

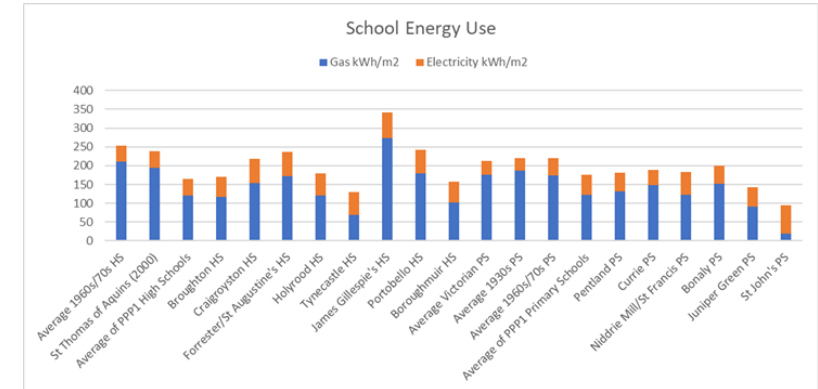
# Why is City of Edinburgh Council adopting Certified Passivhaus for new operational buildings ?

Presentation to  
Passivhaus Trust Conference  
4 November 2020

Patrick Brown CEC



# Edinburgh's journey to Passivhaus:



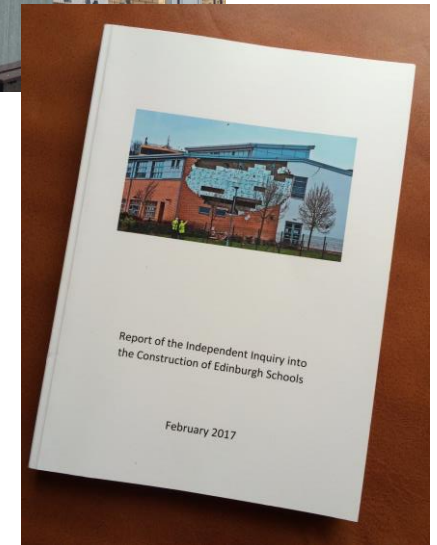
## Key influencing factors:

- Recognition of industry wide **construction quality** questions
- Poor **comfort standards** with respect to air quality and summertime overheating
- Disappointing **energy performance** of new build schools
- Challenging **operational carbon targets** to be addressed
- Need for system **simplicity** where possible



# Construction Quality

- Storm Gertrude January 2016
- 19 PPP/PFI delivered educational properties temporarily closed due to head restraint and wall tie issues.
- Professor John Cole appointed to conduct an inquiry into this 2002/5 construction programme.
- Cole's recommendations addressing construction quality now inform all CEC project delivery.
- This also acted as something of a wake up call for the construction sector.
- All building owners and operators should be aware that this is not an 'Edinburgh Schools' or even a schools specific issue.





