CENTER FOR AUTOMOTIVE RESEARCH

Changing Automotive Supply Chains

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THE CENTER FOR AUTOMOTIVE RESEARCH (CAR)

Automotive industry contract research and service organization (non-profit) with more than 30 years experience forecasting industry trends, advising on public policy, and sponsoring multi-stakeholder communication forums.

RESEARCH

Independent research and analysis on critical issues facing the industry.

EVENTS

Industry-driven events and conferences that deliver content, context, and connections.

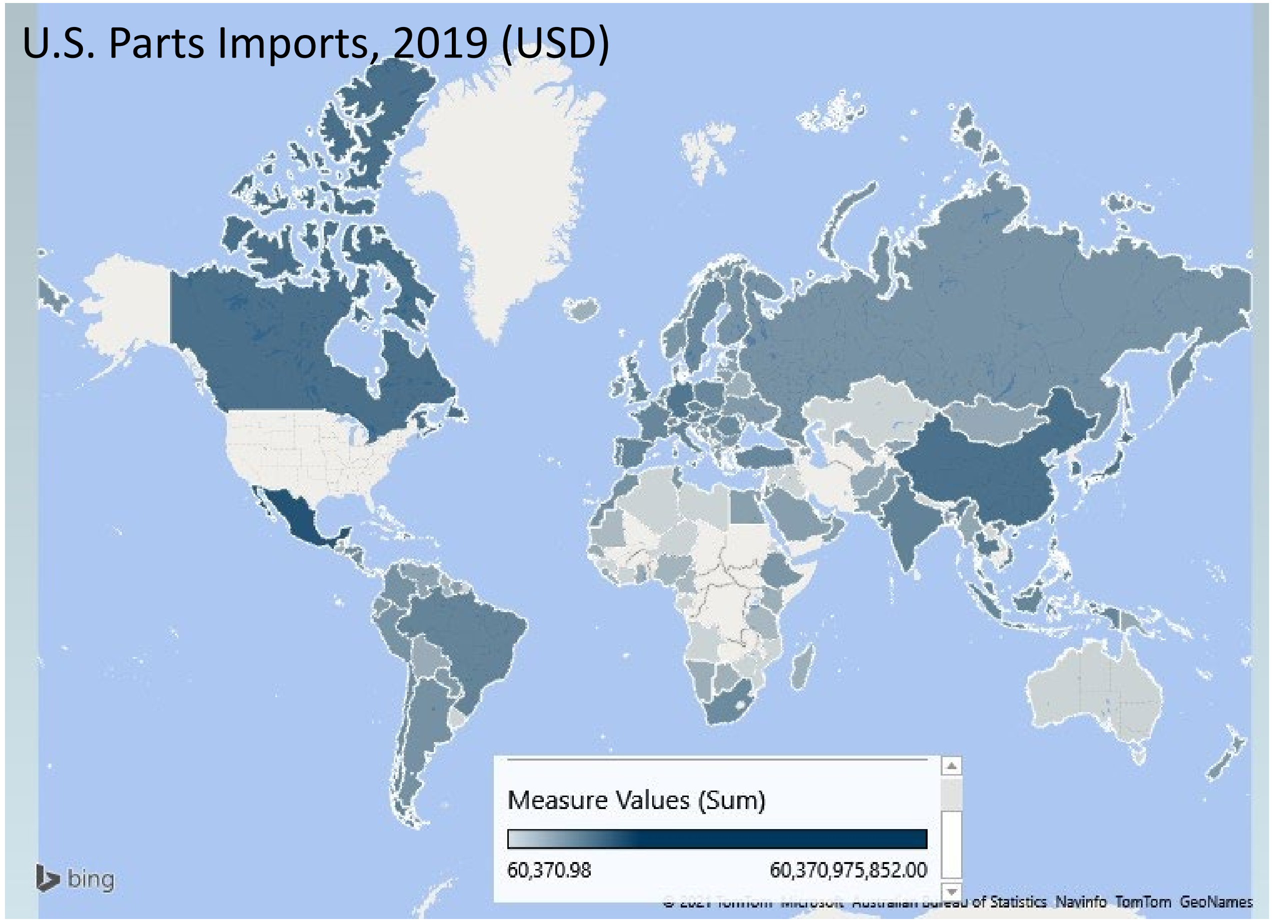
CONNECT

Consortia that bring together industry stakeholders to participate in working groups, networking opportunities, and access to CAR staff.

