



DECEMBER 2022

EV Charging Infrastructure & Distribution

NAED Futures Group

Matthew Young – ABB Electrification



EV infrastructure primary market drivers

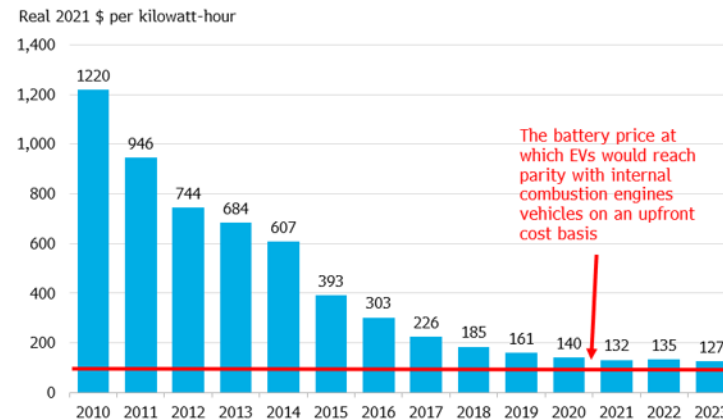
Three main factors are driving acceleration

Climate policy

- 2021 Infrastructure Law (IIJA) and 2022 Inflation Reduction Act (IRA) are primary drivers of climate policy, pushing adoption of low-carbon tech
- State zero-emission targets are driving electric vehicle and charger sales
- State transportation plans and EV targets are creating markets segment by segment
- Utility Commission proceedings and rate cases are providing funding for charging

Battery costs

PRICE OF A LI-ION BATTERY PACK, VOLUME-WEIGHTED AVERAGE



Source: [BloombergNEF](#), July 2022

Private investment

30+ global automakers will invest

\$1.2 trillion



Source: [Reuters](#), Oct. 2022

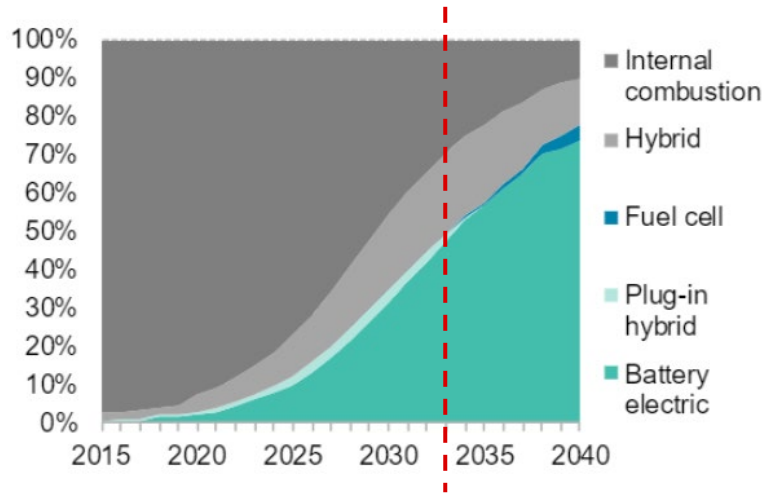
Market drivers will continue to drive solutions approach to the market based on buyer needs

Transportation electrification opportunity

A growing & transformational market

EV sales will exceed ICE sales

North America share of sales by drivetrain



Electric Vehicle Outlook 2021, “North America passenger vehicle share” BloombergNEF, Figure 114.

Vehicle segment sales projections

Type	New Sales	Year
Transit Buses	50%	2030
Passenger Cars	30%	2030
Light Duty Trucks	30%	2030
Medium Duty Trucks	30%	2040
Heavy Duty Trucks	20%	2040

Consolidated projections aggregated from recent reports from BNEF, IEA, IHS.

EV charging investment needed

Globally 40% CAGR from 2019-2026

Addressable Market in U.S.

- **13m** chargers needed by 2030
- **\$100 billion** in electrical hardware investment
- **\$20 billion** in forecasted services

