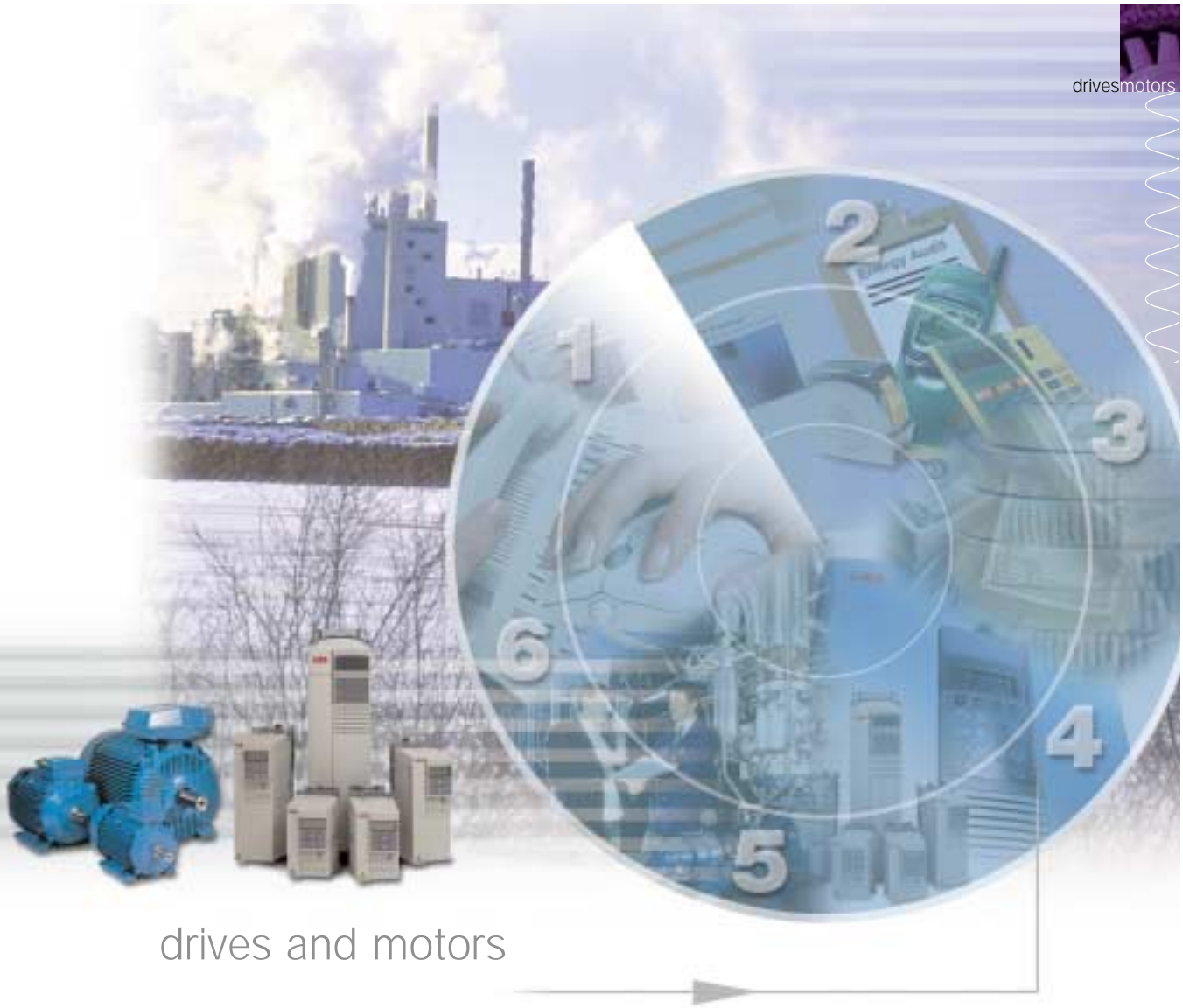


6-step energy saving plan...



understanding measurement analysis control integration **optimization**

ABB

Your call to action

6 step plan

1 The facts	2-3
2 The savings	4-7
3 The finance	8-9
4 The products	10-13
5 The proof	14-17
6 The action	18-19

The six step plan, what is it?

