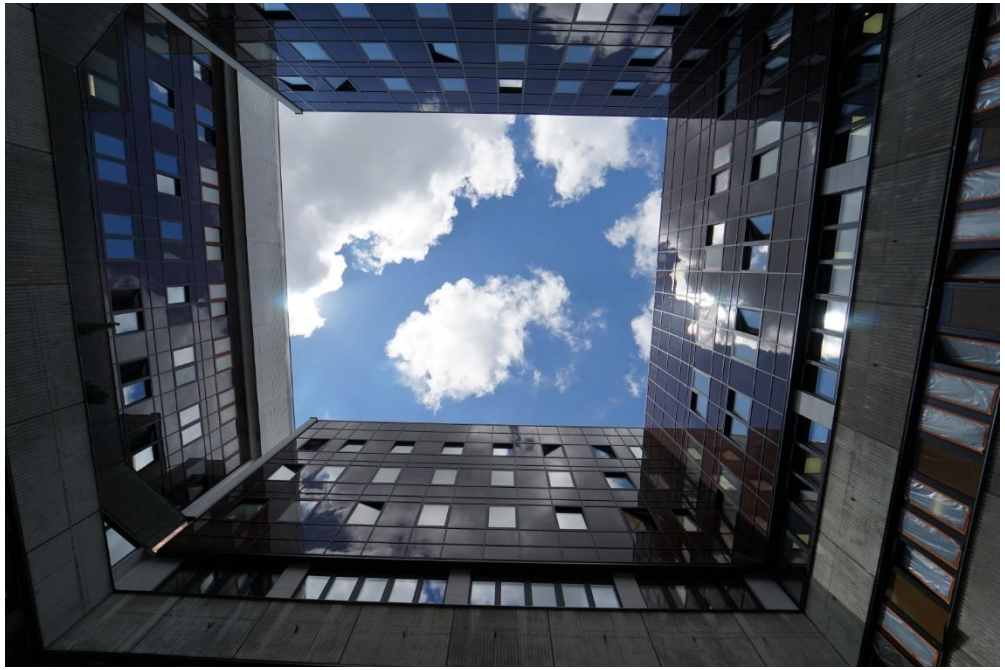
NEMOCNICE NA HOMOLCE

ENERGY-SAVING MEASURES NA HOMOLCE HOSPITAL



EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Životní prostředí

STÁTNÍ FOND ŽIVOTNÍHO PROSTŘEDÍ ČESKÉ REPUBLIKY

MINISTERSTVO ZDRAVOTNICTVÍ ČESKÉ REPUBLIKY

NEMOCNICE NA HOMOLCE

INITIAL STATE

Na Homolce Hospital is a specialized care center - excellent Cardiovascular, Neuro and Diagnostic programme

with 2 thousand employees, over 20 operating rooms, 350 beds (half of them with intensive care), and for clarification: 7 ANGIOGRAMs, 2 CTs, 4 MRIs, 2 PET_CTs, 1 PET_MRI, 1 CYCLOTRON for the production of radiopharmacceuticals

Over 30-years-old monoblock of the Hospital building is a construction with characteristic brutalist architecture from the 1980s.

Most of the building's technological equipment was beyond its useful life.

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BASIC PROJECT DATA

40% REDUCTION IN ENERGY CONSUMPTION (excluding technological consumption), 10 years contractually guaranteed by EPC -
5,823 tonnes of EMISSIONS REDUCTION CO_2/YEAR

- 8 700 MWh gas savings/year
- 4 200 MWh electricity savings/year
- 15 300 m³ water saving/year

CZK 1.1B INVESTMENT COSTS

- CZK 720M Operational Programme Environment & New Green Savings programme
- CZK 393M OWN RESOURCES NNH

- CZK 681M INSULATION — PD - CONSTRUCTION COMPANY 4,6% extra work
- CZK 432M EPC – TECHNOLOGIES — D&B - ESCO 1,6% extra work

- approx. CZK 40M savings per year
- approx. CZK 0.5B saved in emergency-forced future investments in technological units and façade elements
- optimisation of the personnel organisational structure

COST-SAVING MEASURES

- **Building modifications:** roof insulation, window replacement, external blinds - 33km of Al profiles, 42 000 m^2 of waterinsulation
- **Heat:** replacement of the heat distribution backbone and pumps, reconstruction of the hot water source, replacement of the central steam source, use of waste heat from the central cooling system
- **MaR:** installation of a new heat measurement and control system
- **Lights:** replacement of interior lighting with LED technology
- **PV:** 303 kWp, assumption 273MWh / YEAR
- **Air conditioning:** reconstruction of the central air conditioning heat recovery system and replacement of dozens of air conditioning units
- **Water:** faucet aerators and toilet water savers
- **ENERGY MANAGEMENT**





