

Modular Energy-Efficient Healthcare Buildings for the NHS

Delivering Wards, Theatres, Diagnostics and Community Care Through Sustainable Design and Innovative Funding

The NHS estate faces unprecedented pressure from rising demand, ageing infrastructure, and the transition toward community-based care. Modular, energy-efficient healthcare buildings provide a rapid, flexible, and financially viable solution for expanding capacity — when combined with low-carbon technologies and innovative funding models.

Executive Summary

Modular, energy-efficient healthcare buildings provide a rapid, flexible, and financially viable solution for expanding capacity across:

Acute Wards

Rapid deployment of additional inpatient bed capacity

Surgical Theatres

High-spec elective surgery environments

Diagnostic Hubs

Increased imaging and testing capacity

Community Treatment Centres

Decentralised care closer to patients

When combined with low-carbon technologies and innovative funding models, these solutions enable NHS organisations to:

- Increase patient throughput and reduce waiting lists
- Lower operational and energy costs
- Avoid significant upfront capital expenditure
- Potentially mitigate VAT through service-based delivery models

The NHS Estate Challenge

The NHS is operating under significant strain. Traditional construction methods are often too slow and disruptive to meet urgent demand.

7M+

Patient Pathways

Waiting for treatment in England



Rising Demand

For diagnostic and outpatient services



Ageing Infrastructure

Limited adaptability across the estate



Capital Constraints

Limiting new build programmes

Modular Healthcare Buildings: A Strategic Solution

Definition and Scope

Modular healthcare buildings are off-site manufactured, fully compliant clinical environments designed to meet NHS standards (HBN/HTM).

Applications include:

- ◆ Inpatient wards
- ◆ Operating theatres and clean rooms
- ◆ Diagnostic imaging (MRI, CT)
- ◆ Community diagnostic centres (CDCs)
- ◆ Outpatient and primary care hubs

Core Benefits

Speed of Deployment

Facilities can be operational in weeks rather than years — up to **50% faster** delivery than traditional builds

Reduced Disruption

Off-site construction minimises noise, dust, and operational disruption

Flexibility and Scalability

Buildings can be expanded, reconfigured, or relocated as demand changes

Cost Efficiency

Lower construction and lifecycle costs due to controlled manufacturing and reduced delays

Clinical Compliance

Designed to meet NHS technical standards for infection control, ventilation, and patient safety

Applications Across Healthcare Settings

Modular solutions are already supporting theatres, diagnostics, and outpatient services across NHS estates.



Acute Wards

- Rapid deployment of additional bed capacity
- Decant facilities during refurbishment



Diagnostic Centres

- Community Diagnostic Centres aligned with NHS strategy
- Increased imaging and testing capacity



Surgical Theatres

- Elective surgery hubs to reduce waiting lists
- High-spec environments with compliant airflow and sterility



Community Treatment Centres

- Decentralised care delivery closer to patients
- Reduced pressure on acute hospitals

Energy Efficiency and Net Zero Alignment

The NHS has committed to becoming the world's first net zero healthcare system.

Modular buildings support this through a suite of core technologies and deliver measurable sustainability benefits:

Core Technologies

01

LED Lighting

Reduced energy consumption and maintenance

02

Solar PV (Photovoltaics)

On-site renewable energy generation

03

Air Source Heat Pumps (ASHPs)

Low-carbon heating aligned with electrification strategy

04

High-Performance Building Fabric

Enhanced insulation and airtightness

05

Smart Energy Management Systems

Real-time optimisation of energy usage

Sustainability Benefits

Reduced operational carbon emissions

Lower energy costs over building lifecycle

Reduced construction waste through off-site manufacturing

Alignment with NHS Net Zero targets

Funding Models to Reduce Capital Burden

Funding models are widely used to spread costs and reduce financial pressure on NHS Trusts.



Lease Agreements

Avoids large upfront capital expenditure



Managed Service Contracts

Aligns costs with annual budgets



Pay-as-You-Use Models

Enables immediate delivery of facilities

- ☐ **Revenue-Linked Investment:** Increased clinical capacity → increased activity-based funding. The "**Revenue follows the patient**" model supports business case viability.

VAT Mitigation Through Outsourced Services

The Challenge

- ◆ Lease payments are treated as a supply of services
- ◆ VAT is charged on payments
- ◆ NHS bodies typically cannot fully recover VAT on leased assets

Service-Based Delivery Model

By structuring modular healthcare provision as a fully managed service, including:

- Building provision
- Maintenance
- Facilities management
- Equipment integration

Under UK VAT rules, certain outsourced services to the NHS may qualify for VAT recovery under **Contracted-Out Services (COS) rules**.

Potential Benefits

Reduced or Mitigated VAT Exposure

Improved Affordability of Projects

Simplified Lifecycle Management

Additional Financial, Operational and Strategic Benefits

Increased Throughput and Revenue

- More theatres and diagnostics
→ more treated patients
- Reduced waiting lists and RTT breaches

Workforce Efficiency

- Optimised layouts improve clinical workflows
- Reduced staff fatigue and improved productivity

Estate Rationalisation

- Enables phased replacement of ageing infrastructure
- Supports shift to community-based care models

Strategic Advantages for ICS and Trusts

Modular, energy-efficient healthcare buildings enable:

1

Agility

Rapid response to demand surges

2

Resilience

Continuity during refurbishment or crises

3

Sustainability

Lower carbon and energy costs

4

Financial Flexibility

Reduced capital dependency

5

Future-Proofing

Adaptable infrastructure

Risks, Considerations and Conclusion

Risks and Considerations

- Planning and site constraints
- Integration with existing estate infrastructure
- Long-term contract management (for outsourced models)
- VAT and accounting treatment
- Supplier quality and compliance assurance

References

1. Modular healthcare transformation and benefits
2. NHS demand pressures and modular response
3. Lease funding and revenue-linked models
4. NHS SBS modular framework
5. Speed and sustainability benefits
6. Clinical applications (theatres, diagnostics, wards)
7. NHS-compliant modular ward construction

Conclusion

Modular energy-efficient healthcare buildings represent a **transformational opportunity** for NHS estates. They provide:

- ◆ Rapid deployment of high-quality clinical environments
- ◆ Alignment with Net Zero and sustainability goals
- ◆ Flexible, scalable infrastructure
- ◆ Innovative funding routes that reduce capital barriers

When combined with innovative funding, they offer a practical, financially sustainable pathway to modernising healthcare infrastructure and improving patient outcomes across the UK.