



Energy Audit

Your Energy Audit

Thank you for commissioning a Green Assess Energy Audit. We look forward to working with you to help lower your CO2 emissions and reduce your energy and water bills. Within this report you will find the recommendations that our assessor has made to improve the efficiency of your building. These recommendations, both physical and behavioural, will payback their capital investment within approximately 4 years, a number of them will payback immediately.

The areas which your Green Assess Energy Assessor will have looked at are wide ranging, reaching across your whole operation, and have the unique benefit of a holistic approach to energy efficiency. Many different measures will have been modelled using our auditing software, but only those which represent value for money and a good return on investment have been selected for your consideration.

Your overall use of energy has been assessed and the results are closely based on your actual consumption figures. The assessor will have also taken into account the status of the building (if it is listed or in a conservation area), the tenure of the building, staff behaviour patterns and a number of other factors before arriving at this result.

Please study the results carefully and feel free to discuss the various savings opportunities identified with your assessor. He or she will be able to answer any initial questions you might have, including the option of applying for interest-free funding to make this report a reality. Once you and your assessor have decided on a plan of action, you can sit back, relax and leave the rest to us. We can arrange everything from a simple time-switch to a full boiler and heating system replacement. Please remember that your action plan can be fully financed from energy costs savings*. Further, by selecting any larger items of equipment such as boilers, chillers, air conditioning plant and certain more significant controls systems from the government's Energy Technology List you can also claim 100% capital allowances in the year of installation.

Thank you once again for your instructions.

Carbon Trust 0% loans subject to status and conditions. See Page 14

Building Synopsis

The property was originally constructed in 1929 and has been extended several times since. It is arranged over three floors and comprises restaurant, bar and meeting rooms on the ground floor and bedrooms on the upper 2 floors. There are modern extensions containing a fitness suite with a small swimming pool and eight of the bedrooms.

The walls throughout are of solid brick and are not insulated. The ground floor is of suspended timber and is also not insulated. Windows to all elevations of the main building, annexe and restaurant are all single glazed with softwood frames and are in good condition but lack any draft proofing. Windows to the fitness suite are of a more modern double glazed UPVC design. The roof to the main building, annexe and restaurant is of pitched tile construction and has no insulation. The roof to the fitness suite is single pitched and insulated.

Heating is supplied by a gas fired boiler with a seasonal efficiency rating of 78%. This feeds radiators all of which have thermostatic radiator valves fitted, and which evidently are being correctly used.

An air handling unit feeds the fitness suite and has a motor rating of 5kw, its existing air flow rate is 3.1cu.m/sec. The air handling unit runs for 24 hours a day, 52 weeks of the year. The current set point at which the heating begins is 28°C, the current set point at which cooling begins is 28°C. Chilled drinks cabinets in the fitness suite area are not fitted with timers and run 24 hours and day.

Lighting throughout the building is predominantly supplied by tungsten halogens which are manually switched. These are present in the restaurant area and all bedrooms. The conference room is lit by half-silvered 60w tungsten bulbs which block out half the light, while the fitness suite and corridors are lit by T8 fluorescent with switch start. The fitness suite houses a swimming pool along with 2 showers. A shower is also fitted in each bedroom

The building is in a conservation area which limits the option for some externally fitted measures.

Recommendations Identified by Green Assess

Green Assess has identified the following measures which if actioned would reduce the energy consumption of the premises and achieve a simple payback period of less than 4 years.

Lighting

It is recommended that all existing T8 lamps be replaced with a similar output T5 equivalent with high frequency ballasts /end caps. This will give no loss of light, will save up to 51% of the running costs, will give flicker free lighting and offer extended lamp life (up to 20,000 hours) thus also reducing maintenance costs. Remaining tungsten lighting to be replaced with equivalent output compact fluorescent models. In areas of intermittent use such as the meeting room and stationery cupboard, occupancy lighting controls to be fitted to provide an automatic on/off control.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
24,475	89,201	166,111		36,102	1.48	86

Swimming Pool Measures

A manually operated pool cover should be fitted and used overnight when the pool is not in use. When the cover is in place, evaporation from the pool is reduced to a minimum so it is not necessary to run the air handling unit at full capacity to provide heating and dehumidification. A variable speed drive should be fitted and linked to a humidity sensor to ensure that the air change rate in the pool area is no more than needed.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
2,016	704	16,380		821	0.41	28
1,006	4,364	22,967		410	0.41	28
662	2,314	5,382		270	0.41	28

Building Fabric Loss

It is recommended that the insulation in the accessible loft areas be increased to a depth of 250mm in order to limit heat loss through the roof. Internal solid wall insulation was also considered and modelled but found to have a payback period of more than 10 years. It is unlikely to be possible to replace the single glazed windows on the main part of this property at a realistic price due to its presence in a conservation area, however it is recommended that these windows are draught proofed to reduce the air change rate.

The large single glazed area on the south side of the restaurant is deteriorating and should be replaced with modern uPVC double glazed units

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
18,977	82,350	433,420		47,310	2.49	23

Insulation

In the main boiler plant room there are approximately 50 pieces of uninsulated distribution equipment (valves, flanges etc.) leading to continuous heat loss in the plant room estimated at 4kW. It is proposed to fit flexible insulation jackets to each of these. Insulating exposed valves and flanges reduces heat loss and fuel consumption, and also prevents the plant room from becoming uncomfortably hot.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
734	3,187	16,771		1,715	2.34	61

Motor Controls on fridges and freezers

Fridges and freezers should be 'A' rated or better wherever possible. Larger and/or less efficient models should be fitted with plug-in motor controllers. A standard domestic SavaPlug can handle motors rated up to 750W, which covers the tall free standing models found in the catering kitchens.

Motor controllers are controversial because they appear to be giving "something for nothing". They operate by chopping the waveform to reduce the flow of current to a motor, thereby squeezing out the inefficiency that results from the motor being oversized for its application. On a typical non energy efficient model, savings of 20% are common.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
262	1,143	2,128		360	1.37	90

Further Electrical Savings

Bottled and canned drinks do not deteriorate if they are not kept chilled. They only need to be cold when served. Only one of the bars remains open through the night for the benefit of hotel guests, the Sovereign and Strand bars are closed for at least 12 hours each night. The chilled drink cabinets in these two bars should have timers fitted to turn them off overnight.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
322	1,407	2,621		528	1.64	134

Further Heat Savings

The fitness suite contains a spa bath which is heated by an electric element. This should be replaced with a plate heat exchanger connected to the main central LTHW heating system. Heating by gas is cheaper and lower in CO2 emissions than electric heating.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
3,119	13,613	25,114		8,500	2.72	71

Hot Water End User Savings

It is recommended that WaterSave shower heads be fitted in all the shower units in the en suite bedrooms and the fitness suite. These have the effect of reducing hot water consumption without loss of water pressure and washing effectiveness. This saves both energy in the heating of the water and the quantity of water used.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
3,228	18,605	92,825	2,201	1,435	0.44	22

Further Hot Water End Use Savings

It is recommended that all hot taps be replaced with aerating spray taps which have the effect of limiting actual water consumption without loss of perceived power. This saves both energy in the heating of the water and the quantity of water used.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
2,422	674		1,533	1,116	0.46	473

Boiler Replacement

It is recommended that the existing boiler be replaced with a condensing combination model of equivalent output. A modern condensing model with an efficiency of 90% (as opposed to the existing 78% efficient model) will produce the same amount of heat for space and water heating but at a reduced energy cost. The payback for this measure is indicated at just 2.85 years and will reduce the CO2 emissions of the building by 42.61 tonnes.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
9,820	42,614	224,282		28,000	2.85	75

Voltage Optimisation

All EU electrical appliances are rated to run at ~ 220 volts. The National Grid supplies at ~240 volts. Reducing the voltage supplied to the building also results in a reduction of current and in turn the energy (measured in kw) consumed. Our recommended suppliers' products also have the effect of flattening out fluctuations in the voltage which can also prolong the life of equipment.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
4,071	17,764	33,080		14,383	3.53	92

Behavioural Changes

Enabling the stand by facility on computer monitors saves the operator switching off the appliance during periods of inactivity such a lunch breaks, and avoids the risk of the staff member forgetting.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
22	89	183		0	Immediate	

Adjusting the set point on the air conditioning unit in the conference suite to give a dead band between the temperature at which the heating turns off and that at which the cooling turns on reduces overall cooling consumption and avoids the risk of simultaneous heating and cooling.

