Keith Ashton

SPACE PLACE

St Sidwell's Point

The UK's first Passivhaus Leisure Centre

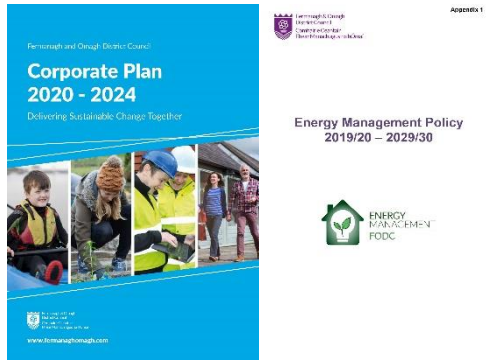
June 2023

SUSTAINABLE DEVELOPMENT

UN Development Goals

Development Framework

Climate Change Act 2008



Define Sustainable Development Goals

1. ENERGY PERFORMANCE
2. NET ZERO CARBON
3. GOOD HEALTH AND WELLBEING
4. SUSTAINABLE WATER USAGE
5. ECOLOGY AND BIODIVERSITY
6. CONNECTIVITY AND TRANSPORT
7. SUSTAINABLE COMMUNITIES
8. SOCIAL VALUE
9. OTHER ?

Define Accreditations and/or Assessments

BREEAM – CODE FOR A SUSTAINABLE BUILT ENVIRONMENT

Passivhaus Institut

INTERNATIONAL WELL BUILDING INSTITUTE™

fitwel℠

Minimum Targets with certification

	Min CO2 saving target	Capex uplift	On site renewables
BREEAM Very Good	n/a	base	n/a
BREEAM Excellent	25%	7.5% over Breeam VG	n/a
BREEAM Outstanding	40%	No Data	n/a
Passivhaus Classic	Circa 70% (increased saving with off-site renewables)	15% over Breeam VG	n/a (promotion of off-site renewables)
Passivhaus Plus	100%	No Data	≥ 60kWh/m^2.yr
Passivhaus Premium	Above 100%	No Data	Renewable Energy +ve generator
N.B. Water consumption	Estimated 50% as a consequence of PH certification		

SPACE PLACE

Passivhaus Institute: Who are they?

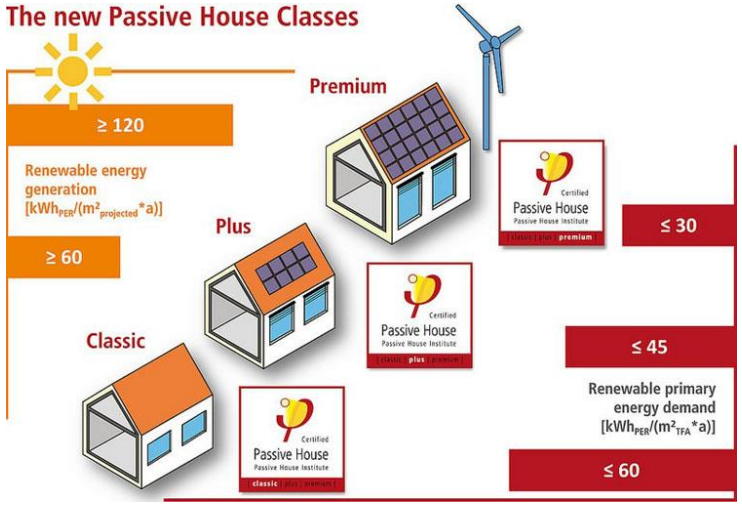
- An independent research institute founded in Germany.
- Internationally recognised quality assurance for energy efficiency.
- Research & development of construction concepts, components & tools.

