



Future Trends and Drivers in Building Automation & Control Systems (BACS)

NIAGARA FORUM 2023

17 May 2023



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Agenda



Trends and Drivers



BACS 2022 & forecast



Uptake of Smart Technologies



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Non-profit distributing 800+ member-based association promoting knowledge and providing specialist services for construction and building services stakeholders

Mission: Make buildings better by improving their environmental, operational and occupational values, and support the industry by providing guidance and solutions

Founded 1955 - Turnover £14.3 million (2019-20) - Offices throughout the UK; France, China, USA, and Associates in Northern Ireland, Japan, Brazil and Australia

Worldwide Market Intelligence (WMI): Over 40 years offering unrivalled specialist intelligence and consultancy across a broad range of technical building services products in 90+ countries - published and custom studies that help clients make confident marketing and business strategy decisions



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The big picture

Climate Change



Demographics & Urbanisation



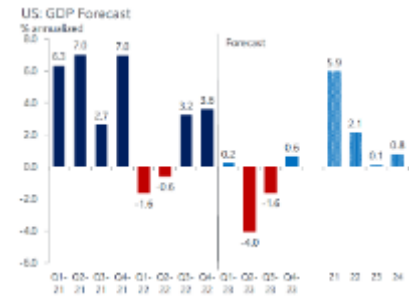
Globalisation & Supply Chains



Geopolitics



Economics



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Key trends affecting change in commercial buildings

Environmental, Social, Governance (ESG) - Sustainability, Regulations



Energy Costs



Workforce

- ✓ Staff satisfaction & retention
- ✓ Hybrid working
- ✓ Skills shortage



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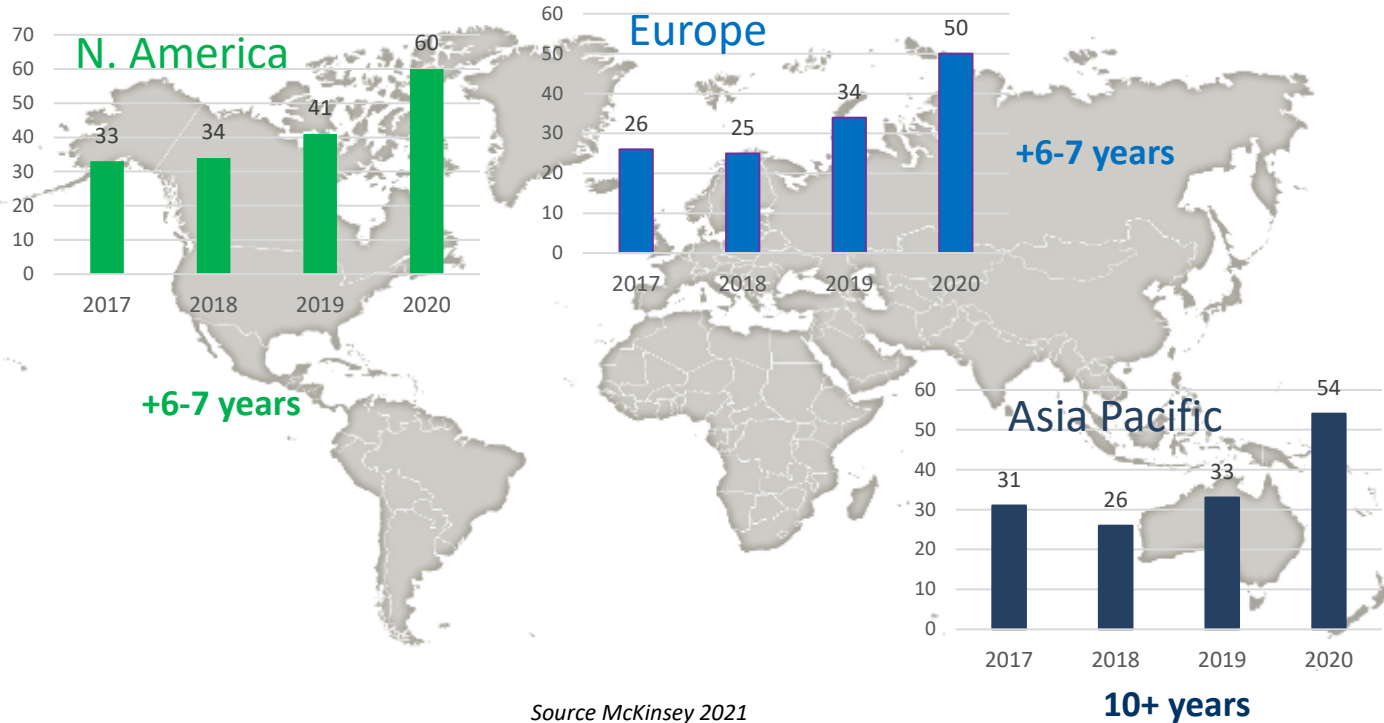


Digitalisation delivering better buildings

Digitalisation

- Changing BACS for the better
- Delivering new smart technologies
- Response to Covid-19 accelerated adoption of digital technologies by several years
- Particularly healthcare, pharma, financial and professional services

Average share of products and/or services that are partially or fully digitalized (%)



Source McKinsey 2021



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European legislative drivers for BACS - EPBD



- **EPBD*** (EN 15232) rev. Dec 2021 - requires BACS in all >290 kW output tertiary buildings by Jan 2025
- **Zero Emissions Building** label applicable to all new buildings from 2027 and renovated buildings from 2030
- **Energy Performance Cert. (EPC)** - non-res. buildings to comply with at least energy perf. level F by 2027, level E by 2030



