Energy Event 2010 – ESTA Seminar

Thursday 9th Sept 2010

Low and Zero Carbon Heating and Cooling Solutions – Maximising Energy Saving Opportunities and ROI

MAKING ENERGY MAKE SENSE

Armstrong Overview

- A privately owned international company that has much of its skill base in the UK.
- The UK business consists of 2 factories producing products & systems for the global 50hz market.
- A forward thinking company with an emphasis on energy, space & maintenance saving solutions.
- Award winning HVAC solutions from Pumps & heat exchangers to the worlds most efficient heating and CHW systems.

MAKING ENERGY MAKE SENSE

1) Replace Existing Fixed Speed Pumps with More Efficient Equivalent

- Belt drive pumps have losses in belts
- Motors may be inefficient
- Pump hydraulics may be inefficient

- Old pump may have been oversized and could be replaced by a smaller pump
- Higher efficiency motor and hydraulics
- Energy savings of 20% are possible
- Pump accessories aids installation

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2) Replace Existing Fixed Speed Pumps with Variable Speed

- Most applications are part load intensive and savings can be high with short paybacks
- System modifications will generally be required
- Where this is a problem a VSD can be used to slow the pump in a constant flow system and open the commissioning valve for some savings
- Integrated solutions can provide increased savings, reduced space and reduced installed cost

- Pre-configured, standalone zone controls are available for complex systems with diverse loads
- Avoids the necessity to modify the Building Management System
- Includes pump protection features not normally found in BMS

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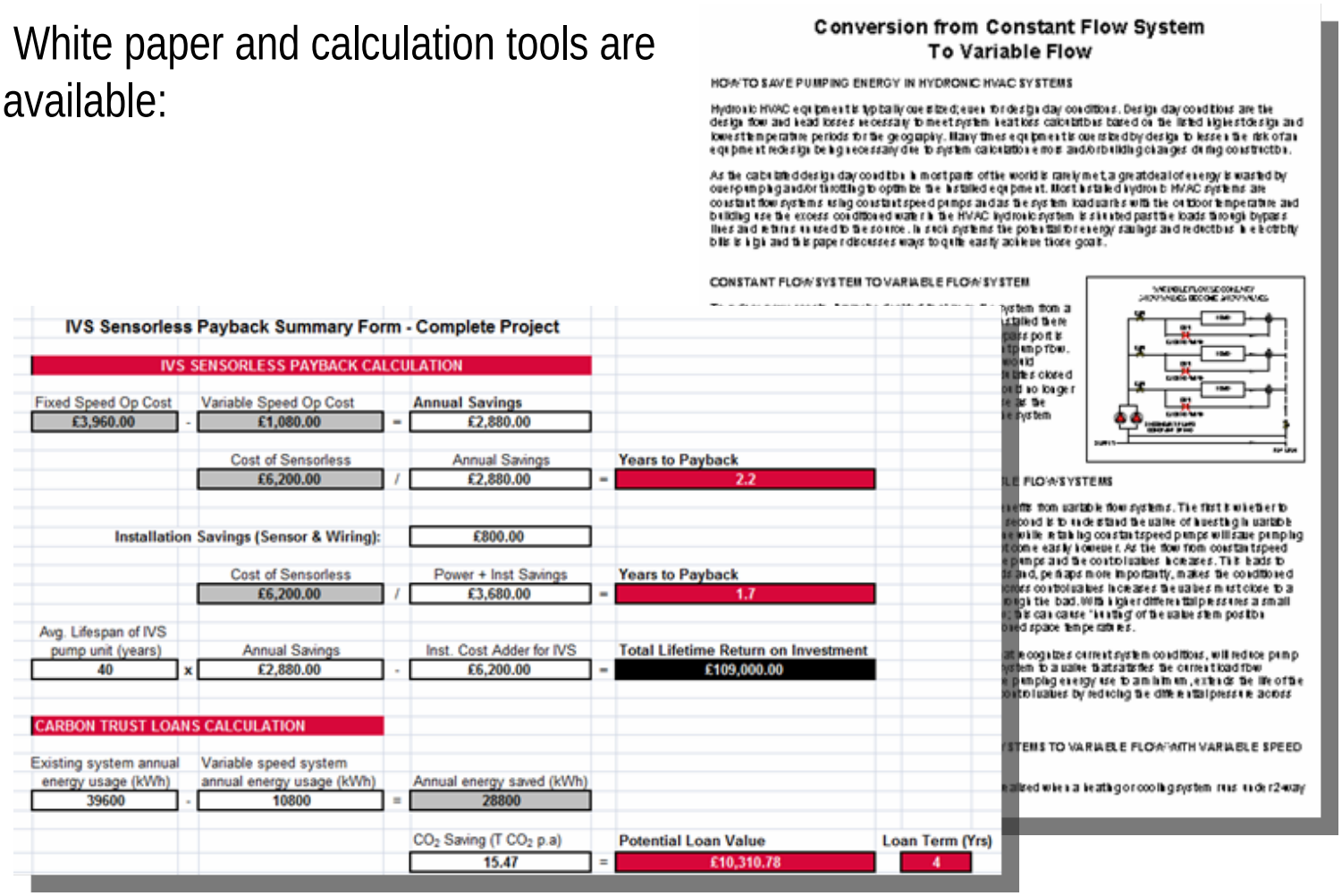
2) Replace Existing Fixed Speed Pumps with Variable Speed

