

# **deltamech**

THE CARBON REDUCTION SPECIALISTS

**CASE STUDY REPORT**

**FOR**

**DK HEAT RECOVERY INSTALLATION**

**AT**

**BURY BLACK PUDDING COMPANY**

**October 2014**

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## 1.0 EXECUTIVE SUMMARY

This report has been commissioned by DK Heat Recovery to provide independent calculation of energy and cost savings at an installation at The Bury Black Pudding Company.

The calculations are based on hot water consumption data and refrigeration running patterns provided by The Bury Black Pudding Company.

The results are based on observations made by The Bury Black Pudding Company regarding the output temperature from the heat recovery system at the start of business each morning, and during the working day.

The following has been concluded:

Annual Hot water Provision by Heat Recovery System	3,042m <sup>3</sup>
Annual saving in Oil	20,280 litres
Annual CO <sub>2</sub> Saving	58tCO <sub>2</sub>
Annual Cost Saving	£10,185 (at 50p/litre)

## 2.0 INTRODUCTION

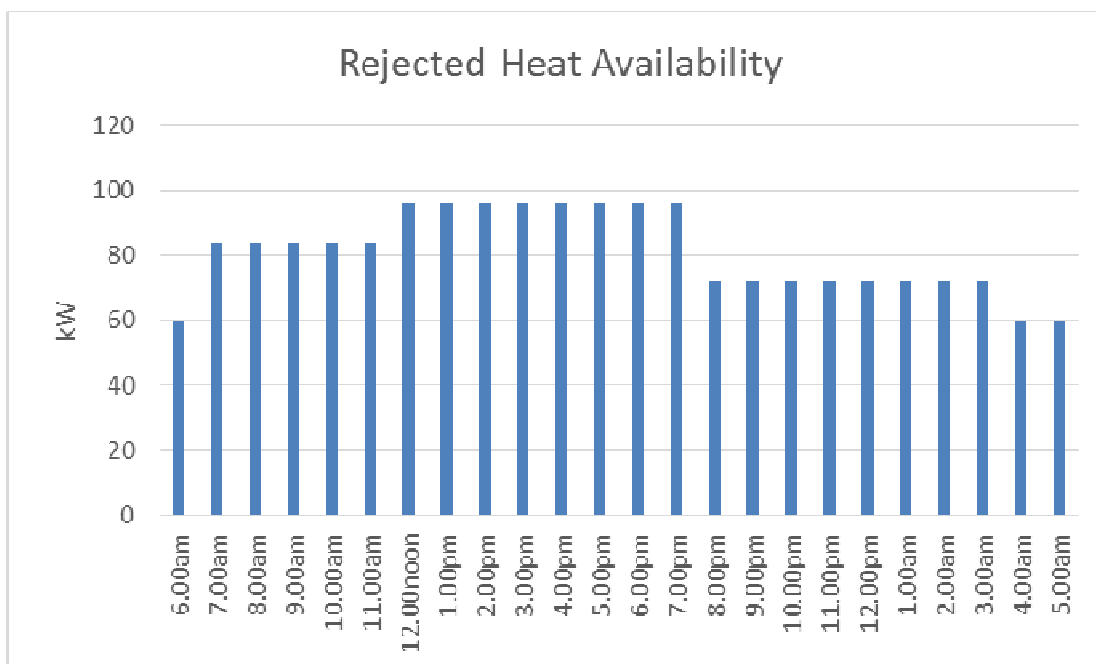
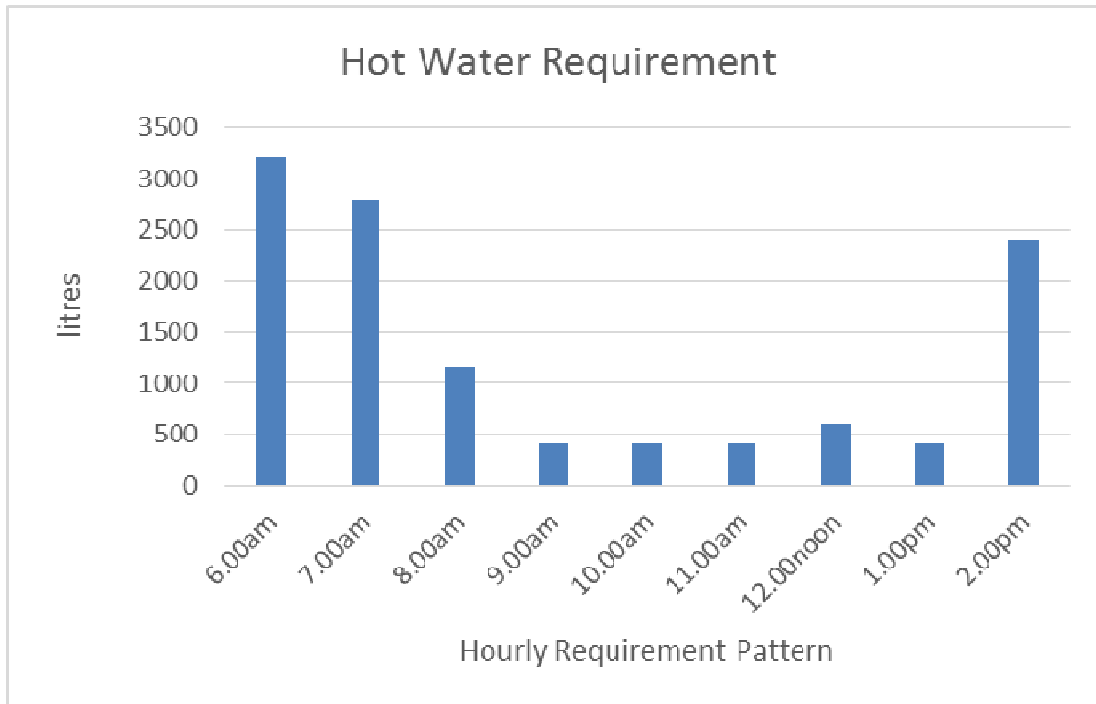
The DK Heat Recovery System utilizes the heat energy rejected by refrigeration systems to heat water. This rejected heat energy is usually lost to atmosphere.

