World Business Council for Sustainable Development

# How to use data for faster and better charging

## A digital action framework for electric vehicle charging and operations

## Contents

Digital collaboration between EV charging infrastructure market players can multiply the impact and capital efficiency of infrastructure investments. Standardizing data sharing is the push we need in the race to transport decarbonization.

**Greg Steele**
Global President of Mobility, Arcadis

Intelligent EV charging, power management and energy storage solutions are the backbone of the transition to low-carbon transport. Only through the cross-sector integration of insights and expertise will we be able to meet the climate imperative. We are proud to support the launch of this digital collaboration framework, which can guide stakeholders toward more efficient and adapted charging infrastructure deployment.

**Anne Lillywhite**
Senior Vice President and General Manager, Energy Transition & Digital, EMEA, Eaton

Beyond collecting data, we must invest in digital capacity and collaboration to extract applicable insights. Connecting the dots across the EV chain will empower us to revolutionize the energy and mobility sector and move toward zero-emissions targets.

**Riccardo Amoroso**
Head of Global Marketing and Sales, Enel X Way

Energy supply decarbonization and vehicle electrification are creating increasingly decentralized energy distribution networks. Digitalization and data will be key instruments to manage this growing complexity, providing more intelligence to guide better business decisions.

**Luís Tiago Ferreira**
Head of Energy Efficiency and Electric Mobility, E-REDES

Meeting transport decarbonization targets will require providing reliable, flexible and scalable EV charging solutions. These solutions should build on established open data protocols like OCPP to ensure that they are user-friendly, interoperable and enable smart charging. Open standards are crucial to unlock efficiencies, optimize investments and accelerate the shift to zero-emission vehicles.

**Remco Samuels**
CEO, EVBox

The collaborative approach presented in these pages provides clear evidence of how sharing data can accelerate decarbonization. Our goal is to transform how we interact with information, enabling us to apply innovative approaches such as Social Digital Twin technology to address pressing societal issues, including reducing $CO_2$ emissions. We call on all businesses to consider how their digital assets can accelerate transport decarbonization and to engage with other industry actors to develop radical digital solutions.

**Yoshinami Takahashi**
SEVP Global Business Solution Business Group, Fujitsu

Data and digital collaboration will be at the core of mobility decarbonization. We must enhance our collaborative capacity for computing and analysis so that we can fully understand and plan for EV charging needs. The first step is building capacity for data sharing into business-as-usual.

**John Stenlake**
Director, Vehicle Innovation & Mobility, Microsoft

# Executive summary

Electrification will play a considerable part in decarbonizing the transport sector, which has a higher reliance on fossil fuels than any other sector, and accounts for a fifth of global carbon emissions.[1] Despite projected growth in both electric vehicles (EVs) and electric vehicle charging infrastructure (EVCI), the sector is still not on track to meet its climate targets.[2]

The effective deployment of charging infrastructure is a critical enabler of meeting transport decarbonization targets in line with the 1.5°C imperative established by the Paris Agreement. Implementing charging infrastructure will require solving quantity, accessibility, operational and efficiency challenges. Collaborative approaches between all actors in the EVCI across the mobility, energy and built environment sectors are critical to success.

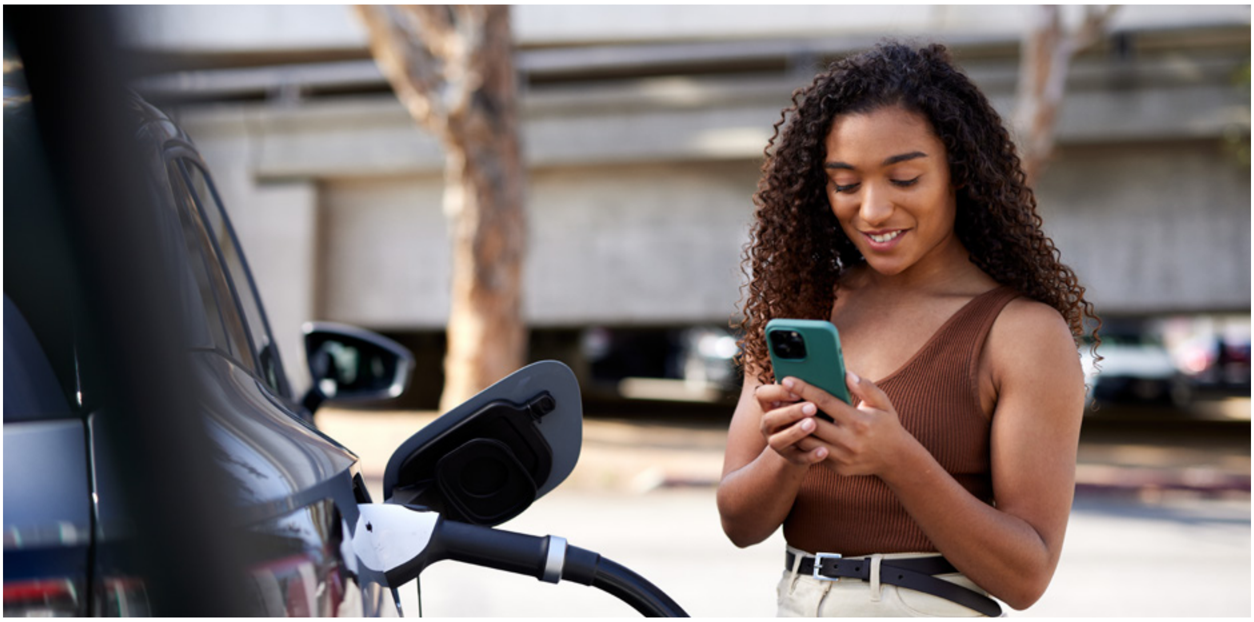
With the rise of digital capacity and the data economy, collaborative digital solutions can help deploy charging infrastructure at pace.

By pooling their information assets (the organized collection of information gathered throughout their operations – their data), businesses can generate more accurate insights and optimize their processes, asset management and capital deployment.

There is immense value creation potential in the development of innovative digital solutions for charging infrastructure deployment and management.

