

The Scottish Government's Net Zero Public Sector Buildings Standard

Lessons Learned from Early Interventions

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SCOTTISH
FUTURES
TRUST



Fife Councils Pathway to Net Zero



30th September 2025 Jonathan Coppock Lead Professional Net Zero

New Build

Dunfermline Learning Campus



Largest Passivhaus Educational building in the world

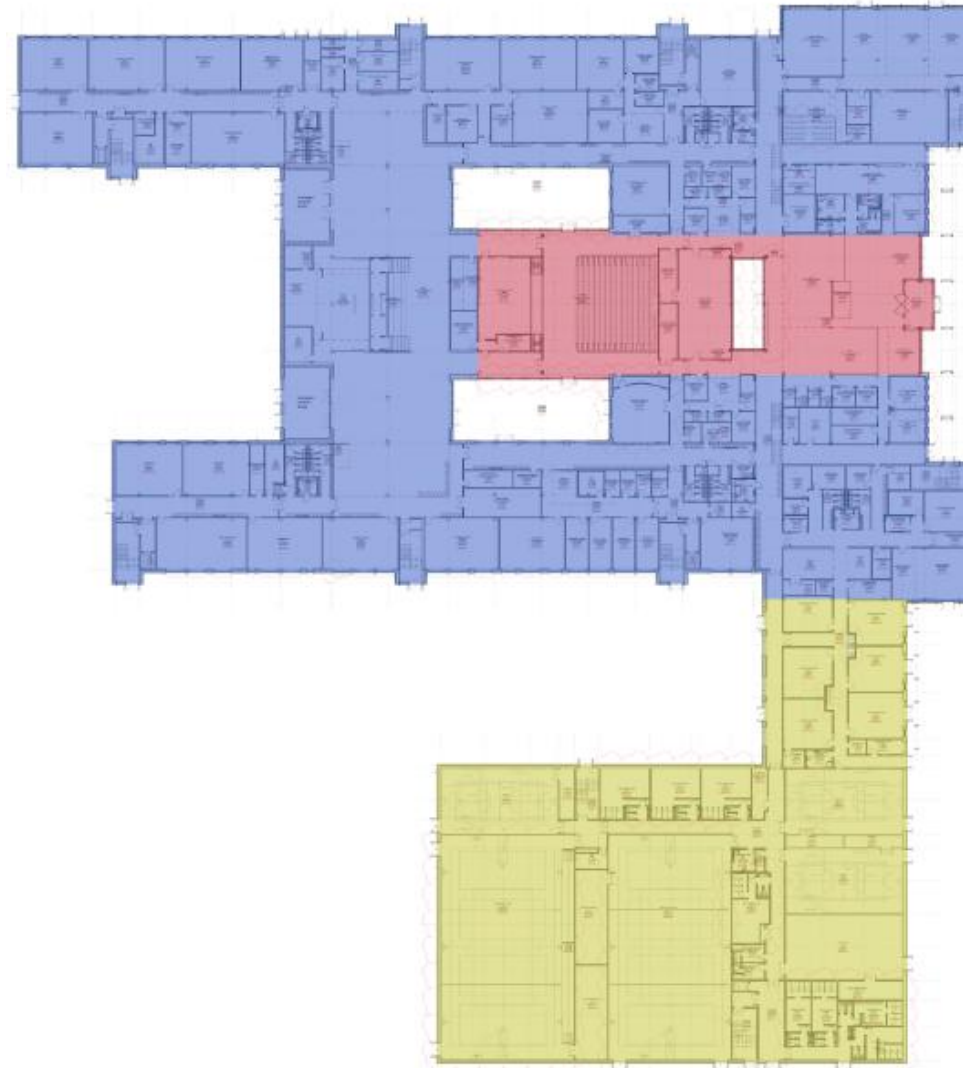
Pathfinder for the Net Zero Public Sector Building Standard