Step 1. The facts:

An insight into the latest thinking on the Climate Change Levy and UK government actions to encourage greater energy savings.

Step 2. The savings:

In just half-a-day, an Energy Appraisal can help identify the applications that offer you the best energy saving opportunities.

Discover the benefits of replacing your old drive with the latest motors and drives technologies.

Step 3. The finance:

How to finance your drive purchase while still

benefiting from the government's Enhanced Capital Allowance.

Step 4. The products:

See why selecting motors and drives from one manufacturer can bring substantial additional savings.

Step 5. The proof:

See how industry has benefited from using variable speed drives and motors.

Step 6. The action:

Find out more about how ABB and its Channel Partners can help you.

The Climate Change Levy

The Climate Change Levy (CCL) is now a reality that UK companies must face. By adding 10-15% to the electricity bill, this UK government charge will reduce profitability unless energy efficiency measures are taken.

The value of potential energy savings in industry is far greater than the cost of the levy. Companies that take action as a result of the levy should soon see their investment pay off.

The greater part of electricity consumed in industry, around two-thirds, is used by electric motors. This seems like a staggeringly high share, but the ubiquitous low voltage AC motor is fitted into virtually anything that moves. In the UK alone, some 10 million motors are used, consuming £4 billion worth of electricity per year. Many of these run far less efficiently than they could, so there is vast scope for savings.

Avoid penalties - here's what to do:

1 Use variable speed drives whenever there is a requirement for reducing motor speed. This can save as much as 60% of the energy in, for instance, a pumping application. Applied to a 90 kW motor in continuous duty, this means £23,000 per year in saved energy.

2 Use high efficiency motors. These are typically 3 to 5% more efficient than their standard efficiency counterparts. Applied to a 90 kW motor, this could save £1,000 per year per motor. Multiply this by the number of motors at your plant, for instance 50, and another £50,000 has been saved.

3 Ensure your motors are properly selected, installed and looked after. Most motors in industry are oversized for their duty; while a motor reaches optimum efficiency at around 75% duty, many are never loaded beyond 40%. This can save another 3 to 5%, and using the same parameters as in the example above, a further £50,000 is saved. Energy is also saved by keeping motors and the associated machinery greased and maintained in line with the manufacturers' guidelines.

Tax and CCL

The Climate Change Levy is not intended to raise tax revenue. The money is repaid to business in the form of a 0.3% reduction in National Insurance Contributions, with the exception of £50 million which will be used for energy efficiency information, and £100 million that is set aside for Enhanced Capital Allowances (see below). What the Climate Change Levy is intended to do, is to stimulate the use of energy efficient technology.
www.environment.detr.gov.uk/climatechange



Enhanced Capital Allowances

The Enhanced Capital Allowances (ECA's), introduced by the UK Treasury, essentially gives you a discount on energy efficient equipment.

It enables companies to deduct the full cost of energy efficient equipment in the year of purchase, rather than writing the equipment off over a number of years.

Depending on your tax rate, it will in most cases cut the cost by 6 to 7%. This will reduce or even eliminate the price differential to less efficient products and shorten the payback time.

ECAs are applicable to a list of specific technologies that includes CHP (Combined Heat and Power), boilers, motors, variable speed drives, lighting, refrigeration, pipe insulation materials and thermal screens, which meet the relevant energy efficiency criteria. Eligible products appear on the Energy Technology Product List published at www.eca.gov.uk.

The list of motors includes all 2- and 4-pole motors between 1.1 - 90 kW that meet the CEMEP EFF1 efficiency ratings (regardless of application); and all 2- and 4-pole motors between 90 - 400 kW and 6- and 8-pole motors between 5.5 - 315 kW that meet the Water Industry Mechanical & Electrical Specifications, WIMES (regardless of application).

