

# Which Renewable is for you? Our rough guide

Consider the following as a rough guide of technologies that are likely to be most feasible for different types of development. This is not exhaustive and indeed some schemes already exist which don't fit into the following guide.

Of course more detailed investigations will be needed as requirements of clients, technical circumstances and the availability of grants and bulk discounts will be different for each development and technology and these will all affect the decision making process.

An indication of costs have been provided in some cases, but to find out costs for all scenarios see section 4.13 of the *London Renewables' Toolkit for planners, developers and consultants*.

## Central retail block

Central London/town centre



Ground sourced heating can give 10% of energy demand at just over 4% of base build cost.

## Small retail unit

Suburban



Ground source heat pumps can contribute 10% of energy demand at just over 1% of base build cost.

## Prestige office

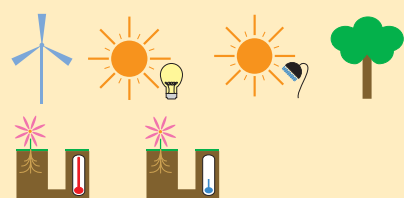
Central London/town centre



PVs can be cost effective especially when replacing expensive cladding: a 1.5% increase in cost providing 10% of energy demand.

## Standard office

Suburban



Additional cost on base build to provide more than 10% of energy demand would be less than 0.5% via wind and 1% via biomass heating.

## Naturally ventilated office

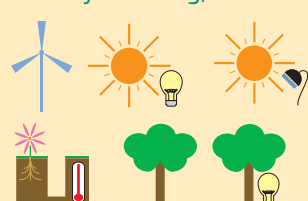
Infill



Lower cost for greater proportion of energy demand met compared to standard office.

## Industry

Factory building, industrial site



## Warehouse and distribution

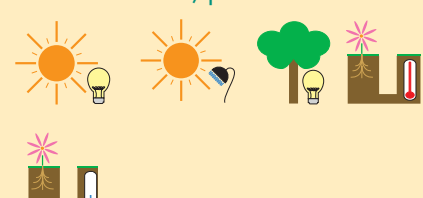
Industrial park



Additional cost on base build to provide 10% or more of energy demand would be less than 1% via wind and 5% via biomass heating.

## Hotel

Central London/prime riverside site



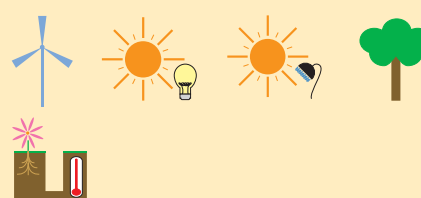
An increase of approximately 1% on base build could provide 10% of energy demand through PV cladding, 5% through solar water heating and 8% through ground sourced heating.

## Care homes and sheltered housing



## Medium density housing

Suburbs



An increase of 1% on base build could provide 15% of energy demand through wind and around 10% through solar water heating. A 3% increase in cost could provide 5% of energy demand through PV, 50% through biomass heating and 15% through GSH.

## Medium density housing

Infill

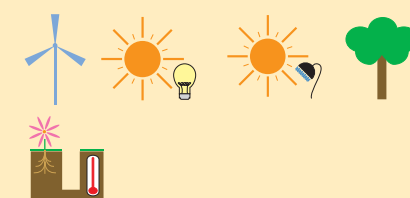


## Residential tower



Solar water heating can provide over 10% of energy demand at less than 1% of base build cost. Biomass heating can provide nearly 50% of energy demand at less than 2% of cost.

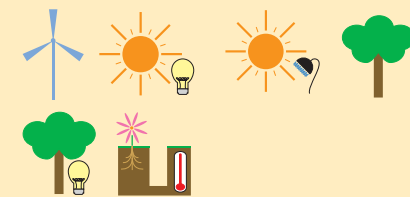
## Schools



Wind can provide 15% of energy demand at 0.4% of base build costs. Ground sourced heating can provide 27% at 3.5% of cost and biomass can provide 35% at 1.3% of cost.

## Sports centre

Suburban



15% of energy demand can be met through solar water heating at 2% of base build cost and through wind at 1% of cost.

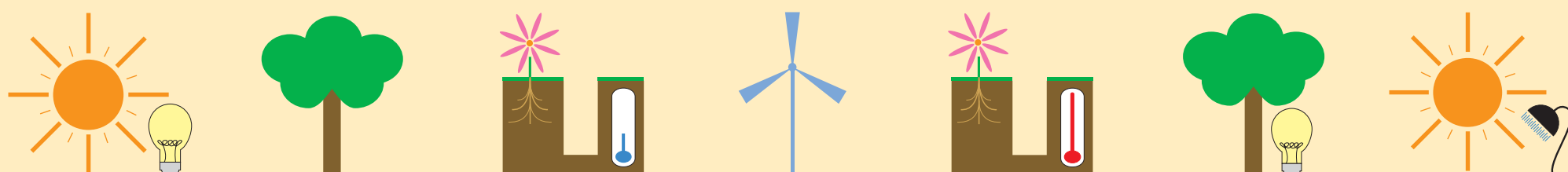
## Note

Technical and financial feasibility will depend on

- Building type
- Specific energy uses e.g. demand for hot water of cooling
- Total energy demand
- Construction costs
- Physical factors, roof space availability, wind speeds, access to grid, access to biofuels
- Use of communal heating can greatly reduce costs.