Opened 2025

Early data on operational energy < 50kWh/m²/yr

Material Selection

- Full CLT frame was specified to the sports block and ASN. This reduced the embodied carbon of the overall building
- Windows, external doors + curtain walling aluminium frames have a high recycled content of 50%
- Suspended ceilings (tiles) specified with high recycled content (up to 55%)
- Vinyl flooring specified with 25% recycled content
- Carpet tiles specified with 75% recycled content



Current New Build Projects

Caledonia High School



Green Steel – steel sections maximised in frame design which can be fabricated from green steel (electric arc furnace)
Windows, external doors + curtain walling aluminium frames have a high recycled content of 70%
Suspended ceilings (tiles) specified with high recycled content (min 29%, up to 64%)
Vinyl flooring specified with up to 59% recycled content
Carpet tiles specified with 75% recycled content

Templehall Community Hub



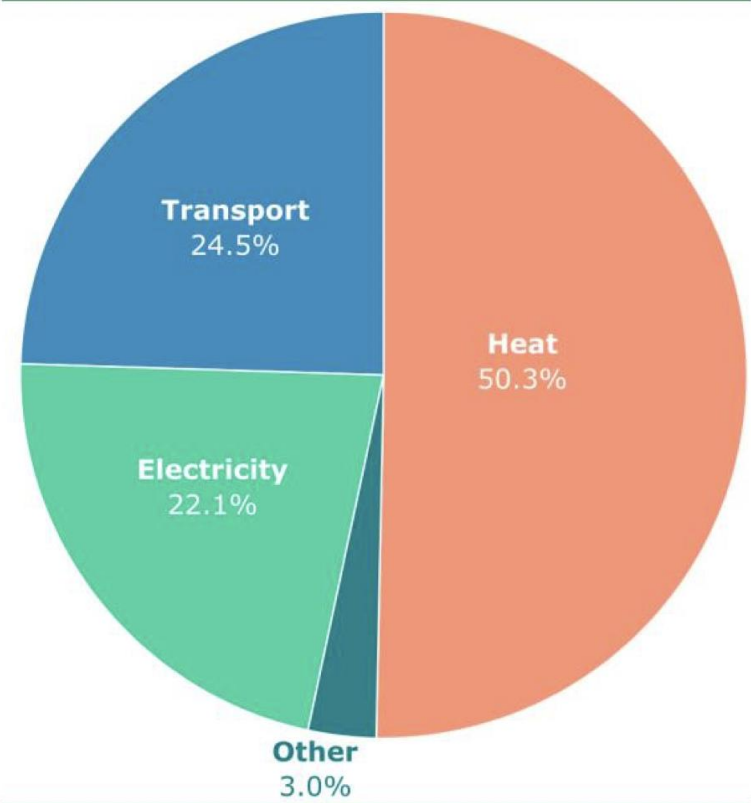
Green Steel – steel sections maximised in frame design which can be fabricated from green steel (electric arc furnace)
100% recycled rebar from electric arc furnace used in concrete slabs
Recycled concrete aggregates specified to floor slabs
Windows, external doors + curtain walling aluminium frames have a high recycled content of 70%
Suspended ceilings (tiles) specified with high recycled content (min 29%, up to 64%)
Vinyl flooring specified with up to 59% recycled content
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Retrofit The Real Challenge