In 2022, members of the WBCSD Transport Decarbonization project collaboratively developed two digital solutions, demonstrating how data sharing can deliver 15% emissions reductions from charging, reduce capital intensity and optimize investment planning. In this publication, we analyze these two cases in detail and share learnings and key recommendations for company action.

This new action framework builds on our Enabling data-sharing: Emerging principles for transforming urban mobility report, published in 2020, which outlines fundamental principles to ensure trust and safety in data sharing while encouraging the rollout of data-based mobility solutions unlocking social and environmental value. It further draws on our 2021 Value framework for sustainable charging infrastructure, which provides guidance for the mobility, energy and real estate sectors to enable conditions for a timely, sustainable and fair transition to 100% electric fleets.



The action framework suggests simple steps for businesses in the charging infrastructure value chain to harness the full potential of their position in the growing data economy by building their digital capacity and contributing to an environment that fosters data sharing.

We bring a set of recommendations for chief information, infrastructure and innovation officers from charge point operators, mobility service providers, energy utilities and site managers from residential and workplace buildings seeking to scale their capacity for digital collaboration:

**Identifying synergies with other actors in the EVCI value chain is crucial to pool insights and create new business value:**

1. Map the position of the business in the value chain to identify opportunities and complementary data needs with other actors.

2. Invest in internal capacity to collect and store data relating to own and shared actions in charging infrastructure deployment and use.

**Selecting the right structure to access data is key to effective digital collaboration:**

3. Participate in relevant voluntary data-sharing schemes, building data-sharing agreements with partners and service providers or considering data monetization.

4. Review the various structures available for accessing data (open data initiatives, open standards and protocols, data-sharing agreements, data marketplaces) and formulate internal recommendations for their use.

**Lastly, fostering business practices and the policy environment that support and scale digital collaboration beyond sectoral silos:**

5. Invest in data architecture and staff capacity to engage in data sharing internally and with other businesses.

6. Support policy developments that provide clear guidelines to facilitate data sharing and clarify data ownership, privacy and security.

7. Support the development of sector-specific data regulation to safeguard competitiveness and intellectual property (IP) but consider whole industry policy approaches to avoid siloes in the value chain.

8. Support the development and adoption of common data standards and protocols to facilitate data exchanges and improve interoperability.

# Introduction

The transport sector is responsible for one-fifth of global carbon emissions. Without action, this footprint could double by 2050.[3] Rapid transport decarbonization is essential to achieve Paris Agreement climate goals and will require multiplying the stock of electric vehicles (EVs) on the road from around 27.4 million in 2022 to 230 million in 2030, as well as investments in clean energy, related distribution grids and charging infrastructure.[4,5,6]

Large-scale decarbonization is already underway, with EVs set to represent more than 55% of new vehicle production in China, Europe and North America by 2030. Sales spiked in 2021 in emerging markets across Asia, Eastern Europe, Latin America, the Caribbean and Africa.[7] Government policies are a strong pulling force, ranging from tax incentives and financing schemes and proposed carbon dioxide (CO2) emission performance standards for vehicles, to direct sales bans or limitations on the circulation of internal combustion engine (ICE) vehicles.[8,9,10] This is also taking the form of intergovernmental coalitions, such as the Zero-Emission Vehicles Transition Council (ZEV-TC) that in 2023 will gather governments from emerging markets and companies (including several WBCSD members) to accelerate private investments and policies for zero-emissions vehicle deployment. Growing industry investments brought five times more EV models to the global market in 2021 than in 2015.

Investments and improvements are driving the price of batteries down, although global supply chain issues are inflating EV prices and the sector will not achieve price parity with ICE until 2025 or 2027.[11,12]

This momentum calls for the industry to deploy charging infrastructure (CI) at a pace matching EV adoption. Meeting the Paris Agreement's climate goals will require charging point installations to increase more than twenty-fold by 2030 compared to 2020 levels.[13] Data-driven digital solutions that unlock efficiencies in use and improve predictability and planning can optimize and secure investments along the race. Such solutions could reduce the number of charge points needed by enabling charging slot reservation, smart charging or journey planning. They could also reduce investment risk and inform future developments by improving the predictability of charge point use. **Deploying electric vehicle charging infrastructure (EVCI) at pace will require accelerated infrastructure investments and increased collaboration between the mobility, energy and built environment sectors to develop new digital solutions.**

The WBCSD Transport Decarbonization project mobilizes companies for an inclusive and safe transition to zero-emissions vehicles. In 2021, our member companies collaboratively defined a Value framework for sustainable charging infrastructure that highlights opportunities at the nexus of mobility, energy and real estate to accelerate the deployment of charging infrastructure.

This new publication builds on the framework and centers on digitalization opportunities, providing a roadmap for the collaborative development of data-powered digital solutions to facilitate EVCI investments. It presents two practical examples developed by project members demonstrating how collaborative digital solutions can solve challenges for EVCI deployment. It identifies further opportunities for digital collaboration, outlines formats and structures for data sharing, and formulates recommendations to streamline digital collaboration by supporting EVCI investments.

# 1 The case of charging infrastructure

# 1 The case of charging infrastructure

As EV markets grow, so does the need for charging infrastructure. Although the numbers of both public and private charging point installations are increasing, they do not yet match the pace of vehicle electrification. Global stocks of public chargers reached 1.3 million in 2020, out of which 900,000 are slow chargers and 400,000 are fast chargers. According to the International Energy Agency (IEA) Sustainable Development Scenario, it is necessary to install over 20 million public slow chargers and almost 4 million public fast chargers, 140 million home chargers and 50 million workplace charges by 2030.[14] To achieve this, stakeholders need to invest more than USD $100 billion (based on current prices) in charging hardware by 2030, along with significant investments in transport infrastructure and energy system decarbonization.[15]

The protracted deployment of charging infrastructure could slow down EV adoption. A lack of charging infrastructure is cited as the top barrier to EV adoption, ahead of lack of appropriate EV types, capital costs of EVs, operational charge impacts and an uncertain policy environment.[16]

**Deploying charging infrastructure will require solving quantity, accessibility, operational and efficiency challenges.**

Several governments support the rise of EVs with funding to facilitate the development and purchase of low-emissions vehicles. But lengthy permitting processes and a lack of government funding and incentives are inhibiting charging infrastructure deployment.[17] Strengthening public and private sector investments and policy incentives will be necessary to deliver charging infrastructure in line with transport emissions reduction targets.

