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## Review and Amendment Log

Version Number	Reasons for Development/Review	Date	Description of Change(s)

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## **1.0 Introduction**

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## 1.0 INTRODUCTION

Driven by apparent rising summer time temperatures, the Trust recognises that, with the increasing use of electronic equipment throughout the Trust, coupled with growing service user and staff expectations, an increase in requests for air conditioning is inevitable.

In common with all NHS Foundation Trusts, Norfolk and Suffolk NHS Foundation Trust is under Ministerial direction\* to reduce its energy consumption. Responding to this and other environmental pressures, the Trust has committed to adopting an environmentally friendly approach across the whole range of its activities and recognises that air conditioning is energy intensive and impacts significantly on revenue costs.

The Trust is also keenly aware that the uncontrolled proliferation of air conditioning may put the electrical services infrastructure of our sites under stress, with a real potential for failure of our electrical supply arrangements. It is also acutely aware of the pressures placed on the national Grid and the recent reports of the low level of available spare capacity which if not improved could lead to possible power cuts and with severe consequences upon our services.

The Trust has determined, therefore, that a formal policy and procedure is required to ensure that summer time environmental cooling is applied in a logical, controlled and appropriate manner.

**F Gas Regulations** -After a long process through the European Parliament the F-Gas regulations became law when they were published in the EU Official Journal in June 2006. They entered into force on 4th July 2006 with much of the regulation applying from 4th July 2007.

The objective of the regulation is to contain, prevent and thereby reduce emissions of the fluorinated greenhouse gases covered by the Kyoto Protocol. The regulation addresses containment, use, recovery, destruction, reporting, labelling, training, certification and some placing on the market prohibitions for the fluorinated gases.

- HFCs are one group of fluorinated greenhouse gases covered by this legislation.
- The regulation does **not** ban the use of HFCs in any static refrigeration or air conditioning application.

There is, however, an enormous responsibility upon those working in the industry to apply these measures so that emissions are significantly reduced

\* The Minister's letter, "New Energy Efficiency Targets" is attached as Appendix 6

## **1.1 AIMS OF POLICY**

The aim of this policy is to:

Raise awareness of the environmental and financial costs of air conditioning and promote the adoption of other space cooling techniques.

Ensure those procuring all electronic equipment consider building services implications at an early stage and consult with the appropriate technical department(s).

Ensure that the Trust operates a fair and consistent process in assessing requests for the installation of equipment and services for reducing summer time temperatures in its properties, by introducing a formal, standardised option appraisal process.

Ensure that the building services infrastructure of Trust properties is not put at risk by the uncontrolled introduction and use of air conditioning.

Ensure techniques employed to provide reduced summer time temperatures are those that are as environmentally friendly as possible and generate least revenue cost to the Trust.

Ensure a strategy is developed for centralising cooling services.

Ensure that environmental controls for heating and cooling are employed to maximise energy efficiency on existing plan controls and new building design to provide a comfortable environment for all within the hospital.

To explore alternative technology for providing comfort cooling other than air conditioning plant i.e. natural ventilated buildings on new design schemes.

To ensure compliance with the current F Gas regulations.

Whilst the term 'Air Conditioning' is more correctly applied to combined temperature and humidity control, any space cooling process based on mechanical refrigeration will be referred to as air conditioning throughout this Policy.

## **1.2 OBJECTIVES**

To provide environmental conditions consistent with activities.

To safeguard site and local electrical supplies to ensure they have adequate capacity and 'head room' to meet existing day-to-day loads

To ensure the availability, accuracy and reliability of medical and associated equipment is not compromised either by excessive temperatures, or by changes in temperature.

To be sensitive to the Trust's responsibilities for limiting environmental damage.

To follow and adhere to best practice design solutions.

To account for energy use within the Trust's properties.

To ensure compliance with the F-Gas regular.