Estimated Annual Savings				Estimated cost (£)	Payback (years)	Cost per tCo2 (£)
(£)	Co2 (kg)	Kwh	M3			
630	2,750	5,121		0	Immediate	

Existing Energy Spend

Existing Operations	Existing Costs			
	(£)	CO2 (kg)	(kWh)	(m3)
Total Electricity Consumption	£63,479	256,441	47,7544	-
Total Gas Consumption	£69,479	342,753	1,803965	-
Total Water Consumption	£8,869	2832		6,437
Total	£141,787	602,026	2,281,508	6,437

Savings Table

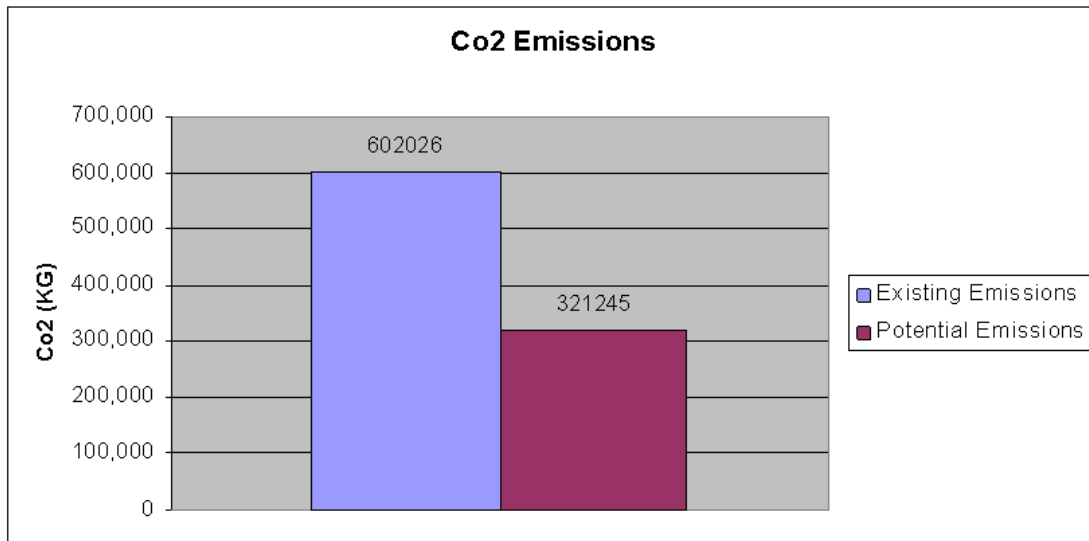
Recommendations and Key Actions	Estimated annual savings				Est. cost (£)	Payback period (years)	Cost per tCO2 (£)
	(£)	CO2 (kg)	(kWh)	(m3)			
Lighting changes	24,475	89,201	166,111		36,102	1.48	86
Reduction in ventilation fan power, heating and cooling costs for swimming pool due to using pool cover	2,016	704	16,380		821	0.41	28
	1,006	4,364	22,967		410	0.41	28
	662	2,314	5,382		270	0.41	28
Building Fabric Loss – Insulate solid walls and loft, double-glaze large window in restaurant area, draught-proof remaining windows	18,977	82,350	433,420		47,310	2.49	23
Insulation – valves, flanges and bends in boiler room	734	3,187	16,771		1,715	2.34	61
Motor controls on fridges & freezers	262	1,143	2,128		360	1.37	90
Enable standby facilities on PCs	22	89	183		0	Immediate	
Other electrical savings – time controls on chilled drink cabinets	322	1,407	2,621		528	1.64	134
Other heat savings – substitution of electric heating on spa bath	3,119	13,613	25,114		8,500	2.72	71
Hot water end use savings – WaterSave shower heads	3,228	18,605	92,825	2,201	1,435	0.44	22
Other water savings – aerators on cold taps	2,422	674		1,533	1,116	0.46	473
Boiler Replacement – upgrade to condensing boiler	9,820	42,614	224,282		28,000	2.85	75
Adjust set point on conference suite chiller	630	2,750	5,121		0	Immediate	
Voltage Optimisation	4,071	17,764	33,080		14,383	3.53	92
Total	71,766	280,781	1,046,386	3,734	140,948	1.96	

Savings Summary

Total savings of £71,766 (50% of original energy spend) were identified based on actual consumption, modelling of selected measures and provision capital cost estimates. The savings identified would improve the building's Operational Rating on a Display Energy Certificate from an F to a C.

