



Transitioning to Electric Vehicles

WORKHORSE™

Work Ahead™

October 8, 2021

Rick Dauch



Twelve Years Experience as a CEO in the Auto Industry

Four Companies – 3 global Tier 1 auto suppliers and now a startup EV OEM



Acument Global Technologies



Accuride Corporation

**Delphi
Technologies**

Delphi Technologies



Workhorse

Annual Production Volumes at Global OEMs (2020)



*The global automotive industry is ruthlessly competitive and undergoing **GENERATIONAL** transition!*

1. VW	9.33m
2. Toyota	7.20m
3. Stellantis	6.88m
4. RNA	6.83m
5. GM	6.76m
6. Hyundai/Kia	6.69m
7. Honda	4.40m
8. Ford	3.97m
9. SAIC Motor	2.53m
10. Daimler	2.43m
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#XX. Tesla	<510K

Two Main Factors Driving Change

- *Global consolidation for scale*
- *Transition to Electric Powertrains*



Global Capital Markets Have Picked the Winners – EV!

EV Technology companies are valued much higher than traditional OEMs.....some with ZERO sales!

ICE Vehicle Exposure is a Drag on Share Price

- Tesla market cap is 5x that of VW and 3x Toyota!
- Tesla market cap is greater than the Top 7 OEMscombined!
- Rivian market cap (IPO value of \$80B) is greater than Ford....and GM!
- The EV SPAC frenzy may be over, although Polestar went public at \$20B

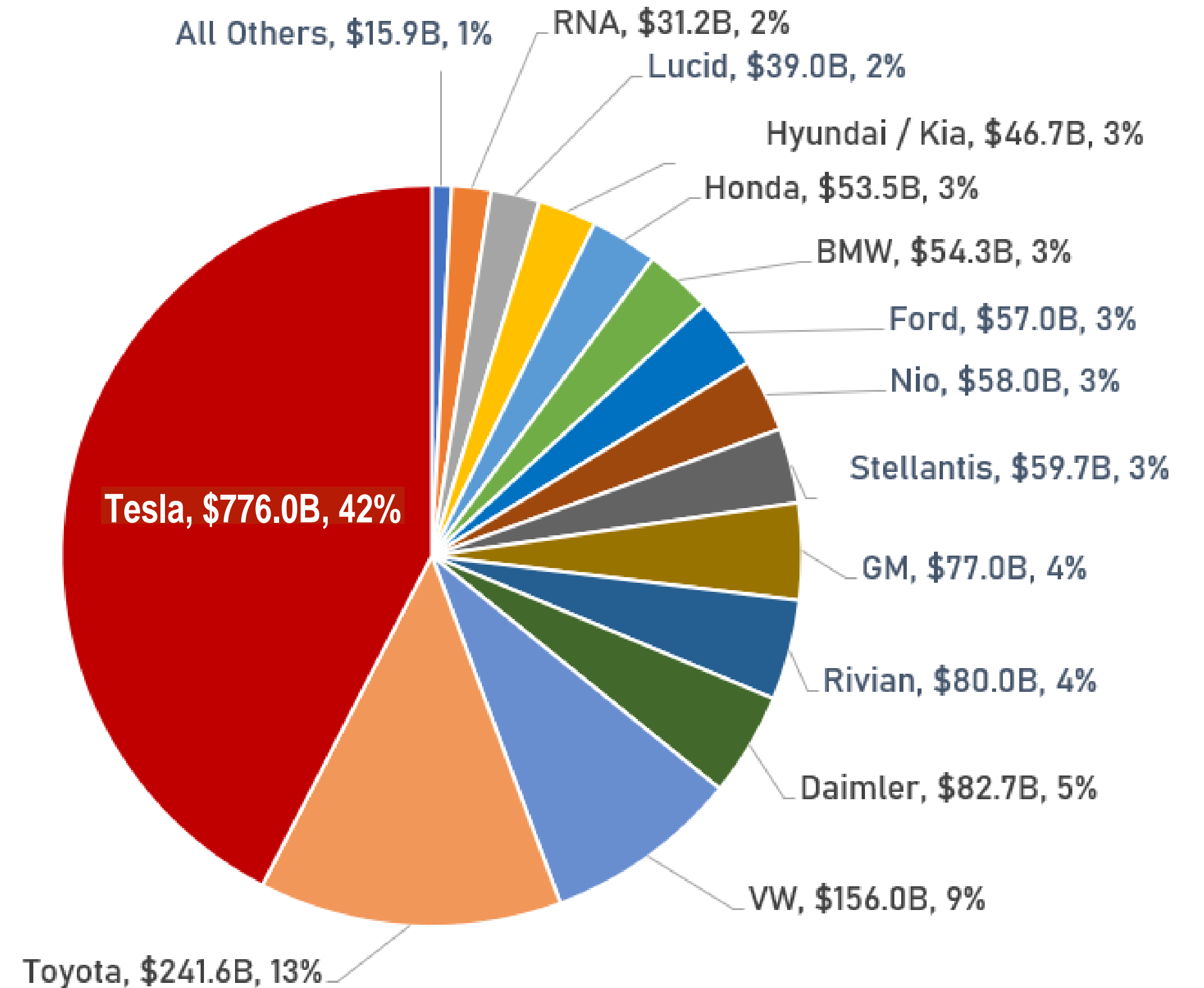
Company	Segment	Market Cap	Stock Price
Tesla	EV	\$776.0B	\$ 775
Toyota	EV / ICE	\$241.6B	\$ 172
VW	EV / ICE	\$156.0B	\$ 31
Daimler	EV / ICE	\$82.7B	\$ 76
Rivian	EV	\$80.0B	\$ -
GM	EV / ICE	\$77.0B	\$ 53
Stellantis	EV / ICE	\$59.7B	\$ 19
Nio	EV	\$58.0B	\$ 36
Ford	EV / ICE	\$57.0B	\$ 14
BMW	EV / ICE	\$54.3B	\$ 83
Honda	EV / ICE	\$53.5B	\$ 31
Hyundai / Kia	EV / ICE	\$46.7B	\$ 39
Lucid Motors	EV	\$39.0B	\$ 25
Renault-Nissan	EV / ICE	\$31.2B	\$ -
Arrival	EV	\$8.0B	\$ 13
Lion Electric	EV	\$2.5B	\$ 13
Shyft Group	EV / ICE	\$1.3B	\$ 39
Workhorse	EV Truck	\$1.0B	\$ 8
ELMS	EV	\$953.0M	\$ 8
Xos	EV	\$883.0M	\$ 5
Lightning Motors	EV	\$660.0M	\$ 9
BlueBird	EV / ICE	\$569.0M	\$ 20
GreenPower	EV	\$329.0M	\$ 14

Traditional OEMs are all chasing Tesla.

