



# Capability Statement

Delivering innovative, efficient, and sustainable Building Services Engineering solutions

## Who?

TGA Consulting Engineers Limited operate in an integrated team with the Building Performance Engineers working directly together with Mechanical and Electrical Engineers (together with BIM Technicians and Specialist Lighting Designers where required). TGA work nationally with offices in 5 locations.



Figure 1 TGA's Integrated Building Services Structure



Figure 2 TGA Offices

## Why?

Often the route taken in decarbonising a building is to replace fossil fuelled heat generation (typically gas or oil boilers) with heat pumps (typically Air Source Heat Pumps). This can be the right approach for some buildings, but can cause issues with running costs, thermal comfort and unnecessary risk in others (including electrical infrastructure and incoming supplies).

Performing energy modelling at the early stages of a project can allow the impact of building optimisation and interventions, including radiator upgrades and demand reduction, to be tested and quantified. The result can be significant in terms of performance (Table 1) and the impact on capital costs can result in an overall saving (Figure ) due to the demand on and the size of heat pumps required being reduced.

Table 1 Example of Performance Against Key Targets of a Recent Project

| Target                      | ASHP | ASHP + Radiator Upgrade | ASHP + Radiator Upgrade + Demand Reduction |
|-----------------------------|------|-------------------------|--------------------------------------------|
| Pathway to Net Zero Carbon: | ✓    | ✓                       | ✓                                          |
| Capital Costs:              | ✓    | ✗                       | ✓                                          |
| Reduced Running Costs:      | ✗    | ✓                       | ✓                                          |
| Achieve Thermal Comfort:    | ✗    | ✓                       | ✓                                          |
| Reduce Risk:                | ✗    | ✓                       | ✓                                          |

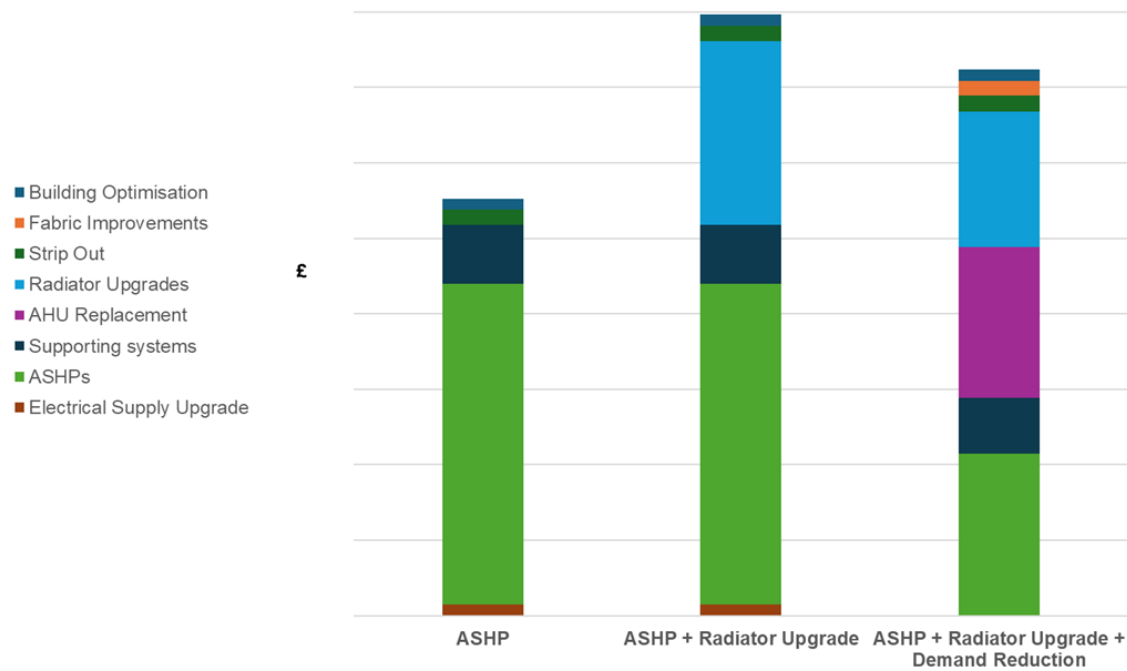


Figure 3 Example Capital Costs of a Recent Project





1. Newcastle City Council PSDS Discovery Museum (Image Credit – Discovery Museum), 2. Durham University LCSF, 3. Crook Civic Centre Durham County Council (Image Credit – Bryan Richardson), 4. Boldon House Durham University, 5. DLI Durham County Council, 6. KGVI Building Newcastle University (Image Credit – GSS Architecture)