White paper and calculation tools are available:



Conversion from Constant Flow System
To Variable Flow

HOW TO SAVE PUMPING ENERGY IN HYDRONIC HVAC SYSTEMS

Hydronic HVAC equipment is typically oversized; even for design day conditions. Design day conditions are the design flow and head losses necessary to meet system heat loss calculations based on the listed highest design and lowest temperature periods for the geography. Many times equipment is oversized by design to lessen the risk of an equipment redesign being necessary due to system calculations errors and/or building changes during construction.

As the calculated design day conditions in most parts of the world is rarely met, a great deal of energy is wasted by over-pumping and/or throttling to optimize the installed equipment. Most installed hydronic HVAC systems are constant flow systems using constant speed pumps and as the system load varies with the outdoor temperature and building use the excess conditioned water in the HVAC hydronic system is diverted past the loads through bypass lines and returned to the source. In such systems the potential for energy savings and reduction in electricity bills is high and this paper discusses ways to quite easily achieve those goals.

CONSTANT FLOW SYSTEM TO VARIABLE FLOW SYSTEM

IVS Sensorless Payback Summary Form - Complete Project

IVS SENSORLESS PAYBACK CALCULATION

Fixed Speed Op Cost		Variable Speed Op Cost		Annual Savings
£3,960.00	-	£1,080.00	=	£2,880.00

	Cost of Sensorless		Annual Savings		Years to Payback
	£6,200.00	/	£2,880.00	=	2.2

Installation Savings (Sensor & Wiring):	£800.00

	Cost of Sensorless		Power + Inst Savings		Years to Payback
	£6,200.00	/	£3,680.00	=	1.7

Avg. Lifespan of IVS pump unit (years)		Annual Savings		Inst. Cost Adder for IVS		Total Lifetime Return on Investment
40	x	£2,880.00	-	£6,200.00	=	£109,000.00

CARBON TRUST LOANS CALCULATION

Existing system annual energy usage (kWh)		Variable speed system annual energy usage (kWh)		Annual energy saved (kWh)
39600	-	10800	=	28800

CO_2 Saving (T CO_2 p.a)		Potential Loan Value	Loan Term (Yrs)
15.47	=	£10,310.78	4

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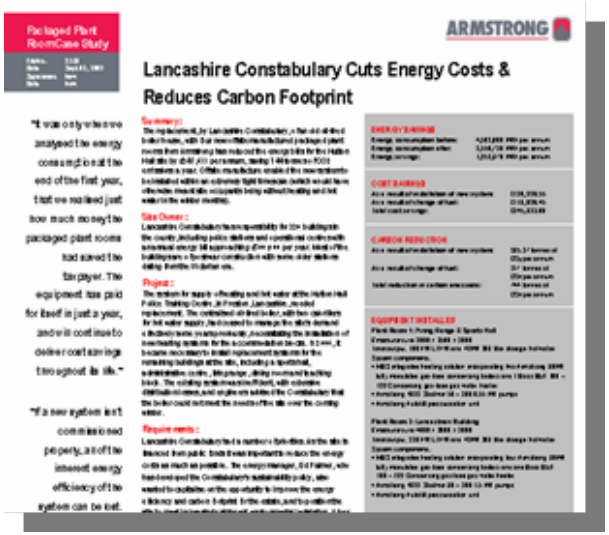
3) Upgrade the Complete Heating System

- Modular heating systems with complete integration of controls, boilers, pumps, expansion, metering etc are available
- Integration of components and sophisticated control allows seasonal efficiencies of 94% to be achieved



Packaged Plant RoomCase Study

ARMSTRONG

Lancashire Constabulary Cuts Energy Costs & Reduces Carbon Footprint

- Modular design and flexibility of layout makes the system ideal for existing installations
- Large systems can be built in a packaged plantroom

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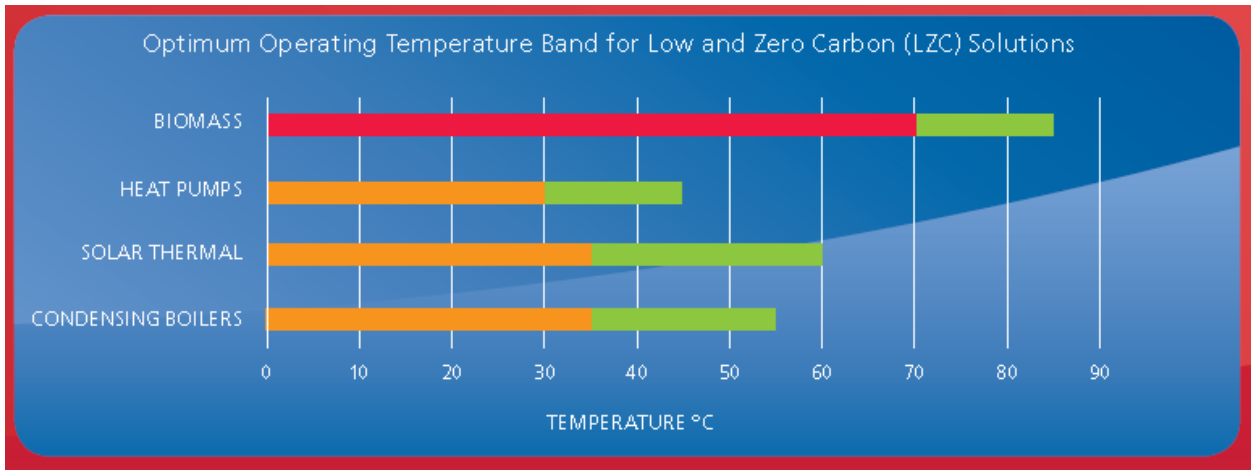
4) Add Renewable Technologies to your Heating System

- To produce the expect savings renewable technologies need to be integrated
- Low and zero carbon technologies have different optimum operating points and ‘bolting together’ does not often work



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5) Upgrade the Chilled Water Plant to an Ultra-Efficient System

- Upgrading systems more than 3 years old will have a positive impact on energy and maintenance
- Demand based control with all variable speed is the most efficient (COP's of 7 for plant)
- Paybacks within two years are possible

- Upgrade measures can range from cooling tower and pump conversion plus plant controller to new chillers as part of an integrated plant package
- Energy consumption of the chilled water system can be reduced by 35 – 40%

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5) Upgrade the Chilled Water Plant to an Ultra-Efficient System

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