Doing so will require high initial capital investments, while the breadth of operational costs is still unclear. In the US market, for example, costs for a single charging port can range from USD $600 for a level-1 residential charger to USD $140,000 for a direct current fast charger, not including installation costs, the potential installation of a transformer, data and network contracts, and "soft costs" such as communications with utilities, process or marketing costs.[18] Accelerating sustainable infrastructure deployment requires unlocking the business case for charging infrastructure and bridging the short-term financial gap.

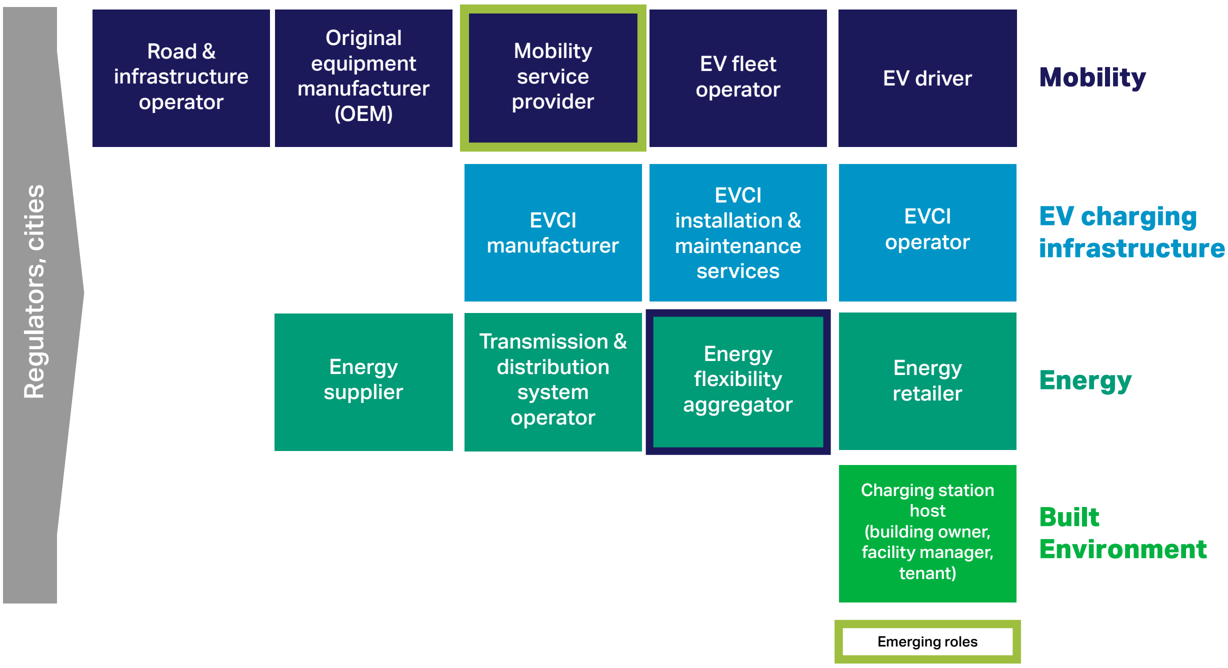
Connecting charging infrastructure to the energy grid can be costly. Ensuring appropriate grid capacity calls for additional investments, especially in energy supply decarbonization.

It is necessary to consider vehicle and grid interoperability and connectivity. Furthermore, well-informed planning is needed to match the distribution of charging infrastructure with EV market growth areas and strategic areas, particularly in crowded urban landscapes, and targeting high-traffic areas and low-emissions zones.[19,20,21]

In addition to proximity challenges, it is necessary to tackle connectivity, interoperability, infrastructure quality and availability, charging time and ease of payment challenges to improve the charging experience for EV drivers.[22,23] A seamless user experience, especially in terms of charging infrastructure availability and accessibility, is critical for user acceptance.[24]

**Solving these challenges will require increased alignment and cooperation between actors from the mobility, energy and built environment sectors and governments**. To better illustrate this EVCI value chain, we have revamped the structure we introduced in our Value framework for sustainable charging infrastructure. Below, we present an updated version of the EVCI value chain structure that we have extended to reflect the various actors involved in the deployment of charging infrastructure.

**Figure 1:** The charging infrastructure value chain[25]




## Where digital collaboration can help

**Digital solutions that create efficiency gains, seamlessly integrate services, increase the accuracy of planning, improve predictability and secure capital investments will be crucial in advancing charging infrastructure deployment.** These solutions require holistic thinking and collaboration between actors across the entire EV value chain. Chief information, infrastructure and innovation officers from charge point operators, mobility service providers and energy utilities, and site managers from residential buildings and workplaces are the primary stakeholders responsible for creating and scaling capacity for digital collaboration.

Creating data-sharing capacity and structures can lead to collaborative digital solutions supporting a wide range of functionalities, such as:

- **Connected infrastructure management systems** – integrating real-time information on charge point status and occupancy with data from smart energy and building systems. Applications include charge point and fleet management and smart grid technology and it is possible to extend them to building energy management systems or smart parking systems to provide a fully integrated decarbonized mobility system.
- **Advanced mapping and spatial planning tools** – informed by robust data such as charging behavior, use rates, EV trends or spatial constraints – that help optimally plan EVCI networks to reduce uncertainty of capital investments and unlock efficiencies.
- **E-mobility services** – providing a platform for EV drivers to plan, reserve and pay for EV charging, and greater data integration across the value chain could improve information accuracy and service delivery and personalization. Emerging services focused on developing vehicle-to-grid (V2G) and demand-response technology are core players at the nexus of mobility.

# 2 Practical examples: harnessing digital collaboration for charging infrastructure deployment

# 2 Practical examples: harnessing digital collaboration for charging infrastructure deployment

The move to data-driven EVCI planning and management will require digital collaboration across the charging infrastructure value chain through data sharing and analysis.

