

Vehicle-to-Grid Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028

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Abstracts

The global vehicle-to-grid market size reached US\$ 2.5 Billion in 2022. Looking forward, IMARC Group expects the market to reach US\$ 18.4 Billion by 2028, exhibiting a growth rate (CAGR) of 39.5% during 2022-2028. The growing purchase of electric vehicles (EVs), increasing environmental concerns and reduction of emissions, and rising development of advanced bi-directional charging infrastructure allowing bidirectional power flow are some of the major factors propelling the market.

Vehicle-to-grid (V2G) is a technology that enables the bidirectional flow of electricity between electric vehicles (EVs) and the power grid. It requires communication protocols that enable seamless interaction between the EV, charger, and the grid, ensuring safe and efficient power transfer. It allows EVs to inject power into the grid during peak demand or grid fluctuations and helps stabilize the electricity network and improve overall grid reliability. It facilitates the integration of renewable energy sources, such as solar and wind, by absorbing excess energy during periods of high generation and redistributing it when needed.

At present, the increasing demand for V2G as it helps mitigate the intermittent nature of renewable energy sources, making it easier to integrate them into the grid on a larger scale, is impelling the growth of the market. Besides this, the rising popularity of V2G, as it enhances grid resilience by offering backup power during emergencies, blackouts, or natural disasters when EVs can act as mobile energy reserves, is contributing to the growth of the market. In addition, the growing integration of renewable energy and the usage of optimized energy to reduce greenhouse gas emissions and promote sustainability is offering a favorable market outlook. Apart from this, the increasing development of advanced bi-directional charging infrastructure allowing bidirectional power flow is supporting the growth of the market. Additionally, rising advancements in battery technology and power electronics are strengthening the growth of the market.

Vehicle-to-Grid Market Trends/Drivers:

Rising purchases of electric vehicles (EVs)

Presently, the increase in electric vehicle (EV) purchases is positively influencing the V2G market, fostering unprecedented growth and driving the global transition towards cleaner and more sustainable energy solutions. The concept of V2G relies heavily on the idea of using electric vehicles (EVs) as mobile energy storage units. When not in use, these vehicles can be connected to the grid, allowing their batteries to store excess energy generated from renewable sources. The growing consumer awareness and acceptance of EVs are promoting a similar trend for V2G systems. As consumers become more familiar with EVs and their benefits, the concept of V2G is also gaining traction. Owners are becoming increasingly comfortable with the idea of their car batteries serving dual purposes, both for driving and for energy storage and transfer. This shift in consumer behavior and perception is propelling the V2G market to flourish. Increasing environmental concerns and reduction of emissions

The rising environmental concerns and mounting pressure to reduce carbon emissions are playing a significant role in positively influencing the V2G market. Apart from this, there is an increase in the demand for energy solutions that reduce our reliance on fossil fuels and prevent the impacts of climate change. The V2G model represents a significant step towards sustainable energy utilization, as it provides a platform for efficient storage and utilization of renewable energy. When connected to the grid, EVs can absorb excess energy generated from renewable sources and supply it back when demand is high, or generation is low. This method of energy management mitigates the need for conventional power plants and enhances grid stability, thereby reducing greenhouse gas emissions significantly.

Growing popularity of smart grids

The increasing popularity of smart grids is having a transformative and positive impact on the V2G market. The core strength of smart grids lies in their ability to intelligently manage energy supply and demand, enhancing grid stability, reliability, and efficiency. V2G systems feed into this strength by acting as a flexible energy resource. When connected to the smart grid, EVs can store surplus energy during periods of low demand and convert this energy back into the grid when demand peaks. This ability to balance the load is contributing significantly to the optimization of power distribution and the prevention of blackouts or power quality issues. Moreover, the proliferation of smart grids encourages the use of renewable energy sources, which is critical for V2G technology. Smart grids are designed to better accommodate and manage the integration of renewable energy sources like solar and wind power.

