

# ADDITIONAL INFORMATION

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Supplementary to the report:

## Material Health

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in England and Wales

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## **Hospital Construction and PFI Schemes in the NHS**

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### **Historical Background of Hospitals and the Health Sector**

Hospitals and the health sector, before WWII, had been poorly constructed and situated, illustrating how uncoordinated the development of hospital services were. The NHS inherited these hospitals in 1948, but it was not until the publication of the 'Hospital Plan for England and Wales' in 1962 that new hospitals were designed to meet the type of service the public required. These new hospitals were designed with the District General Hospital (DGH) concept in mind, meeting almost all the needs of local populations. Eventually the old hospitals became obsolete or modified to meet other NHS services.

The traditional method of providing new hospitals was through the use of public funds. The concerning trust would prepare the specifications which would then be carried out by the private sector company selected. The actual contract with regards to the construction company, though, once the NHS hospital/facility has been built. There is no involvement in the running of the operation, such as cleaning, catering or maintenance. In terms of paying for the construction of a hospital, this would be done through a number of lump sums during construction.

By the time PFI's began to emerge the existing NHS capital stock (quality of buildings) was in poor condition and was struggling to offer the appropriate service. Hospitals were changing rapidly but construction in line with the DGH was slow. As a result by the time hospitals were constructed they were out of date.

### **PFI: Private Finance Initiative construction projects**

The Private Finance Initiative (PFI) was first introduced by the Conservative Government in 1992 and has covered a wide variety of sectors including transport, education, housing as well as health care. The government has been trying to modernise public services, including the NHS, through partnerships with private and voluntary sectors. Initially this 'process' was believed to last 10 years.

The idea behind the PFI Scheme is that the NHS does not actually set out to acquire an asset (in the case of the NHS a Hospital) but to purchase a service for a period of time. You will find that hospitals contract a number of firms, after the construction company has completed the building, to run other operations for a period of 25 - 35 years. This may go as far as sub-contracting for waste management, cleaning services and running the canteen or restaurants. This is referred to as the Design, Build, Finance and Operate contract (DBFO)(Horsman, 2003):

General data points:

- The construction industry employs about 1.5 million people in the UK and is composed of around 180,000 companies.
- The construction industry's turnover is 10% of the UK's gross domestic product (GDP)

- This industry also products 70 million tonnes of waste each year

**PFI Building Construction Procurement:**

- Single contract to design, build, finance and operate (including maintenance) a property asset over a prescribed period.
- Client pays for the availability of the asset over a period of around 25 - 35 yrs. The contractor stands to benefit from life cycle costs taken into account sustainability initiatives. These may be shared with the client.
- Client and advisory team consider sustainability accounting output specifications and contractors design team develops further.

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## Clinical waste and the NHS: Initial data review

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Prior to the 1990's, and due to Crown Immunity, the NHS' predominant method of clinical waste disposal was on-site incineration. The removal of Crown Immunity, financially stretched Trust management and a plethora of guidance documentation ensured that this predominant form of disposal was reassessed (IWM Business Services, 2000).

### Definitions

Waste arising from the healthcare sector is defined in three main legislative documents. These are The Controlled Waste Regulation 1992, Special Waste Regulations 1996 and Radioactive Substances Act 1993 (NHS Estates, 2002a). A standard and approved definition of clinical waste is given in *The Controlled Waste Regulations 1992* (SI 1992 No.588) as:

1. any waste which consists wholly or partly of:
  - human or animal tissue
  - blood or other bodily fluids
  - excretions
  - drugs or other pharmaceutical products
  - swabs or dressings, and
  - syringes, needles or other sharp instruments (commonly referred to as 'sharps') which, unless rendered safe, may prove hazardous to any person coming into contact with it
2. any other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice, investigation, treatment, care, teaching or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.

Within the English and Welsh healthcare sector clinical waste is often referred to as 'yellow bag' waste.

Some clinical waste is also classified as special waste. This includes:

1. waste containing or consisting of all prescription only medicines, including cytotoxins,
2. used sharps and/or fully discharged syringes which may contain or are contaminated with prescription only medicines or needles/sharps that have been used on a patient with a group four infection
3. non-prescription medicines which may have hazardous properties
4. photographic chemicals (e.g. X-ray fluid)
5. batteries (dry cells and lead/acid)
6. oils/solvents, and
7. mercury.

Clinical waste is identified under the following EU Hazardous Waste List/Directive categories (to which the NHS adheres to) (European Union, 1994):

- 06 Waste from inorganic chemical processes, such as  
060404 wastes containing mercury
- 18 Wastes from human or animal healthcare and/or related research (excluding kitchen and restaurant wastes which do not arise from immediate healthcare)  
1801 Waste from natal care, diagnosis, treatment or prevention of disease in humans  
180103 other wastes whose collection and disposal is subject to special requirements in view of the prevention of infection

- 19 Wastes from waste treatment facilities, off-site waste water treatment plants and the water industry,
  - 1901 Waste from incineration or pyrolysis of municipal and similar commercial, industrial and institutional wastes, such as
    - 190103 fly ash
    - 190106 aqueous liquid waste from gas treatment and other aqueous liquid wastes
    - 190107 solid waste from gas treatment
    - 190110 spent activated carbon from flue gas treatment

#### *Sanpro waste*

Household waste such as sanitary towels, condoms, nappies and incontinence pads are collectively known as sanpro waste. This waste, if generated by a healthy individual is not considered clinical waste, and can be disposed with domestic waste (DEFRA, 2003). Sanpro waste can be found in clinical waste generated by hospitals and similar medical facilities.

### **Current policies & regulations**

The Environment Protection Act of 1990 (EPA) provides the main legislative framework for waste management in Great Britain. The act requires controlled waste to be managed in such a way that it does not cause harm to human health, pollution of the environment, or serious detriment to local amenities.

#### *Duty of care*

Section 34 of the EPA of 1990 covers the statutory requirements for duty of care in waste management. The prime aim of the duty of care requirements is to ensure the safe and proper handling of clinical waste. The waste needs to be properly 'tracked', documented and described at each phase of handling (generation through to disposal). Clinical waste generated by householders is not subject to Duty of Care obligations (IWM Business Services, 2000).

The *Waste Management Licensing Regulations of 1994* requires that clinical waste must be kept, treated or disposed of in accordance with a waste management licence. However, the temporary storage of clinical waste at the site of production is exempt from this regulation (IWM Business Services, 2000).

#### *Special Waste*

Special waste is subject to control under The Special Waste Regulations (as amended) 1996. As with clinical waste, all movements of special waste need to be tracked from place of generation to treatment and/disposal facility.

### ***Other relevant legislation and guidelines***

#### *EC Directives*

The EC Directive on Waste Incineration (2000/76/EC) covers a range of processes and aims to reduce emissions of several key air pollutants and to control releases to water and land. The directive applies to all new plants from December 2002, also applies restrictions to the co-incineration of wastes in industrial plants (NHS PASA, 2001).

### *Environment Agency Technical Guidance on Clinical Waste Management Facilities*

The document provides guidance to regulators on the operational aspects of clinical waste management at licensed sites (Environment Agency, 2001). It covers:

Waste acceptance and dispatch procedures.

1. handling and storage of clinical waste
2. validation and controls for alternative treatment technologies
3. emission and environmental monitoring
4. dealing with spillage and site decontamination, and
5. landfilling

### *Health and Safety regulations*

A number of other legislative acts and regulations cover the control of clinical waste.

These include:

1. The Health & Safety at Work Act of 1974
2. The Control of Substances Hazardous to Health Regulations (1999), and
3. Management of Health & Safety at Work Regulations (1999).

