TRANSJOVAN CAPITAL
STRATEGY | M&A | ADVISORY

EV Charging Infrastructure

Future Market Landscape and Strategic Opportunities

March 2024

Executive Summary

Types of EVCI	• Fast charging is ideal for on-the-go and destination charging due to its short dwell time, with **public fast chargers** set to dominate electricity demand • With **~95%** share, private AC slow-type chargers will dominate the EVCI • By the end of **2022**, China had established approximately **2,000** battery swapping stations, positioning itself as a frontrunner in the battery swapping industry
Market Trends	• Auto OEMs have established energy subsidiaries and collaborated with local energy companies to directly engage with grid operators • Huge revenue potential opportunity of **~ US$1.65 Bn** by 2030, and **US$630 Bn** by 2040 for charging operators • Government incentives and market growth have led to a boost in investment, reaching **US$97 Bn** in 2023 and projected to reach **US$349 Bn** by **2030**
Value Chain Analysis	• **Oil & Gas** companies and **Utilities** are leveraging onto high market opportunity and existing capabilities to capture the value chain • New partnerships between Auto OEMS, Energy players and CPOs with innovative business models are set to redefine the EVCI landscape
Where to Play and How to Win	• Players will have to focus on key aspects of business models to gain **competitive edge** and market share • Competitive advantages in the EVCI sector can be achieved by enhancing **customer experience** through software offerings, such as online payments, navigation, and pre-booking capabilities

Types of EV Charging Infrastructure, Locations and Behaviours

Types of EV Charging Infrastructure, Locations and Behaviours (1/2)

Revenue opportunities exist in all four charging segments, but players should consider the charging patterns and preferences of different regions when developing their strategies

Charging Solution	Home/Workplace Charging	Fleet Charging	Destination Charging	On-the-go Charging
Locations	Private or shared parking complex	Fleet depots	Retail spaces (malls, hotels, parking station)	Highways and high-traffic areas
Vehicle Segments	Private 2Ws and 4Ws	Commercial fleet (3W and 4W)	All	Private 4Ws and commercial HDV
Charging Duration	Multiple hours per day	Depending on fleet management objective	3-4 hours depending on average stay duration at destination	<1 hour on-the-go
Parking Set-up	Private or shared	Private	Public	Public
Suitable Charging Technology	Slow chargers (AC)	Moderate AC level 2/3 chargers for 3W and 4W fleet; DC charging for buses	Mix of slow and moderate (levels 1/2) chargers	High power DC fast (level 3) chargers

Highest Market Potential

Our Hypothesis

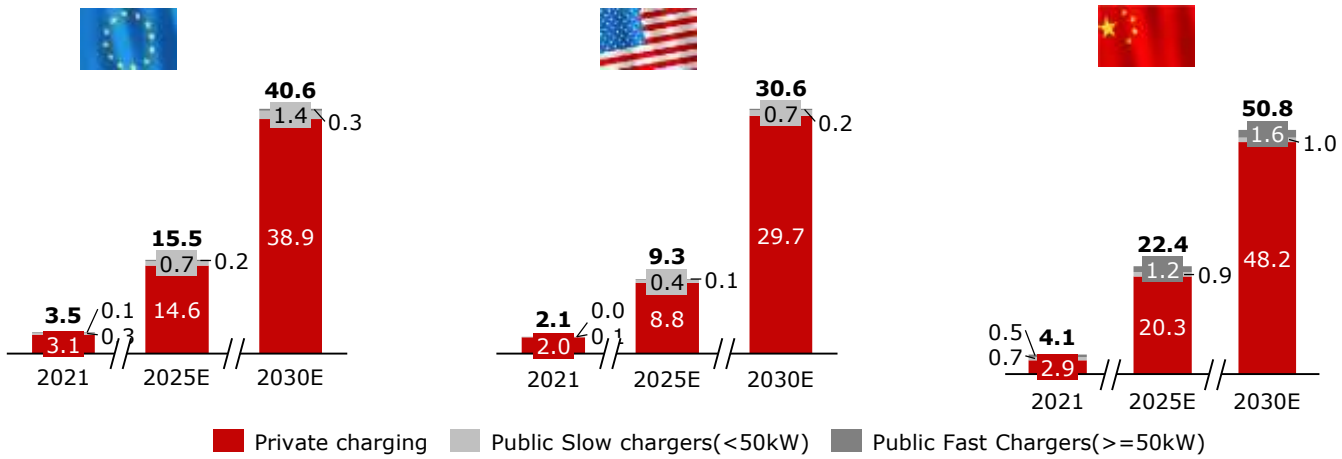
- Destination and on-the-go charging represent the best use case for fast charging given low dwell time
- On-the-go and Destination Charging segment presents significant market potential where operators can command a premium for expedited charging and other services during transit
- Public DC fast chargers require significant investment, CPOs need to ensure recurring revenue from high electricity resale premiums or ancillary services. In public set-up, CPOs can command a premium by leveraging location and speed
- Home/Workplace charging emphasizes private charging - offering prospects in installation & maintenance, equipment sales, and extra revenue for high local utility electricity consumption
- Public fast chargers are poised to dominate electricity demand, driven by rising average throughput from advancements in car and charger speeds
- Aside of battery capacity/charging speed, dwell-time and access to a location determine where charging happens

