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.

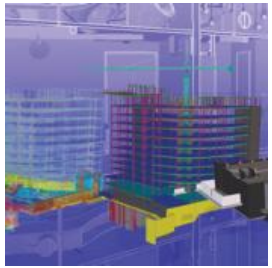
A paper entitled 'Copper Industry Trade Associations and Antritrust Laws' is available upon request.

10/92, 5/93, 10/10

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

Making buildings better








BSRIA

Opportunities for Copper in Data Centres

Krystyna Dawson

Director, BSRIA

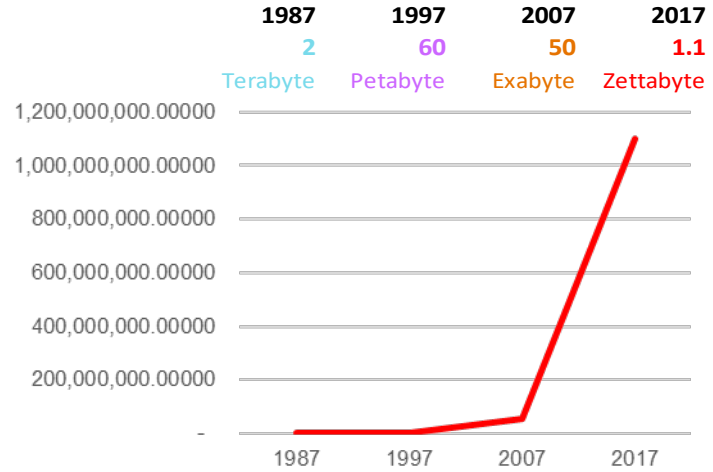
25th October 2019

Data Centres growth & drivers for change

Data Centres (DCs) are a Critical Infrastructure to Modern Life

- Growth in data use over the internet has been significant since the 90s with an exponential boom in the last decade

Growth of Internet use



Main drivers for future change

- Cost consciousness
- Push for increased speed of service delivery
- IoT progression, AI, 5G
- Legislation that aims to reduce DCs environmental impact / power usage

Data Centres Industry stakeholders

Main trends in Data Centres industry

Data Centres Scale and Design

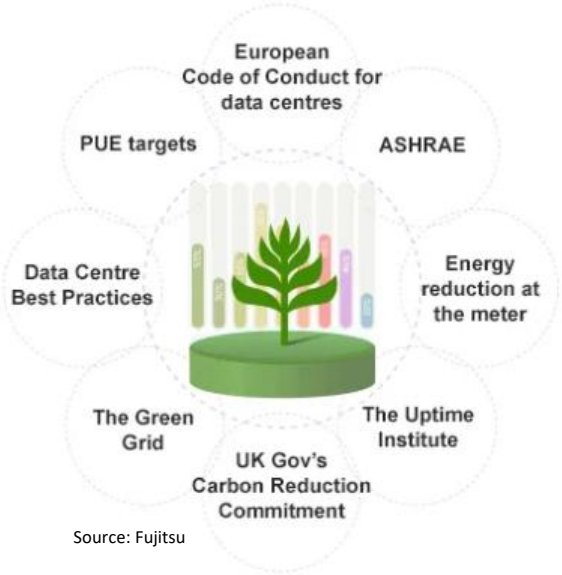
- Shift towards renewable energy & environmentally friendly systems and products
- Standardisation & normalisation of systems and products

Graph: pixabay.com

Data Centres Performance

- Growing need for hyperscale DCs
- Management/Inter-connection of DCs' infrastructure systems
- Increasing importance of Edge DCs

Regulation has growing design influence



Source: Fujitsu

- **Customer privacy** (GDPR and US CLOUD Act…)
- **Fuel / Liquid storage & spillage** (Clean water / spill prevention….)
- **Dangerous chemicals** (cooling and fire-suppression systems, emissions…)
- **Ecodesign Directive** (2019 EU measure for servers and data storage…)
- **General energy usage** (EU 2020 climate change reductions, …)

