

## 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<sup>1</sup> 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.

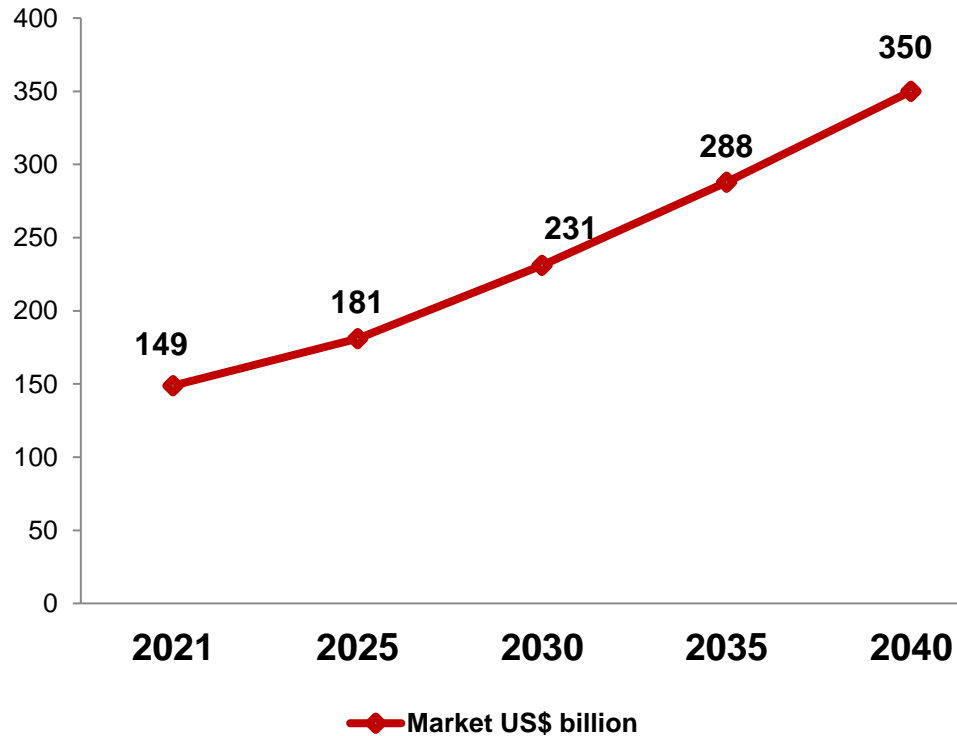
A paper entitled 'Copper Industry Trade Associations and Antitrust Laws' is available upon request.

10/92, 5/93, 10/10

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

# Power Cables in New and Emerging Markets

**Power cable demand 2021, US\$ billion**



- In 2021, US rejoined Paris Agreement with target to reach net zero emissions by 2050. US has set goal to reach 100% carbon pollution-free electricity by 2035
- Increasing distributed energy resources (DERs) are putting pressure on ageing T&D network to integrate new technologies
- Advanced economies have completed several rounds of investments in grid-modernization technologies
- Renewable Energy Directive establishes rules for EU to achieve 32% renewables target by 2030
- European automotive industry is making rapid transition to EV market
- This, in turn, will translate into high demand for fast charge technology cables from end users
- Germany's new Renewable Energy Act 2021 (EEG 2021), passed in 2020, set a carbon neutrality target for 2050 and a 100 GW solar capacity target for 2030
- In 2020, Ten Year Network Development Plan 2020 (TYNDP) aims to lay 46,000 km for both refurbishment and new lines across Europe by 2030 to meet growing consumer demand
- China released an industrial development plan for new energy vehicles for 2021–2035; it has proposed a target of 20% for new energy vehicles in the market by 2025
- California passed an executive order committing to 100% zero-emission passenger cars and light-duty trucks in new vehicle sales by 2035
- Under World Green Building Council's net zero carbon buildings commitment (six sub-national states, 27 cities, and 79 businesses have committed to net zero buildings by 2050

- Power cables are available in various load-carrying capacities and materials, and with varying voltage ranges; these can be installed either underground or overhead
- Power cables are divided into three types of cables; they include high-, medium- and low-voltage cables
- Mainly used for transmission and distribution of electrical energy in power utilities, and for other applications

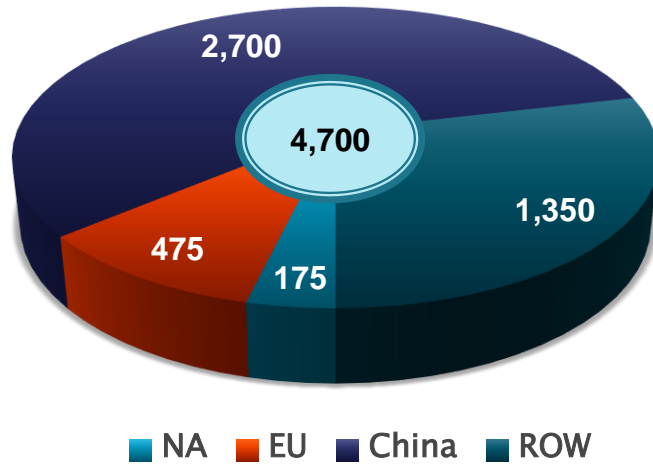
- In 2021, overall global power cable market was 8.7 million mt in volume terms
- Copper comprises 54% of overall demand followed by aluminum at 46%



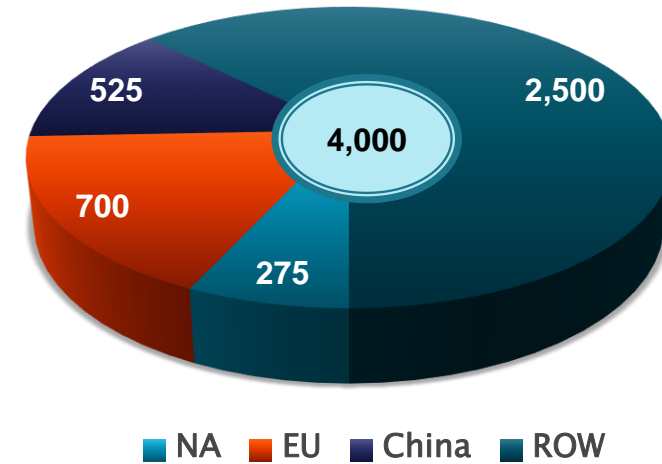
Increased demand for electricity coupled with population growth, urbanization, commitment of leading industrialized countries to implement Paris Agreement to address negative repercussions of climate change, rising trends of renewable energy generation around the globe and switching from overhead lines to underground lines, replacement of older grid infrastructure, positive initiatives supporting renewable energy generation by various governments, and related incentives will collectively drive global power cable market growth

- In 2021, China was the leading consumer of copper in power cable segment
- ROW leads in aluminum use followed by Europe
  - ~62% and ~18% respectively

**Copper power cable market, by Region  
(kmt)**



**Aluminum power cable market, by Region  
(kmt)**



# MARKET DEVELOPMENT



- According to the Paris Agreement, reducing energy-related CO<sub>2</sub> emissions in every region across the globe is necessary to shift from consumption of fossil fuels that cause climate change to cleaner, renewable forms of energy
- Solar, along with wind energy and EV infrastructure, will play a critical role



## Other emerging technologies

Smart cities--transportation mobility, energy, infrastructure, smart buildings and data centers



## EV charging stations



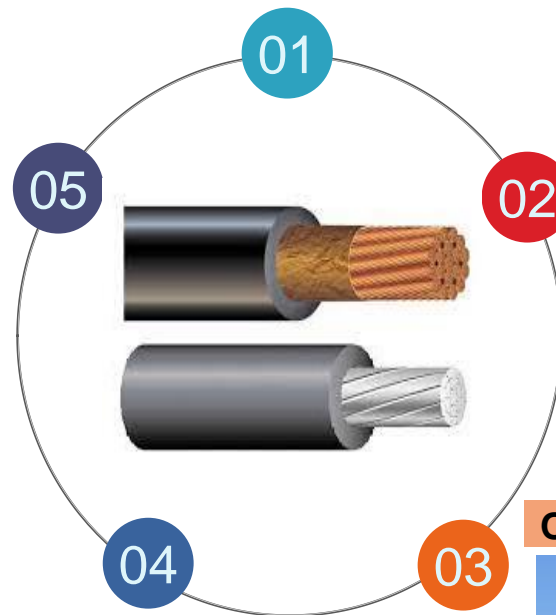
Charging pads, vehicle charging points, cable assemblies and cord extension sets



## Solar Power



In solar, PV cables are used to transmit electrical power  
Cables are used to conduct electricity  
Heat exchangers are used to transfer solar energy



## Offshore wind power



Cables in towers  
Interconnecting towers (& to farm step-up)  
Ground W&C use  
Cable from tower to pad  
Electronics and data transmission cables

## Onshore wind power

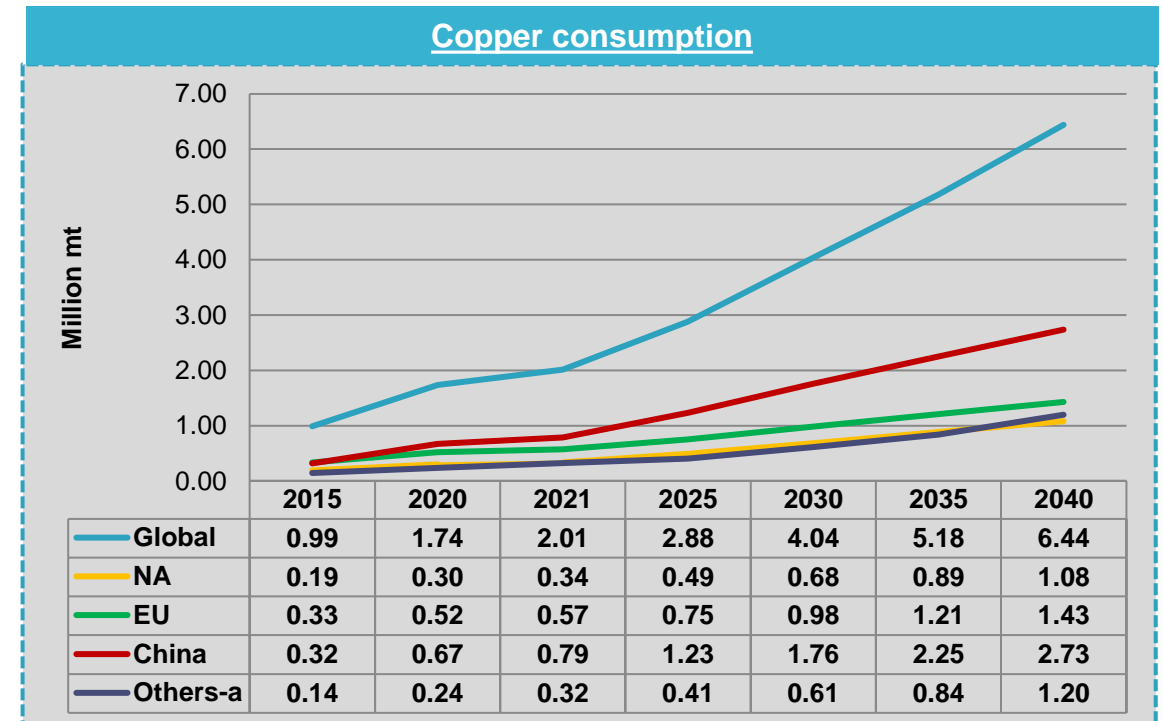
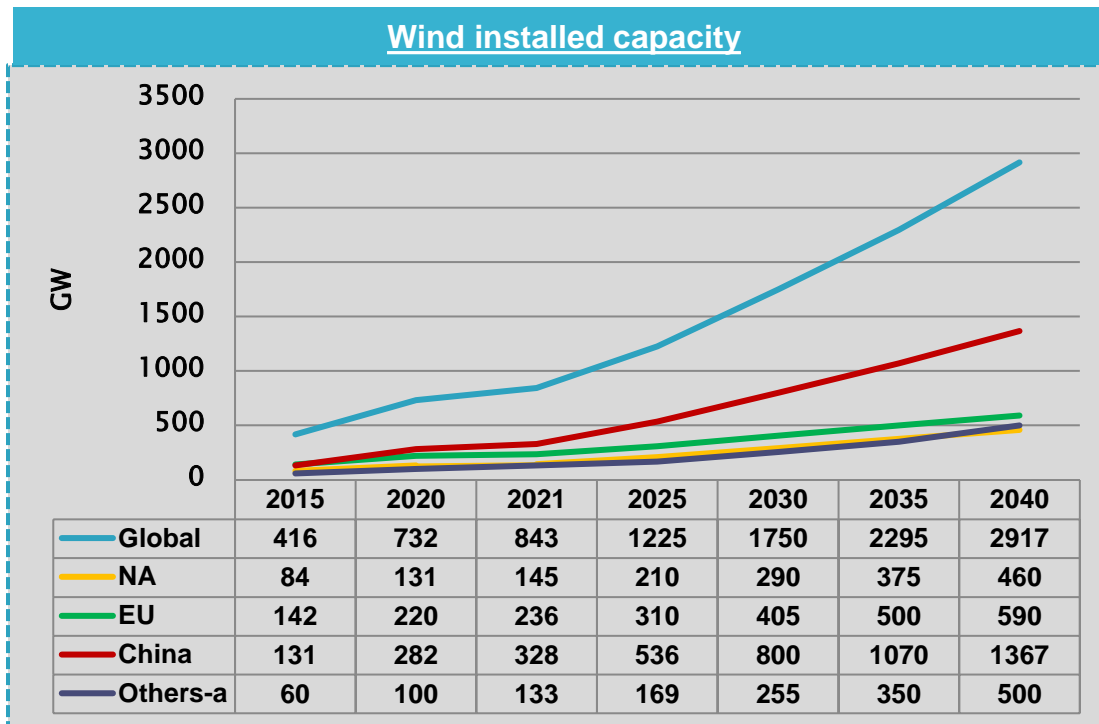


Cable in tower  
Interconnecting towers (& to farm step-up)  
Ground W&C use  
Cable from tower to pad  
Electronic and data transmission cables

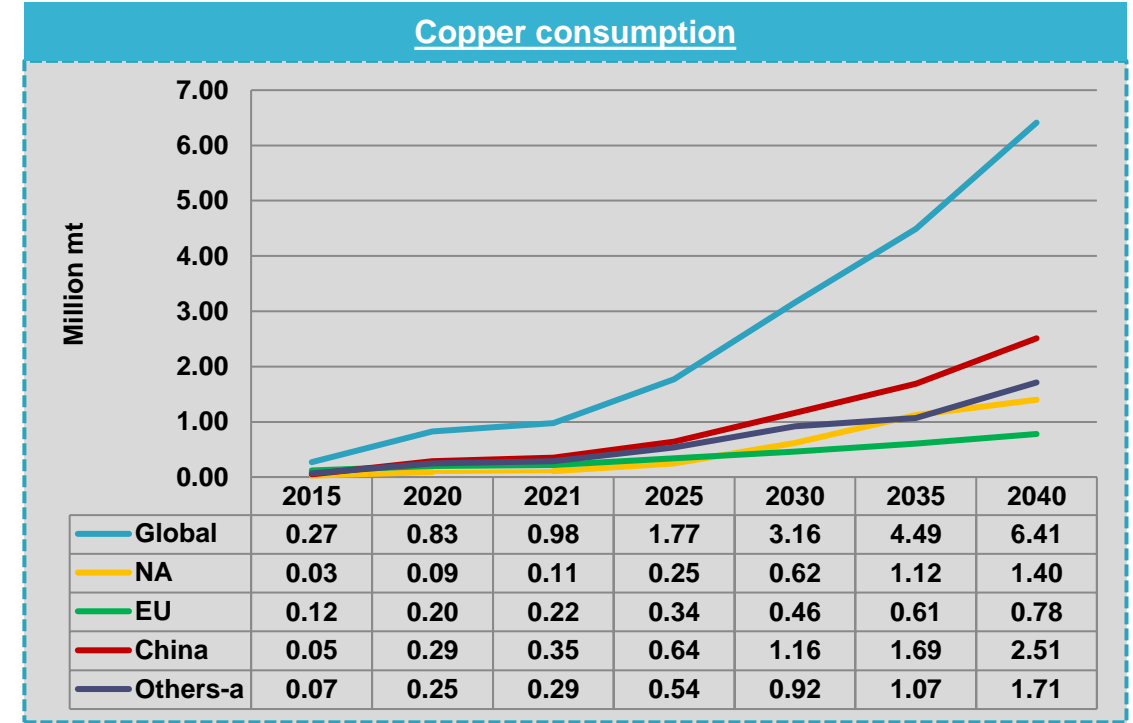
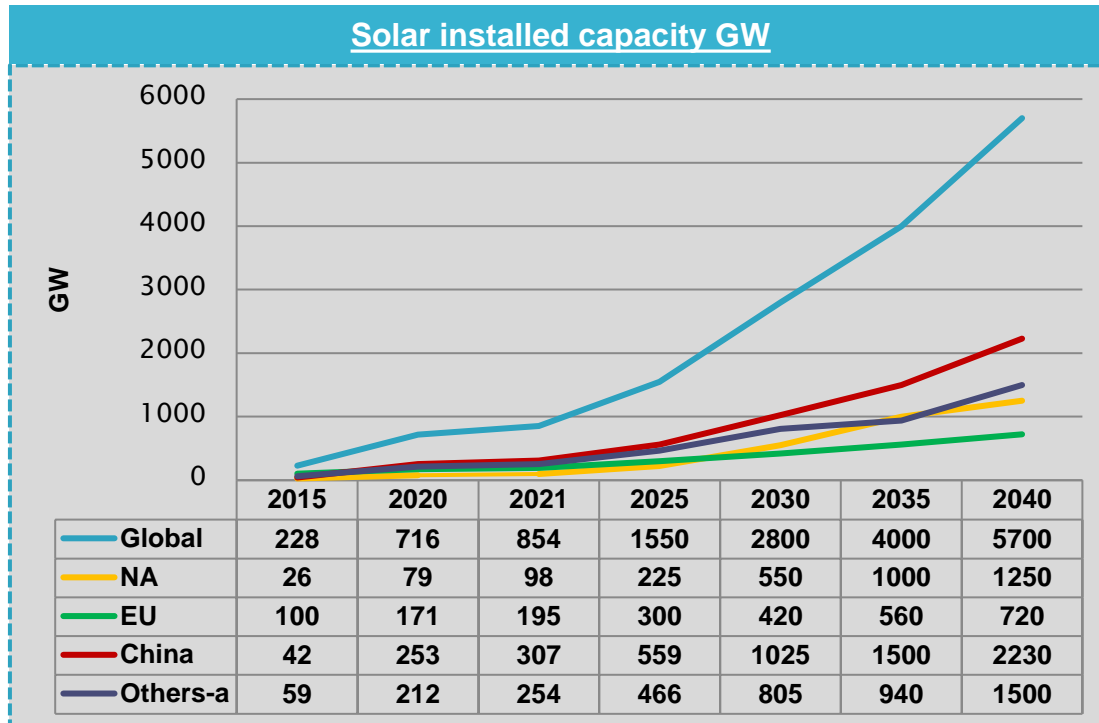
# COPPER POWER CABLE DEMAND – WIND



- Global wind electricity systems installation is expected to reach ~2917 GW through 2040
  - China is expected to be the world leader in wind installation, reaching 1367 GW; followed by Europe ~590 GW
- Copper consumption is expected to reach 6.44 million mt through 2040



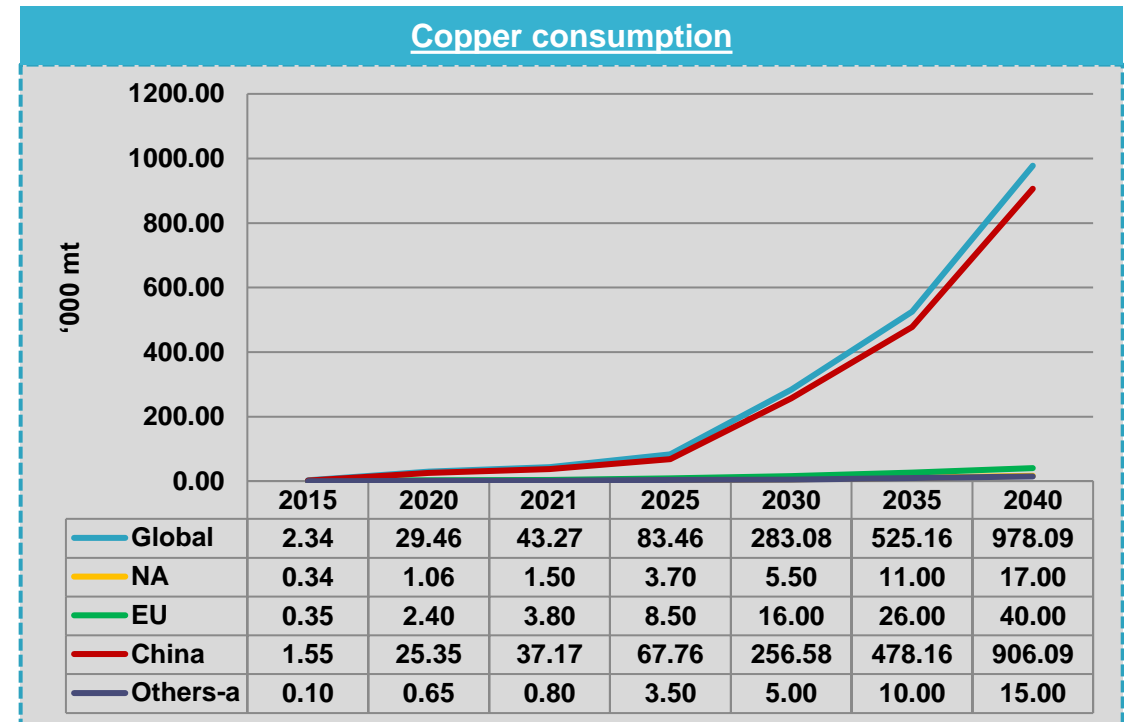
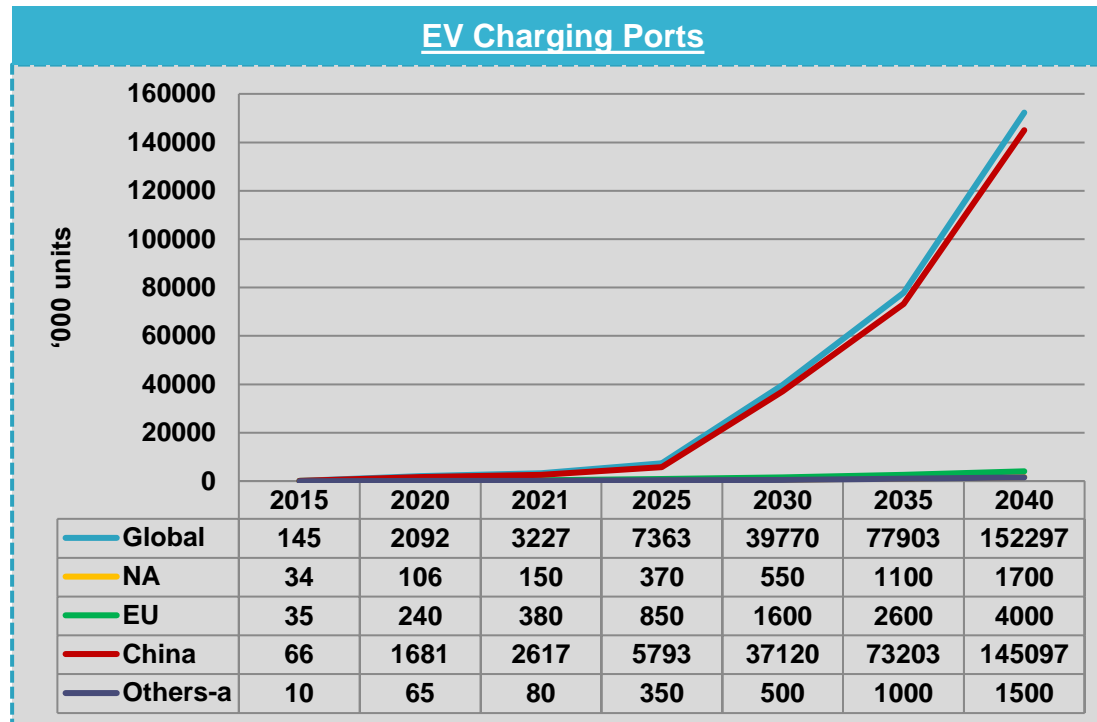
- Global solar electricity systems installation is expected to reach ~5,700 GW through 2040
  - China is expected to be the world leader with ~2,230 GW followed by North America ~1,250 GW
- Copper demand is expected to reach ~6.41million mt through 2040