Germany

- ✓ **Strong pressure to improve energy performance** - Action against Russian gas dependence, “greening” of built environment
- ✓ **EN 15232** reported to be **more widely applied** than elsewhere



France

- ✓ **Tertiary Decree** Oct'19 - reduce energy consumption in all tertiary buildings >1,000 m²
- ✓ **RE2020 regulatory framework** to improve performance/comfort in res. buildings – all commercial from '23
- ✓ **BACS Decree** help reach Tertiary Decree targets - BACS in all non-res. buildings (output >290 kW) by Jan.'25



Spain

- ✓ **Recovery & Resilience Plan** - €300m towards the **Energy Rehabilitation of Buildings Programme (PREE)**
- ✓ Objective: support energy renovations of at least 40k res. buildings and 690k m² of non-res. Building space



UK

- ✓ Mandatory to **equip with BACS all non-res. buildings** (output >290 kW) by Jan.'25.
- ✓ After BREXIT, **independent UK Gov. policies for decarbonising** the economy by 2050. These include:
 - ✓ **NDC** (National Determined Contribution) for reducing emissions under the Paris Agreement
 - ✓ **ETS** - UK Emissions Trading Scheme

* *Energy Performance of Buildings Directive*



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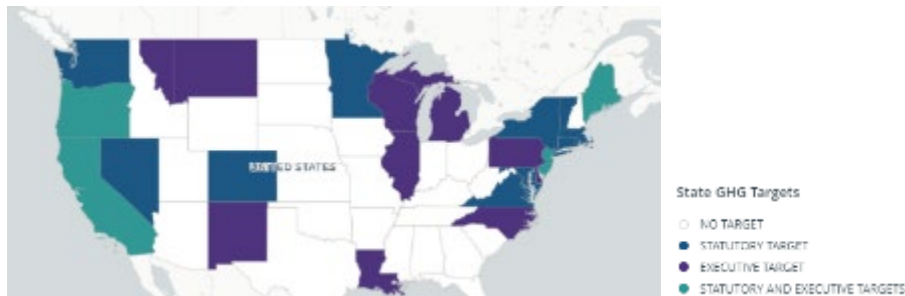
USA drivers for BACS - Federal & State targets/funding



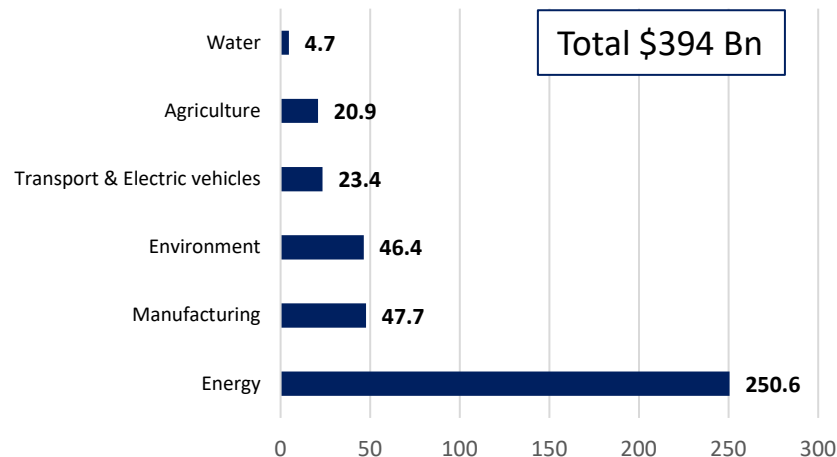
USA

- IRA allocates USD 394 bn to climate change initiatives
- Over 300,000 Federal buildings to reach net-zero emissions by 2045, incl. 50% reduction in building emissions by 2032
- 33 states have or are working on a climate action plan
- Securities and Exchange Commission (SEC) considering new requirements for climate-related risks and GHG emissions
- AIA NRC forecast Jan 2023 - Refurb now accounts for 62% of projects – compared to 38% 15 years ago

Greenhouse gas emissions targets, 2022



Inflation Reduction Act (IRA) investments by sector, USD million



Commercial sector accounts for 18% of energy consumption in the US



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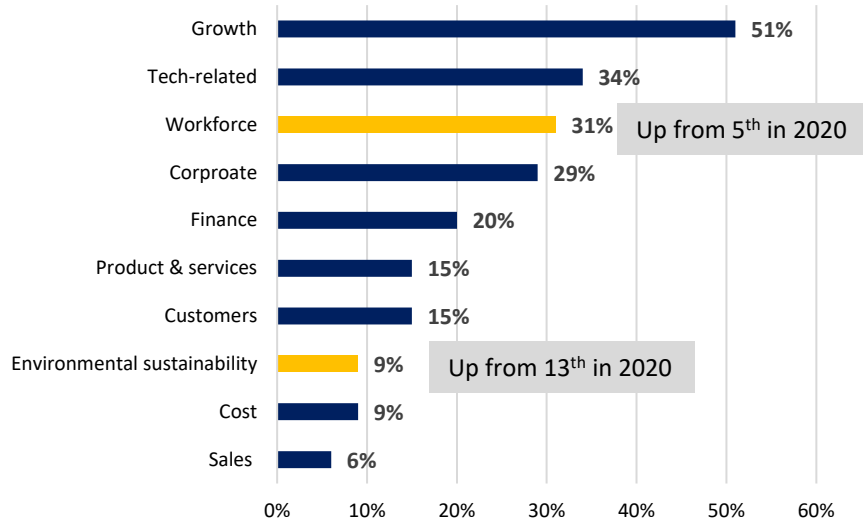
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Sustainability & ESG driving BACS uptake



BACS - effective tool for reducing CO₂ and energy waste

CEOs' Top 10 Strategic Business priorities 2022-2023



Source: 2022 Gartner CEO and Senior Business Executive survey
Sample of 410 respondents (top 5 strategic business priorities for the next 2 years).

