



Blake Street Energy Efficiency Potential

MEC have recently purchased a property on Blake Street, on the edge of Middleport. We are managing the property on their behalf as part of the Eco Lifestyle Project. We have assessed the current green credentials of the property and the potential environmental adjustments that could be made. This report focuses on the property itself and the potential for improving its energy efficiency. It covers the fabric of the structure and major appliances.

The project needs to demonstrate improvements that can be made on a very modest budget. This means that we have to be very aware of the financial cost of any purchases or work. The best environmentally may be unfeasible and we will have to find compromises.

The property

The house is a small two-bedroom terrace with a raised forecourt and a small rear yard. The front door opens directly into the first of two reception rooms. There is a fitted kitchen to the rear of the property, with a door out to the yard. Upstairs, there is a double bedroom, a single bedroom and a fitted bathroom with both shower and bath.



Current state

Heating

There is a gas central heating system fitted. The boiler installed at purchased was estimated to be four or five years old and seemed of reasonable quality and efficiency. However, this boiler was removed by thieves while the property has been empty.

The radiators are of varied age, apparently having been fitted or replaced one at a time rather than all at once. Some of them are clearly quite new, others are older and do not have thermostatic valves.

Insulation

Being a mid-terrace house, the property shares party walls on both sides. This allows for heat to be shared with neighbours in both directions, instead the houses in the row losing heat to the outside on all sides. The brick front and rear elevations are solid wall, not suitable for cavity wall insulation. There is no internal or external wall insulation.

The loft has 270mm glass fibre insulation to the joists.

Most terraces have suspended floors over an uninsulated void and it is assumed this one is the same.



While the property is empty, the heating has been switched off. Despite the cold February weather, the internal temperature has been fairly steady at 13C. This suggests that it is overall effectively insulated and should not require significant energy input to keep at a comfortable temperature.

Outside space

The front forecourt is solid concrete.

The rear yard is mostly concrete, with a decorative slate chip area. The yard has an outside tap.

Windows & doors

The windows are double glazed with uPVC frames throughout. Based on the opening style and the stamps on the corners (BS6206), the windows are likely to be around 15-20 years old. Despite the age, they are in good condition with no apparent draughts and no visible condensation between the panes.

The front door is uPVC. The small double glazed lights show BS12150 stamp suggesting it is relatively new.

Two windows to the rear of the property and the back door were badly damaged when the property was broken into.

Lighting

All fittings have LED bulbs.

Built-in facilities

The built-in cooker has an electric oven and gas hob. Neither seem very old and both appear to be in good condition.



EPC

Score	Energy rating	Current	Potential
92+	A		
81-91	B		85 B
69-80	C		
55-68	D		
39-54	E	49 E	
21-38	F		
1-20	G		

The current Energy Performance Certificate (EPC) rates the property as E with a score of 49.¹ Some work has been done to the property since the assessment, so this is likely to be inaccurate now.

The certificate suggests the potential rating is B, with a score of 85. It makes a number of recommendations:

- Recommendation 1: Internal or external wall insulation
- Recommendation 2: Floor insulation
- Recommendation 3: Low energy lighting
- Recommendation 4: Heating controls (time and temperature zone control)
- Recommendation 5: Replace boiler with new condensing boiler
- Recommendation 6: Solar water heating
- Recommendation 7: Solar photovoltaic panels, 2.5 kWp
- Recommendation 8: Wind turbine

Potential improvements

Heating

The EPC recommendation to replace the boiler with a modern condensing boiler was completed around four or five years ago. This brought with it a portable thermostat and timer controls.

¹ The full EPC is available online at <https://find-energy-certificate.service.gov.uk/energy-certificate/8044-6522-7910-2577-3996>



Embodied emissions mean that replacing an existing boiler that is less than 10 years old is rarely worth it, environmentally or economically. However, as the boiler was stolen while the property has been empty, a new one has become necessary.