## **2.0 PROCESS**

The Risk Office will be consulted whenever and however requests for air conditioning are raised. A first response by the Works/Estates Department to requests for air conditioning will be to ask the occupier to complete a proforma application form (see appendix 3), which will be forwarded to the Works/Estates Manager

The Works/Estates Manager will consider the appropriateness of the request.

If the need is endorsed, in conjunction with the occupier, the Risk Office will request that the Works/Estates Manager for existing buildings or Capital Projects Officer for new building design examines options for changes to the space, relocation and other administrative solutions.

If a solution cannot be provided by process 3.3, a technically competent officer will carry out a formal option appraisal exercise and will make recommendations to the Works/Estates Manager, or a nominated member of that group, will share and explain the option appraisal documents with the occupier.

The Works/Estates Manager will assess the impact those recommendations make upon the existing local and site engineering infrastructure.

Provided the impact can be accommodated, Works/Estates Officer(s) will establish the supply and installation and running and maintenance costs of the recommended solution, including any additional works required within the space to ensure it complies with the maximum Carbon Performance Rating permitted under current building regulations. Estates Officers will factor in a cost to provide energy metering and adequate controls of any air conditioning equipment that may be required.

The Works/Estates manager will advise these costs to the originator of the request and appropriate general manager for funding approval. No work will proceed until the funding including the ongoing costs is met.

If the occupier wishes to proceed with the installation, he/she will be required to source the necessary funding – both for the initial supply and installation costs and for the subsequent annually recurring maintenance charges. A form is attached at appendix 5 for use in confirming approval for the work and for the virement of funding between the Occupier Directorate and Estates.

Where user controls are fitted, the occupier shall pledge that he/she will operate any equipment installed under this policy with due care and practice 'good housekeeping' with respect to its operation. The Works/Estates Manager will provide guidance on this aspect.

The occupier shall notify the Works/Estates Manager if or when there is a change of use of the treated space and/or a change in any medical or electronic equipment installed within it.

A flow chart of these processes appears as Appendix 1.

### **3.0 POLICY LINKAGE**

This Policy is to be considered as devolving from the Trust Sustainability Development Steering Group.

All commitments and obligations of the Trust Sustainability Development Steering Group.

The Estates Manager will report each instance of the completion of an air conditioning option appraisal to the Health & Safety/Trust Sustainability Development Steering Group, effectively providing feedback into the Environmental Performance monitoring process.

### **4.0 TECHNICAL CONSIDERATIONS**

Air Conditioning must be recognised as energy intensive, costly and exceptional.

An option appraisal exercise shall be undertaken to establish a suitable strategy to meet occupiers' requirements; The Officer conducting the appraisal must seek clinical advice to ensure that requirements have been fully expressed and are mutually understood.

The appraisal shall consider:

The elimination/reduction of heat gains from local services and from adjoining spaces; Solar shading; Increasing air movement; Enhanced natural ventilation; Mechanical ventilation; Air Conditioning and combinations of these options.

The appraisal shall be conducted in accordance with the Government's Good Practice Guide 291, 'A Designer's Guide to the Options for Ventilation & Cooling'. Abstracts from the Checklists and Option Appraisal Worksheet are attached as appendices to the Policy.

The Guide makes reference to complementary design resources published by the Chartered Institute of Building Services Engineers and others and these documents, together with NHS design notes and memoranda, shall be consulted in determining options.

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The design process must consider the whole of the space and must include passive measures able to reduce temperature. For air conditioning, the overall Carbon Performance Rating, taking any proposed air conditioning burden into account, should be no greater than the standards published or referenced within Part L of the Building Regulations (Conservation of fuel and power. July 2013). Mechanical ventilation systems should similarly comply with these standards.

Consideration must be given to relocating the user function to a building with installed chilled water services, capable of supporting their need.

Any controlling thermostats shall be installed and adjusted so as to provide the maximum permissible (summer) temperature in the space.

Appropriate controls must be installed to match occupancy and/or use of any heat generating equipment. Where feasible, automatic occupancy sensing shall be employed, giving on/off or 'setback' (variable fan speed) control.