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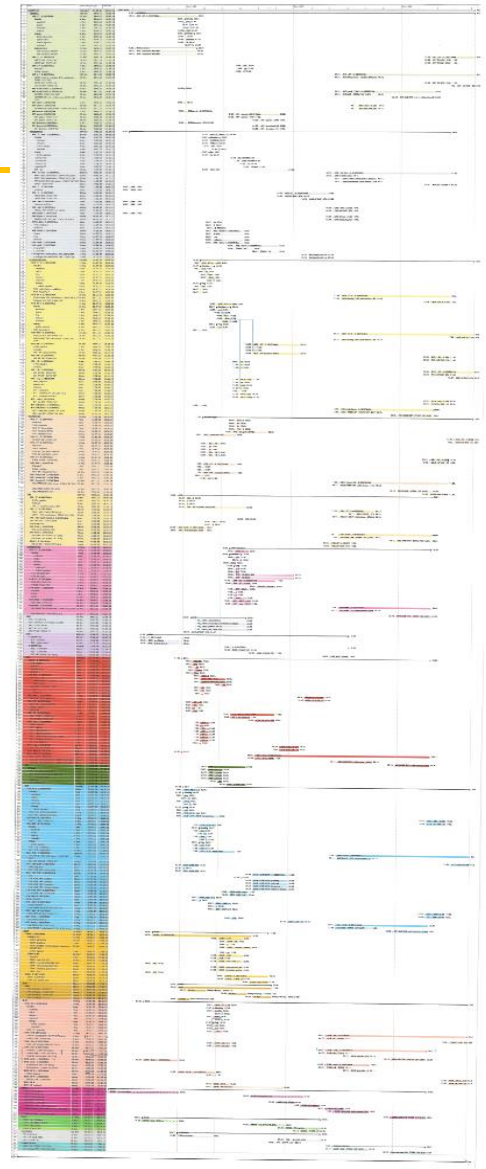
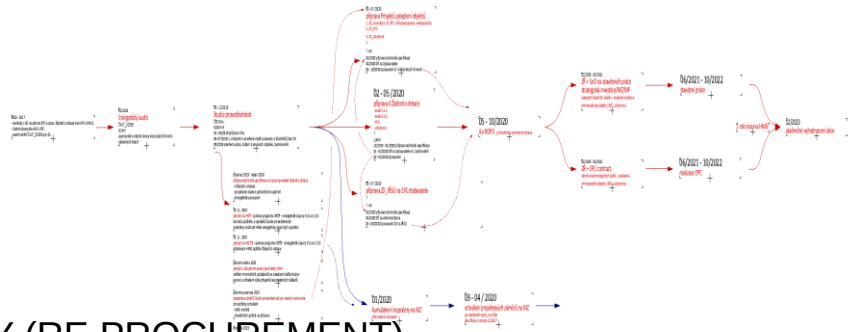


PROJECT LOGISTICS



2018	ENERGY AUDIT
2018 – 2020	ENERGY DATA COLLECTION
2022	CONTRACT WITH ESCO
2023	CONTRACT WITH CONSTRUCTION COMPANY (RE-PROCUREMENT)

DEADLINE FOR THE ENDING OF GRANT PROGRAMMES IN 2023
MINIMISE RESTRICTIONS ON THE PROVISION OF HEALTH CARE

- 1 year of work to build a meaningful schedule
- 1 YEAR IMPLEMENTATION WITHOUT TIME DELAY
  - 12 000 m2 of controlled zones for asbestos disposal - 116 tons
  - 26 000 m^2 of temporary bulkheads
  - more than 300 truck trailers were handled
  - 350 external staff at peak times
  - more than 10 insurance claims under settlement

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Evropské strukturální a investiční fondy
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ŽIVOTNÍHO PROSTŘEDÍ
ČESKÉ REPUBLIKY

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ČESKÉ REPUBLIKY

NEMOCNICE
NA HOMOLCE

		INV dod č.2 v Kč vč. DPH	úspora 2019 Kč. vč. DPH	podíl na investicích	podíl na úsporách	poměr úspory vs inv	úspora 2024 Kč. vč. DPH	přibližná návratnost inv v letech
1	zateplení	681 861 520,00	2 736 400,00	61%	12%	0,2	6 589 251,200000	103
2	kotelna	32 417 443,00	1 045 000,00	3%	5%	1,6	2 516 360,000000	13
3	náhrada centrálního zdroje, příprava TUV	17 164 957,00	1 851 700,00	2%	8%	5,2	4 458 893,600000	4
4	MaR	12 122 611,00	249 000,00	1%	1%	1,0	599 592,000000	20
5	zónová regulace	31 149 526,00	931 000,00	3%	4%	1,4	2 241 848,000000	14
6	transformátory	10 591 856,00	101 600,00	1%	0%	0,5	244 652,800000	43
7	odpadní teplo z chlazení	4 284 673,00	368 000,00	0%	2%	4,2	886 144,000000	5
8	páteřní rozvod UT	49 677 458,00	401 000,00	4%	2%	0,4	965 608,000000	51
9	výměna osvětlení	63 334 384,00	5 656 000,00	6%	25%	4,3	13 619 648,000000	5
10	úspory na vodě	2 712 014,00	1 315 000,00	0%	6%	23,4	3 166 520,000000	1
11	rekonstrukce centrálního systému ZZT	76 195 897,00	2 420 900,00	7%	11%	1,5	5 829 527,200000	13
12	FVE	20 152 878,00	740 400,00	2%	3%	1,8	1 782 883,200000	11
13	VZT jednotky	109 398 741,00	4 188 400,00	10%	18%	1,9	10 085 667,200000	11
		1 111 063 958,00	22 989 897,15				55 121 400,000000	20
	energetická management	150tis /rok						

	plyn	1,18	3,26
	el	2,87	5,81

z toho	kWh	2019 Kč vč. DPH	2024 Kč vč DPH	
PLYN kWh	8 734 000,00	9 469 720	28 472 840	
EL kWh	4 206 000,00	12 076 163	24 436 860	
VODA m3	15 308,00	1 336 608	2 211 700	
CELKEM V Kč s DPH/ROK		22 882 491	55 121 400	2,408889814

