NHS Heat & Western General



- Context – NHS Net Zero Pathway
- Western General Hospital (WGH)
- What's next
- Key challenges

Our NHS
Our People
Our Planet

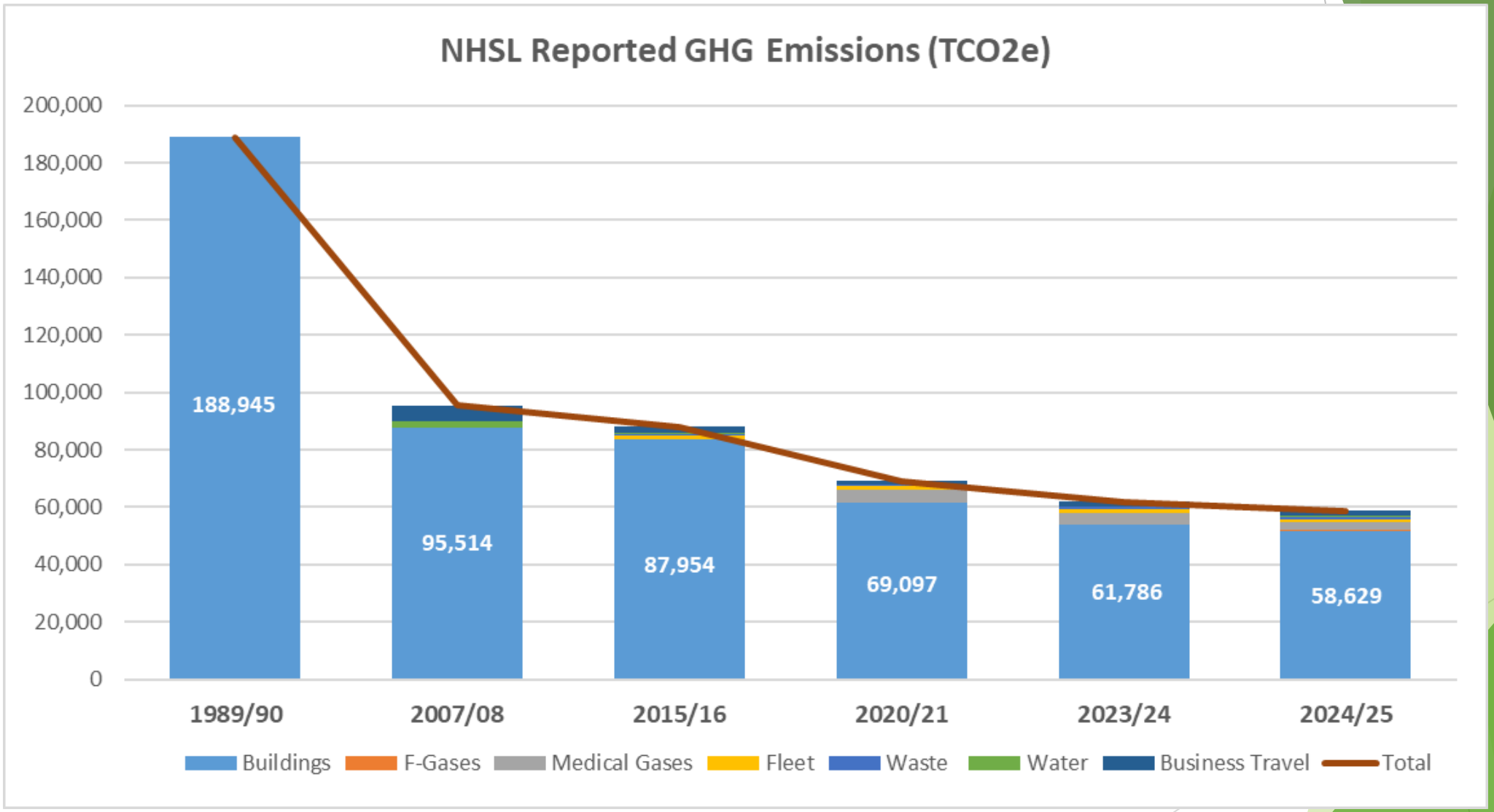
Context

- NHS Lothian Sustainable Development Framework
- NHS Lothian Net Zero Buildings Strategy.
- Climate Change (Scotland) Act 2019:
  - **NHSS Net-zero by 2040**
- Scottish Government – Heat in Buildings Strategy
  - All **publicly-owned buildings** to meet zero emission heating requirements, with a backstop of **2038**.