Passivhaus standard : three sets of criteria

Energy Criteria

Comfort Criteria

Hygiene Criteria



Certified Passivhaus
Passivhaus Institut

DESIGNER
CERTIFIED PASSIVE HOUSE DESIGNER

PASSIVE HOUSE CERTIFIER
Passive House Institute accredited

CERTIFIED PASSIVE HOUSE TRADESPERSON
TRADESPERSON

CERTIFIED COMPONENT
Passive House Institute

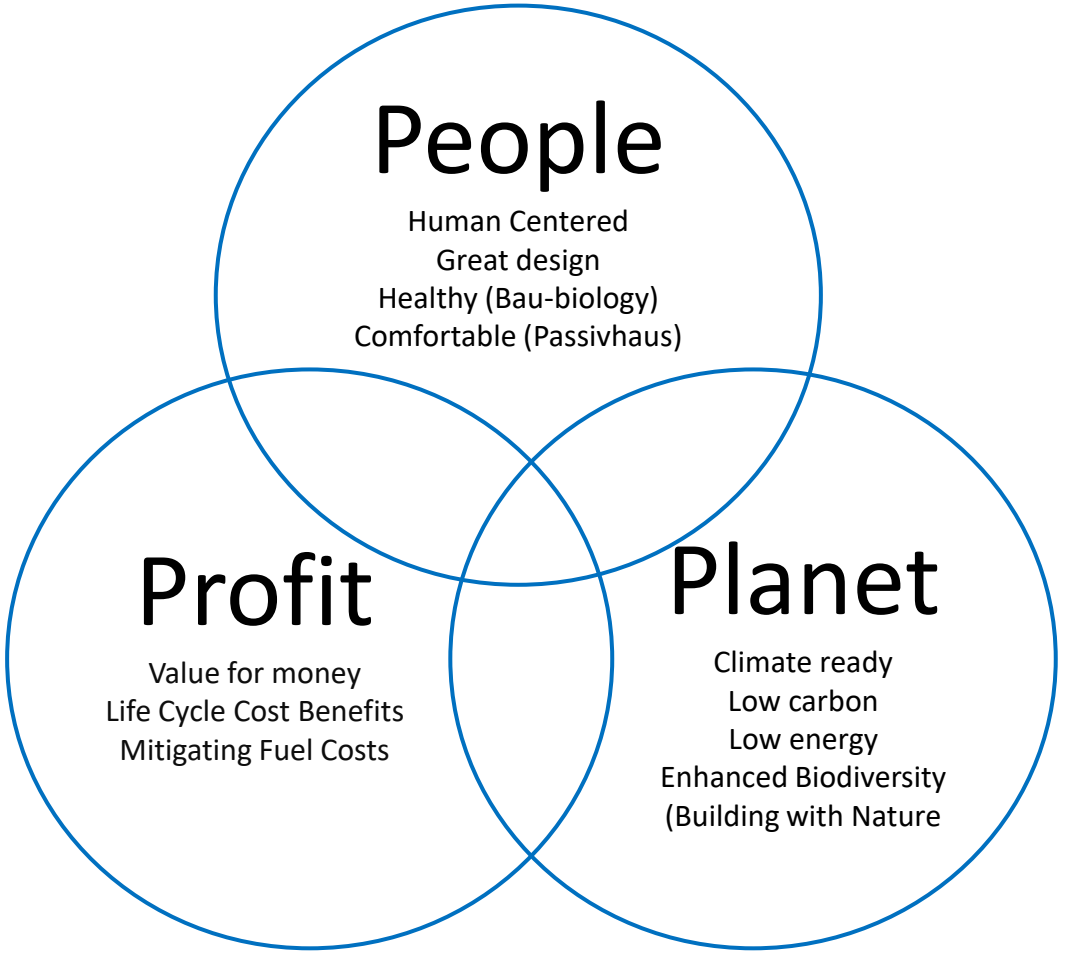
IAKS International Association for Sports and Leisure Facilities

Exeter City Council

Key challenges for sustainable development.

Resource / Carbon / Energy Use / Low cost

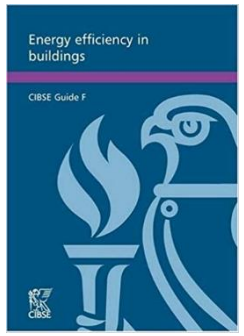
Exeter's Triple Bottom Line



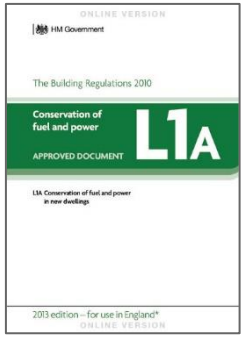
Design for performance.

Working to agreed outcomes.

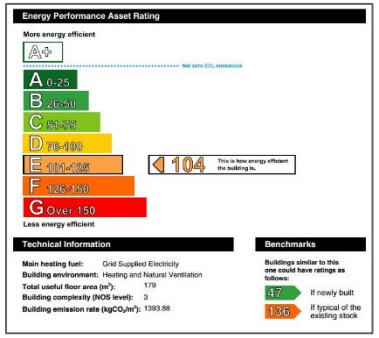
Poor accuracy — **Estimating operational energy** — **Good accuracy**