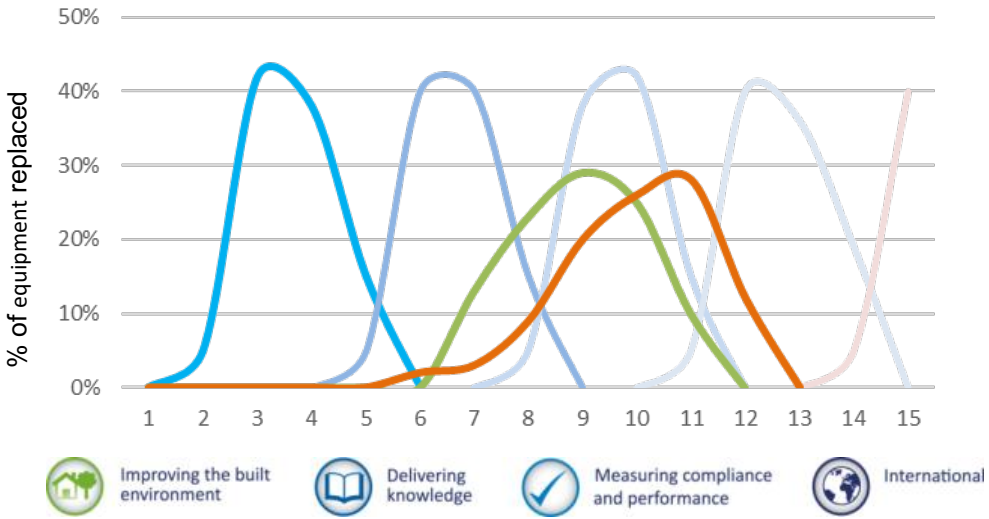
As DCs now represent a large proportion of power use and carbon footprint, new pressures will drive changes.

EU has Code of conduct for DCs (2008) to track and reduce power consumption, likely to be mirrored globally (Asia, MEA and Africa)

Short equipment life cycles and frequent replacements

- Life-span of Information and Communications technology in a DC is 3-4 years
- Life-span of other critical DC infrastructure is about 10 to 15 years
- Owners will replace for economic reasons, but also to avoid failures and downtime

Equipment replacement cycles – Estimated % of 1 years' systems being replaced - **ICT**, **Power & Environmental**



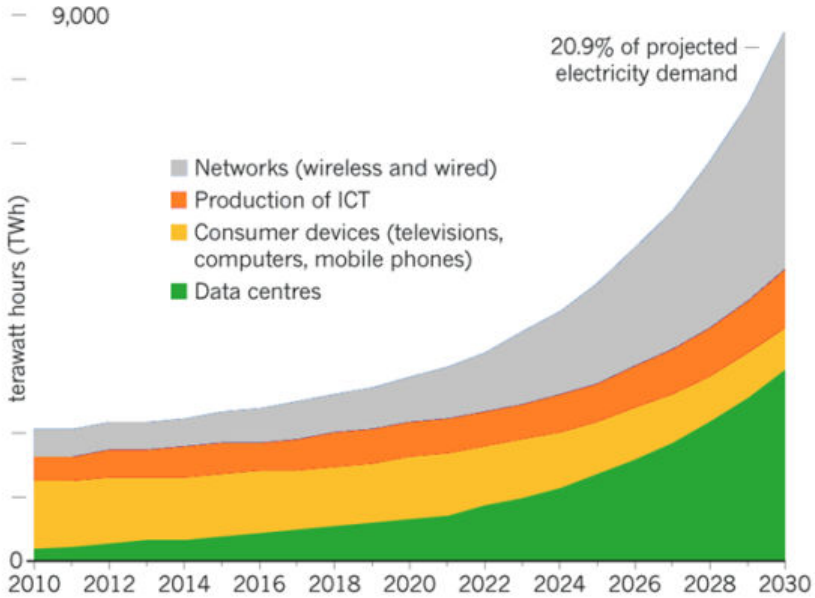
Constant operation, plus higher server densities, mean higher temperatures and power loads;

Over a period from year 3 to year 15, the infrastructure of a DC is in a state of constant change;