PV = photovoltaics (solar power)


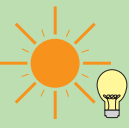



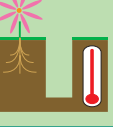
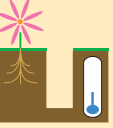
# London's Future is Renewable



[www.london.gov.uk/mayor/environment/energy/london\\_renew.jsp](http://www.london.gov.uk/mayor/environment/energy/london_renew.jsp)

# SUMMARY OF RENEWABLE ENERGY TECHNOLOGIES' CHARACTERISTICS

For full details, refer to the 'London Renewables: Toolkit for planners, developers and consultants', section 3, found on the London Renewables web pages: [www.london.gov.uk/mayor/environment/energy/london\\_renew.jsp](http://www.london.gov.uk/mayor/environment/energy/london_renew.jsp)

	Situations in which technology is best used	Costs and financial incentives (all costs are approximate and exclude grants and discounts available)	Basic technical information	Technical and planning issues
 <p><b>Wind turbines</b></p>	<p>Modern, quiet wind turbines are becoming viable in suburban areas, where they may be cost effective despite lower wind speeds than in open areas.</p>	<p>Cost: £2,500 to £5,000 per kW<sup>ii</sup> installed. GRANTS: <i>Clear Skies</i></p>	<p>The blades drive a generator to produce electricity. The electricity can either link to the grid or charge batteries. An inverter is required to convert the electricity from direct current to alternating current for feeding into the grid.</p> <p>Schemes range from individual turbines or small clusters to large wind farms.</p> <p>Turbines are available with outputs ranging from 600W to 2MW and are able to power the equivalent of up to 1,200 homes. The main factor affecting output of a particular turbine is the wind speed.</p> <p>Small building-mounted turbines are becoming more widely available.</p>	<ul style="list-style-type: none"> <li>• Wind speed monitoring needed.</li> <li>• Potential impact of noise from turbine blades and components, particularly on housing and schools, should be considered, taking into account background noise.</li> <li>• Buildings and other obstructions can cause turbulence and decrease efficiency.</li> <li>• Potential visual impact and impact on local ecology should be assessed.</li> <li>• Developers should take account of any landscape designates/Conservation Areas.</li> <li>• Planning permission required for each turbine (consultation with interest groups and residents can assist this).</li> </ul>
 <p><b>Solar power (PV)</b></p>	<p>Particularly suited to sites that use electricity during the day - offices, retail and schools.</p> <p>In the UK, even flat roofs receive 90% of the energy of an optimum system.</p>	<p>Cost: £5,000 to £8,000/kWp<sup>iii</sup> for a roof mounted system, £10,000 to £15,000/kWp for façade/atrium systems. Discounts as high as 20% may be available for bulk purchases. GRANTS: <i>Solar Grants</i></p>	<p>A solar power system consists of a set of interconnected photovoltaic modules, plus:</p> <ul style="list-style-type: none"> <li>• For off-grid applications: a control, storage (eg battery), cables and a load (eg lights, television).</li> <li>• For grid-connected applications: an inverter to convert the direct current, generated by the PV-modules, into alternating current.</li> </ul> <p>A 1kWp system in London could produce 850 kWh/yr of electricity.</p>	<ul style="list-style-type: none"> <li>• Systems should ideally face between south-east and south-west to maximise the amount of light on the photovoltaics.</li> <li>• Unshaded at all times of day if possible.</li> <li>• Consider loading capacity of the roof.</li> <li>• Ensure the building's metering system allows export of energy if needed.</li> <li>• Birds may need to be discouraged from perching near the systems.</li> <li>• There are no licensing requirements relating to PV systems, but consent must be obtained from the Distribution Network Operator.</li> </ul>
 <p><b>Solar heating</b></p>	<p>Particularly suited to sites which require hot water, particularly during the day - housing, leisure centres or retail units and offices with canteens, washrooms and showers.</p>	<p>Cost: Household system (4m<sup>2</sup>) costs from £2,500 -£4,000 Discounts will be available for bulk purchases. GRANTS: <i>Clear Skies, EEC, ECAs, Action Energy Loans</i></p>	<p>Systems comprise solar collectors (tubes or hot plates), a heat transfer system (a fluid in pipes) and a hot water store (eg domestic hot water cylinder).</p> <p>A 4m<sup>2</sup> collection area will provide between 50% and 70% of a typical home's hot water. Drawing water off during the day and using less hot water, for example with showers instead of baths, increases this percentage.</p> <p>Systems savings average at around:</p> <ul style="list-style-type: none"> <li>• 454kWh/year saving per m<sup>2</sup> of flat plate collector, or</li> <li>• 582 kWh/yr per m<sup>2</sup> for an evacuated tube system.</li> </ul>	<p>Systems should:</p> <ul style="list-style-type: none"> <li>• Ideally face between south-east and south-west to maximise the amount of light on the tubes or panels.</li> <li>• Be unshaded at all times of day if possible.</li> </ul>
