



## Research Report

### **EXECUTIVE SUMMARY:**

### **Neighborhood Electric Vehicles**

Low-Speed Electric Vehicles for Consumer and Fleet Markets: Demand Drivers and Barriers, Technology Issues, Key Industry Players, and Market Forecasts

**NOTE:** This document is a free excerpt of a larger report. If you are interested in purchasing the full report, please contact Pike Research at [sales@pikeresearch.com](mailto:sales@pikeresearch.com).

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# Section 1

## EXECUTIVE SUMMARY

### 1.1 Market Issues

The definition of neighborhood electric vehicles (NEVs) varies by country, and some regions do not have a definition at all. In North America, the National Highway Traffic Safety Administration (NHTSA) defines NEVs as low-speed vehicles (LSVs) that must meet specific requirements to be allowed on public roads. The vehicles are limited to 25 mph and to roads with a speed limit of 35 mph. Additionally, these vehicles must have safety equipment, including a windshield, safety belts, headlights, brake lights, turn signals, and other equipment. Canada follows the same requirements.

In both Canada and the United States, the individual provinces and states are in charge of the road rules and must explicitly allow NEVs to access public roads. Only three provinces in Canada permit very limited NEV access. 43 U.S. states have laws allowing NEVs statewide, while municipalities in another three states permit use of the vehicles.

In Europe, NEVs fall under the quadricycle definition, which is similar to the U.S. classification. However, the European vehicles are limited to a 4 kW power motor for light NEVs (like golf carts) or 15 kW for heavy quadricycles (like city cars). NEVs in Europe are limited to 45 kph.

In Japan, NEVs are categorized as “motorized four-wheel bicycles” with four classifications according to the engine horsepower. Most other Asia Pacific markets do not yet have a definition for NEVs.

NEVs can be fitted as either cargo vehicles or passenger vehicles depending on the needs. Fleet managers are finding that an NEV can replace a full-speed light-duty (LD) vehicle for many tasks that do not require workers to leave the campus or city. In most cases, NEVs are used in campus-type atmospheres, such as colleges or universities, military bases, airports, corporate campuses, and manufacturing facilities. Note that the fleet market makes up about 70% of the global NEV marketplace.

In North America, private consumers who use NEVs are typically of middle age to retirement age. The NEV usually represents a second or third vehicle for these consumers, who often live in planned communities. There are currently about 12 communities in North America are specifically designed to accommodate NEVs and include paths and lanes on the road labeled for NEVs. However, many developers are planning more densely populated communities with town centers and green space that can more easily accommodate NEVs.

In the United States, there are federal tax incentives of 10% of the purchase price up to \$2,500 to encourage NEV purchases. In Europe, numerous countries currently have incentives for electric vehicles; NEVs often qualify for some of those incentives.

## 1.2 NEV Technology Issues

Essentially, all NEVs are currently using deep cycle lead-acid batteries because these are significantly lower cost compared to other battery types. In general, NEV price points have to be well below those of traditional LD vehicles. Therefore, components such as batteries are typically kept at a low cost. At \$100 to \$200 per kWh, lead-acid batteries are the most inexpensive batteries available.

There are currently three different lead-acid technologies being used:

- **Flooded:** A liquid electrolyte (aqueous-based sulfuric acid) covers the plates. Flooded batteries cost approximately 40% less than absorbed glass mat or gel batteries.
- **Gelled:** A thickening gel agent like silica holds the electrolyte in place. The batteries are sealed with a valve to protect against the pressure buildup within the battery case.
- **Absorbed glass mat:** AGM similar to fiberglass physically holds the electrolyte in place. Because of this solid separator, the batteries are considered to be sealed valve-regulated lead-acid (VRLA) batteries.

