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NA CEO Strategic Issues Summit

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Let's start with some common EV 'myths': true or false?

EV range decreases significantly in winter

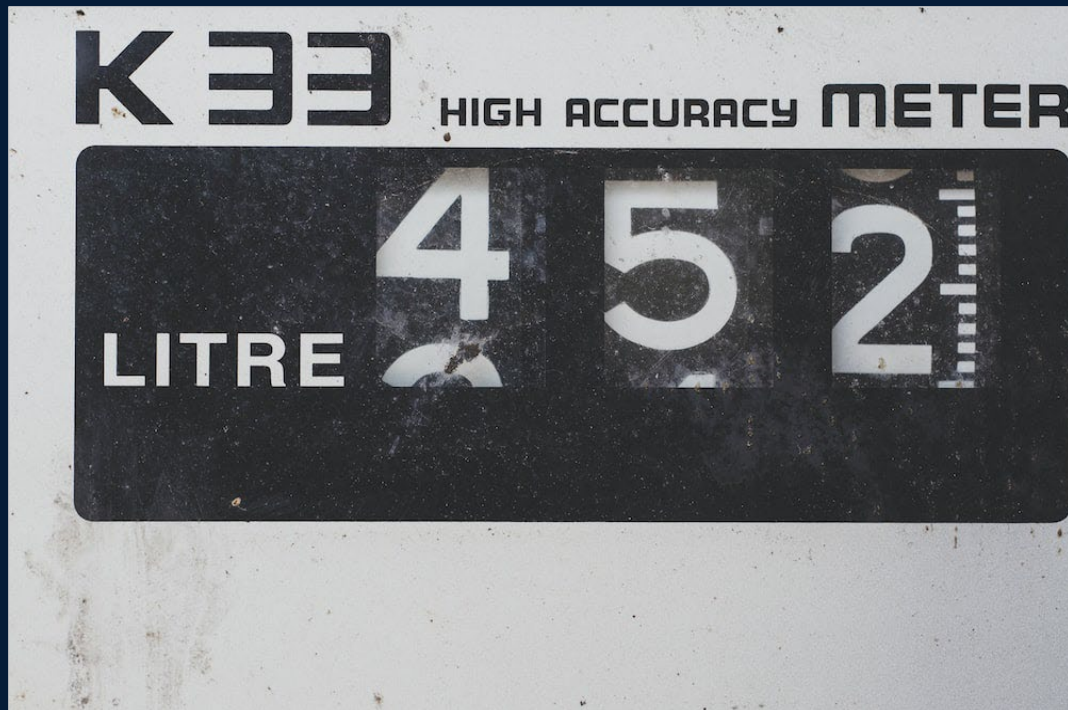


True

EV range can decrease as much as 20-30% in cold weather

Let's start with some common EV 'myths': true or false?

Driving electric is significantly cheaper than gasoline



True

Home charging can be 4-5x cheaper, while public fast chargers can be close in cost per mile

Let's start with some common EV 'myths': true or false?

EV batteries do not last long

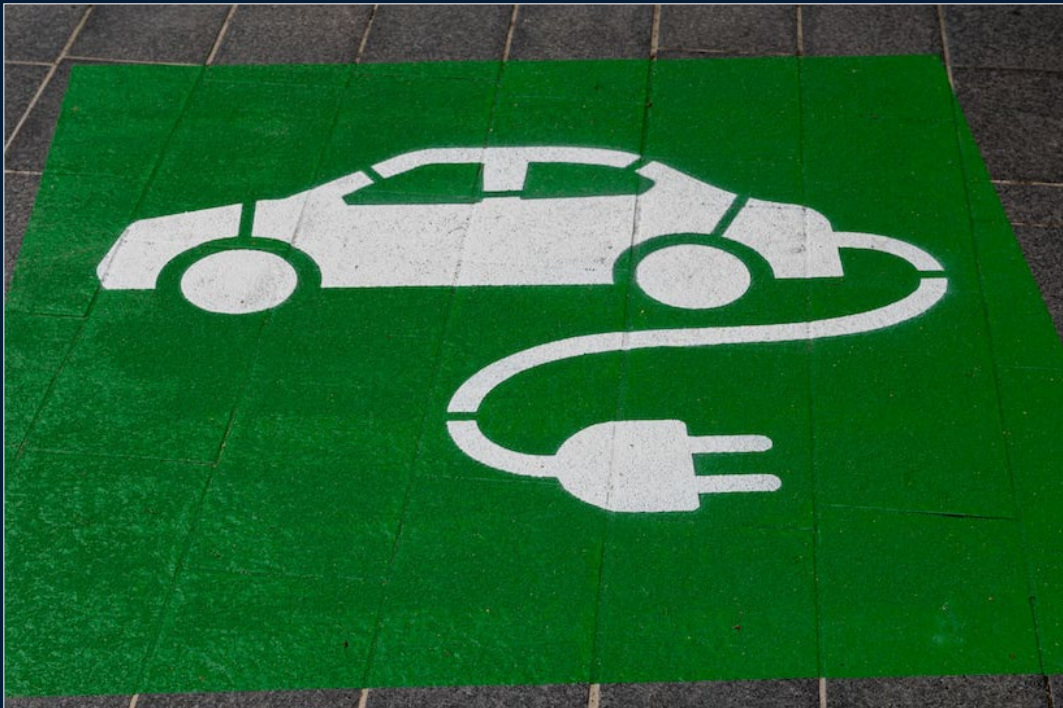


Partially true

**Battery degradation is estimated at:
5% after 100,000 km and
15% after 500,000 km**

Let's start with some common EV 'myths': true or false?

There are not enough fast charging stations



True

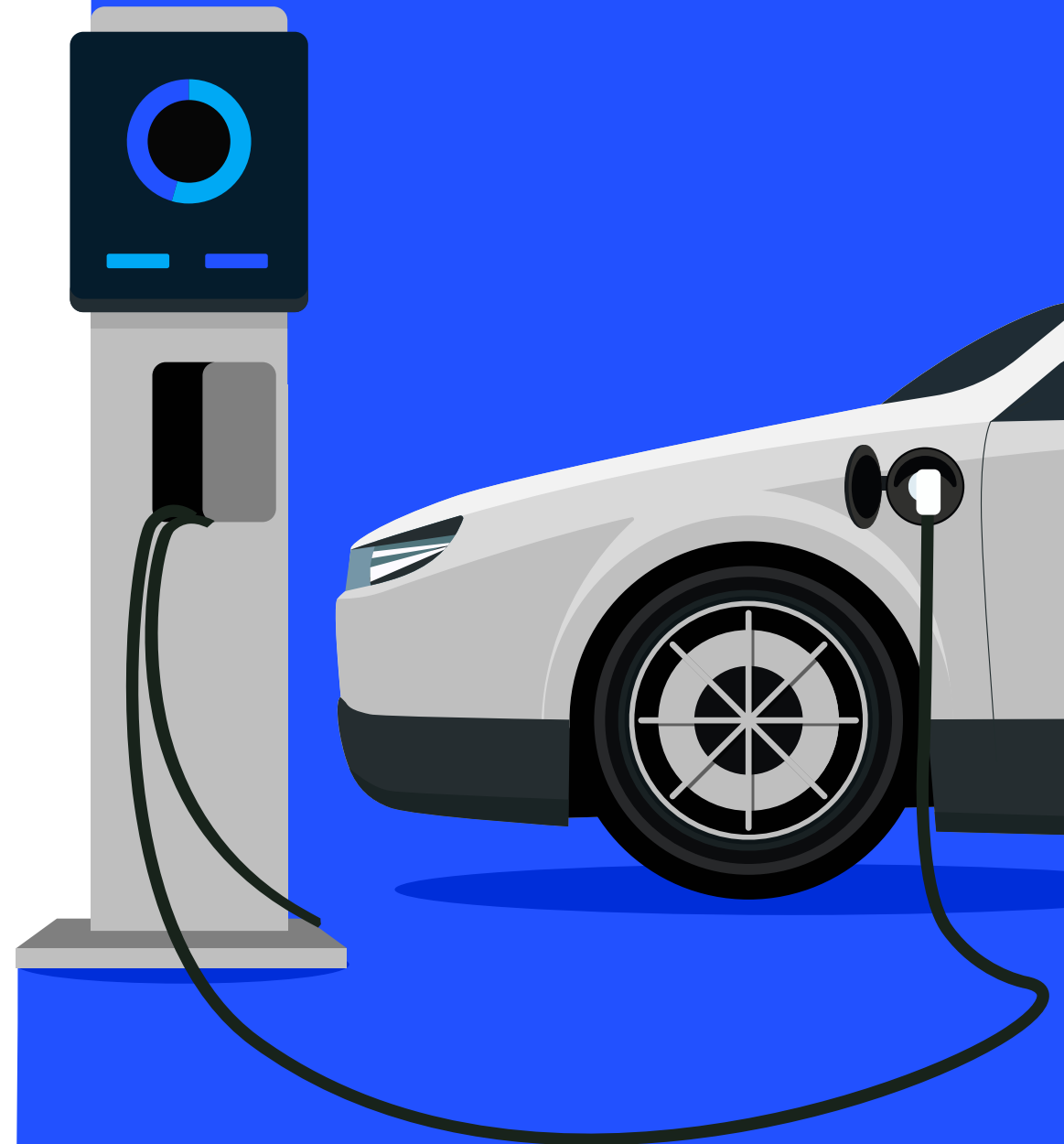
Though still not as common as a gas station, there are more fast charging stations already than you might think: 7,000+ in the US