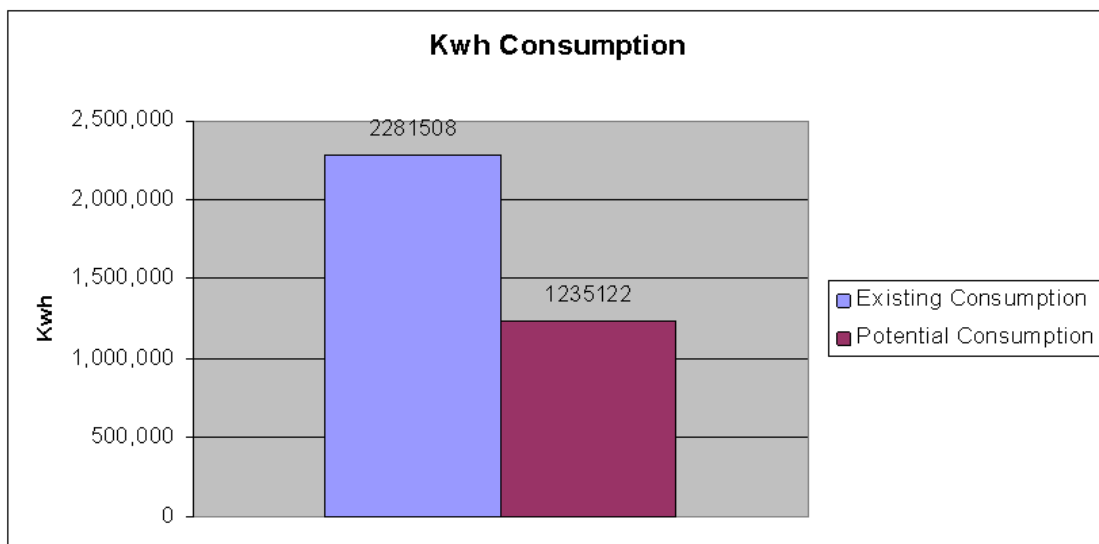
Savings Graphs

Co2



Total saving of 280,781 kg Co2 per annum (53% of existing Co2 emissions)

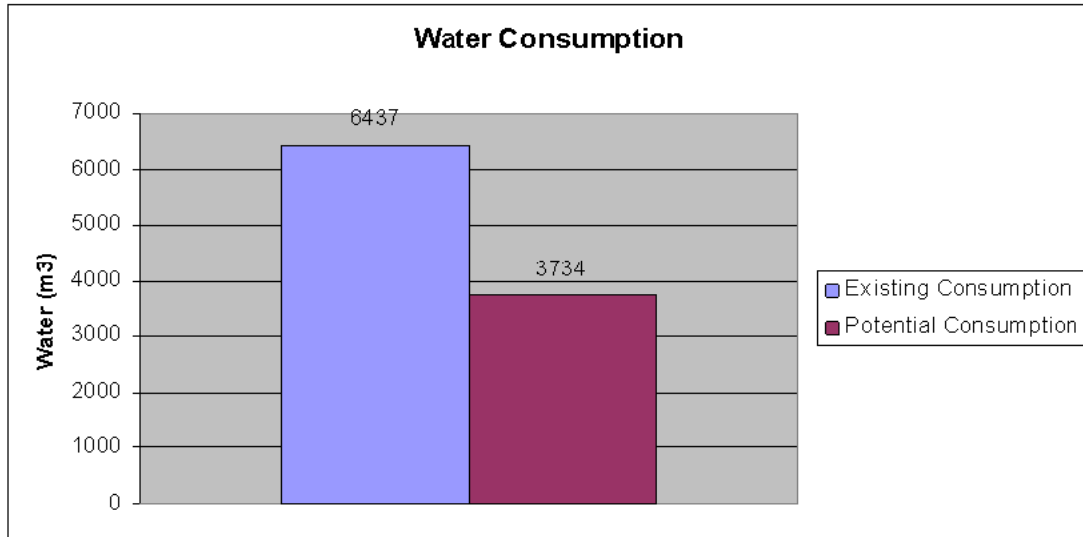
Kwh



Total saving of 1,046,386 Kwh per annum (54% of existing consumption)