# Environmental Comfort (schools)

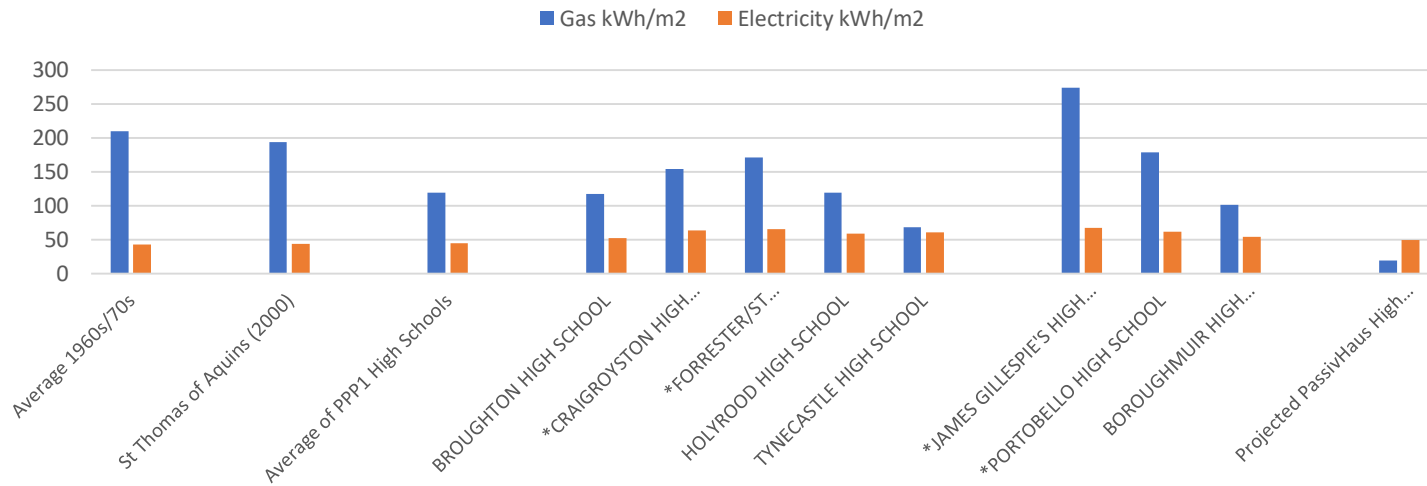
- Many new build schools across the country are failing with regard to summertime overheating and indoor air quality.
- BB101 (2018) recognises the negative impact of high levels of CO2 in learning in schools. Compliance with BB101 now points to adoption of MVHR.
- Building fabric and fenestration design is often not optimised to give more passive solutions to occupier comfort. This can result in a need for additional engineering services complexity.
- In many operational buildings, engineering services and controls are not operating in line with original design intent.



