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 Community[1] 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 Antritrust 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.

BRILLIANCE CONSULTING

NOVEMBER 2019

FUTURE CHINA TRANSPORT

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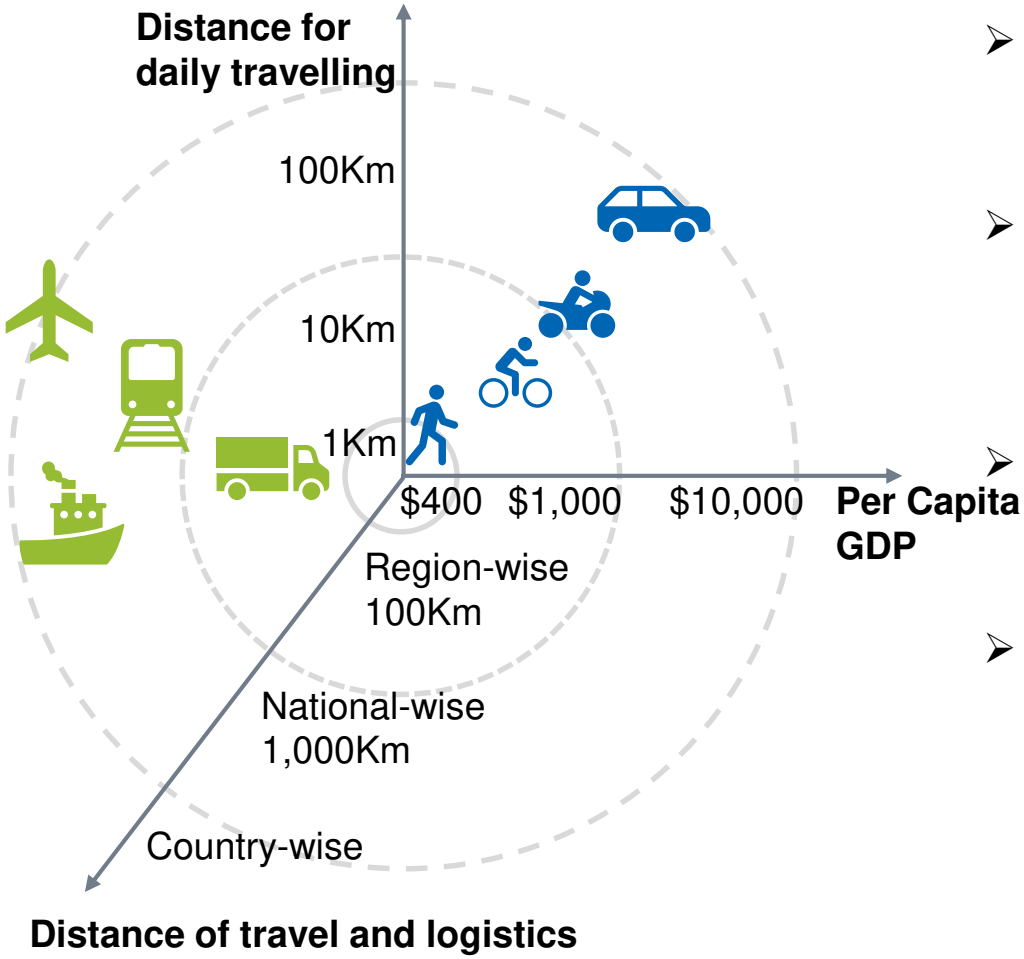
Content

- Development of China's Transportation System
- Current Material Use
- Opportunities and Challenges for Copper
- Demand Forecast

Development of China's transportation system

Economic development has been the main driver for transport growth over the past 10 years



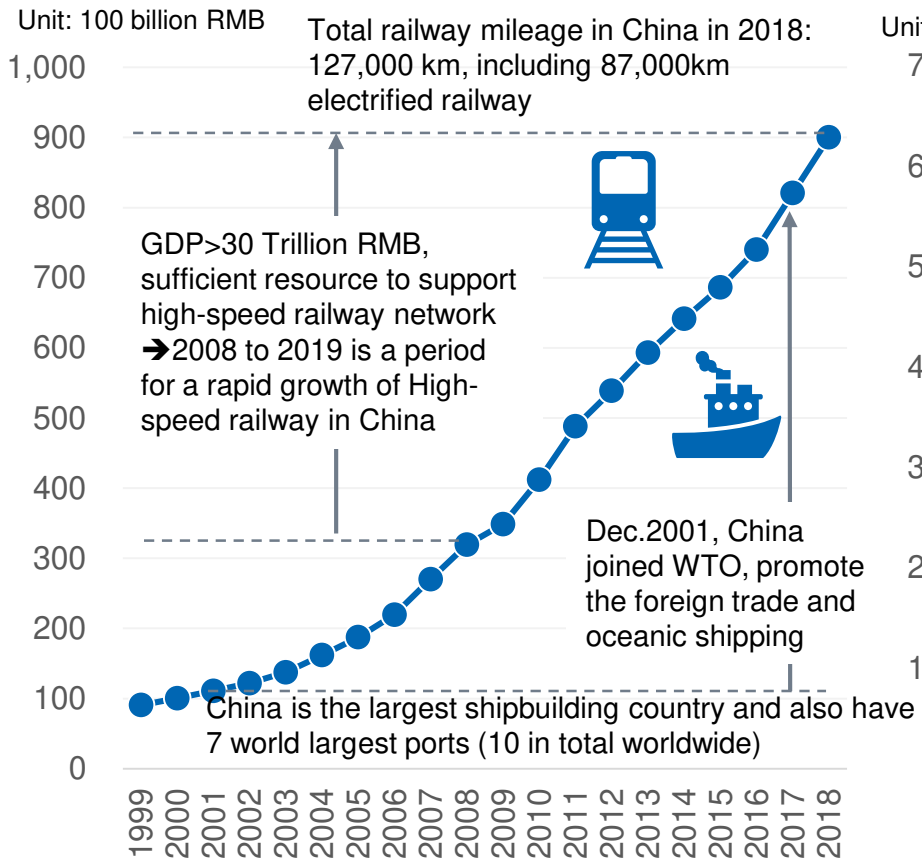
- From 2008-2018, per capita GDP in China increased from 1,000 USD to 10,000 USD.
- Economic growth promotes the process of urbanization, which leads to huge investment in transportation infrastructure.
- The growth of personal income leads to a pressing requirement for good logistics.
- The development of industry and commerce puts forward more requirements for high efficiency traffic, and further promotes the development of transportation technology.