Start-up valuations are likely inflated!

EV Valuations Far Outstrip Traditional OEMs

Market Capitalization of Select EV OEMs



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EV Powertrain Simplicity Will Drive Cost Reduction

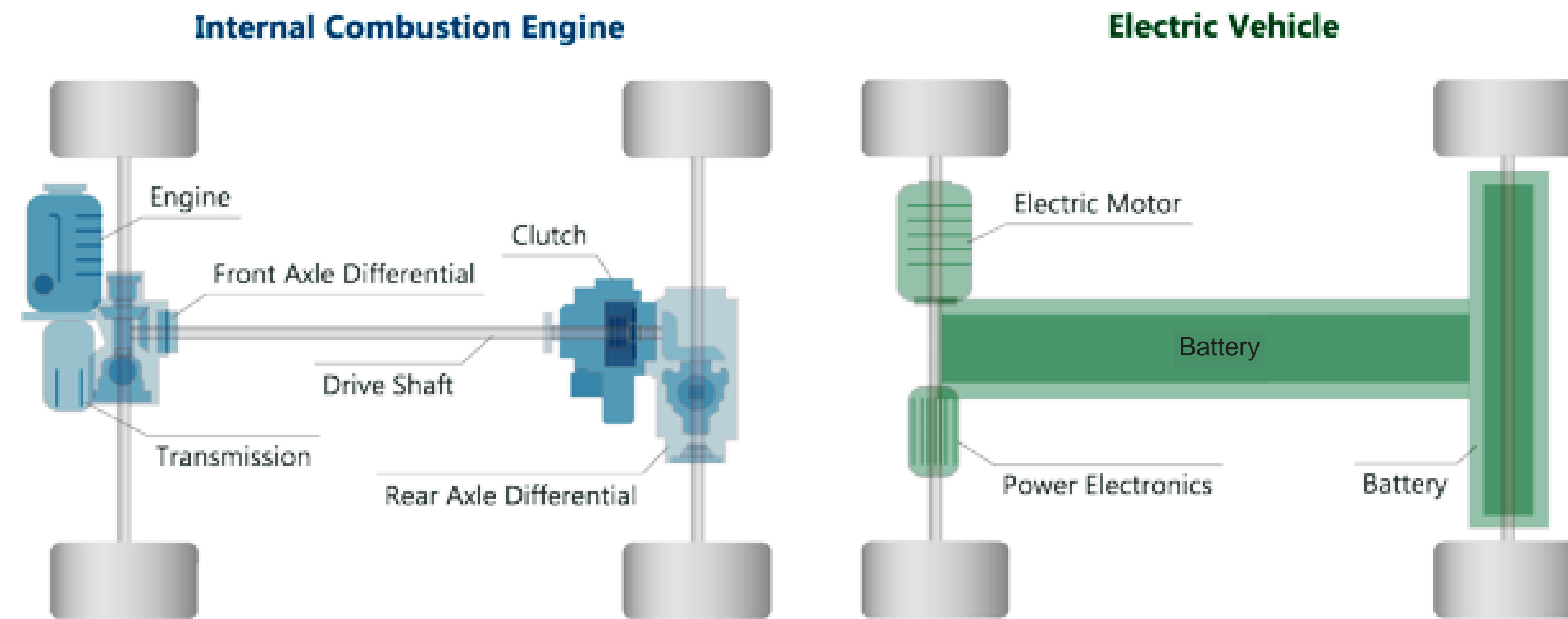
Shared Platforms with Lowered Warranty Costs vs ICE

- Cheaper to maintain because EVs contain far fewer mechanical parts (no clutches, valves, etc.) Fewer moving parts mean less wear
- No need to change engine oil, air filters or transmission fluid
- Faster acceleration
- Better handling due to lower center of gravity
- Skateboard-style designs allow easy integration of various body types to a single powertrain and chassis platform, reducing overall product costs to deploy multiple models.
- VW will base 27 different models on its MEB skateboard



[VW presents MEB platform pushing 'Electric For All' plan - electrive.com](https://www.electrive.com)

ICE vs EV Powertrain



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Automakers “All-In” on Electrification - Billions Allocated to EVs



Automaker electric vehicle sales targets

	Electric vehicle sales target or goal	Year
Volkswagen	50% EV sales in U.S., 70% in Europe, 50% in China	2030
Mercedes-Benz	50% EV sales	2025
Stellantis	40% EV sales in U.S., 70% in Europe	2030
GM	1 million EV sales for the year	2026
Ford	40% EV sales	2030

Sources: Companies, BloombergNEF

Note: Volkswagen is Volkswagen brand only, not Volkswagen Group

- Government regulatory pressure is the prime driver of change – especially in Europe and China.....and pending CARB regulations in the USA
- Existing global OEMs must try and catch up to Tesla on EV technology (Range, Charge time, Software expertise)while also funding massive restructuring costs - closing a plant in Western Europe costs 2-3x > NA
- Relative low barrier to entry for start-up EV OEMs and significant investment capital available to new entrants....and no restructuring required! Relative low technical barrier to entry to start an EV OEM.....but it takes 4-6 years of high cash burn to reach breakeven levels

Automakers' 2020 investment and announced electric vehicle and digital investment

	2020 R&D and capital expenditure	Announced EV and digital investment	Investment horizon
Volkswagen	\$28.7 billion	\$ 83 billion	5 years
Mercedes-Benz	13.8	46	10
Stellantis	13.0	34	5
GM	11.5	35	6
Ford	12.8	30	5

Sources: Companies, BloombergNEF

Source: Nathaniel Bullard, Aug 5, 2021 - Automakers Are Investing Billions of Dollars in EVs - Bloomberg

- Traditional global and regional Tier 1 and Tier 2 suppliers face the challenges – high R&D, CAPEX and restructuring costs
- Delphi Technologies annual revenue shifts between 2017-2025:
 - Diesel FIS: \$1.4B to <\$200M (HD Truck and Auto AFM only)
 - Gas FIS: \$0 to \$1.4B
 - EV components: \$1B to \$4.5B by 2025
 - Close 9 Technical Centers and 4 plants in Western EU/UK and USA
 - Open 2 new Tech Centers and 5 new plants in Eastern Europe, Mexico, China