EV market updates

EV charging is not like refueling

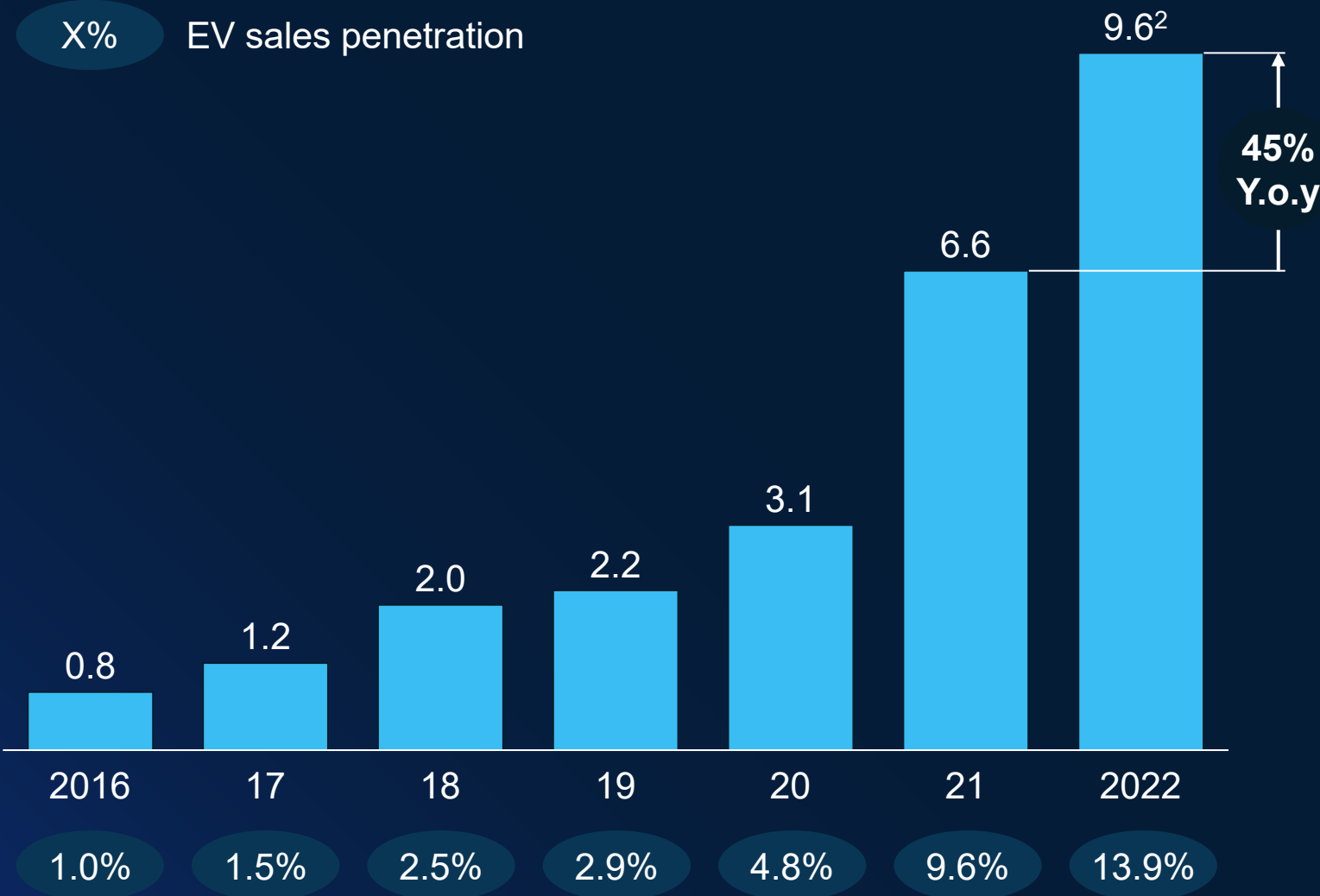
How to successfully play in the
charging infrastructure business



EV sales have continued to gain momentum in 2022



Global electric¹ passenger car sales, M units

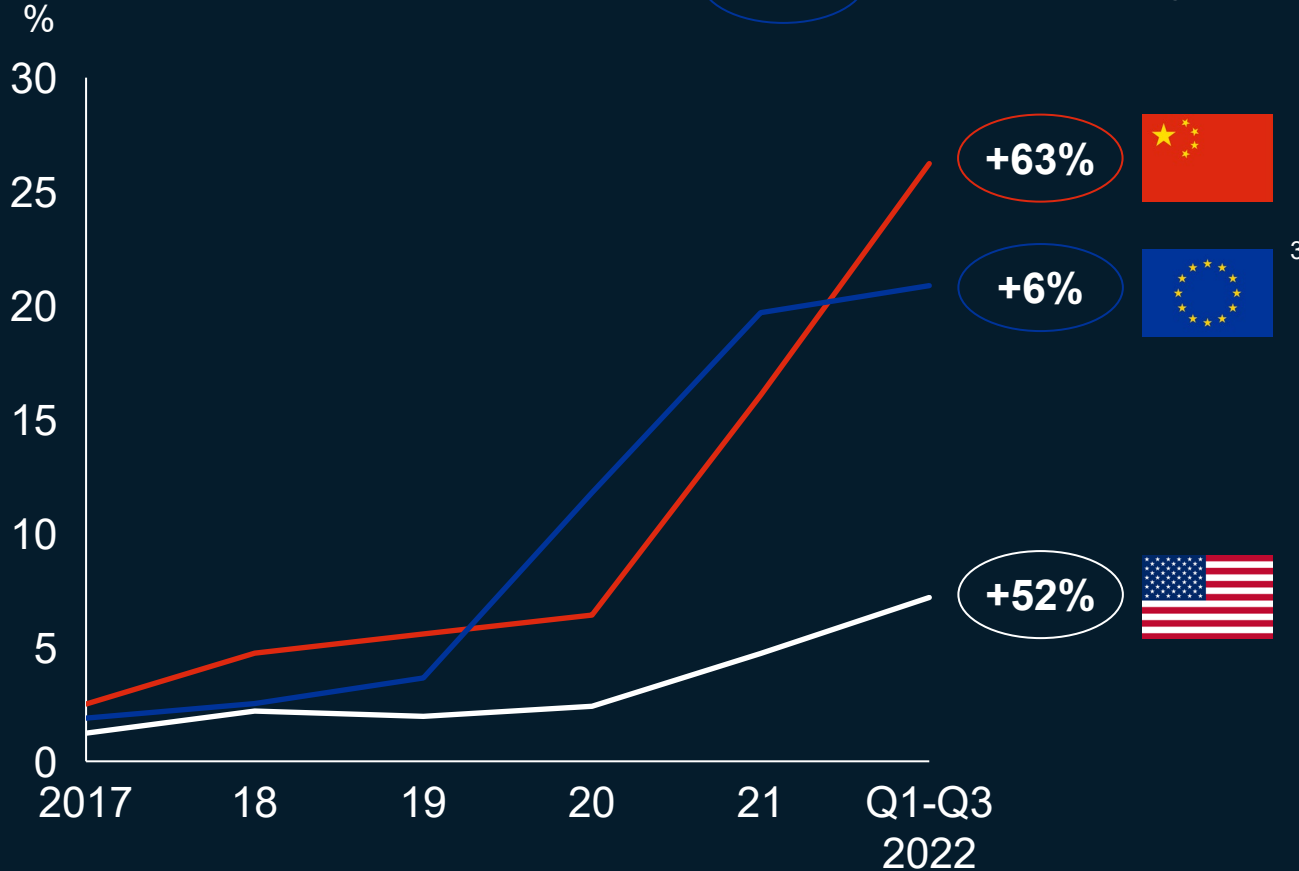


1. EV and PHEV
2. Q4 2022 sales estimated. Assumed equal to Q3 2022 as minimum.

China leads in EV penetration, with Europe growth slowing and the US lagging behind

Nov 2022

EV sales penetration¹ by region X% 2021-YTD 2022 growth²



Highlights around the globe

~80% 2022 EV penetration in Norway vehicle sales

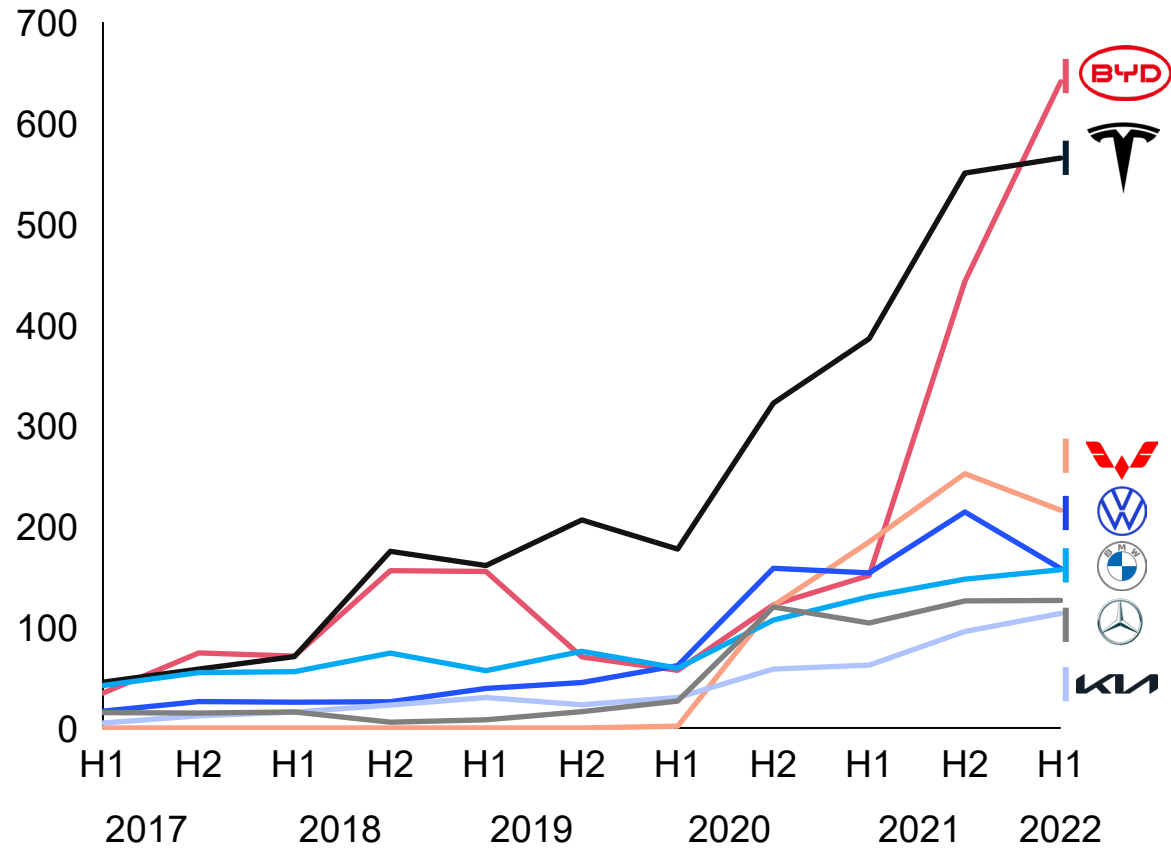
~50% Dec '22 EV penetration in Germany vehicle sales

30+% Chinese public charging volume driven by Didi⁴

1. Share of BEV+PHEV+FCEV in percentage of total passenger car sales
 2. Q1-Q3 2022
 3. EU+EFTA+UK
 4. Based on Q1 2021 data