Source: BC Consulting research in 2019

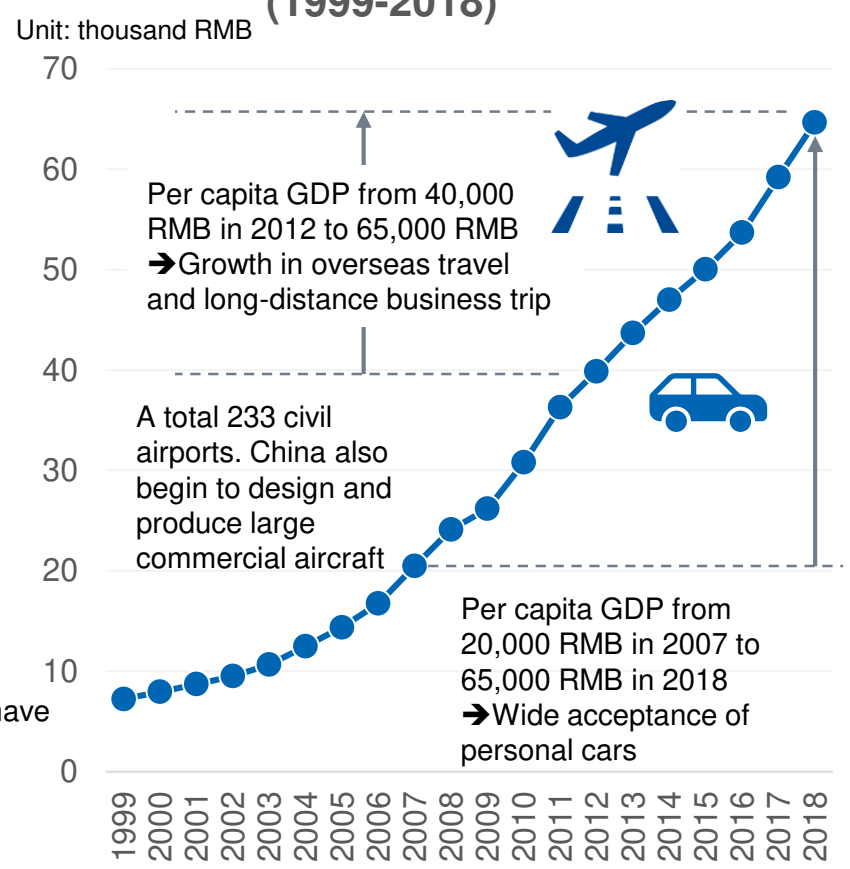
Development of China's transportation system

Railway, shipping, aviation and automobiles are major areas

China GDP (1999-2018)



China Per capita GDP (1999-2018)

