

OVERVIEW

PRESENTATION ON RECOMMENDATION TO RETROFIT A 1900'S ORIGINAL BUILD DETACHED BUNGALOW TO MEET FURTURE LOW CARBON AND LOW ENERGY DOMESTIC BUILDINGS. ASSUMPTIONS AND ESTIMATIONS ON EXSITING U-VALUES HAVE BEEN MADE DUE TO MISSING INFORMATION ON CONSTRUCTION AGE

FABRIC

WALLS
CURRENT MAKE UP

BASED ON THE ESTIMATED AGE OF THE PROPERTY FOLLOWING A SURVEY CARRIED OUT IN 2021, THE WALL CONSTRUCTION IS ASSUMED TO BE SOLID. A TYPICAL MAKE UP OF SOLID WALLS FROM EARLY 1900'S IS SOLID BRICK, WIH NO CAVITY OR INSULATION (STRUCTTHERM 2025).

U-VALUE ESTIMATION
ESTIMATED 1.7 TO 2.1 W/M²K (HOMEMICRO 2025)

ROOF
CURRENT MAKE UP

THERE IS NO HISTORIC DATA OF A NEW ROOF SINCE BUILD AND NO RECORD INFORMATION ON THE EXACT CONSTRUCTION TYPE. THEREFORE IT IS ESTIMATED TO BE PITCHED TIMBER ROOFS, SHELTERED WITH TILES AND LITTLE TO NO UNDERFELT BASED ON THE BUILDING AGE (MASON 2016).

U-VALUE ESTIMATION
ESTIMATED 1.4 W/M²K (HOMEMICRO 2025)



WINDOWS & DOORS
CURRENT MAKE UP

THE WINDOWS TO THE REAR OF THE PROPERTY WERE REPLACED APPROXIMATELY 3 YEARS AGO. ALL OTHER WINDOWS AND DOORS ARE ESTIMATED TO BE OVER 10 YEARS OLD. ALL WINDOWS ARE DOUBLE GLAZED AND BOTH FRONT AND REAR DOOR ARE UPVC.

U-VALUE ESTIMATION
2.8 W/(M²K) TO 2.2 W/(M²K) (HOMEMICRO 2025)

FLOOR
CURRENT MAKE UP

SOLID CONCRETE FLOOR THROUGHOUT. UNKNOWN WHEN THIS WAS INSTALLED HOWEVER REMEDIAL WORKS HAVE BEEN CARRIED OUT IN THE MAIN LIVING AREA TO INSULATE AND LEVEL OUT.

U-VALUE ESTIMATION
0.7 TO 2.1 W/M2/K (CISBE 2025)



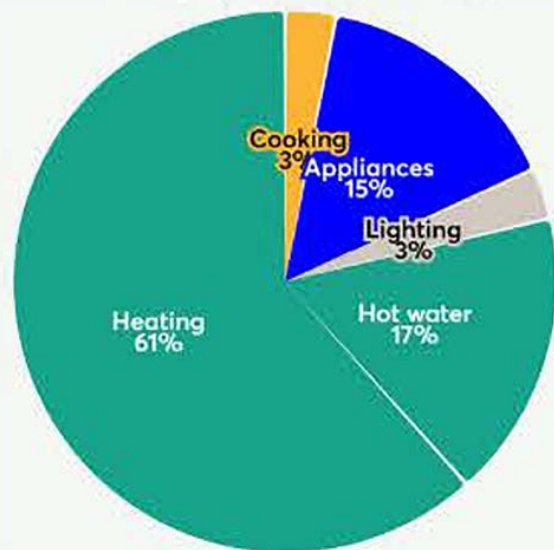
(HOUSING RETROFIT: VENTILATED PITCHED ROOF INSULATION2025)

SYSTEMS
HEATING & COOLING

THERE IS CURRENTLY A GAS BOILER HEATING SYSTEM INSTALLED WITH RADIATORS THROUGHOUT THE PROPERTY. THE ESTIMATED AGE OF THE BOILER IS APPROXIMATELY 10 YEARS. THIS CAN VARY IN EFFICIENCY BUT ON AVERAGE A 10 YEAR OLD BOILER ENERGY EFFICIENCY RATING WOULD BE G-RATED, WHICH MEANS IT IS LESS THAN 70% EFFICIENT (GARNER 2025). THERE ARE NO SYSTEMS IN PLACE FOR OVER HEATING OR COOLING.