Benchmarking CIBSE Guide F



Building Regulation Assessment

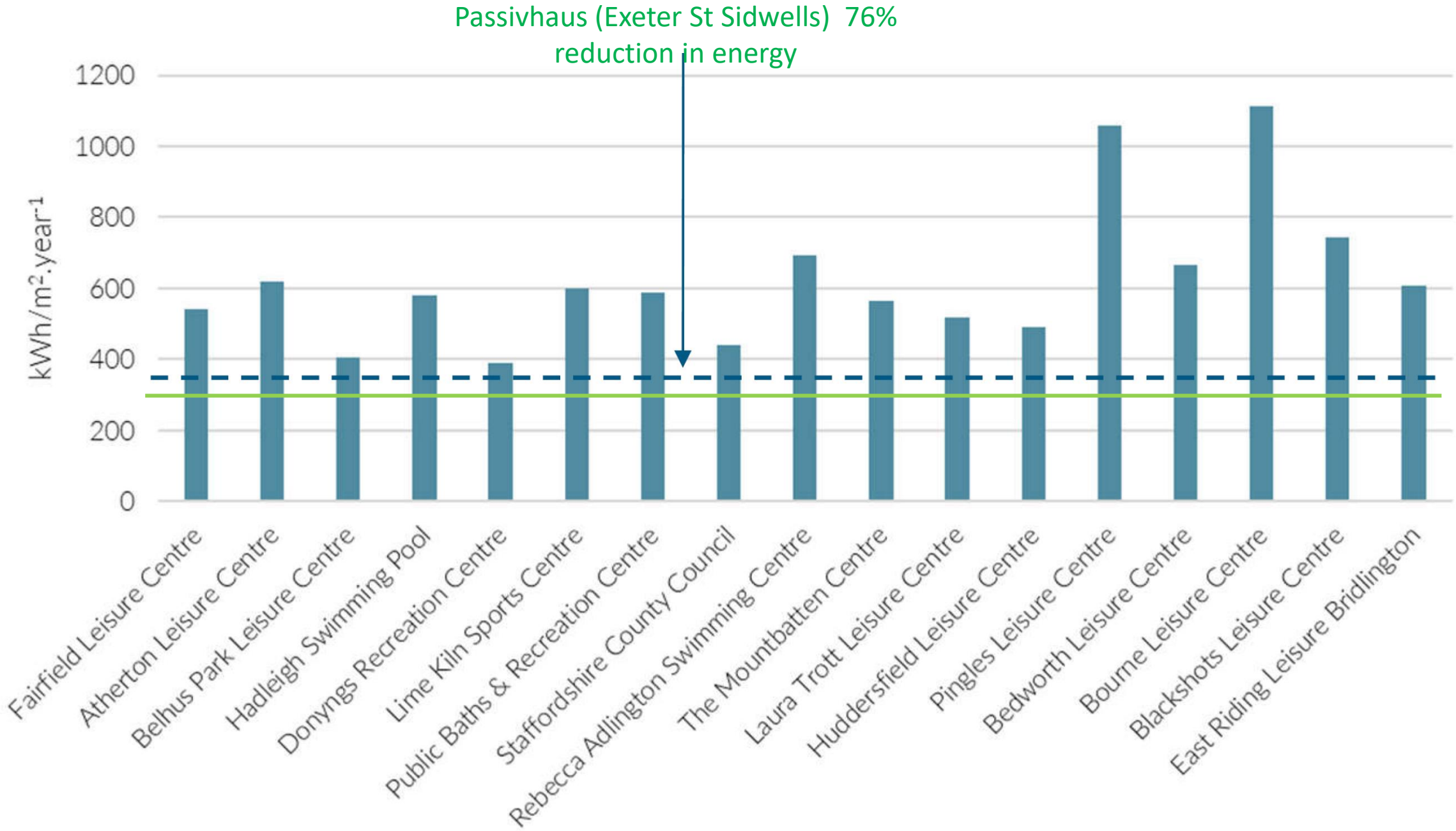


EPC

Passivhaus Planning Package (PHPP)

Dynamic modelling CIBSE TM54

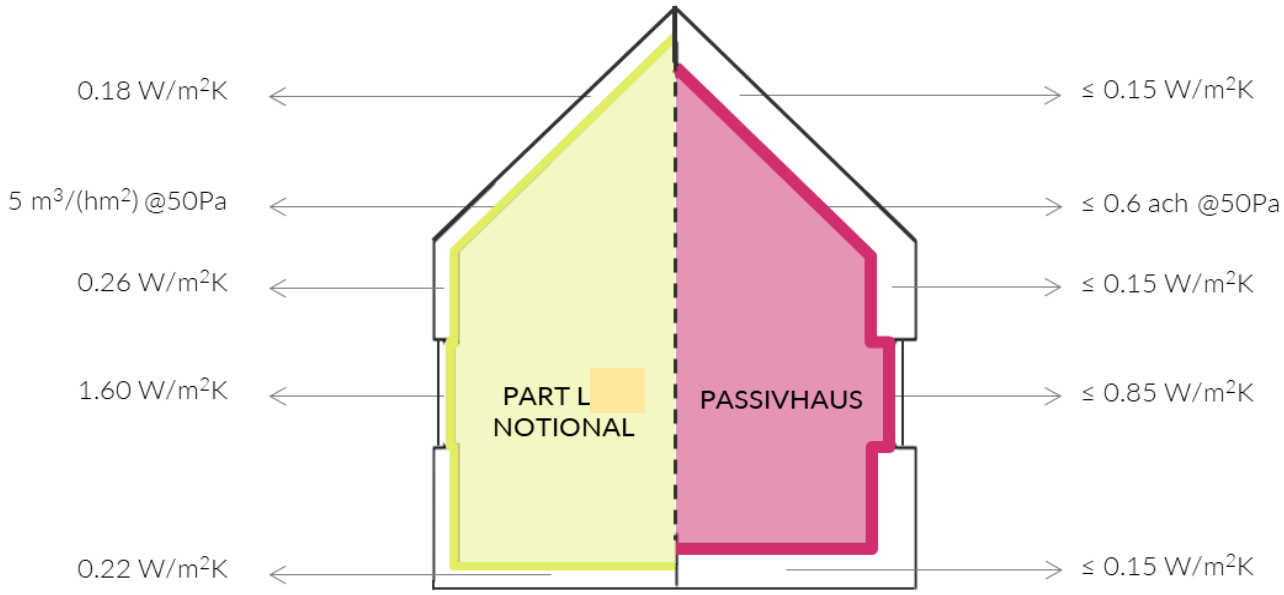
Advanced dynamic modelling for Design for Performance (DfP)


Passivhaus (Exeter St Sidwells) 76% reduction in energy
1200
1000
800
600
400
200
0
kWh/m².year⁻¹
Fairfield Leisure Centre
Atherton Leisure Centre
Belhus Park Leisure Centre
Hadleigh Swimming Pool
Donyngs Recreation Centre
Lime Kiln Sports Centre
Public Baths & Recreation Centre
Staffordshire County Council
Rebecca Adlington Swimming Centre
The Mountbatten Centre
Laura Trott Leisure Centre
Huddersfield Leisure Centre
Pingles Leisure Centre
Bedworth Leisure Centre
Bourne Leisure Centre
Blackshots Leisure Centre
East Riding Leisure Centre Bridlington

Net Zero.