- Nine out of ten publicly traded companies have adopted ESG measures
- Examples:
 - JLL will only occupy offices with Net-Zero in operation by 2030
 - MasterCard linking all bonuses to ESG targets



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Improved control of buildings for wellbeing & health

Increase in voluntary schemes and codes

- Pandemic accelerated move away from traditional metrics (Sq.Ft & occupancy rates) to
 - People-centric (IAQ, Health & Wellness)
- Comfort & health of occupants are key for WELL, RESET, Fitwel, BREEAM, Living Building Challenge...
- Most include environmental impact and/or rating



SPIRE™ - New standard for Smart Buildings



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Hybrid working stimulating demand for smart tech

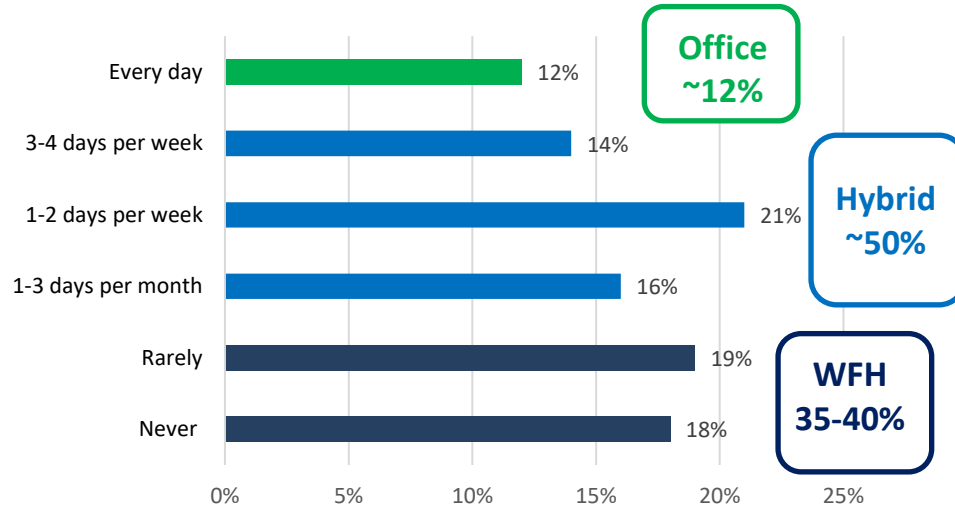
The pandemic changed the way we work

- Employees want flexibility
- Commutes and costly childcare keep workers at home
- Younger workers generally prefer more time in the office

Aspects of office life missed:

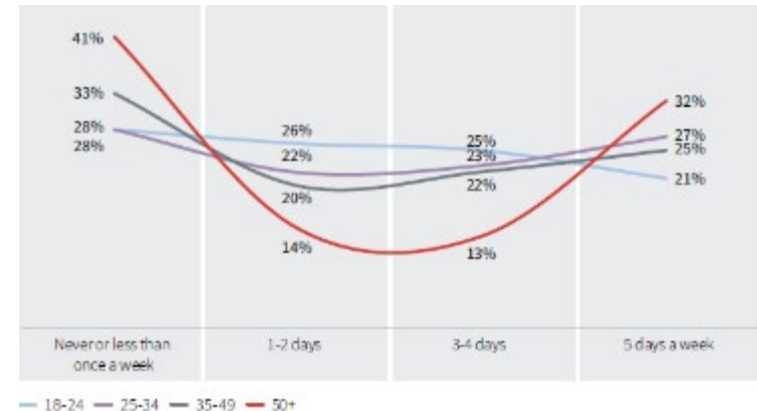
- Human interaction & socialising with colleagues
- Boundaries between personal and professional life
- Support & wellbeing

Desired office attendance post covid, US



Source: Cushman & Wakefield June 2022

Remote work adoption by age



Source: JLL Workforce Preference Barometer, 2022 Q2, 2022 (4,015 office workers in 10 countries)



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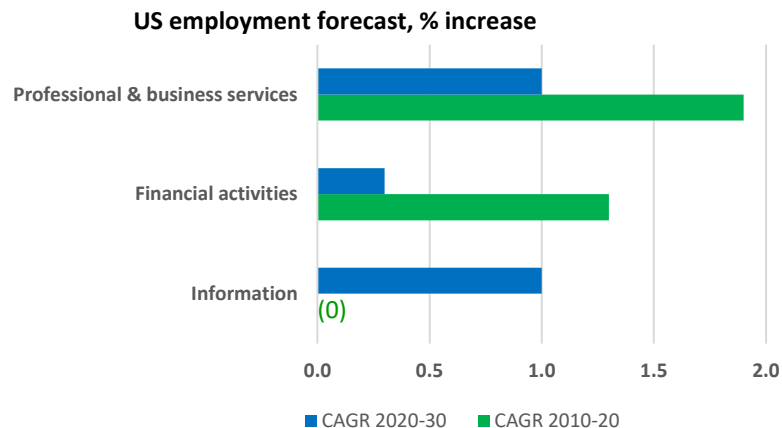
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Office employment growth

- Still growth in office working to 2030, but weaker than 2010 - 2020. Oxford Economics predict expansion in desk-based work
- Employment in information services expected to perform better than previous 10 years