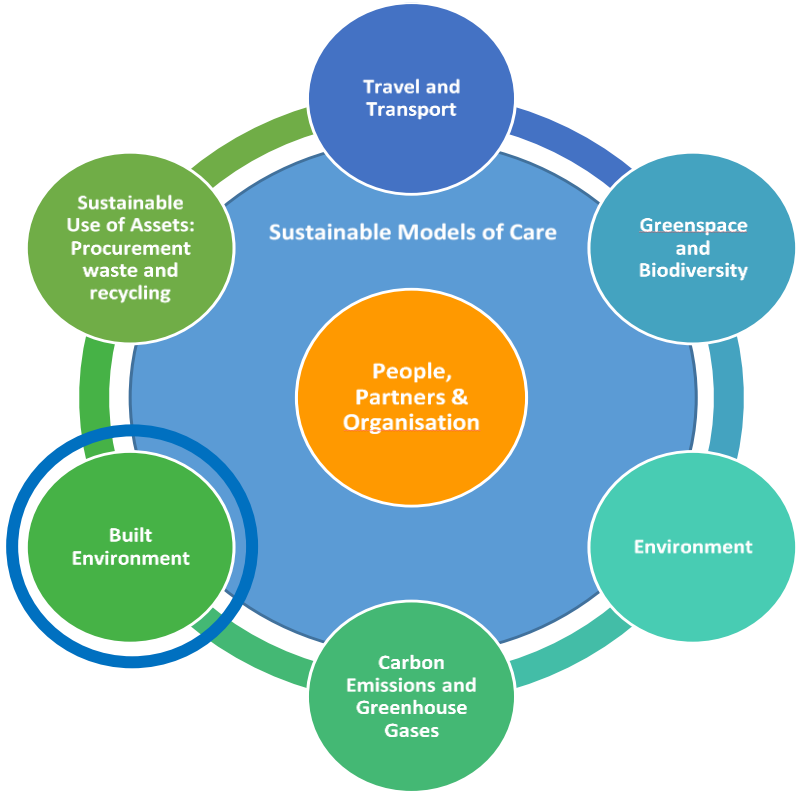
dotace	720 000 000,00
vl. prostředky	393 000 000,00

The return on investment of CZK 1.1B is within 20 years (CZK 55M savings on energy + CZK 5M savings on wages per YEAR).
Return on investment of the hospital's own resources is within 7 years, thanks to European funds CZK 720M

Return on partial investments in:
_insulation (windows, doors, roofs, balcony renovation, ...) 103 years
_return on installation of LED lighting is 5 years
_return on installation of waste heat system is 5 years
_return on cancellation of central steam generation 4 years
_return on installation of PV is 11 years
_return on installation for HVAC units is 11 years

...THANK YOU FOR YOUR ATTENTION

Opportunities and Challenges of Energy Transition for a Sustainable Future



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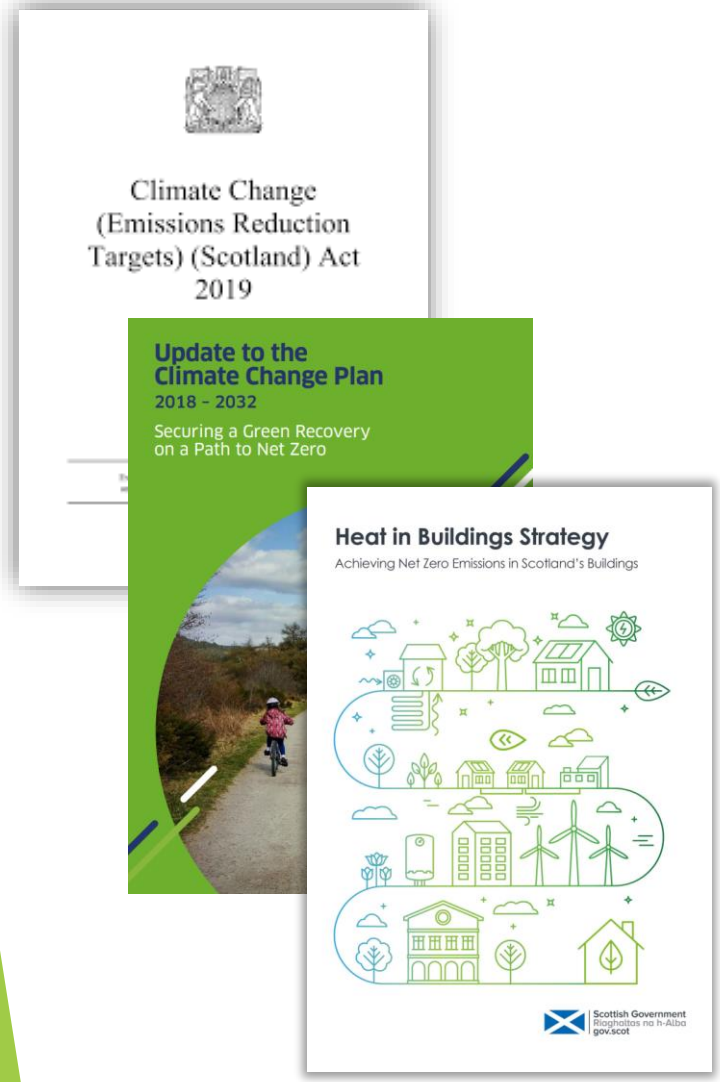
Legislation & Policy



- **Climate Change (Scotland) Act 2019:**
  - 75% reduction by 2030 from 1990
  - National target of net-zero by 2045
  - **Fossil-free heating 2038**
  - **NHSS Net-zero by 2040**

- **Heat in Buildings Strategy**
  - all publicly-owned buildings to meet zero emission heating requirements, with a backstop of 2038.
  - 2024 New Build Zero Emissions from Heat Standard, requiring all new buildings to have zero direct emissions heating systems

- **Part 4: Public Bodies Duties:** Through their functions, public bodies must:
  - **Mitigate** climate change (reduce emissions)
  - Do so **sustainably**

- **NHSS Climate Emergency and Sustainability Strategy 2022 to 2026**

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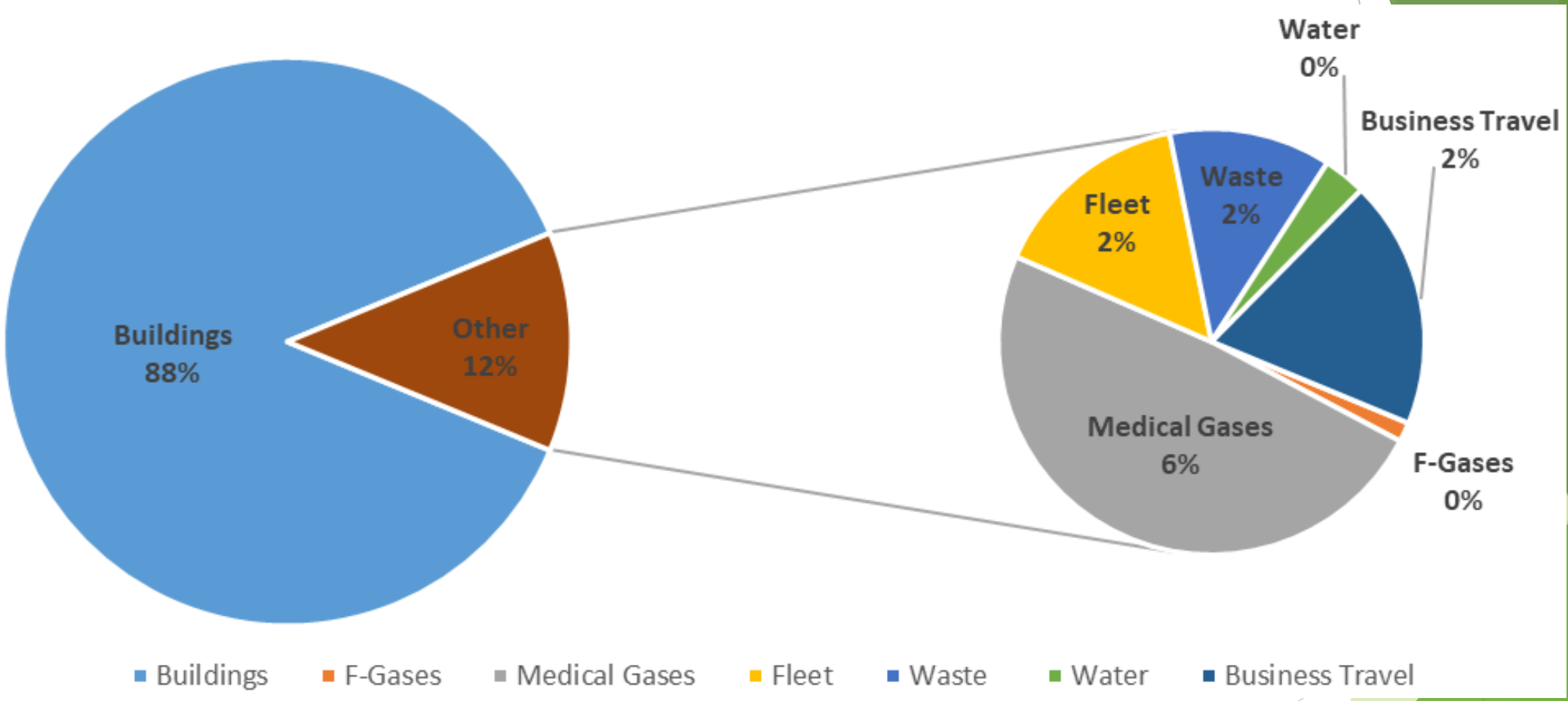
2023/2024 Carbon Emissions (TCO_2e)



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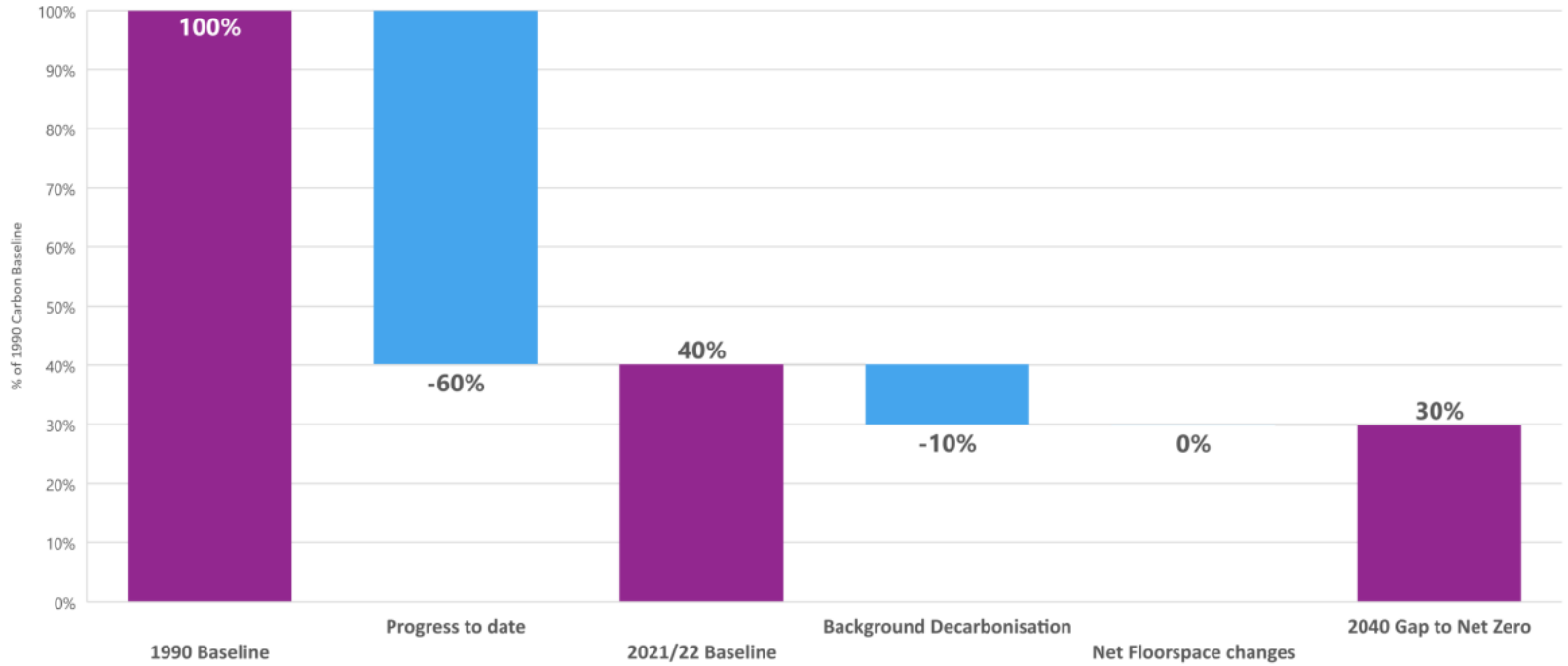
Built Environment

