



Energy saving strategy for - *Al-Madhi Institute*

1.0 Your key recommended actions

| | | Carbon saving effectiveness | Financial return on investment | Potential improvements in comfort |
|----|--|-----------------------------|--------------------------------|-----------------------------------|
| 1 | Modify heating control regime | High | High | High |
| 2 | Insulate pipework | High | High | High |
| 3. | Upgrade heating controls | High | High | High |
| 4. | LED lighting throughout | High | High | n/a |
| 5. | Upgrade lighting controls in corridors, stairwells, basement | High | High | n/a |
| 6. | Upgrade to smart hot water cylinders | High | Medium | n/a |
| 7. | Solar thermal | High | Medium | n/a |
| 8. | Solar electricity | High | Medium | n/a |
| 9. | Monitoring strategy | High | High | High |

Carbon saving effectiveness

High - estimated reduction in greenhouse gas emissions - 10% relative to baseline

Medium - estimated reduction in greenhouse gas emissions - 5-10% relative to baseline

Low - estimated reduction in greenhouse gas emissions - less than 5% relative to baseline

Return on investment

High - estimated return on investment of under 5 years


Medium - estimated return on investment of 5-10 years

Low - estimated return on investment of more than 20 years

Thermal comfort

High - estimated reduction in the amount of energy used for heating of 20% or more
Medium - estimated reduction in the amount of energy used for heating of 5-20%
Low - estimated reduction in the amount of energy used for heating of under 5%.

2.0 Proposed energy saving strategy for the buildings

|  | Actions | Notes |
|---|---|---|
| Insulation strategy (including thermal bridging and airtightness) | Insulate all central heating pipework from boilers to radiators in unheated areas - boiler rooms; basement; include valves and flanges Pipework exiting basement to outside the building renew insulation to three pipes and ensure insulation | Pipework is partially insulated Existing insulation is inadequate and has failed; existing insulation sleeves are compressed by each |

| | | |
|--|--|--|
| | <p>sleeves do not touch; build an insulated box around the pipes</p> <p>Check insulation and roof felt in eaves; reinstate where necessary; ensure rafter level insulation is held firmly in place.</p> <p>Single glazed windows should be replaced or secondary glazed.</p> <p>Consider installing a porch at the entrance to the front door</p> <p>Insulate the ceiling of the basement</p> <p>Install radiator reflective foil behind radiators that are located on outside walls, where space allows</p> <p>Install radiator shelves</p> | <p>other and are forming a thermal bridge; existing insulation sleeves have been eaten by pests; these pipes should be bought within the thermal envelope of the building</p> <p>100mm mineral wool insulation is present at rafter level in the eaves; however in the East wing the insulation and felt have become displaced; thermal imaging shows gaps in insulation</p> <p>Replacement windows - aim for U-value of 0.8 Secondary glazing - aim for U-value of 1.3 Secondary glazing should have ventilation Some frames in Lodge are in poor condition and need replacing</p> <p>There is substantial heat loss from the front door and adjacent glazing and walls</p> <p>To prevent heat loss through the ground floor to the unheated basement</p> |
|--|--|--|

| | | |
|--------------------------------|---|---|
| | <p>above all radiators, where space allows</p> <p>Any open chimneys should be draught-proofed or blocked with a ventilated plate</p> <p>Energy saving hierarchy goals - use less energy</p> | <p>(ideally install cavity wall insulation and dormer insulation but this would be very expensive)</p> |
| <p>Heating strategy</p> | <p>Condensing gas boilers are designed to run at low flow temperatures and to give a steady background heat, rather than short bursts of on/off.</p> <p>Reduce flow temperatures to radiators to 45-55 degrees.</p> <p>Adjust timer settings to have central heating on for longer, to give a steady background heat of 18-20 degrees (16 degrees at night).</p> <p>Reduce or eliminate the use of portable electric radiators.</p> <p>Consider a single building energy management system for all heating systems to include greater control over heating zones through space and radiator</p> | <p>Most of your boilers are not currently running in condensing mode because the flow temperatures to radiators are too high (typically 60-80 degrees). This is wasting fuel.</p> |

