



Energy Research Day Conference

Energy Efficiency in the NHS

Wednesday 6th March 2013

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Low Carbon Strategy in the NHS

DRIVERS:

- Rio Summit & Kyoto Protocol
- EU Directives
- Government National Requirements
- Legislation / Regulation
- Penalties / Incentives

NHS Carbon Reduction Targets

10% reduction in greenhouse gas emissions by 2015 from 2007 levels, leading to a:-

- 34% reduction in emissions by 2020 from 1990 levels
- 80% reduction in emissions by 2050

Other Mandatory NHS Targets

- New buildings will achieve energy performance levels of 35 – 55 GJ / 100M³
- Refurbishments will achieve energy performance levels of 55 – 65 GJ / 100M³
- All new buildings will achieve an 'excellent' rating under BREEAM Healthcare
- All refurbishments will achieve a 'very good' BREEAM Healthcare rating
- Major capital developments will include at least 10% onsite renewable generation capacity

Current Legislation

Energy Performance of Building Directive (EPBD)

- EPC & RR
- DEC & AR
- Air Conditioning Inspections

F-Gas Regulations

F-Gas Regulations require a regular inspection of systems containing fluorinated gas at intervals of at least every 12 months

CRC - The Carbon Reduction Commitment Energy Efficiency Scheme

EU-ETS – European Union Emissions Trading Scheme

Sustainable Development Action Plan

The NHS Sustainability Development Unit (SDU) has issued a directive that requires all NHS Trusts to adopt a Board approved Sustainable Development Action Plan by January 2010. The Plans should address the following key areas:

- Carbon Reduction
- Water
- Transport
- Waste
- Procurement

Annual Energy & Sustainability Reporting to SDU - April 2012

My concerns and current challenges:

- Stringent UK, European and NHS carbon reduction targets.
- A increasing need for new 'low carbon' technologies.
- Extensive competition and innovation across the building services industry.
- Many 'low carbon' technologies now available on the market.
- NHS managers faced with having to select the most effective technologies.
- Only high-level general guidance available to decision makers responsible for the selection of 'low carbon' technologies.
- Currently no comprehensive guidance issued by the NHS or Government on the preparation of technical business cases.
- Concerns as to the validity of 'low carbon' projects and the rational behind decisions made.
- Little evidence of a coherent approach to energy reduction and sustainability.
- Evidence that NHS Trusts tend to work in isolation.
- Evidence that poor decisions are sometimes made based on the perceived benefits of a given technology rather than qualifying its true effectiveness.

Perceived vs. Actual Benefits



T5 Lighting

LED Lighting



Net Present Value — T8 to T5

Operational Costs	Value
Cost of equipment	£49,543
Lamp change costs	£10
Approximate number of lamps	800
Maintenance Cycle	2 years (assuming near constant operation)
Maintenance Cost	£8,000
Depreciation in performance	2%
Annual Savings	£23,924
Interest rate	10%

Assumes a 3.5% rise PA in electricity prices

Term in years	Expenses			Income			Cash flow	Cumulative cash flow
	Fixed costs	Other costs	Total	Money saved by project	Other savings	Total		
0	49,543		49,543				-£49,543	-£49,543
1		0	0	£23,924	£0	£23,924	£23,924	-£25,619
2		8,000	8,000	£24,283	£0	£24,283	£16,283	-£9,336
3		0	0	£24,647	£0	£24,647	£24,647	£15,311
4		8,000	8,000	£25,017	£0	£25,017	£17,017	£32,328
5		0	0	£25,392	£0	£25,392	£25,392	£57,720
6		8,000	8,000	£25,773	£0	£25,773	£17,773	£75,493
7		0	0	£26,160	£0	£26,160	£26,160	£101,652
8		8,000	8,000	£26,552	£0	£26,552	£18,552	£120,204
9		0	0	£26,950	£0	£26,950	£26,950	£147,154
10		8,000	8,000	£27,354	£0	£27,354	£19,354	£166,509
						NPV =	£166,509	£82,572.37

Net Present Value — T8 to LEDs

Operational Costs	Value
Cost of equipment	£115,843
Lamp change costs	£65
Approximate number of lamps	800
Maintenance Cycle	6 years (assuming near constant operation)
Maintenance Cost	£52,000
Depreciation in performance	2%
Annual Savings	£25,517
Interest rate	10%

