

7. EV Charging Technology and Business Model Innovation



Key Takeaways

- Traditional EV charging business models face challenges like significant upfront costs, regulatory hurdles, and coordinating responsibilities between site hosts and operators.
- Innovative technology and business models will be paramount to unlocking private investment for charger deployment and addressing the challenges faced by traditional business models.
- Emerging technologies like smart charging solutions, storage and battery innovations, and customer experience enhancements are shaping the future of how, when, and where EVs can be charged.
- Charging-as-a-Service and other models that offer turnkey solutions with minimal capital investment for site hosts and long-term operations and maintenance support could help scale EV charger deployment, but still need to be successfully demonstrated more broadly.
- Massachusetts must work with the private sector to support innovations in EV charging technology and business models by addressing financial, operational, and regulatory challenges.

As EV adoption accelerates, there is a growing need for innovative charging technologies and sustainable business models. There are significant opportunities for growth, but also challenges in financing, deployment, and long-term viability of EV charging business models.

This section explores the range of current and emerging EV charging business models, including their benefits and barriers; highlights novel technologies reshaping the user experience and grid interaction; examines common challenges facing the sector; and offers actionable recommendations to support continued innovation and scalability.

Private Funding versus Private Chargers

The use of the term “private” can be confusing in the context of EV charging, as it is used to describe both who has access to an EV charger and how the deployment of an EV charger is funded.

“Private chargers” refers to EV chargers that are only available for specific individuals or EVs. It is the opposite of publicly accessible EV chargers, or “public chargers”, which are open to all members of the public. There are degrees between “public” and “private” chargers, notably workplace and multi-unit dwelling chargers which may be used by large numbers of individuals, despite not being open to the public, or, conversely, may be open to the public, but only nominally “publicly accessible” due to its location or other barriers.

“Private funding” refers to private investment used to install, operate, and/or maintain EV chargers. This is the opposite of “public funding”, which generally refers to funds derived from state or federal sources or charges to utility customers. All chargers utilize private funding to some degree and, as discussed in Chapter 4, most public EV chargers receive public funding. This Chapter explores, in part, ways to further leverage private funding to deploy EV chargers.

EV Charging Business Models Overview

As the EV charging industry grows, diverse business models have emerged to meet varying needs across the public and private sectors. These models balance financial risk, site host control, user experience, and network scalability in different ways, each presenting its own

advantages and limitations. Table 7.1 below summarizes key EV charging business models in Massachusetts and beyond, highlighting how they operate, their defining features, and real-world examples that illustrate their application.

Table 7.1. Overview of EV Charging Business Models

Model	Description	Key Attributes	Real-World Example
Host-Owned	Property owners manage stations for customers or employees.	On-site control of access/pricing; Promotes loyalty/sustainability; Owner handles operations and maintenance (O&M) or outsources software management	99 Restaurants (MA locations)
Public Ownership	Government-funded installation and operations; public access.	Equity-focused placement; Supports municipal EV goals; Located in public/community spaces	Recharge Boston (City of Boston EV charging program)
Utility-Owned	Utilities install, own, and operate stations (MLPs only in MA).	Utility manages O&M; Demand response/TOU pricing; Requires regulatory compliance	Concord Municipal Light Plant; Hingham Municipal Light Plant; Middleborough Gas & Electric
Charge Point Operator (CPO)	Private companies install and manage charging networks.	Flexible pricing models; Revenue from charging and subscriptions; Varying levels of control between site and operator	ChargePoint, Electrify America, Tesla
Franchise	Businesses operate under a larger brand's charging network.	Franchisee owns/operates stations; Branding and support from parent network; Revenue sharing may apply	EVgo at Simon Mall, Burlington, MA
Advertising & Sponsorship	Ad revenue funds free or discounted charging.	Free or low-cost for drivers; Depends on high-traffic sites; Strong marketing opportunity	Volta (Shell Recharge)
Charging as a Service (CaaS)	Subscription-based full-service charging model.	Turnkey solution for site hosts; Low upfront cost; Includes installation, maintenance, and operation	EV Connect

Benefits and Barriers of Current EV Charging Business Models

Current EV charging business models offer a range of approaches to infrastructure deployment and management. Host-owned and public ownership models provide localized control and promote community engagement. However, these models often require significant upfront investment and ongoing maintenance responsibilities. Utility-owned models can

leverage existing grid infrastructure and expertise but may face regulatory hurdles. Charge Point Operators (CPOs) and franchise models enable rapid network expansion and brand consistency but may face challenges in coordinating responsibilities between site hosts and operators. Advertising and sponsorship models can subsidize user costs but depend heavily on high-traffic locations to attract advertisers.