 <p><b>Biomass heating</b></p>	<p>Any site requiring heat.</p> <p>Most applicable to some less dense suburban areas due to fuel supply and storage issues.</p>	<p>Costs; from £2,000 for a house to £30,000 to supply 33% of the heating for a standard office of 3,000m<sup>2</sup>. GRANTS: <i>Clear Skies, ECAs'</i></p>	<p><i>Domestic applications:</i></p> <ul style="list-style-type: none"> <li>• Single room heaters or stoves.</li> <li>• Boilers that replace traditional gas or oil boilers.</li> </ul> <p><i>Non-domestic applications:</i></p> <ul style="list-style-type: none"> <li>• Biomass boilers that replace traditional fossil fuel boilers, often as one or more boilers in a sequenced (multi-boiler) system.</li> </ul> <p>Biomass boilers are available in most size ranges and with automatic feeders.</p> <p>Fuel cost likely to be comparable to other fuels.</p>	<ul style="list-style-type: none"> <li>• Consider early in the design process so that fuel storage/delivery facilities can be factored in.</li> <li>• Arrangements for ash disposal and de-coking must be made.</li> <li>• Consider fuel sourcing and delivery arrangements.</li> <li>• Accommodate space requirements (domestic boilers are generally larger than conventional boilers).</li> </ul>
 <p><b>Biomass combined heat and power (CHP)</b></p>	<p>Theoretically suitable in any situation where conventional CHP is viable, such as hotels, hospitals, leisure centres and some industrial premises.</p> <p>More appropriate to less dense areas due to fuel supply and storage requirements.</p>	<p>Cost: individual quotes required GRANTS: <i>Community Energy Programme</i></p>	<p>Typically, CHP achieves a 35% reduction in primary energy usage compared with power stations and heat only boilers.</p> <p>There are no inherent limitations on the range of sizes of biomass CHP, though at present, only large communal systems are available.</p>	<ul style="list-style-type: none"> <li>• Consultation with local interest groups and residents may be required to get planning permission approved by the council.</li> <li>• Combustion gases will require an external flue usually terminating above the ridge-line of the building.</li> <li>• See biomass heating for other technical issues.</li> </ul>
 <p><b>Ground sourced heating</b></p>	<p>All sizes of building where heating is required. Access to suitable ground is necessary.</p>	<p>Cost: £2,500 for a house to £50,000 to supply 50% of the heating demand of a 3,000m<sup>2</sup> office building. GRANTS: <i>Clear Skies, EEC, ECAs</i></p>	<p>Water (or another fluid) is circulated through pipes buried in the ground or is extracted from the ground (borehole). A heat exchanger extracts the heat from this fluid. A heat pump raises the temperature of the second fluid via the compression cycle (also used in refrigerators) to supply hot water to the building.</p> <p>Most suitable with lower temperature heating systems such as underfloor heating and medium temperature radiators.</p>	<p>Technical feasibility depends on:</p> <ul style="list-style-type: none"> <li>• Access for the ground pipe system.</li> <li>• An area for a horizontal system or access to drill for vertical pipes. (For a single house, a horizontal system would require garden area of at least 100m<sup>2</sup>. A license may be required to drill vertical systems.)</li> <li>• Ground conditions will affect ease of construction and system performance.</li> </ul>
 <p><b>Ground sourced cooling</b></p>	<p>All cases where there is access to suitable ground and cooling is required, as with offices, shops and hotels.</p>	<p>Cost: £50,000 for 50% of the cooling load of a 2,000m<sup>2</sup> floor space of retail development, to £90,000 for 50% of the cooling of a 3,000m<sup>2</sup> prestige office.</p>	<p>This uses the same technology as ground sourced heating. The temperature of the ground remains fairly constant and well below peak temperatures in the summer.</p>	<ul style="list-style-type: none"> <li>• Technical feasibility depends on ground conditions (solid rock is unsuitable).</li> <li>• Permission is likely to be required for ground drilling or bore hole use.</li> </ul>

i ECAs - Enhanced Capital Allowances. ii EEC - Energy Efficiency Commitment. iii kW<sup>e</sup> - kilowatt of electrical power. iv kWp - kilowatt peak (peak output of a system.)  
Details of grants are available from the London Renewables web pages. Information has only been provided on grants available to London.