

LEGAL STATEMENT

The purpose of the information in this presentation is to guide ICA programs and provide members with information to make independent business decisions.

ANTITRUST GUIDELINES

Antitrust Guidelines for Copper Industry Trade Association Meetings

The following guidelines with respect to compliance with antitrust laws of the United States, Japan and European Community¹ are intended to govern the conduct of participants in copper industry trade association meetings, both at the meeting itself and in informal discussions before or after the formal meeting.

Price: Competitors should not discuss future prices (including terms of sale) of their products. There is no blanket prohibition against the mention of or reference to current or past prices but limits must be observed. Such references or mentions should occur only when necessary in connection with the development of association programs. For example, reference to a particular price level in comparing the cost of a copper product to a competing product is permitted. Whenever possible, such references should be discussed in advance with legal counsel.

Competitive Information: Competitors should not discuss the market share of a particular copper producer or copper fabricator's products. Furthermore, nothing should be said at a meeting which could be interpreted as suggesting prearranged market shares for such products or producer production levels. The overall market share of copper products may be discussed with regard to competition with non-copper products and general market acceptance.

New Products: Competitors should not encourage or discourage the introduction of a new product by another competitor or reveal a particular copper company's plans to change the production rate of an existing product or to introduce a new product. No company should disclose to another company whether it is in a position to make or market a new product. New products may be discussed in a technical manner or from the standpoints of competition with non-copper products and general market acceptance. In addition, proposed methods for and results of field and laboratory testing can be considered.

The Role of Legal Counsel: Legal counsel attends association meetings to advise association staff and other meeting attendees regarding the antitrust laws and to see that none of the matters discussed or materials distributed raise even the appearance of antitrust improprieties. During the course of a meeting, if counsel believes that the discussion is turning to a sensitive or inappropriate subject, counsel will express that belief and request that the attendees return the discussion to a less sensitive area.

A paper entitled 'Copper Industry Trade Associations and Antitrust Laws' is available upon request.

10/92, 5/93, 10/10

1. Other foreign competition laws apply to International Copper Association, Ltd. (ICA)'s activities worldwide.



PEV CHARGING DEMAND

IMPLICATIONS FOR COPPER INDUSTRY

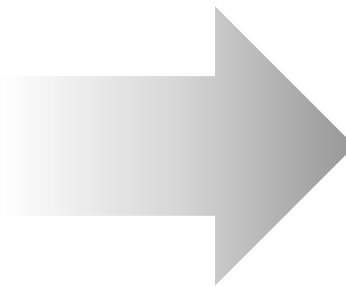
MAY 2018

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NAVIGANT

STRONG GROWTH MOMENTUM FOR PEVS

Growing PEV Availability



14%

of global car sales in 2027, compared to 2% in 2018

- Plug-in electric vehicles (PEVs) include the following:
 - **Plug-in hybrid EVs (PHEVs)** with all-electric range capabilities up to 55 miles and an internal combustion engine to increase range or performance
 - **Battery EVs (BEVs)** use electricity exclusively

WHAT IS DRIVING DEMAND

- Better batteries
- Cheaper EVs
- Faster charging



- Automakers
- Utilities
- Governments

- Cities restricting the use of gas and diesel cars

- Regulations in Europe, China, and North America driving OEMs to increase sales of EVs

BROAD IMPLICATIONS



- Excluding China, North America and EU-28 are the leading regions for PEV uptake
 - While they are expected to have strong EV charging demand, demand could be increased with support for charging deployments in multi-unit dwellings, workplaces, and parking facilities



- Each high power DC charger drives 10-20 times the copper demand of other types
 - Deploying high power charging highways for cars and electric buses and trucks will drive the need for high power DC chargers



- Most copper from EV charging deployment comes from the wiring to deliver power to charger
 - If policies requiring buildings to be made EV-ready are adopted, this would drive copper demand ahead of the PEV market and likely would have an additional benefit in spurring further PEV demand