CaaS offers turnkey solutions with minimal upfront costs for site hosts but may lead to concerns about long-term service quality and reliability. The CaaS model is highly impactful

for lowering capital expenditure barriers and the state can facilitate CaaS accessibility through standardized contracts, targeted incentives for providers, and education.

Novel Business Models

As the electric vehicle market evolves, innovative business models are emerging to address the limitations of traditional charging infrastructure. These novel approaches aim to enhance flexibility, optimize energy usage, and improve accessibility for a broader range of users. By leveraging

advancements in technology and adapting to consumer needs, these models offer promising solutions to accelerate the adoption of electric vehicles. Table 7.2 below summarizes novel EV charging business models.

Table 7.2. Overview of Novel EV Charging Business Models

Model	Description	Key Attributes	Real-World Example
Turnkey Solutions	Comprehensive services covering design, installation, operation, and maintenance of charging stations.	Single point of contact for all services; Minimal upfront investment for site hosts; Scalable solutions tailored to specific needs	Matcha provides end-to-end EV charging solutions, including site evaluation, permitting, installation, and ongoing maintenance.
Dynamic Pricing Strategies	Flexible pricing models that adjust rates based on demand, time of day, or energy costs.	Encourages off-peak charging; Optimizes grid usage; Potentially lowers costs for consumers	EVgo employs dynamic pricing to manage demand charges and optimize energy usage across its network. The Town of Concord does this for their utility-owned and operated network managed by Concord Municipal Light Plant (CMLP).
Mobile Charging Services	On-demand charging services delivered to vehicles at their location.	Provides charging solutions for users without fixed infrastructure; Enhances convenience for urban dwellers- Reduces range anxiety	SparkCharge offers mobile EV charging services in urban areas, delivering energy directly to parked vehicles.
Energy-as-a-Service (EaaS)	Subscription-based model providing energy solutions, including charging infrastructure and management.	Predictable monthly costs; Includes hardware, software, and maintenance- Aligns energy supply with demand through integrated services	SWTCH offers an energy-as-a-service (EaaS) model, also known as Charging-as-a-Service, where they handle the hardware, installation, and maintenance of EV charging infrastructure in exchange for a monthly subscription fee.

Benefits and Barriers of Current EV Charging Business Models

Innovative EV charging business models present opportunities to enhance user convenience, optimize energy consumption, and expand infrastructure reach. Turnkey solutions simplify the deployment process for site hosts, while dynamic pricing strategies can balance grid load and reduce operational costs. Mobile charging

services meet the needs of users without access to fixed charging stations, and Energy-as-a-Service models offer comprehensive solutions with predictable expenses. However, these models also face challenges, including regulatory complexities, technological integration hurdles, and the need for consumer education to ensure widespread adoption and trust in new systems.

Emerging EV Charging Technologies

As summarized in Table 7.3, rapid advancements in EV charging technologies are enhancing performance, efficiency, and accessibility. From cutting-edge batteries to AI-powered smart

charging and renewable integration, these innovations are shaping the future of how, when, and where EVs can be charged.

Table 7.3. Emerging EV Charging Technologies

Technology Category	Specific Technologies	Real-World Example
Battery Innovations	High-density, fast-charging batteries	CATL's Shenxing LFP battery (charges to 80% in 10 minutes)
Charging Technology Advances	Ultra-fast chargers, bidirectional charging, wireless charging	Tesla Supercharger V4, Wallbox Quasar (bidirectional), WiTricity
Customer Experience Enhancements	Mobile applications with station location, availability, and reservations	ChargePoint and Electrify America mobile applications
Smart Charging Solutions	Load balancing, demand response, AI optimization	Wevo Energy's AI-powered platform optimizes energy usage, reduces costs, and integrates with solar energy to provide smart charging solutions.
Storage Integration	Battery storage paired with charging stations	Tesla Megapack used in EV charging hubs
Renewable Energy Integration	Solar-powered EV charging stations	Electrify America's solar-powered stations in California and elsewhere, including using Beam solar-powered stations

Key Concerns and Solutions for EV Charging Business Models

As EV adoption accelerates, a range of challenges must be addressed to ensure the scalability, efficiency, and resilience of charging infrastructure. This section outlines common concerns facing current business models and presents actionable solutions to support a more robust and sustainable EV charging ecosystem.