30,000 parts come to the United States from 186 countries/areas to build 10-12 million vehicles/year

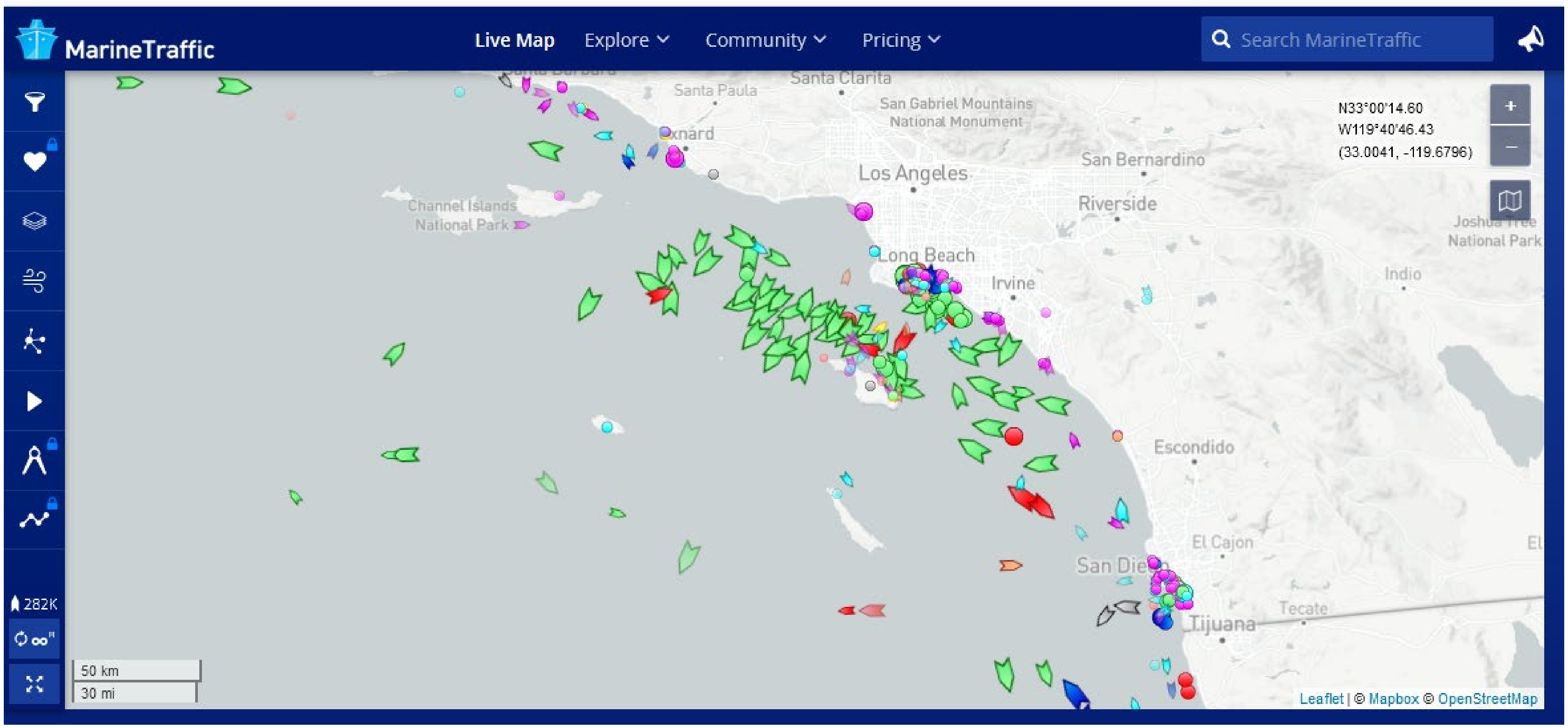
There are many things that can (and often do) go wrong:

- Shipping disruptions
- Parts shortages
- Weather
- Natural disasters
- Finance
- Labor disputes



