



Passivhaus

Capability Statement



Who we are

STANTEC IS A TOP TIER GLOBAL CONSULTANCY. WE HAVE BEEN WORKING WITH OUR CLIENTS AND COMMUNITIES IN THE UK FOR OVER 150 YEARS.

We have consistently been at the forefront of planning, design and delivery of infrastructure and development in the UK.

With offices across the UK, Stantec has a strong reputation for its work with public and private sector clients on a diverse range of high-profile infrastructure and development projects.



Stantec in the UK

1700

INFRASTRUCTURE, BUILDINGS,
WATER & ENERGY

40

PLANNING SERVICES

250

ENVIRONMENT &
SUSTAINABILITY SERVICES

200

CIVIL ENGINEERING

160

TRANSPORT PLANNING

95

BUILDING STRUCTURES
& UTILITY SERVICES

Introduction

IN 2019, THE UK BECAME THE FIRST MAJOR ECONOMY TO PASS A LAW TO BRING ALL GREENHOUSE GAS EMISSIONS TO NET ZERO BY 2050.

Heating and powering buildings accounts for 40% of our total energy usage in the UK. Heating alone results in 10% of the nation's carbon footprint and homes are more significant than all other building types put together.

This is reflected in the Department for Business, Energy & Industrial Strategy's 'Grand Challenge' mission to at least halve the energy use of new buildings by 2030.

In the past decade, there has been a major push to decarbonise the UK's electricity grid. A significant portion of UK electricity is now generated using renewable sources, like wind and solar, rather than fossil fuels.

This trend towards a cleaner grid is expected to continue. Government has also declared that they may mandate the end of fossil-fuel heating systems in all new homes from 2025. Because of these changes, there has been a widespread shift towards low carbon electric heating in new buildings in recent years.

However, this alone will not be enough for buildings to play their part in meeting the net zero target. Significant energy demand reduction in new buildings, alongside decarbonisation of the existing building stock, is needed.

Future editions of Part L of the Building Regulations (Conservation of fuel and power) will recognise this and drive fabric-first demand reduction in buildings. A new version of Part L is expected in 2021.

The new Part L will be a 'stepping-stone' to a proposed Future Homes Standard from 2025, which will require a 75-80% carbon reduction compared to current standards (in part achieved through very high fabric standards).

The Passivhaus standard for new buildings, and its sister standard EnerPHit for low carbon retrofitting of existing buildings, provide a rigorous design and certification method for delivering very low carbon buildings, whilst ensuring thermal comfort for building occupants.



What is Passivhaus?

PASSIVHAUS (OR PASSIVE HOUSE) IS A ROBUST STANDARD FOR ACHIEVING ENERGY EFFICIENCY AND THERMAL COMFORT IN A BUILDING TO THE GREATEST PRACTICAL EXTENT.

Passivhaus is not simply a brand name, but a tried and tested construction concept.

It was developed in Germany in the early 1990s by Professors Bo Adamson of Sweden and Wolfgang Feist of Germany. The first dwellings to completed to the Passivhaus standard were constructed in Darmstadt in 1991. It is now the fastest-growing energy performance standard in the world with over 30,000 buildings realised to date.

The standard defines strict criteria for space heating demand, total energy demand (heating, hot water, domestic electricity), air tightness and thermal comfort.

These are achieved through intelligent design and implementation of the Five Passivhaus Principles:

1. **Thermal insulation** – All opaque building components of the exterior envelope of a building must be very well insulated. For most cool-temperate climates like the UK, this means a heat transfer coefficient (U-value) of 0.15 W/(m²K) at most.
2. **High performance windows** – The window frames must be well insulated and fitted with low-emissivity glazing and filled (e.g. with argon or krypton) to prevent heat transfer. For most cool-temperate climates like the UK, this means a U-value of 0.80 W/(m²K) or less, with g-values around 50% to optimise solar energy gains.
3. **Ventilation with heat recovery** – Efficient mechanical ventilation with heat recovery (MVHR) is essential for Passivhaus and promotes energy efficiency and

good indoor air quality. At least 75% of the heat from the exhaust air is transferred to the fresh air again using a heat exchanger.

4. **Airtightness** – Uncontrolled leakage through gaps must be smaller than 0.6 of the total building volume per hour during a pressure test at 50 Pascals (both pressurised and depressurised).
5. **Absence of thermal bridges** – All edges, corners, connections, and penetrations must be planned and built with great care so that thermal bridges can be avoided. Those that cannot be avoided must be minimised as far as possible.

The Passivhaus standard can be applied to both residential and non-residential buildings.

The Passivhaus standard applies to new-builds; its sister standard EnerPHit provides a low carbon standard for retrofitting existing buildings.



What are the benefits?

WHAT ARE THE BENEFITS?

Why pursue Passivhaus certification?
Here are some of the benefits:

It provides an opportunity to **address two major challenges facing the UK construction industry:**

1. Tightening Building Regulations and the requirement to meet the Future Homes Standard (FHS) from 2025; and
2. Many conventional building designs built in the past few years are demonstrating a performance gap (poor performance compared to predictions) in terms of energy use, ventilation and indoor air quality, and thermal comfort and overheating. Passivhaus overcomes this.

Though capital costs are higher than average, there are ways of reducing these to a minimum, and they should be offset by **reducing running costs**. Good design can simplify the building form / services, **reducing capital costs** as well as those associated with heat loss.

It provides a **(thermally) comfortable and healthy indoor environment** whilst minimising the energy demand of a building.

The target of 15 kWh/m²/yr heating demand means **a large reduction in space heating, carbon dioxide emissions and costs** to around one-tenth of typical levels. It also provides **significant improvement in thermal performance** (increasing thermal insulation, reducing thermal bridges) compared to regulatory requirements.