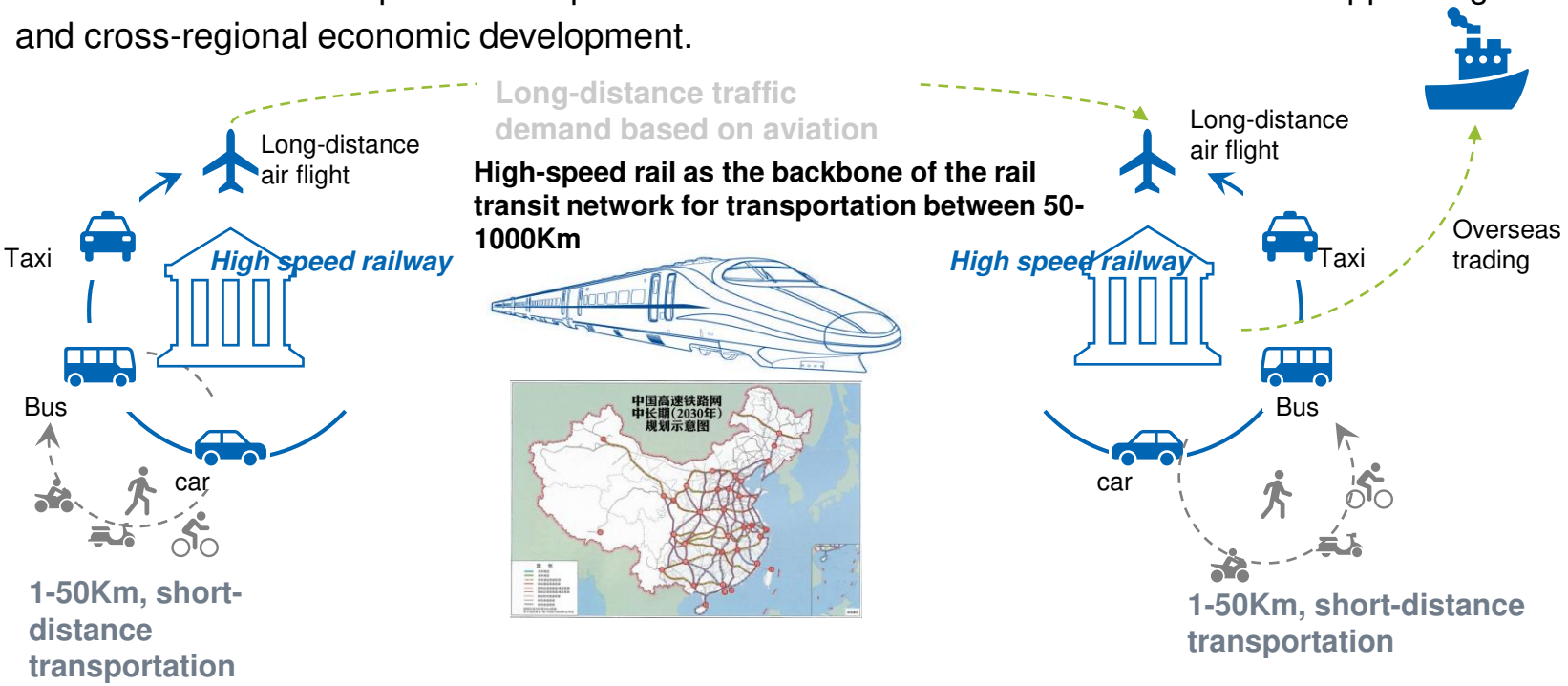


Source: NBS, CAAM

Development of China's transportation system

Rail is likely to be the key market

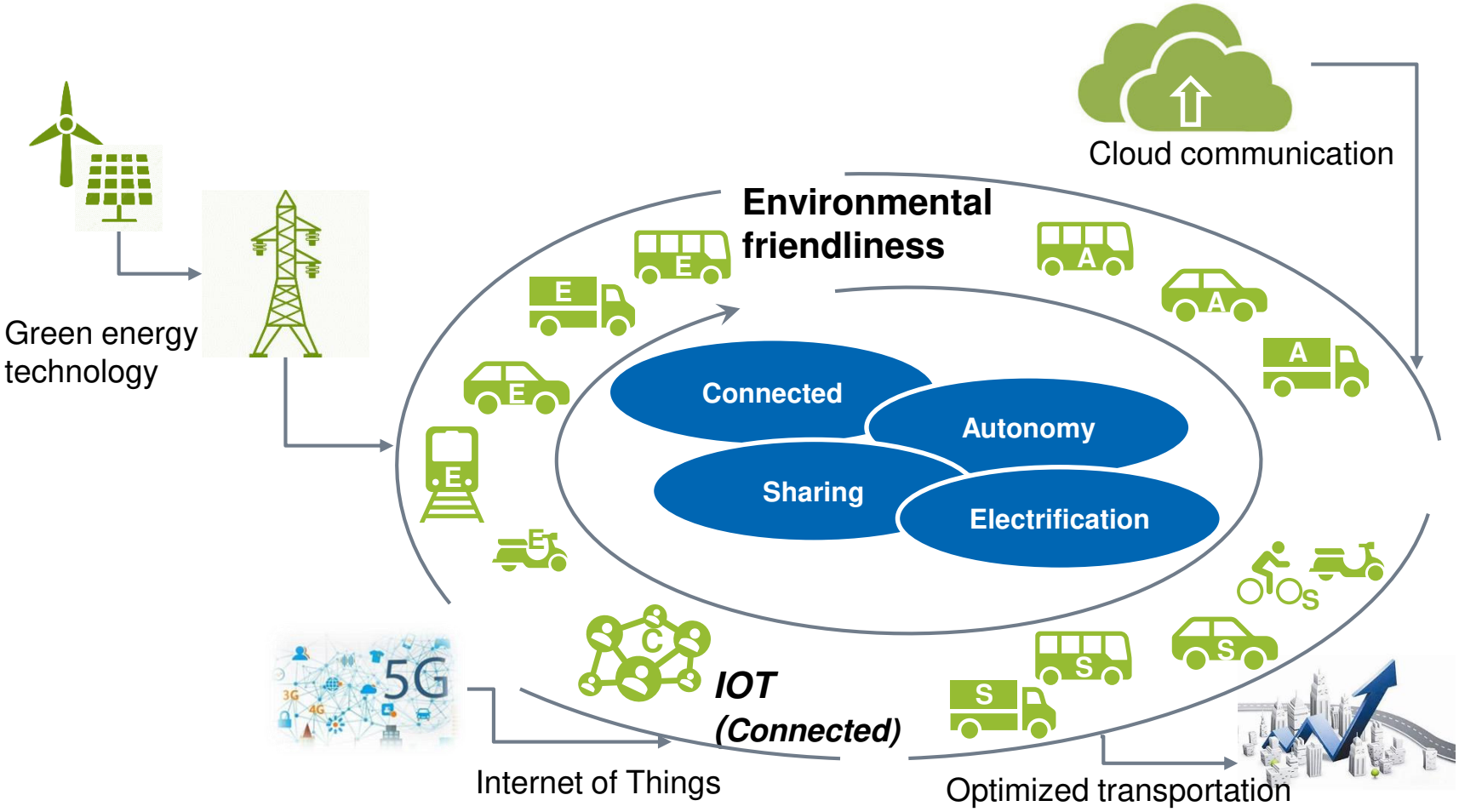
- Due to the large land area and high population density in China, high-speed rail is a suitable solution for future transportation requirements at a national level. This network will support regional and cross-regional economic development.