Members of the WBCSD Transport Decarbonization project illustrate, through the two cases presented below, that digital collaboration can increase **predictability to improve infrastructure planning and management and reduce EVCI investment risks to meet the growing demand for EVs.**

### Case 1: Fujitsu's EV fleet charging energy mix analysis

While electric fleets have no tailpipe emissions, their carbon footprint is only as low as that of the energy used to power them. By combining operational data from a milk delivery EV fleet performing milk runs in the United Kingdom with information on charge point location and carbon intensity, Fujitsu demonstrates how EV fleet operators can optimize the environmental impact of their fleet charging process while keeping charging costs constant and potentially reducing initial capital investment in charging infrastructure.

Fujitsu applied a Fleet Optimization solution, based on its Social Digital Twin technology, to visualize and evaluate $CO_2$ emissions from the charging process of an EV milk delivery fleet. Fleet operator Milk & More shared operational data through fleet management solution provider LEVL Telematics, and National Grid's open data platform provided data on carbon intensity levels at charging points on the territory covered by fleet operations.

Initial data analysis shows that charge points have similar fluctuations in carbon intensity level throughout the day, with a steady decline after the peak hours of the morning and the lowest point happening around midday. This created the opportunity to significantly reduce carbon emissions by switching the charging operations schedule to take place between 9:00 and 14:00. A digital twin model helped compare a baseline scenario – current fleet charging operation – against scenarios designed to integrate the insights from the carbon intensity data.

**Table 1:** Data requirements for EV fleet charging energy mix analysis

| Case 1 | Data asset and description | Sources |
|---|---|---|
| | **Operational data on fleet activity:**<br>Number of vehicles and use, disaggregated routes and distance traveled, number of stops on route, charging time required | Fleet operator (in this case, Milk & More, LEVL Telematics) |
| | **Charger locations:**<br>Charging stations at depot and public chargers | Fleet operator (in this case, Milk & More, LEVL Telematics) |
| | **Carbon intensity data:**<br>Carbon intensity level throughout the day on fleet territories | Energy utility/distributor (in this case National Grid) |

### Findings

The comparison of scenarios shows that simply shifting the fleet charging schedule to align it with the time of lowest carbon intensity at the depot charging station – usually the middle of the day – leads to a **15% reduction in daily $CO_2$ emissions from the fleet charging process – without increasing the cost of charging**.

Furthermore, this scenario shows it is possible to reduce the number of charging stations required at depots by around 85% when several vehicles can be charged optimally in a back-to-back sequence at the same station thanks to smart charging, lowering the capital investment necessary for fleet decarbonization.

There is additional potential for emissions reductions when the company directs vehicles to charge at either the depot or public charging infrastructure for optimal carbon intensity. This is a good fit for EV fleets that cover longer distances or whose operations are spread throughout the day. Although operational difficulties and higher costs make this scenario less attractive, its relevance will increase in a future where it costs more to emit (such as under a carbon tax). Until then, companies can achieve small incremental reductions in $CO_2$ emissions with marginal cost increases.

### Case 2: The Arcadis EVCI Planning Blueprint

Arcadis shows how infrastructure planners can efficiently optimize CI locations to improve charging network capacity and functionality and secure their infrastructure investments by outlining data needs, key data sources, and analytical methods in an EVCI Planning Blueprint.

The blueprint shows how to overlay and map spatial data using geographic information systems (GIS). Companies can then apply different basic data requirements and analytical methods depending on the infrastructure planner's purpose and can differentiate them for two modules: demand (How many charge points are needed?) and locate (Where to install charge points?).

A simple comparison of existing charge points and the number of EVs on the road, historical and predictive analysis, or more complex demand modeling can identify current and future demand for EVCI. Suitability analysis and weighted parameters or interactive planning tools and applications can help locate optimal sites for CI installation.

Analytical modules based on a set of "basic" and "advanced" data requirements, including EVs in circulation, charger locations, energy grid capacity, transport networks, mobility patterns or spatial and development constraints collected from a range of stakeholders, draw a comprehensive picture of the EVCI environment.

**Table 2:** Data requirements for EVCI planning

| Case 2 | Data asset and description | Possible sources |
|---|---|---|
| Demand module: How many charge points are needed? | **Plug-in-vehicle (PIV) registrations**<br>Minimum: total number of vehicles, vehicle type<br>Additional: existing vehicle forecasts, vehicle make/model/age, registered vehicle address/ location | Central government<br>Potentially vehicle manufacturers and sales locations |
| | **Charger locations**<br>Minimum: charge point locations and number<br>Additional: charge point location forecast, charger type, charger usage statistic | National charging locations datasets and independent network operator datasets |
| | ***Transportation networks**<br>Minimum: major road network, customer journey mapping<br>Additional: local road network and types, traffic volumes and congestion, mobile phone or telematic tracking | Central government or national mapping agencies<br>Commercial providers<br>Transport services providers |
| | ***Housing**<br>Minimum: residential areas<br>Additional: housing type, off-street and on-street parking availability | Local government<br>National census |
| | ***Land use**<br>Minimum: land-use type (commercial, industrial and recreational areas) Additional: local amenities, public open spaces, car parks | Open-source mapping databases (e.g., OpenStreetMap)<br>Local or central government |
| | ***Demographics**<br>Minimum: population, socio-economic data<br>Additional: household income, education level | National census<br>Commercial providers |