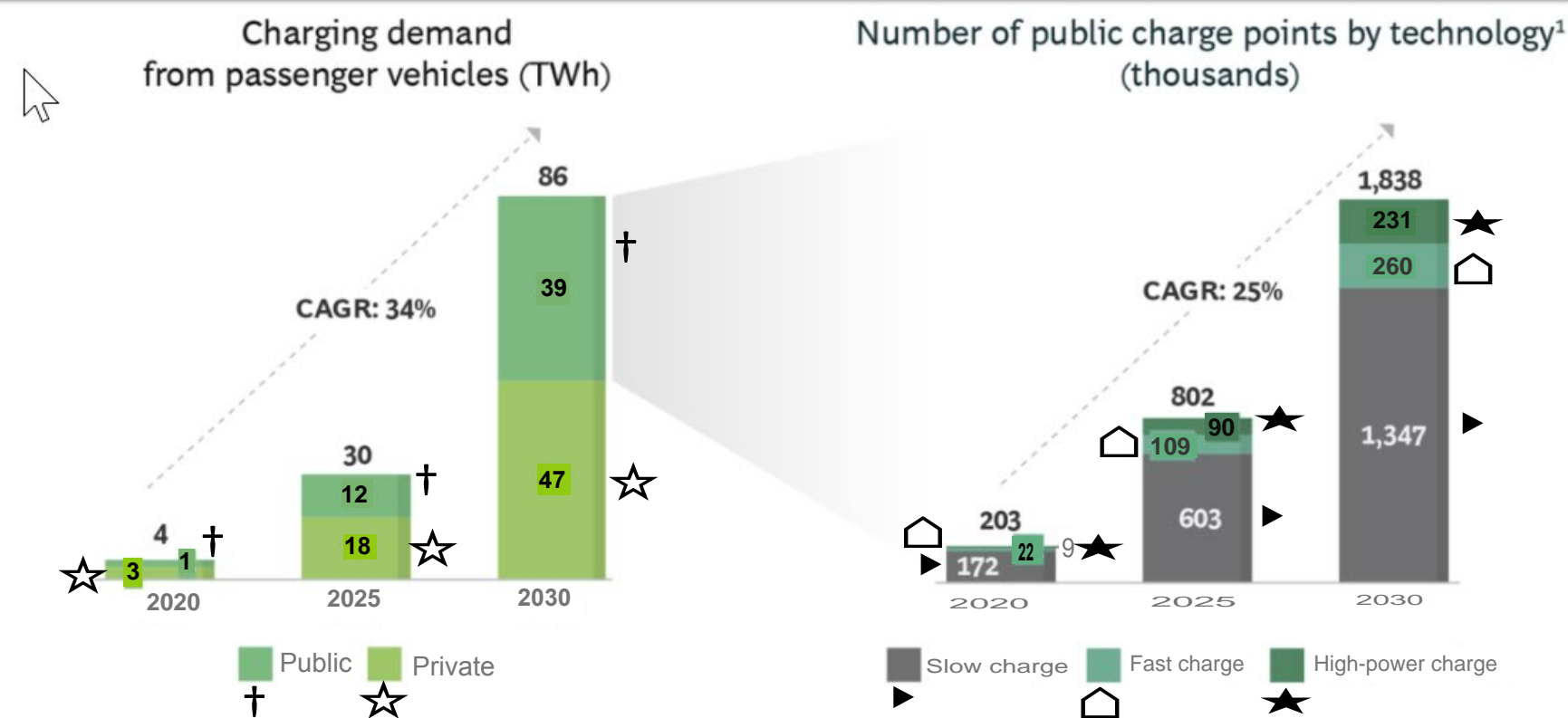
Europe – Stagnant Growth but First to Transition to EV

Strict EU, Country and Major City emission regulations (Shift from Diesel to Gas to Hybrid & BEV)

Driven by Regulations

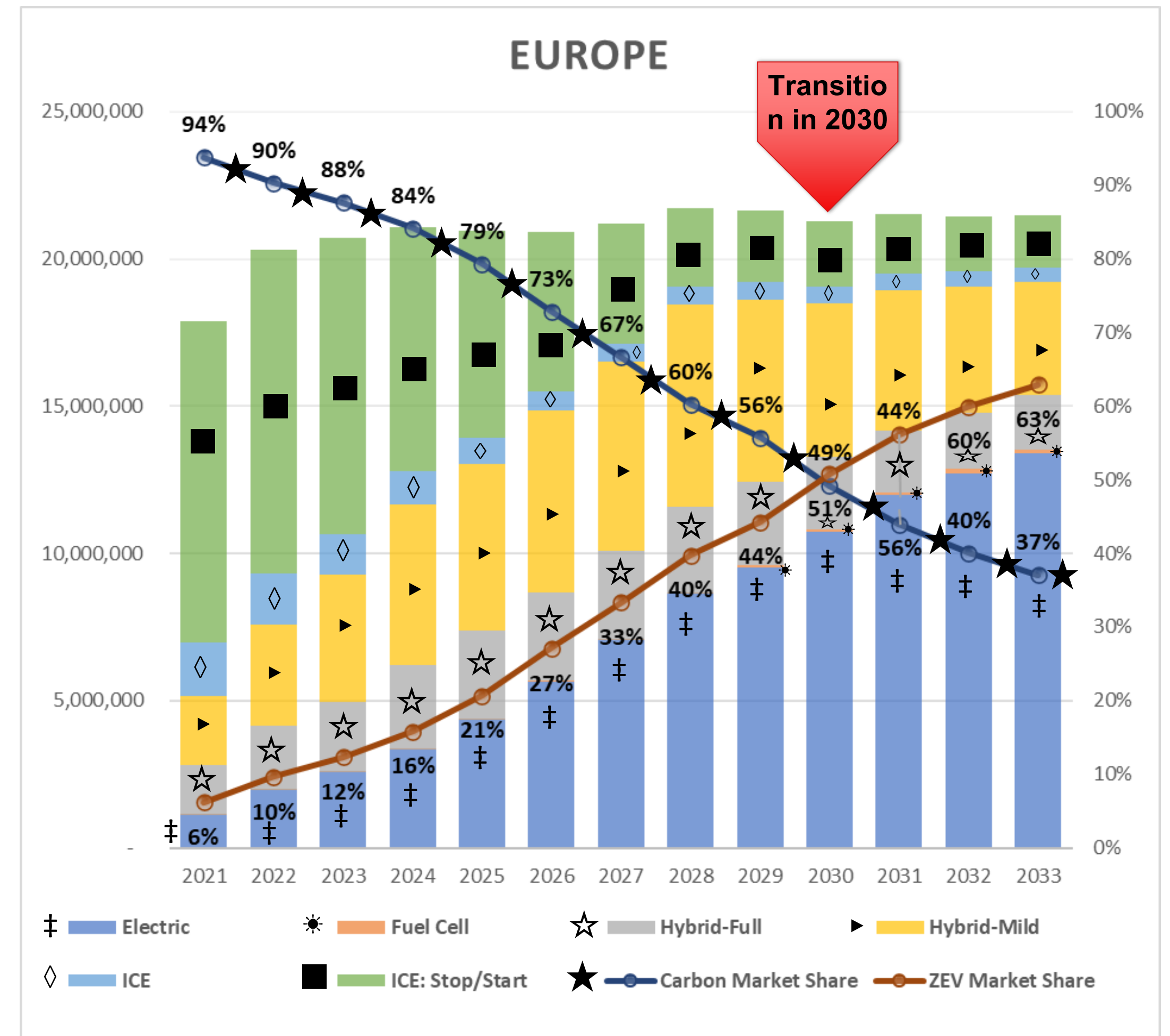
- Europe will be first to transition to ZEVs
- Proposed laws mandate 55% reduction in emissions of new sales from 2030 and 100% reduction by 2035
- Regulations will also require a public charge station every 60km on major roadways
- Between 2022 and 2033
 - The European auto market will grow at a CAGR of only 1.4%
 - ICE vehicle sales will shrink with a CAGR -6%
 - ICE will shed 8.8 Million vehicles
 - EV vehicle show double-digit growth each year, CAGR of 21%
 - EV will gain 12.4 Million vehicles

European Charging Demand 2020-2030



Source: BCG EV forecast, 2021; BCG analysis.