Table 2 Example TGA Simplified Energy Calculation Results of a Recent Project

|                                         | ASHP        | ASHP + Radiator Upgrade         | ASHP + Radiator Upgrade + Demand Reduction |
|-----------------------------------------|-------------|---------------------------------|--------------------------------------------|
| Capital Cost <sup>1</sup>               | £550,000    | £800,000<br>(increase £250,000) | £720,000<br>(increase £170,000)            |
| Heat Require <sup>2</sup>               | 240 kW      | 240 kW                          | 160 kW                                     |
| Heating Temperature                     | 80/70       | 60/40                           | 60/40                                      |
| Radiator Output                         | 160 kW      | 210 kW                          | 170 kW                                     |
| SCOP <sup>3</sup>                       | 1.8         | 2.7                             | 2.7                                        |
| Annual AHSP Heating Energy <sup>4</sup> | 270,000 kWh | 180,000 kWh                     | 85,000 kWh                                 |
| Annual AHSP Heating Cost <sup>4,5</sup> | £55,000     | £35,000<br>(saving £20,000)     | £15,000<br>(saving £40,000)                |
| Simple Payback                          |             | 13 years                        | 5 years                                    |

1. Capital Cost excludes preliminaries, profit and contingency
2. Space heating (excludes fresh air load on AHUs and DHW)
3. Calculated based on COPs at desired output temperatures and hourly weather data
4. Addition energy and cost savings will be achieved as a result of improved fan and pump efficiency
5. Electricity @20p/kwh

## How & How Much?

TGA's Simplified Energy Calculation allows TGA's Net Zero Carbon 10 Point Plan to be implemented at the early stages of a project (or even before a project is realised).

The aim of the calculation is that it is a relatively quick process (for a simple building it could be around a day to survey, plus a day of calculation per building – which will then give the output). More complex buildings can also be assessed, as well as multiple buildings being combined to represent an estate and sitewise strategy.