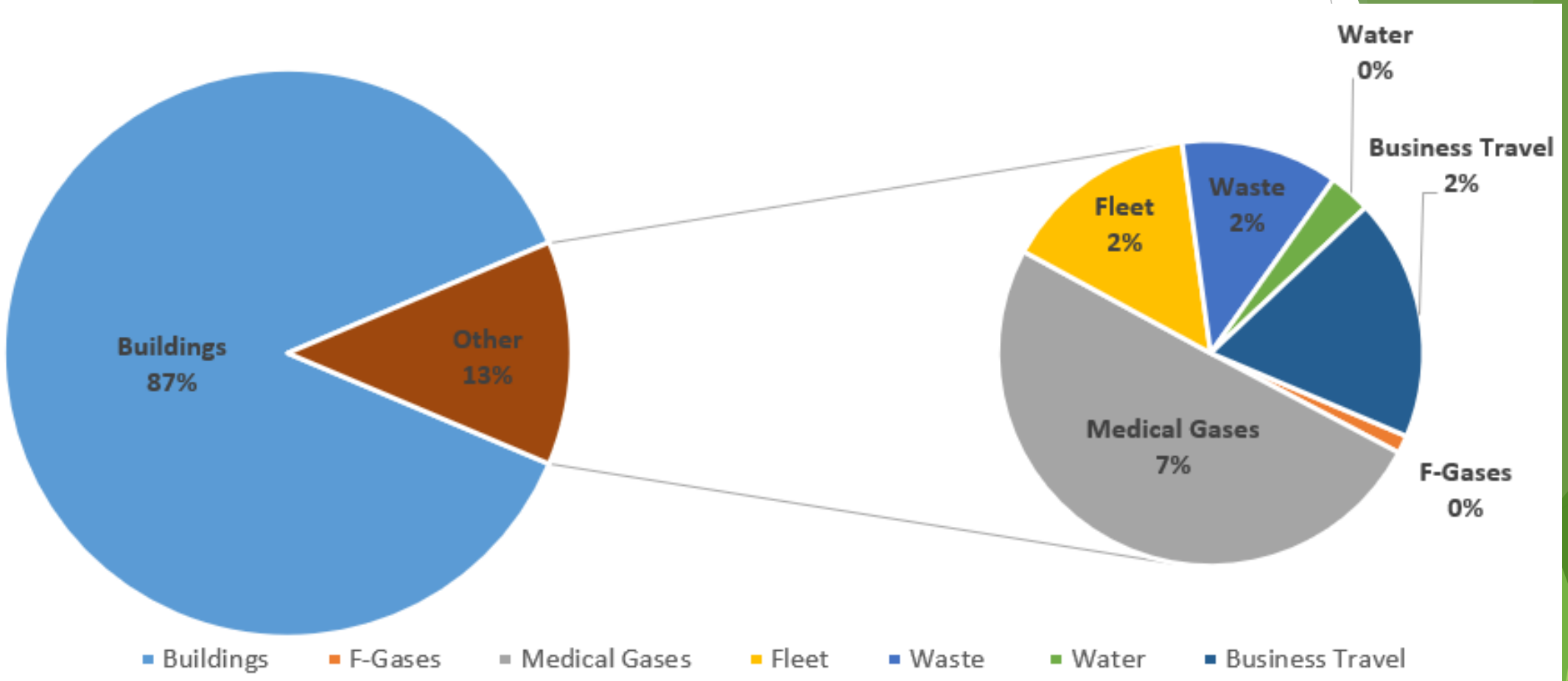
Our NHS
Our People
Our Planet

2024/2025 Carbon Emissions (TCO_2e)