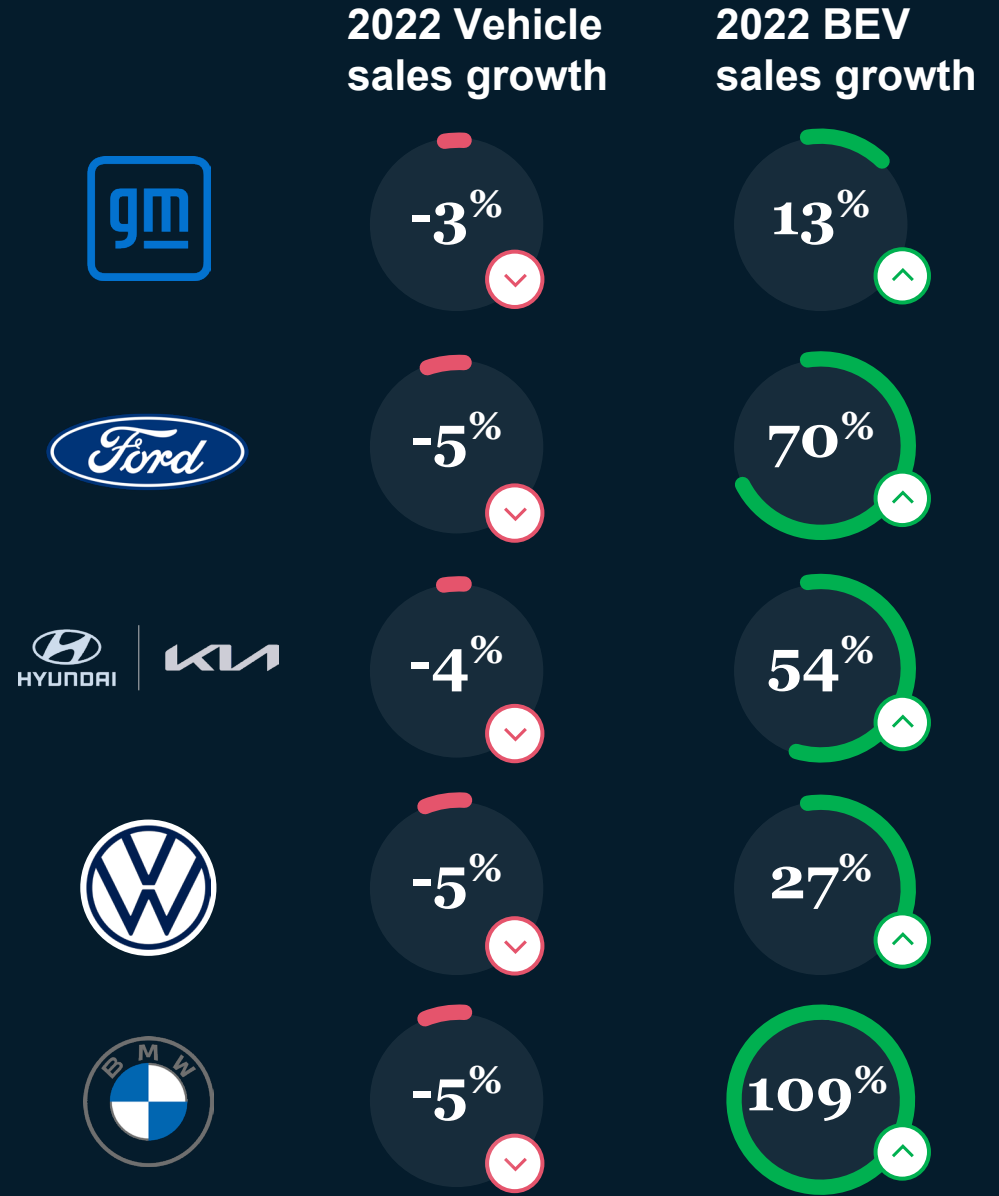
OEMs: BYD takes leading global position, BEV sales show growth vs stagnant overall vehicle sales

Electric¹ passenger car sales by brand, k units



1. BEV and PHEV

Source: EV-volumes, McKinsey





Key EV drivers point towards further adoption acceleration

Government involvement

incentivizing an acceleration of EV sales (e.g., Inflation Reduction Act, CARB phase-out of ICEs)

Customer consideration

for EVs purchases growing significantly (41% of men and 29% of women say their next vehicle is a BEV or PHEV)

\$5bn allocated for charging infrastructure

through the NEVI program, to be allocated for each state

58 new BEV and PHEV models

launched in the USA in 2022

Large fleets are decarbonizing

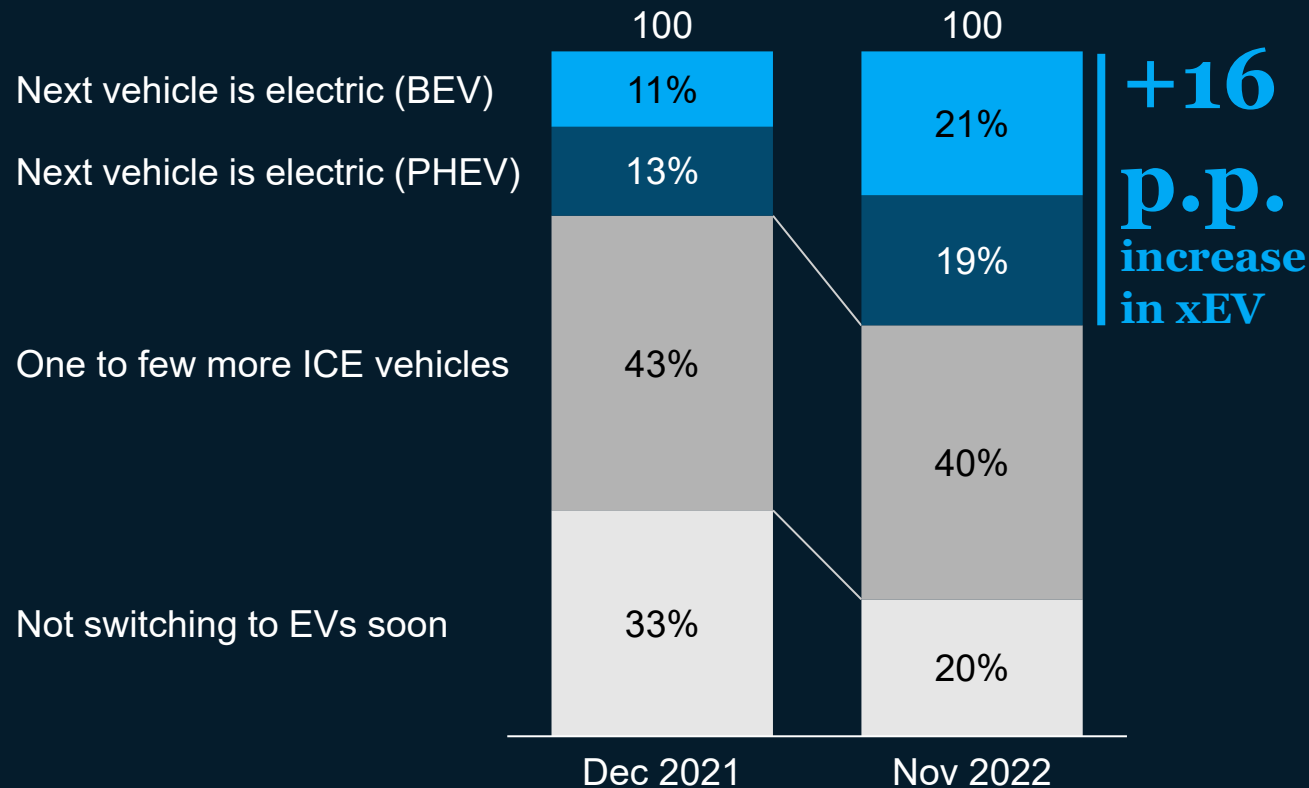
with Uber paying drivers an additional \$1 for every trip made in a zero emission vehicle (Hertz, Avis, Lyft also building ZEV parc)

US consumer sentiment towards xEVs has increased by 16 ppt since last year



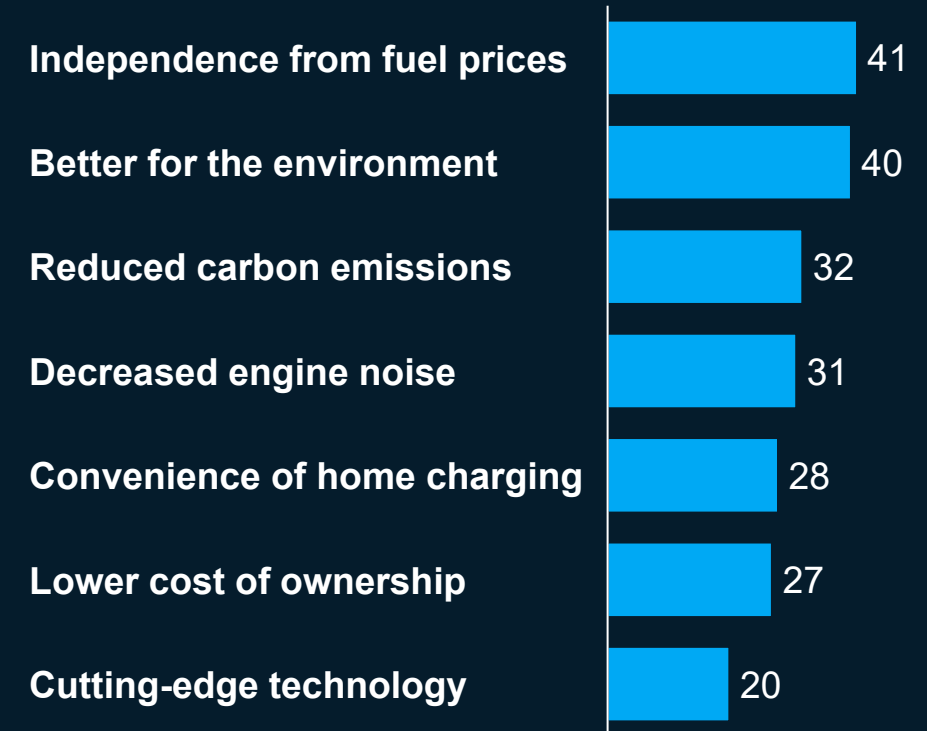
Vehicle of choice at next purchase

Share of respondents



Top reasons to buy xEV

Share of xEV considerers



1.US overview based on ACES survey responses, like for like comparison gives an overview of 30% stating next vehicle is EV

2.Consumer pulse in US, n=1032

Recent legislation will accelerate transition: Bipartisan Infrastructure Law allocates \$5B to National Electric Vehicle Infrastructure (NEVI) Program through 2026

Sourcing and charging requirements



Chargers must have at least **55% American-made content**



Sites must be capable of charging **four EVs at 150kW simultaneously** and a total minimum capacity of 600kW



Sites must have **secure payment methods** and no restrictions based on lack of membership or subscription

Site specifications



Must be deployed every **50 miles**, within one mile of the interstate highway system



Must maintain **97% uptime** and must be operational and maintained for a minimum of five years



Must accommodate disabled drivers

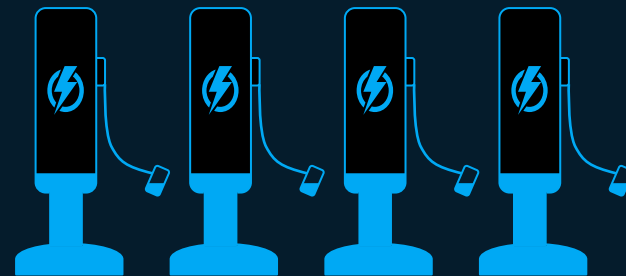
IRA: Alternative Fuel Refueling Property Credit incentivizes sites with multiple chargers and site expansion plans

Raises cost cap from **\$30k** per site to **\$100k**

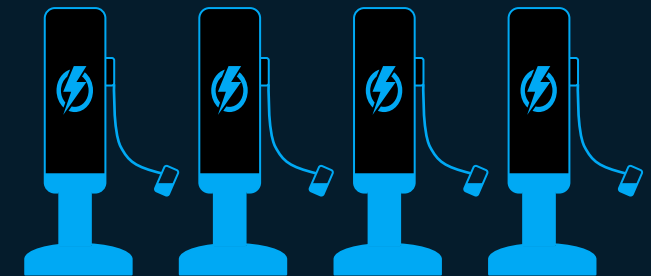
Site must pay **prevailing wages** and be located in a **low-income** or **non-urban** census tract

Example: Tax Credit for a 4x DC150 Charging Station¹

Old 30C Credit:
\$30,000



IRA 30C Credit:
~\$100,000
(without NEVI funding)