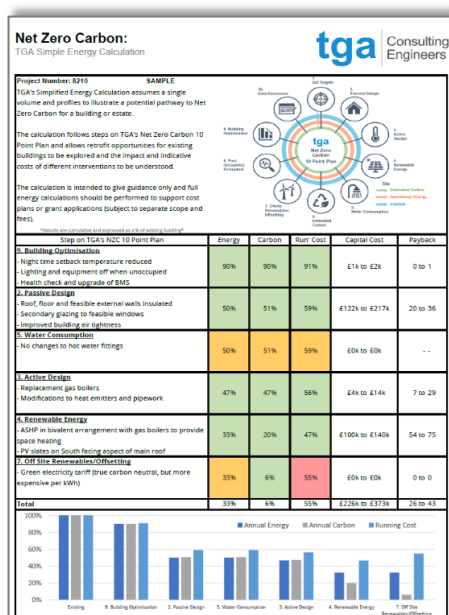


Figure 4 Output from TGA's Simplified Energy Calculation

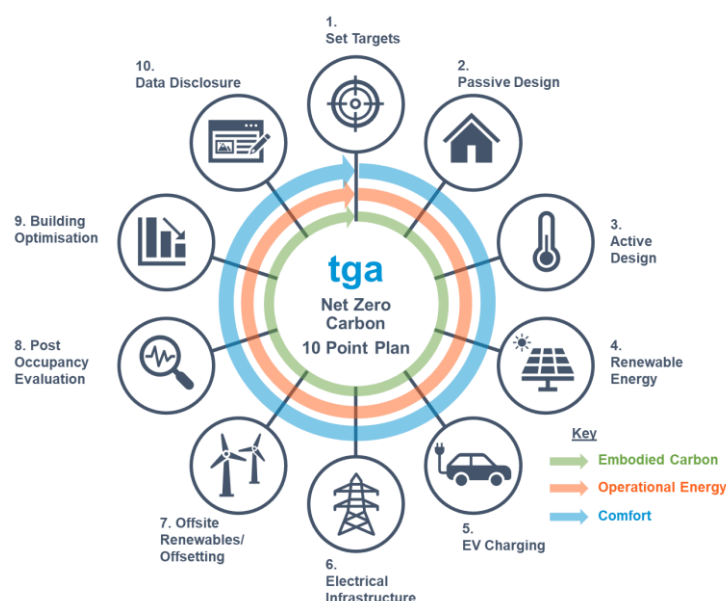


Figure 5 TGA's Net Zero Carbon 10 Point Plan

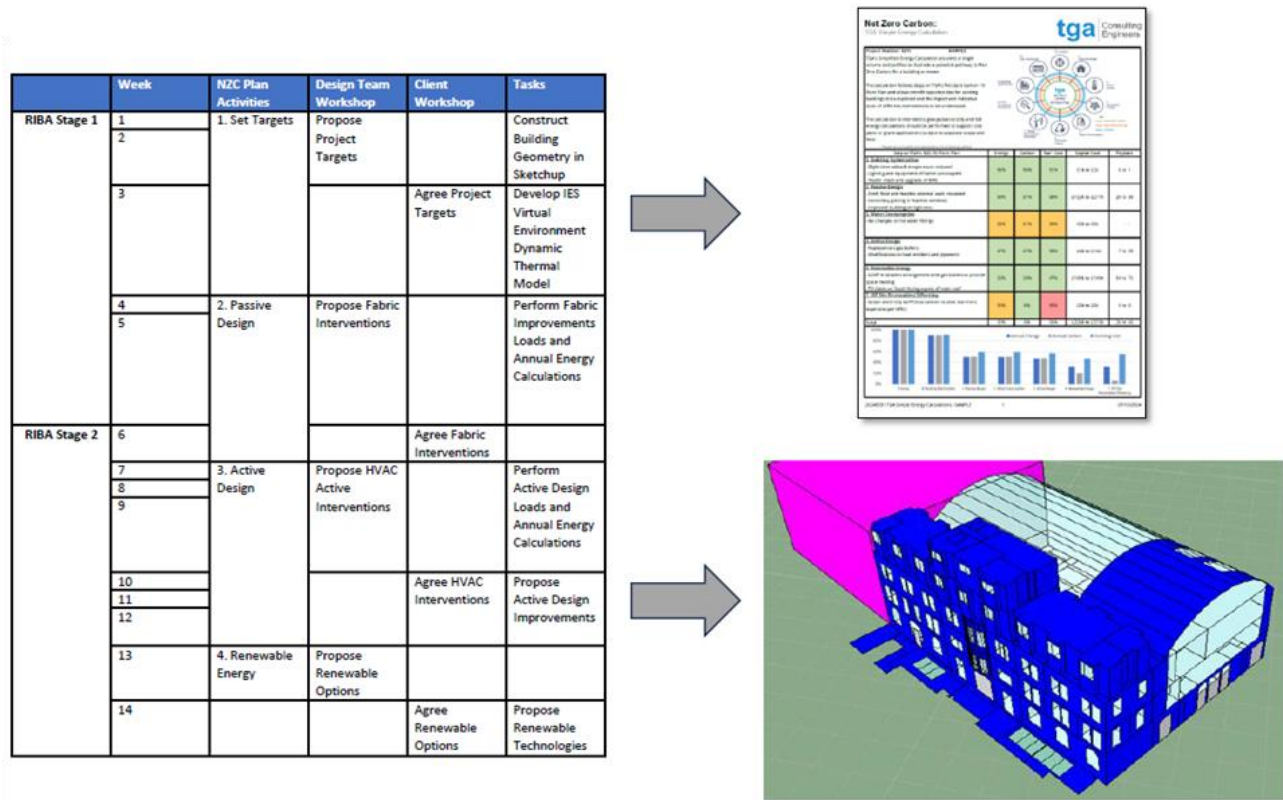




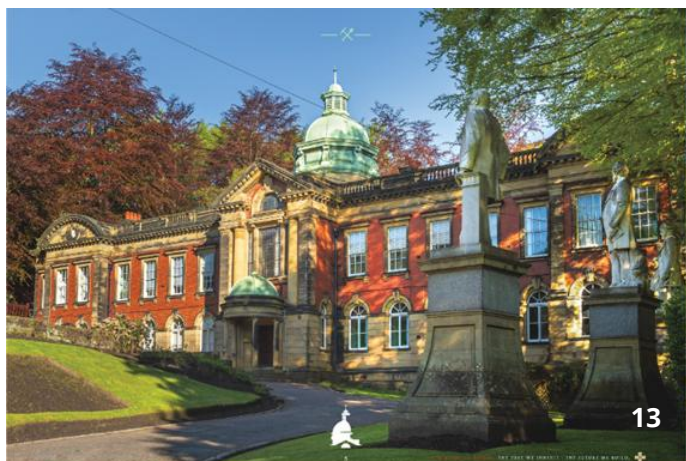
7. St Anne's Church, Historic England/Durham County Council, 8. Salford Cathedral, 9. Portsmouth Cathedral, 10. Durham Cathedral, 11. Beverly Minster, 12. Newcastle Cathedral

# When?

The calculation can be performed at RIBA Stage 1 and could be a project enabler. The intention would be that more detailed energy modelling would be performed from late RIBA 2/early RIBA 3.







13. Durham Miners Hall, 14. Raby Rising, 15. Royal Horticultural Society, 16. Hitachi Rail, 17. Morrison Busty, 18. Farne Islands National Trust



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