Comparison to PassivHaus.

- **Part L 2013 (current):**
  - External Wall (W/m^2.K): 0.26
  - Exposed Roof (W/m^2.K): 0.18
  - Exposed Floor (W/m^2.K): 0.22
  - Window u-value (W/m^2.K): 1.60
  - Air Permeability (m^3.m^2.hr@50Pa): 5.00

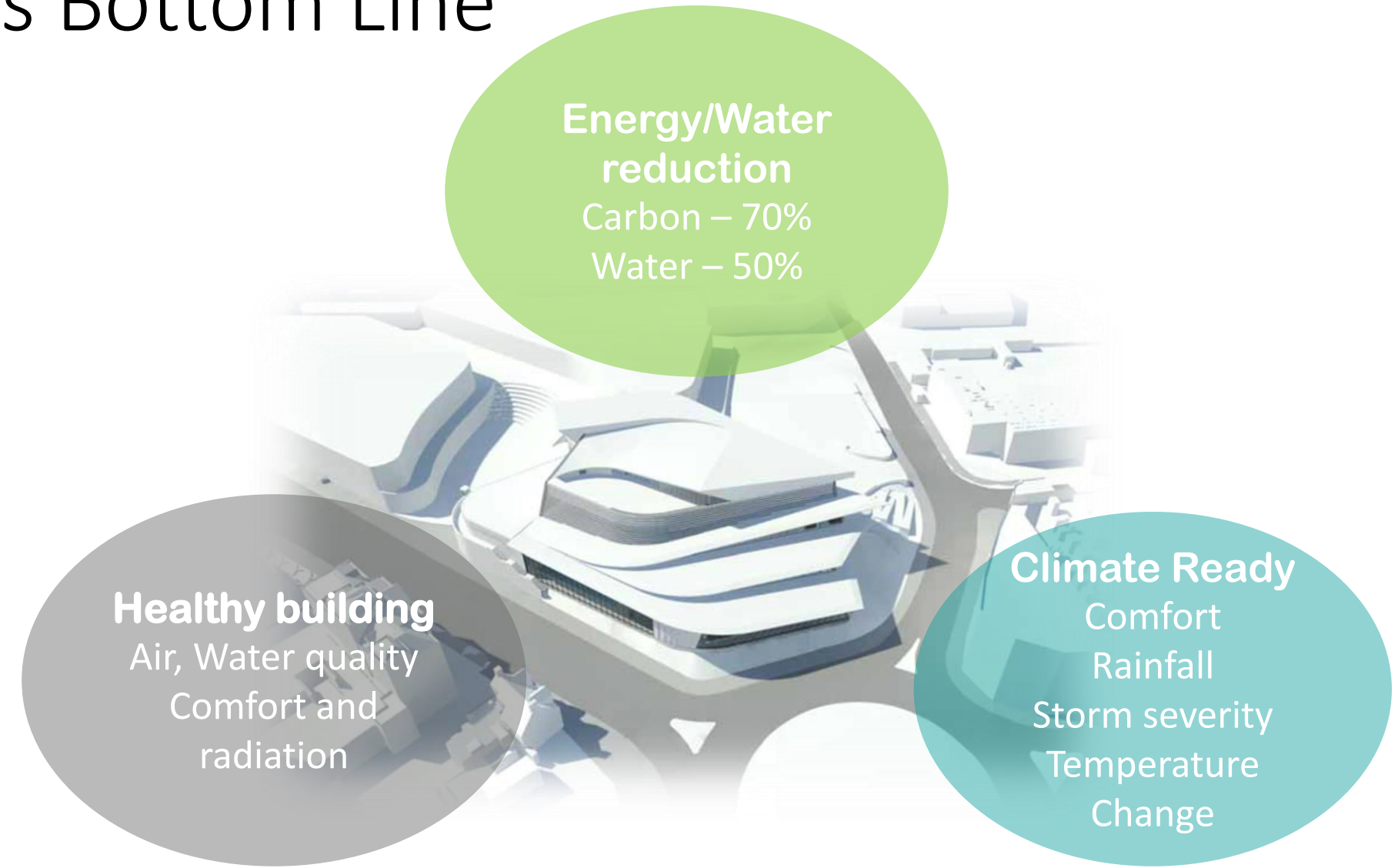


Development Brief

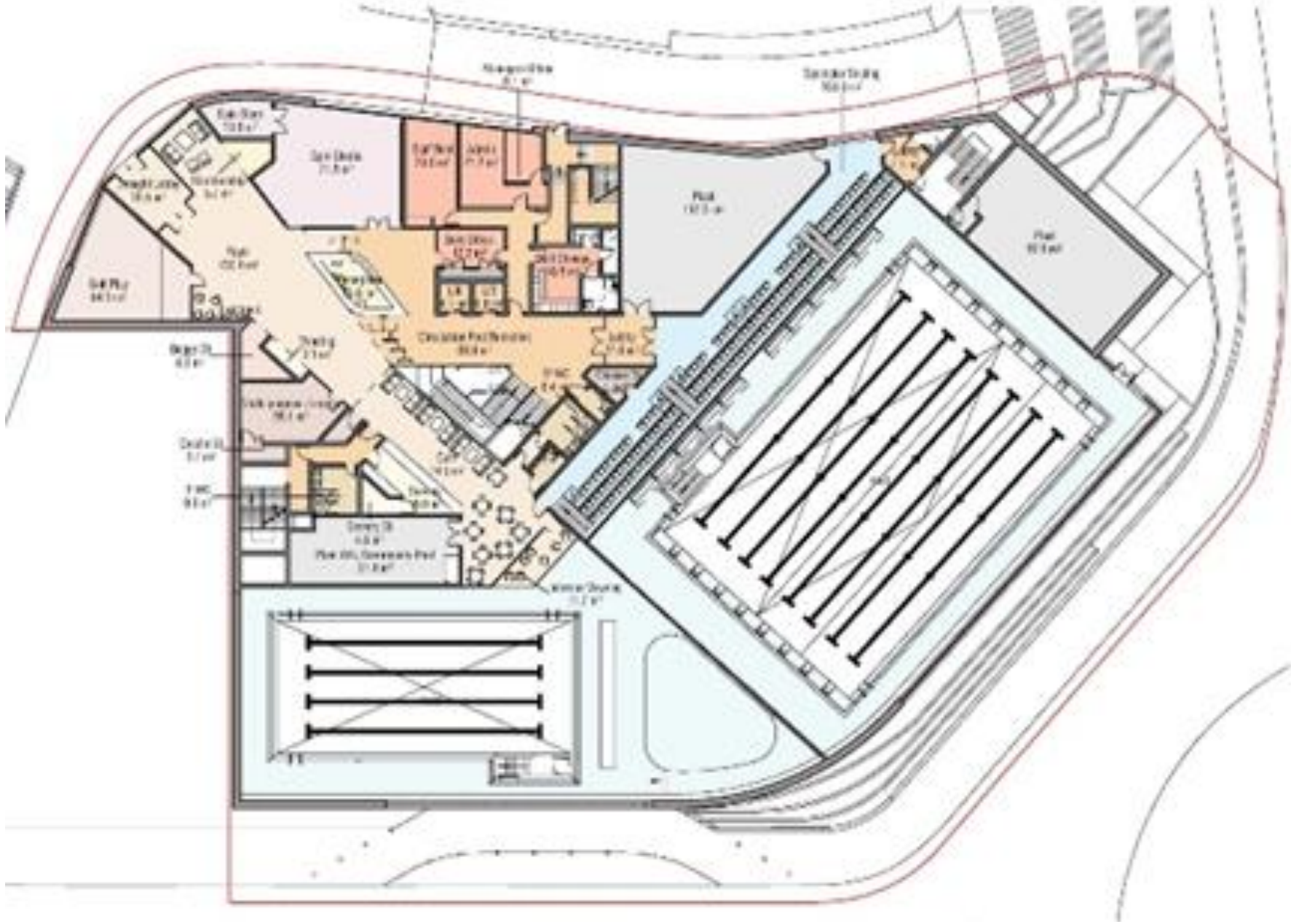
An Urban Leisure Centre

- 25m competition swimming pool
- 20m community pool
- Children's confidence/play water
- Health and fitness centre (150 gym station and flexible studio)
- Café
- Children's soft play activity space
- Spa (including hydrotherapy pool, heat experience and treatment rooms)
- Rooftop terrace
- Contract = £42m (including enabling works)
- **Triple Bottom Line Outcomes**