Amounts may grow depending on acceleration of trend

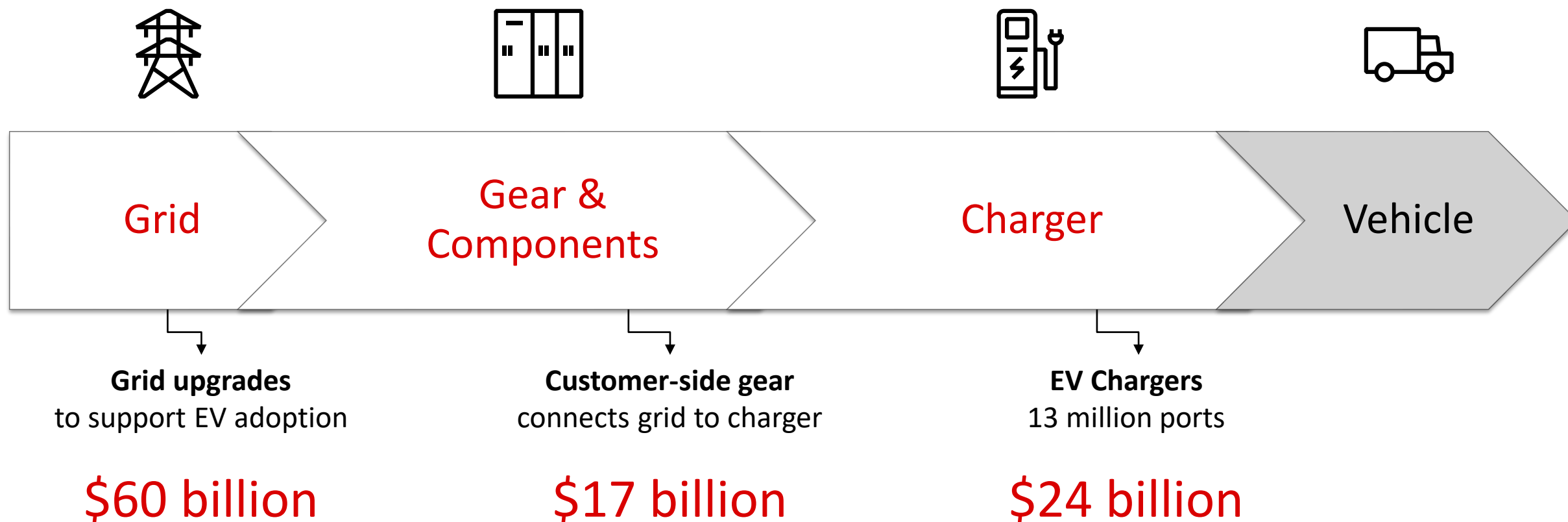
- *Getting to 20M EV's by 2030 . The Brattle Group.*
- *Charging Electric Vehicle Fleets: How to seize the emerging opportunity.* McKinsey & Company, March 2020.

Market opportunity for EV charging will be significant and steadily grow

E-mobility – more than chargers

\$100 billion U.S. addressable market by 2030¹

The 2021-22 acceleration (IIJA, IRA, consumer adoption rates) will likely increase addressable market



Electric Vehicles and Charging

From slow to fast charging



AC Charging – Hours		DC Charging - Minutes	
AC “Level 1” Charging ~1 kW 8-16A	AC “Level 2” Charging 3-19 kW 16-80A	DC Fast Charging 24-50-180 KW 40-125-200 A	DC High power 175-350-600 kW 200-500-600 A
Residential and workplace charging (Destination) When a car, truck or bus is parked all day or overnight		Public / highway / buses and trucks (On the Go) When a recharge is required very quickly / large battery vehicles	
8-48 hours	4-20 hours	15-60 minutes	5-15 minutes

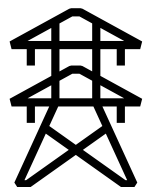
Charge time



4-10 hours

Level 2 AC wallboxes – 3-19 kW

Overnight fleet, multi-family, parking decks, hotels



LV

240v



Alternative: Two lighting panels
for lower cost and less space
required for access / clearance



ReliaGear Power
Panelboard



Surge Protective
Device (in panel)

20x Level 2 AC wallbox chargers (~8 kW)

40A
for each

800A
total



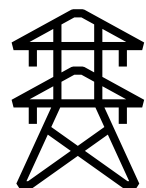
Charge time



5-30 minutes

Terra DC High Power – 175 kW or 350 kW

Highway corridor travel, metro 'charge and go', medium/heavy-duty fleets



LV

480v



Surge Protective
Device (in panel)



ReliaGear
Switchboard



Safety switches



Optional:
LV step-down
transformer for
lower voltage
devices onsite

8x Terra High Power DC chargers (175 kW)

2x Terra High Power DC chargers (350 kW)

