Feeling pumped

Renewable energy is good for the environment and can lead to lucrative government grants – but even without them there is still a strong case to switch to, for example, heat pumps, as they can reduce your energy bills by a third. **Richard Walkden** reports

How might a responsible club manager view renewable technology as part of the future planning of a golf club? The energy cost of space heating and hot water is continuously rising and requires increasing scrutiny. Addressing heat losses through better energy management and improved insulation is imperative, but then what?

The answer might well lie in looking at renewable technologies and management might well look at alternative heat sources including heat pumps, solar thermal panels and biomass boilers. Government incentives warrant every club official to seriously consider both the losses and benefits of renewables. Capital outlay and investment returns can be attractive given the right solution / design and there are currently numbers of clubs where members are considering alternative solutions.

As a heat pump system designer and installer, my focus is on the benefits of this technology and I will, firstly, explain the heat pump concept.

A heat pump collects energy from ground / water / air and via a reversed refrigeration process delivers heat into a building. The benefit is that the energy used in this process is significantly less than the energy captured and delivered, warranting an economic argument for heat pump technology. Heat pumps are robust and proven heating systems used in Europe for decades.

Versatility of design means you don't have to dig up your first fairway to lay collector pipes. Different heat collectors offer different solutions addressing the requirements of most clubs from an air source heat pump heating kitchen hot water to a ground / water source heat pump collecting energy from the pond to heat the entire clubhouse, generate the hot water and provide chiller room cooling. The constraints on the application of heat pumps can be overcome by addressing poorly insulated buildings, inadequate power supply and outdated radiators with improved insulation, soft start heat pump technology and low temperature replacement radiators.

So what's in it for the club? Typically, a rural golf club will be running its heating system on a combustion propane or oil boiler, heating the hot water and space heating. Assuming the boiler is regularly serviced and is operating efficiently, one might generously give the system an efficiency rating of 80 to 85 percent, meaning that of the energy put in, 80 to 85 percent is being transferred into useable heat. As often as not, the performance of combustion systems is significantly less, but for the sake of comparison, 80 to 85 percent will do. A heat pump, by comparison, will convert the electrical energy used to power the refrigeration and pumping process into 350 percent plus, depending on design. When comparing apples with apples your kilowatt (kW) of bottled gas or oil is costing you roughly a third more than your heat pump would and if you are spending the average spend on heating a golf club then that might pay for itself in five to six years – even before taking into account government grants.

Different technologies attract different rates but the government has a mechanism paying 4.8p/kWh for metered commercial applications of ground source heat pumps under 100kW. Most golf clubs have a heating system under 100kW and generate 50,000-60,000kW a year. This is payable over 20 years and stands to generate a stream of income which may equate to the heating fuel bill.

What's the catch? Probably the single greatest obstacle is capital outlay and in my experience most golf clubs are not

in a position to splash out on insulation and a then a new heating system. Our recent experience suggests that clubs in the know are going to members for a debenture and repaying the loan with interest over the subsequent years of low cost heating or borrowing at the current low interest rates.

Other problems are around expectations. Heat pumps by their nature do not generate wasteful high temperature combustion level heating but produce a lower temperature heat for longer. Members will by their nature complain about the heating not being on when failing to get scorched by the radiator in the lobby as they arrive in from a soggy round of golf. So education is all important in addressing expectations. Members need to know why things are changing and how the system works. Gathering support from the members is essential in driving through change. If the objective is to heat the room to a high temperature then the heat pump is your answer as continuous gentle heat to a well insulated building is by far the better and more economical solution. Providing a digital screen room thermostat substantiating room temperatures is a useful tool in convincing members of the value of the system.

The disruption of installing new equipment into existing buildings, replacing heating pipework and radiators and trenching the practice ground are problems associated with any changes. But the exercise is worth it in the end as tank-fulls of hot water are being generated at a fraction of the cost of a combustion system and earning the club money in the process.

For club mangers interested in the idea the first stage might be to invite experienced and reputable microgeneration certificated scheme (MCS) accredited installers to look over your building and calculate the heat losses and hot water consumption. This is comparable to looking over a car chassis, asking what top speed the driver wants and recommending an engine size. This exercise will provide an indicative cost versus benefit and a budget quotation.

Invite detailed quotations and request presentations on the virtues of different propositions. The car analogy here is which engine type and transmission, petrol / diesel / fuel injection / turbo / six gears and so on. The balancing act is choosing the right installer and the balance of cost versus benefit in the design. Meeting the Renewable Heat Incentive (RHI) requirements is a must. Lower temperature space heating systems are more efficient but may require significant pipework changes. De-superheaters make hotter water but cost more to install. Cooling is an option for clubhouses where solar gain is a problem.

Conclude your process by selecting the design to best serve your needs and be assured of a system which will serve you well for a long time.

GCM

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Heat pumps case study: Energy savings of more than £2,000 per year

When property developer, Sir Mark Wrightson, planned the transformation of dilapidated farm buildings into luxury residential accommodation in Darlington, environmental and financial concerns were an important priority. Keen to keep the luxury property's carbon footprint low, Wrightson sought an efficient alternative heating system to oil.

Viessmann installation partner, Parsec Consulting Engineers, designed and installed a heat pump system, with electrical heater support on demand. The system generates a total energy saving of 17,345 kWh per year (75 percent less than a comparative oil system) and estimated annual savings of £980.

Parsec Consulting Engineers specified and installed a heat pump system to provide the property with heating and hot water. Available space surrounding the barns was limited, so project manager Shaun Ackerley carried out detailed calculations to ensure the heat pump's collectors would be large enough to draw sufficient heat from the ground, whilst avoiding obstacles such as external drains and foundations. This careful loop field arrangement avoided the need to access the heat source via the borehole method.

A Vitocal 242-G heat pump supplies warm water to under-floor heating systems throughout the property, whilst a Vitocell 220-litre buffer cylinder stores hot water for when it's needed. A Viessmann inline electrical heater supports the heat pump when outdoor temperatures are especially low.

As part of fitting the heating equipment, Parsec Consulting Engineers installed a Vitotrol 200 system control to manage and integrate each element of the system. The controls are fully integrated into the heat pump unit, and govern when support from the electric heater is required. The customer can be sure there is always sufficient heat energy available, whatever the weather.

The heating system is now harvesting 23,127 kWh of free energy from the ground every year. Compared to an oil-fired boiler, the installed system is using 75 percent less energy to run, the equivalent of £980 per year. Support from the domestic Renewable Heat Incentive is expected to provide an additional £1,200 per year, which would see the installation costs recouped within seven years.