DC equipment is under significantly more stress, albeit under a better, more controlled environment;

Data Centres share in electricity demand grows

Projected global electricity demand
(Terawatts)



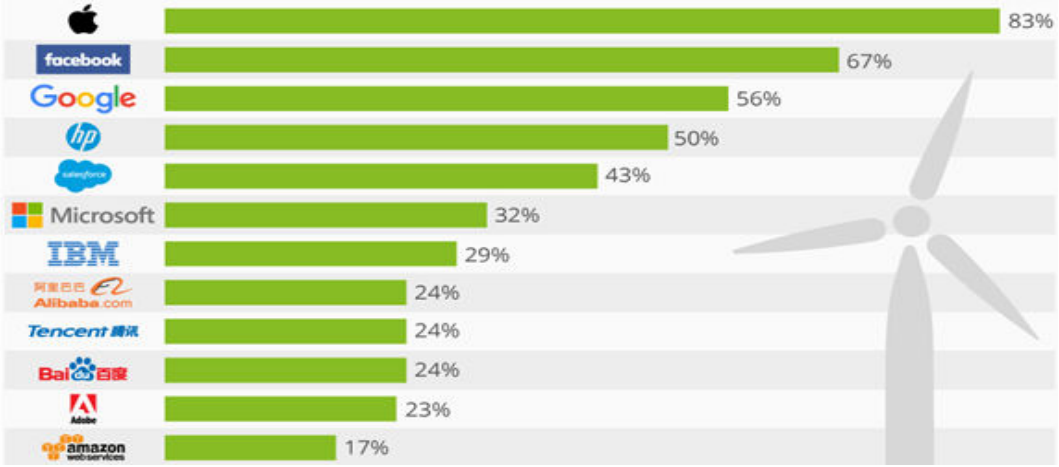
Source: Nature

- IoT, 5G and integration of EVs will drive growth in Internet demand
- DCs role will also increase in importance
- Electricity demand from DCs is expected to reach well over 2,000 TWhs by 2030
- DCs now have the same carbon footprint as the airline industry

Data Centres industry is responding making itself “Green”

The Greenest Tech Companies

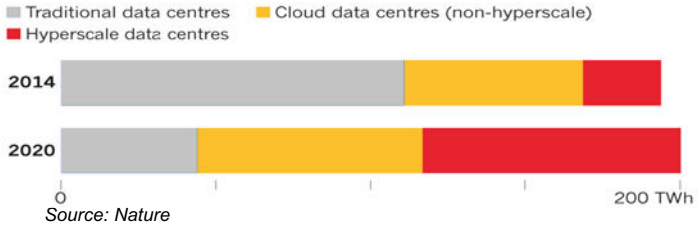
Proportion of renewable energy in their power supply (2017)



Source: Greenpeace

This process is crucial for Data Centres, particularly for types that account for the growing use of the power

Share of electricity usage by different DCs types



Source: Nature

Improving the built environment

Delivering knowledge

Measuring compliance and performance

International

Next generation ICT platform on the way

IoT growth & 5G roll out

Hyperscale DCs

- Streaming services,
- real time applications,
- EVs, smart city, etc

Source: elker.com

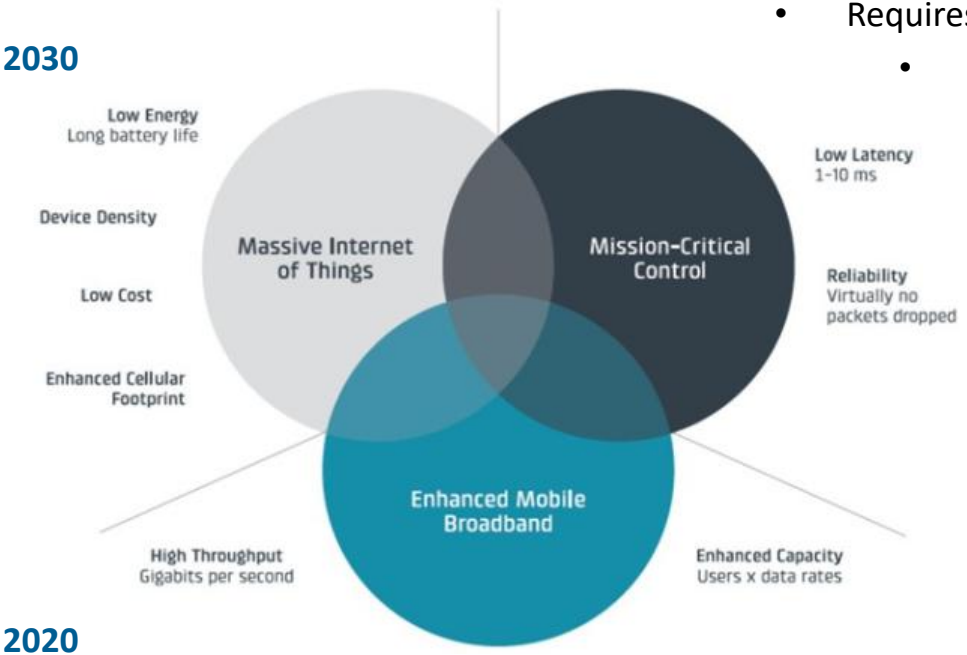
more data, more processing, high speed, seamless delivery

Small and Micro DCs

Edge computing

5G and Edge drives new applications, new Data Centres

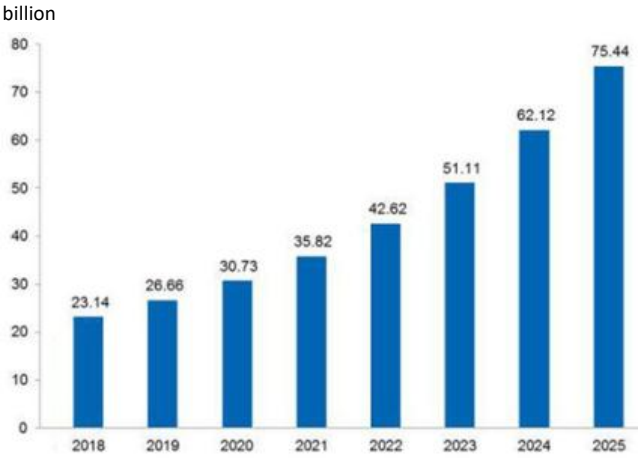
5G Services Development



Source:Cradlepoint

- Edge & 5G means true IoT and other new services can now be developed
  - Requires high numbers of locally-based, small ‘data centres’
    - DC industry is gearing up for self-contained, cooled, backup-powered, (5G) network enabled DCs

IoT Installed Device Development



Source: KPMG

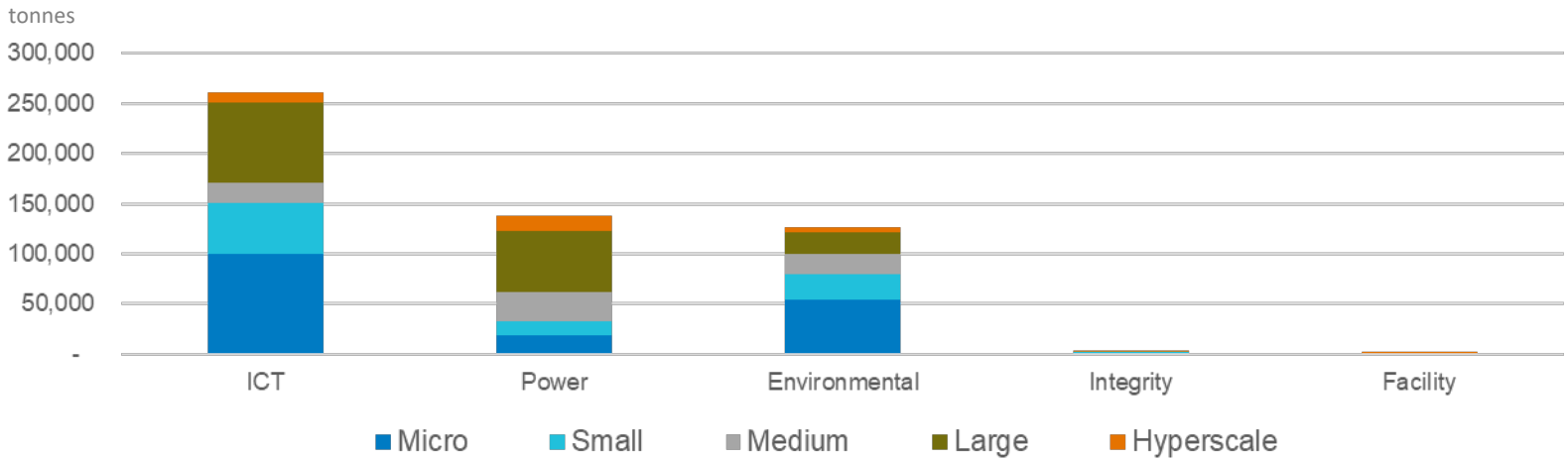
“Edgy” side of Data Centres will get wider distribution