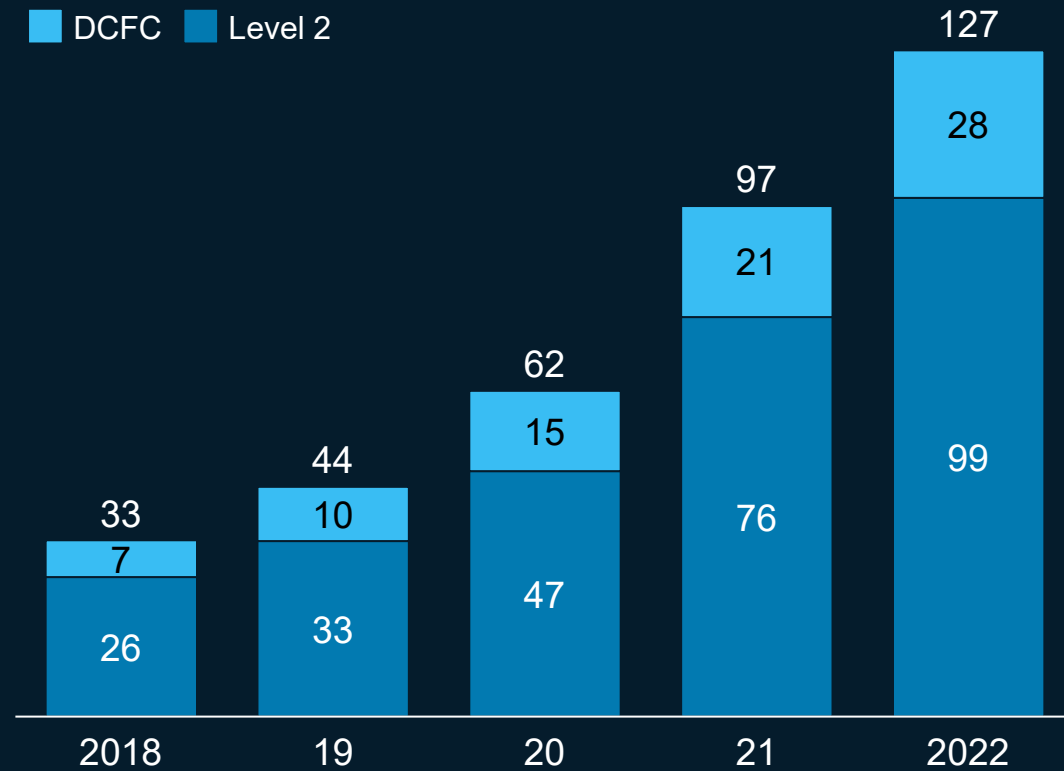


1. Assumes estimated pricing for 2022 for the cost of the charger hardware, installation, and planning and engineering, but does not include grid or site upgrades needed

