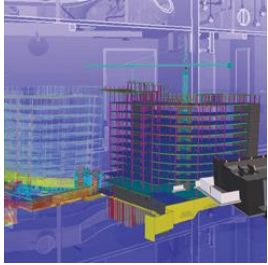


Making buildings better



Opportunities for Copper in Smart Homes

Anette Meyer Holley
Business Manager, BSRIA WMI

Dr Martin Bergemann,
Siemens



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

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.

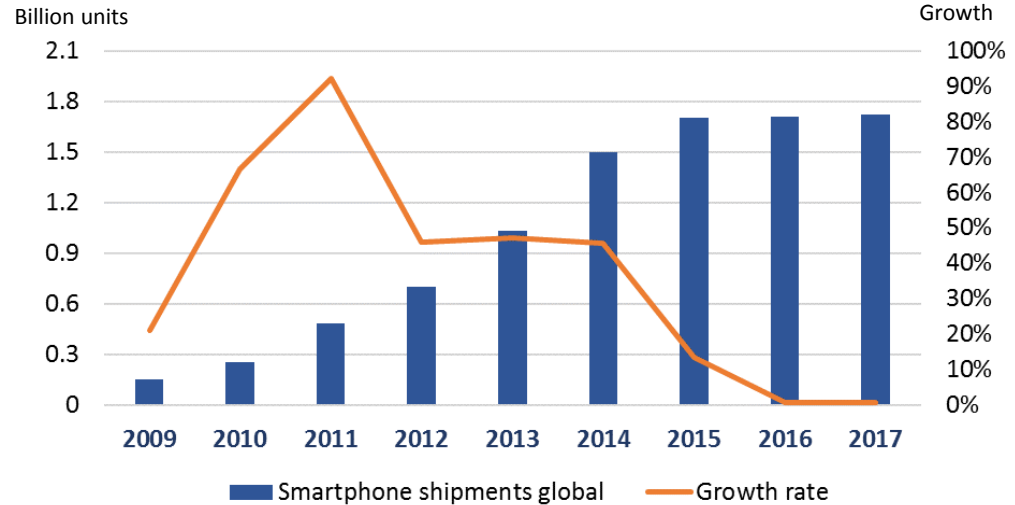
The Role of Legal Counsel: Legal counsel attends association meetings to advise association staff and other meeting attendees regarding the antitrust laws and to see that none of the matters discussed or materials distributed raise even the appearance of antitrust improprieties. During the course of 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.

Smart Telephone Uptake Triggers Smart Home Revolution



Source: Starkinsider elaborated by BSRIA

In less than ten years, sales of smart phones increased from 200,000 to 1.5 billion units. This technology revolution is behind the exponential growth of the smart home market.

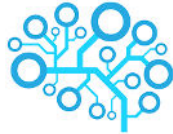
What is a Smart Home?

