

Welcome to 'CORE'



CORE is a landmark building, creating a unique environment in which to work and hold meetings.

CORE provides a 'one stop shop' for renewable energy. The building demonstrates sustainable energy technologies. It is a showroom with working examples, metering and comparing their efficiency, cost, carbon saving and outputs.

We hope that you enjoy your visit to CORE and it helps you understand the facts, viability and costs involved with installing sustainable energy.

CORE details include:

- Renewable energy showroom and demonstration areas
- District heating
- Air conditioning from renewables
- Biomass heating
- Woodchip boilers
- Wood pellet boilers
- Solar heating
- Ground source heat pumps
- Air source heat pumps
- Wind turbine electricity
- PV solar electricity
- Rainwater harvesting
- Smart meters
- Energy cost analysis
- Sustainable building, built from local resources

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Building Sustainability



CORE is a commercial building designed to demonstrate how our homes and offices can use renewable energy and which products will be viable both practically and economically.

CORE is also important to show a sustainable building, producing all its energy from renewable and sustainable sources.

CORE's main building materials have all been sourced locally and derived from by-products at the nearby coal fired power station at Cottam, which is only 5 miles away.

CORE is surrounded by our farm which produces renewable fuel for our local district heat main, the local school and the nearby power station. We believe that this closes the perfect sustainability chain in an ideal way. Please see the chart below.

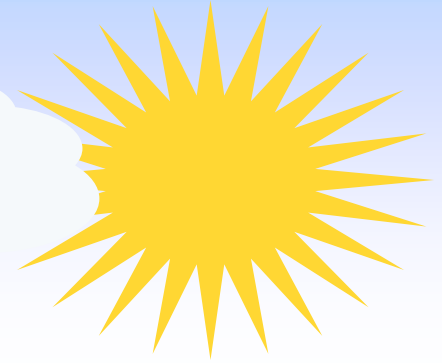
CORE Sustainability details include:

- manufacturing more renewable heat than is used
- manufacturing more renewable electricity than is used
- BREEAM rating of 'very good'
- 80% of the build materials are recycled from COTTAM power station
- All materials and energy features are viable economically
- = Truly sustainable

CENTRE OF RENEWABLE ENERGY- SUSTAINABLE BUILDING MATERIALS



Wood Fuel



Worldwide, biomass is the fourth largest energy resource after coal, oil, and natural gas; estimated at about 14% of global primary energy. Wood fuel is the key element to biomass.

CORE uses the most sustainable source of biomass, locally grown wood fuel that is sourced via 'Strawsons Energy' from the Willow energy crops that surround the CORE building. The fuel is trademarked as- Koolfuel.

Koolfuel is the most efficient and natural source of renewable energy that truly saves on CO2 emissions. 24 tonnes CO2 saved per Hectare per year. The fuel is locally grown to the end market and for every one unit of energy used to grow the crop there are 50 units energy produced.

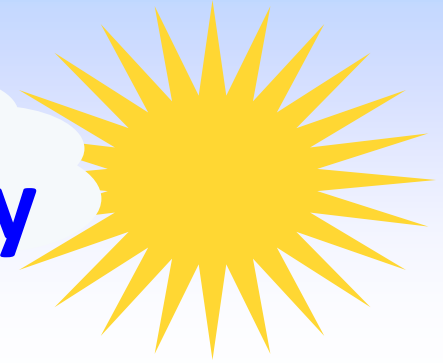
Koolfuel is locally produced and provides large benefits to wildlife and to local biodiversity.

Koolfuel details include:

- 1 Tonne of Koolfuel saves 3.6 Tonnes CO2
- 1 Hectare of Koolfuel saves 54 Tonnes CO2 annually
- 1 Tonne of Koolfuel = 3,888 KWh
- 1 Tonne of Koolfuel = 400 Litre of heating Oil
- 1000 Litre of Heating Oil= 2.5 Tonnes of Koolfuel



Wind Energy



Wind turbines harness wind energy to rotate aerodynamic blades that turn a rotor, which generates electricity. In the UK we have 40% of Europe's total wind energy, this enormous potential is only providing 0.5% of our electricity requirements to date.

Performance depends on selecting the turbine design that is most suited to the site. In the moderate wind speeds prevalent through most of England greatest energy output is achieved from a wider rotor diameter on a taller mast.

Most small wind systems are connected to the national grid, surplus energy is exported and if required additional energy is imported seamlessly. For remote 'off grid' sites, turbine output can be combined with another generator or battery storage using inverter technology to provide an alternative to mains electricity.

Correctly sited wind turbines produce no adverse emissions, can neutralise their own carbon cost in the first year and pay for themselves in less than half of their useful life.

CORE Wind Energy details include:

- Manufacturer- Gaia-Wind
- Capacity- 11KW
- Mast Height- 18.3m
- Rotor Diameter- 13m
- Average wind Speed- 5.4m/sec
- Expected annual output- 25,000MWh
- CORE electric input percentage- 100%

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Solar Energy for Heating



Solar Heat or Solar Thermal systems use heat from the sun. The technology is well developed with a large choice of equipment to suit many applications.