If an existing system contains R22 there is a consideration to replace the total system with an approved refrigerant due to the discontinued support of the R22 gas in 2016.

The latest Health Technical Memorandum 03-10 Specialised ventilation for healthcare premises. Part A -Design and installation and Part B Operational Management.

## **5.0 RESPONSIBILITIES**

### **Chief Executive**

The Chief Executive has ultimate responsibility for providing healthcare services and for the Trust's Environmental Performance. The Chief Executive discharges those responsibilities by ensuring robust management arrangements are in place and work effectively to achieve a proper balance between environmental needs and their cost.

### **Estates Manager**

The Works/Estates Manager has overall responsibility for providing appropriate environmental conditions in which to best deliver healthcare. The Manager is responsible for:

- ☐ Establishing and maintaining an organisational framework for the management of the environment;
- ☐ Ensuring that the Trust sites' Engineering Infrastructure is both safe and reliable;
- ☐ Ensuring that clients of the Facilities Directorate are given best possible service and advice.

The Estates Manager is responsible for ensuring technically competent officers undertake the option appraisal process stage under this Policy.

The Works/Estates Manager is responsible for the overall management of the optional appraisal process and with assisting occupiers to an understanding of the appraisal. In order to achieve this, the Estates Manager will ensure that competent officers undertake the appraisals and that the appraisals are complete, factual and fair.

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The Works/Estates Manager is responsible for assessing the impact of the

recommendations of the appraisal process on the electrical infrastructure of the particular site. He will make safeguarding of both normal & emergency electrical supplies a priority but is responsible for preparing any business case as may be required to reinforce the services infrastructure to meet the outcome of the option appraisal process.

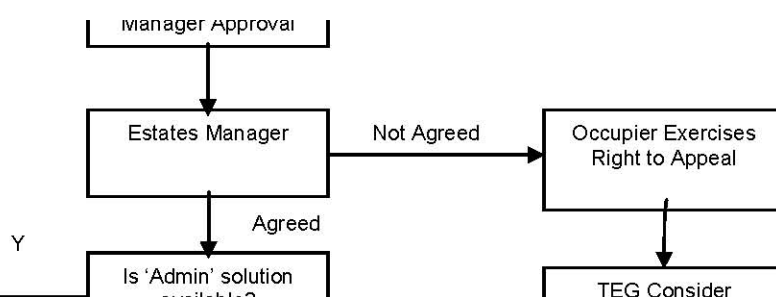
## 6.0 Policy Review

The Works/Estates Manager will conduct a review of the Policy and its application and report any recommendations.

This Policy is to be reviewed every 3 years by the Works/Estates Manager or nominated Officer or sooner if there is any significant change to the regulations. The revised policy is then to be presented to the Trust Sustainability Development Steering Group (SDSG) and or Health & Safety committee.

## 7.0 Appendix 1

A  
A



## Processes Chart

Request Head of Department with General

PROCESSES COMPLETE

## 8.0 Application to Request Works to Reduce Summer Temperatures

Department/Function \_\_\_\_\_

Site \_\_\_\_\_

Building \_\_\_\_\_

Floor \_\_\_\_\_

Space(s) \_\_\_\_\_

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I/we request works to control the summer time temperatures in the spaces indicated above. The room(s) face North/South/East/West and the sun falls on our windows between \_\_\_\_\_ and \_\_\_\_\_ each day. The space is used for \_\_\_\_\_ days per week. The space is used between \_\_\_\_\_ and \_\_\_\_\_ each day (Please provide further information if hours are variable). We propose to procure and locate the following diagnostic/analytical medical/electronic (or other heat generating) equipment in the area:

We require cooling because:

Name of Officer Submitting Request

\_\_\_\_\_  
Job Title

\_\_\_\_\_  
Ext. No.