Drives are only eligible for ECAs in liquid or gas flow applications, such as pumps, fans and compressors. This is because the savings are

particularly large in these applications. The scheme does not apply to soft starters. If the drive or motor is part of a larger machine, only the part of the cost that relates to the drive or motor is eligible for ECA. All of ABB's products highlighted on p. 10-13, qualify for ECAs (providing drives are used in fluid control applications).

1. ECA - how you benefit



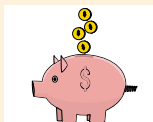
Writing off equipment the traditional way won't give you tax relief on the full amount. ECA saves capital cost by giving 100% tax relief, in the year in which expenditure is incurred.

2. Increase the tax benefit



As you claim back 100% of the value instead of some 90%, the value of the tax benefit increases.

3. Improve your cash flow



As the benefit is gained in the first year rather than over a number of years, the money stays in your account and earns interest or is gainfully employed in your business.

fast and efficient Energy Appraisal

The starting point for any successful energy saving plan is to determine early on just where energy can be saved. ABB's experience means that we can get straight to the heart of the savings. By focusing on your pump and fan applications, we know precisely where to look and what we are likely to find.

We have captured this experience in a unique Energy Appraisal Scheme. The scheme defines where energy can be saved and quantifies just how much energy can be saved with the installation of various ABB drives and motors.



1 Scope of supply

ABB, or one of its strategic technical partners, meets with you and outlines in detail the benefits, requirements and input needed for a successful energy appraisal. ABB not only looks at fixed speed drives but also at existing AC drives to ensure that the application is running at maximum efficiency.



2 Data collection

An on-site appraisal is undertaken with extensive analysis of *selected* fans and pumps. From this, ABB can determine operating parameters and the energy being consumed.

3 Data analysis

Using ABB's dedicated fan and pump energy saving software, the findings are analysed and potential savings rapidly identified.



FACT

On an industrial site with an electricity bill of £150,000 p.a., an average of £100,000 p.a. will be spent on running motors

4 Recommendation

An Action Plan is prepared, comprising an Executive Summary and a detailed Engineer's Report. The reports highlight the applications that can save the most. Figures are then translated into monthly savings - the amount of money that will be saved in energy bills if the recommended drives and motors are installed.



Extract from typical Executive Summary showing energy saving potential

<i>Equipment audited</i>	<i>Investment</i>	<i>Energy saved per year kWh</i>	<i>Pay back time years</i>	<i>Annual savings following installation</i>
<i>Cooling towers</i>	£11,286	252,958	1.1	£10,118
<i>Heating pumps</i>	£14,900	255,000	1.5	£10,200
<i>Boiler Fans</i>	£4,996	75,964	1.6	£3,038
Totals	£31,182	583,922	1.33	£23,356

Benefits

- Guaranteed energy savings
- Installation pays for itself from energy saved
- Full customer training given in appraisal process
- Finance options available

5 Implementation

The report's findings are implemented and actual savings monitored alongside predicted results.



6 Training

So easy is our process that we encourage our customers to learn the Energy Appraisal procedure so that they can take direct control of their energy savings.



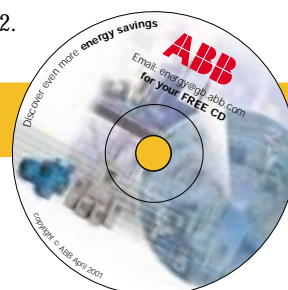
Appraisal costs

- One off £150 fee
- Fee refundable on project implementation
- Complete audit results and detailed energy saving calculations

7 Standardise/specify

Through specifying and standardising on proven, market leading motors and drives you can be assured that the predicted energy savings will be

achieved. Choosing ABB's motors and drives can also reap further benefits - see page 10 and 12.