Characterising features

Connected



Intelligent



Choice of domains



Options

Wired or wireless

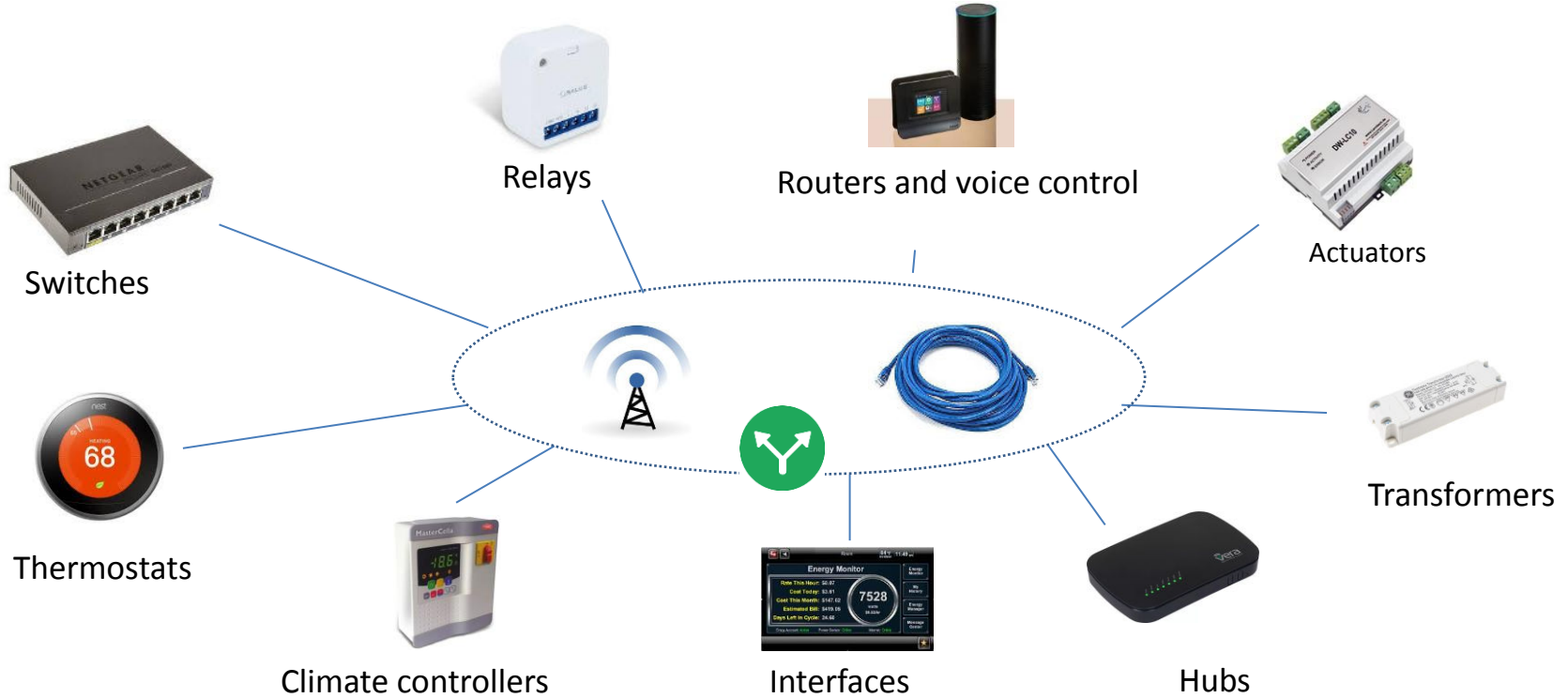


Stand Alone or integrated systems



Professional or consumer





Energy Performance of Buildings

- Buildings with installed automation can get better ratings
- New buildings or new heat generators: **individual room temperature control** (zoning)
- New residential buildings or renovation projects:
For 10 parking spaces, ducting needs to be installed to allow the addition of charging points to every space.
New commercial buildings: Provision for **charging points** for 1 in 5 parking spaces
- Member States may require monitoring and control installations for energy related systems in residential buildings
- By 2025, commercial buildings will be equipped with **building automation systems**



Smart Readiness Indicator for Buildings

- **Promotion of better technical systems in buildings**
- ‘Smart readiness indicator’ describes the capability of a building to adapt operations to the needs of the occupant
- Assessment of installed systems (they don’t need to be in use)
- Smart ready services in 10 domains:

Heating	Cooling
Domestic hot water	Ventilation
Lighting	Shading
On site power generation	Demand side flexibility
EV charging	Monitoring and control



Smart Appliances – Demand Side Flexibility

- The share of renewable power generation is increasing, but more irregular
- Balancing the grid requires either storage capacity or demand side flexibility
- An EU project defines requirements for **smart appliances, which are to communicate directly with the utility**
- The user gets rewarded for having appliances reacting to demand flexibility signals and changing, shifting or shedding loads, or providing power
- The approach requires connectivity and interoperability between devices and smart metering