a-includes South America, Middle East, Asia Pacific excluding China, Africa, etc



- EV charging ports are expected to rise exponentially from 3.2 million in 2021 through 152 million through 2040
  - China is expected to be global leader in EV charging port infrastructure development; likely to reach 145 million ports
- Copper demand is expected to reach ~978 kmt through 2040 from current use of 43 kmt in 2021



a-includes South America, Middle East, Asia Pacific excluding China, Africa, etc

# EMERGING COPPER POWER CABLE MARKET



- **SMART GRID:** “Smart grid” generally refers to a class of technology used to bring utility electricity delivery systems using computer-based remote control and automation
- USA has allocated US\$4.5 billion for grid modernization under the American Recovery Reinvestment Act of 2009
- China’s State Grid Corporation has outlined plans in 2010 for a pilot smart grid program; it maps out deployment through 2030
- Significant economies of scale in power grid construction and development have brought huge market demand and innovation to cable industry
- European countries like Italy, Spain, UK and France are upgrading meters and investing in smart grids features and modernizing networks
- Modernization with automation of grids is expected to drive copper consumption



- **ENERGY STORAGE:** The largest markets are USA, Western Europe and China. Market drivers are energy independence and security; smart grid investments; time of use/peak demand rates; growth in renewable and distributed generation; and government policies, incentives and regulations
- Due to copper’s key core competitive advantages--reliability, efficiency, durability and safety, the metal is critical to the fundamental design of battery cells
- Copper is also important in the manufacture of Li-ion batteries
- At the cell level, copper is used in anode current collectors; at the pack level, it is used in electrical interconnects, for example, bus bars, cables and wiring



- **DATA CENTERS:** Data centers are driven by growing demand for edge computing; this is a distributed computing framework that brings enterprise applications closer to data sources such as *Internet of Things* devices or local edge servers
- Large data centers and hyperscale data centers are the future for data storage in response to rising edge computing, smart cities, and increased use of smart phones and digitization
- Size of China’s data center market in 2019 was US\$ 13.01 billion; it is expected to reach US\$ 36.18 billion in 2025 exhibiting a CAGR of 19.2% from 2020 to 2025
- Increased demand for data centers will lead to infrastructure network expansion, which in turn, will drive copper consumption



# B&C AND SMART CITY MARKET TRENDS



- **B&C:** Building and construction is expected to grow at 9-10% CAGR. Smart building adaptations will lead to increased copper consumption
- Green regulations in building standards like ASHRAE (USA), Eurocodes (EU), and voluntary certification such as LEED (US Green Building Council), Green Star (Australia), CASBEE (Germany), BREEAM (UK BRE) are likely to become increasingly strict, and also enforced
- Global demand for copper in climate-related commercial retrofitting market is likely to grow rapidly in response to growing adoption of green energy technologies and co-generation, HVAC efficiency, lighting efficiency, building envelopes, free cooling etc.