- Long-distance transportation → Large hub airport and large passenger aircraft
- **Mid & long-distance transportation focus on cost, efficiency, and capacity** → **High-speed railway across and connect many populated areas (China & Japan)**
- Short-distance pay more attention on convenience and efficiency → Convenience and diversity, hard to have a simple transportation solution to meet

Development of China's transportation system

New drivers for 'future transportation' – Electrification, Autonomy, Connected, Sharing and Environmental friendliness



Source: BC Consulting research in 2019

Current material use

Copper is widely used in China's transportation

- In 2018, the total copper usage in China's transportation is 1,755 thousand Tonnes Copper[1)]

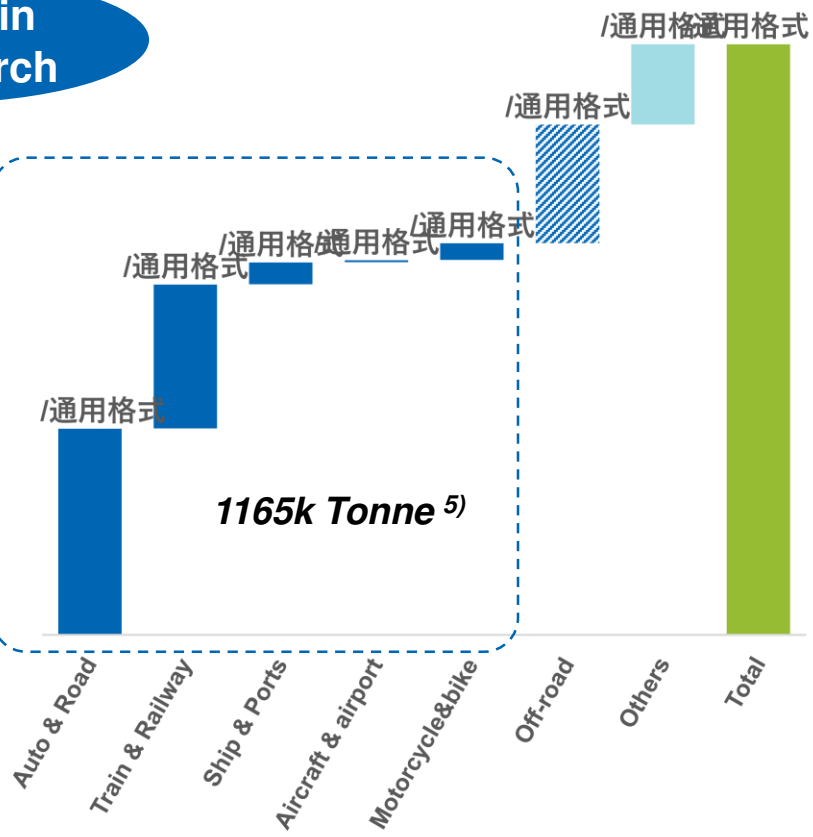
- By segment in transportation[5)]

• Auto & Road[2)]:	613k Tonnes
• Train & Railway[3)]:	428k Tonnes
• Ship & Ports:	66k Tonnes
• Aircraft & airport:	6k Tonnes
• Motorcycle & Bike	51k Tonnes
• Off-road[4)5)]	352k Tonnes
• Others[4)] （Parts）	239k Tonnes
Total	1755k Tonnes

Covered in this research

Copper usage in China's transportation by segment（2018）

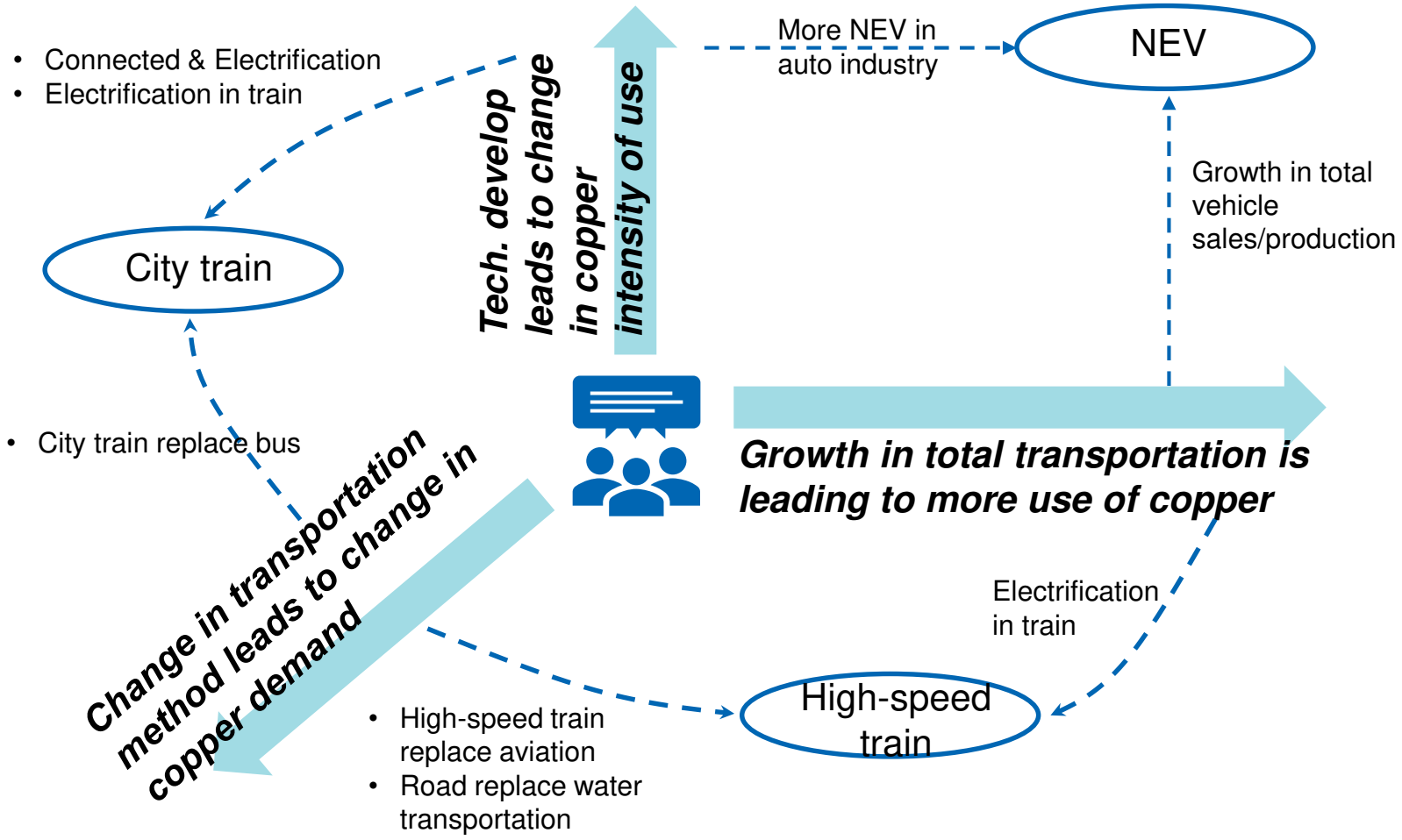
Unit：thousand Tonnes copper



1） 2018 IWCC dataset
2）Including charging equipment for NEV
3）Including Metro & sky-train
4) Including Construction machinery, agriculture machinery, low-speed vehicle, which is not included in followed slides
5）Source: BC Consulting research in 2019

Current material use

Since 2009 the use of copper has 3 new directions

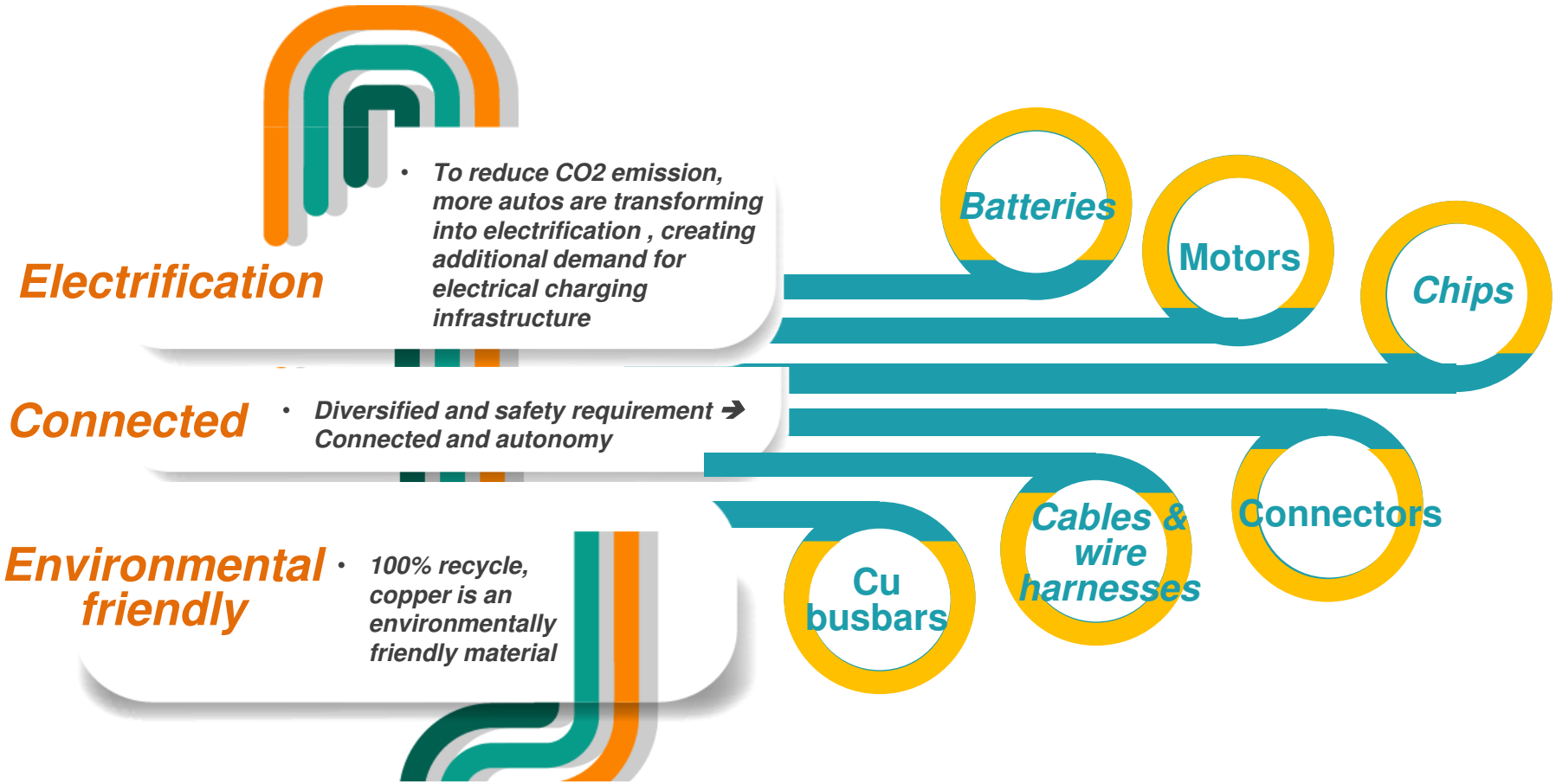


Source: BC Consulting research in 2019

Current material use

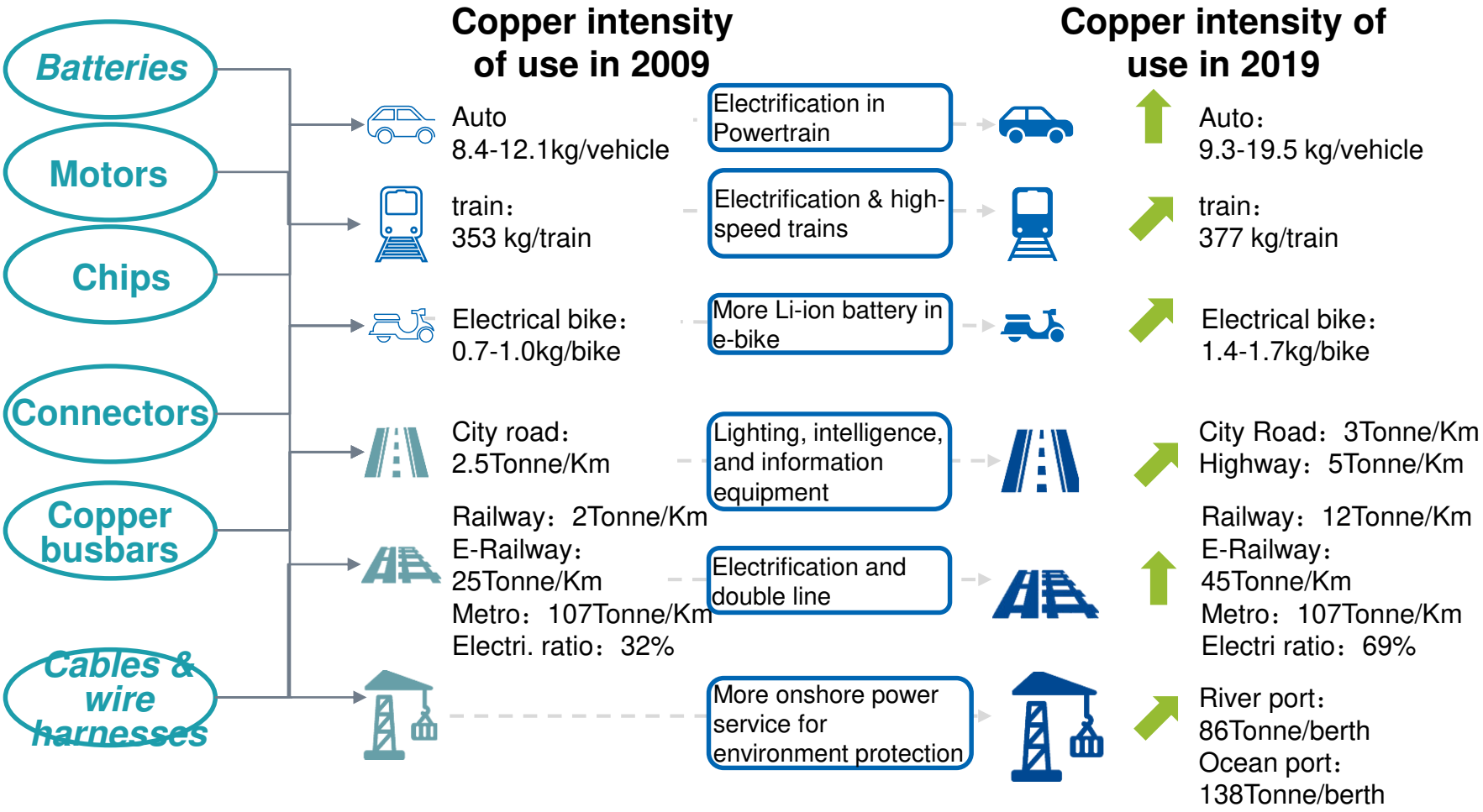
Future drivers for copper in transportation

- Technology will promote copper use in transportation



Opportunities and challenges

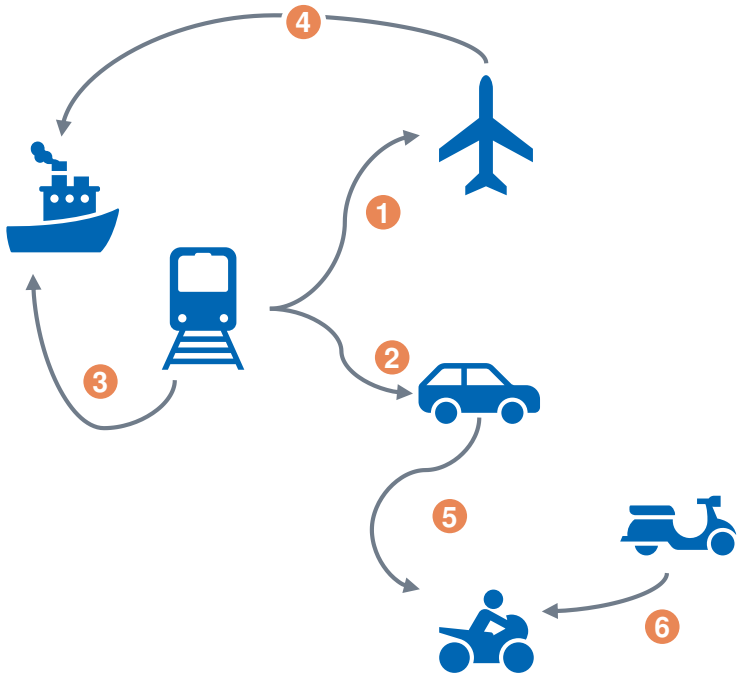
Over the last decade, more copper has been used in transport, both in equipment and infrastructure



Source: BC Consulting research in 2019

Opportunities and challenges

Changes in future transport impact positively



1. E-railway replaces aviation ➔ More copper
2. E-railway replaces auto ➔ little change
3. E-railway replaces shipping ➔ More copper
4. Aviation replaces shipping ➔ Less copper
5. Auto replaces motorcycle ➔ More copper
6. E-bike replaces motorcycle ➔ More copper

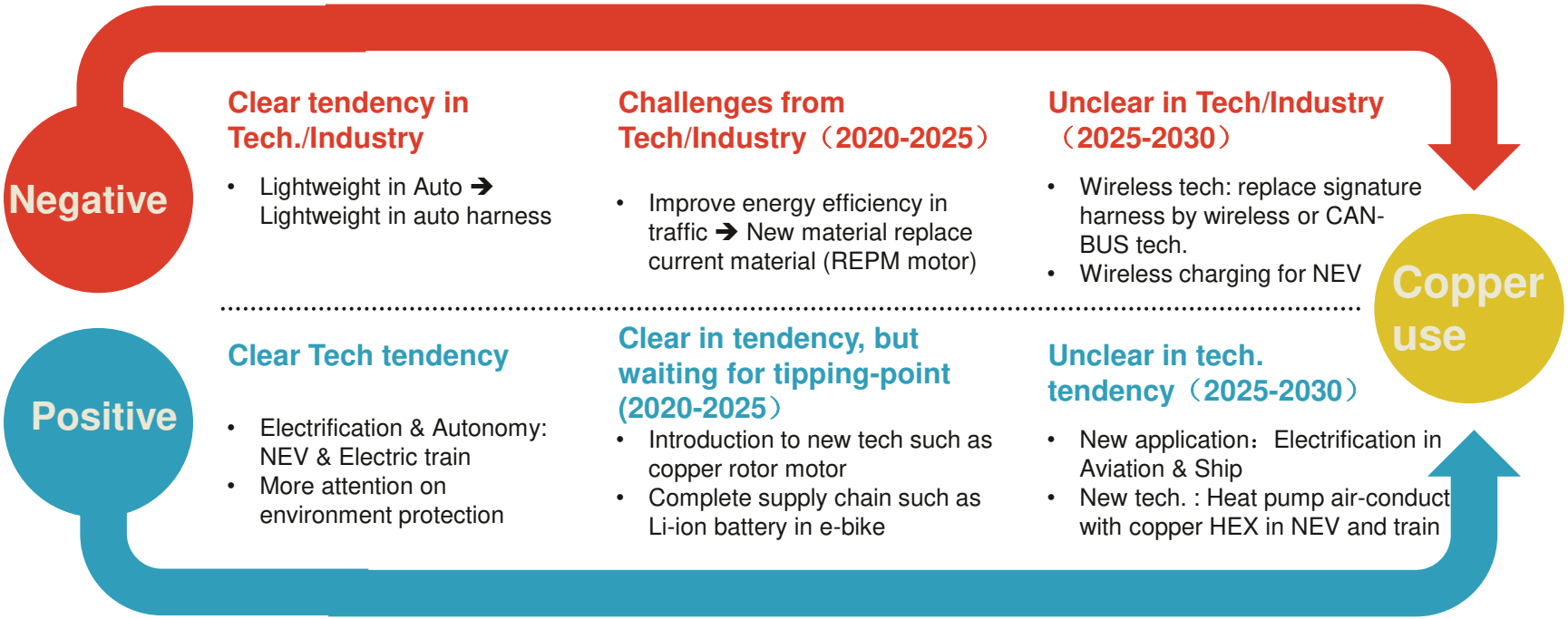
More copper will be used in “future transportation”

Source: BC Consulting research in 2019

Opportunities and challenges

Technology will affect the use of copper

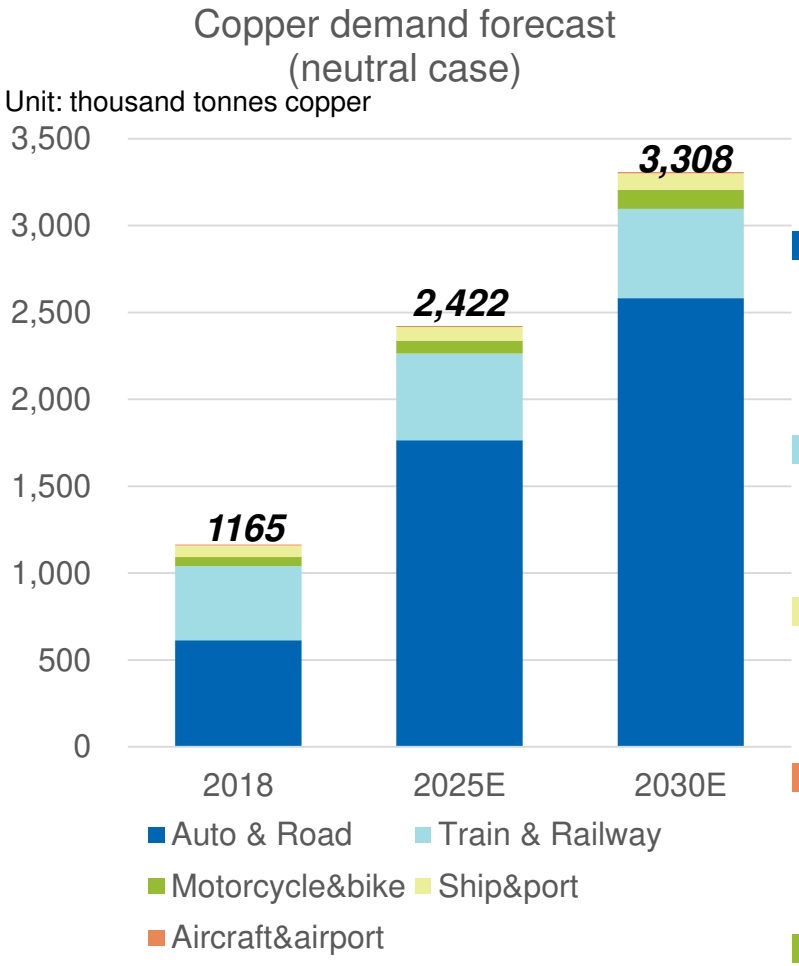
- New tech and new products will be used in transportation, which will have significant impact on copper usage in the next decades.