Try it yourself...

Our free CD-Rom contains your very own energy calculator. See page 19 for more details or visit:

www.abb.co.uk/energy

Motor management using your assets wisely

When an industrial electric motor fails, the natural instinct of many plant managers is to send the unit out to be rewound. Blindly following this habit could be costing companies many thousands of pounds in unnecessary electricity costs every year.

The problem

With swift action needed, the efficiency of the rewind motor is rarely considered. Yet it is well documented that rewinding a motor will reduce its efficiency. The capital cost of buying a replacement high efficiency motor can often be quickly recouped by savings in operating costs.

The solution

The solution is to adopt a motor management policy that gives clear guidelines on when to purchase high efficiency motors. In effect, the decision on whether to rewind or replace is taken long before the motor fails. The time spent creating a motor management policy will be paid for many times over by reduced energy costs, less downtime and lower stock inventories.

High efficiency motors make a difference

The importance of energy efficiency to a motor's life cycle costs is often not well understood. It is startling to realise that an 11kW motor costing about £500, can consume over £50,000 worth of electricity over a 10 year operating life. Energy efficiency is far more significant to the bottom line than the purchase price. Even small differences in efficiency make big differences to a motor's life cycle costs; 3% efficiency improvement can reduce losses by up to 40%.

When to upgrade

Normally, the most practical time to upgrade is when a motor fails. As a rule of thumb, small motors and motors with long running hours should be replaced. Large motors, motors that only run occasionally and motors in imperial frame sizes can be rewind.

New motor assessment

Ensure your motor is correctly dimensioned and



Rewinding should only be considered for large motors and motors with low annual running hours

specified for the task and save energy as well as capital costs. Our partners can help.

Planned maintenance assessment

Machinery needs regular maintenance to maintain performance and efficiency; inefficiency costs money and causes breakdowns. Our partners can assess the service requirement for your plant to prevent unplanned stoppages and save energy.

Manage your motors

- 1 Collect motor data
- 2 Compile a site inventory
- 3 Identify the motors using the most energy
- 4 Decide the best course of action for each application
- 5 Make the changes and measure the savings
- 6 Establish a company policy

Source: ETSU

Our partners can help you save energy costs by identifying inefficient motors that should be replaced straight away for a fast payback against future savings. They also identify which motors should be replaced when failed, and which ones can be rewind.

New for Old

Replacement Drive Scheme

step2

the savings

Replacement Drives Programme

If an average 1980s motor and AC drive is replaced with an ABB high efficiency motor and state-of-the-art drive, the payback time due to lower energy consumption could be 12 to 36 months, depending on annual operating hours, energy price and the utilisation of today's drives technology, such as Flux Optimisation (see p.12). Replacing old drives brings many other benefits too:

- **More energy efficient**

Today's drives are at least 3% more efficient than their predecessors. A 75 kW AC drive from ABB's new range would consume 6,704,082 kWh of energy, at a cost of £301,684 over a 10 year period. A 75 kW drive from the SAMI STAR range would consume 6,915,789 kWh, at a cost of £311,211 over the same period. A saving of almost £1,000 per year. This assumes an electricity charge of 0.45p/ kWh.

- **Lower running costs**

It is highly likely that older drives from any manufacturer will start to suffer breakdowns. While ABB and its partners offer a full spares and repairs service, it could be beneficial to cut your maintenance bill and replace the drive.

What is the Scheme?

The **Replacement Drive Scheme** offers you the chance to replace your existing drives with one from ABB's latest range of advanced technology AC drives, with virtually no disruption to your process.

What is involved with the Replacement Drive Scheme?

ABB and its partners provide a comprehensive service to ensure that the replacement of any drive, irrespective of manufacturer, causes you minimum disruption.

Assessment

- An Energy Appraisal (see page 4-5) determines the cost benefit of replacing your existing drives. In addition, an engineering survey of the application is carried out to determine the feasibility of replacing the drive.