Source: Employment Projections program, U.S. Bureau of Labor Statistics



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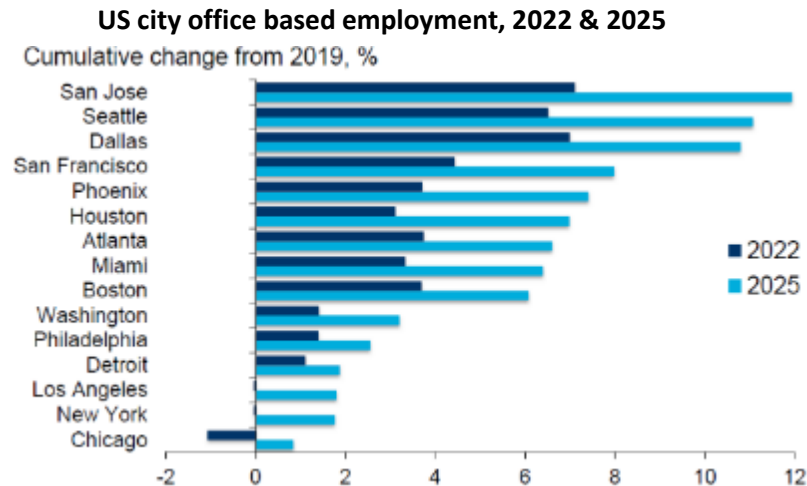
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Cities	Extra office jobs 2019 - 2025
San Jose	45,500
Seattle	59,400
Dallas	113,400
San Francisco	61,900

Source: Oxford Economics Oct. 2021

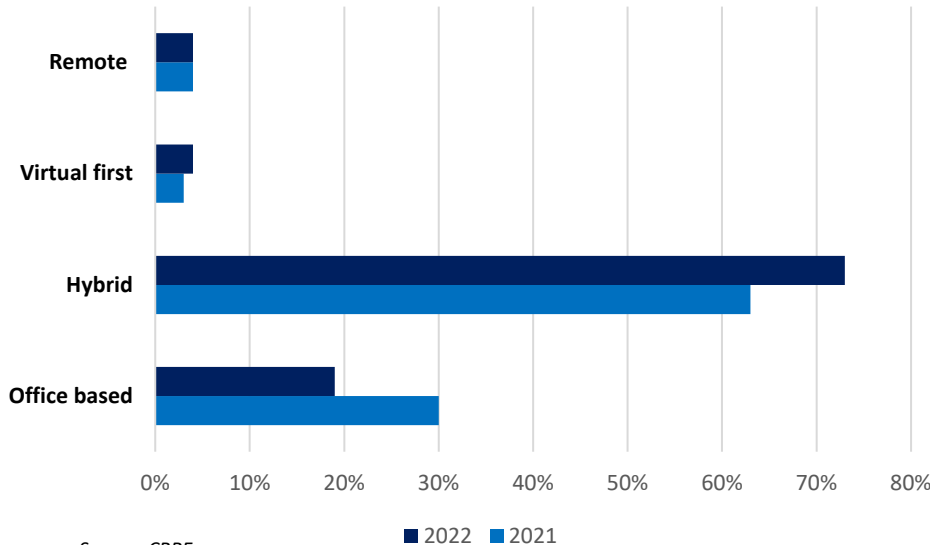


New work practises - focus on collaborative spaces



Data from smart systems helps fast and easy reconfiguration of building floor space, aiding collaboration and best use of shared spaces

Most real-estate executives expect hybrid working arrangement



- 3 in 4 CEOs and real-estate execs expect to reduce their office space
- The office layout is changing

Office space allocation Forecast

Region	Focused work	Collaborative work	Support activities
US & EMEA	30%	50%	20%
APAC	50%	30% - 40%	10% - 20%

Source: Cushman & Wakefield May 2022



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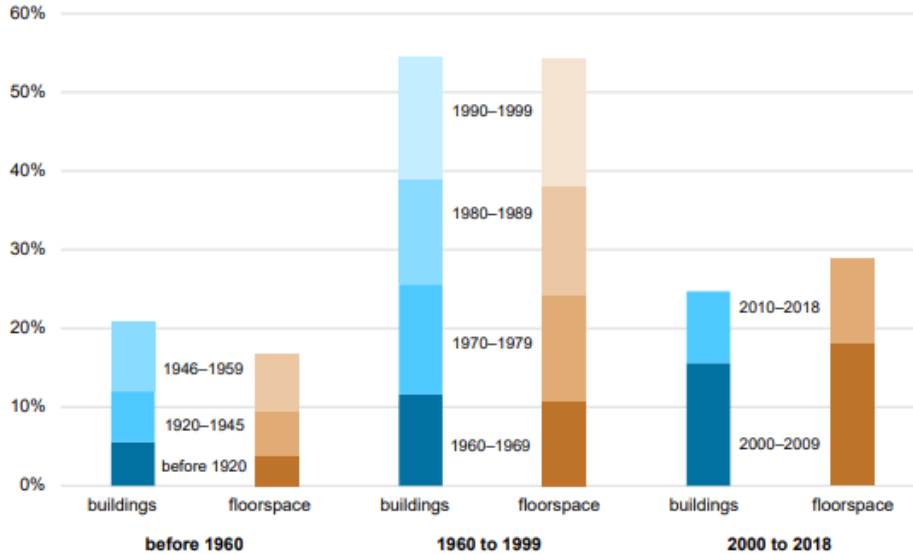
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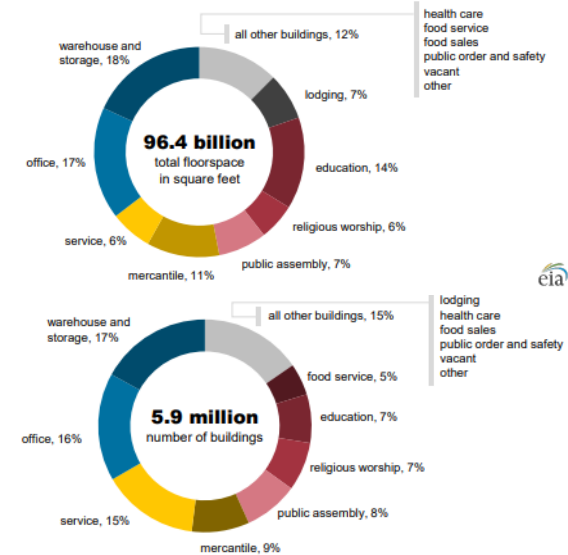
Need for renovation

