

Low Carbon and Renewable Technologies Summary

Technology	Energy Conversion & Utilisation	Key requirements for optimising viability	Key aspects which could affect implementation
Photovoltaics	<ul style="list-style-type: none"> Daylight to electrical energy Generates electrical power for utilisation within the building 	<ul style="list-style-type: none"> Unshaded access to daylight for PV panel location Southern orientation for PV panel 30° - 45° elevation of tilt for PV panel 	<ul style="list-style-type: none"> Suitability of roof structures to mount PV panel arrays Buildings may not have unshaded southerly access to daylight
Wind Turbine	<ul style="list-style-type: none"> Wind to electrical energy Generates electrical power for utilisation within the building 	<ul style="list-style-type: none"> Unsheltered location for wind power location Suitable wind speeds Suitable electrical load that wind turbine will feed in to Suitable site away from housing and relatively close to a suitable connection point 	<ul style="list-style-type: none"> Suitable external areas to mount micro wind turbines or suitable land space to install a free standing turbine Proximity to housing may impact on planning viability A large number of stakeholders require consultation, which may affect the viability of a wind turbine installation
Solar Thermal	<ul style="list-style-type: none"> Solar radiation to thermal (heat) energy Enables heating for domestic hot water systems Can generate up to 60% of hot water requirements in the summer and as a pre-heat in other seasons 	<ul style="list-style-type: none"> Unshaded access to the daylight for solar thermal collector location Southern orientation for solar thermal collector 30° - 45° elevation of tilt for solar thermal collector Suitable hot water demand and storage 	<ul style="list-style-type: none"> Suitability of roof structures to mount solar thermal collectors Central provision for hot water production and storage required (not individual localised heaters) Low demand for hot water will affect the overall performance of a solar thermal system
Biomass	<ul style="list-style-type: none"> Organic vegetable matter (tree wood/crops/waste) combustion converted to thermal (heat) energy Enables heat generation for utilisation in buildings 	<ul style="list-style-type: none"> Access to sufficient, reliable local resource of renewable fuel (i.e. wood chip or pellets) Financially more viable if replacing fossil fuels as primary fuel source 	<ul style="list-style-type: none"> Suitable location for bio fuel boiler location Suitable location for fuel storage and delivery Distance of nearest supply too great Risk of fire minimised through external storage Urban locations influence potential planning restrictions (boiler flue discharge position)
Heat Pumps (Ground Source) (Water Source) (Air Source)	<ul style="list-style-type: none"> Natural source heat sink conversion to higher grade heat or cooler via electric heat pump Enables increased efficiency in operation of mechanical heating and cooling systems (heat pump) 	<ul style="list-style-type: none"> Geotechnical/ water course survey required to establish local suitability of site More suitable for a new build scheme Requirement for summer cooling from the system can improve financial viability For ground and water source a suitable area is required for the laying of a 'loop' system Can be open or closed loop for ground / water source 	<ul style="list-style-type: none"> Existing sites may not be in suitable locations to access most optimum groundwater aquifers Space for closed loop exchangers may be limited and therefore not cost effective or feasible to use boreholes Ground and water source heat is an extremely site specific technology and cannot be easily utilised Electricity is required to power the heat pump so it is therefore at risk from increasing electricity prices, which will in turn affect savings
Micro CHP	<ul style="list-style-type: none"> Utilisation of waste heat from simultaneous electrical power generation at point of use Enables localised production of heat and power – with savings in CO2 emissions from use of waste heat 	<ul style="list-style-type: none"> Year-round requirement for heat utilisation 	<ul style="list-style-type: none"> Suitable location for CHP unit adjacent to existing boiler plant Domestic hot water services to be served from space heating boilers if possible to maximise year round heat demand Primary fuel source is gas, so CHP could be at risk of gas supply issues or price increases
Rainwater Harvesting	<ul style="list-style-type: none"> Utilisation of rainwater from surface run-off from roofs for non-drinking purposes (e.g. flushing WC's) Reduces mains water utilisation, saving in CO2 emissions from mains water treatment process 	<ul style="list-style-type: none"> Significant utilisation of non-portable water required Suitable location for storage tank required (often underground) Most suitable for a new build scenario 	<ul style="list-style-type: none"> Suitable location for storage tank may be difficult to achieve without incurring major cost associated with burying tanks and re-instating existing ground cover finishes Alterations to below ground surface water drainage may be necessary