehicles are under manufacturer warranty, which may limit opportunity for independent aftermarket services
- Higher incidence of unexpected BEV part replacements early in vehicle life-cycles may reflect the nascency of BEV platforms; as experience increases, these may not sustain
- The need for mechanical maintenance on ICEs (e.g., oil change) unlocks opportunities for upsell on less mission-critical services on which ICEs outpace BEVs on (e.g., wiper blades)
- BEV service providers may unlock value by increasing consumer focus of routine maintenance beyond the powertrain (e.g., sensor calibration, software optimization)

Note: Costs associated with reported incidence rates of replacement for 19 components featured on p.11 and p.12
Source: L.E.K. research and analysis

With respect to collision repair, BEVs historically incurred average repair costs ~50% higher than ICEs; while costs have begun to converge, higher labor costs are expected to persist

Average total cost of collision repair, by vehicle type
(2020-Q2 2024)

Thousands of USD



- Higher part costs in collision repair for BEVs is partially driven by utilization of higher cost OE parts (~90% in BEVs vs. ~65% in ICEs); as aftermarket options become available costs will decrease
- Labor costs are higher for BEVs versus ICE alternatives as navigating the electrical and battery systems requires incremental time and technical skill

Source: CCC Intelligent Solutions; Mitchell International; L.E.K. research and analysis

Data from real-world owners of BEVs raise a number of key takeaways and implications for aftermarket service providers

Key Learnings

- 1 BEVs are in no way 'maintenance-free' and will require significant support from aftermarket service providers
- 2 While routine mechanical maintenance for BEVs is significantly reduced, spend addressing unexpected failures will comprise a larger proportion of market demand
- 3 Higher incidence of repair and maintenance needs incurred in the first ~3-5 years of the vehicle lifecycle may shift more market spend towards dealership fixed operations
- 4 Tailwinds in collision market spend driven by the transition to BEV powertrains are becoming smaller in magnitude but are expected to remain durable


Implications for Aftermarket Service Opportunities

- Early estimates of BEVs requiring up to ~40% less spend appear overstated, but the nature of those services will have to evolve
- To target a similar magnitude of addressable market spend, operating models focused on specializing on a limited set of high-volume services will need to evolve; this will require processes, tools, and investment to acquire the requisite skills and capabilities
- Increasing the expectation and/or perceived 'need' for new maintenance activities (e.g., annual sensor recalibration, more in-depth HVAC service) is a potential lever to reduce declines in routine maintenance
- The importance of serving and accessing the dealership channel is likely to increase for providers of equipment, parts, and services
- Investment in the skills and equipment necessary for collision repair on new BEV platforms are required to participate fully


Agenda

- Intro to L.E.K. Auto & Mobility Practice


L.E.K. Consulting is a leading global strategy consulting firm




Established - 1983




21 Offices



~200 Partners



~2,200 Staff



Leaders in growth strategy



We help our clients deliver value-creating growth and address key strategic and operational issues



Strategy

- Corporate strategy
- Business unit strategy
- Edge Strategy®
- Shareholder value management



Marketing & Sales

- Brand strategy
- New product development
- Pricing strategy
- Sales & channel management
- Loyalty & customer experience



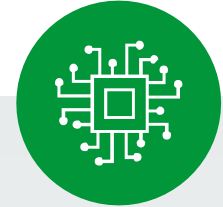
Mergers & Acquisitions

- Post-merger integration (PMI)
- Private equity
- Synergy Assessment
- Transaction services



Organization & Performance

- Organizational strategy
- Commercial excellence
- Performance improvement
- PMI
- Value activation



Digital

- Digital strategy & transformation
- Digital evaluation
- Channel strategy
- Customer experience
- Industry 4.0
- Digital ways of working

L.E.K.'s Automotive & Mobility practice covers the breadth of the automotive value chain

LEKTM's Automotive & Mobility Practice



We have extensive experience working with manufacturers and service providers focused on break-fix and enthusiast upgrades on a wide range of vehicle systems and components

Parts, components, and aftermarket products

SAMPLE ONLY



Examples of recent L.E.K. projects in the automotive aftermarket

CONFIDENTIAL, SAMPLE ONLY

M&A Transaction Support

- CDD on a regional operator of **collision repair shops**
- CDD on a manufacturer of aftermarket **replacement suspension components**
- VDD on a N.A. manufacturer of **aftermarket drivetrain and suspension components** for break-fix and enthusiast upgrade applications
- VDD on a global manufacturer of **replacement engine components** for light duty vehicles and other small engines
- Acquisition strategy to support **global M&A investments based on disruptive automotive technologies**
- CDD on a manufacturer of **specialty and niche aftermarket parts** for European and Asian vehicles
- VDD on a provider of **OE recycled and remanufactured parts**
- CDD on a U.S. **distributor of enthusiast and break-fix parts**
- CDD on a leading **manufacturer & distributor of automotive fluids**

Growth Strategy, Operations, and Performance

- **Growth strategy** for a major quick-lube and preventative maintenance provider
- **Consumer segmentation, brand positioning, and pricing strategy** for a global tire manufacturer
- **Competitive positioning strategy** for a leading parts procurement platform with a focus on U.S. collision repair
- **Technology strategy** for a tire installation and repair operator
- **BEV positioning strategy** for a N.A. manufacturer of drivetrain and undercarriage components manufacturer
- **Growth strategy** for a collective of collision shop operators
- **Market entry strategy** for an EU-based global manufacturer of electrical connector solutions
- **Plant operations improvement** study for a manufacturer of auto accessories

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