Source: BC Consulting research in 2019

Forecast on future demand

Neutral scenario

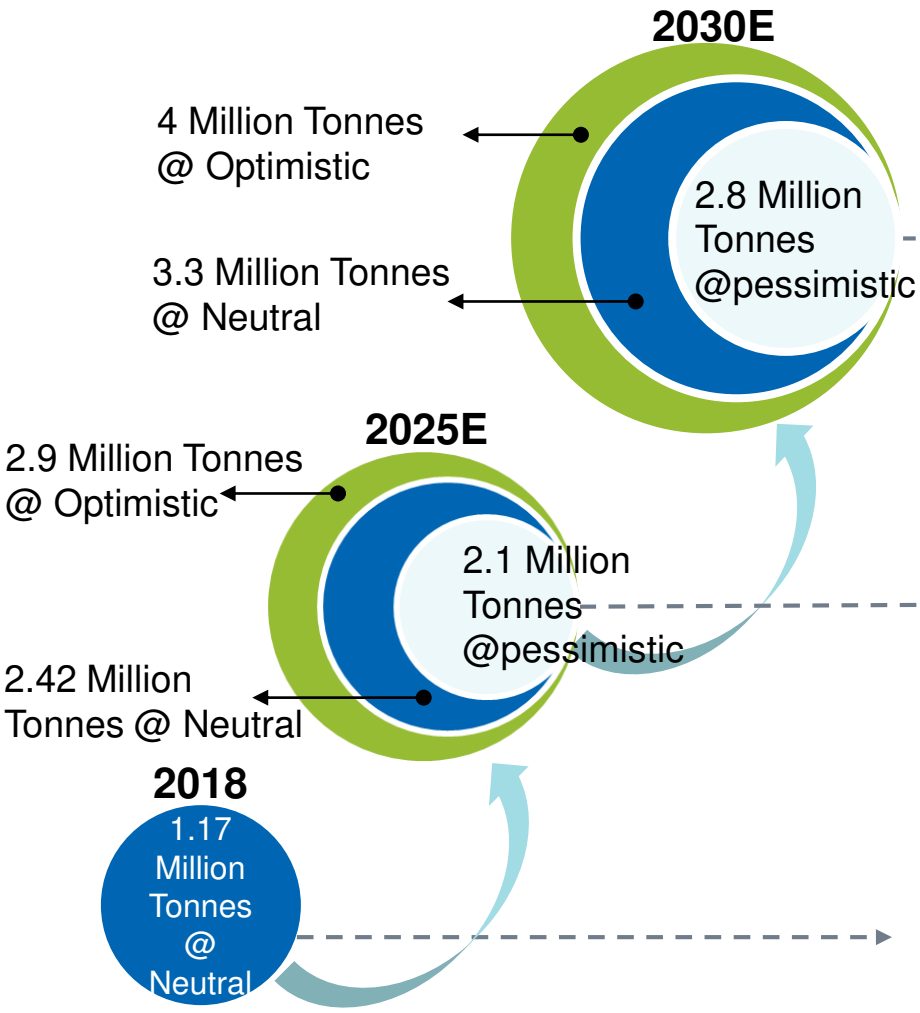


Products	Drivers
Auto & Road	Auto electrification, NEV will be the mainstream in China
	Charing infrastructure can support the daily usage of NEV
	Improve road standard ➔ more green lighting, road intelligence and control, and information equipment on road
Train & Railway	Passenger train will be completely electrified, higher ratio of electrification in freight train
	All of new railway is electrified line. Railway mileage will be more than 200,000 Km in 2030
Ship & Port	Stable in global shipbuilding market, China is still the largest shipbuilder in next 10 years
	Keep stable in number of river and ocean berth, all of berth will install shore-power equipment in 2030
Aircraft & airport	In 2030, the number of civil airplane is 6000 airplanes and general aviation is 9000 airplanes
	370 airports in China in 2030
Motorcycle & Bike	Weak in motorcycle market, e-bike replace low-end motorcycle
	E-bike is popular, Li-ion battery replace lead-acid battery

Source: BC Consulting research in 2019, excluding off-road and parts

Forecast on future demand

Scenario analysis



Opportunities: Both new tech. & future transportation will lead to increased material demand.

Challenges: Some uncertainty remains for the direction of new technologies.

Opportunities: Tech. promotes the growth of copper demand in transportation, esp. electrification in auto and railway leads to higher copper intensity of use.

Challenges: Competitive materials are also trying to meet the requirement in transportation through tech. development

Current: The growth of copper demand in transportation mainly comes from increases in total volume. More copper applications come into effect through new tech.

Source: BC Consulting research in 2019