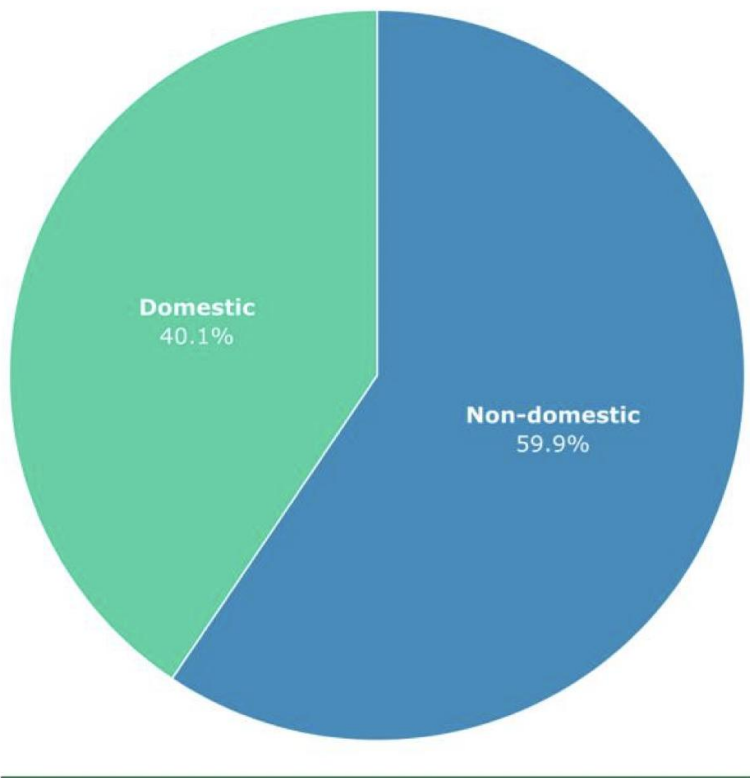
Focus on heat

Total final energy consumption
by sector
2018



Source: BEIS

Total final energy consumption
domestic and non-domestic
2018

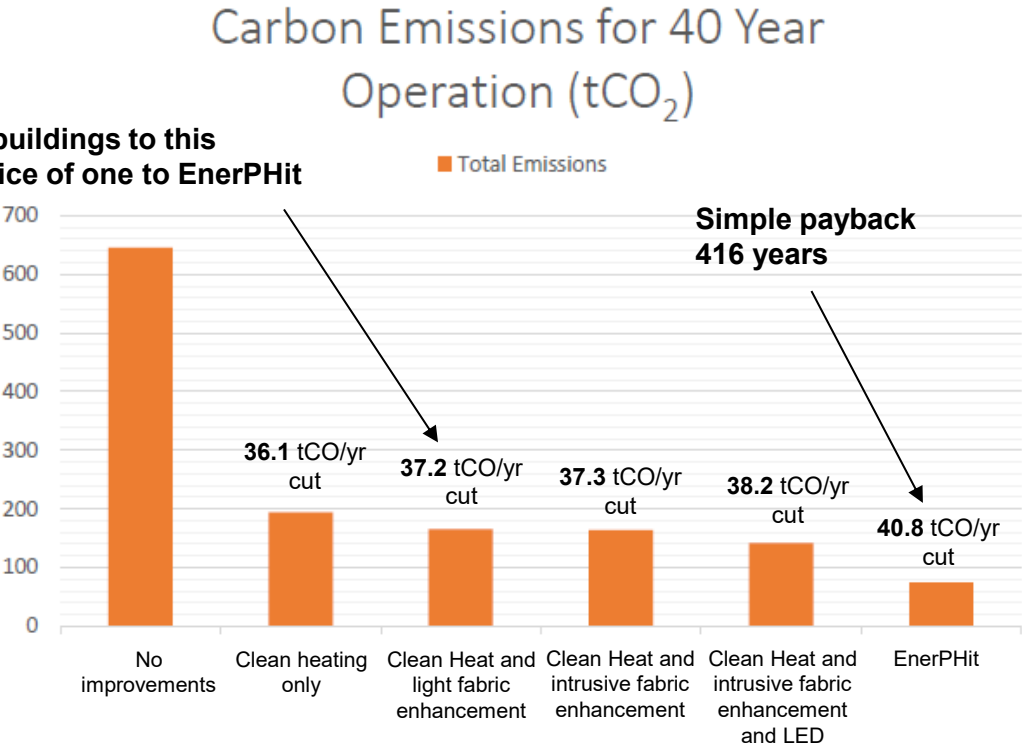


Source: BEIS

Where do we start?