Adaptation

- The survey takes into account all aspects of the application including I/Os, cabling, harmonics, load type. This determines the most effective way to replace the existing drive and any engineering that may be needed.

Selection

- Knowing the details of the application and of your old drives, enables ABB to make the best selection from the world's most extensive range of AC drives. If the drive being replaced is an early ABB model, then using ABB's innovative Replacement Drive Calculator will rapidly determine the most suitable drive.

Removal/Disposal

- ABB, or one of its partners, will remove your old drive and ensure that it is disposed of to the latest environmental standards. Where practical, parts of the drive will be recycled.

Installation

- Fully trained service engineers can carry out the installation of your new drive.

Commissioning

- Along with commissioning of the drive, ABB, or one of its partners, will train your engineering teams in the correct use and maintenance procedures for the new installation.

Service

- ABB's Service Contracts provide 24/365 technical support backed up by the most extensive spares stockholding of any drives manufacturer.

Finance your savings

There are several ways in which you can buy your AC drive and/or motor package including:

- Own cash resources
- Bank borrowing
- Hire purchase
- Finance lease
- Operating lease

While each has its own merits, it is important that you select the finance package that is right for you.

But what is important to note is that the UK government's Enhanced Capital Allowance (ECA) scheme (see page 11-13) does not support the use of leasing arrangements.

To help, ABB offers a great new way to buy a new drive, **Pay As You Save**, which qualifies for ECA's.

Pay for your new drives with the energy you save. Transfer the cost from your capital expenditure to your operating expenditure.

Welcome to **Pay As You Save**

Call FREE on 0700 2 266722

Or visit the website at www.abb.co.uk/energy

Pay As You Save is a new way to buy your next drive for far less per month than you probably imagined. With Pay As You Save, we work out the energy saving potential of your application, arrange the finance and deliver the drive straight to your door.

- You call ABB
- We carry out a 7-stage Energy Appraisal
- You choose the ABB drive type you want
- We quote you a monthly payment
- We deliver your drive to your door

Pay As You Save is a whole new way to buy your next drive

Firstly, you choose the drive that you want. Then we calculate a 12 month payment plan, the cost of the new drive is then offset by the energy savings.

You can even choose to have all the servicing and maintenance included.

For more details, please refer to the typical example on page 9.

So. A new drive for less per month than you



would have dreamt possible. And the option to have service and maintenance included.

Pay As You Save's additional benefits

Pay As You Save is more than just a new way to buy a drive. It comes with a range of benefits and extras that make it an ideal way of buying a new drive:

Routine maintenance

You can avoid those unexpected bills and include the costs of routine servicing in the monthly payment and enjoy fixed cost drives.

No deposit

There's no need for a deposit. You can simply start paying monthly from the day you take delivery of your drive.

Breakdown and worldwide warranty

Your new drive comes with a full 12 month, "no quibble" worldwide warranty cover. Which means should the unthinkable happen and the drive malfunction, then ABB's local service team will repair or replace the drive with no argument.

Part-exchange service

We can even take in your current ABB drive as a part-exchange against your new drive, subject to finding out a few details first!



Complete sales back-up

With Pay As You Save, as with the purchase of all ABB products, you can visit an ABB Channel Partner, or have one visit you, at any time to get hands-on experience of the benefits of ABB's drives.

You simply call 0700 2 266722 and one of our engineers can give advice on the right drive for you and quote you a monthly cost.

No hard sell. Just good advice.

No hidden costs

With Pay As You Save there are no unexpected charges or costs. Not at the start. Not during the agreement. And none at the end. You pay the same monthly amount every month.

Typical example

An Energy Appraisal determines a saving of £1,120 per month on a particular 250 kW application. If a 250 kW drive costs £19,620, then with Pay As You Save, the drive can be purchased over 12 months while the savings on the energy bill offsets the actual purchase cost of the drive. The plant will have the option of spending this "saved money" on an extended credit period and pay for the drive.