We have seen a significant expansion of charging infrastructure in 2022

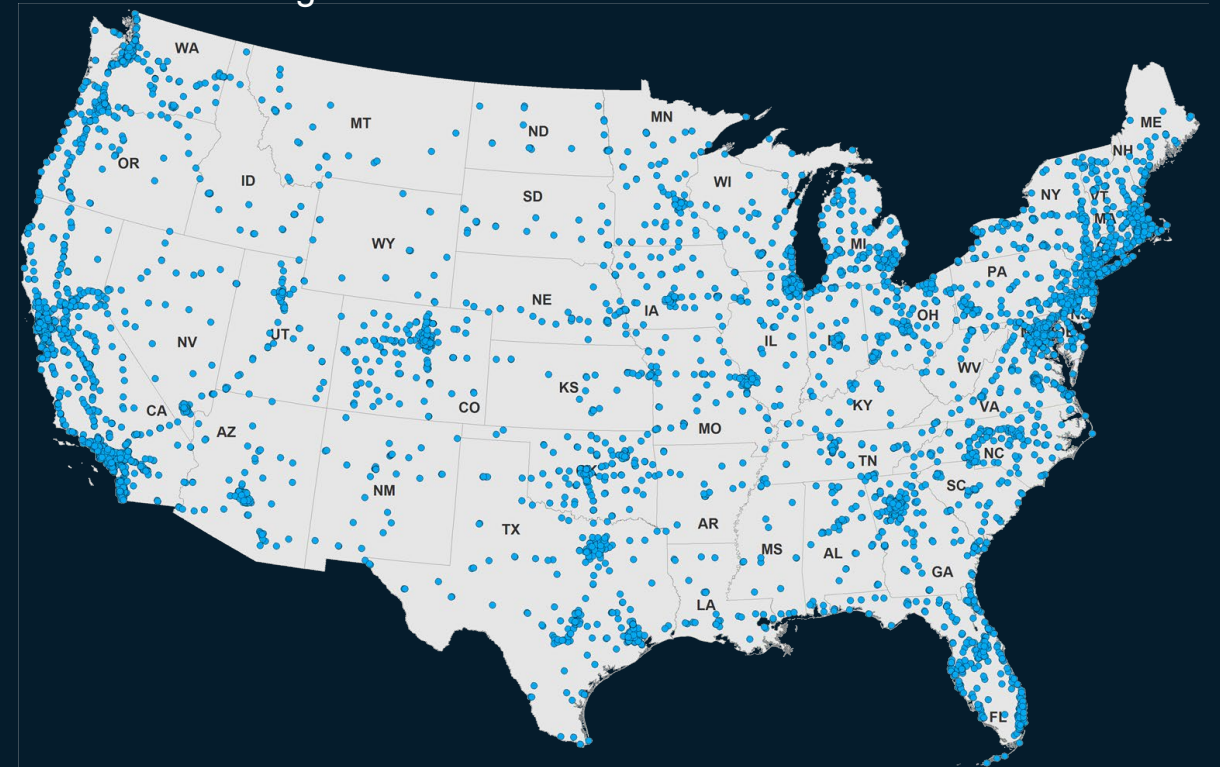
US charger installed base

of charge ports, thousands



2022 US charging station footprint

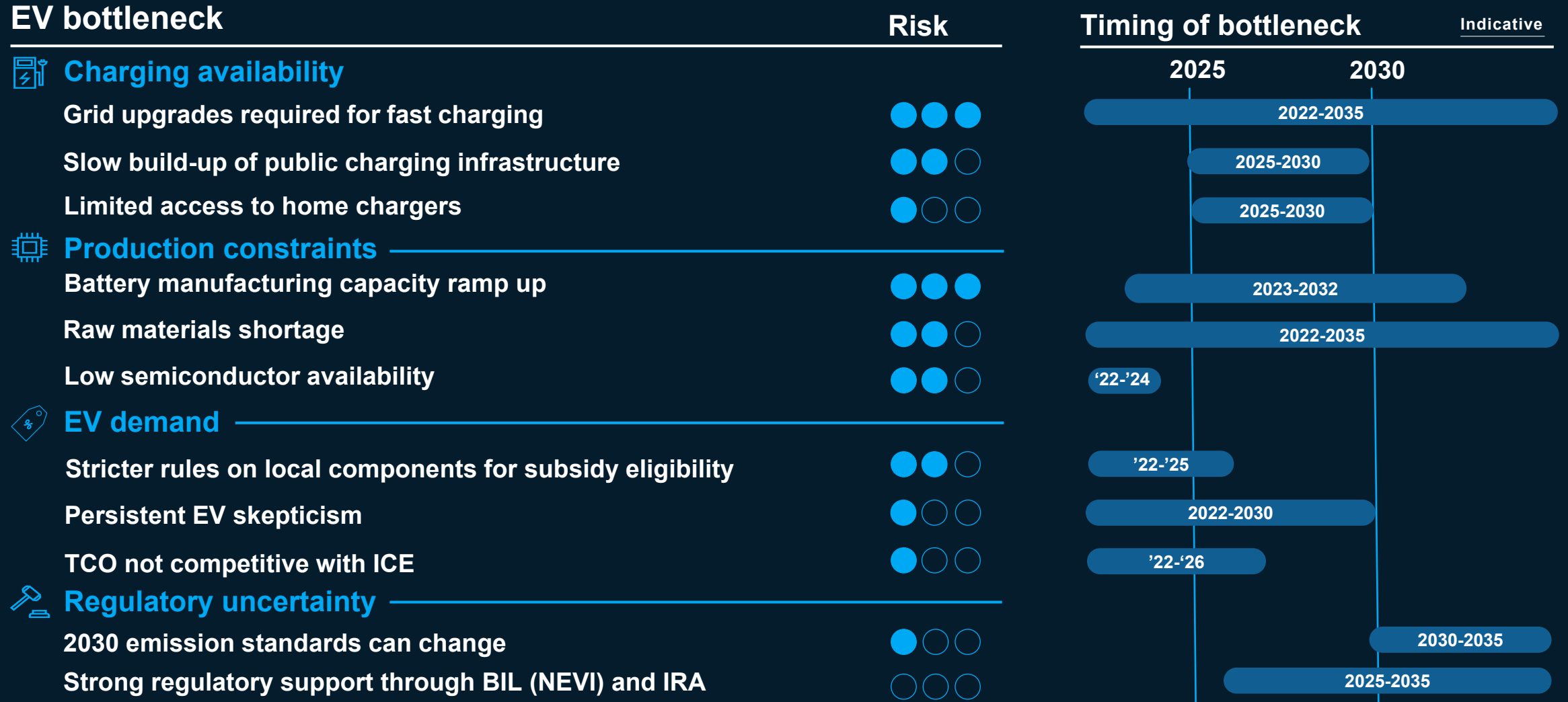
DC fast chargers



~119k Fuel retail stations

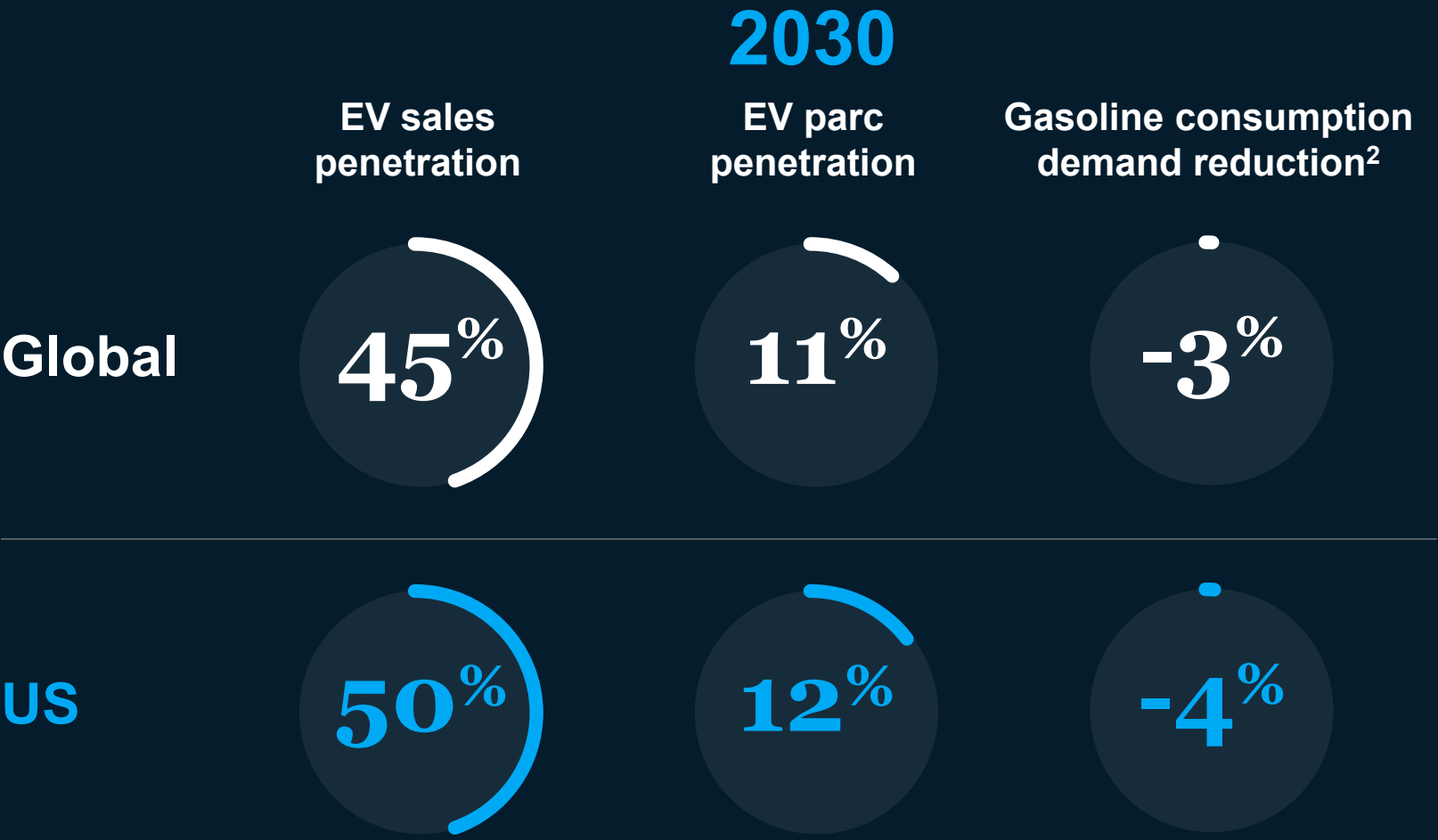
~7k DC fast charging stations

There are several risks that could slow down EV sales growth



Overall, we remain bullish about EV adoption in the US, but parc and gasoline consumption will take longer to transition

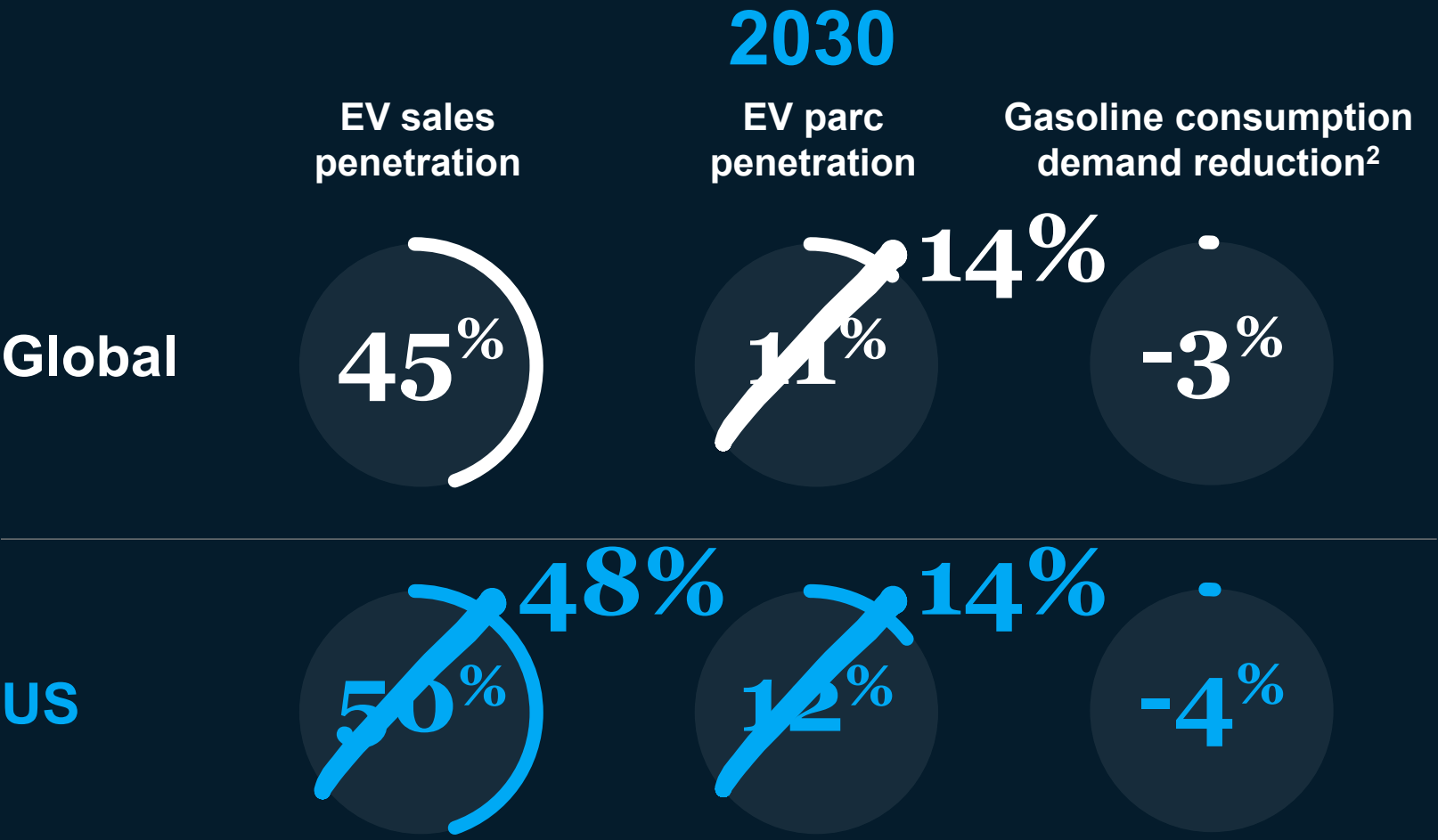
BEV and PHEV 



1. Passenger cars and pickup-trucks weighting <3.5 tons 2. Change from 2021 to 2030

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BEV and PHEV 

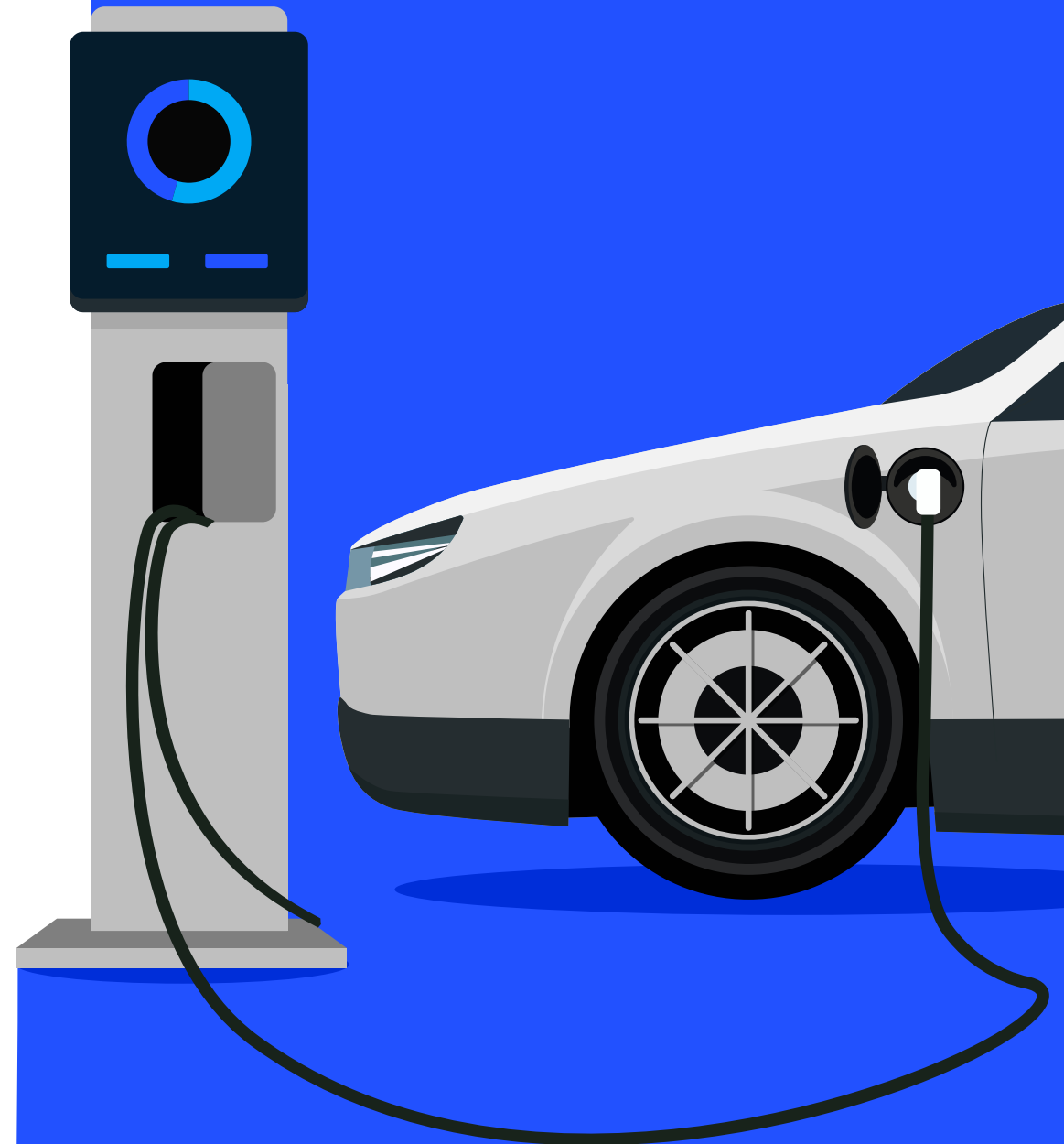


1. Passenger cars and pickup-trucks weighting <3.5 tons 2. Change from 2021 to 2030

EV market updates

EV charging is not like refueling

How to successfully play in the
charging infrastructure business



Unlike ICE vehicles, EVs have multiple options to “refuel” and will not primarily be recharging at public stations

Charging use cases

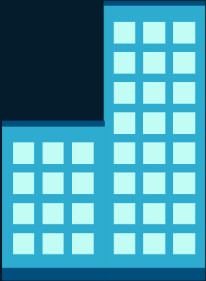
Residential

Apartments & single-family homes



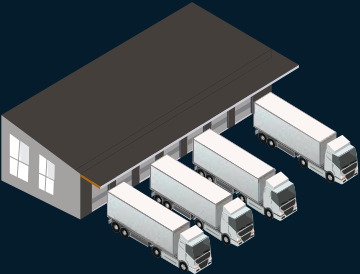
Work

Office, government property



Fleet depot

Fulfillment center, vocational, public services, courier, etc.



Public

Destination

Mall, supermarket, car park, etc.