The heat recovery system fitted at the Bury Black Pudding Company utilizes multiple heat exchange units to recover heat from a number of refrigeration systems.

### 3.0 WATER CONSUMPTION AND REFRIGERATION ANALYSIS

The Bury Black Pudding Company provided an hourly breakdown of hot water requirements, plus and hourly breakdown of the refrigeration duty of the various refrigeration systems.

The data provided was used to compile the following charts:



It can be seen that there is a high requirement for hot water first thing in the morning, however; the heat energy rejected from the refrigeration systems peaks from midday onwards.

The solution was to fit a 5,000 litre buffer tank to accumulate hot water generated overnight, so that this would be ready first thing in the morning.

It has been reported by The Bury Black Pudding Company that the water temperature first thing in the morning reaches 70°C.

Once the initial high consumption of hot water has been passed, the water temperature reaches 50°C for the rest of the day.

#### 4.0 CALCULATIONS

The data provided by The Bury Black Pudding Company in terms of quantity of water consumed, and temperatures reached has been used for the following calculations:

Energy to heat water		4.2	kJ/litre/degC
Daily Total of Hot Water Consumed		11,770	litres/day
Water heated at night to 70oC		5,000	litres/day
Heat rise		60	deg C
Energy per day		1,260,000	kJ/day
Water heated during day to 50oC		6,770	litres/day
Heat rise		40	deg C
Energy per day		1,137,360	kJ/day
Total Energy per day		2,397,360	kJ/day
1 kWh =		3,600	kJ
Therefore energy =		666	kWh/day
Energy from fuel oil		10	kWh/litre
Oil consumption		67	litre/day
Boiler efficiency		85%	
Actual oil consumed		78.3	litre/day
Cost at		50	p/litre
Cost at		£39	per day
	=	£196	per week
	=	£10,185	per year

## 5.0 CONCLUSIONS

Annual Hot water Provision by Heat Recovery System	3,042m <sup>3</sup>
Annual saving in Oil	20,280 litres
Annual CO <sub>2</sub> Saving	58tCO <sub>2</sub>
Annual Cost Saving	£10,185 (at 50p/litre)

## APPENDIX 1 – SUPPORTING DATA

Data Provided By The Bury Black Pudding Company

Time	Litres Hot Water
6.00am	3220
7.00am	2790
8.00am	1160
9.00am	400
10.00am	400
11.00am	400
12.00noon	600
1.00pm	400
2.00pm	2400
Total Daily	11770



Refrigeration Schedule:

Time	kW of Heat Recovery Available			Total kW
	24 hours	12.00pm to 3.00am	7.00am to 7.00pm	
6.00am	60			60
7.00am	60		24	84
8.00am	60		24	84
9.00am	60		24	84
10.00am	60		24	84
11.00am	60		24	84
12.00noon	60	12	24	96
1.00pm	60	12	24	96
2.00pm	60	12	24	96
3.00pm	60	12	24	96
4.00pm	60	12	24	96
5.00pm	60	12	24	96
6.00pm	60	12	24	96
7.00pm	60	12	24	96
8.00pm	60	12		72
9.00pm	60	12		72
10.00pm	60	12		72
11.00pm	60	12		72
12.00pm	60	12		72
1.00am	60	12		72
2.00am	60	12		72
3.00am	60	12		72
4.00am	60			60
5.00am	60			60