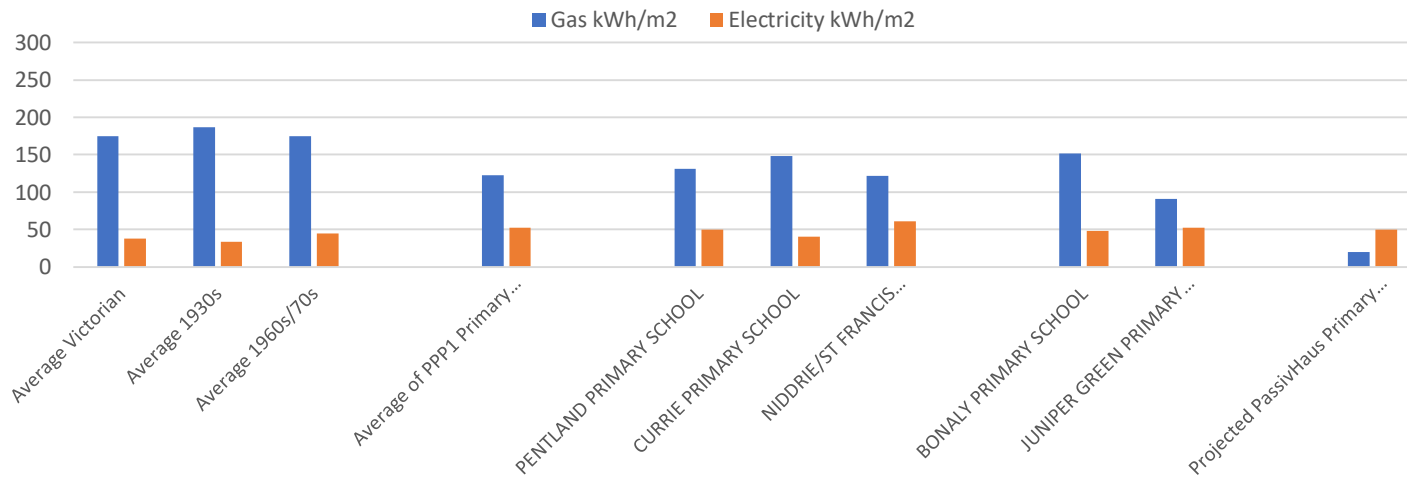
South facing  
fixed glazing

# The Energy Performance Gap (2018/19 data)

## High School Energy Use



## Primary School Energy Use



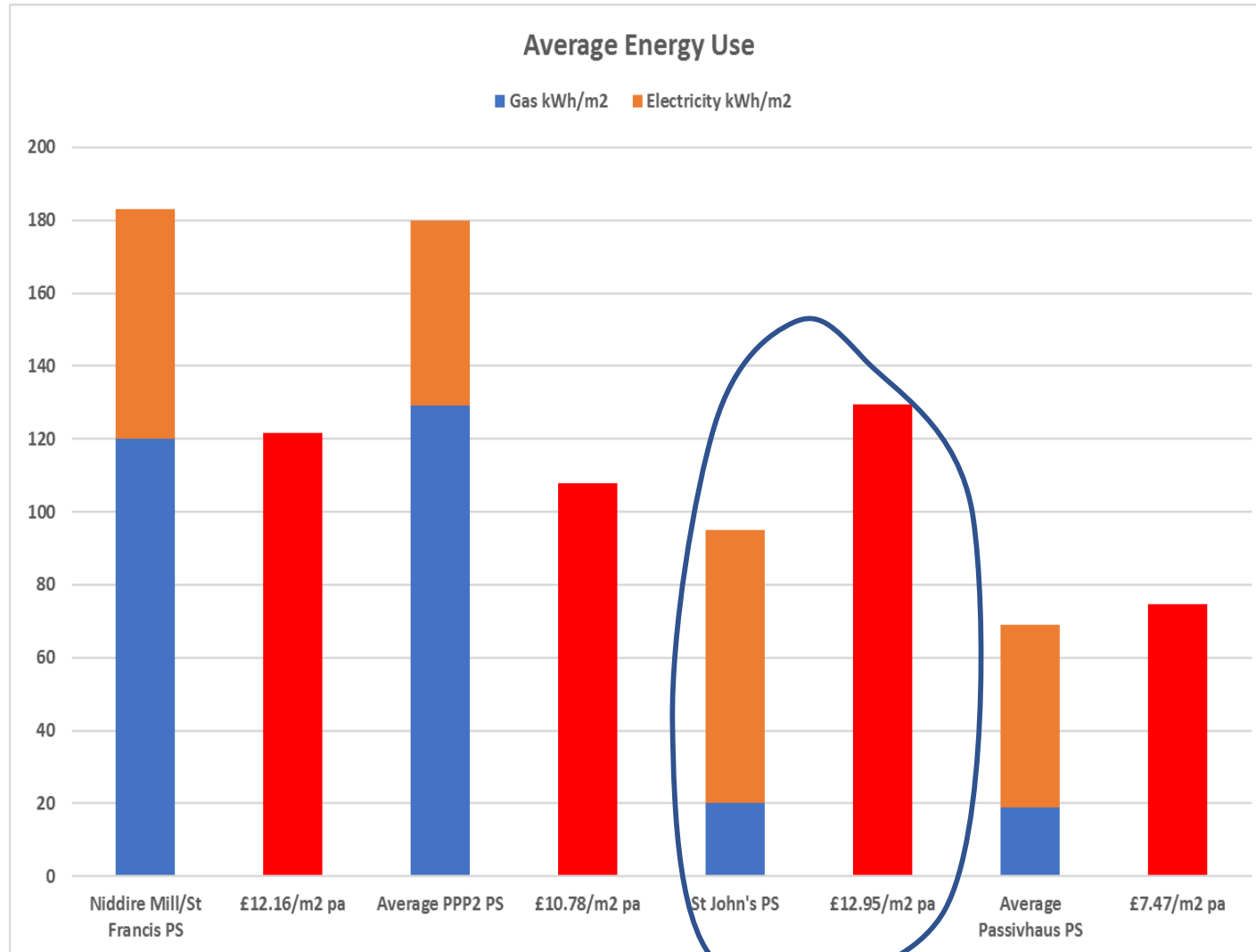
Older  Newer

- New build schools are not realising any significant improvements in energy performance.
- Energy consumption improvements in recent decades has been marginal.
- This 'performance gap' is reflected nationally.

This is a basic overview for illustrative purposes based on 2018/19 data.

Detailed comparisons have to take account of variable energy consumption factors: \*swimming pools, community use, scale of catering operation, or system operational issues.

# Focus on low energy



- Until there are viable alternatives, like decarbonised gas grid, heat networks etc the leading low carbon options, in an urban environment, are typically electrical.
- Air Source Heat Pumps are often a strong contender (the services engineer's default?).
- St John's benefitted from an enhanced fabric specification (not to Passivhaus standard) giving an improved total energy consumption. But the adoption of ASHPs still results in increased energy costs compared to gas at current prices.
- Aggressively reducing energy consumption has to be the first step to affordable Low Carbon solutions. This will address both electricity grid capacity to accept connected loads and energy costs based on current energy pricing.

