Energy Appraisal
Customer Name

Prepared by:

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Radway Control Systems

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29/04/2009

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1) Introduction

Date:	29/04/2009
Customer in attendance:	
Company:	Customer Name
Appraisal Engineer:	Phil Tomkinson
Company:	Radway Control Systems
Background:	During a recent visit it was decided that there were several opotunities on site to save electricity. After a walk around site, 3 applications were agreed to be targeted as these were large motors all with 40 to 60 percent closed dampers
Issues:	At present, the dampers are controlled to regulate the required air flow for all 3 applications. This is an expensive means of control and huge savings could be made if the dampers were fully open and the motors slowed down to achieve the same air flow.
Applications:	The 3 applications that were looked at were the 90KW Exhaust Fan, the 75KW Cooler Fluidising Fan and the Evaporative Cooling Fan.
Recommendations:	Although the equipment only runs 10 hours a day for 5 days a week, the results of this survey are very impressive as the payback is around 12 months
Electricity cost:	10.00p per kWh

2) Executive Summary

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Application	Running Costs	Annual Savings	Investment	Energy Saved	Payback Time	CO2 Saved
Exhaust Fan	£10,285	£6,347	£6,800	63,468 kWh	1.07 years	34 tonnes
Cooler Fluidising Fan	£9,368	£5,191	£5,500	51,910 kWh	1.06 years	28 tonnes
Evaporative Cooling Fan	£4,675	£2,885	£4,600	28,849 kWh	1.59 years	15 tonnes
TOTAL	£24,328	£14,423	£16,900	144,227 kWh	1.17 years	77 tonnes
TOTAL PAYBACK including ECA*					321 days	

* Estimated payback period taking into account ECA claimed at 25%.

These installation and equipment costs attract 100% Enhanced Capital Allowances from the Government.
See www.abb.co.uk/energy for further details.

3) Annual Savings

	Year-on-year savings			Year-on-year CO2 reduction (tonnes)		
Application	1 Year	5 Years	10 Years	1 Year	5 Years	10 Years
Exhaust Fan	£6,347	£31,735	£63,470	34	170	341
Cooler Fluidising Fan	£5,191	£25,955	£51,910	28	139	279
Evaporative Cooling Fan	£2,885	£14,425	£28,850	15	77	155
TOTAL	£14,423	£72,115	£144,230	77	387	775

4) Application Details

5) Equipment Required

Application: Exhaust Fan

Type Designation:	ACH550-01-180A-4+B055
Rated Motor Power:	90 kW
Drive Range:	ABB standard drive
Drive Type:	AC variable speed drive (vsd), 6 pulse
EMC Compliance:	EN61800-3, 1st environment as STD
Quantity:	1
Price Including Installation:	£6,800

Features:

- Sensorless vector control or Scalar control if selected.
- Start-up Assistant to aid commissioning. Diagnostic and maintenance assistants also included.
- State of the art highly intuitive keypad, including real time clock, HELP key and 'changed parameter' features.
- Small compact size. Brake chopper (up to 11kW) and EMC filter fit internally.
- Internal fan starts and stops with the motor, to increase fan life and reduce maintenance.
- Patented 'swinging choke' reduces harmonics as the motor load reduces.
- Well-designed internal spaces to allow easy cabling and installation. IP21 std., IP54 optional.

Description:

The ACS550-01 drive is a wall or cabinet mountable drive. It is supplied with a cable connection box, which allows easy cable glanding for SY and SWA cable. In the larger units, large dual-purpose power terminals make cabling easier. The drives can be tightly packed together in a bookcase-mounting format (no gap between), and can be mounted in multiple rows in the cabinet, as long as ventilation is considered accordingly.

The cooling air is drawn in through the bottom, and pushed out through the top. The air path is constructed to allow through cabinet mounting, with the use of a suitable adapter.

Up to 132kW, the drive contains a patented swinging choke. The impedance of the choke changes with load. The harmonic signature of the drive is 25% lower as the motor load reduces.