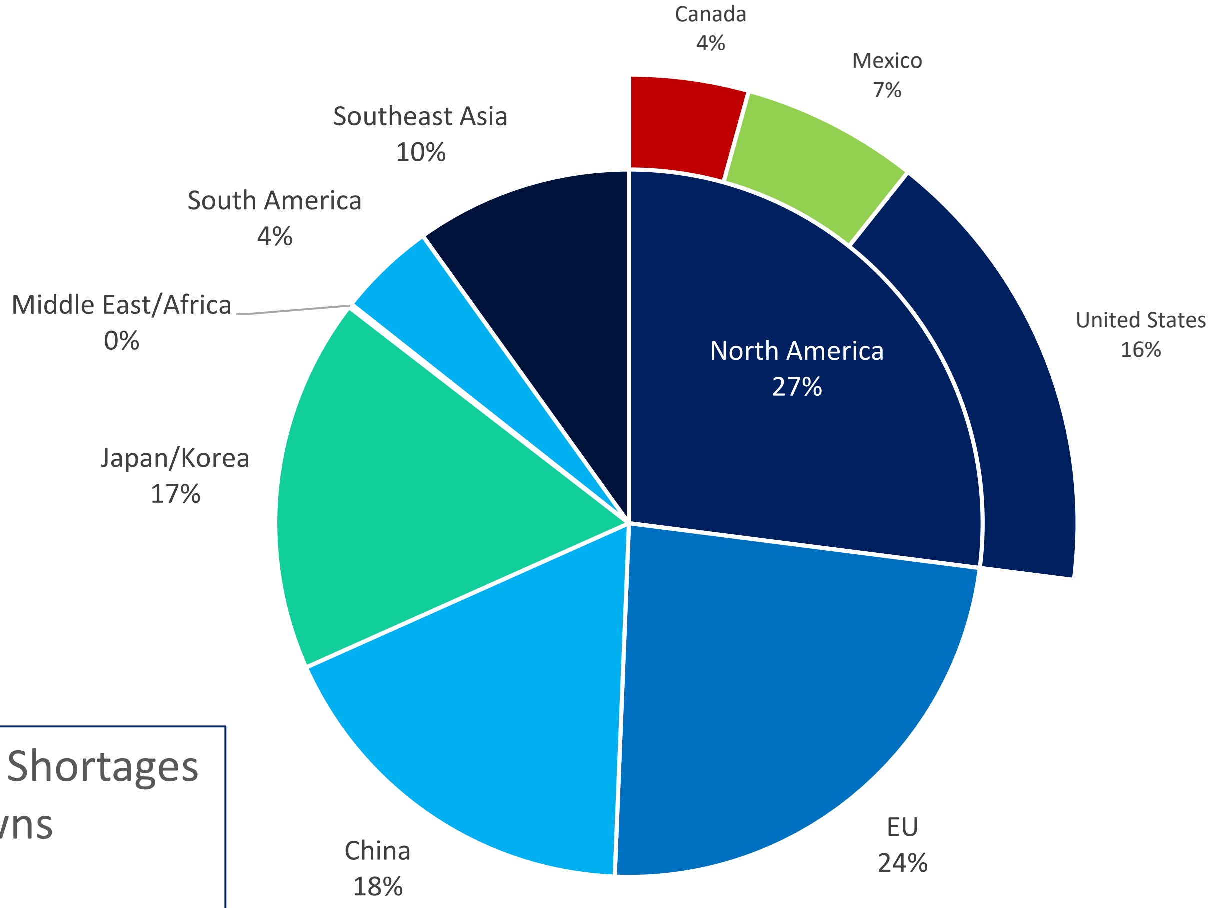
Source: U.S. International Trade Administration