Share of number of buildings and floorspace by year constructed, 2018
percentage of total for all buildings



Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

- >50% of US buildings and floorspace built between 1960 - 1999
- 21% of buildings (17% of floorspace) built before 1960
- 25% of the buildings (29% of floorspace) built after 2000



Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*



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Increasing demand for Class A office space

- **Hybrid working driving leasing change**
- **Class A typically has state-of-the-art BACS**

USA

- Office constr. down slightly in 2022
- Demand for quality space
- Occupants reduce footprint by 20-30%, but choose better quality space

Europe

- Vacancy rate Class A office space 2.5%
- Non-class A at 5.5%
- Want space that is attractive to employees and supports a flexible working strategy





Global BACS product market 2022 – improvement on recent historical performance



Growth in 2022 (USD)

Global 4.5% to USD 6.7 bn

Germany
2.6% (9%)

Switzerland
3.5% (8%)

China
5% (10%)

France
-4% (7%)

Spain
-3% (9%)

USA
18%

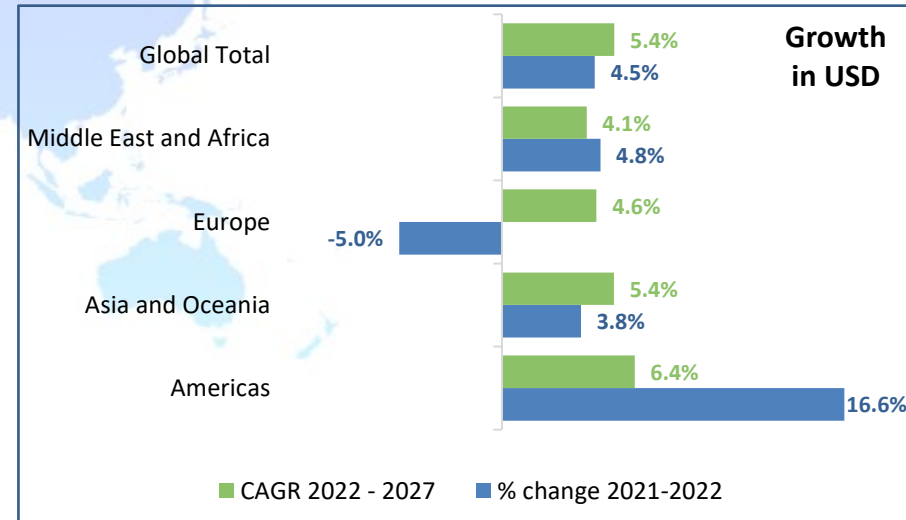
UAE
5%

Brazil
10% (5%)

Key:

Dark blue: Growth in USD

Light blue: Growth in local currency



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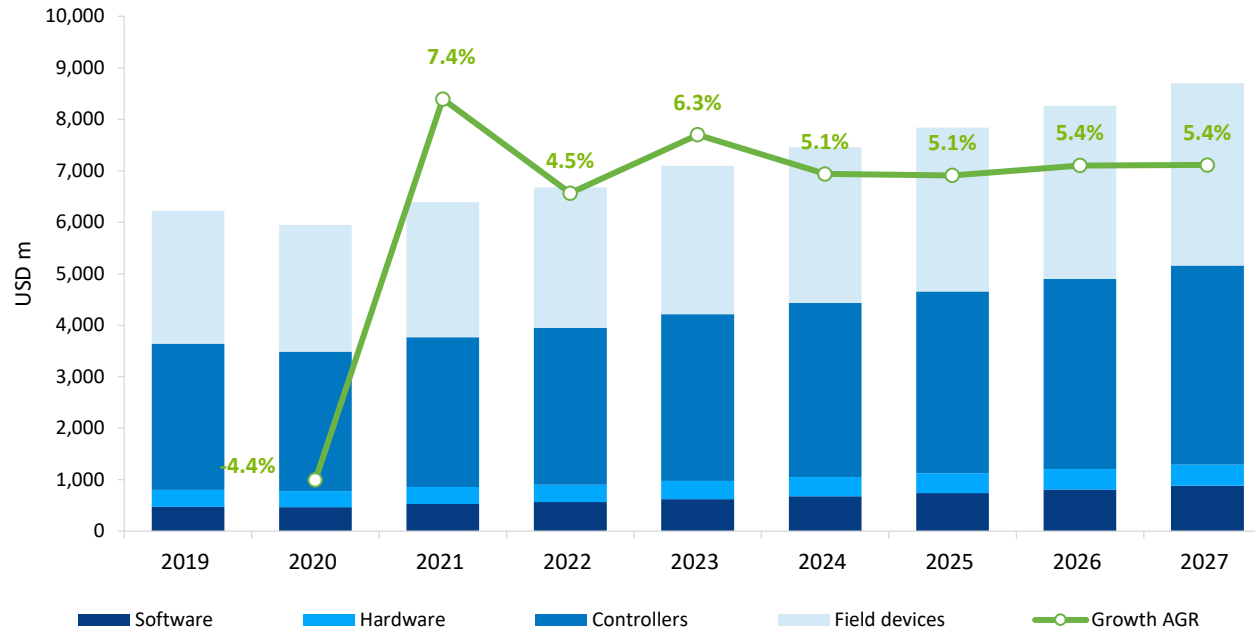
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5.4% CAGR 2022 to 2027