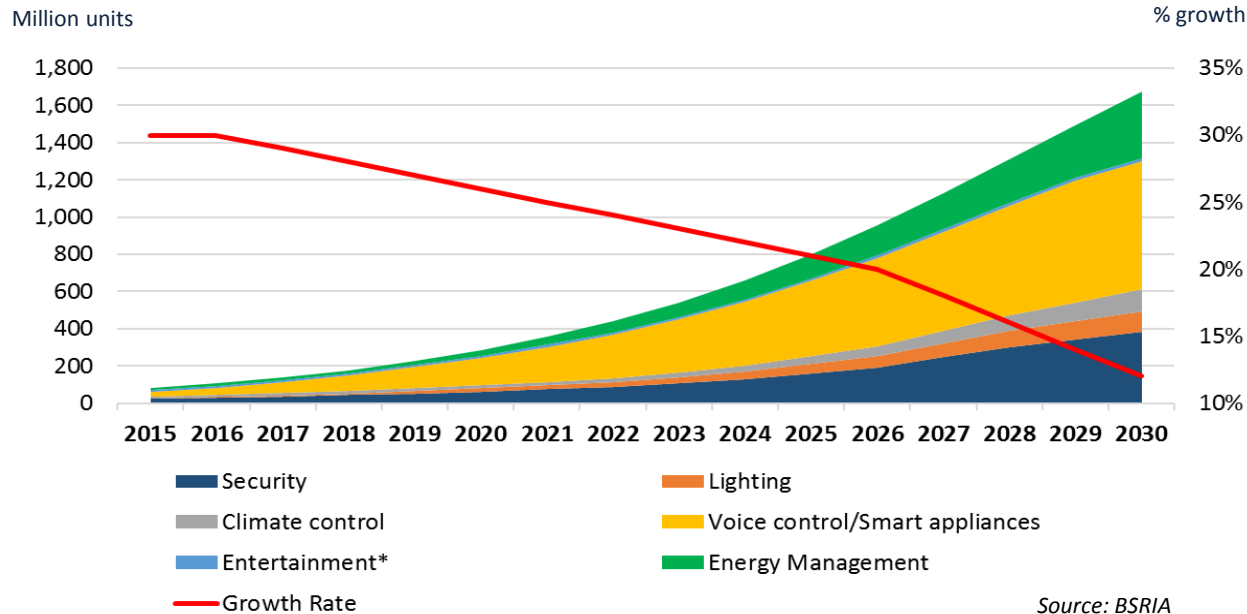
- An increasing number of data breaches is being noticed not in terms of privacy protection, but tampering with safe system performance
- New IEC guidelines focus on product safety involving additional measures to insure the reliability and performance of digital services
- Wireless communication, even of non-safety relevant parameters, will be considered unsafe unless authentication, authorization and cryptographic techniques are in place to prevent attacks
- **Near field communication or hardwired systems are considered safe**, since an intruder would have to be physically present



Smart Home Market Sizes



Global Market for Smart Home Systems* 2015–2030 (F)



2018

177.2 million systems

CAGR: 21%

2030

1,600 million systems

Source: BSRIA

*Smart home system comprises 3 devices on average.

Note: Smart TVs are not included in the estimate.



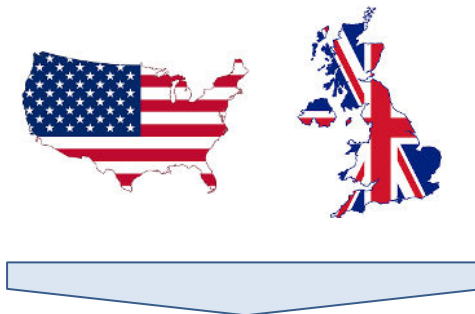
Regional Market Differences



Focus on energy management, security, climate control

Copper demand intensity current	Copper demand intensity future
Moderate	High

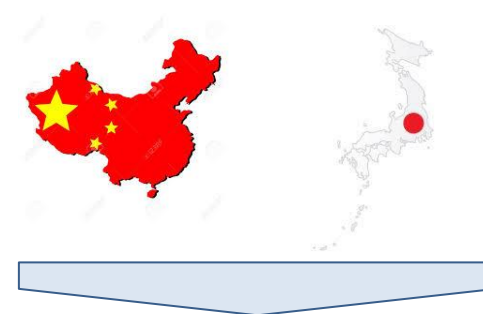
Copper smart home production
Low



Focus on voice control, entertainment, security

Copper demand intensity current	Copper demand intensity future
Low to Moderate	High