5) Equipment Required

Application: Cooler Fluidising Fan

Type Designation:	ACH550-01-157A-4+B055
Rated Motor Power:	75 kW
Drive Range:	ABB standard drive
Drive Type:	AC variable speed drive (vsd), 6 pulse
EMC Compliance:	EN61800-3, 1st environment as STD
Quantity:	1
Price Including Installation:	£5,500

Features:

- Sensorless vector control or Scalar control if selected.
- Start-up Assistant to aid commissioning. Diagnostic and maintenance assistants also included.
- State of the art highly intuitive keypad, including real time clock, HELP key and 'changed parameter' features.
- Small compact size. Brake chopper (up to 11kW) and EMC filter fit internally.
- Internal fan starts and stops with the motor, to increase fan life and reduce maintenance.
- Patented 'swinging choke' reduces harmonics as the motor load reduces.
- Well-designed internal spaces to allow easy cabling and installation. IP21 std., IP54 optional.

Description:

The ACS550-01 drive is a wall or cabinet mountable drive. It is supplied with a cable connection box, which allows easy cable glanding for SY and SWA cable. In the larger units, large dual-purpose power terminals make cabling easier. The drives can be tightly packed together in a bookcase-mounting format (no gap between), and can be mounted in multiple rows in the cabinet, as long as ventilation is considered accordingly.

The cooling air is drawn in through the bottom, and pushed out through the top. The air path is constructed to allow through cabinet mounting, with the use of a suitable adapter.

Up to 132kW, the drive contains a patented swinging choke. The impedance of the choke changes with load. The harmonic signature of the drive is 25% lower as the motor load reduces.

5) Equipment Required

Application: Evaporative Cooling Fan

Type Designation:	ACH550-01-096A-4+B055
Rated Motor Power:	45 kW
Drive Range:	ABB standard drive
Drive Type:	AC variable speed drive (vsd), 6 pulse
EMC Compliance:	EN61800-3, 1st environment as STD
Quantity:	1
Price Including Installation:	£4,600

Features:

- Sensorless vector control or Scalar control if selected.
- Start-up Assistant to aid commissioning. Diagnostic and maintenance assistants also included.
- State of the art highly intuitive keypad, including real time clock, HELP key and 'changed parameter' features.
- Small compact size. Brake chopper (up to 11kW) and EMC filter fit internally.
- Internal fan starts and stops with the motor, to increase fan life and reduce maintenance.
- Patented 'swinging choke' reduces harmonics as the motor load reduces.
- Well-designed internal spaces to allow easy cabling and installation. IP21 std., IP54 optional.

Description:

The ACS550-01 drive is a wall or cabinet mountable drive. It is supplied with a cable connection box, which allows easy cable glanding for SY and SWA cable. In the larger units, large dual-purpose power terminals make cabling easier. The drives can be tightly packed together in a bookcase-mounting format (no gap between), and can be mounted in multiple rows in the cabinet, as long as ventilation is considered accordingly.

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6) Energy Appraisal Process

1) Scope of supply

Following the visit of Radway Control Systems to Customer Name, it was decided that an energy appraisal would be undertaken on selected applications throughout the site.

2) Data collection

Data was collected from the following applications: Exhaust Fan, Cooler Fluidising Fan, Evaporative Cooling Fan and TOTAL.

3) Data analysis

The motor and process are monitored to determine the actual speed profile requirements and, using state-of-the-art power monitors, to identify actual energy consumed. Using ABB's dedicated fan and pump energy saving software, the findings are analysed and potential savings recorded.

4) Recommendations

Many of the applications investigated show significant energy saving potential, with rapid payback times. This, together with the government's ECA's available of 100% of the total installation makes these applications viable for energy saving. Money can definitely be saved by installing the latest variable speed drive technology.

5) Implementation

ABB Ltd can provide variable speed drive solutions to these applications within 7 working days. In some cases, a finance scheme may be available that allows you to spread payments over 12 months. A single invoice at the time of purchase means that you can claim the ECA entitlement, which is not possible with leasing schemes.

6) Training

Training of plant personnel at Customer Name to enable them to undertake their own energy appraisals, can be carried out either on your site or at the specially designed training facilities at ABB Ltd.

7) Engineers' Notes

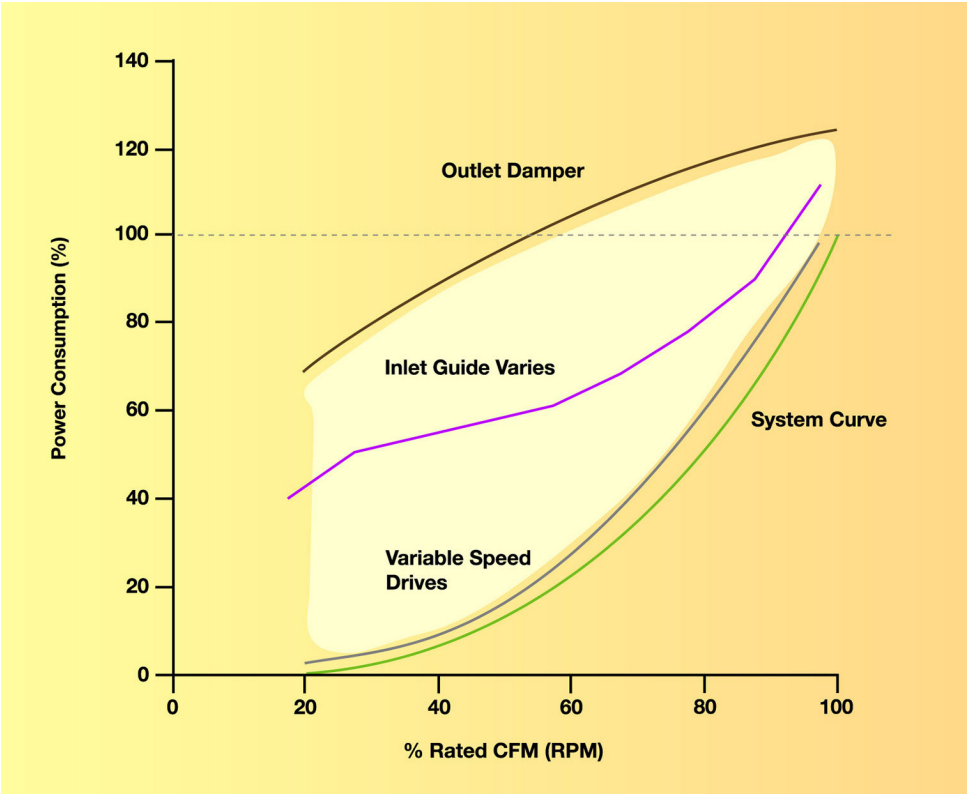
Motor speed control offers industry the single largest opportunity for saving energy and money.

Most motors run at a fixed speed. By adjusting the speed to more accurately match the requirements of the loads, which generally vary over time, you can enhance the efficiency of motor drive equipment. The potential benefits of speed variation include increased productivity and product quality, less wear and mechanical stress, along with energy savings of 50% or more for some types of applications.

One of the most effective ways to save energy is to target your pump and fan applications, firstly because there are so many of them and secondly because the potential energy savings are so great.

The graph below shows the energy use of a fan system with three different control methods. The energy use of the drive closely follows the demands of the system, because this is the only control method that regulates the output without introducing inefficiencies into the system.

Both the inlet guide vane and the outlet damper control the output by placing a restriction in the way of the flow, with the motor still running at full speed. By contrast, the drive varies the speed of the motor and only uses the energy needed to achieve the required output. The same principles apply to pump systems.



8) CCL Overview

The climate change levy is a tax on the use of energy in industry, commerce and the public sector.

The purpose of the levy is to encourage efficient use of energy, not to raise tax. The money collected is offset by cuts in employers' National Insurance Contributions and is also used to support energy efficiency schemes and renewable energy.

The levy is applied as specific rate per unit of energy, for instance for electricity it is 0.43 pence per kilowatt hour. This adds 10-15% to the electricity bill and will reduce profits unless energy efficiency measures are taken.

40 energy intensive sectors are exempt from paying the Climate Change Levy but have instead negotiated specific energy saving targets with the Government. Each sector has received a target and a set of two-yearly milestones in return for reductions in climate change levy.

Climate change is widely recognised as one of the key environmental challenges facing all countries today. There is growing scientific consensus on the potential impacts on climate of increasing concentrations of greenhouse gases in the atmosphere.