Global BACS Product Market 2019 – 2027F



	Share	CAGR 2022-27
Field devices	41%	41%
Controllers	46%	4.9%
Hardware	5%	4.0%
Software	9%	9.2%

Note: Exchange rate fixed 2022 - 2027



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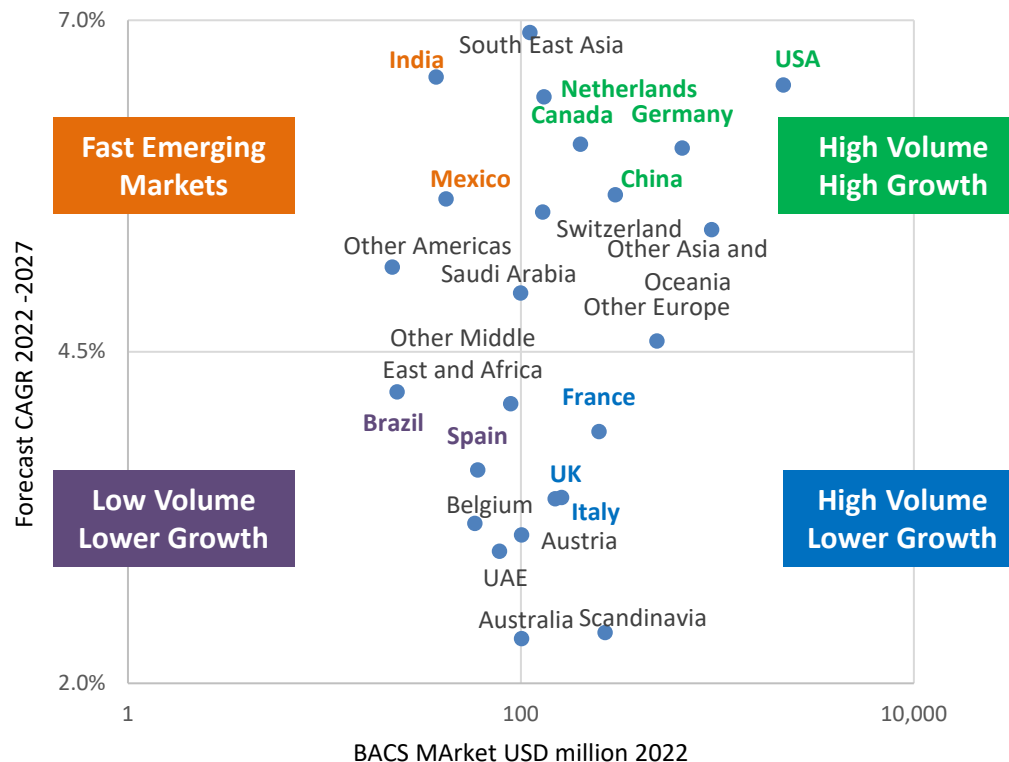


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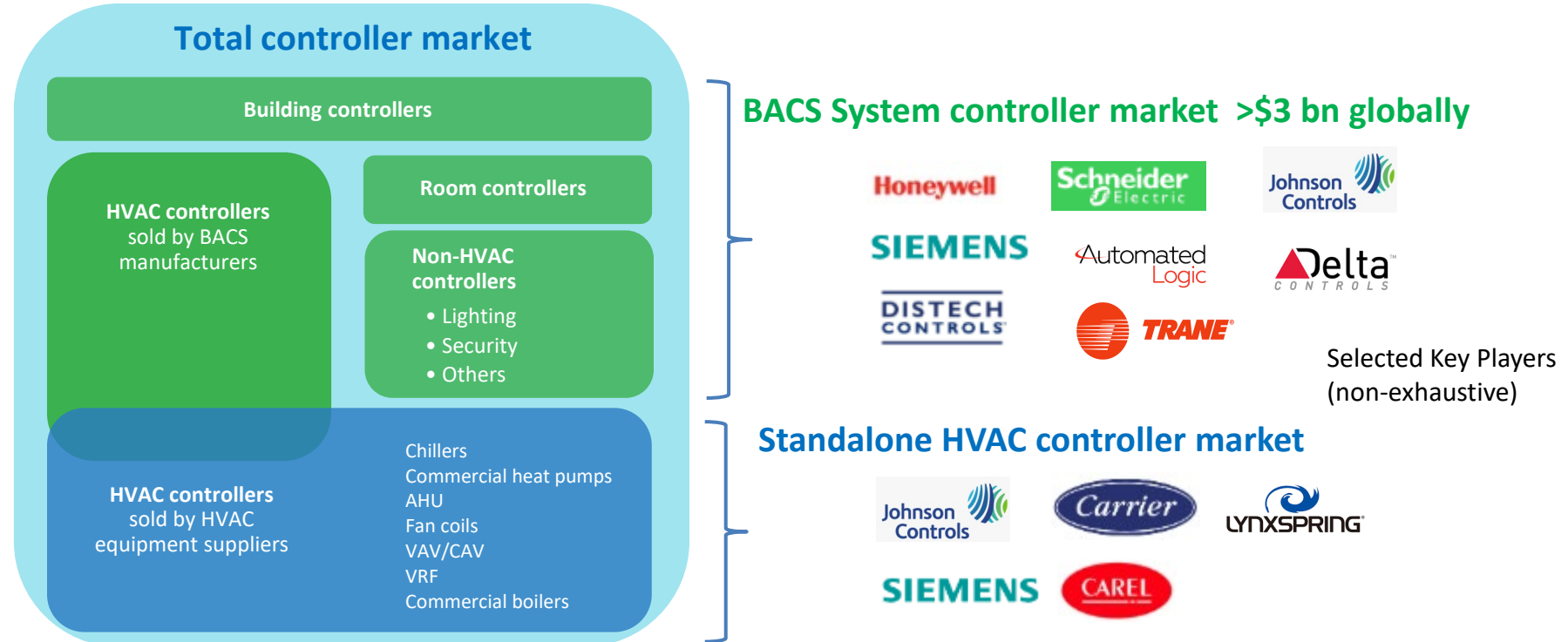
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Multiple BACS markets show high volume high growth