¹ Public slow chargers are under 22kW, while public fast chargers are between 22kW and 149kW; public high-power chargers are more than 149kW.



Source: IHS Markit Global Vehicle Forecast, Sept. 2021

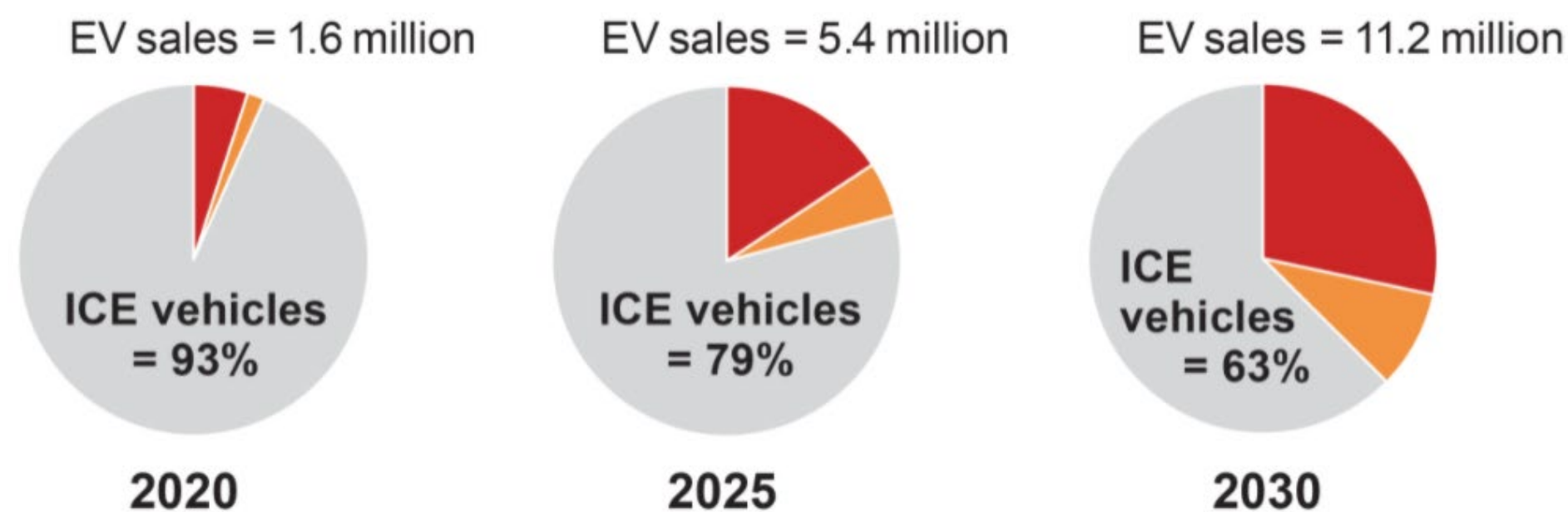


China – Slow Growth with Clear Path to EV Transition

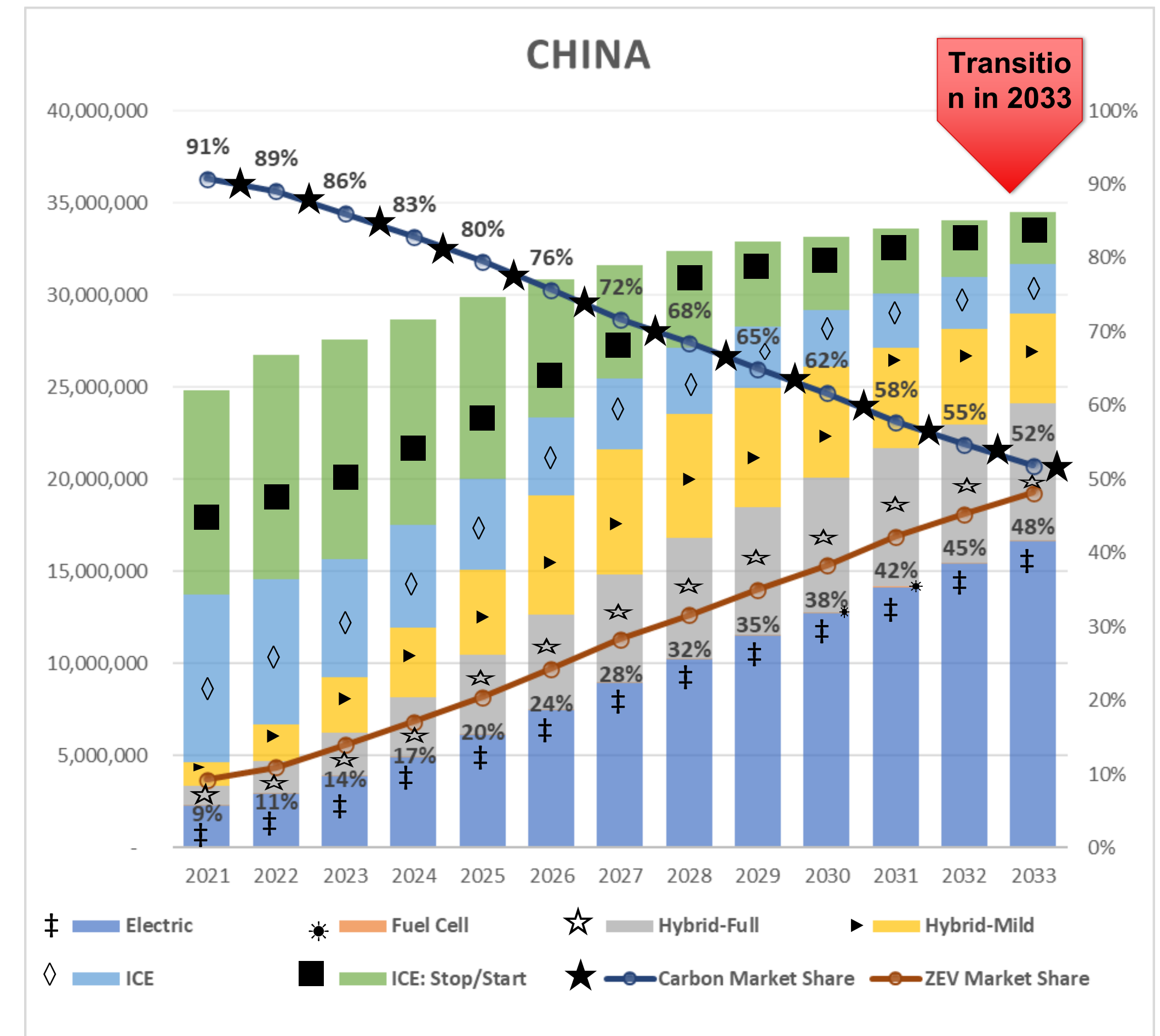
Central Govt and Major City Mandated Emission Regulations (Shift to full BEV)