Investigations were made into electric boilers, as electricity can be produced renewably. They are also more efficient than gas boilers, using around half as much energy.² However, the high unit price of electricity would mean that the annual fuel bills would be around £1,000 higher.³

Most modern boilers achieve an ErP (Energy related Products) A rating and are at least 90% efficient, with little to choose between the major manufacturers.⁴ Additional features worth looking for are weather compensators, load compensators and flue gas heat recovery, all of which add to the energy efficiency of the boiler.⁵ The biggest savings would be found in fitting a small boiler so it does not have excess output and using it efficiently.

We have obtained quotes for the supply and fit of an Alpha Evoke 28 and a Greenstar 4000 30kW. Either will provide sufficient heat and hot water for the house. The Greenstar is slightly more efficient, but it's also larger, so will use more fuel to run than the Evoke. With the Evoke likely being slightly cheaper to run, and certainly being cheaper to have fitted. It seems the sensible choice.

Boiler	Alpha Evoke 28 ⁶	Greenstar 4000 30kW ⁷
Heating rating	A	A
Hot water rating	A	A
Output	24kW	30kW
Seasonal space heating efficiency	93%	94%
Daily gas use	22.406kW	22.896kWh
Daily electricity use	0.122kWh	0.180kWh
Supply & fit cost	£1,965	£2,900

Some of the radiators are a modern design with thermostatic valves. Potentially, the rest could also be replaced with more efficient modern radiators. It would be much cheaper to fit thermostatic

² Information taken from <https://www.boilerguide.co.uk/articles/electric-boiler-vs-gas-boiler-pros-cons-running-costs>, 07/03/2022

³ Based on estimated usage and current prices from <https://www.comparethemarket.com/>, 07/03/2022

⁴ Information taken from <https://www.ethicalconsumer.org/energy/shopping-guide/gas-boilers>, 04/03/2022

⁵ Information taken from <https://www.simpleenergyadvice.org.uk/boiler/advice/combi-boiler>, 04/03/2022

⁶ Information from ERP downloaded from <https://www.alpha-innovation.co.uk/products/Boilers/Combination+Boilers/Evoke/576693270>, 14/03/2022

⁷ Information from ERP downloaded from <https://www.worcester-bosch.co.uk/products/boilers/directory/greenstar-4000>, 14/03/2022



valves to the existing radiators. Additionally, two of the radiators are on external walls. Added reflective panels behind them would improve efficiency for a small price.

Insulation

External wall insulation could be fitted to the front and rear. This could be a significant expense of several thousand pounds. The cost would not be balanced by the fuel savings.

The loft has 270mm glass fibre insulation. More insulation can always be added to lofts and is generally not expensive, though additional benefits are lower when there is already good insulation in place.

Underfloor insulation may be possible, but the void would need to be assessed for space and damp first. This may also be a significant expense that would not see a notable reduction in fuel usage.

Sometimes grants are available via energy company corporate responsibility schemes for insulation. Each one has its own criteria and covered items. These would definitely be worth investigating as they come available.

Outside space

The rear yard offers potential for outdoor drying. Providing a rotary washing line would maximise this. Tumble driers use a significant amount of energy and drying inside can lead to damp.

Adding pots, raised beds, etc, would offer a range of environmental benefits such as supporting biodiversity. Growing food, either in the yard or via membership of the local community allotment Root'n'Fruit, would reduce the energy requirements inherent in bought food.

Windows & doors

The existing windows and front door are in good condition with no noticeable draughts. They are therefore not worth replacing currently.

Two windows at the rear of the property and the back door were damaged during a break-in. This does give the opportunity to update these to meet the most recent safety and efficiency standards.

The two main options for doors are composite or uPVC. Composite have better energy efficiency ratings than uPVC, offering better insulation.⁸ They are more expensive, but as they are also more secure it is worth the additional cost.

One of the windows only needs the hinges replaced. Getting a good seal again will make the property more secure and also increase the air tightness and therefore the overall efficiency of retaining heat. This will give a significant improvement from the damaged state while also keeping costs to a minimum.

⁸ Information from <https://www.checktrade.com/blog/expert-advice/composite-door-vs-upvc-door/>, 07/03/2022



The other window had the glass smashed but the frame was not damaged. This means that simply replacing the glazing unit is by far the most economical. It does limit the options to only standard double glazing, as triple glazing would not fit in the frame. A modern double glazed unit will meet newer standards and therefore will be more effective at keeping warmth inside than the old unit was.

Lighting

As all fittings already have LED bulbs there is little potential for improving the energy efficiency of the lighting. It may be feasible to insulate behind the second floor fittings to prevent draughts and heat loss to the loft space.

Built-in facilities

The oven and hob are in good condition and therefore not worth replacing currently. Should they require replacement in the future, research will need to be conducted to identify suitable replacements. Electric induction hobs and fan ovens are currently the most energy efficient available. Moving from a gas hob to an electric hob (standard or induction) would negate the environmental impact associated with using gas, although at an estimated 700kWh/year,⁹ this is small compared with the gas central heating.¹⁰ If the hob were the only gas appliance in the house, it would be worth changing in order to drop the gas supply and its related standing charge of around £100/year.¹¹

White goods

We will be placing a washing machine and fridge freezer into the property.

Fridge freezers with better ratings cost significantly more.¹² For example, the Indesit IBD5515W1 is F-rated and costs £259, while the cheapest E-rated fridge freezer is the Samsung RB34T602EBN at £450. It is difficult to justify an extra £200 for only one rating better. Also, smaller fridge freezers use less energy even with a lower rating. The F-rated Indesit has estimated usage of 233KWh while the E-rated Samsung uses an estimated 256KWh. A-rated fridge freezers are available, but they typically cost significantly more. The Samsung Bespoke RL38A776ASR costs £1,329.

Improving energy efficiency is possible through careful use of the appliance, such as keeping the door closed as much as possible and using ice packs to fill empty freezer space. This will be discussed with the tenants.

⁹ Based on information from <https://chefspick.co.uk/is-an-induction-hob-expensive-to-run/>, 07/03/2022

¹⁰ Total estimated annual gas usage 12,121kWh. Less 700kWh estimated usage for the hob, leaves 11,421kWh used by the gas boiler. Overall usage estimate from comparethemarket.com, 04/03/2022

¹¹ Information taken from comparethemarket.com, 04/03/2022

¹² Fridge freezer costs, ratings and energy usage taken from ao.com, 22/02/2022



Fridge freezer	Indesit IBD5515W1 ¹³	Samsung RB34T602EBN ¹⁴	Samsung Bespoke RL38A776ASR ¹⁵
Rating	F	E	A
Annual energy usage	233KWh	256KWh	108KWh
Price	£259	£450	£1,329
10 year cost of ownership (based on 15.4p/unit)	£617.82	£858.10	£1495.32

Low-priced washing machines are generally rated E or D for energy efficiency¹⁶ (eg Electra W1042CF1WE, rated D, £179), though some rated C are available for not much more (eg Beko WTL82051W, rated C, £229). There are A-rated machines available for more and some of these may be within reach financially (eg Hoover HW68AMC/1, rated A, £349). The standardised figures are based on 220 cycles per year. With the larger drum size of the Beko, the tenants would need fewer cycles per year than with the Electra and therefore the ongoing costs may well work out less in practice for the Beko. At least a C-rated machine will be worth the extra money.

Washing machine	Electra 5kg W1042CF1WE ¹⁷	Beko 8kg WTL82051W ¹⁸	Hoover 8kg HW68AMC/1 ¹⁹
Rating	D	C	A
Annual energy usage	147KWh	175KWh	118KWh
Price	£179	£229	£349
10 year cost of ownership (based on 15.4p/unit)	£405.38	£498.50	£530.72

Energy supplier

Using a green energy supplier is one of the simplest ways to reduce the environmental impact of running a household. However, some green tariffs focus on buying REGOs (Renewable Energy Generation Certificates) only rather than ensuring their energy is green and investing in increased

¹³ <https://ao.com/product/ibd5515w1-indesit-fridge-freezer-white-77659-28.aspx>

¹⁴ <https://ao.com/product/rb34t602ebn-samsung-rb7300t-fridge-freezer-black-76976-28.aspx>

¹⁵ <https://ao.com/product/rl38a776asr-samsung-bespoke-fridge-freezer-stainless-steel-85149-28.aspx>

¹⁶ Washing machine costs, ratings and energy usage taken from ao.com, 22/02/2022

¹⁷ <https://ao.com/product/w1042cf1we-electra-washing-machine-white-83560-1.aspx>

¹⁸ <https://ao.com/product/wtl82051w-beko-washing-machine-white-76556-1.aspx>

¹⁹ <https://ao.com/product/hw68amc1-hoover-hwash-500-washing-machine-white-76009-1.aspx>



green energy production.²⁰ PPAs (Power Purchase Agreements) support renewable energy generators and actively support the creation of green energy production. Green tariffs based on PPAs are therefore much better than purely REGOs. Good Energy, Green Energy and Ecotricity all use PPAs for 100% of their energy and are also committed to not creating more fossil fuel energy generation. Any of them would all be a good choice from an environmental perspective.

Price comparison site Compare The Market has provided current annual usage figures of 1777kWh for electricity and 12121kWh for gas. According to their quotes service, Good Energy would charge around £155.62/m²¹. Ecotricity's own calculator offers a fixed tariff of £209/m²². Green Energy are not listed on price comparison sites and are not currently providing online quotes due to the ongoing energy crisis.²³ From the available information, Good Energy would be the best choice of fully green energy suppliers.

The very cheapest tariff listed on Compare The Market is Utility Warehouse, which estimates £81.60/m. While this is notably higher than Good Energy, the difference in carbon production is also high. There will be significant efforts made to reduce gas and electricity consumption within the property, which will mitigate the price difference.

Whichever supplier is chosen, it would be worth requesting a smart meter to enable closer monitoring of usage.

Solar water heating and photovoltaic panels

The front elevation has a south-facing roof with not tree shading. There is potential for either water heating or photovoltaic panels or hybrid panels to be fitted. Any solar system would be a significant investment in the order of £10,000, but would then provide clean energy and/or hot water to the occupants for many years. The EPC suggests this could save the tenants £240.70 per year, but with increasing grid prices the savings may well be significantly higher.

Wind turbine

Any wind turbine added to the property would need to be roof-mounted. The area above the roof is not sheltered by trees or tall buildings so the wind is likely to be reliable. A wind turbine would be a significant investment of several thousand pounds and would require planning permission. Once fitted, it would provide clean energy to the tenants for some years, but this could be quite modest – a saving of only £20.07 per year according to the EPC.

Air source heat pump

Heat pumps can be a very efficient and cost-effective way of heating homes. Given the general good insulation and assuming the radiators would be suitable, it is a viable heating option for this

²⁰ Information taken from <https://www.ethicalconsumer.org/energy/shopping-guide/energy-suppliers>, 04/03/2022

²¹ Information taken from [comparethemarket.com](https://www.comparethemarket.com), 04/03/2022

²² Information taken from [ecotricity.co.uk](https://www.ecotricity.co.uk), 04/03/2022

²³ Information taken from <https://www.greenenergyuk.com/quote>, 04/03/2022



property. We have obtained a quote for heat pump installation for £10,244.42. This includes supply and fit of the heat pump and hot water cylinder. This is too high a cost for this project as it is not feasible for the majority of Middleport households. The new boiler upgrade scheme offers homeowner grants of £5000 towards the cost of a heat pump, which brings the remaining cost closer to the cost of a new combi boiler and more feasible for some households.

Conclusions

There is significant scope for what is physically possible to do with the property. The major improvements, such as solar panels or external wall insulation, are unlikely to be cost effective. They would definitely be worth installing if suitable grants become available as the difference in environmental impact can be significant.

Relatively modest improvements, such as choosing a washing machine with a good energy efficiency rating, are feasible both practically and financially. These are things that might be within reach for many households, especially if they are replacing appliances anyway.

There is significant scope for energy efficiency in the usage of the house and appliances. This is especially desirable within the context of the project as it saves money as well as cutting emissions. Comparing bills for this property with other homes along the street would allow us to benchmark this and demonstrate improvements.