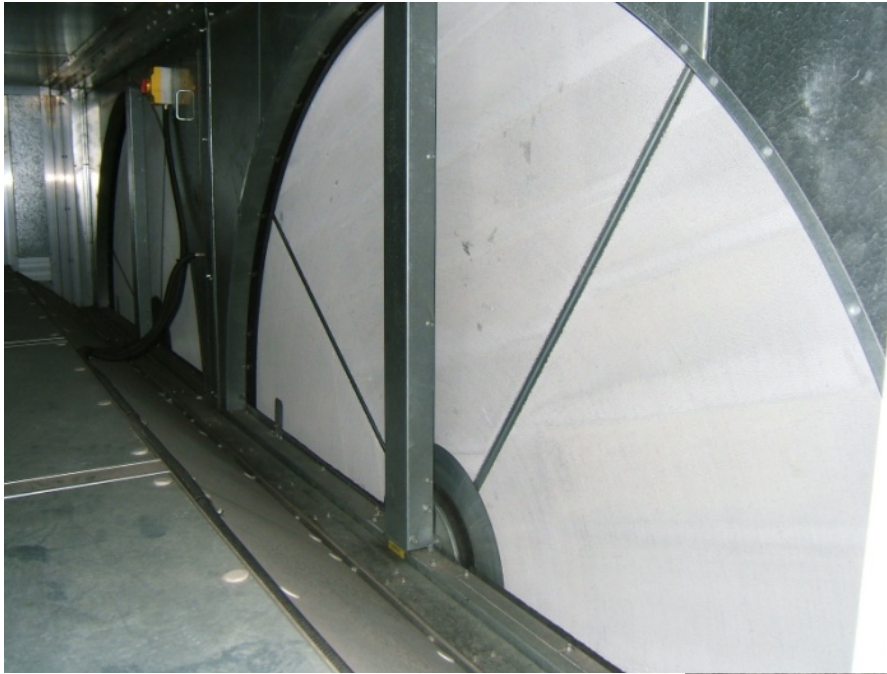
Assumes a 3.5% rise PA in electricity prices

Term in years	Expenses			Income			Cash flow	Cumulative cash flow
	Fixed costs	Other costs	Total	Money saved by project	Other savings	Total		
0	115,843		115,843				-£115,843	-£115,843
1		0	0	£25,517	£0	£25,517	£25,517	-£90,326
2		0	0	£25,900	£0	£25,900	£25,900	-£64,426
3		0	0	£26,288	£0	£26,288	£26,288	-£38,138
4		0	0	£26,683	£0	£26,683	£26,683	-£11,455
5		0	0	£27,083	£0	£27,083	£27,083	£15,627
6		52,000	52,000	£27,489	£0	£27,489	-£24,511	-£8,884
7		0	0	£27,901	£0	£27,901	£27,901	£19,018
8		0	0	£28,320	£0	£28,320	£28,320	£47,338
9		0	0	£28,745	£0	£28,745	£28,745	£76,082
10		0	0	£29,176	£0	£29,176	£29,176	£105,258
						NPV =	£105,258	£20,683.25

Simultaneous Heating and Cooling



Thermal Wheels – Heat/Coolth Reclaim



Can reduce plant running costs
by up to 30%

Poor Insulation – VSDs running at 50Hz

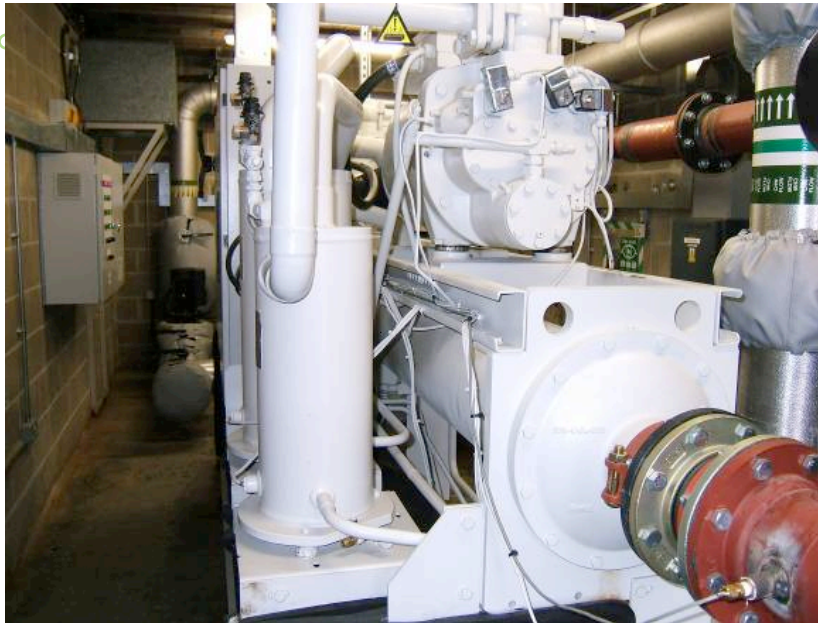


Just 100mm of loft insulation!