Exeter’s Bottom Line

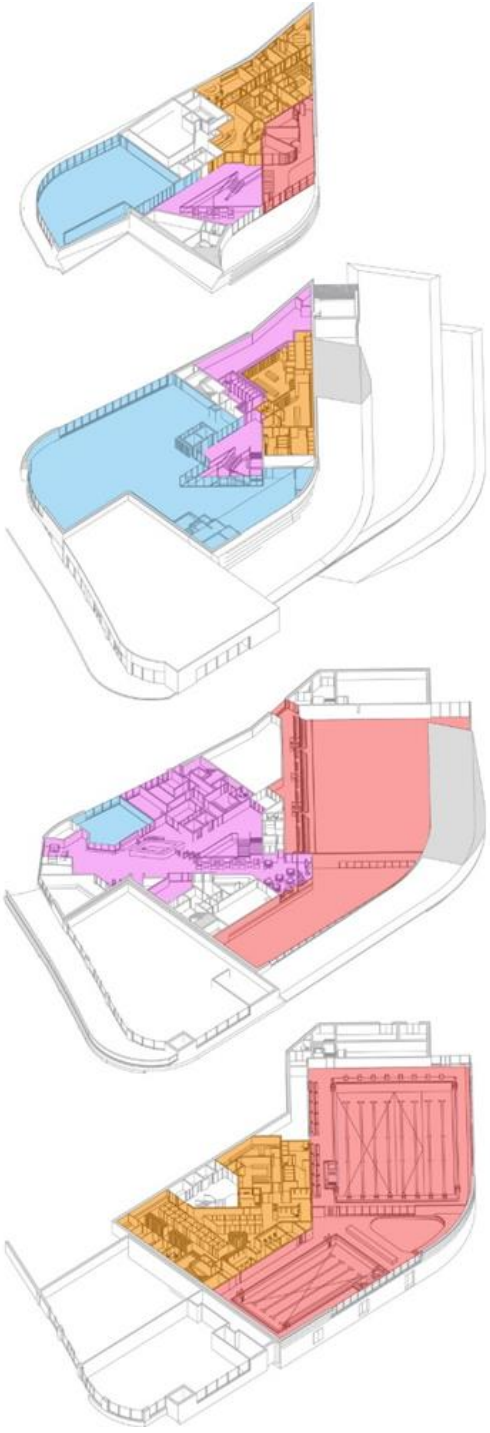


Masterplan



The Passivhaus Zoning Concept

- Reduce energy demand through planning
- Thermal zones minimise heat transfer
- Extensive glazing to maximise daylight
- Vertical core natural ventilation

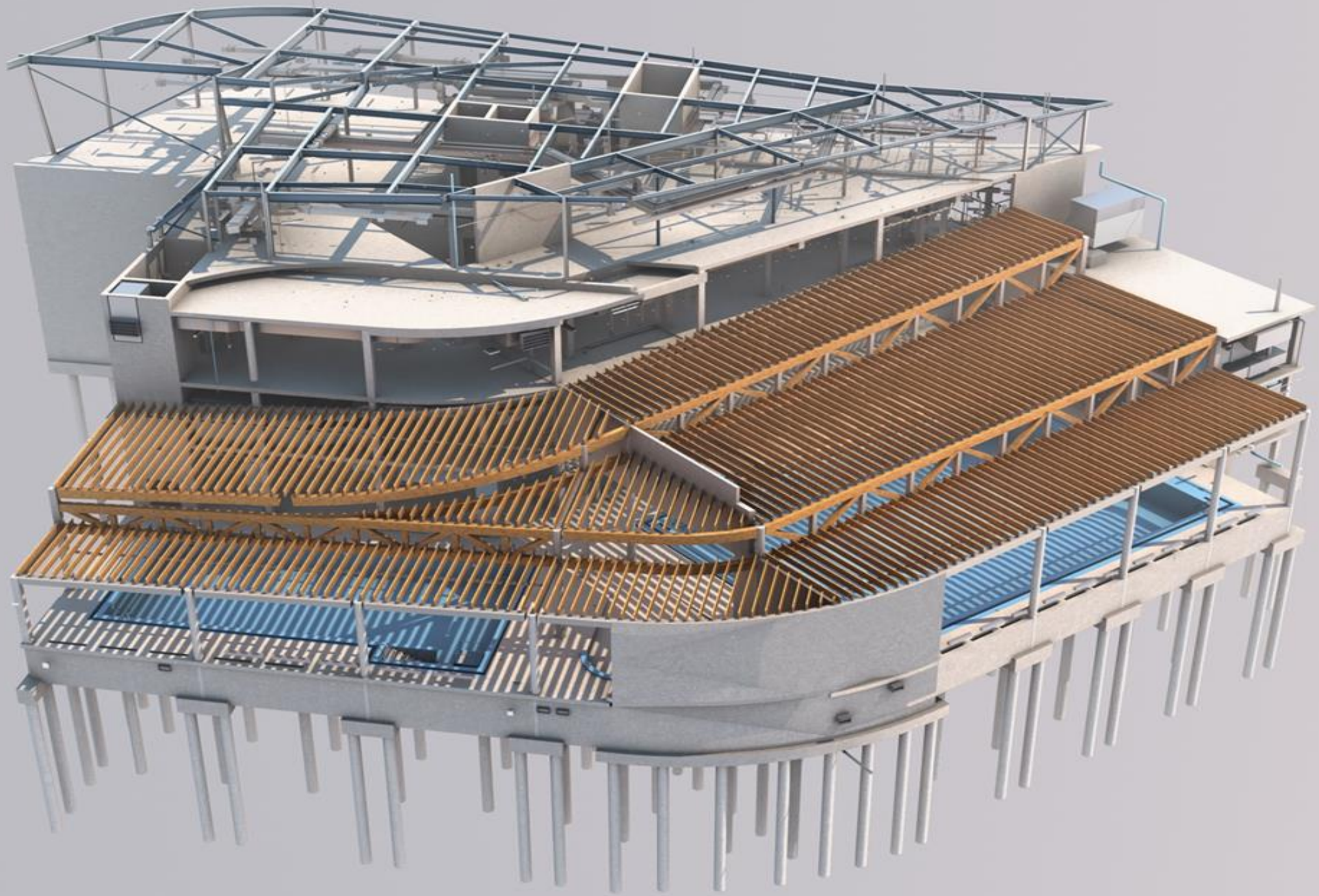


Thermal zoning **:** hot

warm

temperate

cooled



Key strategies for Passivhaus Pools:

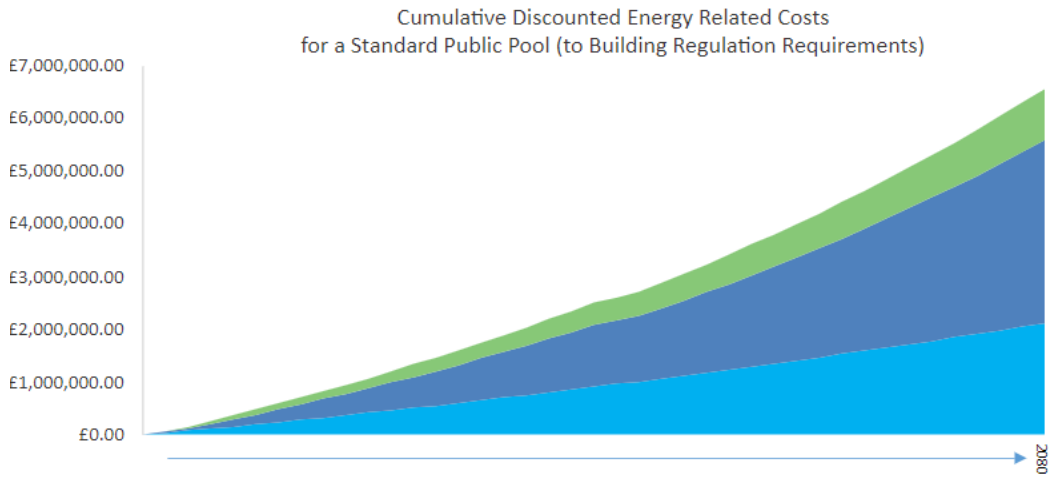
Quality Assurance
compact plan
thermal zoning
Daylight
Natural Ventilation (vertical core and windows)
Optimum solar orientation and gain - ~40% south facing glazing for wet areas to maximise solar gains (biese soliel)
internal distributed plantrooms
Higher surface temperatures
Increased thermal comfort
High levels of insulation U-value < 0.15 W/m²K
High Performance Windows and Doors U-value < 0.85 W/m²K
Continuous Air tight Barrier < 0.6 ac/h @ 50 Pa
Thermal Bridge Free (following the PH method) avoiding condensation risk
Heat recovery & services efficiency - Transfer of ‘waste heat’ to pool water
Large service voids
Low chlorine/chemical filtration
Higher relative humidity possible throughout the year (~64%) to reduce evaporation rates from pool water and reduce required ventilation rates (ventilation rate of 1-1.5 ac/h with no re-circulation) (also glazed façade elements don’t need to be ventilated to protect from condensation.)
CO2 sensors
Night purging
Most efficient equipment in the world

Exeter’s perspective

Our journey delivering this project as a Local Authority :

- We needed strong, consistent political leadership.
- Support and commitment throughout the organisation was required.
- Funding included CIL, NHB and prudential borrowing.
- We spent 6 months doing the Feasibility Study – with 4 different options developed, all considering CAPEX and OPEX (with a 25 year Business Case for each option).
- Costs increased during the design stage – tender price inflation was higher than expected.
- It took almost 5 years to get from the commencement of Feasibility Study to starting construction works on site. ECC resource commitment (officer time) during this 5 years was equivalent to 3 FTE’s throughout, plus legal, finance and estates team support as needed at different times.
- Delivery on site took 3 years & 3 months.
- The Project Lead has always been a Director.

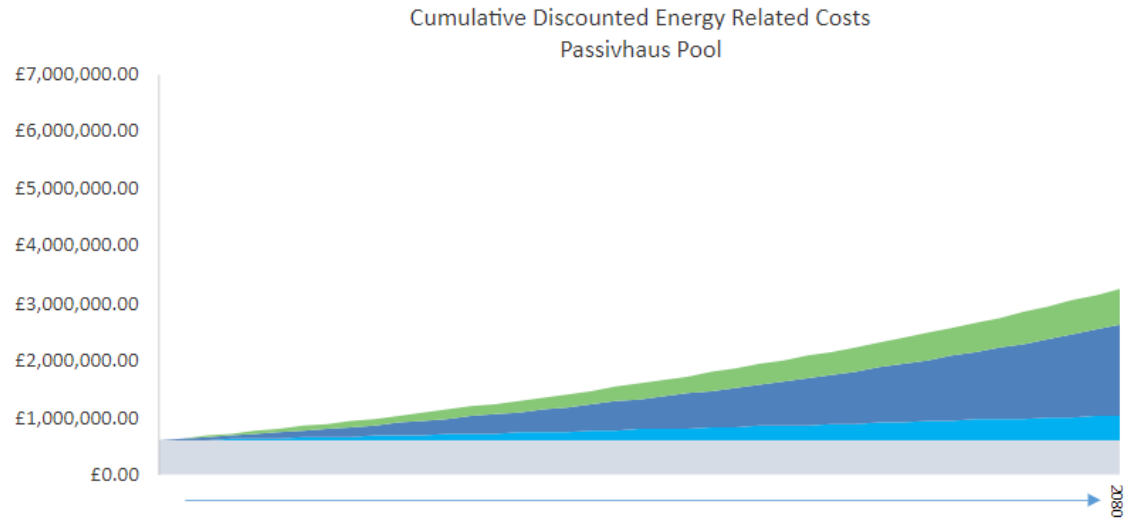
Cumulative Costs for Swimming Pool Building, Built to 2020 Building Regulation Requirements



Cumulative costs for swimming pool building, built to 2020 Building Regulation requirements, for heating/ventilation, hot water/filtration and lighting

All costs have been discounted at 5% to represent present value. A conservative annual increase in fuel costs of 4% has been allowed for and a reduction of heating demand of 30% from 2050 to 2080 has been included.