On-the-go

Retail charging stations



Lowest margin

Highest margin

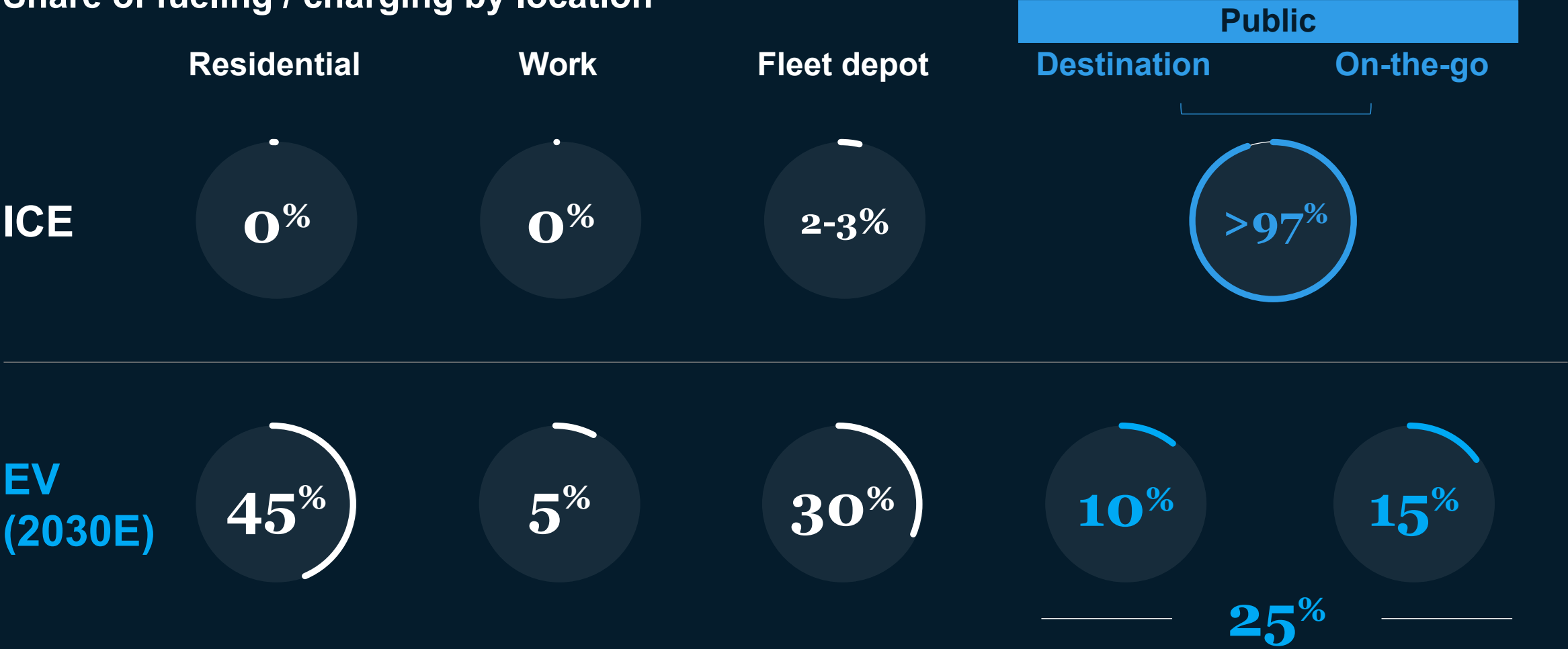
Most charging happens at home or a depot – likely only ~25% in public



BEV and PHEV



Share of fueling / charging by location



Source: ICE data from US EIA 2021, EV data from McKinsey MCFM

However, public fast charging energy sales represent ~40% of the EBITDA value pool in EV charging infrastructure

EBITDA pools across the EV value chain and use cases, 2030, mn EUR

Base case scenario, Passenger cars and LCVs, January 2023



Value chain coverage



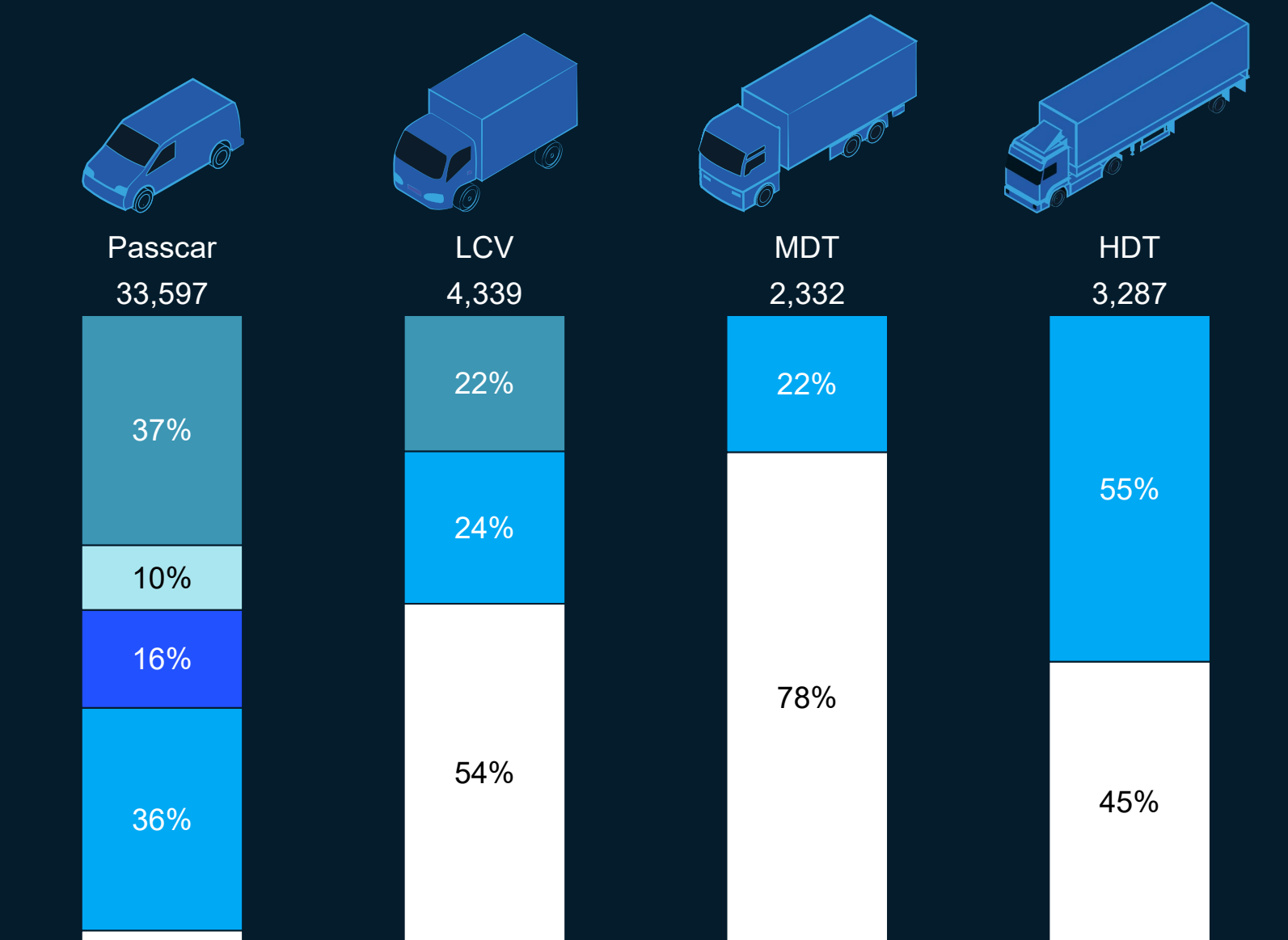
~40% of the entire value pool

1. Excluding convenience and retail value pools
 2. Includes overnight on-street charging

Different vehicle classes will behave differently, with more passenger cars and heavy duty trucks charging in public use cases


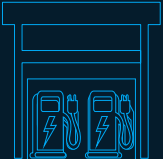

Energy sales¹ – Fleet only (US & Canada), Annual revenue USD m (2032)

- Home²
- Work
- Destination
- On-the-go³
- Fleet hub



1. For public use cases (i.e., public, public overnight) energy resale revenues represented. For private use cases (i.e., fleet hub, residential) energy wholesale revenues represented. Work represented as the sum of wholesale and resale.
 2. Incl. single and multi-family homes
 3. Incl. public fast chargers (on and off highways) and public overnight charging

Different public charging concepts are suitable for certain common trip types that require public charging

		Trip types that may require public charging					✓ Ideal use case
		Estimated share of public charging	Long distance trips beyond EV range	Daily charging due to no home charger access	E-hail drivers charging during the day	Out of town rental car drivers	Commercial EV fleets without depot charger access
 <p>Charging destination Level 2 / 3</p> <p>Chargers next to malls, attractions, venues</p>	20-30%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 <p>Charging hub Level 2 / 3</p> <p>Large residential parking lots with many chargers</p>	10-20%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
 <p>Highway station Level 3</p> <p>Fast chargers located alongside highways and major arteries</p>	50-70%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

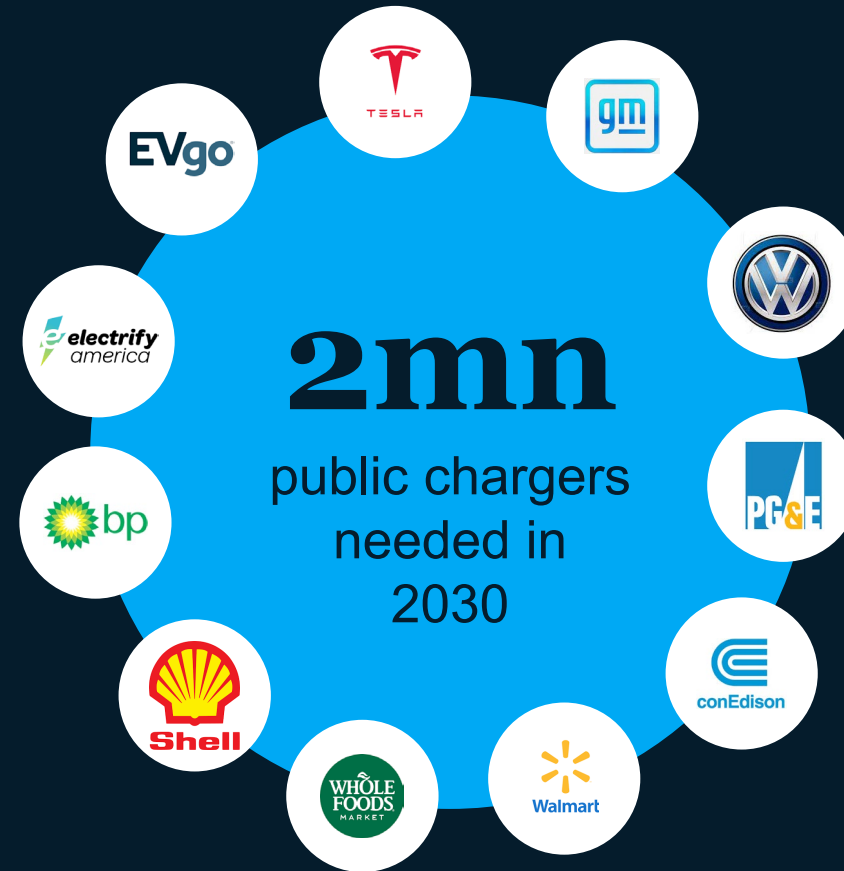
There are many competitors in the market and many more lining up to enter

EV Charging scale-ups

- First mover advantage
- Innovation leader and customer centric

O&G

- Strong expertise in fuel retail; existing network and fleet customers
- Limited exposure so far



Destination site hosts

- Potentially some of most attractive locations
- Revenue opportunity as well as customer requirements

Auto OEMs

- Core focus on enabling all charging use cases
- Only some owning-operating, many focus on partnership