What is NHS Lothian's gap to Net Zero?



- Assumes continued use of gas and no reduction in gas supply emissions.
- Significant investment in energy efficiency and renewable energy required to close the gap
- Short-term priority is reducing demand, through energy efficiency.

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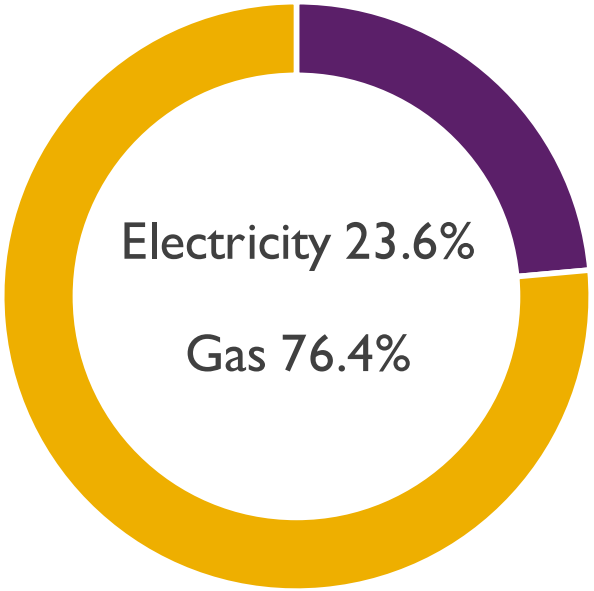
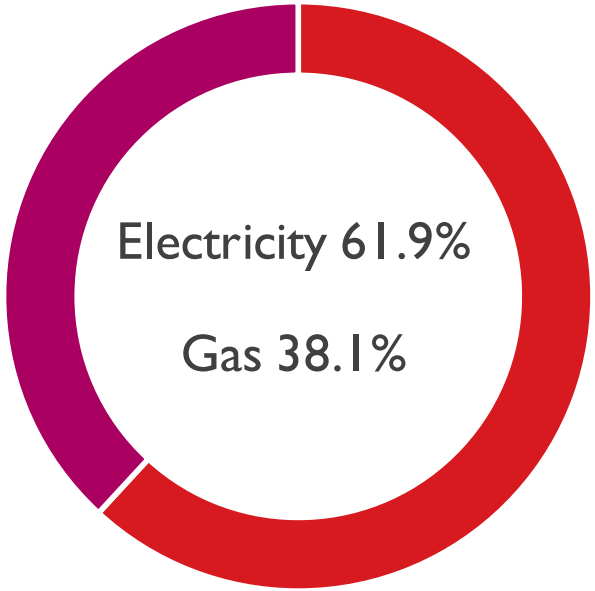
Built Environment

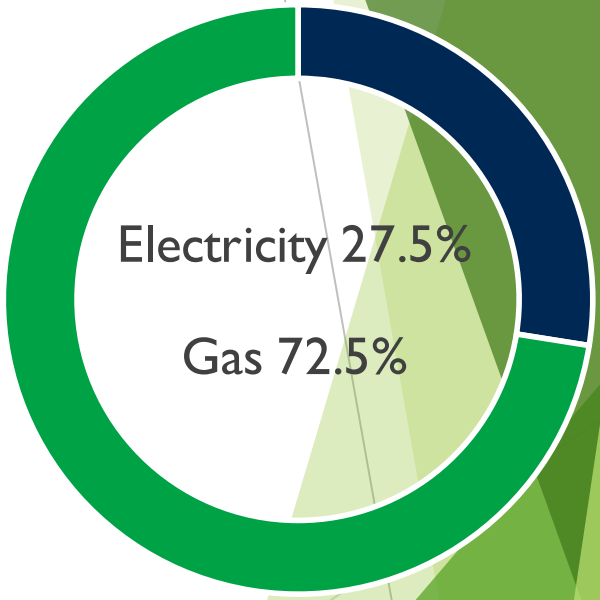
Usage Breakdown



Cost Breakdown



CO_2 Breakdown



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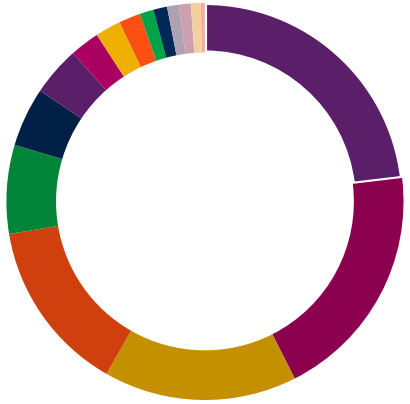
Energy Breakdown