3600A
total

300A

for each 175 kW

600A

for each 350 kW



175 kW

350 kW

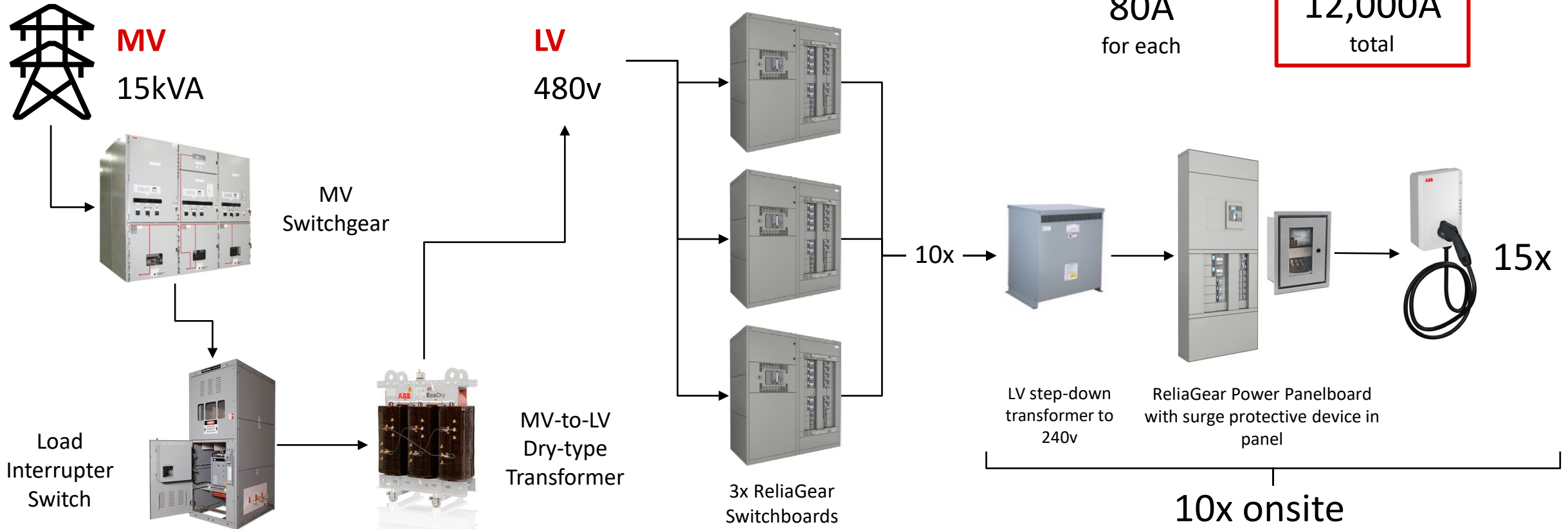
Charge time



4-8 hours

Mass Level 2 AC wallboxes – Fleet trucks – 14 kW






Overnight mega-fleets



Opportunity by type

■ Large opportunity now








□ Large opportunity 12-24 months

	Opportunity	Examples
	■ Large delivery fleets	Amazon, DHL, Fedex, UPS, Walmart
	□ Large rental fleets	Avis / Budget, Enterprise / National / Alamo, Hertz / Dollar Thrifty, Penske, Ryder, Sixt, Zipcar
	■ Charge point operators	Blink, ChargePoint, Electrify America, EVgo, Tesla, Volta
	■ Convenience fuel stations, truck stops, travel plazas	Applegreen, BP, Chevron, Circle-K, Exxon, Love's, Pilot Flying J, 7-Eleven, Shell, TA Travel, Wawa
	■ Charging integrators	ABM, Amply Power, InCharge Energy, NovaCHARGE, Stay-N-Charge, The Mobility House, Voltera

Opportunity by type

■ Large opportunity now









□ Large opportunity 12-24 months






Opportunity type		Examples
	□ Large hotel operators	Choice, Hilton, Intercontinental, Marriott, Starwood, Wyndham
	□ Large commercial property managers	Avison Young, CBRE, Colliers, Cushman & Wakefield, JLL, Newmark Knight Frank
	□ Local fleets	Local delivery, HVAC, plumbers, roofers, contractors, etc.
	□ Multi-family dwellings	Multi-unit developers, property managers
	Local offices	Developers
	Retail/shopping centers	Real estate developers, property managers
	□ Large parking decks	Developers/cities/parking companies

Opportunity by type

■ Large opportunity now

□ Large opportunity 12-24 months

	Opportunity type	Examples
	■ Transit bus fleets	City transit agencies
	□ School bus fleets	School districts
	Auto OEMs	Ford, GM, Rivian, etc.
	■ Auto Dealers	Light-to-heavy vehicle dealers
	□ Medium and heavy-duty truck fleets	Trucking services
	Seaports (drayage trucks, yard tractors)	Local seaport authorities
	□ Airports (ground-side)	Local airport authorities
	Corporate employee transportation	Various companies

	Opportunity type	Examples
	■ Federal Government (direct procurement)	GSA, VA, DOT, FBI, DoD, etc.
	■ Utilities – own fleets	<ul style="list-style-type: none"> Duke, NextEra, SC Edison, AEP, FP&L, Con Ed, Georgia Power, other large IOUs Municipalities Co-ops
	■ Utilities – public roadside charging	
	■ Utilities – make ready	
	□ Utilities – grid upgrades	

ABB