The initial capital expenditure is eliminated and for the first 12 months the energy savings are offset against the payments.

On completion of the 12-month repayment period, the plant will have new energy efficient equipment and their operation costs will fall dramatically, all by avoiding a large initial capital outlay.



Choose the most energy efficient products

Motors

High efficiency electric motors are generally 3% better in efficiency than basic designs. Using such motors would help to reduce CO₂ emissions by up to 2 million tonnes per annum, while reducing the UK industrial electricity bill by up to £120 million.

ABB's high efficiency motors satisfy the market demand for reduced energy costs without an excessive capital cost penalty to the user.



M3000

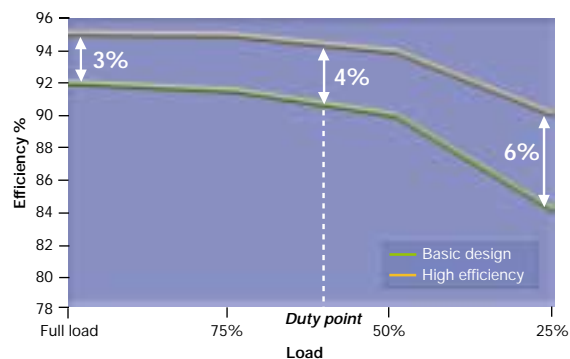
A complete range of the highest efficiency class, EFF1, is available within the M3000 range, with a wide range of variants for process industries, from 11 to 710 kW in cast iron or 0.18 to 75 kW in aluminium

M2000

A full range of energy efficient motors in EFF2 class with standard features.

Effect of reduced or varying load

Motors generally run at 65% of full load. The graph shows how the high efficiency motor maintains efficiency across a greater load range, whereas a basic design motor would incur further losses.



Capital cost versus running cost

Rating	18.5kW	75kW	250kW
Capital cost	£622	£2680	£8840
Typical efficiency	90%	92%	94%
Daily running cost	£22	£103	£276
Time to consume own cost (days)	28	26	32

Assuming continuous duty at a tariff of £0.045/kWh

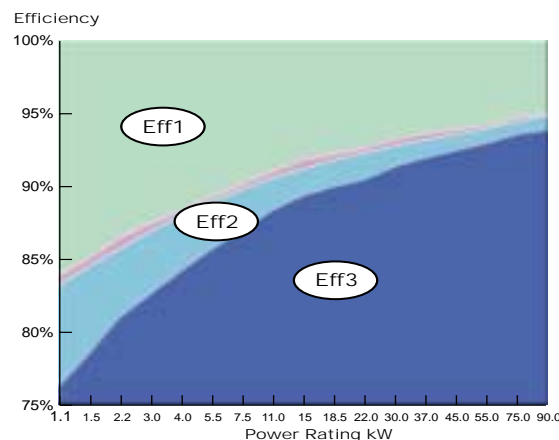
Efficiency has a greater effect on the overall cost of a motor compared to its capital cost. An 18.5 kW motor typically costs £622 to buy, yet over £80,000 to run over 10 years. Here we show the capital cost of various motors with their running costs and how long it takes to consume their own capital cost in energy

CEMEP

A new Europe-wide agreement, signed by major motor manufacturers like ABB, ensures that the efficiency levels of electric motors made in Europe are clearly displayed. It establishes 3 classes:

- EFF1 identifies high efficiency motors, such as those available in the M3000 range
- EFF2 is for energy efficient motors
- EFF3 is for low efficiency

EFF1 motors, chosen from the Energy Technology Product List (see p.3), qualify for ECA's regardless of application. This reduces the overall capital costs of purchasing energy efficient motors.



CEMEP's efficiency levels apply only to two and four-pole, three-phase squirrel cage induction motors, rated for 400V, 50Hz with S1 duty class and IP 55 or IP 54 design

The Enhanced Capital Allowance Scheme Eligibility Criteria

Motors

Cage induction, fixed speed motors between 200 and 750 V/ 50 Hz, are eligible for ECAs, regardless of application, provided they meet or exceed the energy efficiency criteria (below).