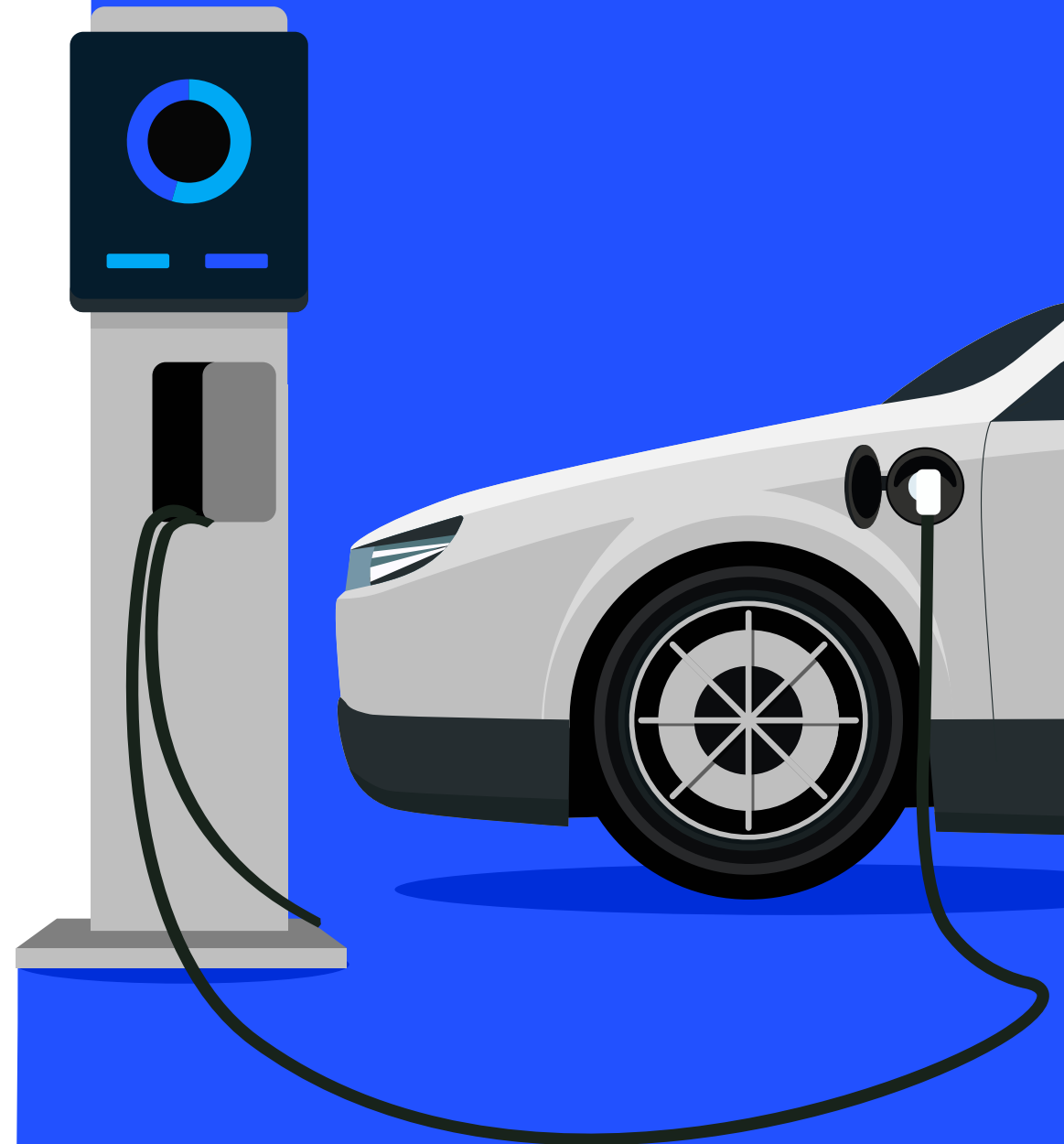
Utilities

- Currently only enabling function (subsidies, rates, grid build-out)
- Non-regulated utilities with potential to enter as in Europe

EV market updates

EV charging is not like refueling

**How to successfully play in the
charging infrastructure business**



Maximizing value creation in EV charging requires optimization along 6 dimensions



- 1 Charge point economics**
Get the timing right: most stations are unprofitable now, but the economics start to look better as utilization increases
- 2 Operating & business model**
Select the right business model for your level of risk and make effective partnerships
- 3 Site preparation**
Optimize location selection and secure power supply to station from utility
- 4 Go to market**
Ensure full digital ecosystem integration and build relevance in the mobile/app space
- 5 Operational Excellence**
Select the right partners and service levels to maintain uptime and provide an improved user experience
- 6 Ancillary revenue streams**
Pair with retail and food-service to take advantage of charging customers' greater dwell time and willingness to spend

① As EV adoption and station utilization grows EV charging will show better profitability

■ Typical range of price and utilization today

Sensitivity of EBIT % to Key Drivers of Profitability¹

		Price					
		\$0.25	\$0.30	\$0.35	\$0.40	\$0.45	\$0.50
Utilization	5%	-330%	-259%	-209%	-171%	-141%	-118%
	15%	-100%	-68%	-44%	-27%	-13%	-3%
	25%	-54%	-29%	-11%	2%	12%	20%
	35%	-34%	-13%	3%	14%	23%	30%
	40%	-28%	-8%	7%	18%	27%	33%

1. Representative of a 4-150kW charging station in California, demand charges of \$20/kW to \$45/kW

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1. Representative of a 4-150kW charging station in California, demand charges of \$20/kW to \$45/kW

1 Subsidies will help public charging stations to become profitable in the EV ramp up phase

■ Typical range of price and utilization today

Sensitivity of EBIT % to Key Drivers of Profitability including subsidies¹

		Price					
		\$0.25	\$0.30	\$0.35	\$0.40	\$0.45	\$0.50
Utilization	5%	-176%	-131%	-98%	-74%	-55%	-40%
	15%	-37%	-15%	1%	13%	22%	29%
	25%	-10%	8%				43%
	35%	2%	18%				49%
	40%	6%	21%	32%	40%	46%	51%

With IRA and NEVI subsidies, fast charging stations are starting to become profitable depending on location and utilization

1. Representative of a 4-150kW charging station in California, demand charges of \$20/kW to \$45/kW

2 Different operating models fit different players – the choice needs to be grounded in strategy and inherent capabilities

Level of attractiveness: High Medium Low

Potential public charging business models



Site leasing

Lease out (part of) site to CPO. Offering location but leaving commercial offer and key operational determinants to CPO; very low investment need but no control over e.g., value proposition



Engaged site host

Engage CPO to install, operate charger on site, while maintaining involvement in definition of commercial offer (e.g., pricing) and network buildout and operations (incl. securing grid connection and managing power on-site)



Owner-operator

Own and operate charge points including full ownership and responsibility of funding and execution; requires holistic set of commercial/marketing capabilities and resources

Revenue source



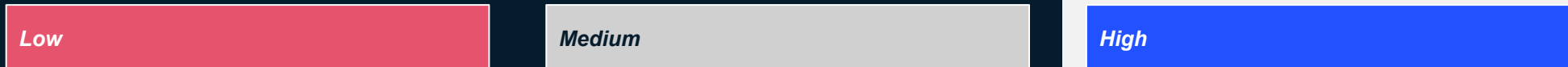
Importance of EV Charging in strategy



Capital deployment & risk

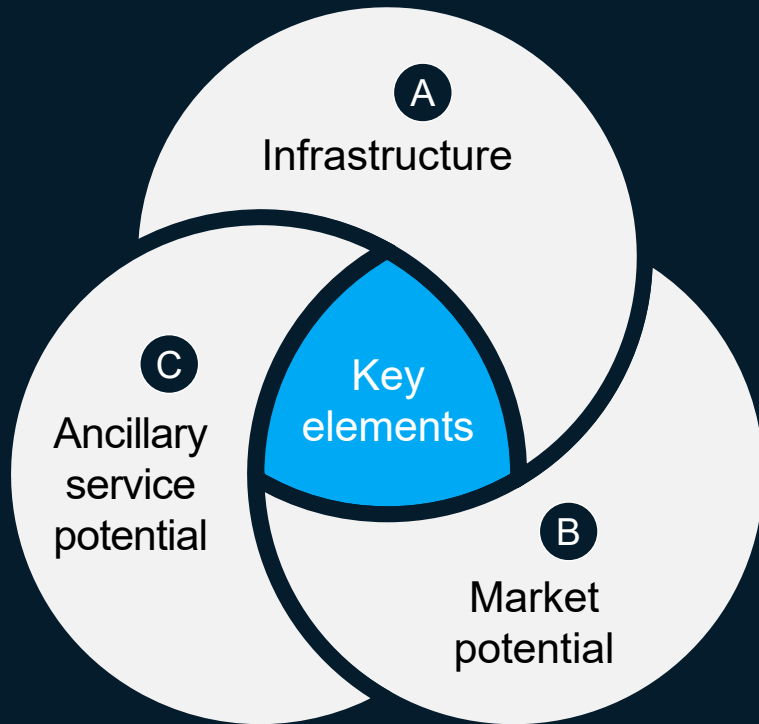


Income potential



Fuel retailers are in a strong position to win operating charging stations, due to their existing footprint, experience in operations, and familiarity to customers

3 Selecting the right location is a key element for success



- A Infrastructure**
 - Grid availability and usage
 - Regulations
 - Demand charges
 - Government subsidies and incentives
- B Market potential**
 - BEV uptake and penetration
 - Traffic density
 - Lack of charging alternatives (private charging, competitors)
- C Ancillary service potential**
 - Nearby attractions
 - Potential to monetize add'l services (retail, car services, advertisements)

Grid upgrade lead times can take 9+ months: choosing a site with available capacity can greatly accelerate timelines

Choice of location informs station type:



Charging destination



Charging hub



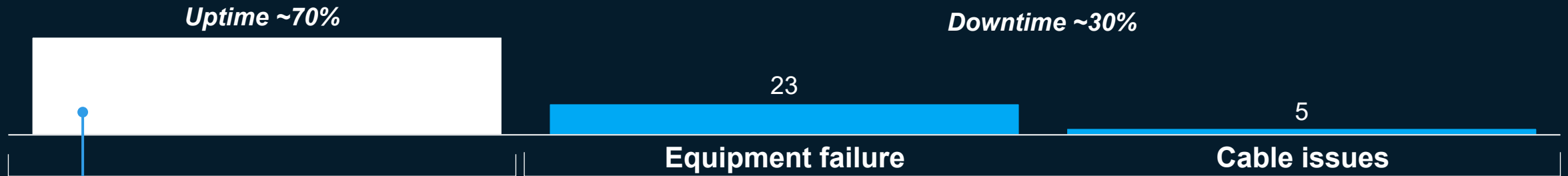
Highway station

4 A successful charging business model requires digital integration, but the degree and ease of integration varies by ecosystem



5 Charger downtime hovers at ~30% in the US, with 4 key drivers

Time split between charger uptime / downtime in US, allocation across downtime (%)



Even during uptime, charger may be unusable due to other reasons such as occupied parking/charging spots

Key drivers



Eqmt. failure

Equipment failure pain points include unresponsive or unavailable screens, payment system failures, charge initiation failures, network failures, or broken connectors



Software

Regular updates needed to keep hardware running with the latest software
Software also communicates with users' mobile apps for charging



Connectivity

Poor connection prohibits the charge point to meter usage, identify users, and bill accordingly.
Also prevents operators from monitoring site status in real-time to book maintenance



Vandalism

Charging cords found cut off at charge ports in acts of vandalism or theft

Example: Many chargers fail when EVs don't communicate correctly; Tesla excels due to proprietary vehicle charger communication