Aggressive Regulation and a Drive to Lead

- All new vehicle sales must be “New Energy” (BEV,HEV,PHEV) by 2035
- China subsidizes about 5% of all EV sales, and nearly half of global EV sales in 2020 were in China
- Dominates the global supply-chain for EV powertrain and electronics
- Between 2022 and 2033
 - The Chinese auto market will grow at a CAGR of 3%
 - ICE vehicle sales will shrink with a CAGR of -2%
 - ICE will shed 3.5 Million vehicles
 - EV vehicle show double-digit growth each year, CAGR of 16%
 - EV will gain 14 Million vehicles



Makeup of projected vehicle sales at three points in time on the red curve above. These pie charts show the split in projected sales among the three vehicle types: ICE vehicles (gray), hybrid EVs (orange), and pure battery EVs (red). The total number of number of EVs sold is indicated for each year.



Source: IHS Markit Global Vehicle Forecast, Sept. 2021



North America – Stagnant Growth, Fast Follower to EV

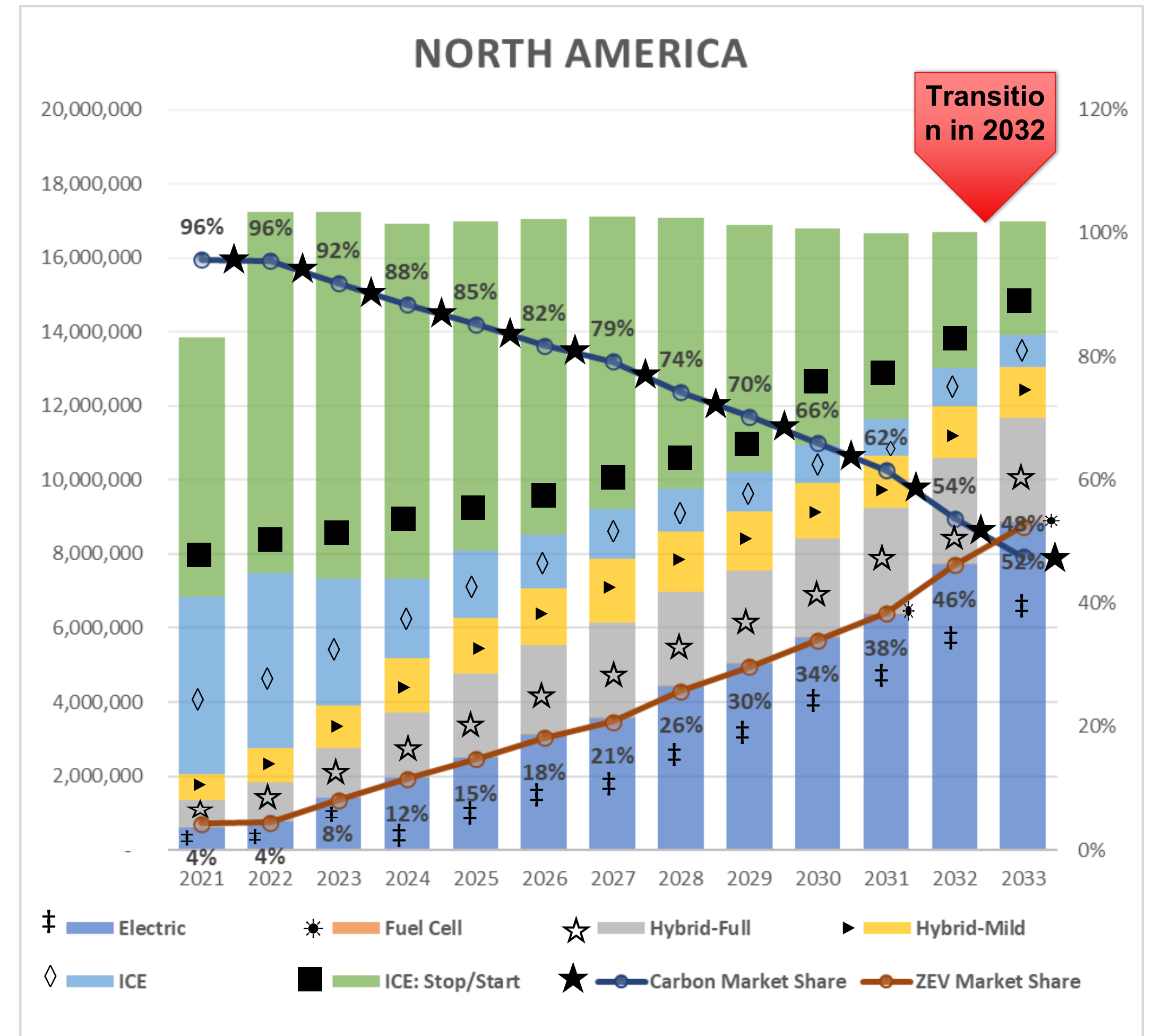
CARB and Federal emission regulations and Govt funding required (Shift from Gas to Hybrid & BEV)

Infrastructure and Incentives are key to successful transition

- California continues to lead in legislation – with all new passenger car sales to be EV by 2035 and eliminating diesel trucks by 2045
- Between 2022 and 2033
 - The North American auto market will grow at a CAGR of only 1.6%
 - ICE vehicle sales will shrink with a CAGR -4%
 - ICE will shed 11 Million vehicles
 - EV vehicle show double-digit growth each year, CAGR of 23%
 - EV will gain 8 Million vehicles
- 2021 DOT EV-eligible infrastructure allocations alone are \$41.9B