Vehicle-to-Grid Industry Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the global vehicle-to-grid market report, along with forecasts at the global, regional and country levels from 2023-2028. Our report has categorized the market based on solution type,

vehicle type, charging type and application.

Breakup by Solution Type:

Electric Vehicle Supply Equipment (EVSE)

Smart Meters

Home Energy Management (HEM) Systems

Software Solutions

Electric vehicle supply equipment (EVSE) dominates the market

The report has provided a detailed breakup and analysis of the market based on the solution type. This includes electric vehicle supply equipment (EVSE), smart meters, home energy management (HEM) systems, and software solutions. According to the report, electric vehicle supply equipment (EVSE) represented the largest segment.

Electric vehicle supply equipment (EVSE) refers to the infrastructure and equipment used to charge electric vehicles (EVs). It is the system that connects the EV to the power source and supplies the electricity needed to recharge the battery of the vehicle.

EVSE is essential for the widespread adoption of EVs, as it provides a convenient and safe way for EV owners to charge their vehicles at home, workplaces, public charging stations, and other locations. EVSE is used at residential properties to charge EVs. Home EVSE units are typically installed in garages or driveways, offering convenience, and enabling EV owners to start each day with a charged battery. EVSE is also installed at various public locations, such as parking lots, shopping centers, restaurants, and tourist attractions, to provide charging options for EV users on the go. Public charging stations help alleviate range anxiety and increase the accessibility of EVs.

Breakup by Vehicle Type:

Battery Electric Vehicle (BEV)

Fuel Cell Electric Vehicle (FCEV)

Plug-In Hybrid Electric Vehicle (PHEV)

Battery electric vehicle (BEV) hold the largest share in the market

A detailed breakup and analysis of the market based on the vehicle type have also been provided in the report. This includes battery electric vehicle (BEV), fuel cell electric vehicle (FCEV), and plug-in hybrid electric vehicle. According to the report, battery electric vehicle (BEV) accounted for the largest market share.

A battery electric vehicle (BEV) is a type of EV that relies solely on an onboard battery pack for energy storage and propulsion, with no internal combustion engine. It represents a promising solution to combatting climate change and air pollution, making it an essential part of the ongoing transition to a more sustainable and low-carbon transportation system. Additionally, BEV is gaining traction in commercial fleets, where it offers cost savings through reduced fuel and maintenance expenses. The electric bus and delivery vehicle is becoming more prevalent in urban areas, contributing to cleaner and quieter streets. BEV is more energy-efficient than internal combustion engine

vehicles. It converts a higher percentage of energy from the grid into usable power for propulsion, resulting in reduced energy waste and a lower carbon footprint.

Breakup by Charging Type:

Unidirectional Charging

Bidirectional Charging

Bidirectional charging holds the biggest share of the market

A detailed breakup and analysis of the market based on the charging type have also been provided in the report. This includes unidirectional charging and bidirectional charging. According to the report, bidirectional charging accounted for the largest market share.

Bidirectional charging is a two-way flow of electricity between an electric vehicle (EV) and the electric grid. Unlike traditional unidirectional charging, where electricity flows from the grid to the battery of the vehicle for charging, bidirectional charging allows the EV battery to discharge power back to the grid when needed. It helps to balance the electrical grid by providing grid operators with a flexible energy resource. During peak demand periods, EVs can discharge stored energy into the grid, helping to alleviate stress on the grid and prevent blackouts. It enables load shifting, meaning EVs can charge during off-peak durations when electricity demand is lower, and energy is cheaper. The stored energy in the EV batteries can then be discharged during peak hours, reducing strain on the grid, and optimizing energy usage.

Breakup by Application:

Peak Power Sales

Spinning Reserves

Base Load Power

Others

Peak power sales hold the maximum share in the market

A detailed breakup and analysis of the market based on the application have also been provided in the report. This includes peak power sales, spinning reserves, base load power, and others. According to the report, peak power sales accounted for the largest market share.