The legislation and regulations referred to above, are enforced by the Health and Safety Executive (HSE).

### *NHS guidance*

The NHS has produced two documents, which provide advice and guidance on the management of healthcare waste (NHS PASA, 2001). These are:

1. *HTM 2065 Healthcare waste management: Segregation of waste streams in clinical waste*,
  - the memo provides guidance on the development of management arrangements for the safe and economic handling and disposal of clinical waste (NHS Estates & NHSS, 1997), and
2. *HTM 2075 Clinical waste disposal/treatment technologies (alternatives to incineration)*

A controls assurance (CA) standard for waste management outlines relevant legislation and best practice within the sector, to ensure safe segregation, handling, transport and disposal of clinical waste (NHS PASA, 2001).

An environmental management tool NEAT (*NHS Environmental Assessment Tool*), developed in 2002, is being used to improve the collection of data for NHS facilities to rate their environmental impact and actions. It provides guidance on gathering data and assessing in-house incineration practices, waste stream analysis and compliance with HTM 2065 (mentioned above) (NHS Estates, 2002).

### **Clinical waste generation**

Clinical waste is generated from two distinct areas:

1. Hospitals, and
2. Community
  - such as, GP's & dentists, nursing homes, blood transfusion centres, home treatment, mortuaries, veterinary practices and farms.

The type and volume of clinical waste produced by individual trusts is dependant upon the type of trust, such as Acute, Community, Ambulance or Primary Care (PCT) (NHS PASA, 2001).

Up until recently, there has been no national, centralised database for clinical waste generated. However, NHS Estates has started to collect clinical waste data from NHS Trusts who have completed their annual ERIC returns. These returns should provide a more accurate and unitary approach to calculating the total of clinical waste generated by NHS Trusts in England.

### ***Hospital clinical waste***

Hospital clinical waste is generated from wards, pharmacy and radiology, theatres and laboratories (NHS PASA, 2001). In acute hospitals, wards generate the most clinical waste (Audit Commission, 1997).

### ***Community clinical waste***

Clinical waste arising from the home consists mainly of unused and/or old haemodialysis waste (kidney dialysis bags), incontinence pads and needles generated by diabetics. The latter are often provided with sharps bins for their used needles (JEMU). Collection schemes exist within the community to collect this hazardous waste, such as Needle Exchange Schemes, DUMP (Disposal of Unwanted Medicines and Poisons) campaigns, local authority or hospital NHS Trust collections (Northwood & Oakley-Hill, 1999).

## **Collection & handling**

For management purposes clinical waste is categorised into five groups, based on level of hazards, as defined by the Health Services Advisory Committee (1999).

These five groups are:

- Group A* - includes:  
identifiable human tissue, blood, animal carcasses, and tissue from veterinary centres, hospital or laboratories. Soiled surgical dressings, swabs and other similar soiled waste. Other waste materials, for example from infectious disease cases, excluding any in Groups B-E.
- Group B* - includes:  
discarded syringe needles, cartridges, broken glass and any other contaminated disposable sharp instruments or items.
- Group C* - includes:  
microbiological cultures and potentially infected waste from pathology departments and other clinical or research laboratories.
- Group D* - includes:  
drugs or other pharmaceutical products.
- Group E* - includes:  
Items used to dispose of urine, faeces and other bodily secretions or excretions, which do not fall within Group A. This includes disposable bed pans or bed pan liners, incontinence pads, stoma bags, and urine containers. Where risk assessment shows there is no infection risk, Group E wastes are not clinical waste as defined.

### ***Hospital clinical waste***

Waste from hospitals is collected in a variety of different containers, which are designed to hold separated categories of waste. Containers must be compatible with the type of waste, the way it will be handled, transported, stored and treated (JEMU). Colour-coding is often used to assist in the segregation of waste at source (yellow for clinical wastes and black for domestic wastes) (NHS Estates & NHSS, 1997).

**Community clinical waste**

Waste collected at source, such as wards and GP rooms, needs to remain separated when stored for external collection. Storage is usually in a demarcated area or building on site.

Community clinical waste (i.e. GP surgeries) can be collected in arrangement with local authorities or commercial contractors (JEMU). Unwanted medicines can be collected through community pharmacies (ONS & DoH, 2001). Household clinical waste is most commonly disposed of with other domestic waste, unless collection is arranged with a local authority or taken away by a community nurse. However, if patients treat themselves at home a local authority is obliged to collect their clinical waste separately and may charge for this service. Or sharp bins used in the home to collect, for example needles used by diabetics, can be returned to their GP practice when full (DEFRA, 2003).

**Treatment & Disposal**

Waste collected from a facility will be treated or incinerated on site, or more commonly removed from site for incineration or disposal. The type of treatment and/or disposal will depend on the nature of the waste. Treatment and disposal type are heavily guided by UK and EU legislation and regulations (JEMU), in particular by the Environmental Protection Act of 1990 (Audit Commission, 1997).

The average price for standard clinical waste disposal is approximately £300/tonne. The price for disposing more hazardous clinical waste, such as pharmaceuticals or cytotoxins, ranges from £420 to £1,200/tonne (NHS PASA, 2001).

The following methods of treatment and management of clinical waste are recommended by the Health and Safety Advisory Committee:

<i>Category of waste</i>	<i>Treatment and/or disposal option</i>
<i>Group A</i>	Clinical waste incinerator
<i>Group A, other than</i> 1. identifiable human tissue 2. any wastes known or likely to contain ACDP Hazard Group 4 biological agents 3. all waste from containment level 3 laboratories, and 4. all cultures of ACDP Hazard Group 2 biological agents	Maceration and heat or chemical treatment.
<i>Group B</i>	Clinical waste incinerator
<i>Group B, other than:</i> 1. any wastes known or likely to contain ACDP Hazard Group 4 biological agents, 2. all waste from containment level 3 laboratories, and 3. all cultures of ACDP Hazard Group 2 biological agents.	Maceration and heat or chemical treatment.
<i>Un-autoclaved Group C</i>	Clinical waste incinerator
<i>Autoclaved Group C</i>	Maceration and heat or chemical treatment; or Direct to landfill

<i>Group D</i>	Clinical waste incinerator
<i>Group E</i>	Clinical waste incinerator Municipal waste incinerator, or Maceration and heat or chemical treatment, or Direct to landfill
<i>Macerated Group E – excreta and the like</i>	Sewer
<i>Sanpro</i>	Clinical waste incinerator Municipal waste incinerator, or Maceration and heat or chemical treatment, or Direct to landfill

(Health & Safety Advisory Committee, 1999)

### ***Incineration***

Incineration is the recommended treatment method for all Group A, B, some C and D wastes in the UK (JEMU). Incineration involves the combustion of waste at high temperatures, which reduces it to ash. Wastes such as cytotoxins, radioactive or prescription-only medicines cannot be incinerated (NHS PASA, 2001).

There are a few on-site, small incinerators in operation in the UK, with CHP recovery facilities. However, the majority of incinerators are operated by private concerns, with many hospitals contracting out the disposal of clinical waste (Audit Commission, 1997). The incineration of waste is heavily legislated with strict emission standards.

Types of incineration include:

1. controlled air/semi-pyrolytic systems
2. rotary kilns
3. pulsed hearth incinerator, and
4. waste fired boilers.

In 1992 there were approximately 600 NHS clinical waste incinerators in the UK (JEMU). By 1999, and due to hospitals no longer being protected by Crown Immunity, the number of incinerators treating clinical waste in England and Wales was approximately decreased to 37 (DEFRA, 1999). The majority of these incinerators were and continue to be operated by private sector companies.