Shipping tie-ups/delays/disruptions impact everything—not just semiconductors



2021 Global Lost Production = 8.7M Light Vehicles (U.S. = 1.4M)

YTD through 11 October Announced Downtime & Shift Trimming, by Region

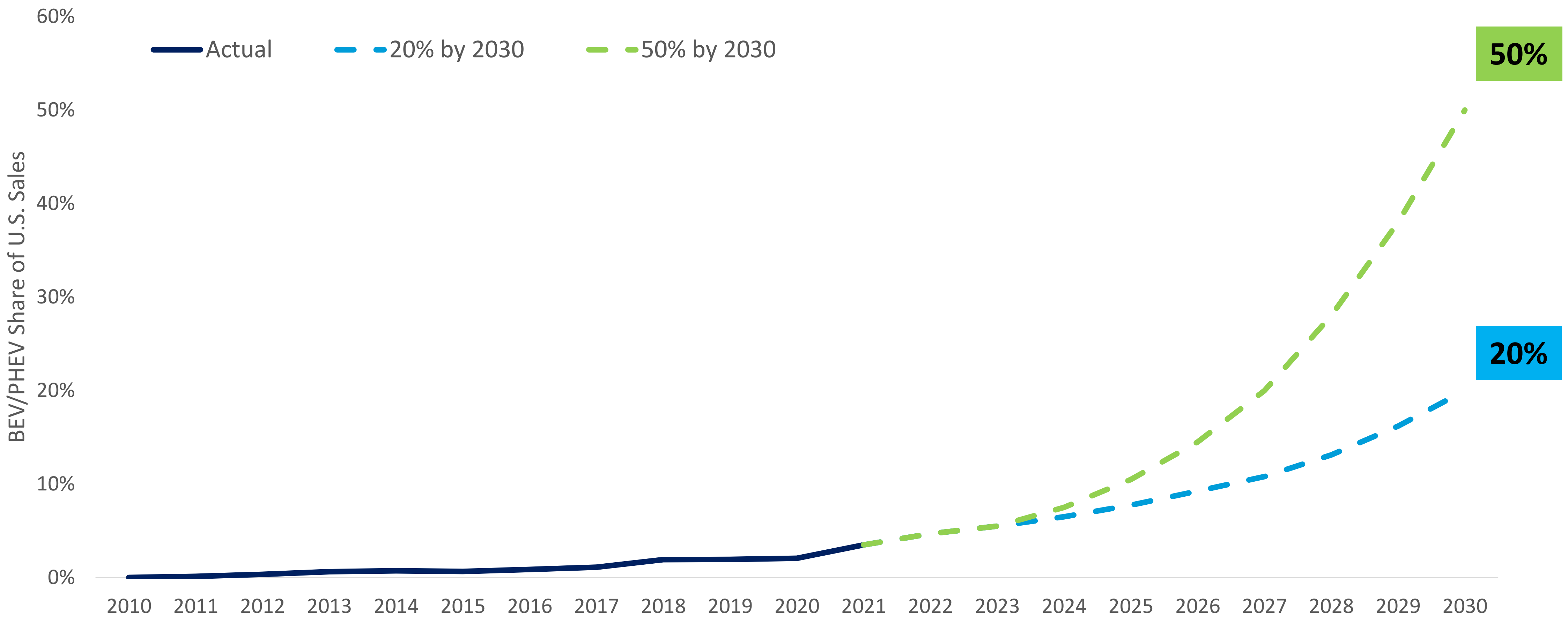


95.6%	Semiconductor Shortages
3.5%	COVID Shutdowns
0.8%	Weather
0.1%	China Power Outages (magnesium shortages?)

Source: CAR compilation of IHS data

A long way to go to get to net zero by 2050

BEV & PHEV U.S. Market Share 2010-2021 YTD; 2021-2030 projected



Source: Ward's Automotive Reports (from 2010 & on), HybridCars.com & CAR Research