HIGH POWER CHARGING IS NEEDED

- Higher power chargers needed to accommodate the shift toward larger capacity battery packs
- Increased demand for home chargers at 7 kW-11 kW
- Commercial charging will have AC chargers up to 22 kW and fast charging technology at >50 kW
- Intercity locations are the next wave of infrastructure
- Automakers and public agencies are planning to build networks of fast charging stations, many with chargers over 100 kW and up to 350 kW
- Higher power drives more copper demand because of the need for larger gauge wires



Source: Efacec

COPPER INFRASTRUCTURE – NEW ELECTRICITY GENERATION

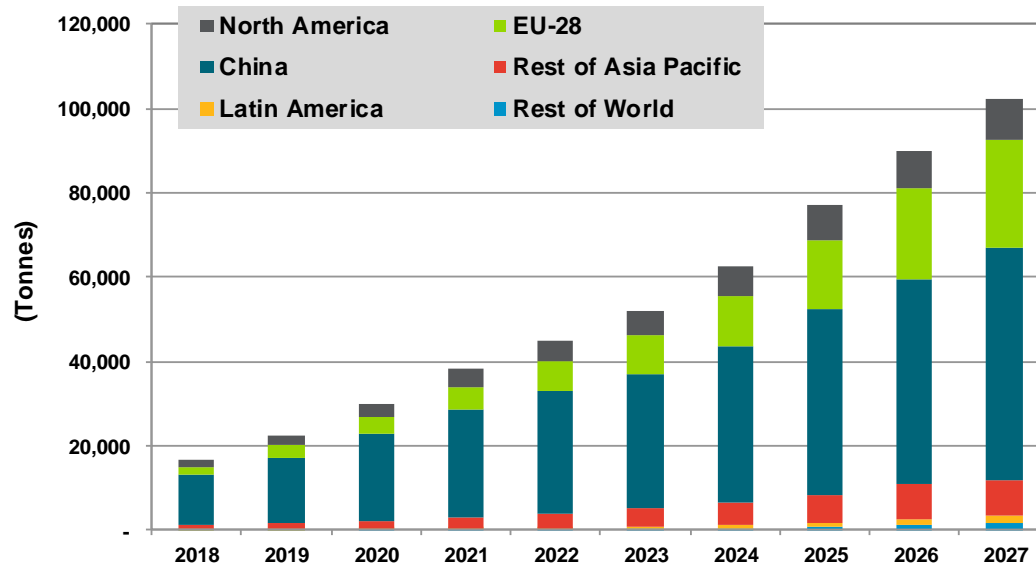
- EVs will drive thousands of gigawatts of demand in just 2018, with significant increases through 2027
- How much new generation this drives is less clear:
 - Utilities will look to load shift and use excess capacity
 - Charging site hosts will try to minimize power demand



CHARGING DEPLOYMENTS

- Annual sales of EV charging equipment are expected to drive new demand for 16,500 tonnes of copper in 2018, rising to 102,000 tonnes by 2027

Annual New Copper Demand from EV Charging Deployments by Region, World Markets: 2018-2027