# The tCO2 challenge:

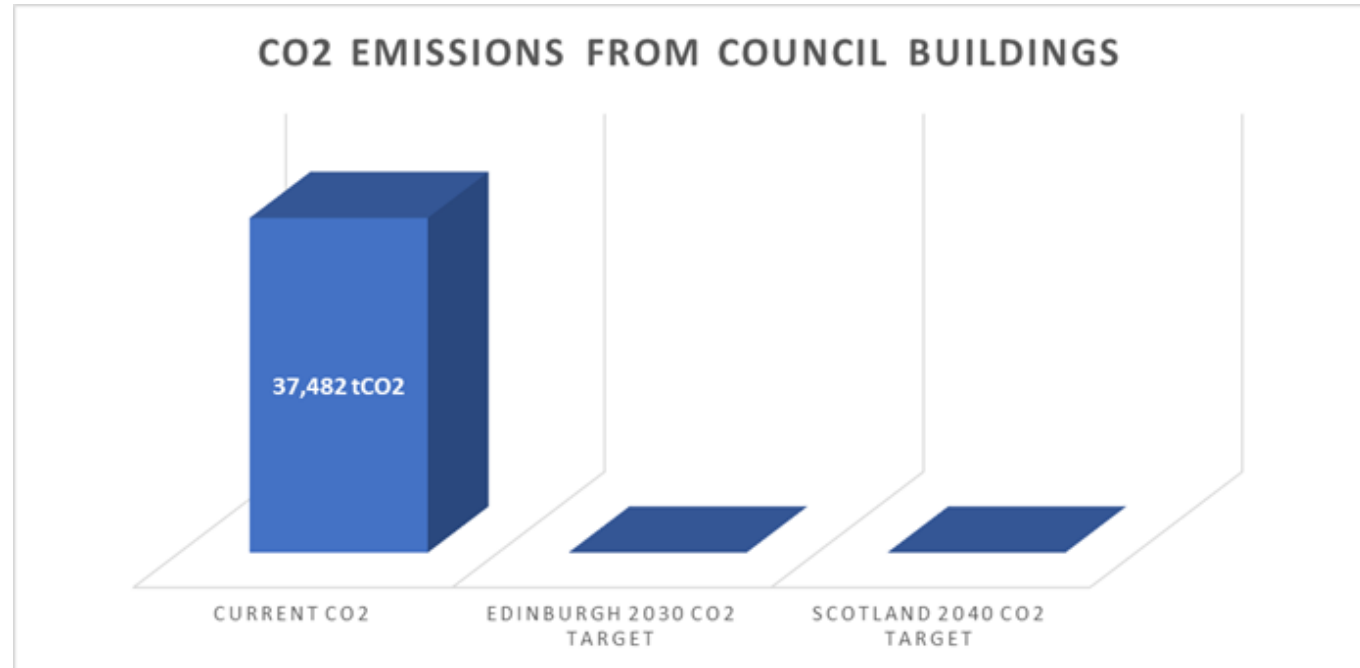
Edinburgh has set a city wide net zero operational CO2 target for 2030

Scottish Government target net zero CO2 operational by 2040

Scottish Government are also in the process of setting a net zero greenhouse gas target for 2045 (all greenhouse gases).

Regardless of challenge, a key approach has to be buildings which are low energy.

In Scotland new schools have been set an energy target of 67kWh/m<sup>2</sup>/year.



# Summary

- A 'fabric first' approach to design is still to be fully embraced by many designers avoiding unnecessary engineering services complexity.
- New buildings are not always performing in line with user comfort or energy expectations (Performance Gap).
- Construction quality remains an issue.
- Net zero operational carbon requires a step change in approach

**Certified Passivhaus addresses these issues, in whole, or in part.**

## Going forward

- We are now examining the potential of the Enerphit approach to addressing the existing estate.
- Focus will soon be placed on addressing embodied carbon or more critically the Circular Economy

**Patrick Brown, Capital Programme Team Manager, City of Edinburgh Council**



Picture taken 18 months ago (March 2019)  
'The next generation expect action'