Table 7.4. Concerns and Potential Solutions for EV Charging Business Models

Concerns	Challenges	Proposed Solutions
Infrastructure Costs	Expensive equipment and installation for high-capacity stations	Government grants, public-private partnerships, modular station designs
Energy Pricing	Variable electricity rates affecting profitability	Dynamic pricing, time-of-use tariffs, integration of renewable energy
Utilization Rates	Low usage can deter investment	Focus on high-demand locations, incentivize off-peak usage
Revenue Streams	Overreliance on charging fees, limited income diversification	Offer subscriptions, ads, retail collaborations, and ancillary services
Consumer Convenience	Long charging times and limited station availability	Deploy faster chargers, expand station coverage, improve payment and user experience
Interoperability	Compatibility issues across networks and vehicle types	Implement open standards, promote cross-network functionality
Grid Dependency	High energy demand strains local grids	Utilize energy storage, integrate solar, develop microgrids, utilize dynamic power sharing at the site level
Government Incentives	Uncertain long-term policy and funding availability	Align with government goals, target programs with stable funding
Technology Evolution	Rapid changes risk making infrastructure obsolete	Design modular systems that can evolve with tech advancements
Battery Advancements	Longer ranges reduce charging frequency	Invest in ultra-fast chargers and mobile/portable charging units
Sustainability	Growing pressure for carbon-neutral operations	Incorporate renewables and carbon offset initiatives
Cybersecurity	Networked systems are vulnerable to cyber threats	Strengthen cybersecurity protocols and maintain regular updates
Supply Chains	Shortages in key components like semiconductors	Diversify sourcing and boost domestic or regional manufacturing

Framework for EV Business Model Success

As Massachusetts scales up its EV charging infrastructure, a strategic approach is necessary to ensure the system is not only resilient and equitable, but also efficient and future-proof. The following provides a framework for state government leadership to strengthen the state's EV charging ecosystem by addressing financial, operational, and regulatory challenges while working with stakeholders. Each category offers targeted steps that Massachusetts can take to lead in the transition to a clean transportation economy.

Partnerships:

- Prioritize establishing public-private partnerships and grant programs
- Streamline permitting processes for joint ventures
- Offer matching funds or tax incentives for qualifying infrastructure projects

Pricing:

- Encourage utilities and charging providers to adopt flexible pricing models by setting clear regulatory guidance, piloting pricing experiments, and educating consumers on rate benefits.
- While EVICC has developed resources and policies in this area, additional guidance on sustainable pricing models should be developed.

Data Management:

- A statewide effort to support interoperable data systems with accurate, real-time data would help track station usage, identify gaps,

and respond to technical issues faster.

- Fund data infrastructure
- Set open data standards for charging operators
- Establish a centralized data portal for EV charging infrastructure analytics.

Enhanced Siting Efforts:

- Develop mapping tools that identify high-potential locations
- Integrate EV charging into broader land-use planning
- Prioritize funding for projects located near high-traffic, mixed-use areas
- EVICC is releasing an EJ site guide for EV charging and will be developing more specific guidance resources on site best practices.

Standards and Policy Alignment:

- Align policies and technical standards with neighboring states and federal guidelines to promote interoperability and attract investment
- Lead or join regional coordination efforts
- Support the adoption of national charging standards
- Streamline permitting and incentive programs to reduce administrative burden

Financing:

Tools like green bonds, revolving loan funds, and community low interest financing models can unlock capital from both institutional and grassroots sources.

- Support legislation to authorize green bonds for EV projects
- Create public loan guarantee programs
- Launch public education campaigns on investment opportunities in clean transportation infrastructure

To accelerate deployment at scale, EVICC recommends that EEA and MassCEC, among others, explore ways to further unlock the Charging-as-a-Service and other business models that provide turnkey solutions for

publicly accessible charging that also minimize the ongoing operations and maintenance requirements of site hosts. The Power Purchase Agreement (PPA) model for residential solar, which similarly provides a turnkey solution and no obligation for the site host, i.e., homeowner, to maintain the solar photovoltaic (PV) system, was instrumental in scaling deployment of rooftop solar in the 2010s. EVICC sees Charging-as-a-Service and similar business models as offering the same opportunity to scale deployment of publicly accessible EV charging infrastructure.