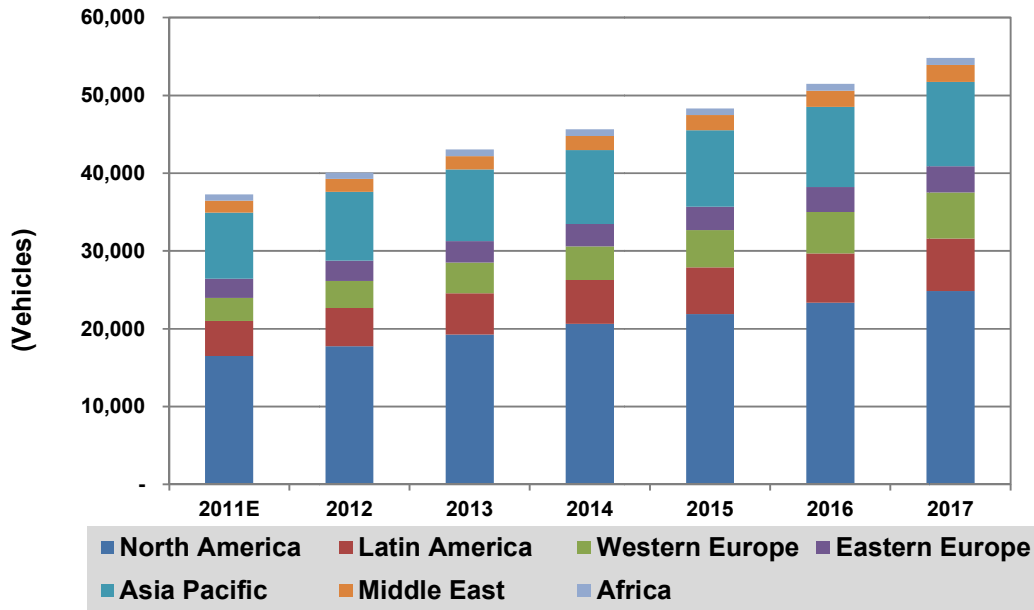
The motors used in NEVs are powered by either direct current (DC) motors or three-phase alternating current (AC) motors. DC motors require less electronic control of the motor, so both the weight and cost are lower. AC motors are more compact, have a lighter weight design and higher RPM limits, and can vary the power delivered to the motors. However, AC motors have a higher cost tradeoff than DC motors. Vehicle charging is done through chargers that can be either onboard the vehicles or as a separate unit to lower the overall cost of the vehicle. While most manufacturers do opt to include the units on board, many of those targeting consumers will instead separate the unit from the vehicle, since most consumer vehicles are anticipated to charge at home. When the chargers are separate units, they are usually portable, so the consumer could take the unit with them.

## 1.3 NEV Market Forecasts

While the global market for NEVs is not large, Western Europe has a history with quadricycles that use diesel fuel. As a result, the market for NEVs in Western Europe is expected to grow at a faster rate than in other regions. Note that the large Asia Pacific region is a challenging market because NEVs have not yet been defined in many countries. In China, NEVs remain illegal for use in cities. This limits the Chinese NEV market largely to the fleet market.

Overall, Pike Research forecasts that the market for NEVs will grow to 54,806 vehicles by 2017, which is particularly small in comparison to other vehicle markets. The key markets for NEVs are the United States (14,737 NEV sales in 2011) and France (2,331 NEV sales). These countries represent the largest single markets now, and are also expected to be the biggest markets in the coming years.

**Chart 1.1 Annual Neighborhood Electric Vehicle Sales by Region, World Markets: 2011-2017**



(Source: Pike Research)

Pike Research expects the NEV market to grow at a compound annual growth rate (CAGR) of 6.6% between 2011 and 2017. While moderate in terms of volume compared to other emerging vehicle markets, the growth rate for NEVs will double that of the LD vehicle market during the same period.

The rise in gas prices, the aging population, and the increase in master planning and community density all point to trends that will encourage NEV adoption. However, the market will remain small, as regulators seem unlikely to allow lower-speed vehicles to mix with higher-speed vehicles in any meaningful way on the roads. The result is that a cumulative 694,678 NEVs will be on the roads by 2017, up from 478,771 in 2011.

## Section 8

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## Section 10

### SCOPE OF STUDY

Pike Research has prepared this report to provide participants at all levels of the low-speed electric vehicle (LSEV) market, including manufacturers, battery suppliers, component suppliers, trade associations, and utility managers, with a study of the market for neighborhood electric vehicles (NEVs). The major objective is to determine the state of the industry and likely future growth of NEV demand. In addition, the report provides a review of major demand drivers, as well as key industry players within the competitive landscape.

The report's purpose is not to present an exhaustive technical assessment of the vehicles and technologies covered. Rather, it aims to provide a strategic examination from an overall tactical business perspective. Pike Research strives to identify and examine new market segments to aid readers in the development of their business models. All major global regions are included and the forecast period extends through 2017.

### SOURCES AND METHODOLOGY

Pike Research's industry analysts utilize a variety of research sources in preparing Research Reports. The key component of Pike Research's analysis is primary research gained from phone and in-person interviews with industry leaders including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Pike Research's analysts and the firm's staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Pike Research's reports. Great care is taken in making sure that all analysis is well-supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

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## NOTES

CAGR refers to compound average annual growth rate, using the formula:

$$\text{CAGR} = (\text{End Year Value} \div \text{Start Year Value})^{(1/\text{steps})} - 1.$$

CAGRs presented in the tables are for the entire timeframe in the title. Where data for fewer years are given, the CAGR is for the range presented. Where relevant, CAGRs for shorter timeframes may be given as well.

Figures are based on the best estimates available at the time of calculation. Annual revenues, shipments, and sales are based on end-of-year figures unless otherwise noted. All values are expressed in year 2011 U.S. dollars unless otherwise noted. Percentages may not add up to 100 due to rounding.

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