\_\_\_\_\_  
Endorsed by Head of Department (signature)

\_\_\_\_\_  
Date

## 9.0 Option Appraisal

**The option appraisal will be a staged iterative process, attempting to balance user requirements and the constraints of cost and environmental performance. The process will consider users' thermal, aural and visual comfort and air quality requirements,**

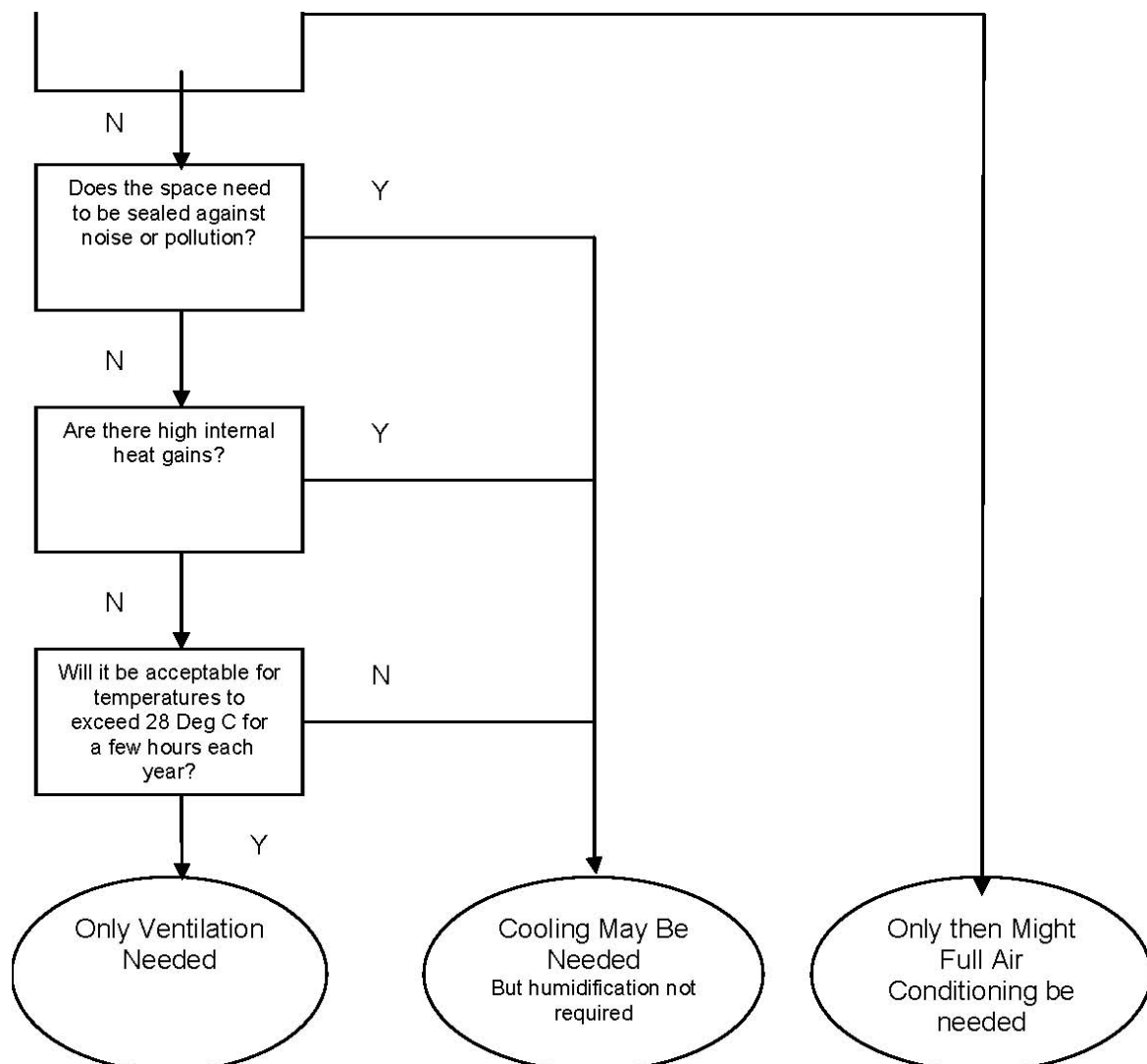
appropriate to the activities in the space and in the building. Where choices may impact on patient welfare, a clinical risk assessment is to be undertaken to inform the option appraisal process.