Copper smart home production
Low

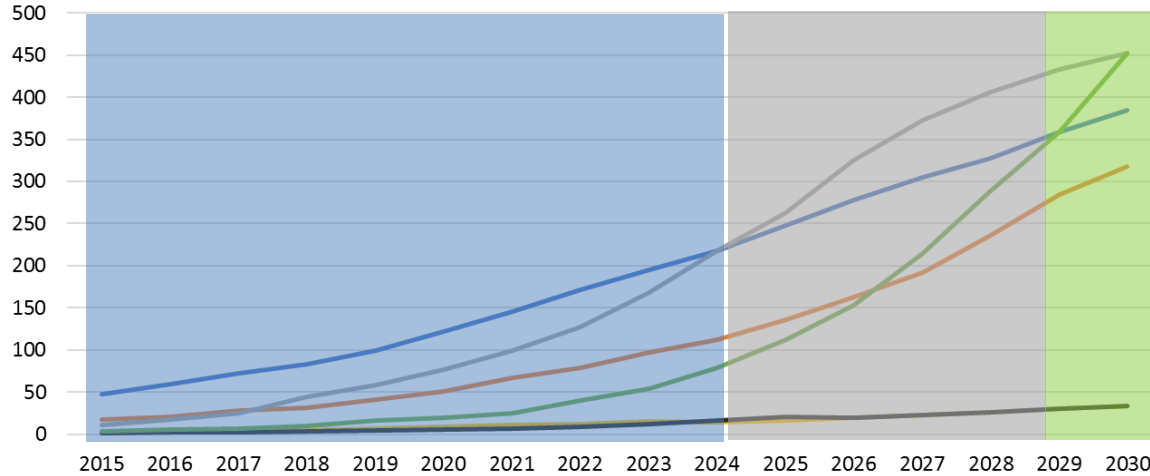


Focus on smart appliances, energy management, security

Copper demand intensity current	Copper demand intensity future
Low	Moderate

Copper smart home production
Very high

Global Market for Smart Home Systems 2015–2030 (F) in Million Units by Region



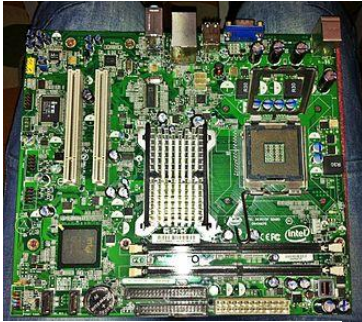
— USA — EU — China — Japan — S. Korea — RoW

Source: BSRIA

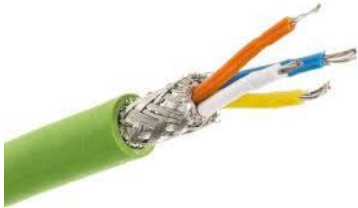
USA led market

China led market

Global market



Active electronic components, such as Central Processing Units (CPUs) and Printed Circuit Boards (PCB), are found in hubs, switches, relays, controllers and routers. Their copper content is around 18% of their weight.