In addition, all multi-speed motors used in liquid or gaseous movement applications are eligible.

All motors on the Energy Technology Product List (see www.eca.gov.uk) have reached the following standards:

- All 2- and 4-pole motors between 1.1 - 90 kW meet the CEMEP EFF1 efficiency ratings (shaded grey).
- All 2 and 4 pole motors between 90 - 400 kW and 6- and 8-pole motors between 5.5 - 315 kW meet the Water Industry Mechanical & Electrical Specifications (WIMES).

Table 1: Minimum efficiencies at Full Load

Power (kW)	2 Pole	4 Pole	6 Pole	8 Pole
1.1	82.8	83.8		
1.5	84.1	85		
2.2	85.6	86.4		
3	86.7	87.4		
4	87.6	88.3		
5.5	88.6	89.2	86	86
7.5	89.5	90.1	89	89
11	90.5	91	89	89
15	91.3	91.8	90	90
18.5	91.8	92.2	90	90
22	92.2	92.6	91.5	91.5
30	92.9	93.2	92	92
37	93.3	93.6	93	93
45	93.7	93.9	93.4	93.4
55	94	94.2	93.8	93.8
75	94.6	94.7	94.3	94.3
90	95	95	94.5	94.5
110	95	95.1	94.8	94.8
132	95	95.5	95	95
150	95.8	95.7	95.5	95.5
185	96.1	95.9	95.6	95.6
200	96	95.8	95.5	95.5
250	96	96	95.9	95.9
280	96.3	96.3	96	96
315	96.4	96.4	96	96
355	96.4	96.5		
400	96.5	96.5		

Replacement motors

If you purchase a motor from the Energy Technology Product List you will be able to claim ECAs on the cost of that motor along with any capital costs incurred directly on the installation of the motor. In order to do this you will need to

keep a record of your expenditure, i.e. your invoice statement in order to claim on the correct amount. Do not use the amounts in the table 2 below.

Capital expenditure

Where you acquire a larger item of plant or machinery that has a qualifying motor already installed, the proportion of the cost that relates to the motor will attract ECAs. Therefore, you will need to establish whether the motor installed with the secondary piece of equipment is eligible.

Most of ABB's range of motors qualify for ECAs. The following is an extract from ABB's motor catalogue.

Table 2: 4 poles 1500 rpm 50Hz, Aluminium motor

Power (kW)	Motor Ref	List Price/£* Foot mounted (see note below)	Incorporated ECA/£** (see note below)
1.1	90 L	£188	£407
1.5	100 LA	£228	£480
2.2	100 LC	£259	£569
3	112 M	£330	£608
4	112 M	£330	£757
5.5	132 S	£423	£965
7.5	132 M	£546	£1,116
11	160 M	£830	£1,696
15	160 L	£979	£1,967
18.5	180 M	£1,150	£2,369
22	180 L	£1,380	£2,723
30	200 MLB	£1,810	£3,502
37	225 SMB	£2,200	£4,572
45	225 SMC	£2,690	£5,385
55	250 SMB	£3,280	£5,953
75	250 SMC	£4,140	£7,320

* The amount that you are able to claim when purchasing motors independent of plant or machinery is the full motor cost plus installation costs incurred. (invoices and receipts will be required). For full details please see <http://www.eca.gov.uk>

** The amount that you are able to claim when buying a secondary piece of equipment that is incorporated with an eligible motor is given in the table above. It incorporates the costs of the motor, enclosures, mountings, terminal boxes and other miscellaneous modifications and extras as well as installation. Installation includes cabling, wiring, end shields, safety guards, mounting, crainage, alignment, shimming and balancing. Where you have purchased a qualified item that is not already incorporated into a larger item of plant and machinery you must use the price paid for the qualified component as the base of your claim. See www.eca.gov.uk

In addition to standard motors, other types of motors qualify, such as dual wound, non-sparking and increased safety motors, and flameproof motors, which refers to EEx d or EEx de type motors.