- Edge DCs will move out into the world, far beyond their buildings and server rooms
- Their footprint will get smaller, some will look be like mobile or modular structures, but new design will develop
- Current DC infrastructure and services will be fully integrated into small units
- The compute and network capacity will get closer to action

Copper is mainly in 3 major Data Centre systems

- **ICT: 49%** Equipment that delivers the DCs Technology & Communications services
- **Power: 26%** Generation & backup
- **Environmental: 24%** Cooling services (mainly)
- There is limited amount of Copper in the Integrity (security) and Facility services

Copper amount in typical DC systems, by System and Type, 2018

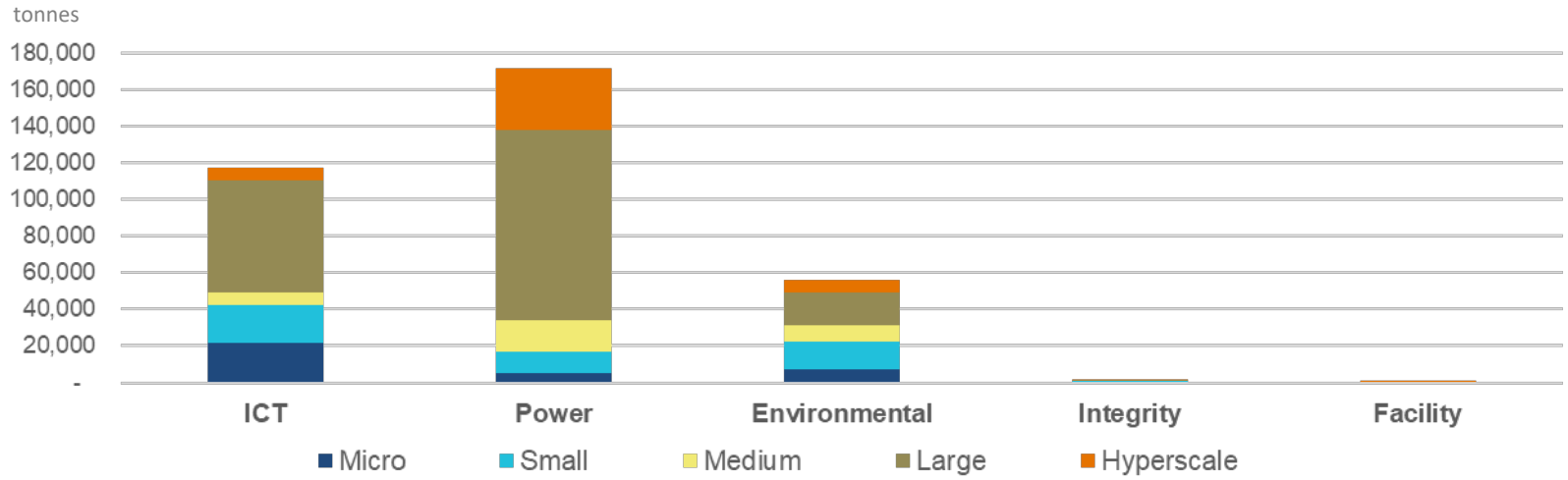


Copper demand shifts to Power Services

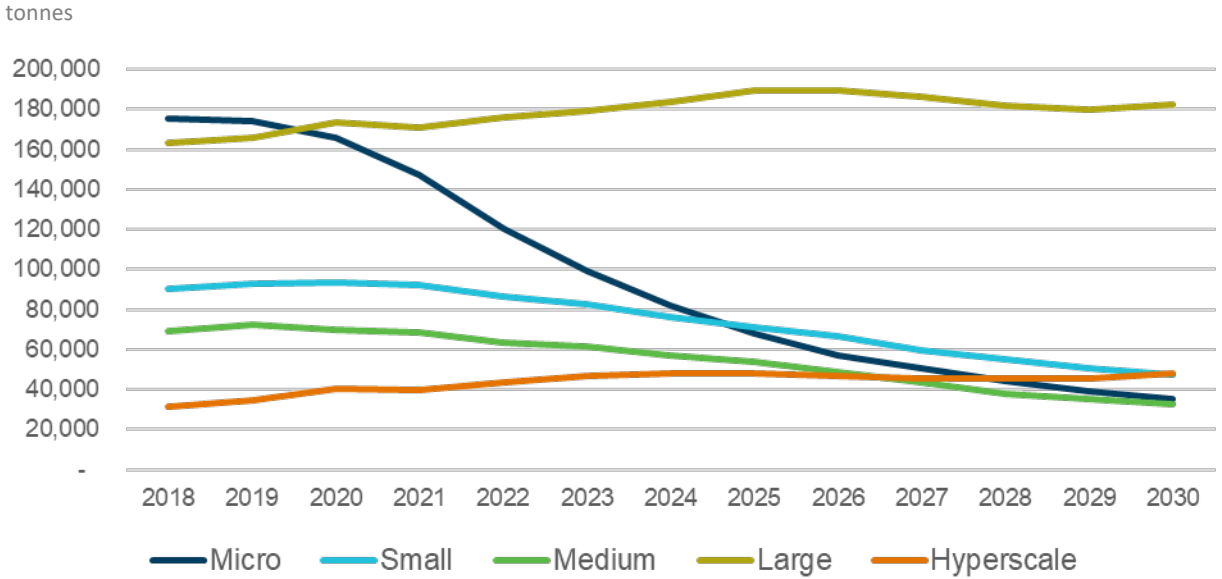
Copper demand in 2030:

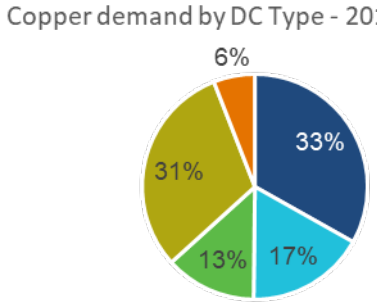
- **Power** share nearly doubles to 50%
- **ICT** accounts for 34%
- **Environmental** becomes less copper intensive, 16%

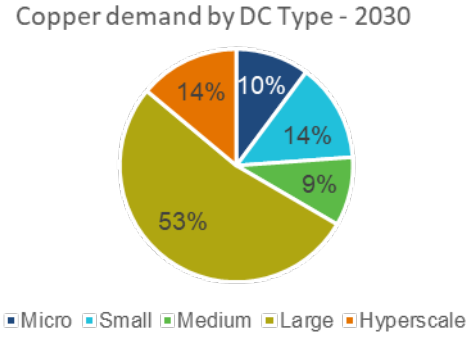
Copper amount in typical DC systems, by System and Type, 2030