### ***Heat treatment***

#### *Dry heat*

This method of treatment is becoming more prevalent in the UK. The treatment reduces the biological contamination of the waste to a point where it is no longer deemed to be a biological hazard (IWM Business Services, 2000).

#### *Microwave radiation*

This procedure involves adding moisture to the waste in the form of steam before treatment to ensure that the treatment is uniform throughout the waste. Microwave energy is then applied to the waste, which heats up the water molecules. This process denatures the proteins within cells, resulting in microbial inactivation (IWM Business Services, 2000).

This form of treatment is not suitable for metallic objects, wastes from pathological laboratories, human or animal tissue or radioactive wastes (JEMU).

### *Steam sterilisation*

Sterilising is the total elimination of all biological life in the waste. Generally, the waste is pre-shredded before low-pressure steam is applied to the waste. A steam jacket is then applied to retain the heat and allows the waste to dehydrate. This produces dry, disinfected waste, which can be landfilled (IWM Business Services, 2000).

### *Chemical treatment*

In the UK, chemical treatment is usually applied to Sanpro waste. The waste is shredded prior to exposure to chemicals. Sometimes heat is combined with the chemicals to reduce the treatment cycle time (IWM Business Services, 2000). Liquid residues can be released into the sewer system, subject to discharge consent, with the solid residue drained of disinfectant and can be landfilled (JEMU).

### *Biological disinfection*

Disinfection treatments are predominantly used on soft wastes, such as swabs, dressings and incontinence pads. Sanitising agents are placed in the collection containers, and acts on the waste while it awaits collection (IWM Business Services, 2000).

### *Landfill*

Without pre-treatment, only Group E clinical waste and human hygiene waste can be landfilled. Treated clinical wastes and residue from all other treatment methods are normally landfilled.

## **Reduction of clinical waste**

A report by the Audit Commission (1997) recommended the following ways to reduce the amount of clinical waste generated (DEFRA, 1999):

1. the reversal of a growing tendency to use disposable equipment by re-introducing more re-usable equipment (with appropriate levels of sterilisation), and
2. careful categorising and segregation of the waste to ensure that a minimum of household waste is mixed with the clinical waste.

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## Freight transport associated with the NHS: Methodology

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The impact of freight transport for the NHS in England and Wales was considered on two grounds. Firstly, the impact of freight transport associated with products before they reached the UK, and secondly their associated transport impact within the UK.

### Main data sources

Data on distance travelled by products consumed by the NHS in England and Wales was obtained from NHS Logistics and HM Customs and Excise (2003).

### *Calculations and proxy measures used*

In 2001 the UK imported 210 million tonnes of products and exported 197 million tonnes. These items were sourced in virtually every country, with an estimated 61% of all imports from Europe. A proportion of imported products will have been destined for consumption by the NHS in England and Wales.

The first stage in the process of identifying what proportion of products imported into the UK and were destined for the NHS in England and Wales, was to model international freight transport flows associated with UK imports in order to provide information on fuel consumption and greenhouse gas emissions. The following variables need to be considered when analysing the environmental impacts associated with the transport of products:

- Different modes used: For example, lorry, rail, ship and aeroplane.
- Each mode produces different quantities of CO<sub>2</sub>
- Varying distances travelled per mode.
- Different country of origin.

Data on the tonnage of products being moved, the distance travelled and the mode of transport was required. This information was obtained from government trade and transport statistics including a HM Customs and Excise (2003) trade database. The latter included data on: Quantity imported (in mass or expenditure) and country or continent of origin (see an overview of findings in Table 53).

**Table 53: UK imports of products, by origin, in 2001**

Origin	Tonnes	% of total imports
<b>Total</b>	<b>210,496,566</b>	
European Union	80,059,597	38%
W Europe (excl. EC)	35,089,432	17%
Asia & Oceania	23,706,096	11%
North America	17,616,686	8%
Other America	16,241,658	8%
Eastern Europe	13,973,468	7%
Middle East & North Africa	13,000,282	6%
Sub-Saharan Africa	10,809,346	5%

Source: HM Customs & Excise, 2003.

Distance tables were used in instances where information on the distance of a transport stage was unavailable. The average distance that products move to the point of departure is 500 kilometres, and the distance from the point of departure to the UK is 5,300 kilometres. However, the distances from each region of origin to the UK depend on the mode of transport. Distances between two points can vary significantly, particularly in the case of transportation of freight by sea and plane. For example, the average distance between the Asia and Pacific region and the UK by sea is almost twice that by plane.

Data generated during this assessment procedure are in the form of tonne-kilometres as the reference data for the environmental impacts of material distribution are provided on a per tonne-kilometre basis (based on DEFRA (2003a) guidelines). Therefore, the reference data was used to determine the carbon dioxide emissions for each transport stage.

CO<sub>2</sub> emissions produced by each mode of transport also needed to be considered, as each mode produces different quantities of CO<sub>2</sub>. Table 1 shows that a lorry produces 17 times more CO<sub>2</sub> than intercontinental shipping, and long-haul airfreight releases 57 times more CO<sub>2</sub> than shipping.

**Table 1: Carbon dioxide (CO<sub>2</sub>) emissions associated with different freight transport modes**

Mode	CO <sub>2</sub> per tonne-kilometre		
	tonne	kilogram	relative to shipping
Intercontinental ship	0.00001	0.01	1
Rail	0.00003	0.03	3
Ferry	0.00004	0.04	4
Lorry	0.00017	0.17	17
Airfreight (long haul)	0.00057	0.57	57
Airfreight (short haul)	0.00158	1.58	158

The total CO<sub>2</sub> emissions of products imported to the UK for the NHS in England and Wales was 0.24 million tonnes. In addition to this was the movement of freight within the UK itself. Between 2001 and 2002 NHS Logistics used 2,238,806 litres of fuel to move goods around the UK. Adjusting this figure to take into account other freight movement not undertaken by NHS Logistics, but for the NHS and freight movement in Wales (assuming Wales represents 3 per cent of NHS consumption). Therefore:

$$3.1 \text{ million tonnes of fuel} * \text{CO}_2 \text{ emissions per tonne of diesel (2.65 kg per litre)} \\ = 8,150 \text{ tonnes.}$$

Therefore:

Adding this figure to the total impact of imports means that the total CO<sub>2</sub> emissions of freight transport are approximately 242,373 tonnes.

## Background information for the domestic waste scenario

By Dr John Barrett and Nia Cherrett, Stockholm Environment Institute (York University)

### Introduction

Waste has become one of the most important environmental issues on the political agenda. While no targets have been established for industrial and commercial waste, numerous targets have been set for domestic waste, mainly related to recycling. The 1989 Community Strategy for Waste Management set out four priorities for dealing with waste: prevention (including re-use), recycling, energy recovery, and optimisation of final disposal and regulation of transport. The Waste Strategy is embodied in the Waste Framework Directive (75/442/EEC) and there are a number of supporting directives that address specific waste streams<sup>1</sup>.

With regard to packaging waste, the EC Directive 94/904/EC on Packaging and Packaging Waste places an obligation on various parties in the 'packaging chain' and is the first example in Europe of 'producer responsibility'. One of the fundamental aims of the Directive was to 'harmonise national measures concerning the management of packaging and packaging waste' (EC, 1994, p12)<sup>2</sup>. The Directive established two targets: a recovery target for packaging waste of between 50 and 60 per cent and a recycling target of between 25 and 45 per cent. Both of these targets, as highlighted by Coggins (2001), are end-of-the-pipeline solutions to waste management.