**Denotes data required for advanced modeling.*

| | | |
|---|---|---|
| Locate module: Where to install charge points? | **Charger locations**<br>Minimum: charge point locations and number<br>Additional: charge point location forecast, charger type, charger usage statistic | National charging locations datasets and independent network operators' datasets |
| | **Power capacity**<br>Minimum: substation locations and capacity<br>Additional: power distribution network, connection capacity | Local utilities<br>Sometimes regional or national governments |
| | **Land use**<br>Minimum: land-use type (commercial, industrial and recreational areas)<br>Additional: local amenities, public open spaces, car parks | Open-source mapping databases (e.g., OpenStreetMap)<br>Local or central government |
| | **Development constraints**<br>Minimum: planning restrictions, environmental constraints<br>Additional: historical/cultural sites, flooding sites | Depending on type of data<br>Local or national government |
| | ***Transportation network**<br>Minimum: major road network, customer journey mapping<br>Additional: local road network and types, traffic volumes and congestion, mobile phone or telematic tracking | Central government or national mapping agencies<br>Commercial providers<br>Transport services providers |
| | ***Housing**<br>Minimum: residential areas<br>Additional: housing type, off-street and on-street parking availability | Local government<br>National census |
| | ***PIV registrations**<br>Minimum: total number of vehicles, vehicle type<br>Additional: existing vehicle forecasts, vehicle make/model/age, registered vehicle address/location | Central government<br>Potentially vehicle manufacturers and sales locations |
| | ***Demographics**<br>Minimum: population, socio-economic data<br>Additional: household income, education level | National census<br>Commercial providers |

**Denotes data required for advanced modeling.*

*Source: Reproduced and adapted from the Arcadis Blueprint for planning EVCI.*

## Findings

**The modules provide the opportunity to derive a more precise picture of EVCI demand and optimal locations to improve the availability and efficiency of the charging infrastructure network for all users**. Added clarity and certainty in decision-making help infrastructure planners reduce investment risks and lower capital expenditure. These gains, however, depend on the availability and quality of data that currently lacks standardization and is scattered across the EV landscape.

While the blueprint targets public charge point installations, commercial charge point operators can generate useful insights to cover more charging use cases. Furthermore, based on modeling capacity and data availability, more advanced analysis can help forecast future EVCI needs or identify regional gaps in energy grid capacity or transportation network connectivity to improve the user charging experience.

### What we recommend

**Digital collaboration, in the form of data sharing or the pooling of computing or analytical capacity across the EVCI value chain, is at the core of the solutions detailed above. At scale, it is a key enabler of EVCI deployment**. Companies can achieve a lot with limited data and simple computing.
A small sample of simple operational data and exogenous variables can sometimes suffice to identify crucial efficiency gains in an operational context. With more granular data, potential applications have greater applicability and are more dynamic.

Spatiotemporal disaggregated data on mobility patterns provide key metrics to better map demand for charging infrastructure and enhance understanding of individual charging behavior. This level of granularity would enable the industry to prevent unnecessary extra miles traveled to reach charging points, clearly target high-traffic areas during infrastructure deployment and solve crucial challenges in the development of vehicle-to-grid on the road to grid decarbonization, for example.

**Companies must develop capacity to collect and process more granular data about their operations. To take full advantage of the growing data economy and affluent opportunities for digital collaboration, they must also map and structure their own information assets**. Thanks to modern technologies, it is now possible to collect more precise and dynamic data sets.
A growing number of cloud-based applications and protocols are facilitating data management. The possibilities for value creation in business are endless: increase process efficiencies and identify cost-saving measures, smartly integrate environmental and driver behavior considerations into daily operations, and increase the accuracy of pricing and the predictability of infrastructure investments.

**Lastly, companies and governments must collaborate to facilitate, encourage and increase data sharing**. A critical barrier to digital solutions is often access to the right data.
For example, while carbon-intensity data or national charge point registries are available in the United Kingdom, this is not always true elsewhere. Regulations on data ownership and use are at unequal stages worldwide.
Data holders are often reluctant to engage in data sharing out of fear for their own competitiveness or out of consideration for privacy and ethics. Data gaps affect the reliability of digital solutions and their replicability across geographies. Furthermore, when data is available, either at centralized data points or through voluntary contributions, it is not always of comparable quality or operability. Moving forward, it is crucial to strengthen incentives for data sharing and to establish wide-reaching standards for quality, interoperability and ethical use. The next chapter provides specific recommendations for this.

# ③ An action framework to build digital collaboration capacity

# 3 An action framework to build digital collaboration capacity

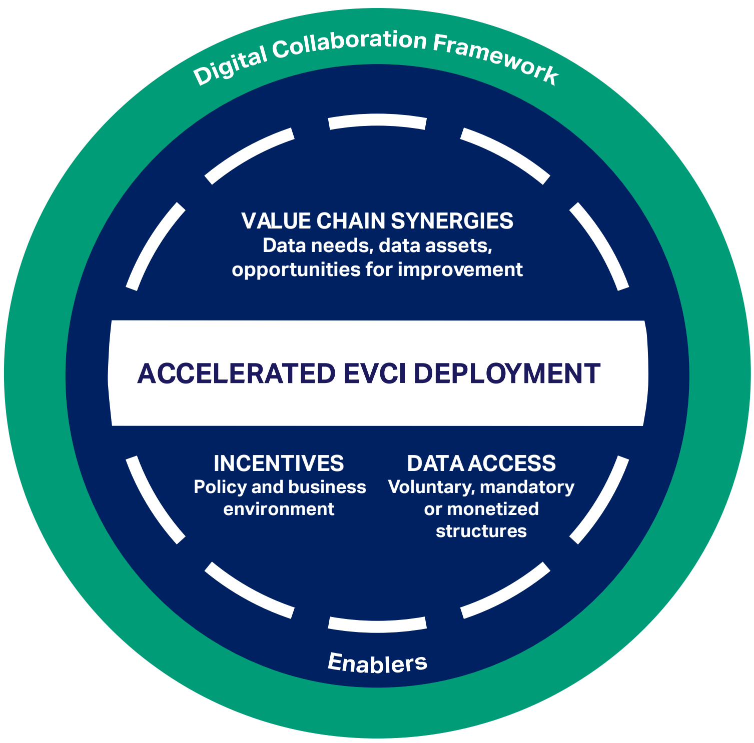
**Digital collaboration is a business opportunity.** Systems are collecting and consuming more data than ever before. An increasing number of businesses recognize that data is a key asset through which they can unlock new markets, create new value and optimize processes and operations. The International Data Corporation (IDC) reports spending on big data and analytics reached USD $215.7 billion in 2021, a 10% increase in one year. It also estimates business investment in digital transformation will be worth USD $3.4 trillion by 2026.[26] The rise of the data economy is evident in the mobility sector too, through the growing presence of sensors in mobility infrastructure, digital monitoring and connected cars on the road.[27]

Consequently, companies view the sheer volume of data they are producing and storing as a highly valuable and sometimes sensitive asset. Coupled with growing concerns about personal data privacy and security, this has hindered their willingness to engage in data sharing. Yet, a growing number of use cases demonstrate how digital collaboration can deliver business value in the deployment of charging infrastructure. The two examples in the previous chapter show how pooling data and analytical capacity can optimize capital and asset efficiency and improve investment and operation planning and predictability.