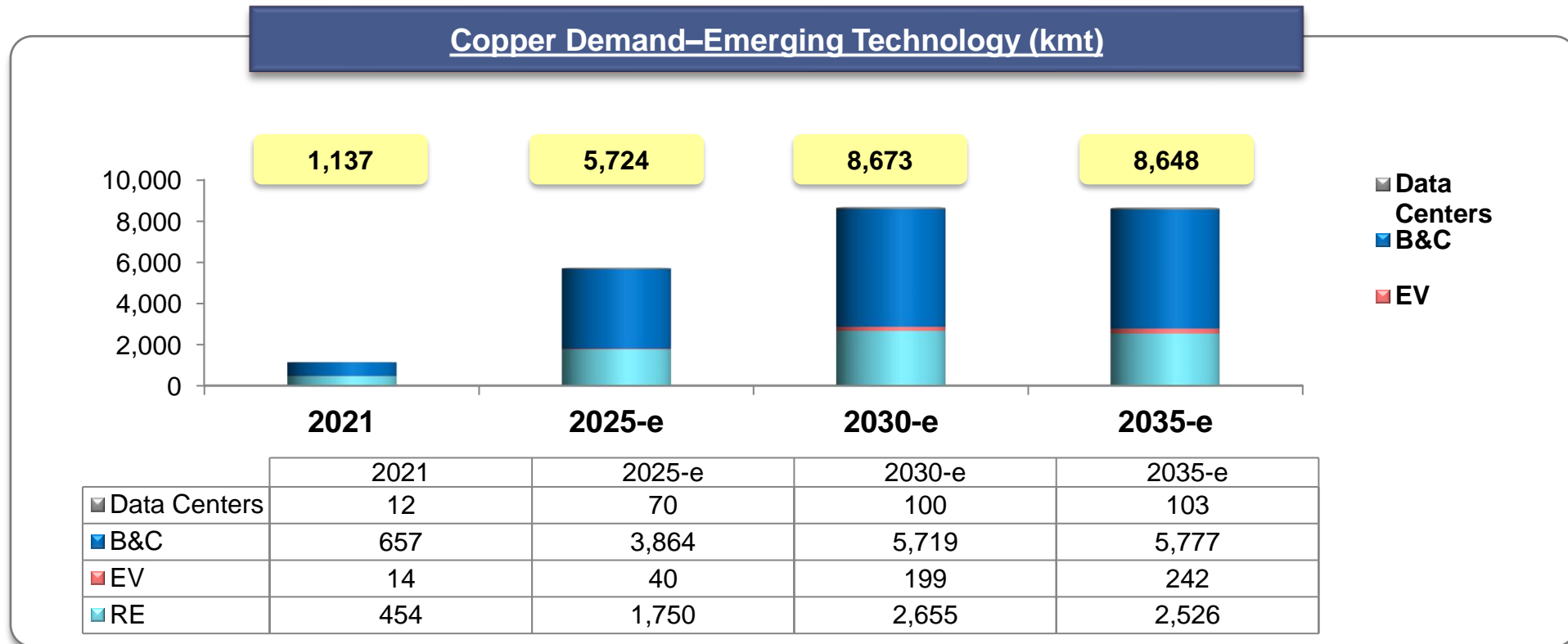
- **Smart Cities:** A smart city is an urban area that utilizes IoT sensors, actuators, and different types of electronic *Internet of Things* technology to connect components across the city. It impacts every layer of a city, from underneath the streets, to the air that citizens are breathing. Data from all segments is collected and analyzed, and then insights and patterns are detected to better manage assets, resources and services efficiently
- Asia and Europe currently lead the world in copper demand for use in smart cities, at 40% and 35% respectively
  - North America has a market share of 20%
  - By 2030, North America will have the highest growth and will be at par with Asia and Europe
- In China, smart cables are an indispensable in smart cities
- With the help of smart cities, a comprehensive intelligent management platform, the intelligent application of smart cables is likely to expand further with growing expansion and reliance of 5G networks on cables
- Arrival of 5G networks has increased reliance on some key components significantly, especially connectors and cables used in wireless and wired infrastructure
- Key sectors, including transport mobility, energy, infrastructure, and smart buildings, all use copper. As the adoption of new copper-based technologies increases, forecast shows copper demand in smart buildings will be a large growth area



# EMERGING TECHNOLOGIES



- Emerging technologies i.e. building & construction, RE, data centers, and EV are expected to drive overall copper demand through 2035
  - Building & construction and RE segments are expected to drive maximum growth among all emerging technologies



e-estimated

# POWER CABLE FORECAST



- Copper demand for power cables is expected to reach 8.7 million at ~5% CAGR through 2035
- Aluminum an alternative energy conductor; it is expected to experience slower growth, at ~4% CAGR through 2035

