GC-ITH HEAT BATTERY

Green Cooling provide a bespoke equipment package which enables the recovery of FREE waste heat from refrigeration systems by using well proven methods coupled with the innovative use of thermal transfer & energy storage technology.

- 24 hour/365 day FREE ENERGY
- NEW installation or RETROFIT
- Complete DESIGN & SPECIFICATION service
- Free SITE SURVEY
- 500 to 5,000 litres ENERGY STORAGE
- 3kw to 3,000kW CAPACITY
- REDUCE CARBON
- REDUCE ENERGY COSTS

The GC-ITH Heat Battery enables the highest level of return on investment to be gained by matching the available waste heat capacity that can be recovered from the application with the required level of heating or hot water energy that is actually needed on site.

This coordinated approach is coupled with a practical and flexible means of installation that allows complete compatibility and integration with other heat sources on site either on a new installation or retrofit basis.

Unlike other heat recovery equipment that usually provides a standard range of equipment sizes with a “one size fits all” approach, the GC-ITH Heat Battery utilises a bespoke format that is geared to providing the highest level of both value and performance in order to match the profile of use on each particular site.

Behind the GC-ITH Heat Battery system is the understanding that each application will vary and will call for different levels of heat transfer and different amounts of stored energy to meet a peak hot water demand.

Hence the flexible design of the GC-ITH Heat Battery system acknowledges that the level of hot water required on one site may be different to the next, for example this could be due to the specification of dishwasher within a kitchen or the economies of other heat sources that may already be on site.

Therefore with this in mind any heat recovery system that is proposed must meet the specific demands of each particular application and this is why the Green Cooling application team provide a design and specification support service in order that the correct system be specified to provide the highest level of return.

Experienced thermal design engineers will assess demand for heating and/or hot water with the objective of then designing a method of integration that takes maximum benefit of the available FREE recovered refrigeration energy whilst at the same time focusing on the reliability of the overall thermal system in terms of ensuring that the provision of services is enhanced by the addition of the GC-ITH Heat Battery heat recovery system.

What is refrigeration based heat recovery….

WHY?

Basically high value waste heat is rejected from a cooling system within a building or process and at the same time a boiler could be operating in the same building to provide heating or hot water; hence the production of energy is duplicated at very high cost.

Historically the specification of heating and hot water systems has been treated as a completely separate area to the specification of air-conditioning or refrigeration equipment.

WHEN?

However we are now entering an era where this duplication of plant in terms of refrigeration equipment and boilers is becoming extremely visible and is viewed as being unacceptable due to increasing energy costs and equally important carbon reduction targets.

As a result of increasing awareness and the need to reduce energy costs and also reduce carbon emissions Green Cooling have developed their Integrated Thermal Hub with the objective of providing bespoke heat recovery packages on a new installation or retrofit basis to counter the duplication of existing heating and cooling systems.

HOW?

The GC-ITH Heat Battery captures waste heat from a refrigeration system and transfers this FREE energy into the heating or potable hot water system within the building in order that the use of other fuels can be removed or minimised.

RESULT

The outcome is that immediate reductions in energy costs and carbon emissions can be achieved and will continue to be achieved with minimal maintenance and intervention over future years.

For more information call: 01253 685145 **email:** sales@greencooling.co.uk **visit:** www.greencooling.co.uk

Typical application

The savings that can be achieved by installing the GC-ITH Heat Battery result from displacing other fuel sources i.e. if 250kW of heat energy is available from a refrigeration system, then 250kW of heat energy does not need to be provided from other fuel sources.

The following typical application example illustrates the potential savings that can be made by utilising the GC Heat Battery.

Medium sized restaurant

As an example if we were to look at a typical medium sized restaurant, the potential cost and carbon savings of utilising the GC Heat Battery become clear.

The three scenarios shown below use different fuel types as follows:

1. Mains Gas **2. Direct Electric** **3. GC-ITH Heat Battery**

Scenario 3 utilises refrigeration-generated (recovered) heat, which is stored and distributed by the GC-ITH Heat Battery, which enables this free heat energy to be efficiently, and reliably used.

1. GAS Currently using gas

A. Potable hot water production

An application requires 150kWh of pre heat energy* for hot water production per day but at two distinct times, 45kWh between 09.00 and 11.00 and 105kWh between 18.00 and 21.00.