This chapter builds on the principles for data sharing,[28] the value framework for sustainable infrastructure,[29] lessons learned from the use cases above and stakeholder consultations. It lays out a digital collaboration framework guiding companies looking to harness the full potential of their information assets and to implement new digital solutions for the deployment of electric vehicle charging infrastructure. Three enablers of digital collaboration are the foundation of the framework:

- Synergies and complementary needs among actors across the value chain;
- Structures for data access;
- Supportive company and policy environments.

**Figure 2:** Digital Framework



## Identifying value chain synergies

The first building block of digital collaboration lies in the synergies between companies' digital assets and opportunities for growth across the EVCI value chain. Each actor – charging infrastructure manufacturers and operators, stakeholders from mobility, energy, real estate, emerging mobility services and governments – collects sets of data related to their own operations.

Digital collaboration allows for aggregation of this data to generate new insights and capabilities.

The table below consists of a (non-exhaustive) overview of the information assets held by each actor and their respective opportunities in accelerating the deployment of charging infrastructure. It intends to identify potential synergies between actors in the EVCI value chain to support the elaboration of collaborative digital solutions.

It is worth noting that this canvas of opportunities is bound to evolve in a fast-moving market. For example, new roles, needs and synergies will emerge across the value chain in the move to the implementation of vehicle-to-grid (V2G) bidirectional charging or with the rise of mobility-as-a-service (MaaS) and the related opportunity to integrate EV parking and charging in a holistic mobility system.

**Table 3:** Data-sharing opportunities across the EVCI value chain

| Sector | Value chain actor | Information and digital assets | Information and digital assets | Data needs (non - exhaustive) |
|---|---|---|---|---|
| **Mobility** | Original equipment manufacturer (OEM) | EV sales<br>Telemetry (e.g., charging patterns, vehicle maintenance).<br>Location patterns. | Advanced driver assistance systems (incl. charge planning).<br>Feedback-based R&D optimization. | Live on-route conditions.<br>Infrastructure location.<br>Mobility service and infrastructure and services status, booking. |
| | Mobility provider | Passenger volumes and profiles.<br>Routes. | Optimized use.<br>Personalization.<br>Out-of-service placement. | Live feedback.<br>Live on-route conditions.<br>Infrastructure status. |
| | E-mobility service provider | Journey planning.<br>Passenger load and profiles (historical and real-time). | Integrated fleet management solutions.<br>Personalization.<br>Connection to other mobility services (e.g., parking, MaaS). | Live feedback.<br>Live on-route conditions.<br>Infrastructure and services location and status. |
| | Road and infrastructure operators | Live on-route conditions.<br>Infrastructure location and status. | Air-traffic control (ATC)-style routing and journey optimization.<br>Better predictive services for journey. | Real-time demand. |
| | EV fleet operator | Fleet operations. | Integrated fleet management solutions.<br>Asset usage and optimized use.<br>Journey planning.<br>Smart charging planning/ booking. | Vehicle telematics.<br>On-route conditions.<br>Charge location, status.<br>Disaggregated carbon intensity (charging stations). |
| | EV driver | Own passenger profile.<br>On-route location.<br>Origin and destination. | Charging services app (planning, reservation, dynamic pricing).<br>Integrated journey planning.<br>In-vehicle integration. | On-route conditions.<br>Charge point location and status. |

| Sector | Value chain actor | Information and digital assets | Information and digital assets | Data needs (non - exhaustive) |
|---|---|---|---|---|
| **Charging infrastructure** | Charging infrastructure manufacturer | Sales. Infrastructure capacity. | Smart systems integration in infrastructure. Feedback-based R&D optimization. | Charging demand. Infrastructure use and optimized use. User profiles and charging behavior. |
| | Charging infrastructure operator | Infrastructure location, usage, maintenance. | Integrated charging planning/ booking. Charging infrastructure location and demand planning. Infrastructure management. Dynamic pricing. Flexibility and V2G facilitation/provision. Renewable energy integration. Interoperability with other operators. | Live feedback. Live and historic grid capacity. Real-time and forecast charging demand. Charging behavior. Dynamic pricing. Available locations for new infrastructure. |
| **Energy** | Energy retailer | Energy carbon intensity. Energy prices. Energy demand. | Better demand forecasting. Dynamic grid capacity management. Smart grid management. Vehicle-to-grid (V2G). Dynamic pricing (e.g. discounts for low-$CO_2$ charging timing). | Disaggregated charging demand (historical and forecasts). Live feedback. |
| | Transmission and distribution system operator | Energy grid capacity disaggregated. Energy grid load. Energy grid state. Smart metering data. EVCI grid connection requests. | Smart metering. Power management technologies. Smart grid management. Smart planning of new/ reinforcement of grid capacity. Investment optimization from EV charging/V2G flexibility usage. | Disaggregated charging demand (historical, live, forecast). Live feedback. |
| | Energy flexibility aggregator | Energy demand. Energy supply. | Demand flexibility planning systems with predictive capacity. | Disaggregated charging demand (historical, live, forecast). |
| **Real Estate** | Real estate owner and real estate manager | Property type. Private charging infrastructure. Parking locations. | Building energy management systems. Optimizing global building load and renewable integration. | Grid capacity. Electricity prices. $CO_2$ energy supply intensity. |
| **Regulators** | Local and national government | Public charging infrastructure location. Land use types and zoning. Public road infrastructure. | Infrastructure planning and monitoring. Charging infrastructure permit process facilitation. | Live feedback. Charging demand. Forecast EV market growth. Charging infrastructure status and capacity. |

**Box 1: An example of digital collaboration**

Through their partnership, charging solution provider EVBox and Mobility House, an innovative tech company, connected their respective charging management software and charging and energy management system. The resulting digital environment allows customer station operators to prevent peak load, optimize energy efficiency, gain unique insights into driver charging behavior and have full control over card or fee management.