| | | |
|----------------------------------|--|---|
| | <p>thermostats</p> <p>Alternatively, each heating system to have upgraded controls to include greater thermostatic control over zones, and thermostatic radiator valves.</p> <p>Energy saving hierarchy goals - use less energy; use energy efficiently</p> <p>Replace gas heating systems with air source heat pumps as they reach the end of their useful lives. Energy saving hierarchy goals - use lower carbon energy</p> | |
| <p>Hot water strategy</p> | <p>Insulate all domestic hot water pipework in boiler rooms and from cylinders to taps/showers; include valves and flanges</p> <p>Replace existing hot water cylinders with smart cylinders e.g. Mixergy</p> <p>Energy saving hierarchy goals - use less energy, use energy efficiently</p> <p>Install solar thermal panel arrays to reduce use of gas or electricity to heat water;</p> | <p>Pipework is partly insulated</p> <p>Smart hot water cylinders save energy by using artificial intelligence to predict when hot water will be needed, which means that you only heat the water you need, and reduce the energy required to keep water at 60 degrees</p> <p>Evacuated tube solar thermal systems should be used and located in</p> |

| | | |
|---------------------------------|---|--|
| | <p>separate arrays for each plant room</p> <p>Energy saving hierarchy goals - use lower carbon energy</p> | <p>accordance with the Bournville Village Trust Design Guide</p> <p>Solar thermal systems should be located to minimise pipe runs from panels to each plant rooms</p> <p>Solar thermal could also be used to top-up space heating during spring and summer</p> |
| <p>Lighting strategy</p> | <p>Replace non-LED light fittings with LED:</p> <ul style="list-style-type: none"> - Replace incandescent bulkheads on stairwells with LED bulkheads - Replace non-LED fluorescents in kitchen and basement with LED fluorescent conversion kits - Ensure light fittings in outdoor areas are LED, including fountain <p>Install passive infra-red lighting controls (PIR) in corridors, stairwells, basement.</p> <p>Energy saving hierarchy goals - use less energy, use energy efficiently</p> | <p>Specify LED lighting with high frequency ballasts</p> <p>Corridor PIR controls should be for alternate lamps; this means half the lamps are always on for security purposes; and half of them are activated by movement.</p> |
| <p>Fuel strategy</p> | <p>Install solar electricity panels to reduce the need</p> | <p>Solar systems should be sized according to</p> |

| | | |
|----------------------------|--|---|
| | <p>for grid electricity</p> <p>Install solar thermal panels to reduce the need for gas</p> <p>Energy saving hierarchy goals - use lower carbon energy</p> | <p>measured energy use and not over-sized</p> |
| Monitoring strategy | <p>Devise a monitoring strategy to enable ongoing checks of your success in implementing the energy saving strategy, and identify areas for improvement</p> <p>Energy saving hierarchy goals - use less energy, use energy efficiently, use lower carbon energy</p> | <p>Sub-metering would be a cost-effective way for you to measure and benchmark your progress and identify areas for improvement</p> |