An NHS Estates report entitled "Healthcare Waste Management – Segregation of Waste Streams in Clinical Areas" suggests that 61 per cent of clinical waste is non-clinical. This figure becomes shocking when looking at the different disposal costs between clinical and domestic waste. It is estimated that disposal of clinical waste costs between £180 - £320 per tonne while domestic waste disposal costs between £20 - £70 per tonne. Taking the average of these figures means that over £200 per tonne is wasted for every tonne of domestic waste that is disposed of via the clinical waste stream. Approximately 73,500 tonnes of clinical waste in the NHS could be domestic waste, meaning that over £14.5 million is wasted in the NHS in one year due to poor management of waste.

Along with the financial costs come the environmental costs of poor disposal methods. At present 17 per cent of domestic waste within the NHS is recycled or reused. This leaves an enormous potential to reduce the ecological footprint of waste in the NHS.

### Review of waste policy in the NHS

NHS Estates have not adopted a target-based approach for domestic waste in the NHS. However, the Department for Health did establish a target to achieve a

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<sup>1</sup> Haq, G. and Artola, (1996) A. Waste policy and management in the European Union, *International Journal of Environmental Education and Information* 15(1), pp 1-16.

<sup>2</sup> EC (2001) Environment 2010: Our Future, Our Choice: the Sixth EU Environment Action Programme 2001-10, European Commission, Brussels, Belgium.

reduction in waste by 40 per cent and recover/recycle 25 per cent by 2000/1. There is no evidence to suggest that this target was achieved. However, NHS Estates does encourage the production of a waste policy and strategy at the trust level. Individual trusts are encouraged to set targets and benchmark performance<sup>3</sup>.

The main focus for the NHS has been reducing the volume of clinical, mainly because of the substantial costs of disposal. In line with the waste hierarchy the most recent report (Sustainable Development in the NHS) highlights the need for:

- Minimising waste arisings;
- Effective waste segregation; and
- Choice of waste disposal options.

Finally, in conjunction with a range of partners the most comprehensive report on waste in the NHS explores best practice scenarios from a number of trusts.

“Healthcare Waste Minimisation – A Compendium of Good Practice” provides an understanding into what could be achieved and has hopefully informed trusts across the UK.

### **Better waste segregation**

To achieve higher rates of recycling one of the first steps to undertake is better segregation of waste. This involves removing domestic waste from the clinical waste stream. This also has the advantage of saving a considerable amount of money, as previously highlighted.

An excellent example of a hospital that has achieved this is Queen’s Medical Centre, Nottingham. In pursuing an aim of the Trust’s Environmental Policy, to “Identify and initiate feasible segregation and recycling schemes for waste” a project aimed at improving ‘point of generation’ waste segregation was introduced at this large teaching hospital in April 2001. The initiative has been adopted with enthusiasm by staff across all disciplines, and has produced dramatic results and some remarkable paybacks, i.e.

- Self-financing and now saving £65,000 p.a.
- Clinical waste production per patient among lowest in the NHS
- Staff are more aware of their part in the process and their duty of care.

Part of the reduction in clinical waste was achieved through the introduction of a “confidential paper” recycling scheme. It was often the case that confidential paper was placed in the clinical waste bins because staff knew that this was going to be incinerated. This meant that the trust was paying £250 per tonne to dispose of paper. A confidential waste collection service from wards and departments was introduced with the waste taken off-site by a specialist contractor for recycling. Overall a 30 per cent reduction in clinical waste was achieved.

### ***Cardboard and paper***

Many trusts have found it difficult to identify a stable recycling market for cardboard, or time consuming as the recycling company requires the cardboard to be baled by machinery before collection. However, at East Cheshire NHS Trust a total of 52 tonnes of cardboard was collected in one year. A baler was purchased and cardboard

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<sup>3</sup> NHS Estates, New Environmental Strategy for the National Health Service.

taken out of the waste stream by the porters. Assuming that the domestic waste composition is the same as the national average, East Cheshire NHS Trust is recycling 74 per cent of all the cardboard. Preston acute Hospital Trust has also achieved a credible cardboard recycling scheme managing to recycle 50 per cent. Birmingham Heartlands also achieved a similar recycling rate for cardboard of between 75-80 per cent by recycling 84 tonnes. Birmingham also sees no reason why an even higher recycling rate could not be achieved in the future. Paul Williams (Facilities Health and Safety Advisor at Birmingham Heartlands) suggested that up to 90 per cent of cardboard could be collected and recycled. As cardboard often enters the hospitals at the same place, i.e. delivery point, it is easier than some materials to collect.

At Bassetlaw Hospitals NHS Trust a successful paper recycling scheme was introduced. Twenty tonnes of office paper was recycled, with an estimated 28 tonnes in the waste stream. This represents a capture rate of 71 per cent. The scheme is considered to be revenue neutral. Central Manchester Healthcare NHS Trust have achieved similar results, now recycling approximately 132 tonnes of paper a year, representing 60 per cent of total paper in the waste stream.

### ***Glass***

Birmingham Heartlands achieved a high recycling rate of 33 per cent. Glass recycling facilities are only available in two places within the trust; these being maternity and the pharmacy. These two areas capture a considerable proportion of the glass meaning that a reasonable recycling rate is achieved without too much effort. In the future, it is hoped that 40 tonnes of glass will be recycled, representing a recycling rate of 68 per cent recycling rate. There are very few other examples available of glass recycling from the selected case studies.

### ***Toner Cartridges***

Toner cartridges are a good example of a successful recycling scheme that is employed by most hospitals. At present 58 per cent of toner cartridges are recycled and there is no reason suggest why this will not continue to increase. One of the findings from the best practice assessment of waste in the NHS was that recycling of toner cartridges was considered to be the norm. At Macclesfield District General Hospital a specialist company collects the toner cartridges generating an income of £100 per year. Also when the toner cartridges are returned the packaging they came in is also returned. Hospitals who have introduced recycling schemes for toner cartridges have achieved a 70-80 per cent recycling rate.

### ***Aluminium***

Economically aluminium is one of the most profitable materials to recycle. A number of hospitals have introduced recycling schemes for aluminium including Portsmouth NHS Trust, Parkside Health NHS Trust and Southend Community Care Services NHS Trust. Birmingham Heartlands suggested that most of the aluminium was generated from drink cans. In UK households, only 12 per cent of aluminium is recycled. Within the NHS 21 per cent of aluminium is recycled. However there is still potential for improvement, as a significant proportion of trusts do not have any recycling schemes in place for aluminium. No precise figures were available on the tonnes of aluminium

recycled for specific trusts. Therefore, it is assumed that a 50 per cent recycling rate could be achieved.

### ***Kitchen waste***

There are very few examples of hospitals introducing composting schemes. “Sustainable NHS Food Procurement in the NHS”, produced by the Sustainable Development Commission, was unable to quote any schemes from NHS hospitals. However the Hospital Catering Association warns that unless all departments including medical staff actively support a waste reduction policy, the £8 million saving indicated by the Commission’s auditors is unlikely to be achieved. The report also suggests that there is a significant variation in the amount of food wasted in hospitals (discussed in more depth under “Waste Minimisation”).

None of the case studies that were contacted had a composting scheme in place. The only example found was Portsmouth Healthcare NHS Trust, listed in the best practice guidelines produced by NHS Estates. The Trust recycled 600 litres of cooking oil in one year.

The Sustainable Development Commission quote an American example where food waste is collected and transported to a local farm for use as animal fodder. One restriction in the UK is the fact that meat cannot be composted. However, there is considerable potential for the composting of other foodstuffs.