By targeting an extremely low airtightness level, Passivhaus takes **full control of the ventilation strategy, reducing drafts and noise** and allowing for recovery of heat from outgoing stale air.

A project must clearly demonstrate that it meets the **validated quality assurance (QA) requirements** of the standard in order to be certified. The methodical QA process also **helps the team to work together**, as everyone understands what is expected of each of them throughout.

HOW CAN STANTEC SUPPORT YOU?

With a wide range of skills and experience, both within the UK and worldwide, Stantec can provide bespoke support for Passivhaus buildings from inception and masterplanning to detailed design, completion and certification.

Our UK Passivhaus works are led by **Stuart McDougall (Director, Sustainable Buildings)**. Stuart is an energy engineer and sustainability specialist. He was involved in pioneering approaches to carbon emission buildings evaluation even before the current legislative emphasis on low energy sustainable design. Stuart became a **Certified Passivhaus Designer** in 2010 and has since worked on numerous prestigious projects which have used the Passivhaus standard or principles, including Elephant Park and the Y-Cube home design. Stantec also provided Passivhaus support for Agar Grove.

Stuart is supported by **Michael Dray (Principal Consultant)**. As our lead **Certified Passivhaus Consultant**, Michael has a strong and practical knowledge of building physics and energy-efficient building design.

He is also a qualified **Part L Building Regulations Assessor** and provides guidance on the interplay between the Passivhaus standard and Part L compliance.

Rahul Patalia (Director Buildings) and **Matthew Wood (Associate)** are both chartered structural engineers with a specialist interest in low carbon design and masterplanning.

Both were instrumental in delivering the Agar Grove Project in Camden. Working with the Passivhaus assessors, WARM, Stantec's structural engineers developed bespoke details that improved the thermal isolation of the structure beyond current industry standard details.

Stantec has a long-established collaboration with WARM, who we involve in many of our Passivhaus projects. WARM is the UK's leading independent Passivhaus consultancy and certifiers, with theoretical and practical understanding to bring pioneering low energy buildings from design to reality.

Project Experience



ELEPHANT PARK

CLIENT: Lend Lease

LOCATION: London

Elephant Park - formerly known as Heygate Estate – is a development designed around the creation of a new park at Elephant and Castle. It will provide 360 new high-quality homes and a central shopping street in the city's greenest new place to live.

It is also an example of broad collaboration, with MAKE Architects completing the masterplan, MaccreeanorLavington Architects working on the first-phase detailed design, Panter Hudspith Architects

and AHMM working on the second phase detailed design, dRMM working on Trafalgar Place, and Squire & Partners working on One The Elephant.

With an obligation to the Clinton Climate Initiative, the Elephant Park masterplan aims to be a climate positive development and is one of 17 founding projects from across the world to be part of the Climate Positive Development Program, set-up by the C40 Cities Climate Leadership Group.

Within South Gardens, there is a terrace of fifteen ultra-energy efficient town houses called "Futurehomes". These award-winning homes achieved Passivhaus accreditation.

Stantec worked with the team to instigate a Passivhaus solution by combining the use of cross-laminated timber (CLT) as a sustainable building material, smart building technology and Passivhaus design enabling the residents to enjoy low carbon, affordable living in comfort.

They are the first of their kind in London's Zone One.



Elephant Park, Elephant & Castle, London

AGAR GROVE

CLIENT: Camden Council
Hawkins/Brown and Mae
LOCATION: London

Agar Grove is the largest council community investment programme (CIP) scheme to date, as well as the largest Passivhaus scheme in the United Kingdom. This truly community-orientated project will deliver new high-quality homes for existing residents – it will also create rented, shared ownership, and private homes to make better spatial use of the estate to meet Camden’s future housing needs.

For this project, we supported the architect on engineering constraints, carrying out forensic engineering studies on the existing retained tower block and providing multi-disciplinary technical support for the overall master plan. This creates more liveable spaces between buildings, allowing people to move easily across, through and within the site. We also provided structural, civil, transport, geotechnical, noise, air quality and flood risk services.

For the client to address fuel poverty issues in the borough, it was also important to minimise the heating and electrical demand for new units.

Stantec collaborated extensively with the Passivhaus Consultant (WARM) to **secure the Passivhaus certification** through our related services.

A key focus of this was the structural engineering design and the requirement to **design-out or minimise thermal bridging and secure the strict airtightness rating** to reduce uncontrolled heat loss.

This included comprehensive detailing of below ground, perimeter and superstructure thermal bridges.



BRUNEL ESTATE

CLIENT: Westminster City Council
LOCATION: London

Stantec is appointed by Westminster City Council (WCC) to provide engineering and technical multi-disciplinary services to support the redevelopment of the Brunel Contact Centre site. Brunel Estate is currently home to a disused single storey building, and is located south of the Great Western Railway / Hammersmith & City / Circle Line in Westminster.

Two options for residential-led redevelopment of the site are currently being considered:

- A linear tall building with a taller section to the west (up to 14 storeys) and a shorter section to the east (up to 6 storeys) providing circa 78 new homes.
- A dynamic tall ‘jewel-form’ building providing circa 75 new homes.

Stantec has provided preliminary specialist advice (RIBA Stages 0 – 1) on incorporating early-stage **Passivhaus principles** to help shape both potential options and to **promote energy demand reduction and thermal comfort**, considering items such as massing, glazing distribution and building shape/ layout.

Stantec is now appointed to provide Passivhaus consultancy and energy assessment services up to RIBA Stage 4 (Technical Design).

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Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN. Visit us at stantec.com or find us on social media.

Design with community in mind