Peak power sales refer to the selling of electricity at times of peak demand when the demand for electricity is highest. In an electricity grid system, there are periods throughout the day when the electricity consumption reaches its maximum, typically during the morning and evening hours when people are waking up and returning home from work. These periods are known as peak demand periods. During peak demand periods, the electricity grid experiences a significant load, and power utilities may need to activate additional power generation resources to meet the increased demand. These additional power sources are often more expensive to operate or may rely on less efficient power plants, which can drive up the cost of electricity production. Peak power

sales can take various forms, including time-of-use pricing, where electricity rates vary based on the time of day, with higher rates during peak durations and lower rates during off-peak periods.

Breakup by Region:

North America

United States

Canada

Asia-Pacific

China

Japan

India

South Korea

Australia

Indonesia

Others

Europe

Germany

France

United Kingdom

Italy

Spain

Russia

Others

Latin America

Brazil

Mexico

Others

Middle East and Africa

North America exhibits a clear dominance, accounting for the largest vehicle-to-grid market share

The report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, North America represented the largest market.

North America held the biggest market share due to the increasing focus on reducing greenhouse gas emissions and combating climate change. Besides this, the increasing purchase of electric vehicles (EVs) as they prevent the usage of fossil fuels and

emission of harmful vehicular exhausts is propelling the growth of the market. Apart from this, the implementation of various government incentives, tax credits, and policies to promote EVs and clean energy is contributing to the growth of the market. Additionally, advancements in smart grid infrastructure are supporting the growth of the market.

Europe is estimated to expand further in this domain due to the increasing adoption of renewable energy sources. Moreover, rising research activities to improve V2G systems are bolstering the growth of the market.

Competitive Landscape:

Key market players are investing in research operations to improve the efficiency, scalability, and performance of V2G systems. They are also improving bidirectional charging technology, optimizing battery management systems, and developing advanced communication protocols for seamless integration with smart grids. Top companies are collaborating with electric vehicle (EV) manufacturers, utilities, and other stakeholders to establish a robust ecosystem. They are also deploying more V2G-enabled charging stations at key locations to support a larger number of EVs and enable widespread participation in V2G programs. Leading companies are focusing on integrating V2G systems with numerous renewable sources of energy, including solar and wind power. They are also educating consumers about the benefits of V2G technology and its role in supporting a cleaner and more sustainable energy system. The report has provided a comprehensive analysis of the competitive landscape in the market. Detailed profiles of all major companies have also been provided. Some of the key players in the market include:

AC Propulsion Inc.

Coritech Services Inc.

DENSO Corporation

Enerdel Inc.

ENGIE Group

EV Grid

Hitachi Ltd.

Nissan Motor Company Ltd.

NRG Energy Inc

OVO Energy Ltd.

Recent Developments:

In 2023, OVO Energy Ltd. announced the launch of 'Charge Anytime,' a smart charging electric vehicle plan that can charge EVs automatically during off-peak energy usage periods.

In 2023, ENGIE Group announced the launch of its new brand named ENGIE Vianeo, which aims to develop 12,000 electric charge points in France for cars and heavy goods

vehicles by 2025.

In May 2023, DENSO Corporation announced its collaboration with United Semiconductor Japan CO., Ltd (USJC) to produce insulated gate bipolar transistors (IGBT) for expanding the electric vehicle market.

Key Questions Answered in This Report

1. What was the size of the global vehicle-to-grid market in 2022?
2. What is the expected growth rate of the global vehicle-to-grid market during 2023-2028?
3. What has been the impact of COVID-19 on the global vehicle-to-grid market?
4. What are the key factors driving the global vehicle-to-grid market?
5. What is the breakup of the global vehicle-to-grid market based on the solution type?
6. What is the breakup of the global vehicle-to-grid market based on the vehicle type?
7. What is the breakup of the global vehicle-to-grid market based on charging type?
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9. What are the key regions in the global vehicle-to-grid market?
10. Who are the key players/companies in the global vehicle-to-grid market?

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