### **Waste minimisation**

As the waste hierarchy suggests the most effective method to reduce the impact of the waste is to ensure that as few materials as possible appear in the waste stream. A number of hospitals have included a range of approaches to ensure a reduction in the volume of waste. At the UK level there is a worrying increase in the volume of household waste and it is important that a similar growth rate does not occur in the NHS.

The best practice report that addresses waste minimisation in the NHS highlights that the majority of trusts had no targets for waste minimisation. Seventy per cent of the trusts that responded to the survey had waste management strategies in place but only 10 per cent of these had established a waste minimisation target.

However, a number of forward thinking trusts have put a range of measures in place that if implemented correctly, could reduce the amount of materials entering the hospital waste stream.

### ***Reducing waste meals***

Part of the reporting required for the ERIC database is to provide data of the amount of food wasted. The majority of trusts did not provide the data to NHS Estates. Out of a total of 2073 organisations within the NHS, 743 replied. Some of the missing returns could be from organisations that do not serve food. From the 743 organisations the average amount of food wasted was 10 per cent. However, as mentioned earlier there is a substantial variation in performance. At one extreme, 14

trusts (who are prominently primary care trusts) dispose of more than 30 per cent of uneaten food. The most extreme example (that will remain unnamed) was a children's hospital where 50 per cent of all meals are wasted. At the other end there is a considerable number of trusts that only waste 2 to 3 per cent of all meals. As some food waste is inevitable (i.e. peeling and inedible food) it is assumed that to achieve the universal best practice in the NHS would reduce food in the waste stream by 29 per cent. This assumes that, on average, 36 per cent of the food disposed of in the domestic waste stream is wasted meals. Considering the average waste composition of the domestic waste in the NHS and the average percentage of meals wasted derived this figure.

### ***Reduction in the paper use***

An example for office paper reduction was provided in the best practice compendium and undertaken by Parkside Health NHS Trust. Procedures for minimising paper use included:

- When typing or photocopying using both sides of the paper;
- Re-using envelopes;
- Using scrap paper as notepads;
- Using scrap paper in fax machines;
- Using email as often as possible;
- Avoid long computer print-outs;
- Avoiding over-subscription of magazines.

### ***Reducing cardboard waste***

Birmingham Heartlands attempted to reduce the amount of cardboard waste produced by discussing with suppliers potential ways by which to reduce the packaging. In this particular case the company was not willing to change the packaging, as they believed the packaging was required for this particular product. However, the process of engaging with suppliers to reduce the required packaging on products is an essential step. Only by placing pressure on suppliers will encourage the exploration of alternative approaches.

### **Variation in domestic waste produced**

The Audit Commission survey "Getting Sorted"<sup>4</sup> clearly highlighted the difference levels of waste generation in the same hospital types (i.e. acute hospitals). The variation was substantial ranging between 0.25 tonnes per bed and 1.2 tonnes per bed. There is no reason to suggest why other hospitals could not achieve a waste generation rate nearer the bottom end of this scale. Therefore, in this scenario it is assumed that all the other material could be reduced to coincide with the average product of waste per bed, this being 0.48 tonnes.

### **Successful measures to achieve best practice**

There were many similarities between the case studies that have achieved a more sustainable waste management system. Many of the approaches adopted are essential when attempting to increase recycling rates and reducing waste production. Not all

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<sup>4</sup> Getting Sorted: the safe and economic management of hospital waste. Audit Commission, 1997.

the case studies had all the possibilities in place but the majority of the examples below were undertaken by most.

1. Targets areas that have a large scale production of a particular material. A good example of this is at Birmingham Heartlands where they have target key areas where a considerable amount of cardboard has been produced.
2. Queen's Medical Centre in Nottingham believed that the employment of a waste officer was crucial to their success in reducing clinical waste
3. The importance of segregation – Until waste is properly segregated then it is impossible to divert waste from landfill to recycling
4. The importance of education and awareness raising - Queen's Medical Centre in Nottingham placed a considerable emphasis on education and awareness raising. This requires information to be included in “in-house” magazines, emails, training sessions and information booklets. The considerable potential of the information material was seen when while waiting for a re-print of the information booklet there were no copies available and an increase in the production of clinical waste. Clinical waste declined again when the booklet was made available.
5. Senior manager buy-in – support “from above” adds credence to the operation and usually financial support.

## **Conclusions**

The issue of efficient domestic waste management in the NHS has not been given a high priority. This becomes apparent when looking at the data that is available. Very few hospitals have a concrete idea of the composition of their domestic waste, little knowledge of the recycling potential of their various materials. There is a serious lack of relevant information to understand the true impact of waste generation in the NHS and the potential for improvement.

## Background information for the transport scenario

By Dr John Barrett and Nia Cherrett, Stockholm Environment Institute (York University)

### Current transport policy

#### *UK Policy*

Transport issues in the UK, particularly those connected to road traffic and congestion, are major topics of debate and concern. Between 1980 and 1997 there was a 65% increase in motor vehicle traffic, almost all of which was increased car traffic, accounting for nearly 82% of all road traffic in 1997<sup>5</sup>. Since then, traffic levels have grown by over 7% - representing close to an extra 21 billion vehicle miles<sup>6</sup>. The consequences of this ever-increasing road traffic are becoming only too well documented: reduced accessibility as a result of congestion having economic costs associated with it in terms of fuel costs, time spent in traffic queues, delays and unreliable journey times; road safety concerns and the adverse effects of carbon dioxide emissions on the environment and on our health. Currently in the UK road transport is the fastest growing source of greenhouse gas emissions.

The 1997 forecasts by the Department of the Environment, Transport and the Regions (DETR)<sup>7</sup> of the growth in volume of motor traffic (excluding motorcycles) indicate a central estimate of a 38% increase between 1996 and 2016, and a 60% increase between 1996 and 2031. These statistics sit against a backdrop of national transport policies, which began evolving as early as 35 years ago:

- 1963 - Buchanan report entitled 'Traffic in towns: a study of the long term problems of traffic in urban areas' predicted a dramatic increase in traffic with profound consequences for the environment and way of life.
- 1997 - Road Traffic Reduction Act placed a statutory requirement on all local authorities to monitor traffic in their area and consider setting targets for reducing traffic levels.
- 1998 - White paper 'A New Deal for Transport; better for everyone' provided a detailed integrated transport strategy that would require new legislation and a new approach to tackling transport problems.
- 2000 - 'Ten Year Plan' was published setting detailed targets for modal shift to rail, bus, cycling and walking.
- 2000 - 'Transport Act 2000 – Regulatory Impact Assessment' was passed. This act honoured the commitments laid down in the 1998 White Paper.
- 2001 - Planning and Policy Guidance Note 13 for Transport (PPG13) places greater importance on the role of travel plans in contributing towards the delivery of a sustainable transport objectives.

#### *The development of travel plans*

A travel plan is defined by Rye (2002) as providing a strategy for an organisation to reduce its transportation impacts and to influence the travel behaviour of its

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<sup>5</sup> National Statistics Online (2002) *Transport Statistics Great Britain: 2002 edition*

<sup>6</sup> Friends of the Earth (2003) *Press Release: Traffic Levels Increase Again*

<sup>7</sup> DETR (1997) *National Road Traffic Forecasts (Great Britain)*

employees, suppliers, visitors and customers. It involves the development of a set of mechanisms, initiatives and targets over the course of time and in accordance with the changing circumstances of the environment in which it works.