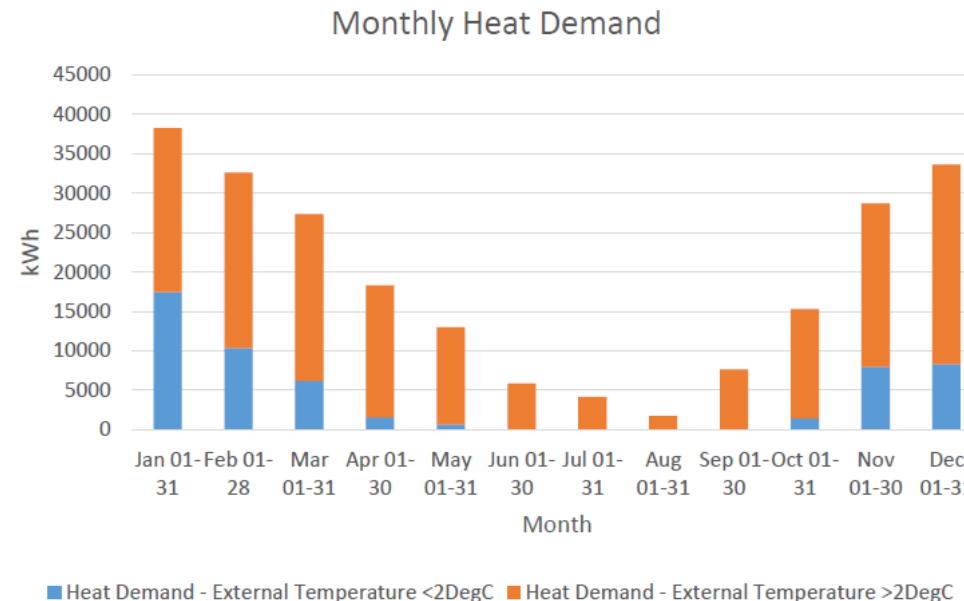
We can retrofit 25 buildings to this standard for the price of one to EnerPHit



Source: Limekilns PS report

Actions

- ASHP's and less intrusive insulation enhancements strike the best balance between CO2 reduction and cost
- We keep existing gas boilers to help with peak demand (ASHP sized to deliver >80% of annual load)
- Phase 1 - installed heat pumps at 5 trial schools
- Phase 2 - 11 projects in primary schools
- Phase 3 – High School, Leisure Centre and 7 medium sized primary schools



- Phase 4 feasibility for 11 sites complete
- Phase 5 feasibility due to start on 13 sites (in house)
- Fabric surveys have started across all sites

Example Projects

Phase 1

- Five trial projects – 4 operational and 1 awaiting power supply
- Selection of primary schools including a listed building and one of our larger primaries. Mixed construction typology.
- ASHP's offsetting 30 to 72% of gas consumption.
- Legionella and noise concerns at isolated sites.