This hot water production is currently generated by on demand gas boilers at a cost of £2,254 per year at a gas tariff of 3.5p/kWh and an 85% efficient boiler/heater.

B. Space heating

Within the same application there is a heating requirement of 10KW per hour to supply a door curtain for an average of 6 hours per day/year.

This door curtain supply requirement is currently provided by gas at a cost of £901 per year with the tariff and efficiency shown above.

Total site requirement

The total daily site requirement is therefore 150kWh for potable hot water and 60kWh to supply the over door curtain at a total cost of £3,155 per anum.

2. DIRECT ELECTRIC Currently using electricity

A. Potable hot water production.

The same application requires 150kWh of pre heat energy* for hot water production per day but at two distinct times, 45kWh between 09.00 and 11.00 and 105kWh between 18.00 and 21.00.

This hot water production is currently generated by on demand gas boilers at a cost of £2,254 per year at a gas tariff of 3.5p/kWh and an 85% efficient boiler/heater.

B. Space heating

Within the same application there is a heating requirement of 10KW per hour to supply a door curtain for an average of 6 hours per day/year.

This door curtain supply requirement is currently provided by electricity at a cost of £2,676 per year with the tariff and efficiency shown above.

Total site requirement

The total daily site requirement is therefore 150kWh for potable hot water and 60kWh to supply the over door curtain at a total cost of £9,367 per anum.

3. REFRIGERATION HEAT Using the GC-ITH Heat Battery

A. Potable hot water production.

As above the same application requires 150kWh of pre heat energy* for hot water production per day but at two distinct times, 45kWh between 09.00 and 11.00 and 105kWh between 18.00 and 21.00.

This hot water production is currently generated by on demand gas boilers at a cost of £2,254 per year at a gas tariff of 3.5p/kWh and an 85% efficient boiler/heater.

B. Space heating

Within the same application there is a heating requirement of 10KW per hour to supply a door curtain for an average of 6 hours per day/year.

However on the same site there is a refrigeration system producing an average 8.75kW of thermal energy per hour that is normally rejected to atmosphere, and as such any use will be virtually free of cost and will be extremely low carbon.

Therefore if an integrated heat recovery system is installed to accumulate and distribute the required 210kWh of thermal energy per day by utilising the refrigeration systems waste thermal energy we see the following achievable savings.

COST SAVING		CARBON SAVING	
Gas	£3,155 per year	Gas	16,682 kg CO2 per year (0.185 kg/kWh)
Electricity	£9,367 per year	Electricity	45,138 kg CO2 per year (0.530 kg/kWh)

CONCLUSION:

This example is based on efficiently utilising 210kWh of refrigeration generated heat energy per day via the GC-ITH Heat Battery.

Clearly if a system were rejecting larger amounts of energy the associated cost and carbon savings would be significant.

Basically if a user were to be recovering & using ten times the amount of energy used in this example, then the savings would be ten times the figures shown above in terms of both cost and carbon, as an application of this type is completely scalable.

The approximate payback on this illustrative example shown would be as follows:

✓ Payback on capital employed **DISPLACING GAS...3.5 YEARS**

✓ Payback on capital employed **DISPLACING ELECTRIC...1.2 YEARS**

SUMMARY:

It is important to note that without the integration and storage benefits of the GC-ITH Heat Battery it would not be possible to achieve these significantly attractive results from the use of recovered refrigeration heat.

This is because the 24 hour production profile of the refrigeration generated heat will not match the usage profile of the application.

This is why the GC-ITH Heat Battery represents a major step forward in allowing waste energy from refrigeration to be efficiently and cost effectively utilised with the associated cost and carbon savings that we see in this example.

In doing so we can now treat the refrigeration generated heat as a primary heat source and incorporate this free energy reliably within the building.

*This illustration requires 150kWh per day of heating capacity to provided 75% of total hot water production i.e. heating mains potable water from 10°C to 47.5°C with a secondary heat source taking water from 47.5°C to 60°C. Therefore the total increase in temperature of the potable hot water is 10°C to 60°C, hence the GC Heat Battery will displace 75% of the total energy required by providing free energy to heat from 10°C to 47.5°C.