Major BACS Product markets by size and growth forecast 2022 – 2027F



Strong trend towards standalone control of HVAC



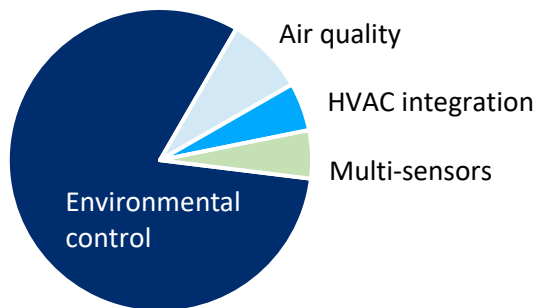
Increased uptake of smart technologies



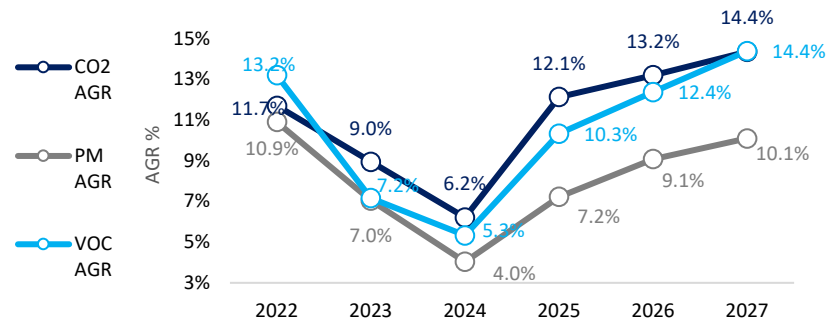
- **\$561m field devices market (valves, actuators and sensors) across Germany, France, Italy, UK (2021)**
- **US field device study shows \$500m market for sensors (2022)**

- Sales increased significantly in 2020, 2021 and 2022
- Forecast: High single-digit growth rates
- The pandemic boosted sales of IAQ sensors
- Increase in applications offered for multi-sensors

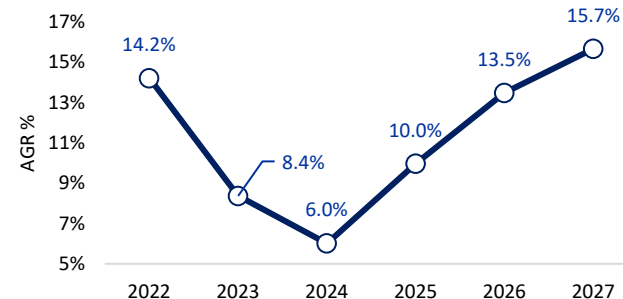
HVAC sensors, 2022, USD m



Sales of air quality sensors, 2022 - 2027, value, AGR %



Sales of multi-sensors for commercial HVAC, 2022-2027, value, AGR %



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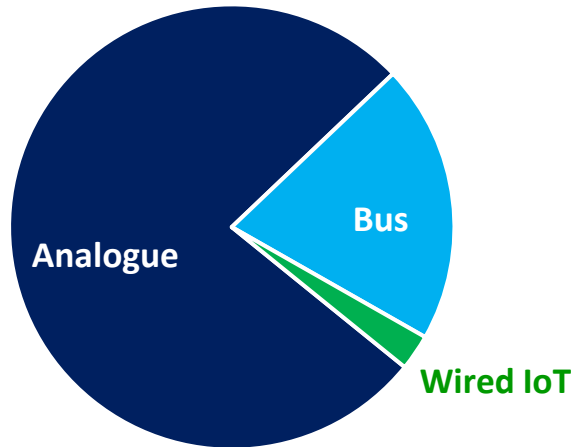


Connectivity and IP increasing steadily

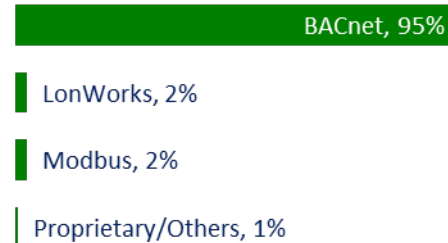


- BUS sensors - 21% of the market
- IoT sensors small but growing
- Wireless used when wiring not possible
- IP uptake continues to increase from low base
- BACnet is the dominating protocol

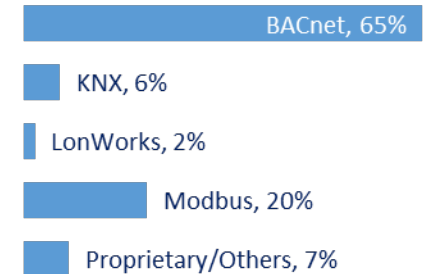
US Wired Sensors by protocol, share by value, 2022



North America



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New IoT platforms scaling faster digital transformation