Travel plans provide a key tool for achieving road traffic reductions, in compliance with the Road Traffic Reduction Act 1997, and for responding to congestion. A DTLR study undertaken in 2000/01 revealed that 24% of local authorities had developed a travel plan and a further 45% were in the process of developing a travel plan while 7% of businesses, 61% of hospitals and 50% of higher education establishments had or were thinking about developing a travel plan<sup>8</sup>. There now exists a substantial body of literature concerned with implementing travel plans and best practise guidelines.

It is mandatory for all local authorities to produce a local travel plan, laying down strategies and detailed plans for transport in the local area for the succeeding five years. They also set out how the local authority will secure the voluntary adoption of travel plans amongst major employers in the local area. These major employers include hospitals.

### ***NHS Policy***

In 2001 the NHS employed 852,110 people<sup>9</sup> and provided an assortment of health services to 52 million people<sup>10</sup>, consequently generating 24.4 billion passenger km. The NHS has acknowledged its role in the development of local transport strategies, mainly driven by the development of the listed national transport policies above. Hospitals are required to develop measures to control their transport impact as part of the UK National Health Service own risk management process, known as the Control Assurance Scheme (NHS Executive, 1999). In 2001 NHS Estates published a report titled 'Sustainable Development in the NHS' in which it listed green transport and travel plans as one of three methods by which the NHS could reduce its contribution to local transport problems. In 2002 the 'New Environmental Strategy for the NHS' took this further by setting a target for all NHS sites to have a green transport plan in place by October 2002. To date this target has not been met.

### **Hospital travel plans**

#### ***Reasons for implementing a travel plan***

Only one out of the eleven Trusts considered in this report stated the principle reason for initiating a travel plan to be a demonstration of their commitment to creating a better and more integrated transport system under the Governments 1998 national transport strategy plan. The Trust also highlighted its commitment to serving the local community by: providing effective and efficient health care which is accessible to all; minimising the impact of transportation on the environment and the health of the people to whom the Trust provides a service; and to minimise inconvenience of traffic

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<sup>8</sup> DTLR (2001) Take up and effectiveness of travel plans and travel awareness campaigns

<sup>9</sup> Merry, P. (2002) The Pocket Guide to the NHS in England. NHS Confederation, London

<sup>10</sup> Office for National Statistics (2001)

related congestion on residential roads and major thoroughfares in the immediate hospital vicinity (South Devon Healthcare NHS Trust, 2000).

The remaining Trusts have designed a travel plan only as a requirement linked to a Section 106 planning agreement under the Town and Country Planning Act 1990. Derriford Hospital's travel plan, for example, was initiated in response to refusal of planning permission by Plymouth City Council in 1995 for a major increase in car parking provision, required as part of the Hospitals structural expansion (DfT, 2002a). The proposal of major building redevelopments on hospital sites has created the need to review the car parking provision and the subsequent traffic congestion which could potentially be created, and as Newcastle upon Tyne Hospitals NHS Trust (2001) rightfully highlighted:

“A superficially easy answer to congestion problems would be to create more car parking spaces, thus creating the illusion of solving the problem. This however, ignores reality and experience which demonstrates that simply providing more car parking leads to greater traffic congestion, and greater demand.”

The requirement of Trusts to prepare a travel plan in order to ensure that planning permission is granted for future developments has forced them to review their transport activity, the implementation of appropriate car park management schemes and the development of healthy transport plans. The following section explores the various measures that have been implemented across the eleven Trusts to achieve these goals.

### ***Travel plan measures***

Most trusts in this instance have full management support of the travel plan, ensuring that it's implementation is overseen and co-ordinated. The approach adopted for the implementation process appears to be uniform across all the trusts and involves identifying a green transport plan framework. This is often based on responses from travel questionnaires aimed at staff, and sometimes patients and visitors. Once the travel needs of the trust have been recognised the travel plan can be finalised to incorporate a set time scale for implementation. Some trusts have taken extra steps to ensure this process retains longevity, Addenbrooke's being one. Since their travel plans' inception in 1994, otherwise known as the Access to Addenbrooke's initiative, the trust went on to produce a report in 1999 called Access to Addenbrooke's: An action plan for 1999-2001, and another in 2000 titled An Operational Plan for the Period 2000-2005. The travel plan objectives were incorporated into the corporate strategy objectives in 1999, and at the same time an Access Travel Bureau was established, the staffing and running costs of which are met from car park charge revenue. The bureau provides information to staff, patients and visitors about travel options to and from the site. The trust has also worked hard to build partnerships with key stakeholders whose roles are integral to the implementation of the travel plan and has resulted in the establishment of an Access to Addenbrooke's Technical Group which includes representatives from all the local authorities and bus operators. The focus of the travel plan is now being shifted towards patient and visitor travel. To achieve this, a £20k promotional and publicity campaign has been launched, called Space Programme, which is hoped will help get people to consider and use alternative

travel options, rather than expecting a guaranteed parking space when they arrive at the hospital (TRAVELWISENEWS, 2003).

Good Hope has been involved in extensive consultations with staff and local residents throughout the process of drafting and implementing the green transport plan. The trust has found this a valuable process as it has resulted in a range of changes to the original proposals making the package more fitting to the needs of the Trust and the community it serves (The Pulse, 2003). Queen Victoria has taken a slightly different approach by joining the East Grinstead Transport Forum to share in the development of sustainable travel in the area, another way of gaining insight into the needs of the local community (QVH Travel Plan, 2002).

#### *Measures implemented to encourage walking*

Safety has been highlighted as the greatest concern for staff who could potentially walk to work. In most hospitals the staff profile is predominantly female (usually 70% or more) and generally have an array of working patterns, which vary from 'normal' office hours to shift work. If Trusts are aiming to increase the percentage of staff walking to work it is of paramount importance that safe access routes are available on and off site. Most Trusts have therefore increased security on site by enhancing the lighting and improving walkways, as well as providing security devices such as the operation of CCTV cameras (e.g. York), patrol services (e.g. Plymouth) and even a security escort service to walk staff to their car (e.g. Good Hope). Such measures also provide general benefit and security to the hospital, not just to pedestrians.

Nottingham has spent over £100,000 on introducing a 15mph speed limit on site with some cycle-friendly calming measures, dropped kerbs, and a new pedestrian zebra crossing. In 2000 a Pedestrian Signing Strategy was established to introduce and upgrade pedestrian signing on site. Trafford, on the other hand, is hoping to not only provide a safe and accessible on site environment, but to enhance it by providing outside seating and artworks.

Off site improvements of lighting and security, as well as general accessibility, are more difficult to implement. However, if effective coordination with the necessary bodies is undertaken a variety of measures could be adopted. Plymouth has installed five zebra crossings, while Nottingham has managed to facilitate the upgrading of street lighting and the construction of new paths, while Good Hope is aiming to introduce additional site entry points which will improve access on and off site. QVH is also liaising with the local authority to improve walking links between the city centre/rail station and the hospital.

Another incentive for walkers is to have access to changing, shower and/or locker facilities. These facilities are often provided for cyclists, but those who walk to work do not necessarily gain automatic right to that service. No trust, as yet had appeared to offer other incentives, such as free umbrellas or gift vouchers from sport shops to help with the purchase of outdoor wear.

#### *Measures adopted to promote cycling*

Safety, for both the person and the cycling equipment, has again been expressed as a concern from staff who could potentially cycle to work. The two most common measures adopted by Trusts to induce their staff to cycle to work have been the provision of good, secure cycle parking and access to pleasant changing, shower and locker facilities. At Addenbrooke's an extra 200 cycle parking stands have been installed since 1994, amounting to a total of 950, and yet it has been observed that supply continues to outstrip demand (DfT, 2002a).