Alternative Solutions to Ensuring Sustainable EV Business Models

Massachusetts' state agencies and utilities currently offer numerous incentives to support EV charging infrastructure. However, as demand for EV charging grows to meet the Commonwealth's transportation decarbonization and electrification goals, and as existing federal incentives are eliminated, it is critical for EVICC to collaborate with stakeholders and the industry to understand how to reduce the need for public incentives over time and to explore sustainable, long-term funding mechanisms for the public incentives that are offered.

Today, the two largest, ongoing EV charging incentive programs in Massachusetts are funded directly or indirectly through rates charged to EDC customers, as shown in Table 7.5. Other state programs also utilize revenue collected from

EDC customers. A number of other programs are federally funded. While these funding sources have supported the initial growth in EV charger deployment, relying solely on ratepayer funding raises concerns regarding energy affordability despite the downward pressure EV adoption puts on electric rates, especially as federally-funded programs utilize their remaining funding and EV charging deployment grows. Further, the utilities' ability to expand their incentive programs can be limited by extensive regulatory processes, which limit flexibility and speed of EV charger deployment. To ensure timely, stable, and cost-effective EV charging, EVICC will work with stakeholders to explore additional and/or alternative funding pathways.

Table 7.5. Summary of funding source of EV charger programs in Massachusetts¹

	Funding Source	Program Administrator
MassEVIP	90%+ EDC ratepayer-funded moving forward (Primarily funded by the Climate Mitigation Trust, which ultimate derives its revenue from ratepayers; VW Settlement funding was historically a larger portion; See MassEVIP Funding Summary and Appendix 2)	MassDEP
Investor-Owned Utility Programs	100% EDC ratepayer-funded	National Grid, Eversource, and Unitil
NEVI Formula Program	Federal Funding	MassDOT
CFI Grant Program		Grant dependent (e.g., DCR, MBTA, etc.)
On-Street Charging Solutions, Ride Clean Mass, Vehicle-to-Everything Demonstration, Mobile Charging		MassCEC
Green Communities	Mix of state, federal, and ratepayer funding	DOER
Leading by Example Division (LBE) / Division of Capital Asset Management and Maintenance (DCAMM)		DOER / ANF

¹The information contained in Table 1.2 is simplified for clarity. Future availability and design of the programs listed in this table will vary based on factors specific to each program including, but not limited to, the availability of funding and regulatory authorization. The existing MassCEC programs are limited in time, scope, and funding and are scheduled to sunset after MassCEC issues guides to scaling each EV charging application. Chapter 3 and Appendices 2 through 6 provide additional details on the programs included in Table 1.2, including hyperlinks to the program websites.

EVICC Recommendations

EVICC recommends the following actions to address the key themes highlighted in this Chapter, to help scale impactful EV charging business and technology models, and further leverage private funding.

- **Agency Action:** Build on the success of MassCEC's existing innovative EV charging infrastructure programs and ACT4All, Round 2 innovative charging projects by providing resources and lessons learned to help further unlock the potential of these business and technology models. Simultaneously, look for new opportunities to test and help scale other innovative business models. *(Lead(s): MassCEC; Support: EEA)*
- **Agency Action:** Explore ways to further unlock the Charging-as-a-Service and similar business models for publicly accessible charging. *(Lead(s): EEA; Support: MassCEC)*
- **Agency Action:** Work with EV charger developers to identify existing procedural and technical barriers to utilizing solar and storage technologies to support EV charging and efficient use of existing grid infrastructure and, subsequently, engage with the EDCs to explore potential solutions to the identified barriers. *(Lead(s): DOER; Support: EEA, MassCEC, DPU, as appropriate, and the EDCs)*
- **Legislative Action:** Work with stakeholders and the legislature to explore sustainable, long-term models to fund EV charging initiatives that leverage existing funding pathways and reduce the reliance on funding from EDC customers. *(Lead(s): EEA; Support: All EVICC member organizations)*
- **Agency Action:** Develop resources to reduce barriers for municipalities, potential EV charging site hosts, and other EV charging stakeholders similar to the [Public Level 2 EV Charging Station Fees and Policies Guide](#) potentially including, but not limited to, guidance on how municipalities can utilize the Second EVICC Assessment, more detailed Level 2 fee guidance and DCFC fee guidance, information on EV charging station operations, maintenance, and networking, and demand charge information and best practices. *(Lead(s): EEA and EVICC member organizations with expertise related to the resource under development)*