## Stage 1. Assessment of User Requirements

User requirements must be established in accordance with the following diagram:

Is close control of Humidity Required?

Will it be acceptable for temperatures to exceed 28 Deg C for a few hours each year?



## **Stage 2 – Option Appraisal Checklists**

**These checklists present information on aspects of building services engineering and environmental control in a standardised way. They are referred to by the Estates Officer undertaking the Option Appraisal as part of the process.**

**The options cover a number of techniques, some of which are only appropriate for ‘new build’ situations and are unlikely to be feasible for existing accommodation.**

### **1. Assessment of the Space**

- ☐ **Relationship – Adjacent spaces or services transiting the space may be contributing heat gains.**
- ☐ **Shape – Narrow or deep plan. Single or double sided. Natural ventilation can meet comfort criteria for narrow plan and double sided spaces.**
- ☐ **Windows – Glare & Heat Gain will need to be controlled by some form of shading.**
- ☐ **Mass – Heavy structures can attenuate heat gains. During prolonged warm weather, structure must be cooled at night.**
- ☐ **Insulation – Insulation is good for winter and summer operation, reducing peak heating and cooling demands.**
- ☐ **Shading – Shading devices can reduce direct solar gain through windows. The most effective devices are external.**

### **2. Natural Ventilation**

**Occupants have a broad tolerance to naturally ventilated buildings, they understand them, they have individual and immediate control (openable windows) and generally accept the peak summertime periods when control is lost on temperature and relative humidity.**

- ☐ **Heat gain -Heat gain in the space should be less than 40W/m<sup>2</sup> to meet comfort criteria. The source of any heat gain may be re-locatable, e.g. consider remote compressor/condenser for refrigeration equipment.**
- ☐ **Single sided – Single sided ventilation is effective for widths up to twice the floor to-ceiling height. Horizontal pivoted and vertical sash windows have good ventilation capacity. Side and top/bottom pivoted windows are less effective.**
- ☐ **Cross flow – Cross flow ventilation is effective for widths up to five times the floor to-ceiling height; spatial layout must not restrict cross flow of ventilation air.**
- ☐ **Stack – Effective for widths up to five times the floor-to-ceiling height but stack must be generous to minimise pressure loss. Can achieve sufficient air movement during still summer peak conditions. Stairwells and atriums can generate stack forces.**
- ☐ **Wind tower – Effective, but wind pressure is not completely predictable. Needs complex control to maintain comfort criteria**

### 3. Mechanical Ventilation

- ☐ **Simple extract** – Simple extract system has low capital and energy cost but needs to be run in mixed-mode, i.e. natural ventilation must be available to give high airflow rates for summertime operation to obtain adequate air movement. Source of make-up air needs to be considered to minimise draughts and dust/pollution ingress.
- ☐ **Supply & Extract** – Ducted system will permit heat recovery, filtration and humidification. Fan speed control will minimise fan energy and allow turndown for minimum winter ventilation.
- ☐ **Hollow core** – Moving air *through* the structures (as opposed to moving air *across* the structure) has the potential to use the mass of the building fabric for heat exchange. With nighttime ventilation, cooling is stored and used the following day to cool the supply air before passing it to the space. In winter, waste heat gains can similarly be stored and re-used.

### 4. Mixed-Mode Systems

Different systems are used at different times of the year. This type of operation may confuse building occupants unless it is clearly explained what they should be doing at particular times of the year in terms of opening and closing windows.

Mixed mode systems offer improved environmental conditions without the need to operate ventilation fans throughout the year.

- ☐ Assuming the space is relatively air tight, mechanical ventilation, with exhaust air heat recovery, may be used to provide minimum fresh air during the winter months.
- ☐ Spring and Autumn natural ventilation will allow free cooling.
- ☐ Summer operation is by natural ventilation, with mechanical ventilation for nighttime cooling.