Source: TJC Analysis

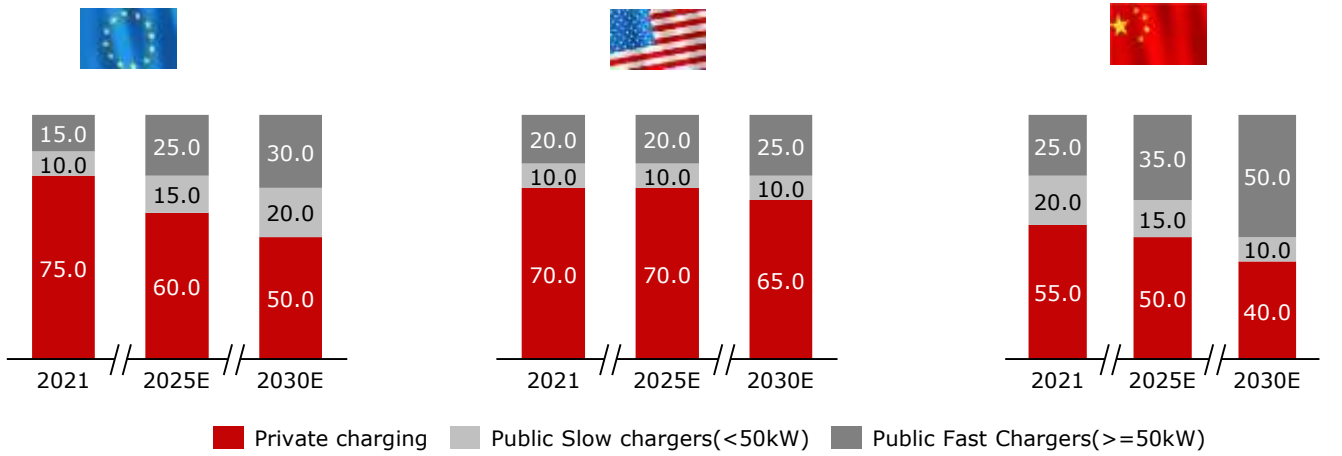
Types of EV Charging Infrastructure, Locations and Behaviours (2/2)

Huge growth opportunity in EVCI with public charging emerging as the choice for charging solution

Installed base of charge points by geography (*Mn*)[1]



Charging by Location *(% of electricity demand)*[1]



Key Insights

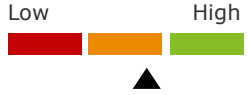
- The increasing adoption of BEVs necessitates charging infrastructure growth, leading to an estimated ~**120 Mn** installed charge points by **2030**
- Increasing adoption of EVs facilitate need for public fast charging because of their ability to tackle **range anxiety** and facilitate longer journeys with emerging technologies
- In Europe & US, single-family homes lean towards home charging; densely populated areas use public charging. As markets evolve, this trend will shift towards public charging
- Estimates suggest **~95%** charging points will be private AC/slow due to residential concentration. However, the rising demand for public fast chargers remains significant
- While private chargers are projected to lead in unit count, the electricity demand will be driven by public fast chargers
- Currently, China has the highest public charger infrastructure deployment consuming **~55%** of electricity demand for EV charging well above other major EV markets