An investment of
£20,000 on VSDs



Poor Chiller Selection



Never considered a Chiller that utilises Turboacor Compressors – Typical COP of 8

New Chiller fitted with Screw Compressors – Typical COP of 4

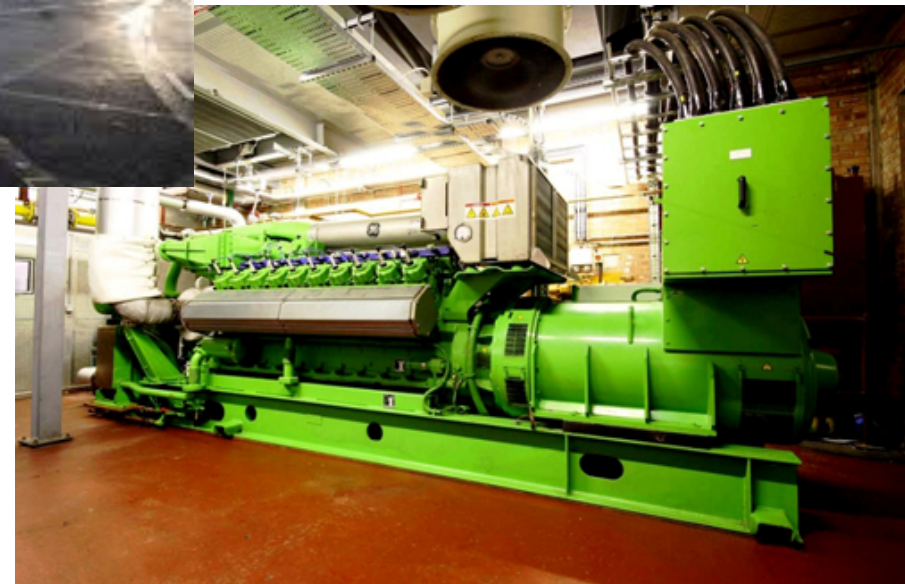


New Generators at a London Hospital



No consideration given to installing CHP

£5m Spent on New Generators



My Research Project

- Will reflect on the use of low carbon building service technologies employed within new and existing healthcare buildings
- Examine those factors that affect and influence present procurement methods and decision-making processes of low carbon technologies
- Will explore the ways in which these initiatives are evaluated and promoted within the healthcare environment

Key aims of my research

- To assist the NHS in making more informed decisions about the 'low carbon' technologies they employ.
- To understand decision-making processes within NHS organisations and the difficulties and barriers faced by senior managers when procuring and implementing low carbon technologies.
- To analysis the strengths and weaknesses of current knowledge sharing practises, allowing recommendations and guidelines to be developed enabling a more robust dissemination of knowledge within the NHS.
- To understand how 'low carbon' building service technologies perform within a range of building types and uses.

Principal Research Question

How (or to what extent) can I help to provide a resource that will assist the NHS in making sound, sustainable decisions regarding the specification and application of future low Carbon technologies?

Subsidiary Questions

A number of secondary questions will need to be answered at various stages of my research in support of the primary question, these can be broken down into specific groups that include:

- **Technology Suitability** – Do low carbon technologies operate more effectively in building specific situations?
- **Technology Verification** – Is technology currently used verified through quantitative measurement?
- **NHS ‘Low Carbon’ Decision Making Processes** – Are decisions made undertaken in a cohesive and effective manner?
- **Energy Project Advisory Tool** - Would the development of such a tool provide a more reliable information resource on which NHS procurement decisions can be based?
- **Knowledge Dissemination** - Do knowledge dissemination vehicles such as NHS Energy and Environmental Forums and the NHS Sustainability Portal influence the decision making process of NHS senior managers?

Proposed Research Methodology

How do I plan to answer these questions?

Review of relevant literature, such as:-

- Low Carbon Technology – Case Studies
- NHS Sustainable Development Unit (SDU) policy and guidance documents
- Trust specific Carbon Reduction Programmes

One to one, or group discussions with NHS staff will help support the literature review and ascertain the type and scope of energy reduction technologies adopted and their perceived benefits and pitfalls.

Proposed Research Methodology

Research methods will also need to be developed to ascertain the answer to specific decision making questions such as:

- Who are the decision-makers?
- What influence does each decision-maker have?
- Are project stakeholders proportionally represented in decision-making processes?
- What are the main factors considered during the decision making process?
- Are there aspects of the tendering process working against sustainable development?
- Are there sufficient case studies and associated literature to draw accurate conclusions and recommendations?

Again, one to one, or small group interviews will be set up with Energy Managers, Engineering Managers and NHS procurement teams in order to ascertain the answers to questions raised above.

*Currently undertaking interviews at Nottingham University Hospitals NHS Trust
as part of a Energy Management Case Study*

Outcomes of this Research

- Potential outcomes of my research might be:
 - The development of guidelines for the future procurement of sustainable low Carbon technologies within the NHS in the context of what technologies are best suited to any given building environment.
 - Guidelines for the development of effective and accessible knowledge dissemination within the NHS that encourages the appropriate specification of technology.
 - The possible development of an ‘energy project advisory tool’ that will provide guidance to NHS managers founded on the use of reliable, verified data and established ‘building specific’ energy saving technologies.



Thank you for listening...

Any Questions Please?