

Sustainable Kidney Care: Checklist for New and Retrofit Haemodialysis Units

Location	
1	Convenient location, co-located with other amenities/health and care services <input type="checkbox"/>
2	Accessible by public transport, walking, or cycling <input type="checkbox"/>
3	Biodiversity is preserved and enhanced <input type="checkbox"/>
Building design	
4	Achieve sustainable building standards: NHS Net Zero Building Standard, Health Technical Memorandum 07-07, “Outstanding” BREEAM rating <input type="checkbox"/>
5	Sustainable heating, lighting, and energy generation <input type="checkbox"/>
6	Passive heating/cooling and natural room ventilation <input type="checkbox"/>
7	Smart energy management systems and sensors to independently control and monitor heating, lighting, and ventilation in different areas <input type="checkbox"/>
8	Natural light maximised in high-occupancy rooms (e.g. waiting areas, offices) <input type="checkbox"/>
9	Access to green space for patients and staff <input type="checkbox"/>
Dialysis infrastructure	
10	Central Concentrate Delivery System (CCDS) installed for bulk acid deliveries <input type="checkbox"/>
11	Higher concentration acid solutions (1:44) <input type="checkbox"/>
12	Optimise water purification efficiency and minimise waste <input type="checkbox"/>
13	Energy efficient dialysis machines incorporating heat exchangers, online priming and low flow idling between sessions <input type="checkbox"/>
Service model	
15	Procurement of sustainable equipment and medications <input type="checkbox"/>
15	Electronic recording of dialysis sessions <input type="checkbox"/>
16	Telemedicine where appropriate <input type="checkbox"/>
17	Shared/self care <input type="checkbox"/>
18	Waste management infrastructure <input type="checkbox"/>
Enablers	
19	Kidney Unit Sustainability Champion <input type="checkbox"/>
20	Lifecycle costing in financial calculations for business cases <input type="checkbox"/>
21	Senior leadership commitment to prioritisation of sustainability and associated costs <input type="checkbox"/>
<i>More information on implementation details can be found in the CSH resource library.</i>	

LOCATION

The location of a renal unit has important implications for the travel needs of staff and patients. An ideal location will be convenient for the patient population, accessible via sustainable modes of travel. Co-location with other health and care services will also reduce overall patient travel. Additionally, any existing ecosystems on site which will be cleared for a new build should be incorporated in the design of the build or relocated to another site to preserve local biodiversity.

1. Convenient location co-located with other amenities/health and care services.

- Staff/patient engagement to support choosing location
- Consider other local amenities which would complement the renal unit and are useful to co-locate with.

2. Accessible by public transport, walking, or cycling.

- Ensure new build fits with Trust's green travel plan
- Analysis of existing infrastructure on site, transport connections e.g. cycle lanes, walking paths, cycle
- Review patient catchment area and transport options

3. Ecosystems are preserved or enhanced

- Conduct an ecological survey and environmental impact assessment to understand local ecosystems and biodiversity
- Plan to incorporate green space into new build (see no.9)
- Ensure [Biodiversity Net Gain](#)

BUILDING DESIGN

Building a new renal unit provides a good opportunity to ensure it is designed to minimise its carbon footprint. This section provides an overview of good practice in the technical design of sustainable health estate/infrastructure, including any relevant national guidelines and standards.

4. Achieve sustainable building standards

- Technical specifications in the NHS Net-Zero Building Standard
- BREEAM certification of at least "Excellent" for new buildings, or "Very Good" for a retro-fitted building.

5. Sustainable heating, lighting, and energy generation.

- South/west facing roofs are best positioned for solar power and heating.
- Photovoltaic panels supply renewable electricity. Any excess can be exported to the grid under the Feed-in Tariffs scheme.
- Solar thermal panels or tubes lower energy needed to heat water.
- Similarly, heat pumps gather heat from the environment to warm rooms and are more efficient than gas boilers.
- LED is most efficient for lighting, emitting 95% light and 5% heat.

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6. Passive heating/cooling and natural room ventilation

- Incorporate insulation into new builds or retrofit existing buildings.
- Take advantage of building orientation in relation to sunlight. Direct sunlight through windows contribute to heating in winter, but can cause overheating in warm weather or make screens difficult to read.
- Shading windows and reflecting glass also help to prevent direct sunlight entering through windows.

7. Smart energy management system and sensors

- Installation of building energy management systems to facilitate e.g changes in temperatures for different areas in the dialysis unit/rooms
- Incorporate sensor technology to detect when rooms are empty and maintain correct temperature and light settings to reduce energy consumption.
- Sub-meter renal unit to independently monitor energy and water use to help engage staff, patients and visitors in reducing consumption

8. Natural light maximised in high-occupancy rooms

- When designing layout of the renal unit, ensure areas that would benefit from natural light are placed near the outside where there are windows, rather than in the center.

9. Access to green space for patients and staff

- Incorporate green space on site for patients and staff to connect with nature and improve mental and physical health.
- Consider co-producing green space with patients/local community and using it as a community space.
- Rooftop and vertical gardens can be good options where space is constrained. The NHS Forest can provide ideas and support in designing natural space for different contexts.

DIALYSIS INFRASTRUCTURE

Dialysis is a resource-intensive treatment, which requires large amounts of energy, purified water, and a regular supply of acid concentrate. Additionally, it generates waste water and packaging. Modern dialysis infrastructure is more efficient and can minimize waste.

10. Central Concentrate Delivery System (CCDS) installed for bulk acid deliveries.

- Install holding tanks for large volumes of acid concentrate, with piping systems to deliver acid concentrate to dialysis machines. This will reduce the number of deliveries and packaging waste from central concentrate cannisters.

11. Higher concentration acid solutions

- Procure more concentrated acid solution (1:44 dilution ratio), reducing volumes and therefore carbon impact of transporting solution for delivery.
- Adjust dialysis machine settings for correct composition of dialysate fluid.

12. Optimise water purification efficiency and minimise waste

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- Invest in new reverse osmosis (RO) machines that can adjust water flow or minimise dead space.
- The RO system should also be the appropriate size for the needs of the renal unit, to avoid excessive water treatment and cleaning requirements.
- Install piping and water storage to divert reject water away from sewage and towards other uses, e.g. cleaning, toilet flushing.

13. Energy efficient dialysis machines incorporating heat exchangers, online priming and low flow idling between sessions.

- Use haemodiafiltration capable machines to produce fluid online for priming, bolus, and washback of bloodlines, rather than bags of saline which generate plastic waste.
- Reduce dialysate flow to 150ml/min when idle, e.g. when waiting for dialysis to start.
- Ensure dialysis machines have heat exchangers or retrofit heat exchangers on existing dialysis machines in order to reduce energy needs of heating dialysate.

SERVICE MODEL

Reviewing the way care is delivered can also improve the sustainability of a renal unit. This can be supported by incorporating digital technology as an infrastructure with patient input.

14. Procurement of Sustainable equipment and medications

- Ensure that procurement aligns with the NHS net zero supplier road map (England) or the sustainable procurement guidance in the country where the unit is sited.

15. Electronic recording of dialysis sessions

- Use electronic patient records and prescriptions
- Populate information directly to computer systems instead of paper notes. Some dialysis machines are able to transfer information from dialysis sessions straight to patient records allowing staff time to provide more support to patients

16. Telemedicine where appropriate

- Offer virtual consultations for patients that are digitally literate and confident to access care remotely.
- Share laboratory results online using national digital packages such as Patient Knows Best
- Work with information governance to ensure patient data is secure when communicating information online with dialysis providers.

17. Shared/Self Care

- Encourage patients to be involved in their care and for those able, to transition to home dialysis
- Consider a home training area within the dialysis unit thereby maximising use

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of facilities

18. Waste management infrastructure

- Provide bins to separate different types of waste and staff education on correct waste disposal.
- Establish recycling or take-back programmes for acid concentrate and other packaging.

ENABLERS

NHS financing can pose problems for incorporating sustainability into a new build or retrofit of a build as this can require significant additional capital costs. It is therefore vital to gain the support of finance and the senior leadership team to ensure sustainability measures are incorporated irrespective of project costs increase.

19. Kidney Unit Sustainability Champion

- Involve your local Kidney Unit Sustainability Champion in development of sustainable changes in new builds and retrofit building.
- Clear communication with project team and contractors to position sustainability as an integral goal of the new unit.

20. Lifecycle costing in financial calculations for business cases

- Calculate cost over the lifetime of the renal unit, rather than separating capital and revenue costs, to illustrate the cost saving potential of sustainability measures.
- Include inflation and projected price rises for energy and water.

21. Senior leadership commitment to prioritization of sustainability and associated costs.

- Refer to the environmental commitments of the Trust and NHS, e.g. Green Plan, net-zero carbon targets.
- Link sustainability to healthcare priorities like improved population health and reduced health inequalities.

Additional resources and case studies

- The [CSH resource library](#) contains case studies of implementing greener kidney care.
- Green Plan and Green Travel Plan for your Trust. New renal units should contribute to the goals and commitments laid out in these documents.
- The [NHS Net Zero Building Standards](#) has technical guidance for new healthcare buildings.
- The [NHS Forest programme](#) can provide guidance and support in incorporating green space into healthcare estate, and maximizing use of these spaces for patient and staff wellbeing.