Everything is new

PRODUCT

New platforms, new vehicles, & new business models

TECHNOLOGY

New technology is more capable with longer range & lower costs

INPUTS

EVs require different inputs & different current part & component content

PROCESSES

New plant investments = latest manufacturing processes & tecniques

COMPANIES

Upending existing supply chains with new entrants, JVs, M&As, & new leaders

NEW STRATEGIES

1 EV platform = 18+ vehicle models

GM BEV3 Platform

Buick Enspire

Buick D-SUV 3-Row

Cadillac Celestiq

Cadillac Lyriq

Cadillac C-Sedan

Cadillac D-Sedan

Cadillac C-SUV

Chevy Bolt

Chevy Bolt EUV

Chevy Camaro

Chevy Corvette EUV

Chevy B-SUV

Chevy C-SUV

Chevy D-SUV 3-Row

Cruise B-Hatchback AV

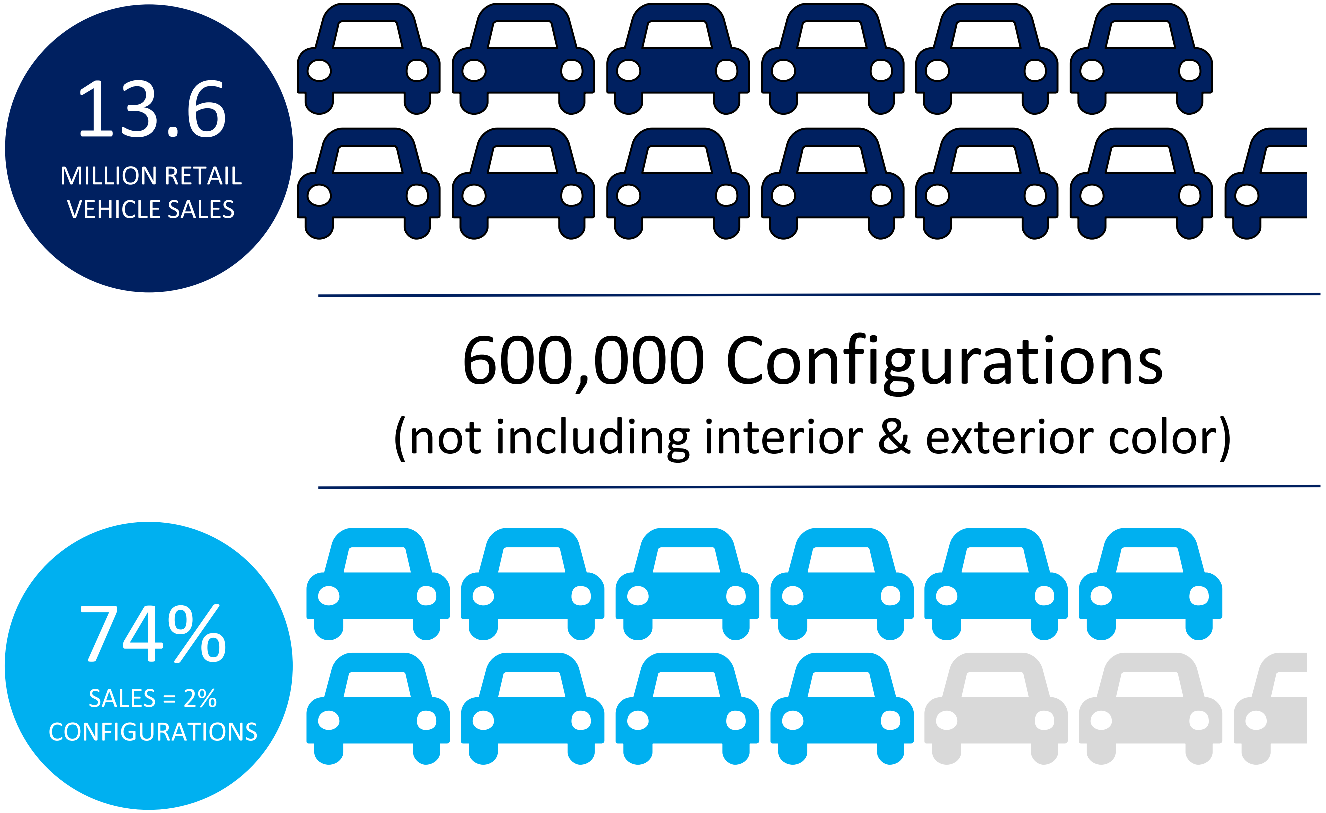
Cruise Origin AV

Acura D-SUV

Honda Prologue

Blank sheet of paper platforms = Less manufacturing complexity

2019 JD Power Data:

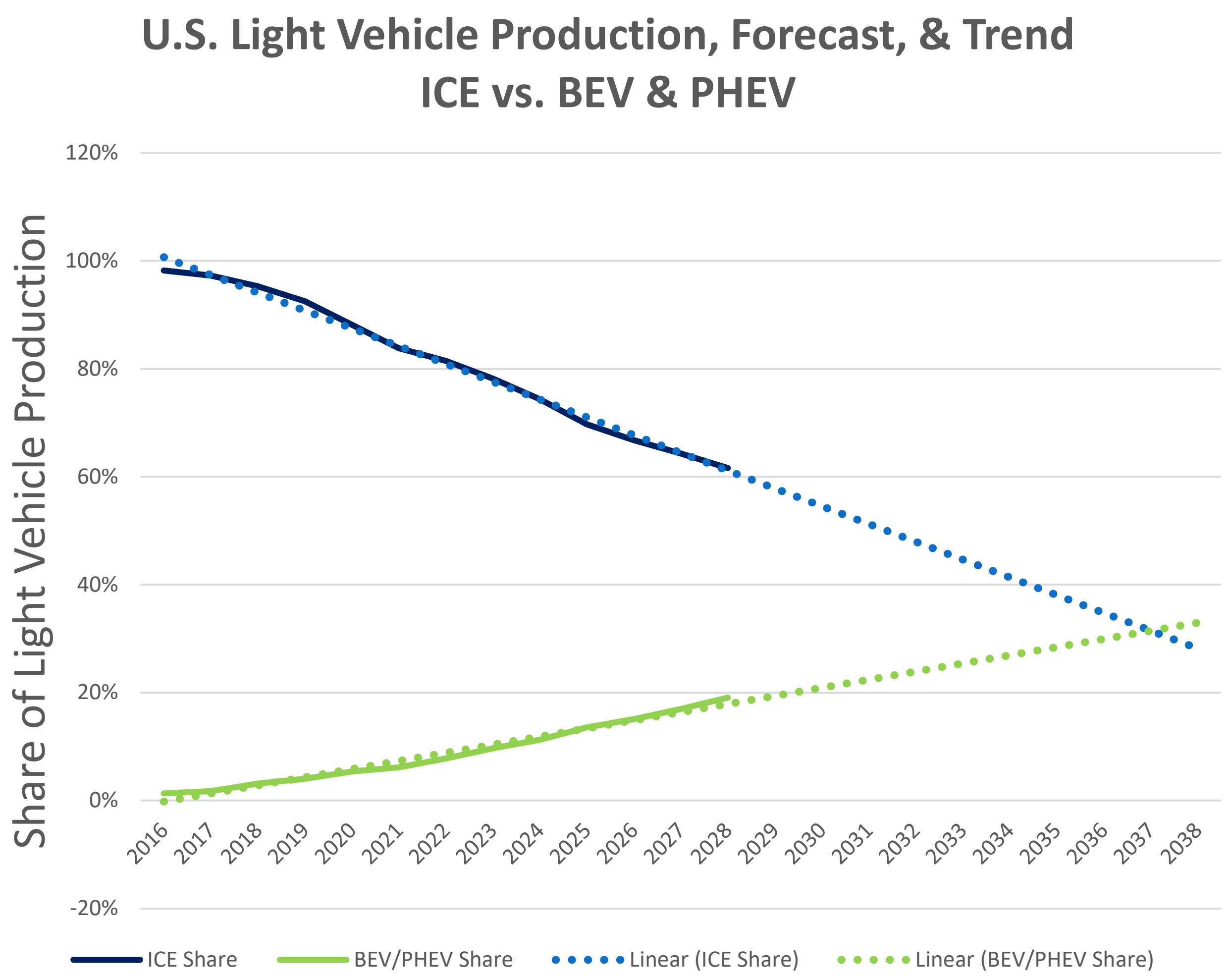


Source: JD Power-CAR Webinar https://www.youtube.com/watch?v=Gj6jJi3iR5M

More common propulsion parts, too

https://www.borgwarner.com/newsroom/press-releases/2020/08/05/borgwarner-enables-high-performance-eco-friendly-driving-with-latest-integrated-drive-module-for-ford-mustang-mach-e

Ramping up PEVs & Ramping down ICE = Low productivity & potential for plant shutdowns/consolidation



Source: CAR analysis of LMC Automotive data

New brands/new entrants

ARRIVAL
BOLLINGER MOTORS
brightdrop
CANOO
ELMS
ELECTRIC LAST MILE SOLUTIONS
FOXCONN®
JAC
KARMA
LION ELECTRIC
LUCID
RIVIAN
ZOOX
ACCUMOTIVE
CATL
CLARIOS
ENEVATE®
Envision AESC
KeraCel INC
LG Chem
Panasonic
BATTERIES
ROMEO POWER
SAKUÚ
DREAM IT. BUILD IT.
SAMSUNG SDI
SILA
NANOTECHNOLOGIES
SK
ULTIUM CELLS
Solid Power
XALT Energy®

THANK YOU

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