### Selecting structures for data access

Businesses should assess and select structures for data access carefully depending on the nature and scope of the digital collaboration initiative, as they vary in function, capacity and purpose. We present the main structures and their features below.

**Open data portals** are a wide-ranging and accessible source of data. Founded on voluntary data sharing – and sometimes on multilateral collaboration or coordination – they cover a diverse range of subjects and sectors. We list a few examples of open data initiatives related to the EVCI value chain in Box 2. On the downside, the voluntary basis of open data initiatives makes them less flexible for specific needs. A lack of standardization can sometimes affect the quality of the data accessible and its interoperability.

**Box 2: Examples of open data initiatives in the EVCI value chain**

- The UK National Grid's ESO Data Portal provides free access to more than 100 data sets covering demand, generation, carbon intensity, future energy scenarios, etc.;
- Portugal's DSO E-REDES Open Data Portal provides free data on local hourly demand, grid connections, EVCI supply points, etc.;
- The French Ministry of Transport's open data portal includes several data sets sourced from public and private sector service providers, detailing prices and locations of charging stations throughout the country.

**Elective specifications and protocols** are freely available to facilitate liaising between service providers and solve issues of interoperability. The Open Charge Point Interface (OCPI), for example, is a protocol designed to support connections between e-mobility service providers and charge point operators. The Open Charge Point Protocol (OCPP) facilitates communication between specific charging stations and central charging station networks, while the Open Smart Charging Protocol (OSCP) links charge point management and energy management systems. Open standards are an essential link to ensure seamless charging. As such, they must remain open and accessible to all. A best practice in this regard is using creative commons licenses to deploy such protocols.

**Data-sharing agreements** allow limited data sharing between a set of select partners. They are a strong tool for engaging in digital collaboration. The ability to collaboratively specify data needs can deliver insights of higher quality than would be accessible through open data. Setting clear conditions for data use, ownership and accountability is crucial in fostering trust and guaranteeing the lawfulness and fairness of the agreement.

**Data marketplaces** provide an architecture to enable data sharing through data monetization, acting as the "middleman" between the data holder and the data user. By creating a single interface and federating data integration, transactions and support, they improve the velocity and ease of data exchanges. They also have strong aggregation capacity and can better standardize datasets for improved quality and interoperability.

Marketplaces are an emerging structure in the data space and their role is set to evolve depending on future data regulations.

## Incentives for digital collaboration

### Business policies for digital collaboration

To take full advantage of the growing data economy, companies must build their capacity to collect, store, use and share information and digital assets, starting with collection (see Table 3). In building their data intelligence architecture, companies can follow a "maturity model," beginning with getting their own enterprise data platform in order and ending with mature data-sharing infrastructure and capacity, enabling data sharing directly, via marketplaces and via collectives including "enclave" models that share insights derived from data but not the data itself. The use of hyperscale clouds, a dynamic cloud architecture, allows for the progressive scaling of data-sharing capacity.

Companies must integrate data security and privacy by design through data inspection, deletion or retraction, and audits to ensure compliance with data protection regulations without excessive operating costs. Our [Enabling data-sharing: Emerging principles for transforming urban mobility] report, published in 2020, provides specific recommendations for this.

### Data governance frameworks

Governmental standards and regulations can play an essential role in shaping the data economy. Setting common standards creates a climate of trust by introducing measures for monitoring and accountability. By providing clarity and legal frameworks, they can also facilitate the use, reuse and sharing of data to unlock new digital solutions and incentivize data sharing and data exchanges throughout the economy.[30]

Defining specific conditions for the ownership and use of both personal and non-personal data is essential to protect the sensitive proprietary data of individuals and businesses while encouraging digital innovation. These should set minimum requirements for consent to use, data sovereignty, portability and measures for enforcement. The most far-reaching existing frameworks are the EU's General Data Protection Regulation (GDPR), which entered into force in 2018, and South Korea's Personal Information Protection Act, first issued in 2011 and updated in 2020. Other regulations focus on the access to and use of non-personal data by governing and private entities. That is the case of Japan's Basic Act on the Advancement of Public and Private Sector Data Utilization (2016) and is the subject of the EU's proposal for the Data Act (2021, debate ongoing).[31]

It is necessary to specify such regulatory frameworks for specific sectors and ensure the distinction between raw and intellectual property (IP)-protected enriched data. Sectoral data spaces, such as the Mobility Data Space, have the mission to adapt the EU's digital economy frameworks by sector. Moving forward, it will be crucial to consider sectoral intersections by connecting mobility, energy and other data spaces.

Governments also play a role in **guiding and centralizing the sharing of key intelligence assets.**

The EU does so already through the specification of National Access Points (NAPs), which define mandatory or elective collection and accessibility requirements for several data sets. Here again, it is necessary to develop sectoral specifications to secure IP-protected data and safeguard competitivity in the commercialization of data-driven intelligence. The Alternative Fuels Infrastructure Regulation (AFIR), which outlines minimum standards for charging infrastructure deployment in EU member states, is a step in the right direction as it contains additional requirements for the availability of CI information assets related to charging station availability, waiting times and prices at NAPs.[32]
Governments can facilitate data sharing by issuing official guidelines on the scope and content of data-sharing agreements to ensure lawfulness, privacy, security and fair competition.
The EU Data Governance Act, for instance, which will come into effect in September 2023, provides updates on the rights and obligations of individuals, public bodies and companies sharing data.[33]

# Conclusion and recommendations

With the rise of digital capacity and the data economy, collaborative digital solutions can deliver immense benefits through data-driven capital, assets and process optimization. Members of the WBCSD Transport Decarbonization project have collaborated to demonstrate how they can deliver 15% emissions reductions from charging, reduce the capital investments required for charging infrastructure, and optimize investment planning. Digital solutions are undoubtedly a key facilitator of electric vehicle charging infrastructure deployment. Below we detail recommendations for chief information, infrastructure and innovation officers from charge point operators, mobility service providers, energy utilities, and site managers from residential and workplace buildings to invest in digital collaboration capacity.