A bicycle loan scheme is another increasingly popular measure, which is received well due to it operating on an interest-free plan. The loans can vary from £500 (e.g. Plymouth) to £350 (e.g. Addenbrooke's) over three years with repayments organised through salaries/wages. Entitlement to discount purchases of bicycles and equipment at local stores complements the loan scheme very well, as does the provision of cycle repair services on site. Nottingham presents a fine example of this as it has implemented the greatest number of measures to promote cycling out of all the Trusts listed here. Not only have they established the aforementioned measures, they also established a bicycle users group, which has evolved into the alternative transport group within the hospital which focuses on all alternative modes to solo car use. The Trust also takes part in various cycling promotion events, including the annual Bike Week in June. It has a fleet of twelve bicycles for staff use and pays 11p a mile for travel during the course of work. Nottingham has built a good rapport with the local bicycle manufacturers, Raleigh, who offer the Trusts' staff a 20% reduction on cycle equipment and a 12% reduction on the cost of a new bike. Raleigh also provide on site service, maintaining the pool bicycles which allow staff access to lights, locks, baby seats, helmets and car racks. The Trusts' efforts were recognised by the UK's National Cyclists Organisation in 2001 when they won an employers award for its facilities for cyclists (DfT, 2002a).

Plymouth encouraged the shortening of road humps to make site roads more cycle friendly, and also offers cycle training to staff. Again, off site development requires greater negotiation and time to implement. Addenbrooke's and Radcliffe have the most developed on and off highway cycle paths, some of which took place before the travel plans were initiated since both these areas have the highest levels of cycling in the UK. Nottingham successfully managed to route part of the city cycle network past the front of the hospital site. Good Hope are expecting to enter into dialogue with the City Council and the sustainable transport organisation, Sustrans, to review existing cycle tracks and routes in the surrounding area, while Trafford will be producing cycle maps to aid staff identify safe routes to the site.

It appears that no Trust offers the equivalent car mileage allowance for bicycles, which could provide a further very strong incentive for staff to cycle.

#### *Measures to encourage travel by public transport*

Reliability, frequency and comfort are the three factors identified for discouraging staff from using public transport. Although this may be the reality of the situation in some areas, it is often the case that people are simply misinformed and fabricate a false perception of their local public transport system. To overcome such misconceptions, it is necessary to publicise existing local transport services and provide travel information. This is often the first measure to be implemented by

Trusts. Newcastle provides public transport information at main reception points and out patient departments, while Nottingham has information about bus services on the hospital website. Plymouth, in collaboration with the city council and the bus companies, has funded and produced a Travel to Derriford leaflet with bus timetables, and Queen Victoria now includes public transport information with appointment cards sent to patients.

In all cases there is definitely a need to liaise with local transport operators to either initiate a new bus service or to extend the routes of existing services to cover main staff residence areas not being facilitated. Prior to 1997/98 there were 22 bus services serving the Plymouth site at peak hours, by 2001 this figure had risen to 44. The bus operators have restructured their services so that 80% of the existing routes serving the northern part of Plymouth provide direct and frequent access to the hospital (DfT, 2002a). Some Trusts have paid for the introduction of a new bus service, York for example, have a staff bus running onto the hospital site, and have organised a free park and ride service for staff during peak hours.

These measures are often coupled with the offer of a discounted season ticket, paid for either by the operator or the Trust. Plymouth offers an array of discount subsidised bus passes. The original was the Derriford Travel Pass, a half price ticket, available to staff handing back their car parking permits. The Trust also offers a four-month trial free bus pass to staff for handing back a car-parking permit. At the end of the four months staff continuing to use the bus can get a 65% reduction on a bus pass for 12 months, further bus passes have a 50% discount.

For other staff there is a Green Zone Bus Pass giving a 25% reduction on the standard single bus journey ticket. Other ticket offers include 10 journeys for the price of 12. Plymouth has also funded discounts on two routes to the hospital operating through areas of poor health. Both Newcastle and Trafford will be hoping to offer staff interest free loans for the purchase of an annual travel ticket, the payments for which can be organised through salary deductions.

An increase in public transport services naturally puts pressure on existing infrastructure, and often a Trust must make necessary structural changes to accommodate this. Plymouth has increased the number of bus stops on site from two to five, three of which have bus shelters and set up and set down points. The hospitals lay by has been trebled in size and now the Trust plans to create a purpose designed bus station on site. To complement the new fleet of low floor buses now serving Nottingham Hospital, the Trust has provided raised kerbs at each of the eight bus stops on site. Safety at bus stops is another concern, so Trusts must also ensure that they are located in a well lit area and may have to consider the use of CCTV cameras.

#### *Measures to promote car sharing*

Car sharing arrangements offer the opportunity for staff to retain the convenience of 'personal car transport' whilst at the same time contributing to the objective of reducing the demand for staff parking places on Trust sites. Staff travel surveys have shown that generally 30% of staff would be willing to car share, clearly an area with huge potential for change. The first stage in setting a car share scheme is to identify potential sharers. Most Trusts use a computer software programme using postcodes to

help match staff. Other methods just involve filling in an application form providing details on work days and times which can be matched up and details sent to the subscribers. To support this measure Newcastle, amongst others, offer a guaranteed ride should the planned ride home not be available due to unforeseen circumstances. Those choosing to join the car share scheme often have priority parking spaces closest to the hospital buildings, as in Good Hope, while others may receive a reduction in parking charges or be totally exempt, as in Nottingham. At Plymouth car sharers can split the cost of a car parking permit as the permit can be transferred between vehicles, which are identified through their registration plate numbers being listed on the permit disk.

Addenbrooke's have held promotional events to publicise the scheme and significant publicity has been distributed across the site, including through the internal staff newsletter (DfT, 2002a).

### *Car park management measures*

In a typical hospital at least 65% of staff commute to work in cars, therefore car park management is crucial to the success of every travel plan. In this case it is in the Trusts interest to discourage staff to drive to work. The easiest measure to introduce has been a parking charge. This is also considered the most fundamental measure as the revenue generated from the car park always funds travel plan initiatives. Parking charges can vary in their sophistication and often work as a counterpart to parking permits. Different charging schemes can be applied where staff either pay a daily charge (e.g. 30p at Addenbrooke's) or an annual charge (e.g. £75 at Good Hope). Parking for visitors and patients tends to be more expensive and dependent on duration of stay, for example Addenbrooke's charges £1.50 for two hours while Oxford charges £1.50 for up to four hours. Various concessions operate for people visiting longer stay patients, and for patients who are seriously ill and/or need regular treatment. Oxford offers a £5 permit to those visiting a patient staying for more than two or three days. This enables use of pay and display car parks for up to seven days with no restrictions on the number of hours or occasions on which it may be used within that time period. Patients who attend hospital regularly over a long period of time can be considered for a free permit. At Plymouth weekend parking has remained free for staff and permits are not required out of hours.

The allocation of parking permits is a further method of restricting the use of car parks. Oxford has established three types of permits, which also enforces a priority parking system. The priority permits (orange) are assigned on the basis of staff clinical commitments and need to travel, such holders also have designated parking spaces. The standard permits (blue) are for staff living outside a distance where they could reasonably be expected to walk, cycle or bus to work. Staff who live within the boundary of the zone are entitled to have a permit if they fulfil the criteria for a priority permit. Those who are disabled or have a medical condition are entitled to a permit, as are essential operational users, volunteers, shift workers, and those with childcare/other caring responsibilities, which means they cannot get to work without a car. There are also yellow permits for staff residents, however blue and yellow

permits do not guarantee a parking space (DfT, 2002a). At Addenbrooke's car sharers and staff responsible for undertaking the school run are provided with a separate car park. Whipps Cross will be denying all resident students access to parking while South Devon is simply not going to increase its car park facilities. Whipps Cross continues to re-evaluate the status of parking permits having already reduced the number of essential user permits from 3,500 to 500 and permits for essential staff who rarely leave the site from 7,000 to 1,500.