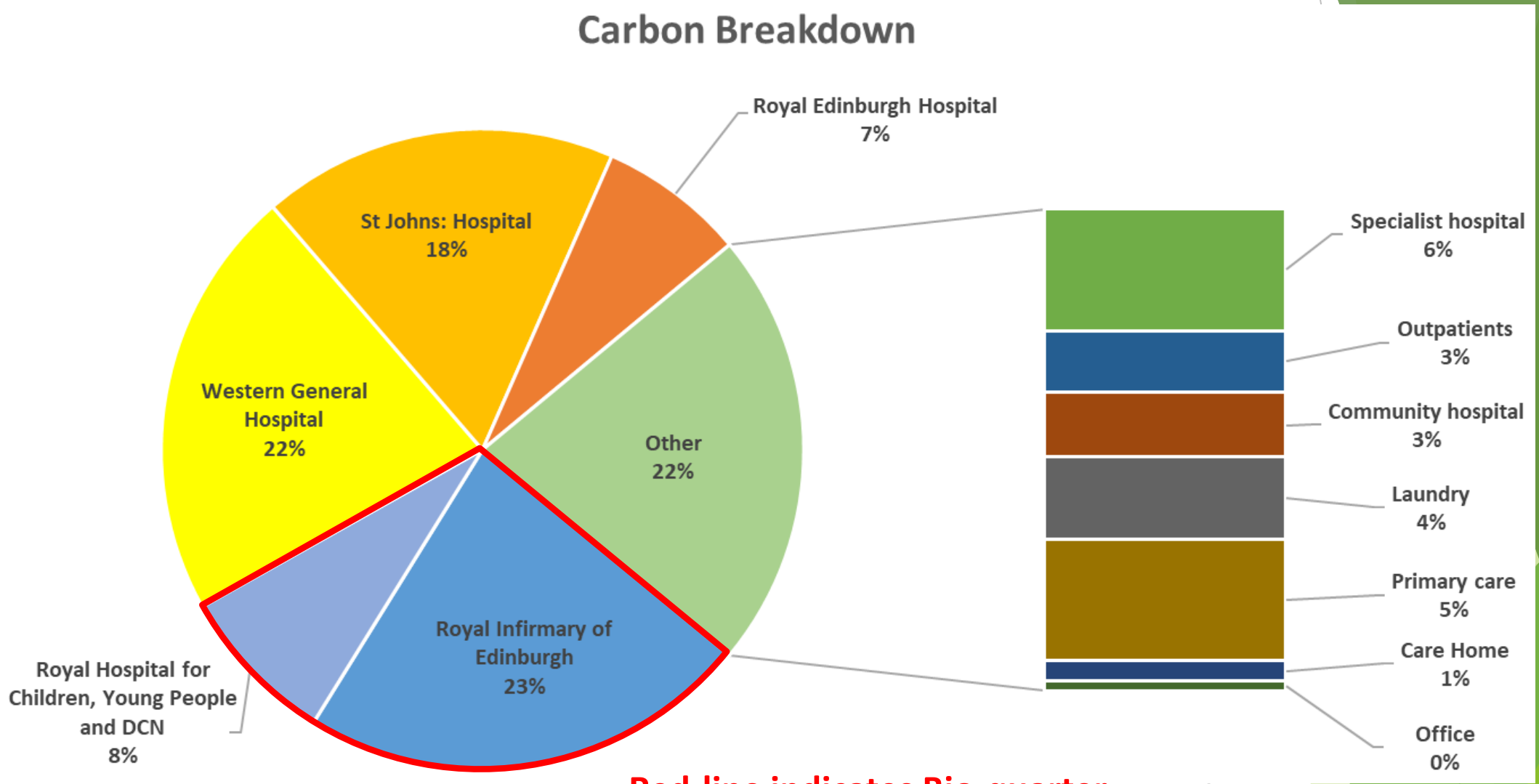
Our NHS
Our People
Our Planet

2024/2025 Carbon Emissions (TCO_2e)



