



Department
of Health &
Social Care



Cooling: A Strategic Estates Issue

NHS Estates: Challenge and Opportunities Arising

Presented by:

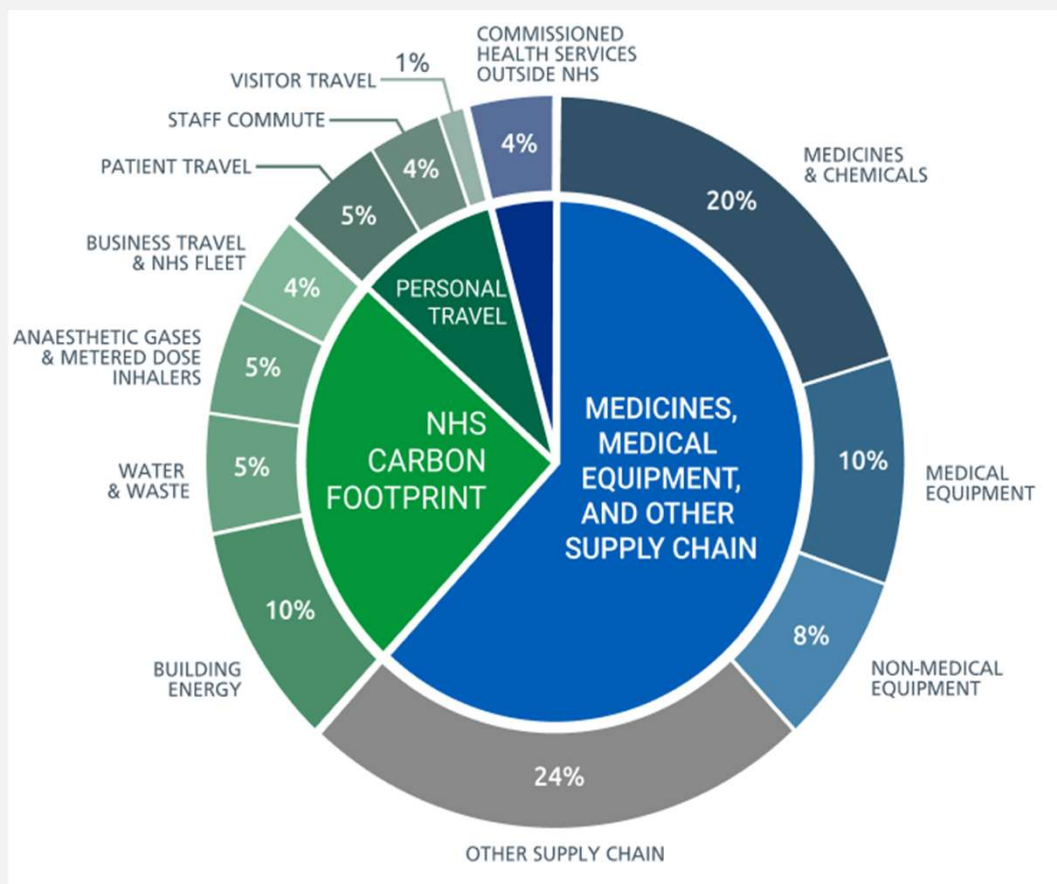
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Why Cooling Is Now a Strategic Estates Issue

- Drivers of rising cooling demand in the estate
- How the NHS Estate is responding to the challenge
- **HTMs and Net Zero Building Standard**; *the technical enabler of safe, compliant cooling and guardrail for sustainability-led design and retrofit decisions*
- **Call to Action**

The Challenge: Net Zero Target



- October 2020 **NHS became the worlds first** health service to commit to being Net Zero. It committed to:
 - Net Zero in its Directly controlled emissions by 2040 (80% reduction by 2032)
 - Net Zero in its Indirect emissions by 2045 (80% reduction by 2039)
- Climate change is the **biggest and most pressing challenge of our generation**. The climate emergency is a health emergency
- NHS responsible for **5% emissions in the UK**; Estate emissions a large part of that making up over 1/3 of all public sector energy emissions
- NHS operates in **25,000,000M2 of hospital estate** (1,140 hospitals) plus 7,500 Primary care facilities and 11,000 community pharmacy sites – these need to be **80% NZC by 2032 and 100% by 2040**