- Strategic layer on top of BACS
- Live data, AI/ML, enhancing real time analytics and monitoring
- Digital twin facilitation
- Harness power of the Cloud
- Homogeneous - pull data from all suppliers
- Squeeze energy consumption, CO² emissions, sustainability
- Big growth expected in developed markets

Examples include:



Live data



AI/ML



Digital twin

IoT platform			
Building Automation	Grid	Industry	Other
HVAC	Physical Security	Other	Other
Lighting	Sensors	Other	Other



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Challenges for BACS market players

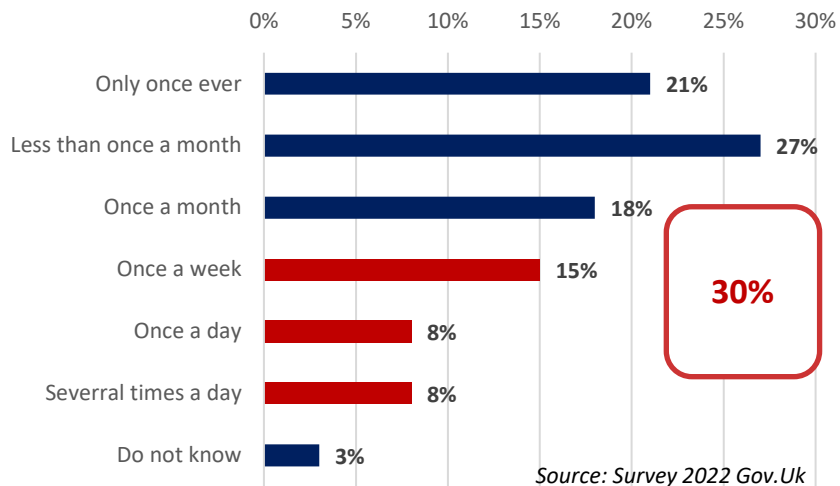


- Cyber attacks more frequent, sophisticated and effective
- Cyber security accounts for 22% of IT spending

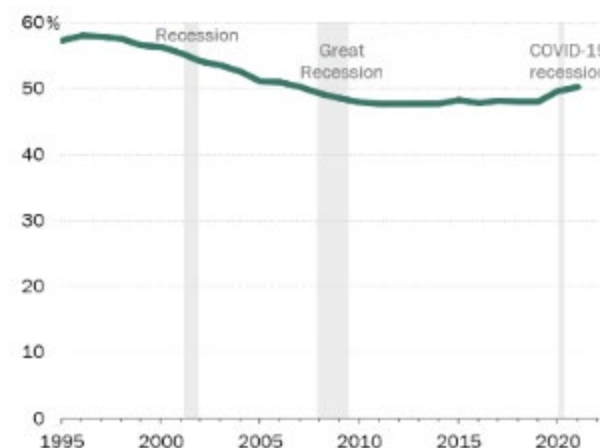


- Lack of training last 10-15 years
- Baby boomers retiring
- Most sectors affected

How often do UK companies experience cyber attack on average?

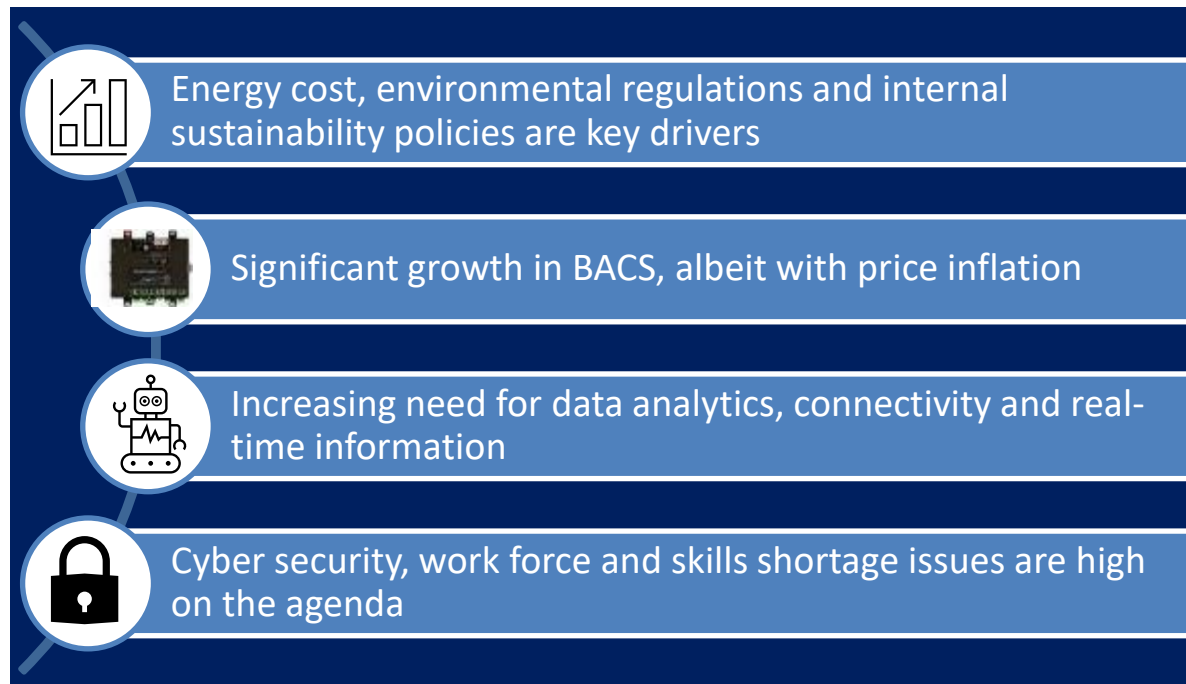


% of US adult age 55 and older who are retiring





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Thank you!





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