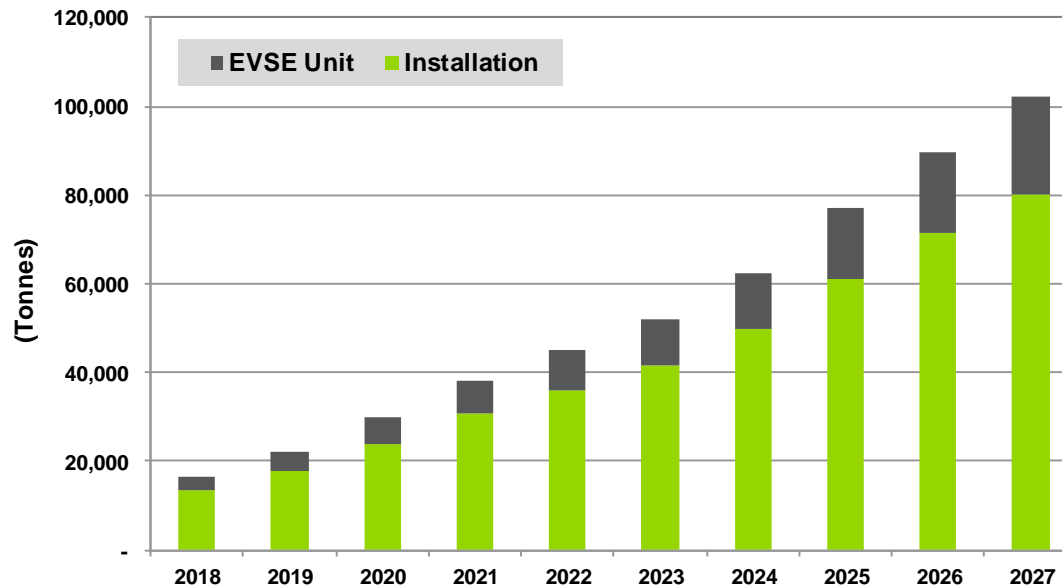


Source: Navigant Research

EVSE INSTALLATIONS

- The amount of copper from charging units is modest compared to the wiring installed to connect chargers to electrical panels
- Navigant Research's analysis suggests this will drive 4-9 times as much copper depending on charger placement (e.g., outdoor parking lots vs. workplaces)

Annual New Copper from EV Supply Equipment (EVSE) Units and EVSE Installations, World Markets: 2018-2027

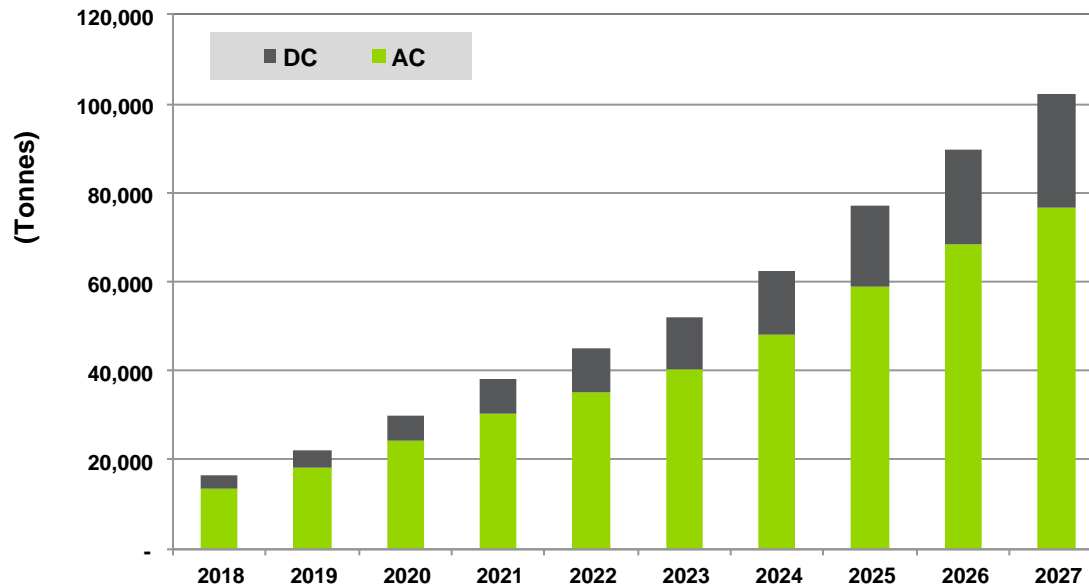


Source: Navigant Research

AC AND DC EV CHARGING

- AC charging represents the bulk of EV charging units currently driven by residential charging
- DC chargers have much higher total copper volume due to size of the units and conduit required

Annual New Copper Demand from New EV Charging Deployments by Type, World Markets: 2018-2027