The impact may vary starkly across the world, with rising sea levels and flooding in some regions at the same time as water shortage and famine in others. Already, in England four of the five warmest years in the 340 year record have occurred in the last decade. But we could see a very much greater rise over the course of the next century unless action is taken to significantly reduce greenhouse gas emissions.

Climate change is a global problem requiring actions on a global scale. At Kyoto in 1997, the developed countries agreed a legally-binding commitment to reduce greenhouse gas emissions by 5.2 per cent below 1990 levels over the period 2008-2012.

The EU Member States collectively agreed to a 8 per cent reduction at Kyoto. The UK's contribution to this target has been set at a 12 per cent reduction on 1990 levels in emissions of a basket of six greenhouse gases.

The UK has also set itself a domestic objective that goes beyond the legally-binding Kyoto target. A target to reduce emissions of carbon dioxide by 20 per cent on 1990 levels by 2010 was set in 1997. While this now seems unlikely to be met, a cut of 15-18% by the end of the decade is still seen as realistic.

9) ECA Overview

Enhanced Capital Allowances is a form of tax relief for businesses investing in low carbon technologies. Offering 100% tax relief on qualifying investments within one year, they provide fiscal incentives to users, aiming to encourage companies to choose energy efficient products and technologies. This can deliver a significant cash flow boost and shorten the payback period on investment.

Ordinary capital allowances can save £7.50 for every £100 spent per annum. ECAs, offering 100% first year allowances, save £30 for every £100 spent, assuming the company pays tax on profits at 30%.

As all allowances are due in the first year, the greatest effects are on cashflow. See the table below for a comparison.

Year	Expenditure written off against profits		
	Capital Allowance (25%)	Capital Allowance SMEs Rate (40% then 25%)	100% ECA
1	25.0	40.0	100
2	18.8	15.0	-
3	14.1	11.3	-
4	10.5	8.4	-
5	7.9	6.3	-
6	5.9	4.7	-
7	4.4	3.6	-
8	3.3	2.7	-
9	2.5	2.0	-
10	1.9	1.5	-

Plant or machinery easily certifiable as qualifying energy efficient products and technologies all qualify. You can also claim on installation costs, professional fees and costs of alter an existing building.

The Energy Technology List

The Energy Technology List provides detailed information on the products from all technology categories that meet the scheme's eligibility criteria. Qualifying technologies include:

Variable Speed Drives (VSDs), Motors, Compressed air equipment, Combined Heat and Power (CHP), Refrigeration equipment, Boilers, Lighting, Pipe insulation, Thermal screens, Heat pumps for space heating, Solar thermal systems, Warm air & radiant heaters, Investments in assets for leasing.

Details of qualifying products and technologies can be found on www.eca.gov.uk. All the products and technologies on the Energy Technology List meet the energy efficiency criteria. As well as being tax efficient, they bring significant long-term financial benefits through enhanced energy efficiency.

How much can you claim?

For a qualifying item bought on its own, for instance a variable speed drive for an existing application, you claim the price paid. For a qualifying item bought as part of a non-qualifying system, for instance a variable speed drive built into a piece of machinery, you use the claim values published on the ECA website, www.eca.gov.uk. ECAs are claimed as part of your normal income or corporation tax return calculations.

Interest-free loans from the Carbon Trust

- £5,000 min to £100,000 max
- 0% Interest
- No other fees
- Unsecured
- Repayment period matches project payback
- Not limited to products on the Energy Technology List

Who's eligible?

Small and Medium Enterprises (SMEs) in England Wales & N Ireland, with:

- A trading history of at least 12 months
- An acceptable credit rating
- No involvement in agriculture & fisheries, transport and export related activities

An SME is an enterprise with fewer than 250 employees and a turnover of less than £35m or assets less than £30m.

Energy saving projects qualify if the savings pay back the loan within 5 years. The installation costs can be included. The loan is based on energy savings only. If payback is more than 5 years, the loan is capped at 5 times the annual saving.

Energy Efficiency Loans example

- Project cost: £20,000
- Estimated annual saving: £7,500
- Project payback: 2.7 years
- Potential loan: £20,000
- Loan repayment period: 36 months
- Annual loan repayment: £6,666

For further information, see www.thecarbontrust.co.uk/loans

10) Supporting Information