Solar panels or collectors - are fitted to your roof. They collect heat from the sun's radiation. There are 2 main types of collector:

- Flat plate systems - which are comprised of an absorber plate with a transparent cover to collect the sun's heat, or
- Evacuated tube systems - which are comprised of a row of glass tubes that each contain an absorber plate feeding into a manifold which transports the heated fluid.

Also required:

- A heat transfer system - uses the collected heat to heat water;
- Hot water cylinder - stores the hot water that is heated during the day and supplies it for use later.

CORE Solar Energy details include:

- Manufacturer- Hoval
- Capacity- 6KW (6*1KW panels)
- Expected annual output- 7.88 MWh
- CORE heat input percentage- 8%

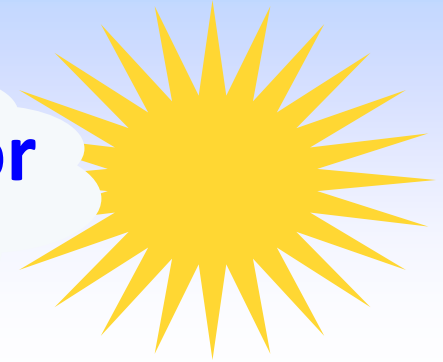
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Solar Energy for Electricity



Solar electric or Photovoltaics (PV) is the application of solar cells for energy by converting sunlight directly into electricity.

The PV cell consists of one or two layers of a semi conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers causing electricity to flow. The greater the intensity of the light, the greater the flow of electricity.

PV cells are referred to in terms of the amount of energy they generate in full sunlight, know as kilowatt peak or kWp.

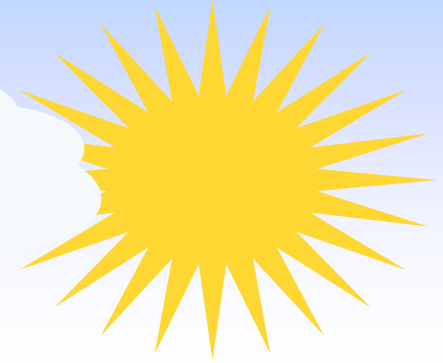
You can use PV systems for a building with a roof or wall that faces within 90 degrees of south, as long as no other buildings or large trees overshadow it. If the roof surface is in shadow for parts of the day, the output of the system decreases.

CORE Solar Electric details include:

- Manufacturer- Schuco
- Capacity- 1.05kWp (6*175KWp panels)
- Expected annual output- 796KWh
- CORE electricity input percentage-8%



Rainwater Harvesting



Rainwater harvesting simply collects the rain which falls onto roofs, then stores it in a tank until required for use. When required, the water is then pumped to the point of use, thus displacing what would otherwise be a demand for mains-water.

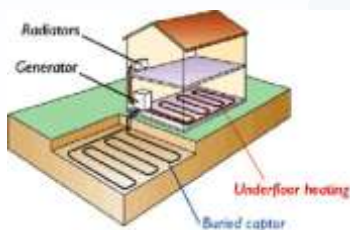
Modern rainwater harvesting systems reduce mains water consumption by around 80% in commercial buildings, or around 50% in the home, by collecting rainwater from the roof and using it for non-potable purposes such as toilet flushing, clothes washing, and the outside tap.

Water demand has started to exceed supply, and localised flooding has become an issue. Industry experts are now recognising the important role that rainwater harvesting (also known as rainwater recycling, and greywater recycling) has to play in alleviating both these problems.

CORE Rainwater Harvesting details include:

- Manufacturer- Freerain
- Capacity- 6,500 Litres
- Expected annual output- 132,000 Litres per annum
- CORE water input percentage- 75%

Ground Source Heating



Ground source heat pumps use a buried ground loop which transfers heat from the ground into a building to provide space heating and, in some cases, to pre-heat domestic hot water. As well as ground source heat pumps, air source and water source heat pumps are also available.

The ground loop is comprised of lengths of pipe buried in the ground, either in a borehole or a horizontal trench. The pipe is usually a closed circuit and is filled with a mixture of water and antifreeze, which is pumped around the pipe absorbing heat from the ground.

A heat pump extracts heat from the ground loop and uses it to heat your home or building.

CORE Ground Source Heating details include:

- Manufacturer– Hoval
- Capacity– 5KW
- Expected annual output– 15MWh
- CORE heat input percentage– 15%

District Heating



District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. The heat is often obtained from a cogeneration plant burning fossil fuels.

Increasingly biomass plants are also used either heat only or combined heat & power (CHP). District heating plants provide higher efficiencies and better pollution control than localized boilers. District heating traces its roots to the hot water-heated baths and greenhouses of the Roman Empire.

The CORE building forms part of Manor Business Park that uses district heating from a central biomass boiler using koolfuel quality wood granules.

CORE District Heating details include:

- 34KW of energy into CORE (potential 100% of demand)
- central boiler is 100 KW
- burning 60 tonnes of koolfuel per annum
- producing 205 MWh/annum of heat
- system includes 382 metres of insulated district heat main pipe.