Carleton PS



Limekilns PS



Ceres PS

Phase 2



Saline PS



Hill of Beath PS



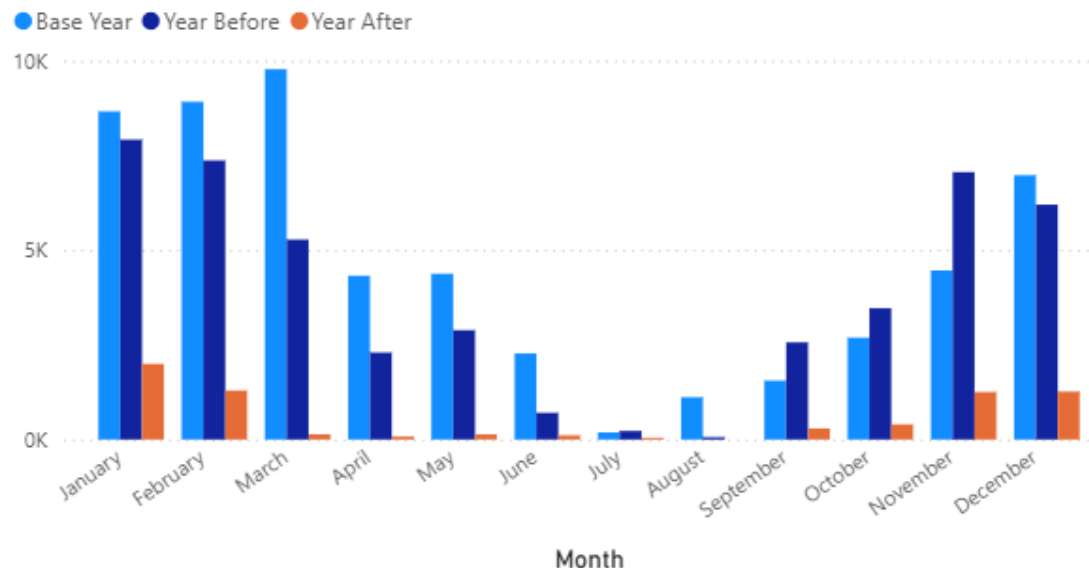
Cairneyhill PS



- Eleven projects – 9 operational and 2 awaiting power supply
- Operational projects completed end 2024.
- Moved to high temperature heat pumps R290.
- ASHP's offsetting 33 to 87% of gas consumption.
- Noise concerns on one site and issues with faulty pressure sensors and submeter connectivity has affected performance.

Cairneyhill Primary School

Monthly Gas CO2 Emissions Comparison (kg)



- 3 ASHP @ 44kW each
- Acoustic enclosures cost £43k
- Upgraded controls
- Plantroom re-piped
- Utilised temp boilers for phasing works
- Project cost = £345k

Month	Base Year Gas CO2e (kg)	Year Before ASHPs Gas CO2e (kg)	Year After ASHPs Gas CO2e (kg)
January	8661	7916	1996
February	8916	7367	1294
March	9775	5279	139
April	4324	2297	79
May	4377	2886	137
June	2273	705	111
July	188	227	12
August	1115	61	
September	1555	2565	293
October	2689	3466	399
November	4464	7059	1254
December	6978	6199	1267
Total	55315	46027	6981

- Onsite for just under 5 months!
- 48.3 tCo2/annum reduction
- 87% reduction in gas
- Installed cavity wall insulation over the summer holidays £22k
- Carried out seasonal commissioning



Phase 3

- Nine projects – High School, Leisure Centre and 7no. primary schools
- Await power connections for 4 sites.
- Projects close to completion on site, handover in the next few weeks for those with power.
- Starting to separate DHW and heating systems
- Integrating solar panels where feasible to offset running costs of clean heat systems

St Andrews RC High School



Cost:

Clean heating and energy
efficiency works = £1.7m

Window Replacement = £760k

Scope:

2 x 254kW ASHP

3 x 224kW WSHP

166kW Solar PV

POU water heaters

BEMS upgrade

Energy and zone valves

Heater Battery upgrades

Window replacement



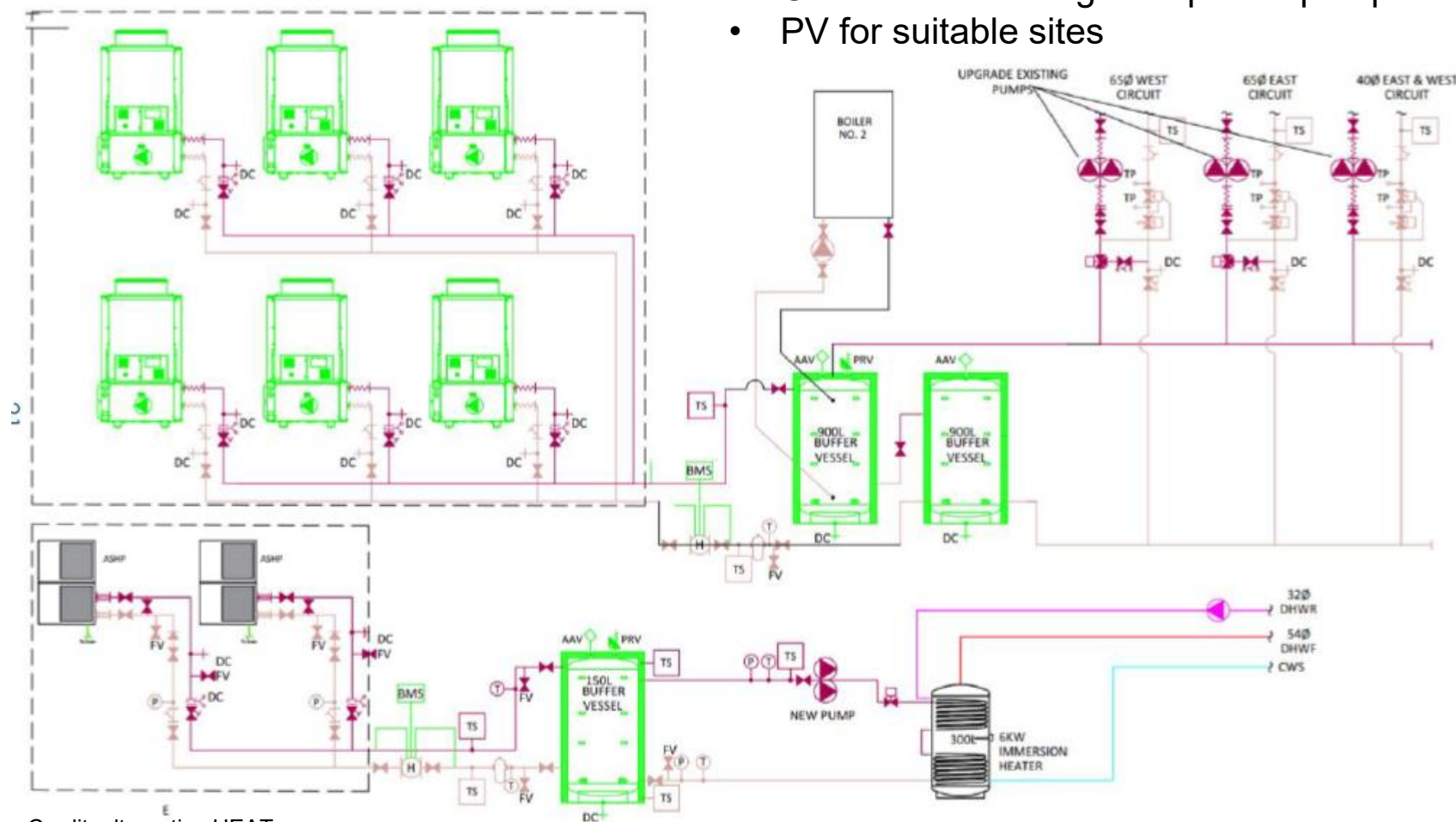


Window Replacement Work



Next Phases

- Separate DHW generation from the heating
- Continue to use high temp heat pumps
- PV for suitable sites

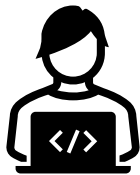


Credit: alternative HEAT

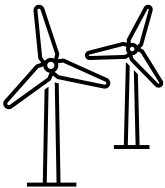
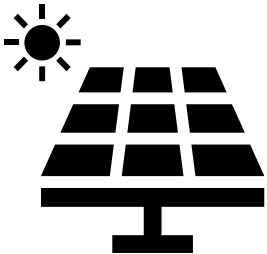
Other Solutions

- BEMS energy savings
- Electric kitchen conversions
- Gas to electric hot water
- Insulation
- District Heating
- Hydrogen
- PV and solar
- Local Energy Storage
- Estate rationalisation
- Carbon Offsetting
- Etc.....