Electricity

Estimated End Usage Category Breakdown Electricity

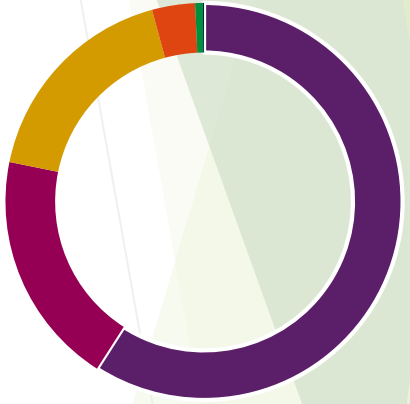
End Use Category	%
Medical Equipment	23.08%
Lighting - Internal	19.39%
Fans	15.71%
Small Power	14.10%
Cooling & Humidification	7.21%
Catering	4.81%
Entertainment Equipment	4.01%
Hot Water	2.40%
Space Heating	2.08%
Pumps	1.76%
Controls	1.12%
Vertical Transport	1.12%
ICT Equipment	0.96%
Lighting - External	0.96%
Cooled Storage	0.80%
Laundry	0.32%
Pool/Leisure	0.02%



Gas

Estimated End Usage Category Breakdown Natural Gas

End Use Category	%
Space Heating	59.07%
Hot Water	19.12%
Medical Equipment	17.59%
Catering	3.50%
Laundry	0.63%
Pool/Leisure	0.09%
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-



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Sustainability Case Study – LED Lighting

Overview

The Energy Team successfully developed a project, granted funding from Scottish Government to deliver energy savings at St John's Hospital by replacing older inefficient lighting, with LED fittings.

The Challenge

- Reduce energy **costs and carbon** emissions.
- Meet challenging funding constraints on programme.
- Replace fittings across a **live** operational site.
- Ensure products and delivery consider **Infection Control** risks.

The Solution

- Over **9,000 LED replacement fittings** installed across the St John's Hospital site.
- **£2,000,000** Grant fund from Green Public Sector Estates Decarbonisation Scheme (GPSEDS)
- Delivered through our **Energy Performance Contract**, which guarantees the level of savings.
- Improved clinical environmental conditions

The Results

Total Capital Cost	£2.38M
Energy Savings (£/annum)	**£308k**
Carbon Savings (TCO_2/annum)	**619**
Payback	**8 years**

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Sustainability Case Study - Laundry Heat Recovery

Overview

NHS Lothian operates an industrial laundry facility. Operation requires substantial energy and water to provide this critical service, with carbon emissions equivalent to the 5th largest site in the estate. The project was completed in May 2024.

The Challenge

- The aim was to achieve substantial reductions in energy consumption and carbon emissions.
- Reduction in laundry operational costs.
- Meet challenging programme constraints from funding scheme.

The Solution

A special purpose heat exchanger, designed to extract the heat energy from laundry wastewater and transfer it to the incoming freshwater, without risk of contamination.

The solution includes integration of purpose designed heat exchangers, water tanks and process controls to connect to the laundry systems.

Projected Results

Total Capital Cost	£253k
Energy Savings (£/annum)	**£173k**
Carbon Savings (TCO_2/annum)	**269**
Payback	**1.5 years**

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Sustainability Case Study – Energy Optimisation

Overview

Staff contacted the Energy Team as they were keen to work with the NHS as their building owner to support energy optimisation, carbon reduction and behaviour change for their staff and people in the communities they support.

The Challenge

- Identify energy saving measures
- Identify plant optimisation
- Monitor energy usage

The Solution

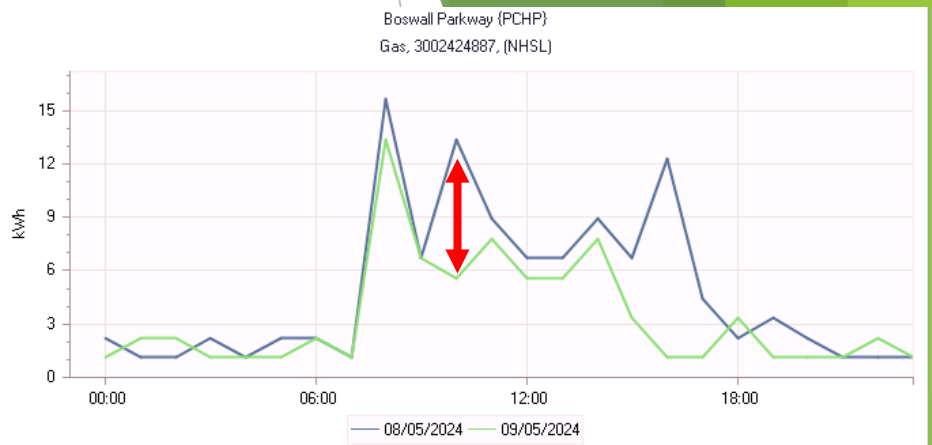
Desktop energy survey completed before a site visit. Identified high gas usage during the evening and weekends when closed. Through collaboration with site user and estate colleagues, this led to:

- Time schedule adjusted to switch off at 3.30pm and over weekends.
- Energy Saving measures such as fridge/freezer rationalisation implemented by the staff.
- Staff trained and given access to energy manager Monitoring & Targeting software.