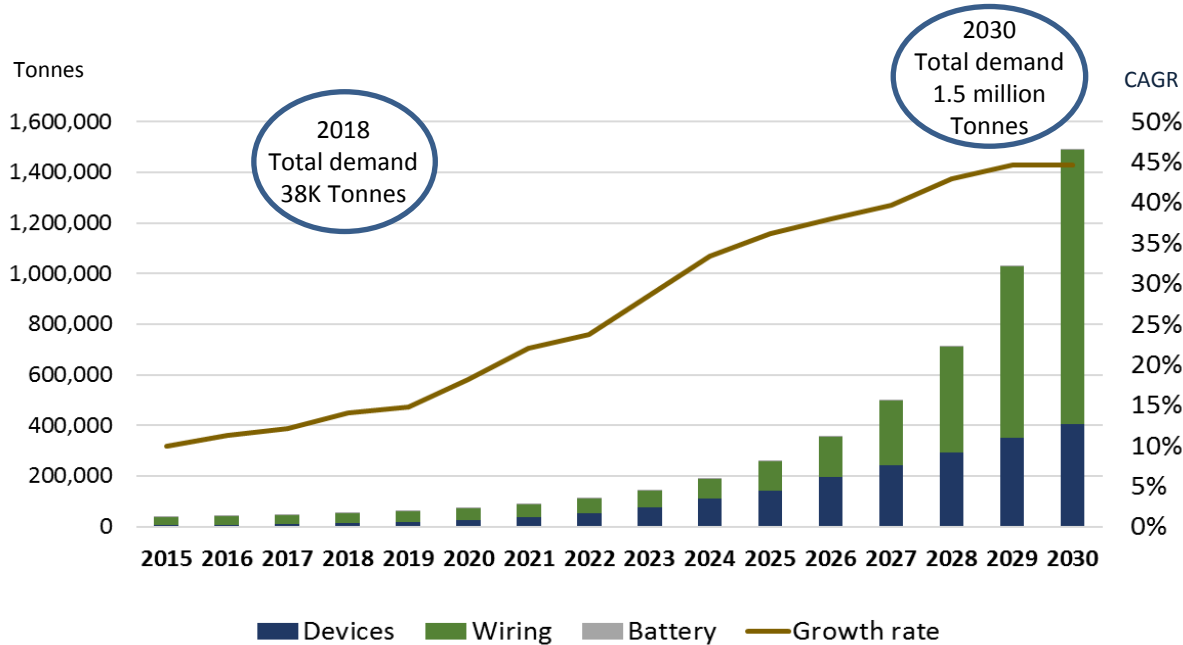


Wiring. Mostly CAT 5 in smart home applications*. 1,000 metres of cable contains around 20 Kg of copper.



Lithium ion batteries for energy storage. Copper amounts to around 18–20% of the total weight of the metal components.

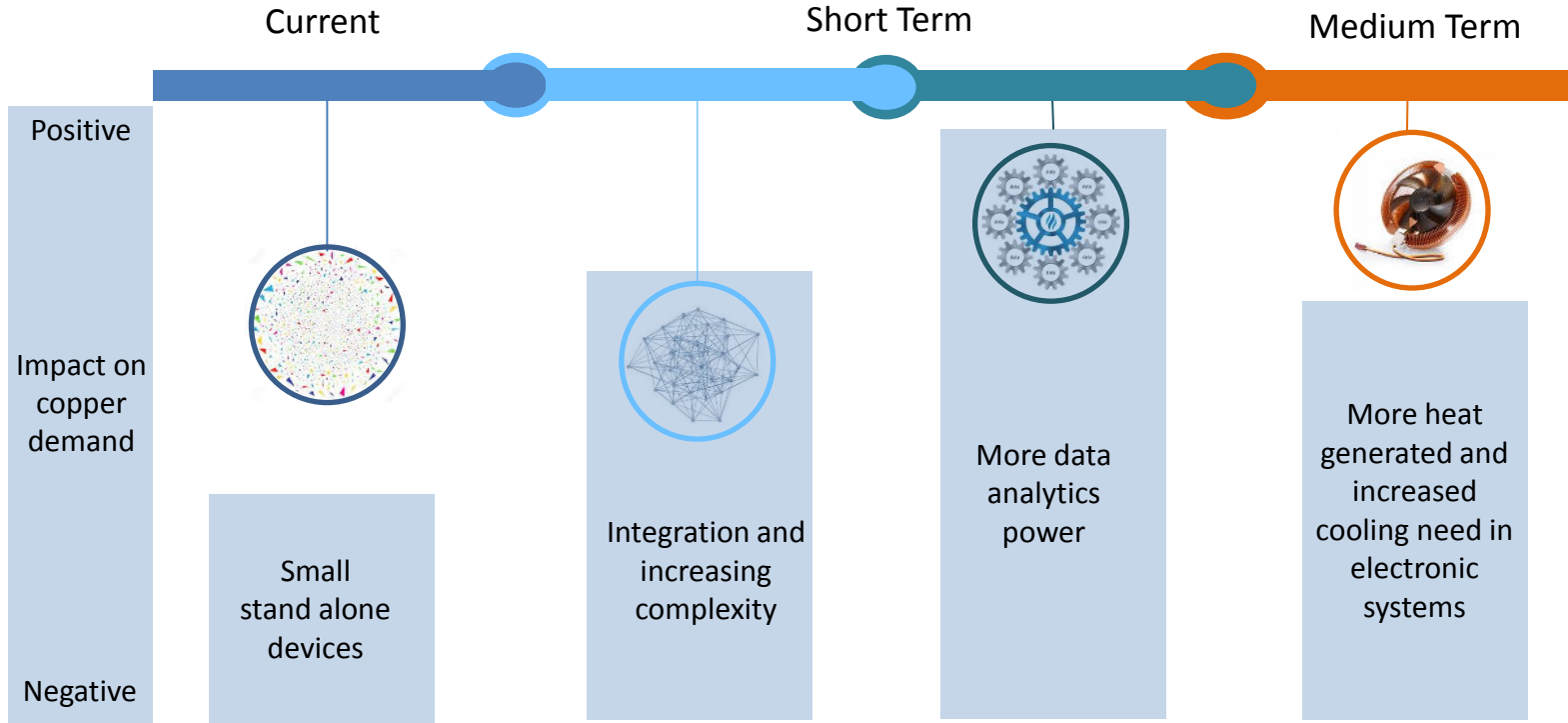
Total Global Demand for Copper Generated by the Smart Home Market (2015–2030)