Cashing out payments are available at all times for staff at Good Hope who wish to surrender their parking permits and change their travel behaviour. Two major cashing out promotions have been run, the first at the time of introducing restrictions, and the second to coincide with permit reissues in April 2002. The most recent cashing out scheme offered a £375 payment for the permanent surrender of a parking permit. Eighty members of staff surrendered permits during the first offer, and a further 16 have cashed out since April 2002.

Whipps Cross penalise staff and students who park without paying or anyone who parks in a dangerous area by clamping and charging a £25 release fee, other abusers are warned by notices.

#### *New conditions of employment*

Although the majority of hospitals are aware of the potentials in offering new conditions of employment to staff, not all have implemented such measures. Newcastle are considering flexible working hours for staff, where appropriate, in an attempt to relieve peak hour congestion and avoid the need for car travel. South Devon are undergoing investigations on the adoption of a home working policy and the establishment of teleworking, the results of which will be used to initiate trials aimed at influencing future policies. There have been no attempts to phase out or alter company car initiatives. These measures are considered almost impossible to implement in a hospital setting due to its functional nature. For most staff it is not possible to work from home, and many need a company car to perform their work effectively.

#### *Other travel plan strategies*

If Trusts are expecting effective adoption of the travel plan by staff an efficient and positive communication strategy to promote the new measures is integral. Most Trusts communicate with staff through the hospital newsletter alongside a variety of other communication strategies including: public transport information with pay packets; road shows; articles for hospital notice board; e-mails; and general displays. Some trusts organise staff seminars which are used for consultations and presentations to communicate the need for demand management at the site and to explain the various initiatives for reducing car traffic, as they are introduced.

Plymouth communicates its travel plan initiatives to all applicants through an introductory information pack including details on the travel plan and the parking constraints, which might help with location choice for new employees who are considering moving into the area. Good Hope promote their travel plan to new

employees at induction courses. Trafford is in the process of developing a 'personalised journey planner' service with the aim of identifying relevant information and routes on public transport options and car sharing opportunities.

As part of an additional initiative to enable staff to commute without a car, seven pool cars have been made available at Addenbrooke's for travel during the course of work. The pool cars have proved very popular as they are generally less expensive than reimbursing travelling expenses (DfT, 2002a). Newcastle has recently expanded their intra site hopper bus service between its three sites, saving in excess of an estimated 200,000 car journeys between sites and a saving of no less than 50% in taxi use. They are also aiming to instigate green transport initiatives with their contractors and suppliers.

Few Trusts are really promoting the health benefits of reducing car use, so clearly an opportunity exists here to raise awareness and improve staff health. An opportunity also exists for modifying car mileage allowances, and it appears that Newcastle are the only Trust seriously considering introducing a flat mileage allowance irrespective of engine size. This measure has potential for not only dissuading people from using the car but ultimately also influencing the choice of car they buy.

### *Travel Plan Effectiveness*

In general, there is a consensus across the UK literature that the most effective travel plans are those that have the greatest impact in achieving lower levels of car use and reducing the environmental impact of car use<sup>11</sup>. There is also broad agreement in the existing guidance, that the effectiveness of the travel plan should be measured by monitoring progress in reducing car use. Most of the hospital Trusts considered here attempt to monitor their travel plan progress, funds permitting, on an annual basis in terms of the modal split.

As most hospitals' travel plans are centred on changing staff travel behaviour, not many monitor the effectiveness of the travel plan on patients and visitors, Addenbrooke's being the exception. Addenbrooke's travel plan is approaching ten years of existence and is considered well established. They have also always considered the impact of patients and visitors, even if they have not always been the main focus of the travel plan.

Only four Trusts (Addenbrooke's, Plymouth, Oxford and Nottingham) are able to provide monitoring results. This is mainly due to the fact that the majority of Trusts have only recently (in the last two to three years) established a travel plan and because they are in the initial stages have not needed to repeat a travel survey.

These four Trusts are not only well documented but their travel plan efforts have been described as successful. This success was driven by the fact that the travel plans were a compulsory requirement of the section 106 planning agreement for the redevelopment of the hospital sites. The travel plans have also been established within a supportive environment and lead by dedicated and enthusiastic staff. Evidence of long-term commitment is also fundamental as a successful travel plan is not just a

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<sup>11</sup> DfT (2002b) Making Travel Plans Work: Research Report

quick fix solution, but an ongoing process which evolves over time to complement the context in which it sits. This ensures the programme has a greater impact.

There is a huge range of literature covering, in extensive detail, the factors, which lead to effective travel plans. The findings highlighted here support the fact that there is no single recipe for success. Each site has its own characteristics in terms of its location, size, employee demographics and other variables which means that a single set of strategies will not produce a predictable uniform set of results across all hospital sites. We can also derive from these findings that it is not just the implementation of one measure that will determine a high success rate, but the implementation of a package of measures, combining both incentives and disincentives. A study undertaken by the Napier University Transport Research Institute (2001) on Government departments' travel plans concluded the following:

- A plan containing only marketing and promotion is unlikely to achieve any modal shift.
- A plan with car sharing and cycle measures may achieve 3 – 5% reduction in drive alone commuting.
- A plan with car sharing, cycling and large discounts (30% +) on public transport and works buses will achieve around a 10% reduction.
- The combination of all the above measures, together with disincentives to drive, can achieve 15% - 30% reduction in drive alone commuting.

For greater detail on how to make travel plans work the readers are encouraged to refer to the Department for Transport's 2002 'Making Travel Plans Work; Research Report' as a starting point.

## **Conclusions**

The review undertaken of the implementation of travel plans within the NHS underlines their importance as a key tool for achieving levels of modal shift and commuting trip reduction, thus leading to a reduction in the ecological footprint. Despite the evidence for their potential to reduce road traffic their take up to date has not been widespread, not even for the NHS where the existing targets to have all sites with a green transport plan in place by 2002 has failed. Also, information on existing hospital travel plans is not always easily accessible and often hard to attain. A wealth of knowledge regarding the success and failures of hospital travel plans does exist and must be made available across the NHS to encourage and guide those sites who are yet to undertake this step.

Section 106 of the Town and Country Planning Act appears to be the most powerful driver behind the establishment of travel plans at NHS sites. An opportunity clearly exists for the NHS to develop greater incentives at the internal level to further encourage sites to implement a strategy.

In contrary to Rye (2002) who believes there is insufficient evidence at the present time to indicate that a travel plan of a given nature can produce a modal shift reduction of x percent, this review proves otherwise in the case of hospitals. It emphasises that a travel plan implemented under the following conditions:

1. In an area where there is a need to address parking problems; is backed by management.
2. Is designed specifically with the opportunities and weaknesses of the site in mind; is supported by all stake holders.
3. Is lead by enthusiastic staff with a good publicity campaign.
4. Offers a combination of measures to promote cycling, walking, the use of public transport and discourages single car occupancy.
5. A long term unwaivering commitment and flexibility to adapt the strategy as changes occur over the course of time.

can indeed achieve a 15% - 30% reduction in “drive alone commuting”.

The NHS leads a high profile in the eyes of the nation and therefore has the potential to be a powerful influential body in the ways of environmental development and sustainability. NHS wide uptake of travel plans which set strict targets and not only considers staff travel but also encompasses journeys taken by patients and staff would without doubt have a nation wide impact beyond those suggested in this review.

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