Our NHS
Our People
Our Planet

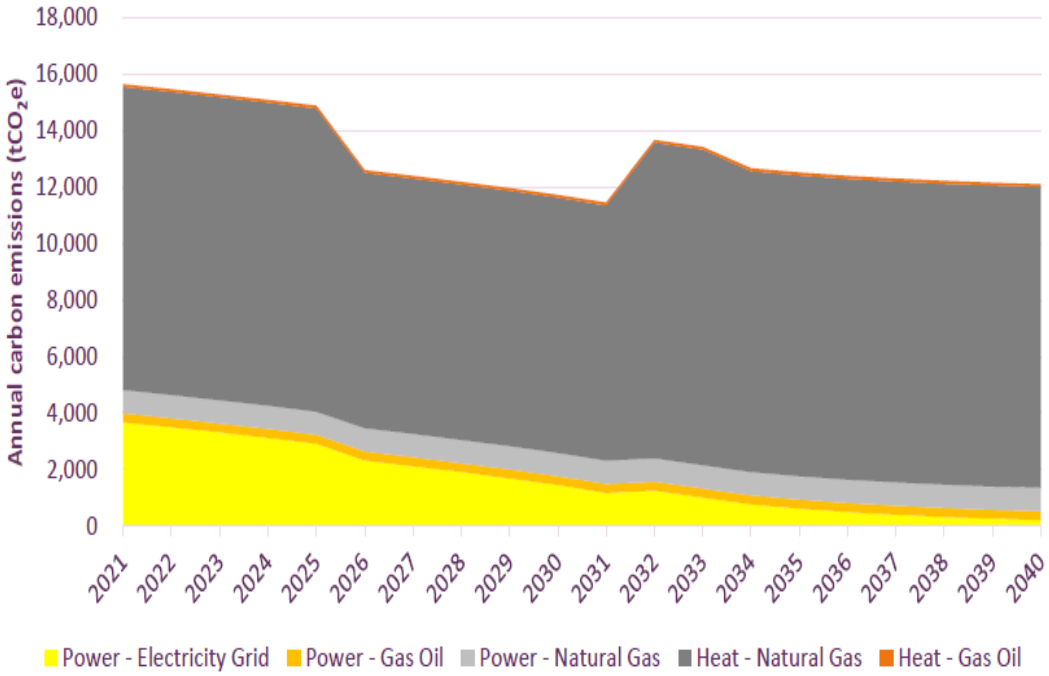
Context - Buildings CO_2



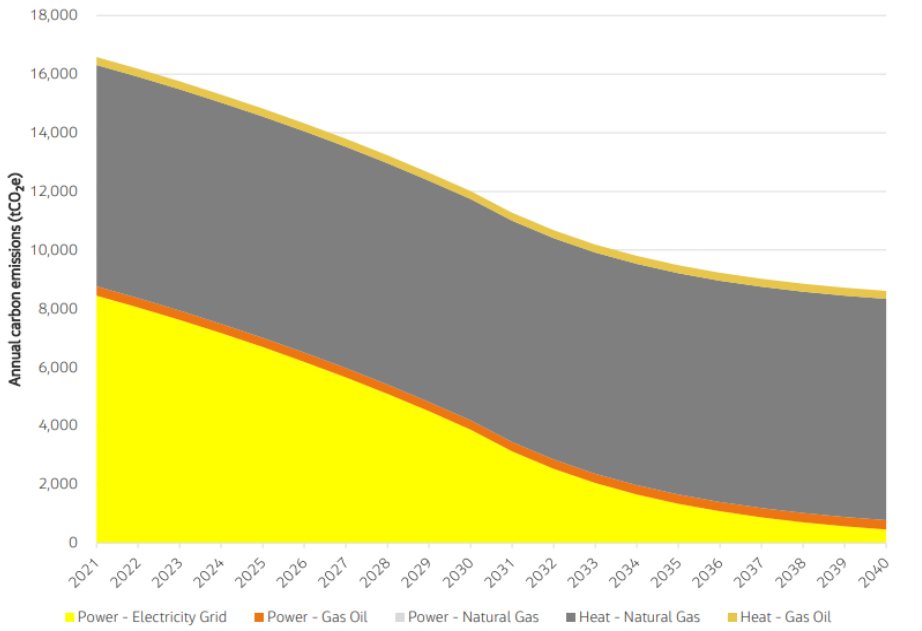
Red-line indicates Bio-quarter

Context – Emissions BAU

Western General Hospital



Royal Infirmary of Edinburgh



	WGH	RIE
Energy - Heat	41.9 GWh	34.7 GWh
Carbon – Heat % of total	14%	12%

Our NHS
Our People
Our Planet

Western General Hospital (WGH)



SUSTAINABLE DEVELOPMENT GOALS

Our NHS
Our People
Our Planet

Western General Hospital (WGH)