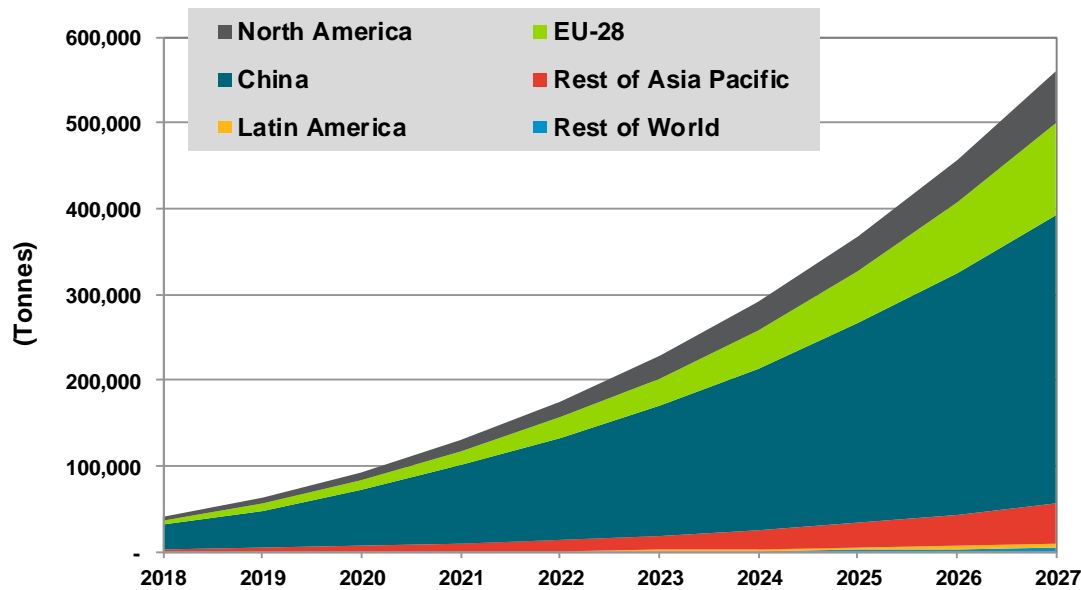


Source: Navigant Research

TOTAL INSTALLED

- Estimated copper used for EV charging installations through 2027 will reach 560,000 tonnes
 - Includes copper used for EV charging deployments before 2018

Total Installed Copper in EV Charging Deployments by Region, World Markets: 2018-2027



Source: Navigant Research

WHAT ARE THE SENSITIVITIES AROUND THE PROJECTIONS

PEV SALES

- Navigant Research's forecasts are based on a wide range of factors, including future battery prices, oil prices, and regulatory and policy schemes in place to support PEVs. If these factors change, forecasts could be more aggressive or could slow down.

CHARGING INFRASTRUCTURE PROJECTIONS

- Navigant Research's forecasts assume that there is a buildup of charging infrastructure in response to the growing PEV population, but the market faces challenges in terms of the cost of deploying charging and the perceived benefits to the charging hosts. If this dynamic is altered by significant new government funding or funding by other major stakeholders, the charging market could expand much more rapidly than projected.
- In addition, because DC fast charging is such a major driver of copper, a faster or slower uptake of DC charging would have a significant impact on copper demand.

UNEXPECTED INNOVATIONS

- Navigant does not anticipate any shift away from copper to aluminum for the wiring in the chargers or for the conduit. What could happen is a shift in the way charging is deployed to reduce costs from copper wiring—for example, greater use of power-sharing technology to decrease the total power demand of the stations.

BEYOND 2027

AUTOMATION IS AROUND THE CORNER

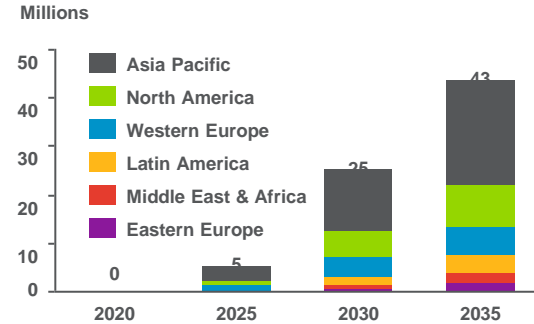
Full driving automation is expected debut in 2019, with rapid growth from 2025 thereafter