Utility Savings	TOTAL kWh	TOTAL £	TOTAL Co2(T)
Gas	1,974,942	£107,409	361.28
Electricity	339,850	£103,875	70.37
Total Savings	2,314,792	£211,285	431.65



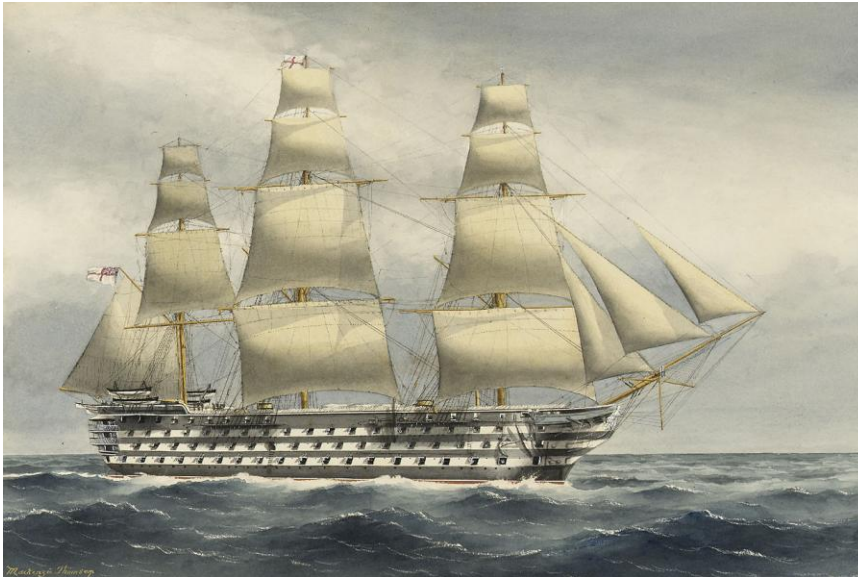
Source:
BBC



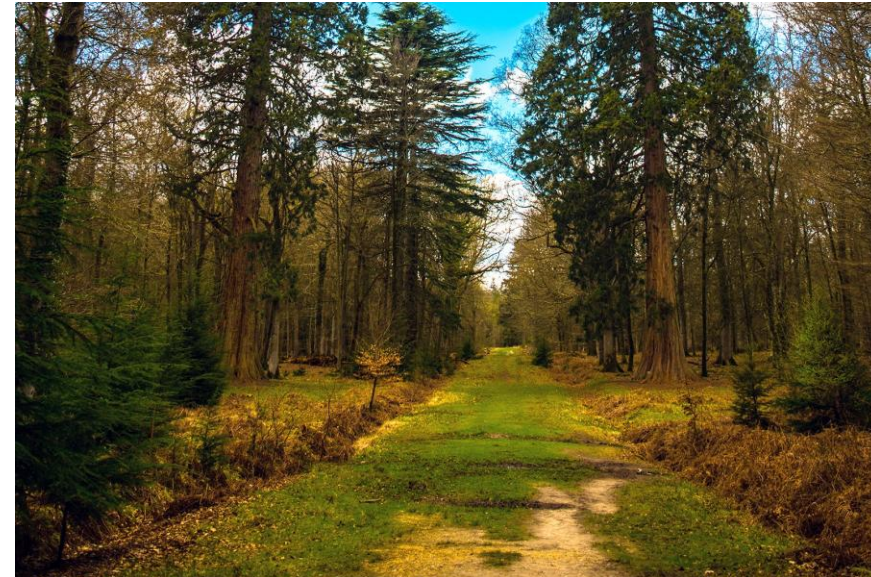
Summary

- Over 50% of our national energy is used to heat our buildings and it's the largest source of greenhouse gas emissions
- There are a range of proven solutions available to meet net zero now
- Consider embodied carbon – maximise the use of existing assets and be selective with new materials
- Heating and domestic hot water demand needs to be carefully considered
- Adopt a forward thinking, flexible no regrets approach to achieving net zero

A forward thinking no regrets approach



HMS *Victoria*, painting by William Mackenzie Thomson





A Vision for Low Carbon Construction in Fife

Vision, Values and Focus Areas

Vision

All Fife Council led construction projects to develop new buildings or refurbish existing properties shall enable our objective to reach Net Zero targets by 2045 at the latest.