The Critical Stats

- In glass-heavy hospital builds, cooling now accounts for up to **10 to 15% of total electricity spend** during peak summer months.
 - 1985 to 2014 ~48% The "PFI Surge"; includes many glass-heavy designs.
 - Post-2015 ~10% The most modern builds; theoretically highest efficiency.
- **Energy Intensity** of newer buildings often have a higher electricity intensity than 19th-century buildings because of the sheer amount of medical technology and the 24/7 cooling required for glass-heavy wards. Similarly clinical space has increased by **26%** over the last decade. This is significant because clinical spaces (theatres, ICU) require the most cooling
- **BREEAM Legacy** of many buildings rated "Excellent" 15 years ago are now underperforming because their "glass-box" design didn't account for the 2020s' frequent 35°C+ summer peaks.
- **The "Equipment" Problem**; A single MRI or CT scanner generates enough heat to warm a small house. As hospitals digitise (AI diagnostics, electronic records), the energy required to cool onsite server rooms has grown by an estimated **~20%** since 2020

HTM Lens

HTM 03-01 (Specialised Ventilation) is primarily an infection control document

- Requires high "Air Change" (e.g., 20+ changes per hour in theatres) to ensure sterility. In glass-heavy buildings, this "100% fresh air" requirement means that on a 30°C day, the system must cool massive volumes of hot outside air to 18°C, creating a huge electricity spike

The Conflict: To hit net zero, trends include recirculate air. However, HTM 03-01 strictly limits recirculation in clinical areas to prevent cross-contamination.

The Shift: We are seeing a move toward "Variable Air Volume" (VAV) systems. Instead of running fans at 100% 24/7, AI sensors now "set back" ventilation when theatres are not in use, a practice finally standardised in the 2021/22 updates

HTM 07-02 is the NHS's primary guidance on making energy work.

In its rewrite, it is being used to fix the "Greenhouse Effect" of modern glass builds:

Benchmark Pressure: HTM 07-02 sets EUI targets. Modern glass buildings often fail these because their "cooling load" is too high.

Focus on "Passive First": EnCO2de will prioritises fabric-first interventions. Therefore, before upgrading a chiller, trusts will need to consider "passive" measures like external solar shading.

Operational Management: Providing the framework for "Energy Champions" to use data from the ERIC database to identify "Energy Performance Gaps" where a modern building is using 2x the energy it was designed to use.

Trends in NHS Cooling Strategy

From "Mechanical" to "Passive"

- Solar Filming & Shading
- Thermal Mass Strategy
- Heat Recovery e.g. Simultaneous Heating & Cooling, Ice Storage
- Layout and operational changes e.g. Heat-generating equipment zoning and separation of clinical and non-clinical heat loads - NZBS

Renewable/ Decarbonised Cooling

- Shift from Gas-fired absorption chillers, Older, inefficient DX systems toward;
 - High-efficiency electric chillers
 - Variable speed drives and intelligent controls
- Integration with Heat pumps (reversible systems)- Winter heating and Summer cooling, Indirect Evaporative Coolers,
- Solar-Enabled Cooling with On-site PV
- Ambient and Ground-Source Opportunities, ie use of aquifers, boreholes, or thermal stores for:
 - Large acute sites
 - New builds or major refurbishments

Emerging Trends

Thermal Storage and Demand Flexibility

Chilled water or phase-change thermal storage:

- Shifting cooling demand off-peak
- Supporting grid-friendly operation

Alignment with:

- Time-of-use tariffs
- On-site renewables

HTM Perspective

- Maintaining temperature control and resilience
- Clinical acceptability of stored cooling
- Monitoring and assurance requirements
- Likely future themes:
 - Stronger guidance on overheating risk
 - Greater acceptance of demand-side solutions

Conclusion: A Strategic Convergence

- The "Future NHS Estate" is being shaped by these three drivers:
 - **The Net Zero Building Standard (NZBS):** Acts as the **Financial Gatekeeper**
 - **HTM 03-01 & 07-02:** Act as the **Engineering Guardrails.**
 - **Governmental Overheating Policy (Part O & Climate Adaptation):** Acts as the **Risk Manager**

- Framing the Future:

Phase A: The Death of "Unchecked Glazing"



Phase B: AI-Driven "Anticipatory" Cooling



Phase C: Increase of "Radiant & Passive" Cooling

Call to Action- Solving the Cooling Paradox

The future of the NHS estate is not about 'cooling the air'; it is about building thermal sovereignty.

By moving from energy-hungry mechanical chilling to integrated, passive, and resilient design, we aim ensure that our hospitals remain sanctuaries of healing, no matter how high the temperature climbs.

Let's stop designing for the climate we used to have and start building and optimising buildings for the one we now have.



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