Copper demand shifts to large and hyper Data Centres

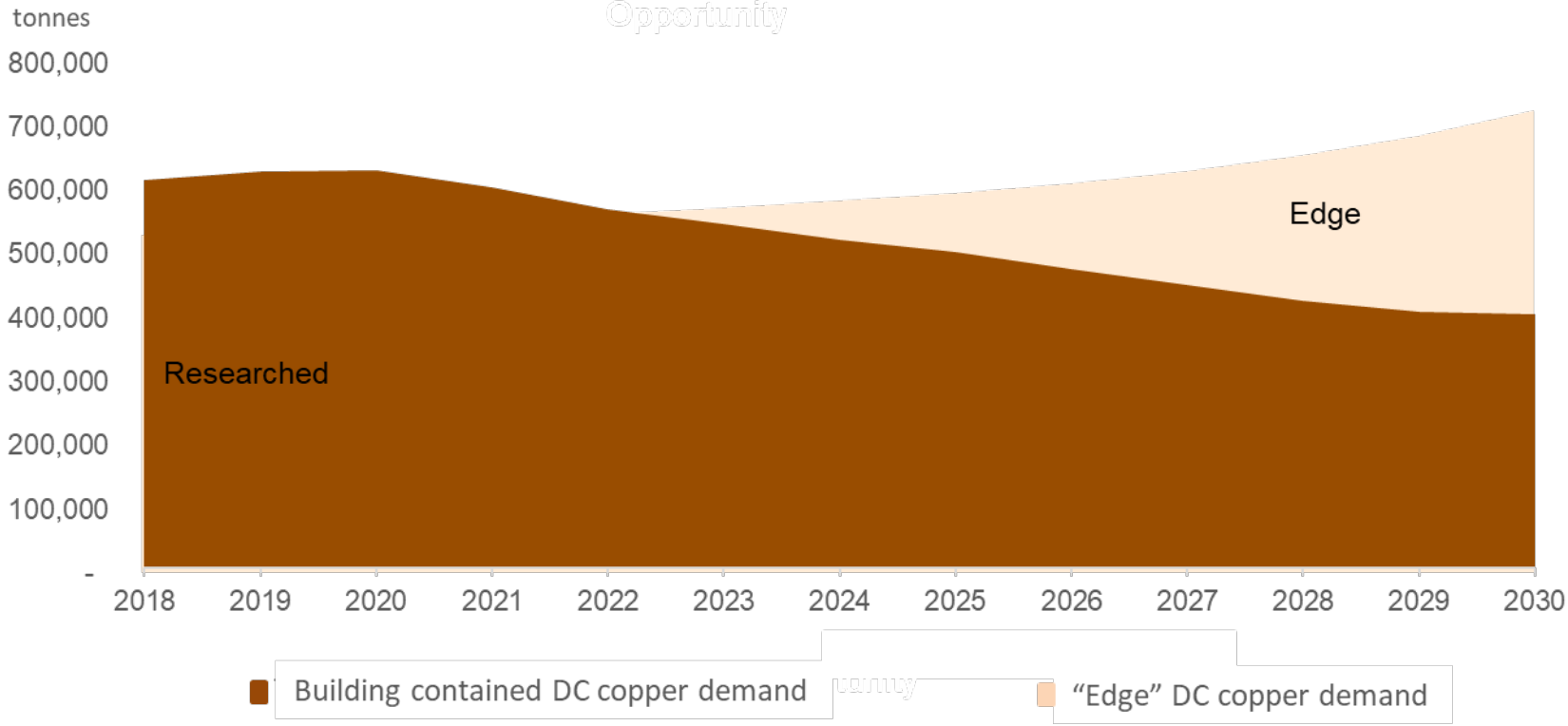






- Large and Hyperscale DCs account for 67% demand of copper by 2030
- Copper consumption in Smaller and Micro DCs decreases by half in 2030

Demand forecast



Conclusions

- Technology development and environmental concerns drive shift towards Large and Hyperscale DCs while the number of Micro and Small DC halves.

- Hyperscale and Large DCs are the most copper intensive and will sustain demand for copper in the segment.

- North America will remain the biggest market but Europe's importance will decrease while dynamic growth is expected in South-East Asia.

- Edge computing creates new space for copper demand in future.