We will consider the carbon impact of our construction activities, minimising embodied carbon emissions associated with construction materials and operational carbon emissions from our buildings in use. In doing so we aim to be a leading authority in delivering carbon conscious design and construction. We will do this by adhering to the following:

- Ensure no work completed now will negatively impact a buildings ability to transition to net zero operational carbon by 2045.
- Reduce energy consumption through careful fabric design and detailing and selection of energy efficient equipment.
- Wherever feasible, maximise the use of low embodied carbon materials.
- Develop and support local skills and suppliers through a consistent standard of specification.
- Provide healthy and attractive spaces in which people can learn, work and enjoy.
- Consider emerging technologies and processes to ensure appropriate solutions are appraised as the sector and market evolves.
- Support climate change targets through the decarbonisation of our buildings
- Attract external investment to progress our vision.

The vision supports government ambitions by delivering projects which positively contribute towards current targets:

Scottish Government: the Climate Change (Emissions Reduction Targets) (Scotland) Act requires all buildings in Scotland to be net zero by 2045.

UK Government: all buildings in the UK are to be net zero by 2050.

Our vision brings together all our key priorities into one concise list, it makes clear the outcomes Fife Council expects from the projects we construct and substantiates the decisions made to achieve these goals.



Values

Place: We will take a place-based approach to the projects we work on, maximising benefits for local communities.

Ambition: We are committed to scaling up our decarbonisation plans, acknowledging that initially this will be a steep learning curve whilst maintaining a key focus on the long-term benefits.

Pragmatic: We will continue to deliver practical, realistic, and best value solutions following data based and industry best practice approaches, accepting that focus may need to shift as markets and technology develop.

Enabling: We recognise the need to decarbonise our own property estate, in doing so we must implement solutions that don't create barriers to neighbouring buildings which are following similar decarbonisation strategies and we will support local projects which help Fife transition to net zero.


Collaborative: We will build on existing partnership working, sharing experiences, and learning from others to enhance the benefits realised in Fife.

Our values set out the core beliefs that shape the work we do in Property Services, they reflect the behaviours and considerations we promote that will help us to achieve our vision.

Focus Areas



Applicable standards for construction




Building Standards Division
Non-domestic Technical Handbook
June 2022

Building Regulations – The Scottish Building Regulations must be followed on all projects and they represent a minimum standard in terms of building energy efficiency.


If there is potential on a project to improve upon the Building Regulations standards through enhanced fabric and/or building services performance upgrades where these have minimal impact on upfront costs or follow the recommendations of a whole life cycle costing analysis, then we should progress on that basis. It's more cost effective and less disruptive to improve a buildings performance when undertaking a wider package of works than it is to retrofit energy efficiency solutions in isolation.

Applicable standards for net zero construction



Passivhaus

Passivhaus – Focuses primarily on creating ultra-low energy use buildings that will meet net zero targets, limited consideration for embodied carbon in current version of the standard.



Net Zero Public Sector Buildings Standard

Net Zero Public Sector Buildings Standard – Focuses on achieving net zero by 2045 by setting standards for energy efficient buildings, also with a focus on embodied carbon and whole life cost outcomes. There are two versions of this standard, one for new builds and the other for refurbishments. The standard focusses on routes to net zero; a project may target net zero on completion of the works or set out subsequent works which should be completed prior to 2045 to achieve the net zero target.

Alternative standards are available and providing they support our vision they can also be used to develop a project. These are all voluntary standards so there is no obligation for full compliance, a pragmatic approach would be to follow and evidence a designated low carbon standard on large projects and simply follow the principles on smaller projects. Frequently on larger projects funding will be conditional on a suitable low carbon standard being followed, to evidence work undertaken to reduce the carbon impact of the project. For smaller projects the additional resources required to evidence these standards are unlikely to present value for money and funding may be better directed to low carbon measures incorporated into the project.

We are not stipulating here what constitutes a large or small project, the Contract Administrator should make a judgement at project inception whether there is added benefit in targeting a low carbon certified design for their specific project. Some things to consider:

- Is external funding sought or approved for the project?
- Is there potential to significantly reduce operational energy consumption?
- Are considerable quantities of new materials required to complete the project?
- Is the building likely to be part of the council estate post 2045?

**If the answer to any of the above questions is 'Yes' then following a certified standard for net zero construction will benefit the project.*