**Harnessing the potential of digital collaboration to secure and maximize the capital efficiency of investments in charging infrastructure starts with identifying synergies with other actors in the EVCI value chain to pool insights and create new business value.**

**Recommendation 1: Map the business's position in the value chain**, starting with service or product suppliers and clients and extending the analysis to the surrounding EVCI system. Identify common opportunities; define common and complementary data needs.

**Recommendation 2: Invest in internal capacity for collecting and storing data relating to own and shared actions in charging infrastructure deployment and use**. Emphasize growing disaggregated data that increase accuracy and predictive capacity.

**Selecting the right structure to access data is key to effective digital collaboration.**

**Recommendation 3: Make the business's own data more accessible.** Consider participation in relevant voluntary data-sharing schemes with low-sensitivity information assets to build valuable links with organizations supportive of digital collaboration. Consider the monetization of data for an added revenue stream. In both cases, target structures with the strongest access to the most relevant actors from the charging infrastructure value chain.

**Recommendation 4: Review structures for accessing data and formulate internal recommendations**. Strengthen employee understanding of the various structures for data access (open data initiatives, open standards and protocols, data-sharing agreements, data marketplaces) and provide them with a set of tools to select the right structure for their purpose. This includes basic principles to guarantee lawfulness, data privacy and security and competitiveness.

**Lastly, business practices and the policy environment should foster digital collaboration.**

**Recommendation 5: Invest in architecture and staff capacity to share data internally and with other businesses**. This starts with organizing enterprise data use by developing adaptive processes and interfaces to collect, store, manage and share data. Employees dealing with data collection or computing should have the capacity to engage in the sharing of data or insights through clear procedures. Legal teams should be qualified to guarantee compliance with data protection regulations and to draft strong data-sharing agreements.

Companies can develop their maturity progressively, starting with data exchanges with one entity and the use of marketplaces, gearing up to dynamic policy-driven data sharing with multiple entities. Another path is to leverage marketplaces as a business choice to increase available data pools and simplify infrastructure while also taking advantage of more flexible arrangements.

**Recommendation 6: Support policy developments that provide clear guidelines to facilitate data sharing and clarify data ownership, privacy and security.** Build industry coalitions to make recommendations for data granularity, quality and interoperability to achieve standardized data regulations across sectors, geographies and contexts.

**Recommendation 7: Support the development of sector-specific data regulations but consider whole industry policy approaches to avoid siloes in the EVCI value chain.** For example, the EU should develop its mobility data space, taking into consideration the interdependencies of transport with the energy and built environment sectors into consideration.

**Recommendation 8: Push the development and adoption of common data standards and protocols** to facilitate data exchanges and improve interoperability. Ensure these remain open and accessible by favoring deployment through creative commons licenses.

# Glossary

**Carbon intensity:** Refers to how many grams of carbon dioxide ($CO_2$) are released to produce a kilowatt hour (kWh) of electricity.

**Data intelligence architecture:** A framework composed of the various technologies an organization deploys to run business intelligence and analytics applications. It includes the use of information technology (IT) systems and software tools to collect, organize, store and analyze information assets.

**Data open protocols:** In computer science, a protocol refers to the set of rules that guide the transmission of data between two IT systems. Open protocols are non-proprietary protocols, i.e., no particular company owns them and their use is not limited to one particular product. Therefore, they improve the interoperability of data.

**Data open standards:** Documented, reusable agreements that help people and organizations publish, access, share and use better quality data. Their development may aim to agree on common data architecture models or a common language to share information consistently.

**Data portability:** Refers to an agent's capacity to easily access, download or transfer their personal data from a digital platform.

**Interoperability:** Refers to the ability of computational systems to interact, i.e., the capacity of data exchange between different data intelligence architectures.

**Data sovereignty:** The understanding that data stored outside an organization's host country are still subject to the laws in the country where the data are stored.

**Digital collaboration:** The practice of pooling data or IT system capacity between several organizations to create new insights and data-based services.

**Information assets:** The organized collection of information collected throughout business and service operation, i.e., data.

**Non-personal data:** Electronic data that does not contain any information that someone or something can use to identify a natural person.

**Personal data:** Data that contains information relating to a particular person. In the field of digital mobility, this can be the case of payment information, online orders, travel history, addresses and more.

**Smart charging:** a smart charger has the ability to provide additional functionality such as energy load management, restricted access, remote start / stop, status / session monitoring and more, allowing for example to optimize sequential charging of several vehicles to avoid charger idle time.

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## DISCLAIMER



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## ABOUT THE TRANSPORT DECARBONIZATION PROJECT

WBCSD's Transport and Mobility Pathway mobilizes members for a safe and inclusive transition to a 60% zero-emissions vehicle global market share by 2030 and to scale digital mobility solutions for efficiency to abate road transport emissions to 4 Gt of $CO_2$ by 2030 while helping the automotive sector to reduce GHG emissions by 50%. We deliver collective action, capacity building and tools to improve transport efficiency and accelerate the global deployment of zero-emissions mobility technologies. Together, we drive system transformation, creating greater transparency on Scope 3 emissions, building supply chain decarbonization solutions and raising ambition and action to improve road safety.

## ABOUT WBCSD

WBCSD is the premier global, CEO-led community of over 200 of the world's leading sustainable businesses working collectively to accelerate the system transformations needed for a net zero, nature positive, and more equitable future.

We do this by engaging executives and sustainability leaders from business and elsewhere to share practical insights on the obstacles and opportunities we currently face in tackling the integrated climate, nature and inequality sustainability challenge; by co-developing "how-to" CEO-guides from these insights; by providing science-based target guidance including standards and protocols; and by developing tools and platforms to help leading businesses in sustainability drive integrated actions to tackle climate, nature and inequality challenges across sectors and geographical regions.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD $8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. Since 1995, WBCSD has been uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

Together, we are the leading voice of business for sustainability, united by our vision of a world in which 9+ billion people are living well, within planetary boundaries, by mid-century.

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