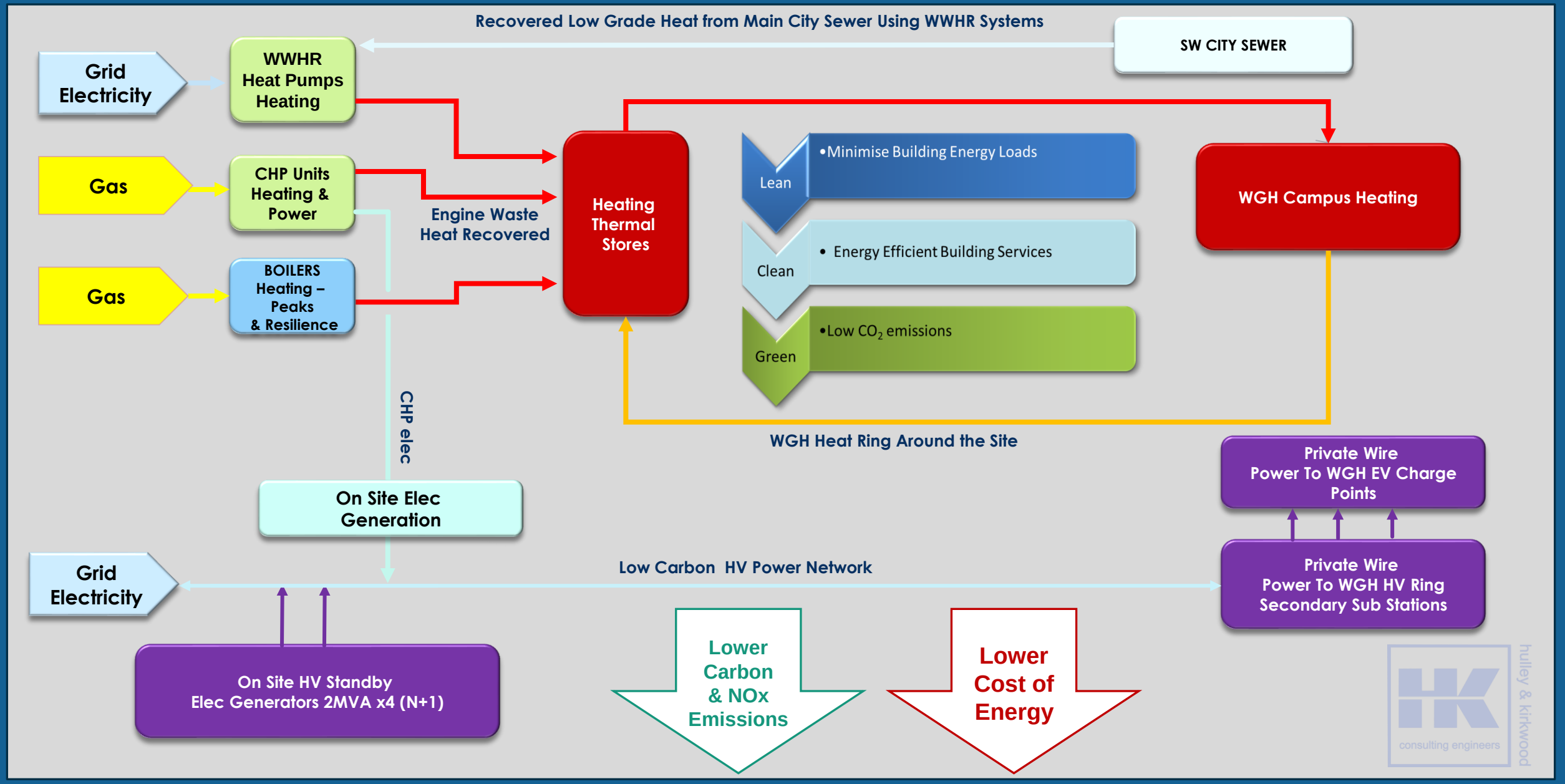
SUSTAINABLE DEVELOPMENT GOALS

Our NHS
Our People
Our Planet

WGH Need for change - 2016

What is the cause of the need for change?
Site developments requiring increased **capacity** and **future ready** systems and networks
High Carbon Footprint and need to meet **carbon reduction** targets.
Poor **reliability** and lack of operational **resilience** in systems and networks
Increasing **legislation and policy** requirements in relation to reducing Energy and Carbon emissions.
Direct replacement **does not align** with Low Carbon pathway
High energy infrastructure running costs
Health and Safety risks due to working in excessive high temperatures in limited access environments and potential exposure to asbestos