ELECTRICAL
UNREGULATED ENERGY USE SUCH AS SMALL ELECTRICAL USE, LIGHTING AND HOUSEHOLD APPLIANCES ACCUMULATE TO APPROXIMATELY 18% OF HOUSEHOLD ENERGY CONSUMPTION FOLLOWING A GOVERNMENT REPORT ISSUED IN 2024. ALTHOUGH THIS IS AN IMPORTANT FACTOR TO CONSIDER WHEN RETROFITTING, IT'S LOWER LEVEL OF ENERGY CONSUMPTION COMPARED TO OTHER AREAS SUCH AS HEATING AND WATER DOES MEAN EVEN LARGE CHANGES WILL MAKE A SMALLER IMPACT IN COMPARISON AS SHOWN IN THE CHART BELOW.

Total household energy consumption by end use (kWh)



(KAVAN 2025)

COST & FEASIBILITY

THE COST ASPECT TO THESE RETROFITTING SOLUTIONS AND FEASIBILITY NEED TO BE CONSIDERED. THE CURRENT HOMEOWNER HAS INTENTION OF MOVING THEREFORE THE OVERALL VALUE IN THE RECOMMENDATIONS ARE IMPORTANT. SUGGESTING CHANGES SUCH AS EXPENSIVE INSTALLATION OF NEW EQUIPMENT THE CURRENT OWNER WILL NOT BENEFIT FROM IN 5 - 10 YEARS IS NOT REALISTIC. ALL OF THE RECOMMENDED RETROFITTING ITEMS HAVE TO BARE THIS IN MIND. ISSUES SUCH AS THE ROOF, WHERE THE MOST EFFECTIVE RESULT WOULD BE REPLACING THE ENTIRE AREA FALLS UNDER COSTLY AND NON FEASIBLE FOR THIS EXACT REASON. HENCE RECOMMENDATIONS SUCH AS ADDITIONAL INSULATION AND MANAGEABLE CHANGES TO OTHER FABRIC COMPONENTS. IT IS IMPORTANT TO MENTION THAT CHANGES IN ONE AREA OF FABRIC, AND NOT IN OTHERS WHERE THERE LAY LARGE LOSSES AND UNKNOWNNS CAN AND DO IMPACT THE RESULTS OF OTHER IMPLEMENTED WORKS (BROWNRUIGG, BARBOUR INDEX 2006).

RETROFITTING EXISTING BUILDING STOCK

RECOMMENDATIONS
OPTION 1

FULL ROOF REPLACEMENT. THE ROOF AREA CAN ACCOUNT FOR UP TO 25% OF HEAT LOSS ON A PROPERTY (BEWELLBWD 2025). SOMETIMES MORE ON POORER PERFORMING BUILDINGS. AS THE LARGEST CONTRIBUTOR TO HEAT LOSS OF THE PROPERTY AND DUE TO THE AGE AND CONDITION OF THE CURRENT ROOF IT WOULD BE RECOMMENDED TO FULLY REPLACE THE ROOF. FOLLOWING UP TO DATE GUIDANCE ON INSULATION AND MATERIAL USAGE TO ENCOURAGE BETTER HEAT RESERVATION. THE LIMITATIONS ON THIS OPTION ARE COST AND OVERALL USAGE FOR HOMEOWNER. THIS COULD IMPROVE THE POTENTIAL U VALUE BY 35% (HOMEMICRO 2025).

OPTION 2
INTERNAL WALL INSULATION

INTERNAL WALL INSULATION IS RECOMMENDED FOR 2 MAIN REASONS. THIS IS A CHEAPER ROUTE THAN EXTERNAL WALL INSULATION, AND INTERNAL WORKS ALLOW FOR BETTER MANAGEMENT OF MOISTURE WITH MORE CONTROL OVER COLD BRIDGING.

ROOF INSULATION

FOLLOWING NEW INTERNAL WALL INSULATION IT WOULD BE STRONGLY RECOMMENDED TO REPEAT THIS PROCESS IN THE ROOF AREA. AS THIS IS POSSIBLY THE LARGEST HEAT LOSS AREA ADDING A STRONG INSULATOR, SUCH AS WOOL, WOULD CONTRIBUTE TO BETTER HEAT LOSS RESULTS AND WILL WORK ALONGSIDE THE INSULATED WALLS TO CREATE GREATER EFFICIENCY FOR THE OVERALL BUILDING. THIS WILL OFFER SOME HEAT LOSS CONTROLS BUT WILL BE RELIANT ON OTHER FACTORS OF THE BUILDING TO BE BETTER AT HEAT RETENTION.