ENTERING PEAK CAR OWNERSHIP

Mobility as a service (MaaS) will first drive shift from human-driven to automated taxi services—and ultimately toward on-demand multimodal mobility

WITH CLEAN POWERTRAINS

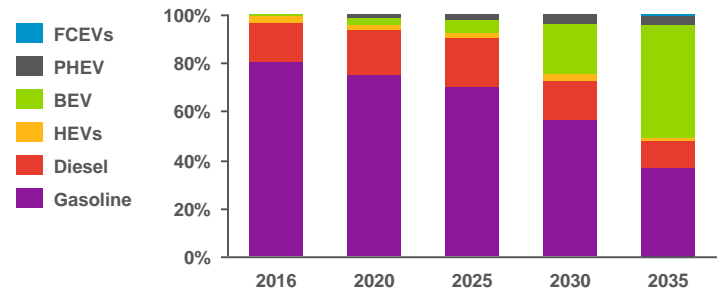
PEVs will offer operational cost savings to users quickly



Source: Navigant Research



Estimated LDV Sales by Powertrain, Aggressive Scenario, World Markets: 2016-2035

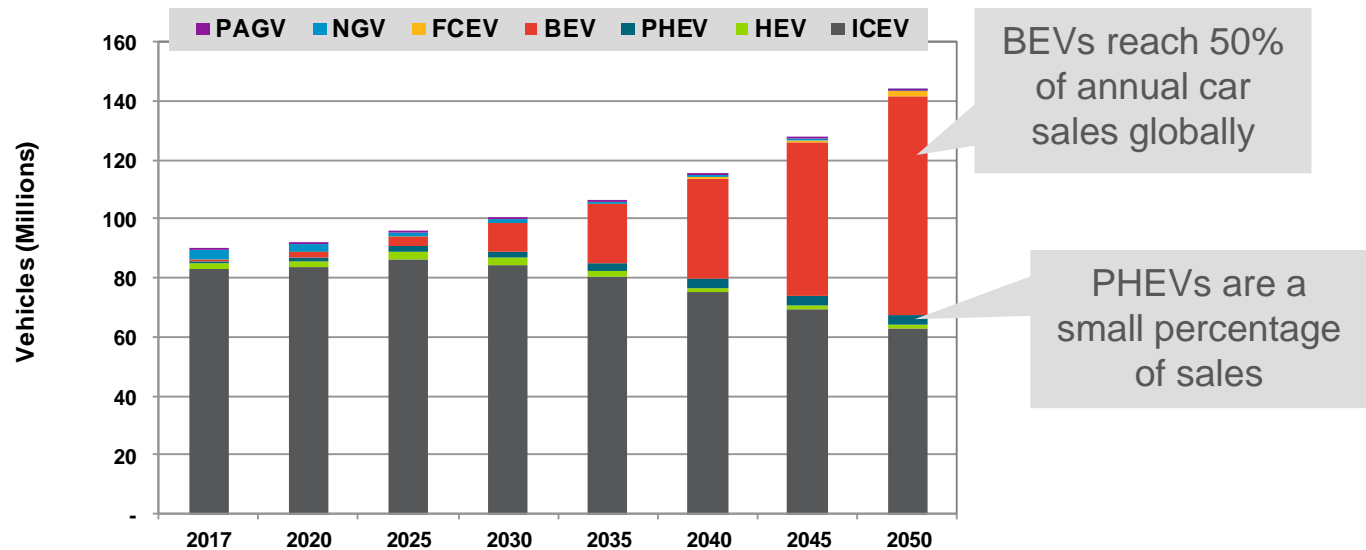


Source: Navigant Research

ELECTRICS DISPLACE OTHER POWERTRAINS LONGER TERM

- From 2030 on, BEV sales increase rapidly
 - Sales concentrated in Western Europe, North America, China, and OECD APAC and driven by strong national/local policies
- Electric drive has been slower to capture truck and bus markets
 - By 2050, at under 20% of global sales
 - PHEVs have even less traction in this market

Car Sales by Powertrain, World Markets: 2017-2050



Source: Navigant Research