	FY 2021 AMOUNT						
FORMULA PROGRAMS							
National Highway Performance Program (NHPP)	\$23.1 B						
Surface Transportation Block Grant Program (STBG)	\$10.2 B						
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	\$2.4 B						
National Highway Freight Program (NHFP)	\$1.5 B						
State Planning and Research (SPR)	\$641.5 M						
Metropolitan Planning (PL)	\$357.9 M						

FACT SHEET: Biden Administration Advances Electric Vehicle Charging Infrastructure | The White House



Source: IHS Markit Global Vehicle Forecast, Sept. 2021

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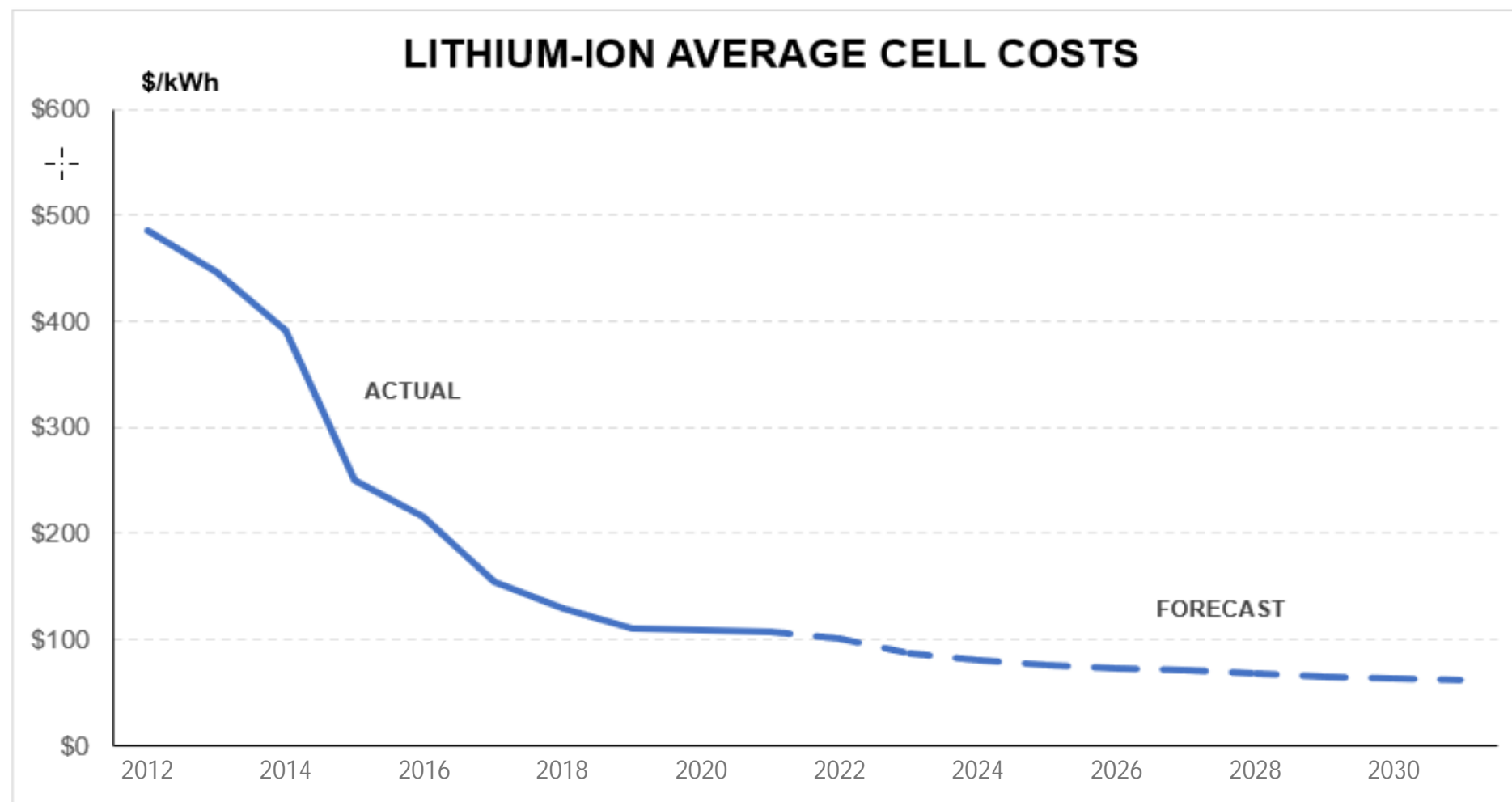
EV Powertrain Costs are Rapidly Sinking (Economies of Scale, R&D)



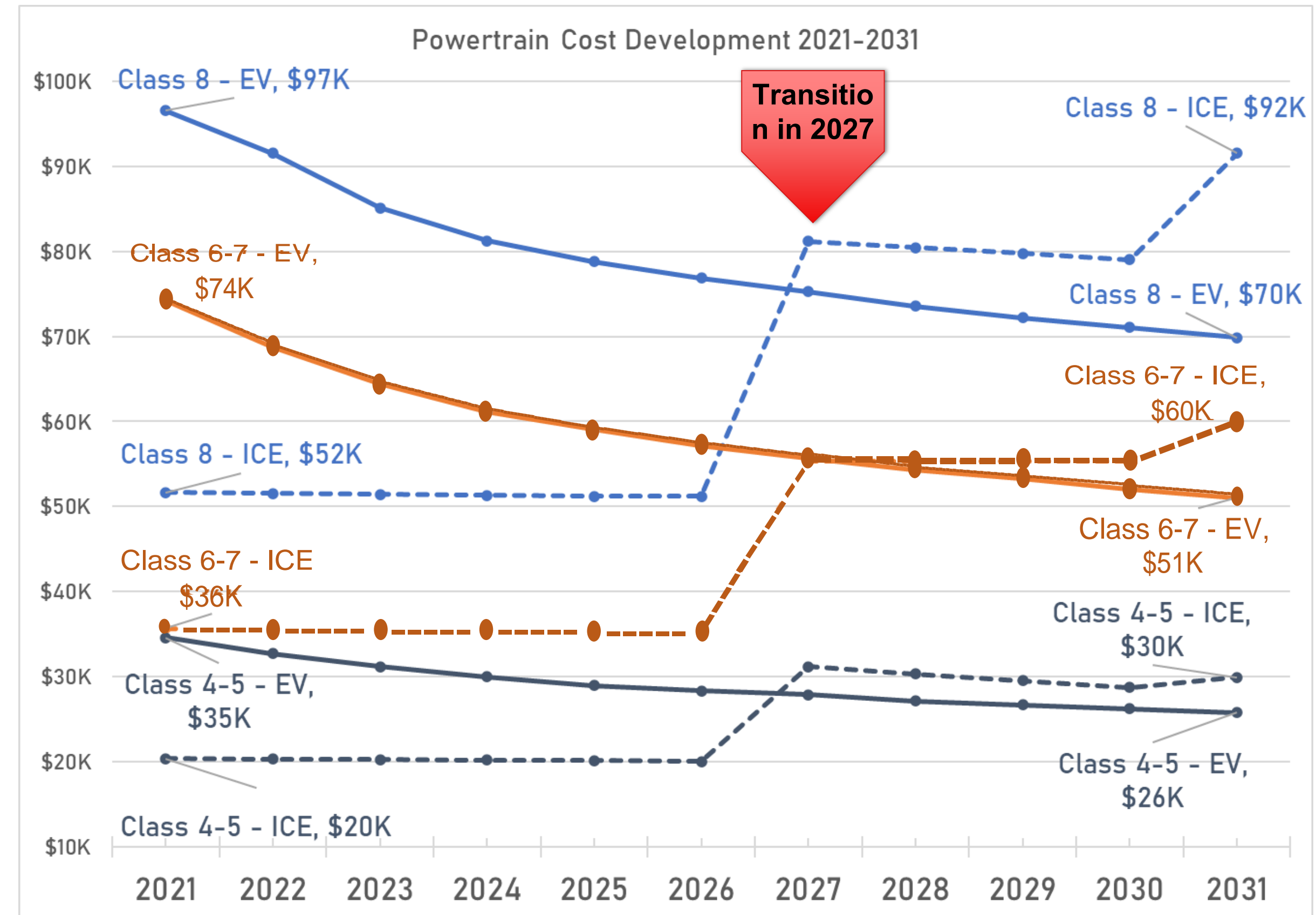
The “tipping points” are 2024-26 for cars; 2027-30 for Commercial Vehicles)