NEW WINDOWS DOORS

UPDATING THE WINDOWS FROM DATED DOUBLE GLAZING TO NEW TRIPLE GLAZING COULD POTENTIALLY SAVE UP TO 29% A YEAR OF CO2 EMISSION FROM ENERGY GENERATED TO WARM A HOME (LÓPEZ SALAZAR, SIMÁ ET AL. 2024).

AIR SOURCE HEAT PUMP

COMPARED TO A GAS BOILER OF 10 YEAR OLD THE ENERGY EFFICIENCY COULD BE INCREASED BY POTENTIAL 77% (GREEN POWER 2022). AS THE PROPERTY IS DETACHED THERE IS AMPLE EXTERNAL SPACE TO INSTALL. ACCORDING TO (USDE, 2025) AN AIR SOURCE HEAT PUMP CAN HEAT PUMP CAN DELIVER UP TO TWO TO FOUR TIMES MORE HEAT ENERGY TO A HOME THAN THE ELECTRICAL ENERGY IT CONSUMES.

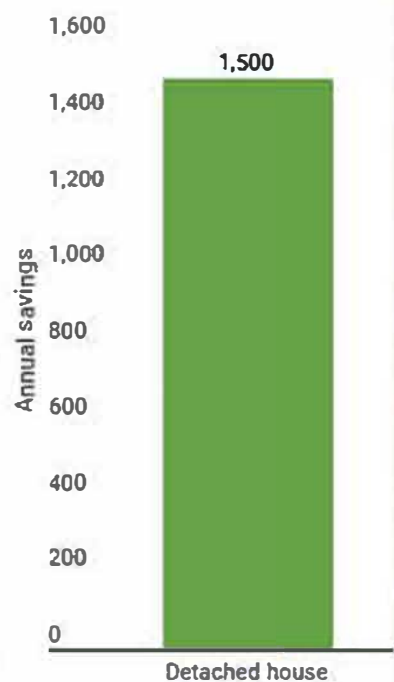
PAS-2035

ALL ASPECTS OF RETROFIT ARE IN THIS GUIDANCE. WHOLE-HOUSE APPROACH, PROJECT LIFECYCLE AND POSSIBLE FUNDING AVAILABLE (IAA, 2025).

MVHR

AN MVHR UNIT WOULD PROVIDE FRESH AIR TO THE PROPERTY TO HELP WITH MOISTURE CONTROL AND REDUCE HEAT LOAD THROUGH HEAT RECOVERY IN COMPARISON TO NATURAL VENTILATION VIA OPENABLE WINDOWS. NOTING, DUE TO CEILING VOID RESTRICTIONS IN AREAS OF THE DWELLING IT IS NOT FEASIBLE TO INSTALL ALL THE DUCTS REQUIRED FOR THE SYSTEM.THERE ARE ALSO ADDITIONAL COSTS SUCH AS SOUNDPROOFING AN CEILING VOID MOUNTED MVHR.

Carbon dioxide savings (kgCO2/year)



(WILLIAMS, NORTHCOTT 2025)

NEWER TECHNOLOGY

IT IS ALSO RECOMMENDED THAT NEWER TECHNOLOGY AND SYSTEMS ARE USED THROUGHOUT THE HOUSE TO MONITOR LEVELS OF ASPECTS SUCH AS HUMIDITY AND AIR QUALITY. USING MONITORS REGULARLY CAN HELP HOMEOWNERS BE IN CONTROL OF LOWERING LEVELS OF DAMP AND MOULD ISSUES (SCHIEWECK, UHDE ET AL. 2018).



RENEWABLES

PV PANELS

UNDER OPTION 1, IT WOULD BE RECOMMENDED TO INCORPORATE PHOTOVOLTAIC PANELS ON A DOMESTIC SCALE. THE RENEWABLE ENERGY WILL CONTRIBUTE POSITIVELY TO A BETTER INSULATED HOME (O'LOAN, GIBBS 2025). HOWEVER, OPTION 2 WHERE THE EXISTING ROOF WOULD REMAIN RAISES MORE RISKS AND CONSTRAINTS ON INSTALLING PV PANELS.

RAINWATER HARVESTING

DOMESTIC SCALE - BUNGALOW ROOF TO FLOOR AREA RATION OFFERS MULTIPLE DOWNPIPES THAT CAN BE USED.

CONSTRAINTS

WEIGHT BEARING CAPACITY OF THE BUILDING

SPACE FOR CERTAIN EQUIPMENT

AIR TIGHTNESS - BUILD AND AGE

AGE AND UNKNOWNNS

PLANNING LIMITATIONS