### 5. Displacement Ventilation

Displacement ventilation is based on the concept of an ideal airflow pattern. Instead of turbulence and mixing, flow is unidirectional with reduced spreading of contaminants. Air is introduced at low velocity and at a temperature slightly lower than the room target temperature and creates a 'pool' of fresh air. At local heat sources (people or equipment) the air temperature naturally rises. The natural buoyancy of this heated air gives rise to air currents drawing up the conditioned air thus removing pollutants and heat to high level, where they are extracted.

- ☐ Displacement Ventilation functions better in spaces with larger floor to ceiling heights. Minimum height for effective utilisation of technique is 3m. At this floor to ceiling height, Cooling loads of 40 W/sq m are achievable.
- ☐ Air supply temperatures > 18 Deg C are employed.
- ☐ A temperature gradient will be noticeable in the space and should not exceed 3 Deg C, ankle to head.
- ☐ Considerable occupant movement or high air infiltration rates will reduce the effectiveness of the system.

## **6. Static Cooling Systems**

Chilled building fabric elements are employed to offset heat gains of the order of 70 to 140 W/ sq m.

- ☐ Chilled ceilings employ radiant panel(s) integrated into the total ceiling design; Lighting, smoke detection, partitioning must be taken into account. The maximum cooling load to be handled is of the order of 70 W/sq m.
- ☐ Chilled beams can be of the static (passive) type, offering cooling loads of up to 100 W/sq m., using natural air buoyancy effects, or fed from a primary air system (active beam), offering cooling loads of up to 140 W/sq m.
- ☐ Can be applied in conjunction with displacement ventilation (see above) but may disrupt the desirable airflow patterns of dv. Hence cooling capacity is not additive.
- ☐ Condensation can be a problem with static cooling systems. Internal moisture loads and moisture from outside air are very variable and openable windows should be sealed. Inevitably, avoidance of condensation requires reducing the cooling capacity of the installation at or near the dewpoint temperature of the space.

## **7. Distributed Cooling Systems**

- ☐ These are local room units, which contain the refrigeration machine in its entirety or are 'split' between a room unit and a condensing unit located outdoors.
- ☐ Can also include more elaborate arrangements; such as cassettes or variable refrigerant flow units, where several rooms are served from a single condensing unit.
- ☐ Fan coil units utilise a centralised system, using water as the means of distributing cooling and/or heating. Capable of dealing with cooling loads in excess of 100 W/sq m. Maintenance costs may be high due to numbers of units each with fan,

filters and controls. Fan noise levels and aesthetics must be taken into account.

## 8. Conventional Air Conditioning

- Capable of dealing with large cooling loads in excess of 100 W/sq m. Cooling is distributed by air supply. Duct sizes can be matched to suit cooling loads.

Option Appraisal Worksheet – Ventilation & Cooling				
	Option 1	Option 2	Option 3	
Year-round humidity control can be achieved.				
System types				
High standards of air cleanliness can be achieved.				
ENERGY CONSUMPTION				
FAN ENERGY				
Fan installed load (W/sq m)				
Large plant/air distribution space requirement				
Number of fan hours during occupation per year				
Number of fan hours for night cooling per year				
High capital, energy and maintenance costs.				
Annual fan energy (KWh/sq m)				
Option Appraisal Worksheet				
PUMP AND PIPING SCHEME APPENDIX 4				
Annual chilled water pump energy (KWh/sq m)				
Annual condenser water pump energy (KWh/sq m)				
Annual other pump(s) (KWh/sq m)	Option 1	Option 2	Option 3	
Total annual pump energy (KWh/sq m)				
CO2 EMISSIONS				
CO2 Emissions (kg/sq m)				
CO2 Emissions (kg/sq m)				
CO2 Emissions (kg/sq m)				
Peak cooling load (W/sq m)				
Number of equivalent chiller hours run at full load				
OTHER ISSUES				
Chiller co-efficient of performance				
Space Requirement				
Annual chiller energy consumption				
Resultant quality of the internal environment				
HUMIDITY CONTROL				
Humidifier energy per year				
Reheat energy				
ANNUAL RUNNING COSTS				
Electrical (fan and pump) energy (KWh/sq m)				
Electrical (refrigeration) energy (KWh/sq m)				
Gas (humidification reheat) energy (KWh/sq m)				
Gas (refrigeration) energy (KWh/sq m)				
Maintenance Costs (£/sq m)				
Total annual cost				
CAPITAL COSTS				
Enabling work				
Equipment costs				
Metering costs				
Installation costs				