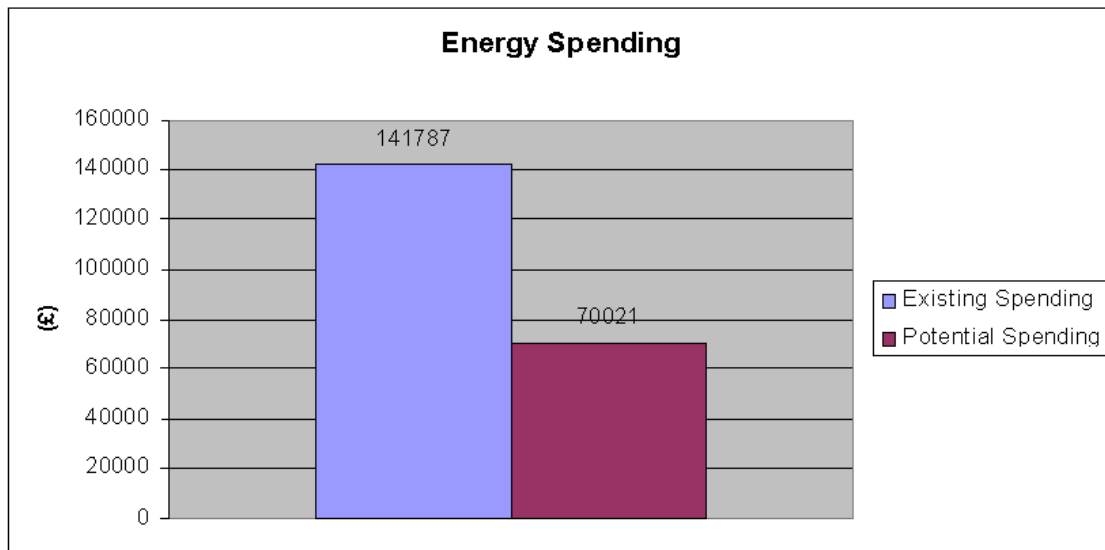
Savings Graphs

Water (m³)



Total saving of 3,734 m³ per annum (58% of existing consumption)

£



Total saving of £71,766 (50% of existing energy spend)

Other measures to think about

Staff Awareness

Of course, you can have the most energy efficient building in the country but it need to be used correctly! Improving staff awareness of energy issues can be a really effective and no cost method of significantly reducing your energy spend. We can provide a short staff training session (at a time convenient to your operation) which will dispel some of the myths around energy matters and enthuse your staff to join in the project. Please ask your assessor for details.

Topics covered may include:

- Correct use of thermostatic radiator valves to improve comfort and save money.
- Energy savings from switching off lights - you can save 15% of lighting costs just by encouraging this practice and no, it doesn't cost more than leaving them on!
- Take control! On cold days turning up the room thermostat doesn't heat the building any quicker. Instead it overshoots and then overheats the area wasting energy. Set the room temperature to 19°—20° should be comfortable if appropriate clothing is being worn.
- Windows. Keep them closed whilst heating is on. If it gets too warm, turn down the thermostats and allow the building to cool slowly.
- Obstructed radiators/ventilation grills. Placing furniture in front of items such as these which are designed to do a job can affect not only the energy use, but also the comfort levels of the area.
- Use of daylight. People feel better working in daylight. Horizontal blinds can be used to direct natural light to the ceiling, reducing glare and helping to prevent overheating on warm days.
- Report it! Let someone know if that light is flickering, or that tap is dripping.

Have a nominated person to deal with energy related issues.

Other measures to think about

Limiting Solar Gain

Solar heat gain is not modelled under the software model. However it was noted that staff on the south facing side of the building made significantly greater use of the air conditioning split systems than those on the north side. This is due to higher solar heat gain which can be a bonus in the winter (if correctly managed) but a cause of higher than necessary cooling bills and temperature spikes in the warmer months. It is possible to fit solar reflective films to the windows to allow light gain, but repel unwanted heat. These clear or tinted films can save up to 15% of comfort cooling costs. We can arrange a quotation on request

Fit a programmable room thermostat

It was noted that an older style room thermostat is in use in the main corridor. Changing this for a programmable model will enable closer matching of the occupancy pattern of the premises thus reducing heating hours and costs. They can be manually overridden if staff are working 'out of hours'. Display key instructions in a prominent place to assist staff with operation.