Source: 1. PWC Report: EV Charging Market Outlook 2023, 2. IEA

Market Trends

Market Trends (1/2)

Emerging technologies and innovative partnership models are now shaping the EV industry with players across the mobility space trying to capture the market opportunity

Trend	Description	Relative Importance
Growing Alliances and Partnerships	• Strategic alliances and partnerships have emerged as a pivotal force, reshaping the industry dynamics ○ **Synergistic** Collaborations: ChargePoint's Uber partnership, Tesla-Volkswagen charging standard, and Fortum-ABB European network venture ○ **Energy titans** capitalize on fresh horizons: Shell acquires NewMotion, BP purchases Chargemaster; both invest in Chinese EV players ○ **Auto OEMs** align for Future Mobility: 7 Auto OEMs (BMW, GM, Honda, Hyundai, Kia, Mercedes-Benz, Stellantis) unite for rapid North American EV charging network	
Automakers pursue Energy Space	• Several OEMs establish **energy subsidiaries**; **Mercedes-Benz Energy** GmbH, launched in 2016, focuses on lithium-ion storage battery systems • GM introduces **GM Energy** in October 2022, offering vehicle-to-home, vehicle-to-grid charging, battery storage, solar solutions, and software tools • GM collaborates with **Pacific Gas & Electric** for bidirectional charging pilot, while also partnering with SunPower, indicating a shift towards **direct engagement with grid operators**	
Emerging Business Models	• **Gas station-style** fast charging networks, including Tesla's Superchargers, Ionity's European network, and Petro-Canada's Electric Highway, redefine charging as a primary service • **Charging as-a-service** models flourish in ancillary locations such as malls, metro stations, parking lots, and restaurants, separating charging management from hardware ownership	
Exponential Revenue Growth Ahead	• The revenue potential for EV charging operators is poised for impressive growth, projecting a rise from US$60 Mn in 2022 to a substantial **US$1.65 Bn** by **2030**, and an extraordinary **US$630 Bn** by **2040**	

Market Trends (2/2)

Emerging technologies and innovative partnership models are now shaping the EV industry with players across the mobility space trying to capture the market opportunity

Trend	Description	Relative Importance
Surging Investments	• Global EV charging infrastructure investments surged from $30B (2021) to $64B (2022) and an estimated $97B (2023), projected to reach $349B (2030) • Government Incentives Driving Momentum: ○ **Federal Investment Tax Credit** (ITC) in the US offers up to a 30% tax credit for businesses investing in EV charging equipment ○ The **UK** government provides **grants** that cover a significant portion of the installation cost for home and workplace charging points	
Increasing Level of Differentiation	• As the EV charging equipment landscape grows complex, manufacturers pursue differentiation via advanced manufacturing capabilities and supplementary services • Noteworthy advancements encompass high-capacity rapid chargers, wireless charging systems, intelligent charging stations, and seamlessly integrated charging ecosystems	
Diminishing Barriers to Entry	• EV charging equipment market is **fragmented** particularly for the AC market, with relatively low entry barriers • **Manufacturing complexity** rises with power ratings: crafting a 200 kW DC charger is more intricate than a 50kW model, surpassing challenges of an 11 kW AC charger • The trend gains momentum through increasing adoption of EVs, the continuous evolution of technology, and the concerted efforts towards **standardization** within the industry	

Source: Macquarie Report 2023, Virta Global Report- EV charging Industry Trends, TJC Analysis

Value Chain Analysis, Revenue Opportunities and M&A Partnerships

Emerging Synergies in the EV Charging Ecosystem

Oil and gas, OEMs, and Utilities, alongside newcomers are expanding into EVCI market

EV charging infrastructure value chain

Energy Provision	Equipment Supply	Installation and Field services	Site and Asset Ownership	Charge Point Operation	E-Mobility Services
Generating, storing, managing, and retailing electricity	Engineering, manufacturing and selling AC and DC chargers	Preparing sites, installing and maintaining chargers once in operation	Investing in sites and chargers, sourcing electricity from utilities and selling it to end users at a markup	Running the charge points at stations, including monitoring charger status and coordinating maintenance	Providing charging and other mobility services to end users, app or charge- card based

Illustrative purposes only

Oil and Gas

bp, Shell

bp, Shell

Utilities

TATA POWER, fortum, ENGIE, enel X

TATA POWER, fortum, ENGIE, enel X

Auto OEMS

gm

Tesla, IONITY*

EVCI Suppliers and Operators

FREEWIRE, TRITIUM, TGOOD, ABB, EVBOX, evconnect, wallbox, FASTNED, blink, TGOOD, FASTNED, chargepoint, EVgo, stem, LonShine 朗新科技

** IONITY: JV between BMW Group, Ford Motors, Hyundai Motor Group, Mercedes Benz AG and Volkswagen Group with Audi and Porsche*

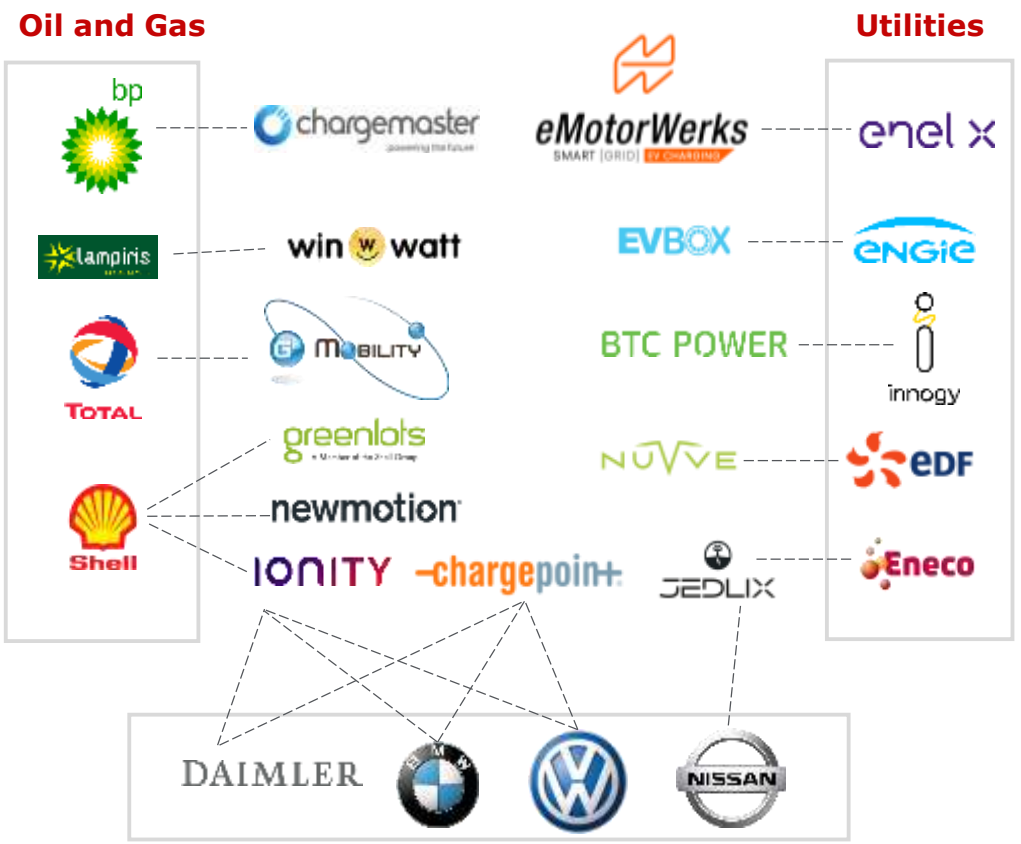
Source: TJC Analysis

Revenue Opportunities and M&A Partnerships across the Value Chain

Charging providers increasingly aggregate revenue pools through in-house operations or strategic partnerships

EV Ecosystem M&A Activities and Partnerships [1]

Illustrative purposes only

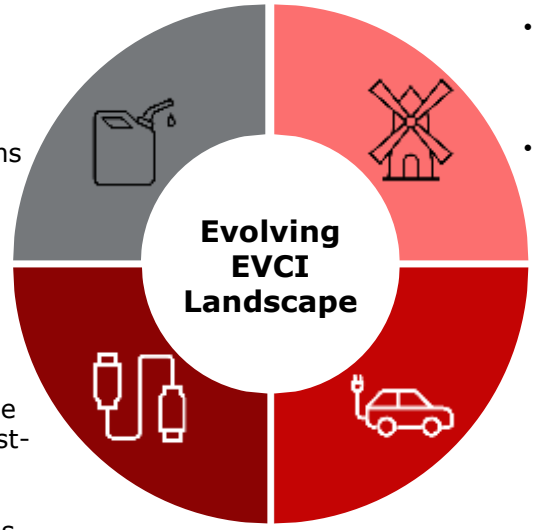


Energy Companies (Oil & Gas)

- Companies can branch into renewables, leveraging diverse revenue streams beyond just traditional fuel operations
- Seamlessly integrate EV fast charging into existing gas stations for strategic advantage
- Evolve from traditional refueling stations to locations tailored for efficient EV servicing

Local Energy Companies (Utilities)

- Recognized by customers with potential to deliver cost-effective, integrated home charging bundles
- Leverage competitive electricity procurement, direct customer engagement, and grid expertise
- Navigate challenges: inexperience in public charging operations



Pure-Play CPOs

- Gain first-mover advantage with branded, premium fast-charging experiences
- Value proposition combines rapid charging, seamless customer interface, and prime locations
- Business model pivots on electricity arbitrage; to stay competitive, forge partnerships and diversify services

Automotive OEMs

- Likely to engage in the EV charging infrastructure to promote EV adoption
- Some view the market beyond just an enabler and are venturing into profitable CPO businesses
- Leverage existing customer relationships and bolster loyalty with innovations like Plug & Charge

Source: 1. Capgemini Report 2018, 2.TJC Analysis

Key Capabilities for Building *a Sustainable Competitive Advantage*

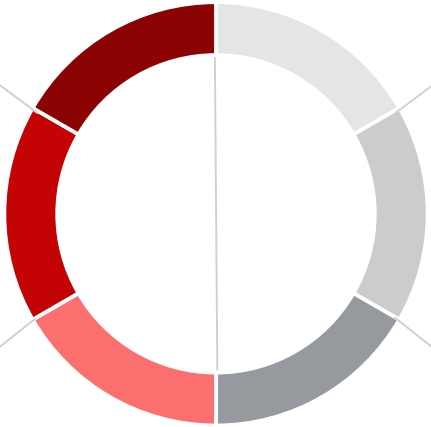
Players will have to design for long term value and focus on enhancing customer experience by investing in robust sales channels and partner networks

Smart Charge Point Provider

- Design for long-term value (SW and Services) and integration into the energy ecosystem
- Maintain rigorous global production standards, whether in-house or outsourced
- Emphasize robust sales channels and partner network with focus on end users

Value Added Services

- Offerings such as online payments, navigation, pre-booking to improve customer experience
- Leverage data to provide enhanced value through utilization of insights and analytics
- Integration and partnerships with wider charging ecosystem



Charge Point Software

- Define a compelling value proposition centered on efficient charge point operation
- Utilize cloud-based platforms to optimize cost-base through self-service sales and marketing
- Employ a modern UI and data analytics to generate insights and increase uptime

Turnkey Providers

- Ensure rigorous control of costs and maintain robust access to capital during scaling efforts
- Develop a well-defined location strategy, securing critical sites early and optimizing for grid availability
- Implement cost control measures, particularly in HW and electricity pricing, and focus on operational excellence

Ownership

- Evaluate ownership structures, weighing land only vs land + charging infrastructure
- Provide value-added offerings to consumers while making locations attractive for business partnerships
- Prioritize smart utilization of charge points for optimal efficiency

Installation and Maintenance

- Sustain a local presence and maintain proximity to clients
- Providing robust after-sales support and services to meet client needs
- Establish a prominent position as the preferred resale partner for hardware providers

Source: TJC Analysis

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