WGH PREFERRED FEASIBILITY SOLUTION – WWHR/CHP/BOILERS FOR SITE WIDE LTHW NETWORK: SITE WIDE ENERGY DIAGRAM



WGH Energy Infrastructure Phase 1&2



SUSTAINABLE DEVELOPMENT GOALS

Our NHS
Our People
Our Planet

WGH Energy Infrastructure Phase 1&2









The Works







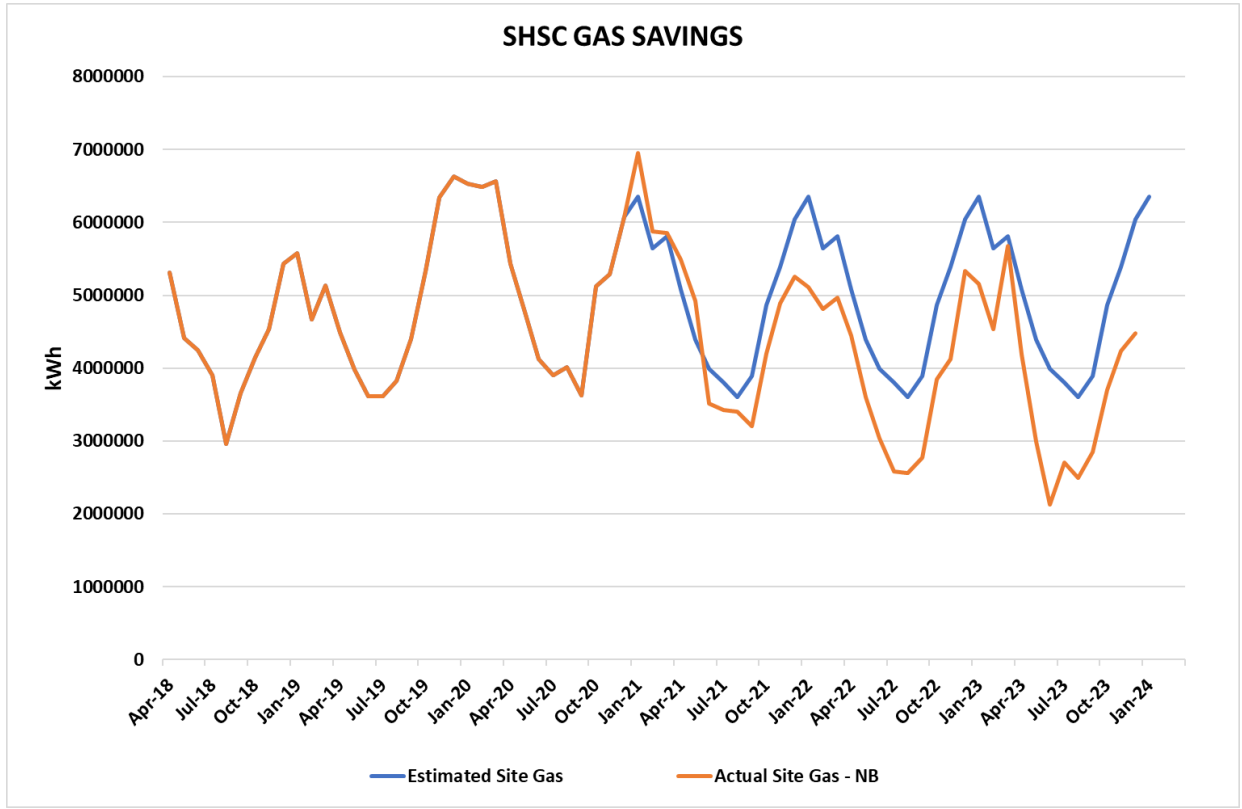
SUSTAINABLE DEVELOPMENT GOALS

Our NHS
Our People
Our Planet

Lessons Learnt - Investment Objectives

Effect of the need for change on the organisation	Was this achieved?
Inability to provide capacity to projects in development (i.e. expanded Linear Accelerator demand and provision).	**YES**. New heating infrastructure was delivered to meet the demands and timescales of the new LINAC and Renal Buildings.
Limited capacity of existing systems and ability to achieve relevant **energy and carbon legislation**.	**YES**. Existing steam had insufficient capacity for new builds. Designing new builds based on low temperature hot water ensures buildings are better suited to future low carbon technologies.
System failures, with increasing frequency, that severely impact on site operationally	**YES**. Transition of existing buildings has reduced steam system failures impacts in this area, and ensured new builds are connected to resilient heat supplies.
Potential future **penalties** and failure to meet national and local policy and legislation.	**YES**. The reduced steam demands, and system losses has reduced site carbon emissions below permitted thresholds.