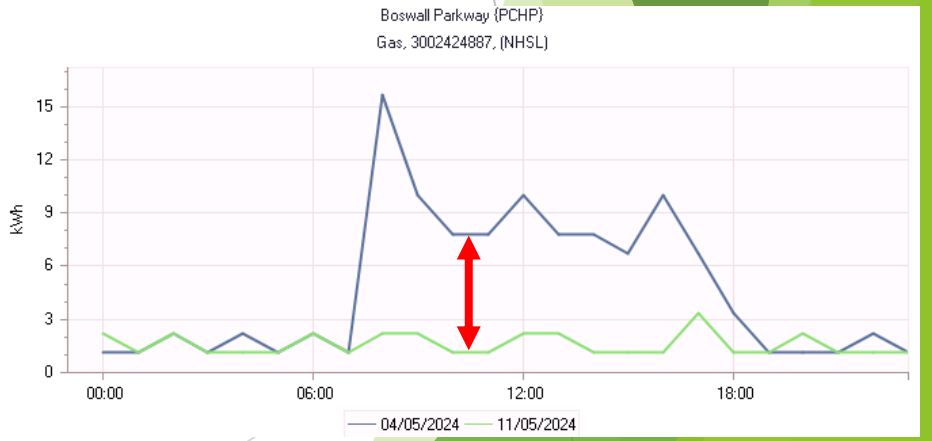
The Result

Projected Savings	
Energy Savings (£/annum)	**£1,939**
Carbon Savings (TCO_2/annum)	**0.73**

Weekday



Weekend



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De-Steaming

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Sustainability Case Study – Energy – Heat Network at WGH

Overview

Generation of thermal energy, is critical to site operations for buildings environmental conditions, hot water and other process demands such as kitchens. Heat provided from a single energy centre with industrial steam boilers.

The Challenge

- Reduce energy costs and carbon emissions, through efficiency of heat **generation and distribution**.
- Increase system **resilience** and operational performance.
- Undertake disruptive engineering works on a live operational site, and transitioning buildings heat source.

The Solution

- Phases 1 - site wide de-steaming and transition to a new low-temperature heat network began in 2019, with phase 2 completed in 2024.
- New **gas heating plant** and around a **kilometre of underground insulated pipes** to connect new and existing buildings to the new network, in the south-east zone of the site.
- Further development of the project is needed, but this is a significant step on the decarbonisation pathway for WGH.

The Results

Total Capital Cost	£15M
Energy Savings (£/annum)	**£460k**
Carbon Savings (TCO_2/annum)	**2575**

Sustainability Case Study – Energy – Energy Performance Contract

Overview

3rd largest energy consumer within NHS Lothian, St John's Hospital embarked on a significant initiative to enhance energy efficiency, focusing on reducing costs and minimizing carbon emissions. A variety of critical clinical services and laundry services.

The Challenge

- Replacement of aged Energy Centre.
- Energy demand and cost reduction.
- Maintain site operations while replacing heat generation plant.

The Solution

- New steam boilers and Combined Heat and Power (CHP) unit to generate both thermal and electrical energy at a more efficient and cost-effective rate.
- Project development and delivery involved use of an Energy Performance Contract (EPC), guaranteeing energy cost savings and providing expert ongoing support to maintain savings and efficient operation of the systems.

The Result

Total Investment Cost	£6.1M
Energy Savings (£/annum)	**£950k**
Carbon Savings (TCO_2/annum)	**143**
Payback (years)	**6.4**

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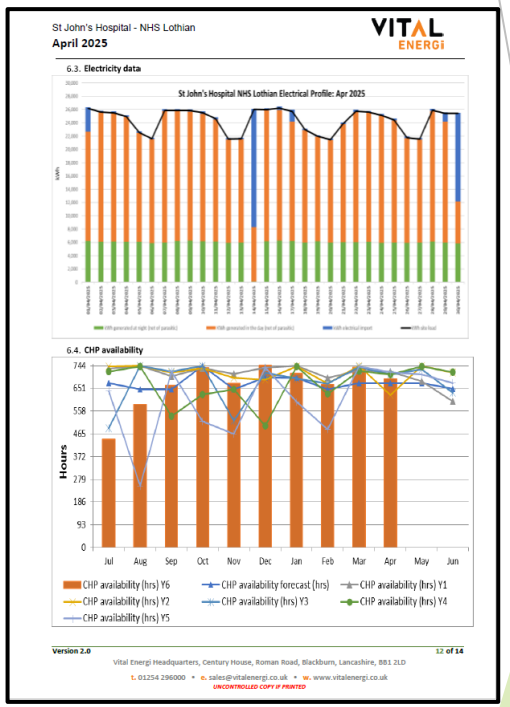
Sustainability Case Study – Energy – Energy Performance Contract

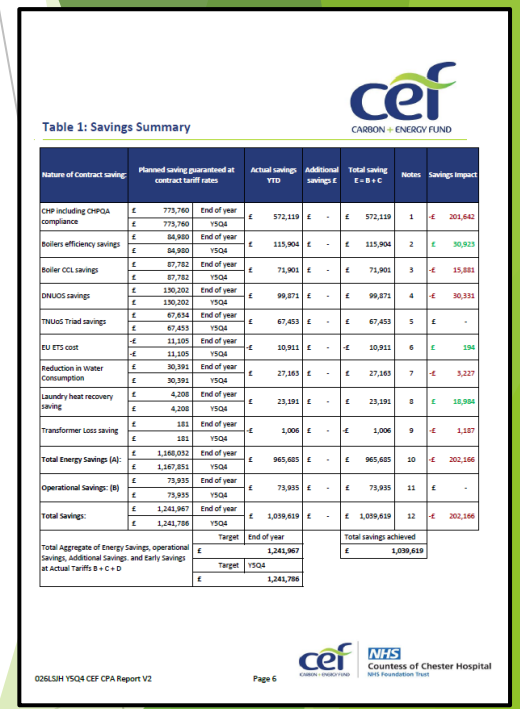
The Solution

- 25-year Guaranteed Energy Performance Contract
- Robust Energy contract model
- Operations delivery
- Includes flexibility
- Route for additional projects

Conclusions

- Large opportunity for further expansion
- Project finance option
- Complex





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NHS Lothian

The Future?

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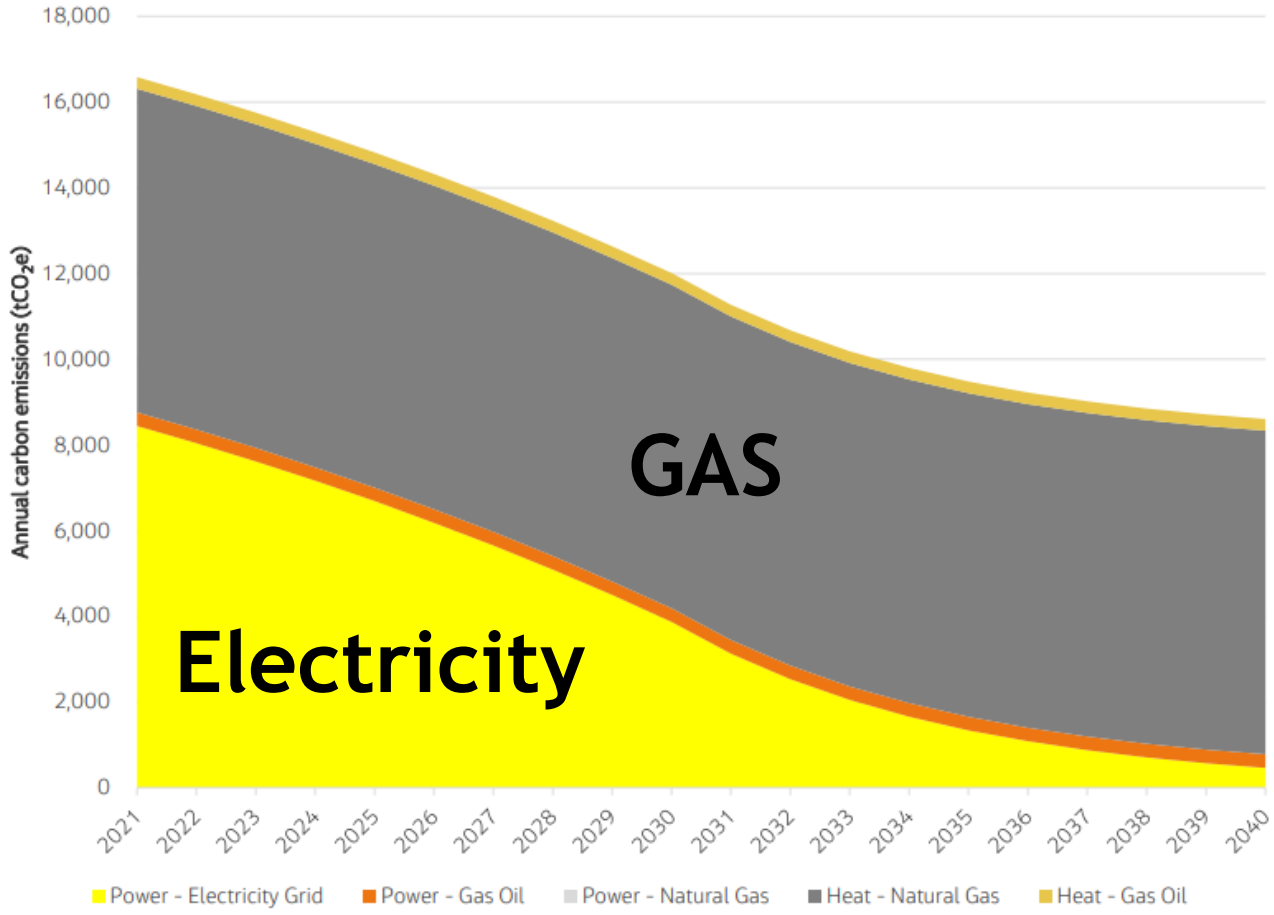
Carbon Reduction

Royal Infirmary Edinburgh



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Heat Decarbonisation

Pathway	Technology	Suitability	Impact
1	**Heat pump** systems	Air-source and closed-loop ground-source heat pumps are **unlikely to be suitable**	Estimated **cost** to provide the site's peak demand is **exceptionally high**.
2	**Hydrogen** as the primary heating fuel	Currently **unclear** whether there will be widescale adoption of hydrogen	**Significant risk** to the target of decarbonising heat by 2038
3	**District Heat Network**	Accelerated site decarbonisation, thanks to the displacement of imported gas with **purchased heat**	Estimated to be l**owest cost and best technology**.

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Challenges	Opportunities
Aged Buildings & Infrastructure	Cost savings from Energy Efficiency as the priority
Access to capital funding	Alternative financing models
Competing priorities (Clinical and Operations)	Collaboration and shared outcomes
Gas v's Electricity price & Carbon Balance	
Technology options and reliability	

Questions?

Daniel Mill

Senior Project Manager Sustainable & Technical Development

Facilities Department

NHS Lothian

Royal Edinburgh Hospital

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