## To Proceed With Works to Reduce Summer Temperatures

This form is to be used when Directorates wish to proceed with works and/or the installation of equipment designed to reduce summer temperatures.

**Part A – To be completed if the installation requires on-going maintenance and energy resources to operate.**

I can confirm that I have been provided with a quote for works to reduce summer temperatures - details as follows:

Location of installation: \_\_\_\_\_

Annual running costs of installation: £\_\_\_\_\_ (maintenance and energy costs)

I hereby give authorisation for the amount identified above to be transferred from my budget on a recurrent basis.

Cost Centre: \_\_\_\_\_ Account Code: \_\_\_\_\_

Authorised by: Name:

Signature:

**Part B – Only complete if your Directorate is funding the installation costs.**

Ventilation and air conditioning units will generally be classified as capital expenditure with installation funded through the Trust's capital programme. However, some smaller installations may fall under the £5,000 capital threshold and be funded from revenue. In this instance, Directorates will need to fund the installation costs in addition to any costs falling within Part A.

I hereby give authorisation for my budget to be cross-charged with the installation costs of the above identified air conditioning unit (one-off costs)

Please forward this form to:

Installation costs: £\_\_\_\_\_ (as supplied by Corporate Infrastructure)

Cost Centre: \_\_\_\_\_

Authorised by: Name:

Signature:

**Estates Department Norfolk and Suffolk NHS Foundation Trust, Hellesdon Hospital, Drayton High Road, Norwich, Norfolk, NR6 5BE**

To: NHS Foundation Trust Chief Executives NHS Foundation Trust Estate Managers  
Health Authority Chief Executives NHS Executive Regional Directors NHS Regional  
Heads of Estates NHS Regional Directors of Finance SHA General Managers

April 2001

Dear Colleague

## NEW ENERGY EFFICIENCY TARGETS

INTRODUCTION As you know the Government is committed to tackling pollution and improving the environment.

The NHS has been highly successful in meeting the previous target of 20% reduction in energy use from 1990 to March 2000 and staff are to be congratulated. However, with the introduction of the Climate Change Programme, the NHS must now work towards a new energy saving target.

To achieve this we have introduced two sets of mandatory targets for NHS bodies in England to:

<sup>1</sup> Reduce the level of primary energy consumption by **15% or 0.15 MtC (million tonnes carbon) from March 2000 to March 2010**<sup>1</sup>

<sup>2</sup> Achieve a target of **35-55 GJ/100 cu.m.** energy efficiency performance for the healthcare estate<sup>2</sup> for all new capital developments and major redevelopments or refurbishments; and that all existing facilities should achieve a target of **55-65 GJ/100 cu.m.**

ACTION You are reminded of the importance of environmental issues, including achieving energy efficiency and whole life cycle costing to encourage best use of resources over a sustained period. The attached annex draws on best practice and innovation and provides examples of how the NHS can meet these targets. FURTHER INFORMATION/ENQUIRIES Any enquiries should be addressed to the NHS Estates Regional Office in the first instance – contact details are attached at appendix two.

JOHN DENHAM MINISTER OF STATE FOR HEALTH



<sup>1</sup>DETR *Climate Change Programme* <sup>2</sup>NHS  
Estates *Developing an Estate Strategy*

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