Current energy **contract beyond original agreed term** and investment in new equipment aligned with low energy distribution network	**NO**. This was further extended due to capacity of Energy Team to manage this project and other service requirements.
Increased running costs due to aging systems and networks from associated maintenance, repair and rising fuel costs	**YES**. Energy demands for the WGH reduced through the de-steaming transition, due to highly inefficient steam distribution.
Health and Safety risks are difficult to manage and there are limited numbers of contractors with the specialist skill set and experience to deal with repair and maintenance	**YES**. Low temperature heating is significantly safer to operate and maintain, due to operational system pressure, temperature, compliance costs and high costs of steam remedial works.

Lessons Learnt - Energy & Carbon



Change	Consumption	Cost	Carbon
Gas	-7,53,254 kWh	-£662,141	-1,356 TCO_2
Electricity	980,707 kWh	£118,118	88 TCO_2
Total	-6,550,547 kWh	-£544,022	-1,179 TCO_2

Our NHS
Our People
Our Planet

Lessons Learnt

Enabling: Not ready for Low Carbon

Complex: Live Site & many unknows

Partners: Consultants & Contractors

Energy Efficiencies: Large benefits still available

Align objectives: Cost, Carbon, H&S, Resilience and more

Our NHS
Our People
Our Planet

What's next



SUSTAINABLE DEVELOPMENT GOALS

Our NHS
Our People
Our Planet



Our NHS
Our People
Our Planet

Remaining Challenges

- Net Zero Solution is Undefined
- Approach to Resilience?
- What operational models are suitable?
- Alignment of actions

Daniel Mill

Head of Energy & Sustainability
Facilities Department
NHS Lothian
daniel.mill@nhs.scot