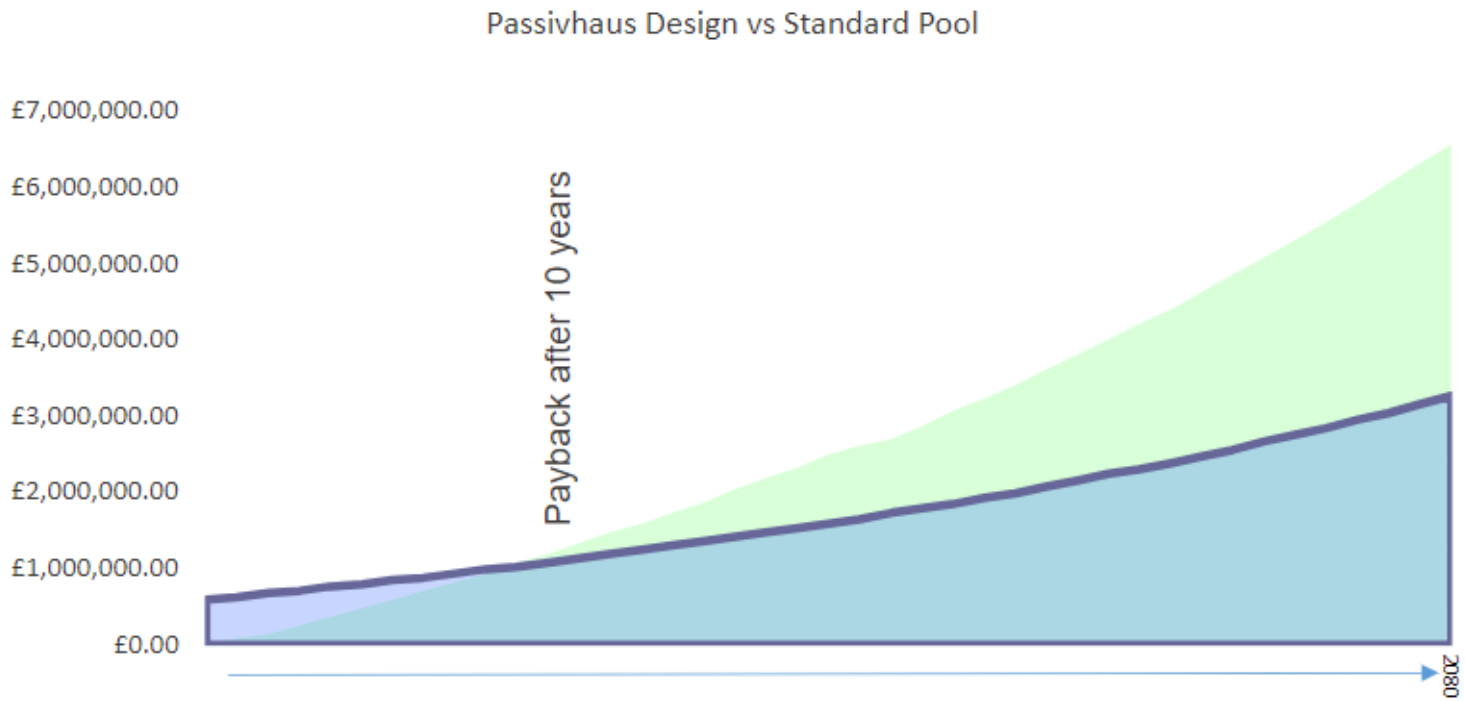
Cumulative Costs for Passivhaus Swimming Building



Cumulative costs for swimming pool building, built to Passivhaus standard, for heating/ventilation, hot water/filtration and lighting.

All costs have been discounted at 5% to represent present value. A conservative annual increase in fuel costs of 4% has been allowed for and a reduction of heating demand of 30% from 2050 to 2080 has been included.

Comparison of Cumulative Costs for a Standard Pool (Green) Building and the Proposed Pool (Blue)



70% reduced running costs

Payback period 10 years

Business Case for Passivhaus – WHY?

- Energy savings ‘pay for’ capital uplift in construction costs and more
- SSP uplift circa 10% (for all environmental factors & enhanced specification)
- Pay back within 10 years or less given rising energy prices
- Enhanced internal environment attracts more customers and strengthen revenue potential
- Reduced life-cycle costs – 80 year design life
- Retrofit mitigation
- Compelling and guaranteed performance and business case attracts investment/funding
- Great publicity and PR potential – customer demand
- Shows leadership – that leads to wider benefits

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St. Sidwell's Point, Exeter

The world's first multi-zonal Passivhaus Sports Centre