Charging players are exploring adjacent revenues streams and pricing schemes

Examples of adjacent customer service offerings in EVCI markets



Customers spend more time in an EV charging station than they would refueling an ICE vehicle. Some concepts that capitalize on this increased dwell time:



Enhanced F&B



Enhanced retail



Entertainment & leisure outlets



Children's playgrounds

Subscription

Offers subscription-based memberships with additional benefits to customer, e.g., app services, payment or reduced cost; EA charges up to 4\$/month

Charger reservation

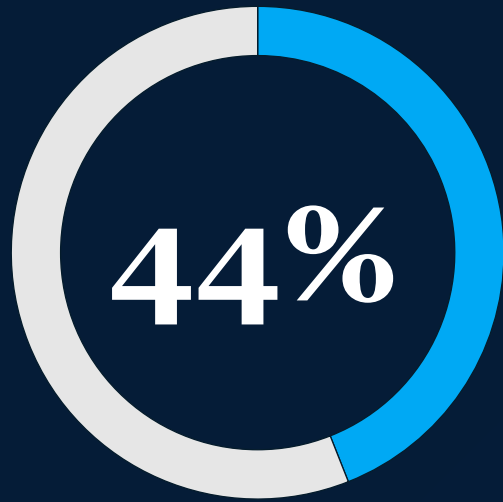
Members can reserve chargers to ensure availability at the station and avoid any long waiting times for a charger to become free. EVgo offers reservations for \$3/session; ChargePoint has a waitlist feature

Convenience & retail

EV customers have a substantially longer wait than a typical ICE refueling, and so have more time to spend in a retail location

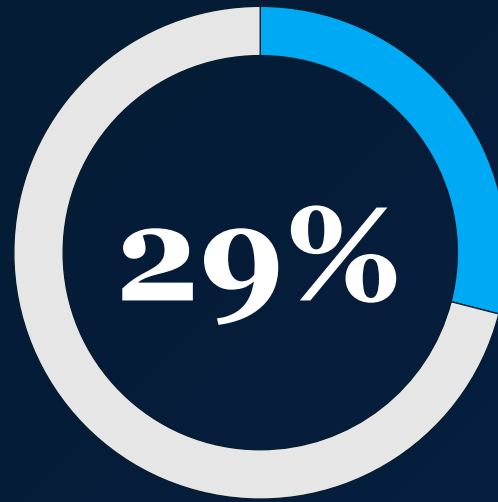
6 EV charging is a positive retail story: turn-in rate can be 44% higher and average food spend is ~25% higher vs. ICE

Turn-in rate



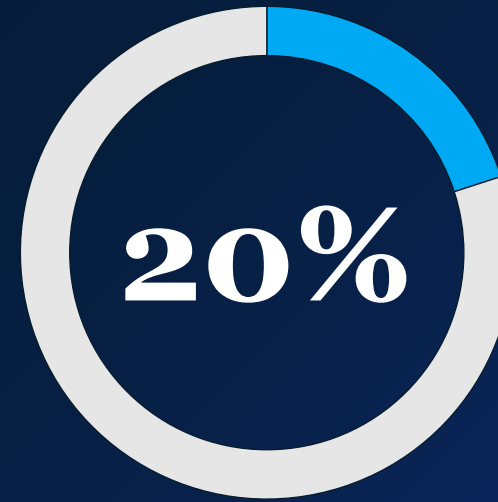
44% more EV owners than ICE owners stopped at a service location

Spend on sit-down food¹

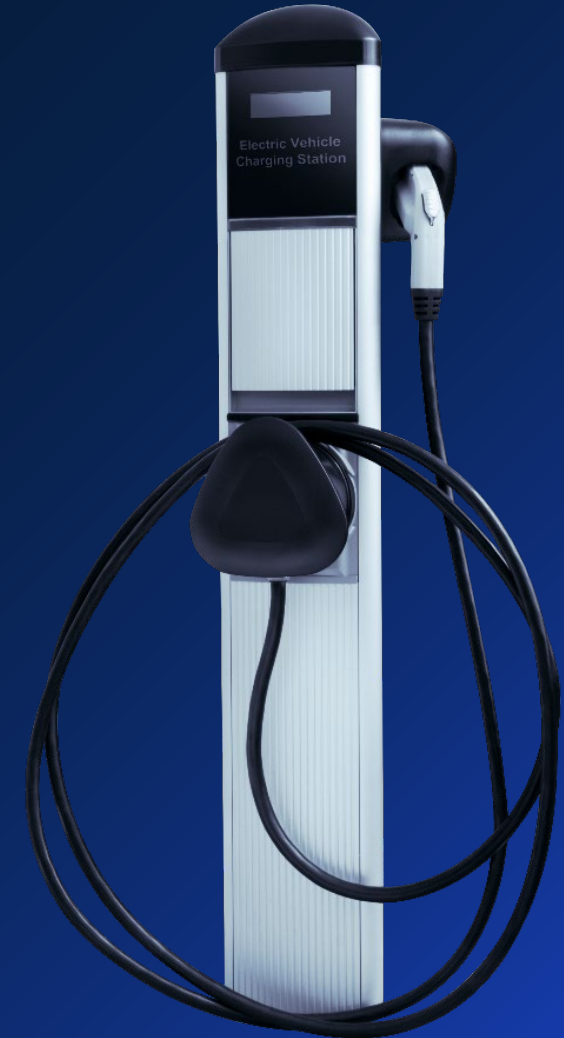


29% more sit-down food spend from EV owners than ICE owners

Spend on takeaway



20% more takeaway food spend from EV owners than ICE owners



1. Ratio between EV and ICE owners is used rather than total spend as a common practice in survey analysis to eliminate survey distortions based on spend misperception by respondents
Note: Survey questions: "How much did you spend during that stop on the following things?" and "On this occasion, did you stop at a service station?"

The successful 'charging station of the future' pulls together all of these elements to create an omni-channel ecosystem of customer-centric services

5 Operational excellence

Maximize uptime by excelling in customer service, and addressing charging / payment issues quickly and effectively

1 Charge point economics: Distributed power generation and storage

Invest in on-site solar and battery storage upfront to reduce long term costs with on-site storage for demand management and lower TOU pricing

2 Operating / business model

Set real-time prices based on location demand and utilization - Consumer survey indicates higher willingness to pay during peak time

6 Ancillary revenue streams

Partner with retail chains to offer convenience and shopping ecosystem while charging – 30% of all gas station revenue comes from non-fuel sales

4 GTM: Co-marketing

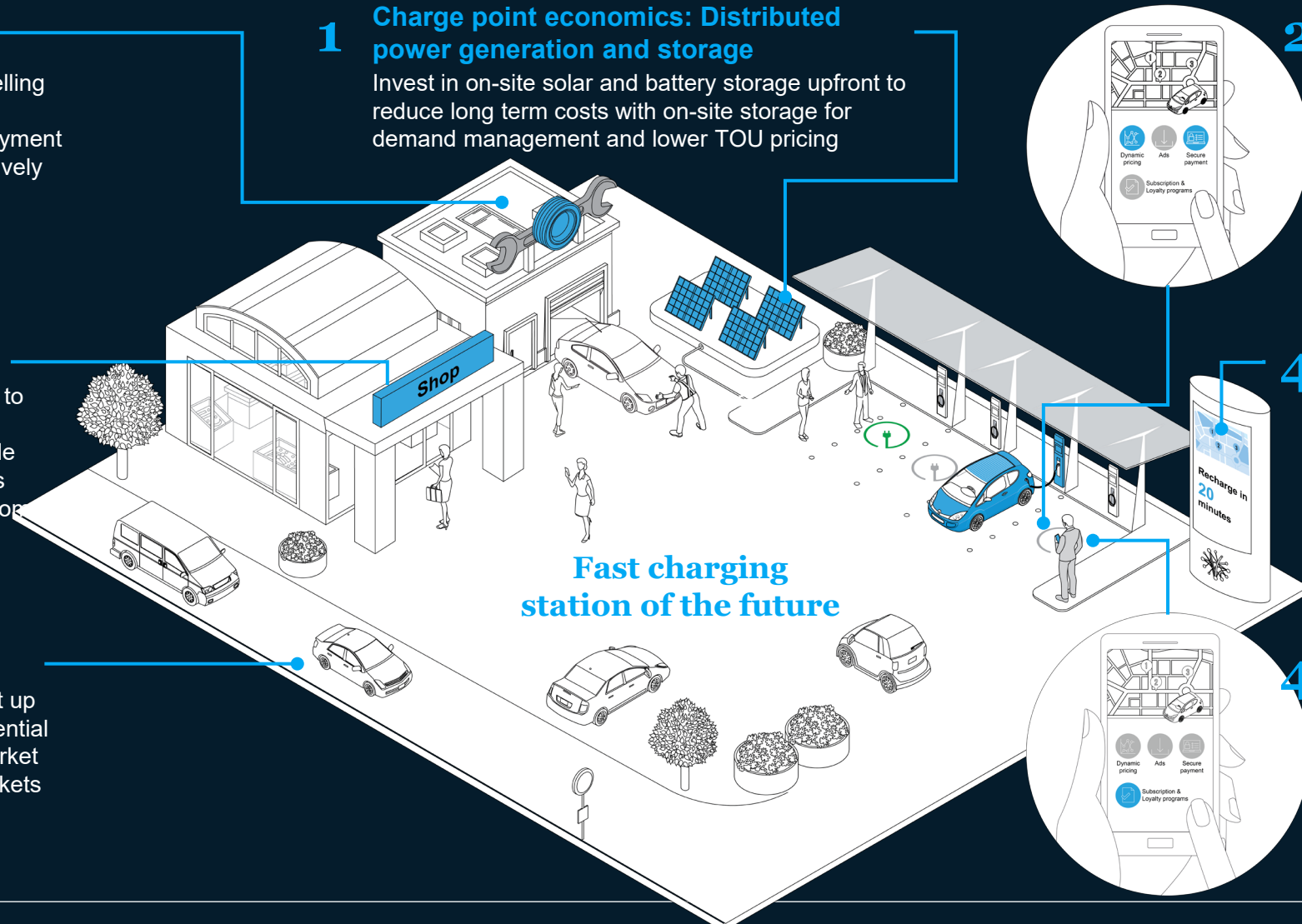
Advertise the 20-30min charge-window as an opportunity, target with location based messaging (e.g., EV ads) and offers

3 Site preparation

Optimize location and set up to capture maximum potential across infrastructure, market and ancillary service buckets

4 GTM: Subscription and loyalty program

Capture monthly recurring revenue and create customer stickiness through loyalty programs



Fast charging station of the future

McKinsey works with clients across the EVCI ecosystem



① EVCI location optimization strategy

33%

EV charger utilization projected for selected sites and demand assessed for ~ 1000 locations for a **leading highway fuel retailer**

Leveraged MCFM Geospatial model to assess site NPV and optimize EV strategy



② EV charging strategy

~ \$ 30 mn

EV charger equipment rollout for **major car fleet operator** enabled to scale fleet from 1,200 to 50,000 EVs in 5 years

Developed charging demand model and assessed charger technology for client's fleet behavior and evaluated partnership model options



③ Fleet decarbonization roadmap

~ 30%

offset in capex through EV charging and vehicle switching optimization for **major tourism client's** fleet of ~ 10,000 vehicles and equipment

Used McKinsey fleet decarbonization model for conducting diagnosis and developing sustainable strategy