Set a 'dead band'

Areas which have separate heating and cooling systems are likely culprits for wasting energy. Set a 'dead band' between the point at which heating cuts out and cooling can operate. The recommendation is for heating to switch off at 19° and cooling not to cut in until 24°. If the building has a current heating and cooling set point at 22° on a 5kw system and is changed to the recommended set points of 19° for heating and 24° for cooling the building could achieve total savings of £2000 per annum. This relates to a saving of 39602Kwh and 6.8 tonnes of Co2.

Boiler and Air Conditioning Servicing

It was noted that a good regime is in place for the servicing of the boiler. However the air conditioning units have not been serviced for some time, and there were signs such as blocked filters that these are not operating to design efficiency, replacement filters could save as much as **20% of fan power consumption**. This building has a total cooling output in excess of 12kw so it should be noted that an Air Conditioning Energy Assessment will be required by law before January 4th 2011. We can arrange this on request.

Borrow £3,000 to £100,000 at 0% interest

0% business loans of £3,000 - £100,000 are available from the Carbon Trust to help organisations invest in energy saving projects.

Why a 0% business loan makes business sense:

- You can borrow between £3,000 and £100,000 interest free
- Anticipated energy savings offset the loan repayments. So new equipment should pay for itself and you should continue to make savings year on year
- The loans are government funded and unsecured
- A straightforward and fast application process with no arrangement fees
- You'll receive a conditional offer within 24 hours of your application being processed
- Loans can be repaid over a period of up to 4 years
- You can track the progress of your application online

Your Green Assess Energy Assessor will help guide you through the process

Eligible companies

- Private sector
- Trading for at least 12 months
- For project sites based in England, Wales and Scotland:
- All Small or Medium-sized Enterprises (SME)
- Larger businesses can also apply if they do not qualify for participation in the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme.
- For project sites based in Northern Ireland, any sized enterprise.

The EU definition of an SME is an organisation with:

- An annual turnover not exceeding €50m (approximately £43m) and/or assets not exceeding €43m (approx £37m)
- No controlling interest of more than 25% by a non-SME
- Fewer than 250 full time equivalent employees

The next step—how Green Assess can help you achieve your goals.

Our software is more than just an auditing system. We have carefully selected a whole host of partner organisations with whom we work to cut companies' energy bills. Your Green Assess energy assessor therefore has direct access to specialist companies who can supply all of the identified measures at a competitive price, on time and in a professional and considerate manner. Some smaller measures will be sourced locally whilst larger items are delivered by regional or national companies.

Most are recognised by the Carbon Trust. All are recommended by our software and are constantly monitored by client feedback to ensure a consistently high standard is maintained. Green Assess scours the energy efficiency market, constantly looking for new and innovative products to help our clients cut costs. Your Green Assess energy assessor will contact you if a new product or service comes to the market which it is felt would be of interest to you. Work with an Green Assess partner organisation and you can be sure of the best in energy efficiency supply.

Green Assess partner organisations products include:

- Insulation - cavity, solid wall, loft, flat roof, floor
- Draught Proofing — including a new, innovative secondary glazing system for older style double or single glazed windows
- Lighting - T8:T5 replacement, LEDs, compact fluorescents, occupancy and lux level controls, hi-bay systems
- Boilers and boiler controls - from a small domestic combi through to large modular system
- Voltage Optimisation - from small domestic sizes right through to large industrial premises
- Air Conditioning - from individual cooling split systems through to large VRF and centralised Systems. Also air conditioning service and assessment services
- Renewable Energy Solutions — solar water heating, solar voltaic panels, biomass heating systems, micro and mini CHP, air source and ground source heat pumps, solar daylighting systems
- Advanced monitoring/controls systems — automated meter reading, monitoring and targeting systems, Building Energy Management Systems
Solar Gain Control—window films, light shelves, external and internal solar control systems
- Water Saving—spray motion sensing and percussive taps, showerheads, specialist water auditing and control systems

Contact
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