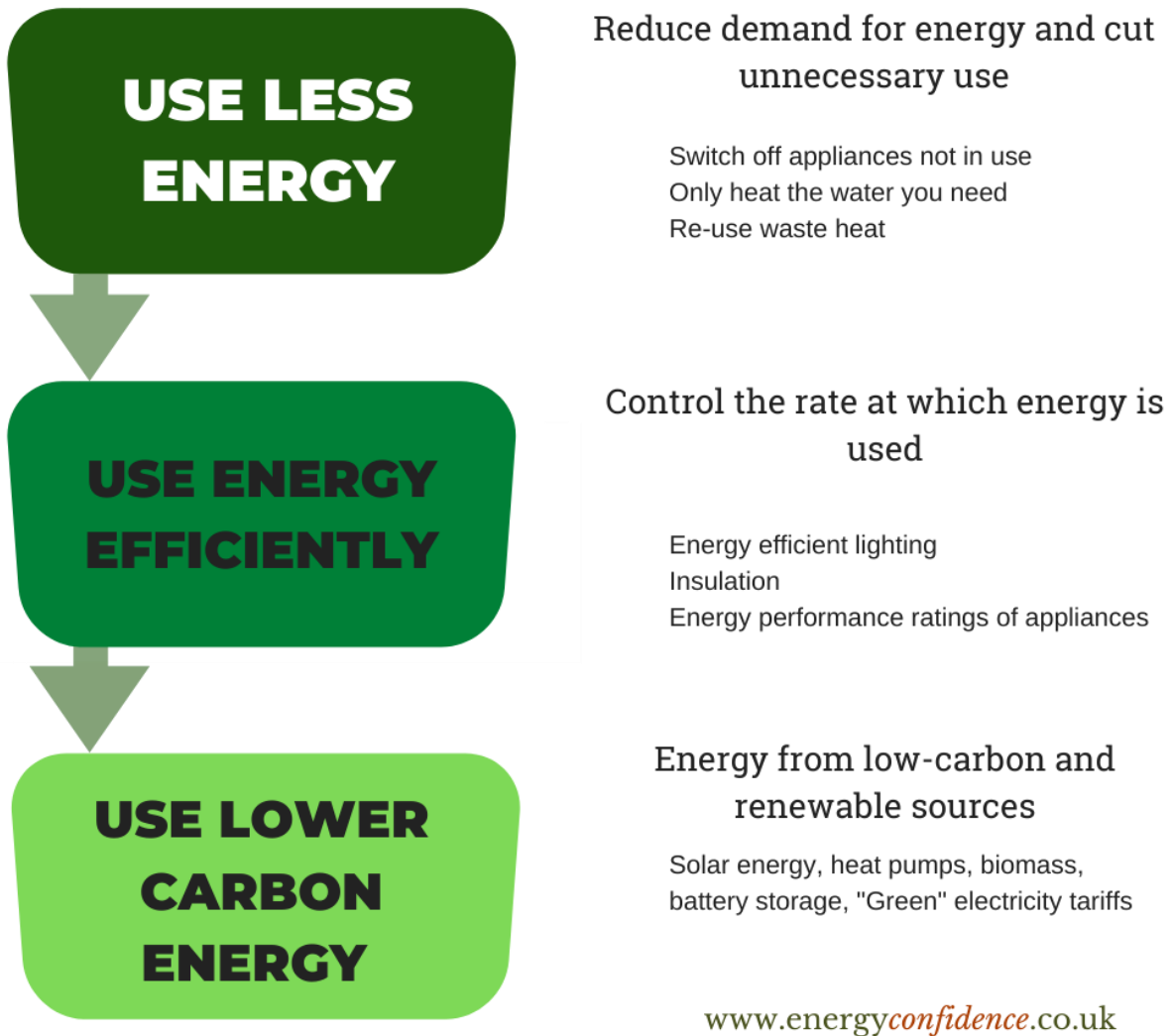
3.0 Your baseline of energy use and greenhouse gas emissions

The following graphic shows key energy performance indicators for your building, compared to benchmark figures. Energy consumption in kWh per square metre per annum is the most significant indicator. It is a measurement of how many kiloWatt hours of energy (electricity and gas) you are using per square metre of floor space, in a year. It is the best indicator to measure progress against.

| | | | | |
|--|--|--|---|---|
| | Gas consumption in kWh/m2 per annum | Electricity consumption in kWh/m2 per annum | Emissions split <i>gas</i>/electricity | Greenhouse gas emissions in kg CO2e/m2 per annum |
|--|--|--|---|---|

| | | | | |
|--|-----|-----|------------------|------|
| Al-Mahdi Institute | 145 | 30 | 84% / 16% | 35.4 |
| Benchmark - typical office (natural ventilation, cellular) | 188 | 132 | | 64 |
| Benchmark typical college | 150 | 40 | | 38 |
| Benchmark typical small hotel | 360 | 120 | | 97 |
| Suggested target for Al-Mahdi Institute by 2025 | 110 | 25 | 80% / 20% | 28 |

Where possible, you should follow the energy hierarchy - which tells us that the most sustainable actions are those that reduce energy demand. In this report, I have linked the proposed actions to the energy hierarchy.



4.0 Thermal imaging

Your thermal images can be found [here](#) - and the password is **Al-Mahdi**

The webpage shows thumbnails of all of the images, you can click on each image and magnify. If you right-click on an image, you can save it. Please also see Appendix below for more information on the images.

The thermal images can also be viewed in Dropbox [here](#)

5.0 Choosing contractors

In getting quotes for insulation, you should ask for the following:

- Wall insulation products that are vapour permeable
- Internal wall insulation products that reduce the risk of interstitial condensation

- What additional ventilation should be installed to ensure air quality, and whether the installer can supply and fit it. The best option is to find an installer that will do both insulation and ventilation.

See also **Glossary** at the end of this report.

These are some logos to look out for:

