



Energy Reduction Opportunities

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Presentation Content

- Introduction
- Systematic Energy Reduction (Monitoring & Targeting)
- Motor Management – eXpert Motor
- Refrigeration – eXpert Fridge
- Variable Speed Drives – eXpert Pump (Case Study)
- Questions

Introduction - Energy Efficiency vs Carbon

Who are Cotopaxi ?

- A new company
- Experienced chartered mechanical engineers from consulting & industrial backgrounds, 1000+ audits completed across many sectors
- Producing eXpert solutions to reduce energy using a Siemens backbone
- Initial focus Energy Efficiency, End goal – Smart Grid platform/functionality

Cotopaxi Approach

- Implement solid M&T platform (the basics), post site scoping
- Implement eXpert solutions for key plant & process (motors, pumps, refrigeration, boilers, air)
- Drive opportunity identification & project manage sub solutions (partner with solution providers)

Why Energy Efficiency & eXpert solutions

- Price of energy is going up
- Be green and get greener – CSR & Sustainability essential
- 57% of the CO2 reduction is possible from Energy Efficiency, 23% from Renewable & Bio Energy*

* Source IEA 2009

Introduction - Energy Efficiency vs Carbon

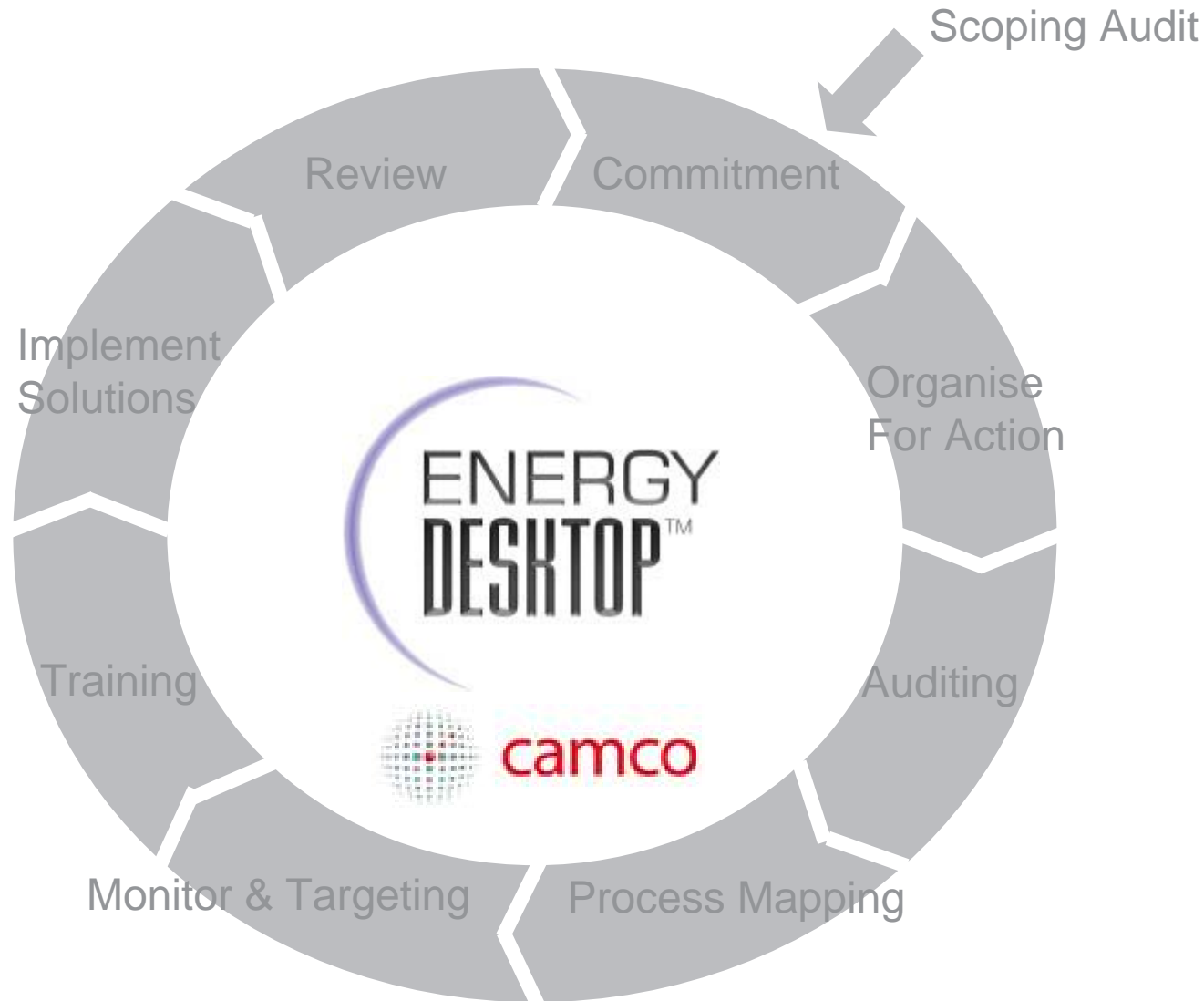
100+ Text Book Energy Efficiency Opportunities Not Implemented

- Complicated and difficult to implement following 1st review
- Tried and failed - so it doesn't work, requires determination and hard work
- Poor data = fragile justification
- Lack of knowledge

Improvements Needed

- Robust data collection, metering and reporting
- Bridge the gap from process scada/bms to Monitoring & Targeting
- Solid Justification and preliminary engineering (River Pumps)
- Solutions rather than products (from Generation > Distribution > End Use)
- Ability to interrogate and challenge 'closed' systems – fridge plant
- Mechanisms/reports/data to identify solutions to problems

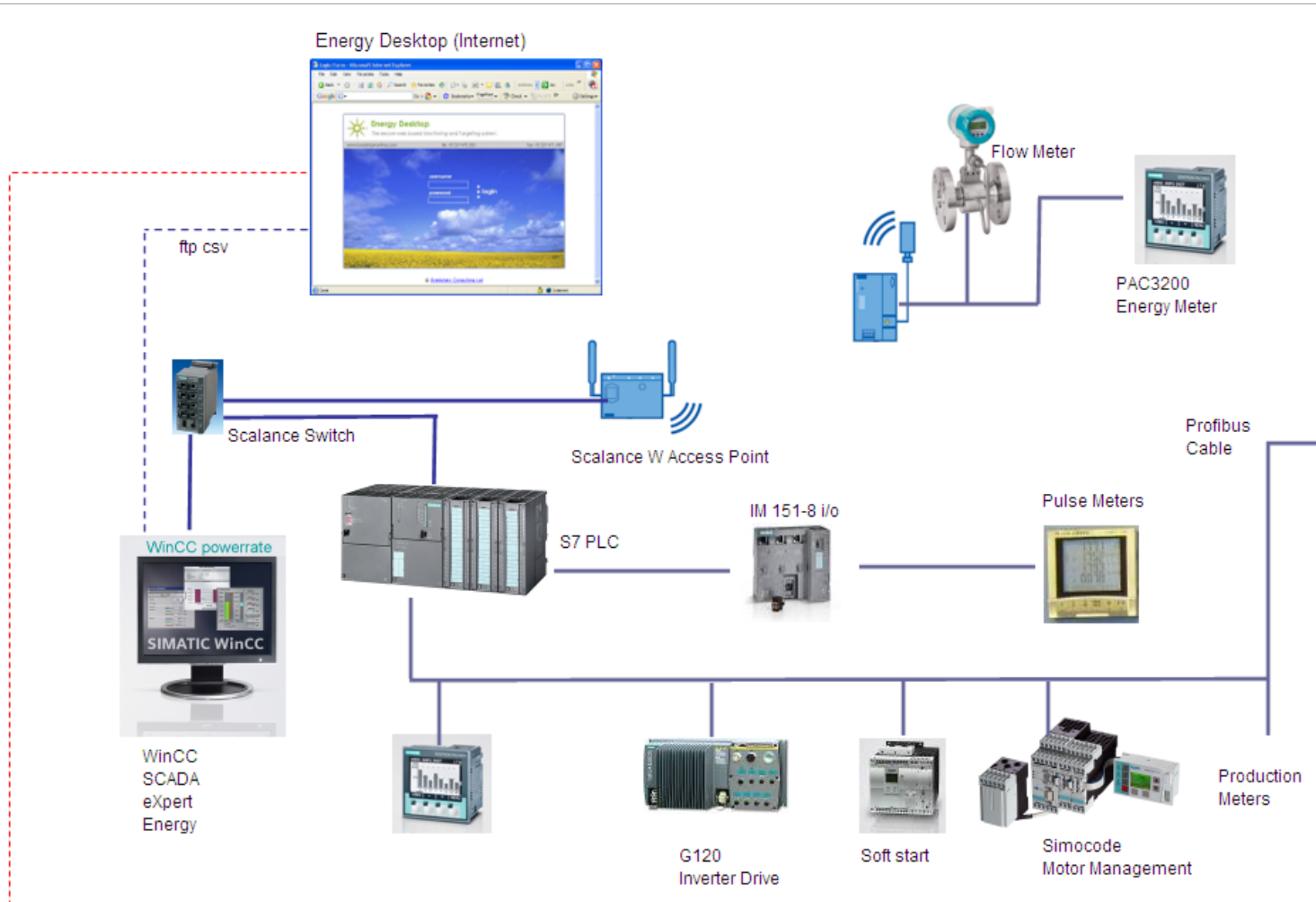
Systematic Energy Reduction



Benefits

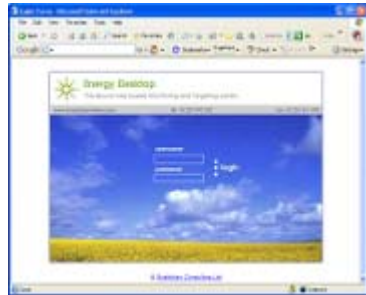
- Energy 5% - 20%
- Water 5% - 30%
- Raw materials up to 1%
- Packaging 5%
- EN 16001

Data Collection Topology (real time)



Data Collection Topology (Increment)

Energy Desktop (Internet)



LAN/GPRS/GSM Data Concentrator



(Fixed Wireless AMR Network - 500 meters industrial landscape)

Pulse Senders 153 MHz Concentrator



Turbine Water Meters (New)



PAC3200 or 3100 (New)



GSM/GPRS Network



Solution Offering

eXpert Motor provides a integrated real-time and enterprise web platform to manage and control electric motor systems. The embedded functionality reduces life cycle costs, improves facility reliability and enables demand response for 'smart grid' applications.



The following complementary eXpert modules are available:-



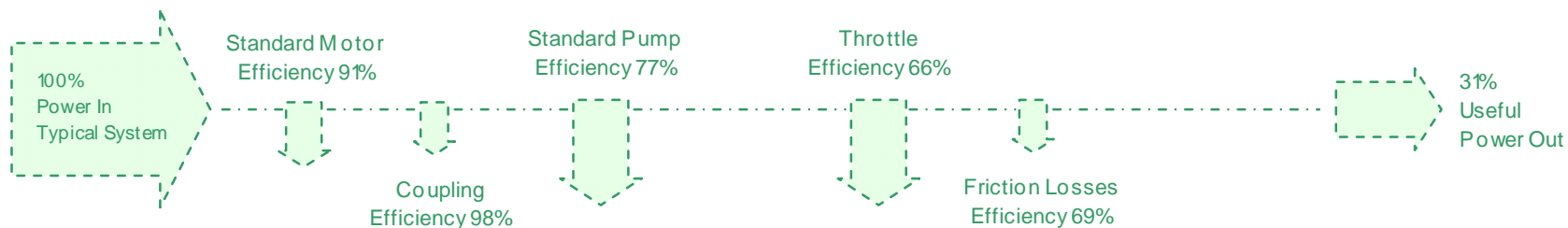
Motor Management – eXpert Motor

Motor driven systems account for approximately 65%-75% of the electricity consumed in UK industry. This could be reduced by up to 24 Billion kWh PA (£1.4 Billion or 12 Million tonnes CO₂) if motor systems were systematically controlled and optimised.



Factors Effecting Motor System Efficiency

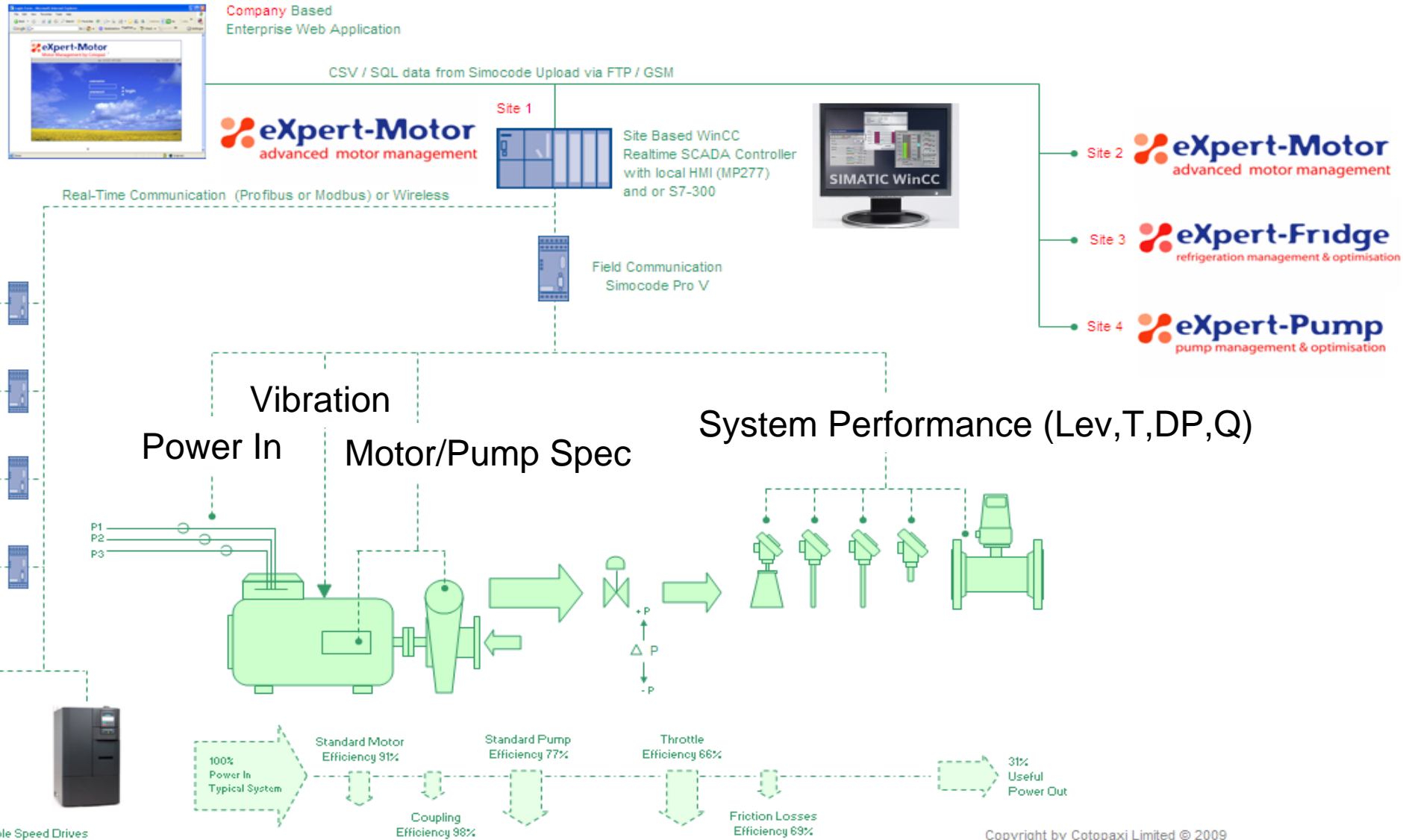
- motor efficiency (74% -95%)
- motor speed control
- correcting sizing
- power supply quality
- distribution losses
- mechanical transmission (gearbox efficiency)
- maintenance practices
- lubrication
- sequencing in motor set
- end-use mechanical efficiency (pump, fan, compressor, etc).



Siemens Simocode



Schematic Detailed



Solution Benefits

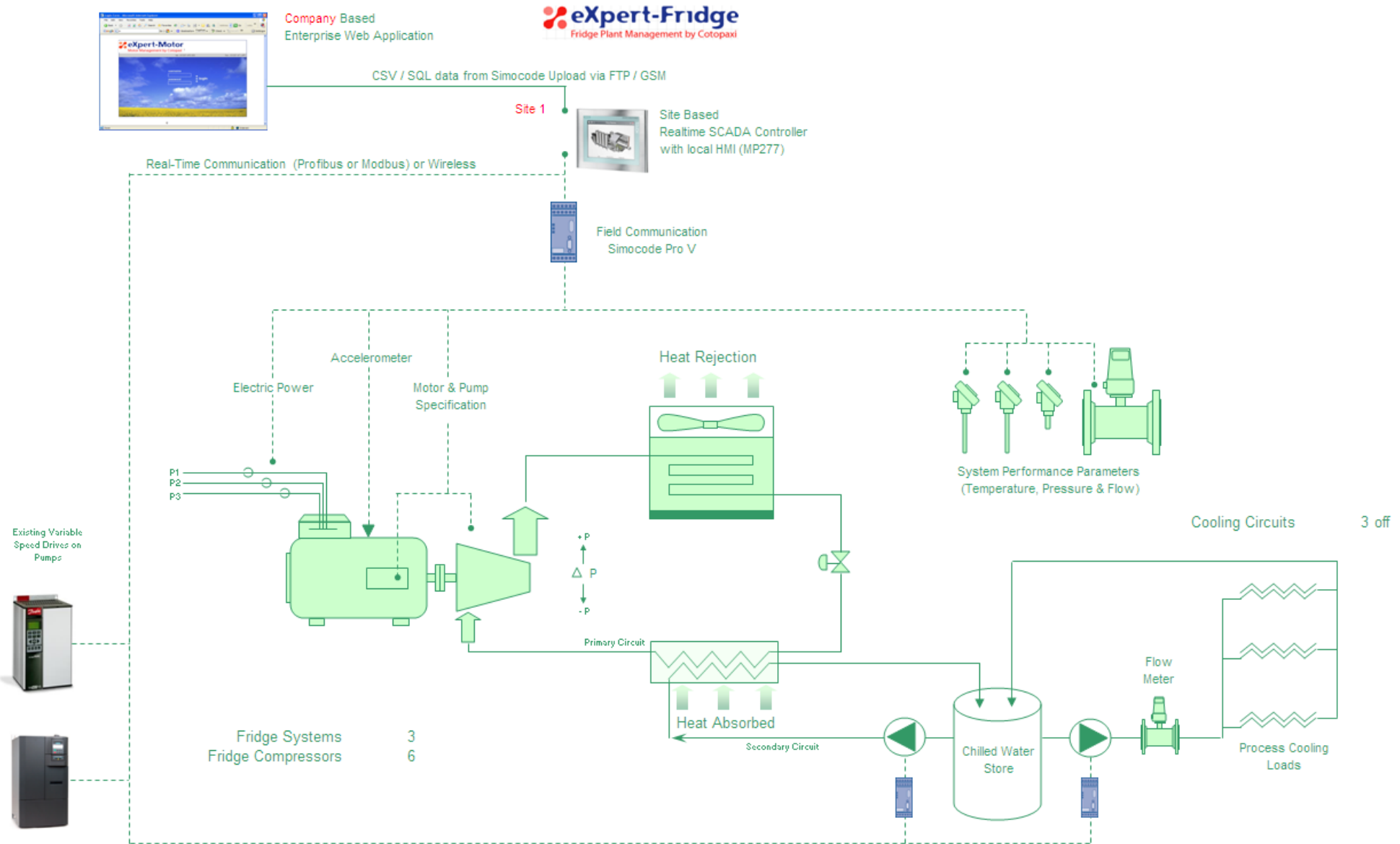
eXpert Motor will aim to reduce motor system life cycle costs by up to 60%

- improve life cycle motor system efficiency (reducing electric power consumption)
- calculate 'motor system' efficiency
- provide sector/plant specific intelligent energy efficiency diagnostics
- improve asset utilisation
- reduce plant down time
- It will prepare the facility for 'smart' grid applications, (Adaptive/Predictive/Integrated)

Refrigeration – eXpert Fridge



eXpert Fridge

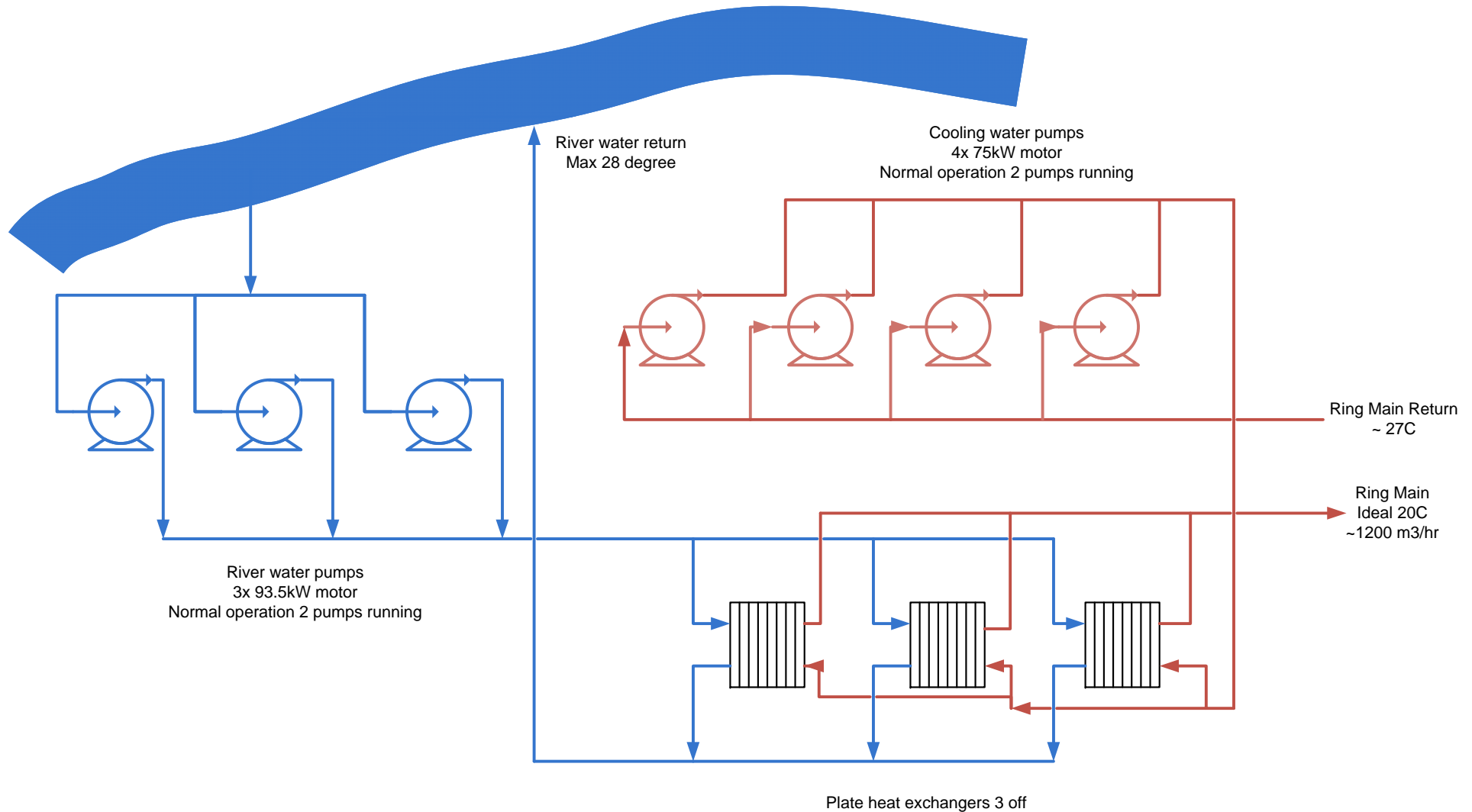


Refrigeration – Assess Opportunities

- Replace Plant (opportunity to resize, consider heat pump options and incorporate Tri Generation)
- Upgrade SCADA
- Oil recovery systems
- VSD's on Screw compressors
- VSD's on cooling tower fans
- VSD's on secondary cooling circuits and review pump type/capacity
- Controls to float minimum condensing pressure vs. ambient
- Electronic expansion valves and LPA
- Heat exchanger cleaning
- Complete cooling loads analysis (temperature profiles and energy flows)
- Increase evaporating temperatures and reduce condensing temperatures (1C=3% saving)
- Increase produce control temperatures and minimise loads
- Implement free cooling – i.e. process plant
- Implement and optimise regeneration on plate heat exchangers

eXpert Pump – Case Study

Original Installation & Approach

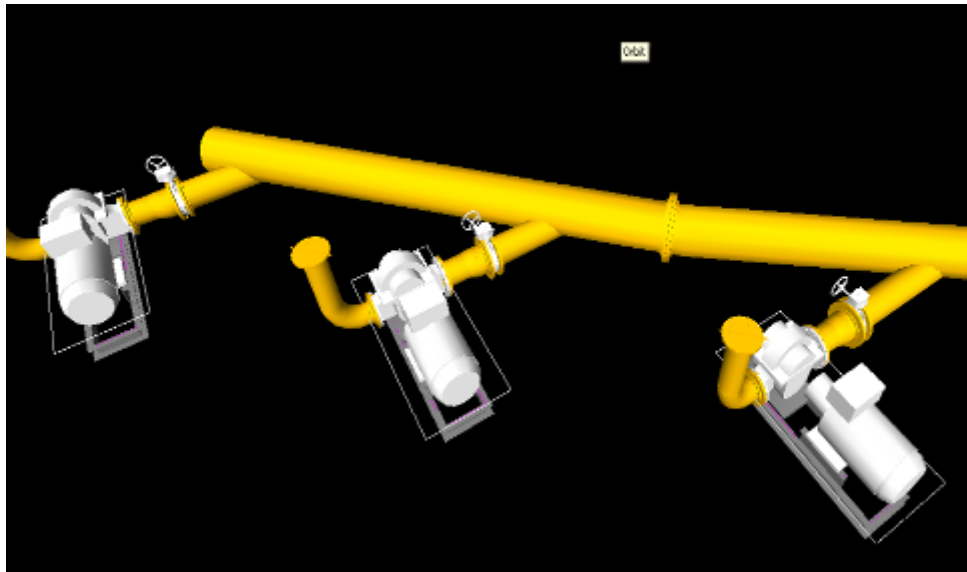


Original Installation



- DOL (2 river pumps+2 process)
- Unknown Pressures at HX
- Unknown Cooling Duty (approx 9 MW)
- 2-3 rewinds on motors (eff 75-78%)
- New river Intake manifold required
- Over Cooling / Pumping
- No remote control from Control Room
- New valves required

eXpert Pump Solution

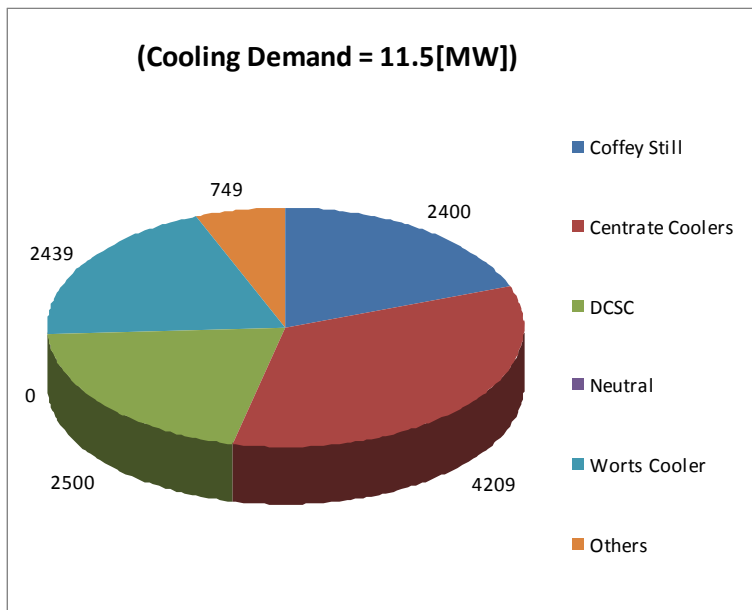


Hardware (Mechanical)

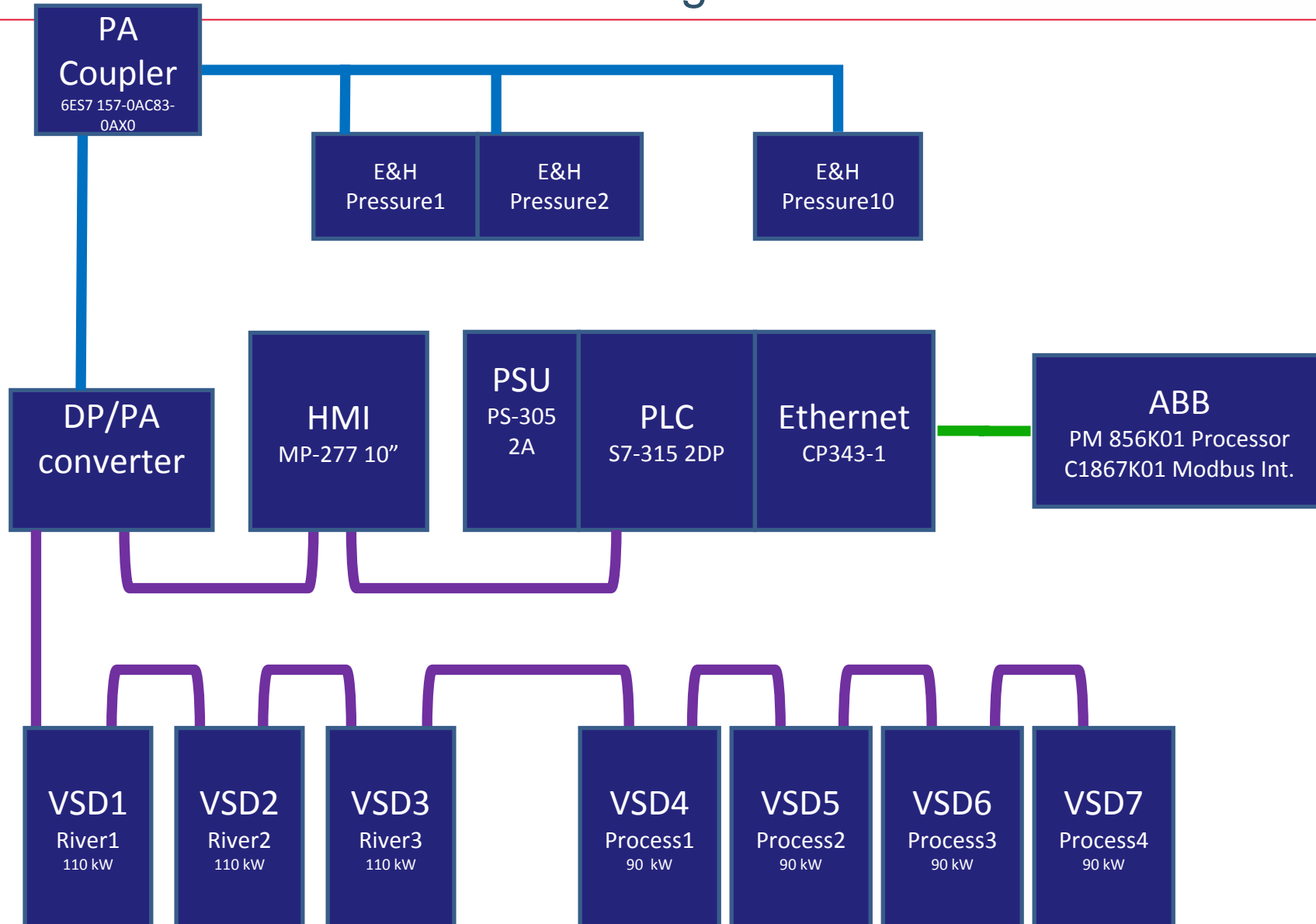
- 3 New ITT Centrifugal River Pumps (85.5%)
- 3 New ITT Centrifugal Process Pumps (83.5%)
- New EFF1 Motors – Efficiency 95.2%
- 3 River Pump 110 kW VSD's
- 4 Process Pumps 75 kW VSD's
- Manifold Redesign (0.2 Bar Improvement)
- 8 New Pressure Sensors
- Check Valves / Isolation Vales

Software & Control

- Siemens S7-315 2DP
- Siemens MP277 10" HMI
- ABB Modbus Interface
- WinCC eXpert Pump Control
 - Respecting real time cooling demand
 - Protecting 2 key environmental consents
 - Optimising pumping with seasonal river temperature



Revised Control Hardware Configuration



Savings £100K + PA (686 Tonnes CO2) = 3 Year Payback



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SIEMENS

SIMATIC MULTI PANEL

TOUCH