Barriers to Adoption are Falling

- E-powertrain costs are currently the greatest barrier to adoption of EVs in the Commercial Vehicle market
- Rapid reduction, driven by surging volumes across all EV vehicle types, will bring EV to parity with ICE by 2027. Dwindling volumes will drive prices of ICE up making them uncompetitive by 2031
- Battery costs are the main driver of the change
 - Improvements in battery chemistry will improve pack life from current 6-8 years to 15+ years by 2030
 - Battery supply will increase from current 900GWh/year to 1,300GWh by 2024
 - Approximately 95% of raw material cost will be recycled by 2030, further driving down costs



Source: ACT Research Co., LLC: Copyright 2021



Source: ACT Charging Forward - 2020-2040 BEV & FCEV Forecast and Analysis

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Commercial Vehicles – Business Models vs Regulations



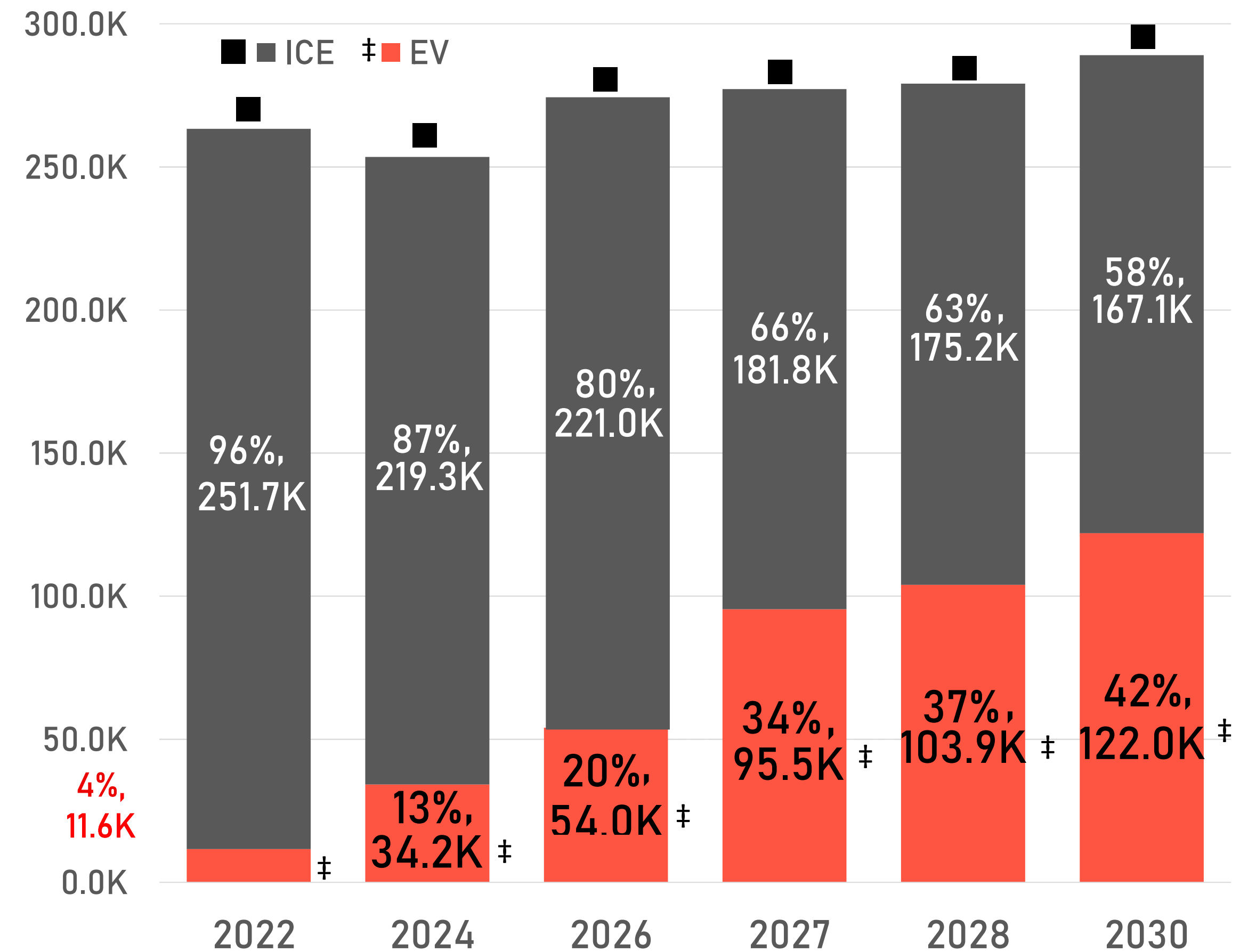
Medium Duty, “Return to Station” will convert to EV; Heavy Duty will stay Diesel or move to CNG

Residual Value and Service Cost Losses Hold Back Adoption

- The HD commercial vehicle market is dominated by 4 major CL5-8 Truck OEMs. MD vehicles rely on Auto or Truck OEM vans and chassis. Business models rely on vehicle financing, repair & service revenues.
- EVs require much less service (no oil changes, fewer brake pads, etc). The traditional aftermarket will be face massive change – in 1-2 decades.
- Existing CV fleets rely on public fueling stations. EV charge infrastructure doesn't exist in sufficient numbers yet to support fleets, who are left stuck between investing or waiting out Govt funded infrastructure spending.
- Regulatory changes – especially in California and the 14 states that adopting CARB standards – are driving change – but mainly where subsidies exist.

Vehicle Weight Class	Subsidy per Vehicle
Class 2B	TBD
Class 3	\$45,000
Class 4-5	\$60,000
Class 6-7	\$85,000
Class 8	\$120,000
Class 8 Drayage Truck Early Adopter*	\$150,000

The EV Transition in CV Will Happen more slowly



Source: ACT Charging Forward – 2020-2040 BEV & FCEV Forecast and Analysis Class 4-7 Vehicle Unit Volume North America

Funding Updates - Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project | California HVIP

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Workhorse – Optimizing Every Last Mile

Workhorse C1000

- Ground up designed EV with driver & operational efficiency focus
- Inner floor 10" lower than ICE comp. (2 steps vs. 3 steps to enter/exit vehicle)
- Highly efficient dual axial flux motors for aggressive acceleration & re-gen
- 70 – 120 kWh battery pack = 100 – 150-mile range with up to 8-year warranty
- Telematic insights driving maintenance management & uptime performance
- North America-wide distribution & maintenance networks
 - Ryder, Amerit Fleet Services, Pride, Pritchard's
- Major start-up challenges – lack of experience, FMVSS testing, suppliers



Horsefly[®] UAV



- Purpose built high efficiency package delivery drone
- ARES software for automated flight control
- 10 lbs. package flies 10 miles on a single charge
- Patent for launching drone off a package delivery van
- ASTM-certified Parachute Recovery System (PRS)
- Entered FAA Type Certification pipeline in October 2020

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Thank You

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Federal Gov't Focused on Rebates but Lagging on Infrastructure



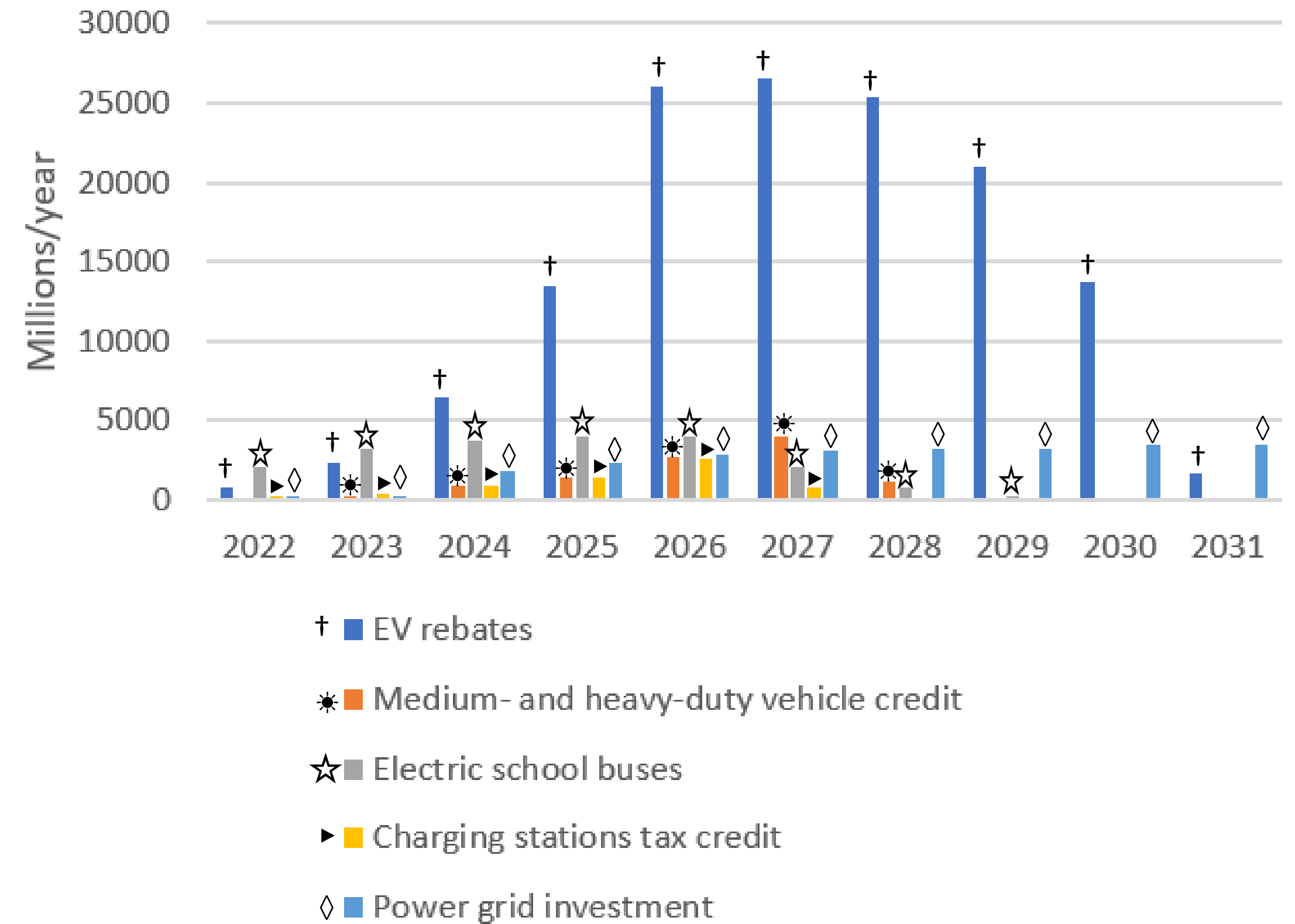
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Spending Priorities

- Current budget proposal from the Biden Administration significantly ramps up federal spending
- The plan is targeted on job creation through support of manufacturing expansion, but lacks significant support for electric infrastructure (20% of total spending)
- Plan focuses on:
 - Increased EV Tax Credits and increased limits per manufacturer (\$7,500 → \$12,500 per vehicle / 250,000 units → 500,000 units)
 - EV Tax Credits for School buses and Medium and Heavy Trucks
 - Mandates that the Federal fleet must convert to majority EV

Program	Spending
Federal EV Purchases	\$6.6B
National EV Charging Network	\$15.0B
EV Charging Station Tax Credit	\$1.5B
Medium and Heavy Duty Vehicle Tax Credit	\$4.0B
Electric Grid Improvement Tax Credits	\$2.1B
EV Tax Credit to Consumers	\$48.2B
	\$77.5B

Federal government proposed support for electric vehicles, FY 2022-2031



Biden FY 2022 budget doubles down on commitment to electric vehicles | IHS Markit