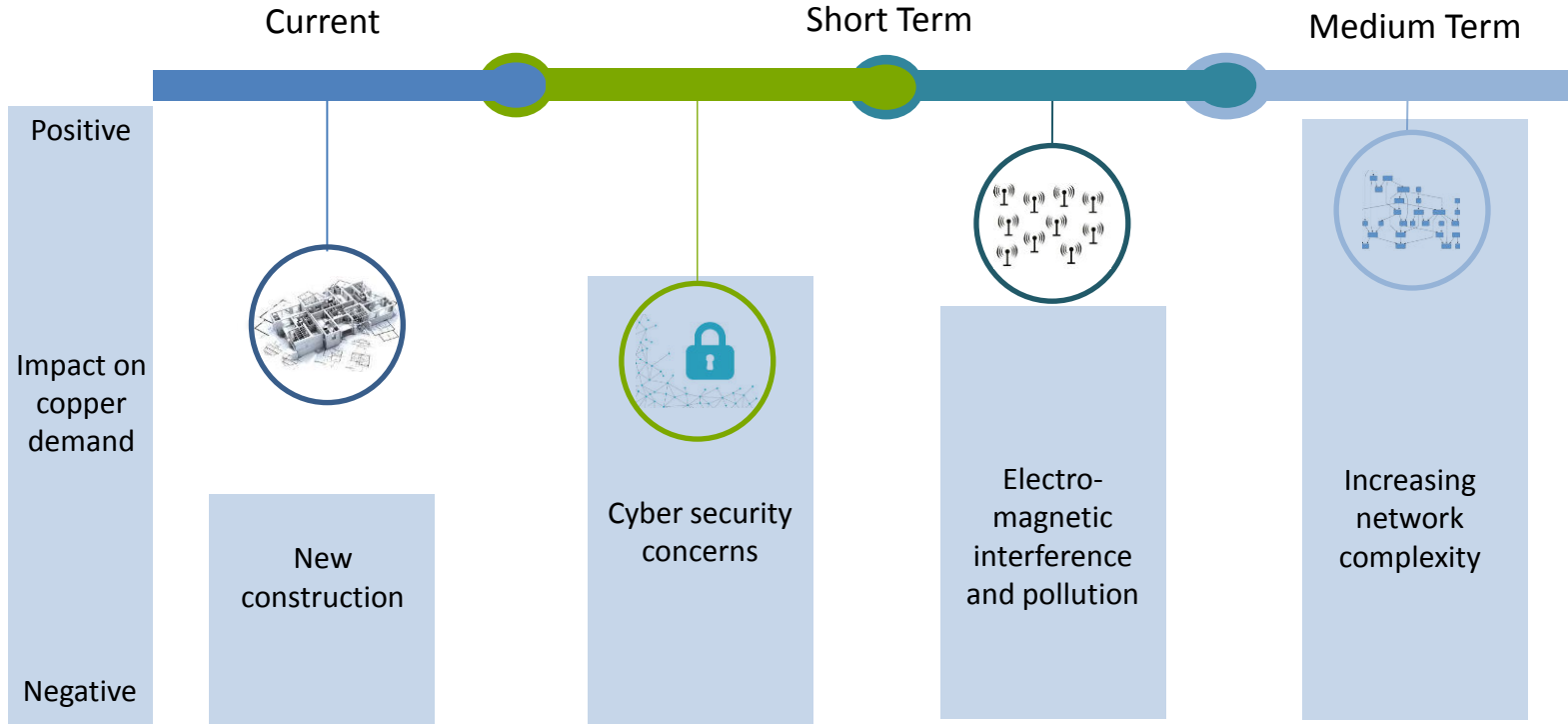


CAGR 2018–2030

Total demand: 32%

- Wiring: 33%
- Devices: 32%
- Batteries: 22%





Battery Storage: Market Drivers