STOP PRESS

ECAs quoted here were correct at the time of going to press, but were under review by the DETR and may therefore change.

step 4

the products

Choose the most **energy efficient** products

Drives

AC drives reduce energy wastage in all phases of operation. Changing production volumes by mechanical means is very inefficient. With AC drives, this can be achieved by changing the motor speed. Particularly in pump and fan applications, this saves lots of money, because the shaft power is proportional to the cube of the flow rate. AC drives save energy because the motor does not use more electrical energy than required.

For all applications, ABB offers the most



extensive AC drive product range available, ranging from 0.12 kW to over 5MW

Comp-AC

low power drives

0.12 kW to 37 kW

ACS 600

2.2 kW to 4.3 MW

ACS 1000

Medium voltage

315 kW to 5 MW



Reduced maintenance through smooth starting methods



Accurate process control through infinitely variable stepless speed control



Full motor protection protects cables and motor against many faults



Soft start and stopping avoids any mechanical damage to the process



Wide range of speed, torque and power gives accurate speed control that results in process optimisation and an improved quality end product



Improved power factor helps maintain motor efficiency at reduced load



EMC protection against interference with other sensitive equipment



Production increase through increased top speed (application dependent)

Call 0700 2 266722

for your FREE drives catalogue - complete with prices

Direct Torque Control

Drives within ABB's ACS 600 and ACS 1000 ranges use the revolutionary Direct Torque Control (DTC) motor control platform. DTC gives even better energy savings than traditional PWM drives, as well as more accurate speed and torque control across a wider speed range.

A Flux Optimisation feature saves up to 30% additional energy compared to standard AC drives on pump, fan and other centrifugal applications.



Regenerative drives

Further energy savings can be achieved by using regenerative drives. These drives use the energy produced by a decelerating load. Large energy savings can be achieved in applications where energy from the braking of the motor can be fed back into the network and used by other applications. In addition, large braking resistors, which dump waste heat into the atmosphere, can be eliminated, freeing up floor space and reducing the need for ventilation.

The Enhanced Capital Allowance Scheme Eligibility Criteria

Drives

Drives eligible under the ECA scheme are only those installed for liquid or gas movement applications such as pumps, fans and compressors. The scheme is limited to those controllers designed specifically to electronically vary the speed of a motor including:

- controllers for switched reluctance motor drive systems
- integrated motor/drive packages
- variable frequency controllers (inverters)

Soft starters and dedicated energy optimisers which optimise induction motor excitation losses for single-speed motors are excluded.

If you purchase an AC drive from the list of qualifying drives you can claim ECAs on the cost of that drive along with any capital costs incurred directly on the installation of the drive. You must keep a record of your expenditure, e.g. an invoice statement, in order to claim on the correct amount.

Incorporated drives

For a larger item of plant or machinery that has a qualifying drive already installed, the proportion of the cost that relates to that drive will attract ECAs. The amount that you are able to claim on when buying a secondary piece of equipment that is incorporated with an eligible drive is given in the table.

It includes provision for supply of the drive and typical enclosure (including measures to meet EMC directives) or the cost of integrating it into other equipment. Other costs for associated control equipment such as programmable logic controllers (PLCs), transformers etc, are not included.

How to claim

ECAs are claimed in the same way as other capital allowances on the Corporation Tax Return for companies and the Income Tax Return for individuals and partnerships.

Formal definitions

Formal definition of drives eligible under the scheme are only those installed for liquid or gaseous movement applications and which employ electronic means to vary the speed of an electric motor used in such applications.

The nature of the control method employed by all types of controller shall be such as to allow the motor to be used for the purpose for which it is intended without detracting from the performance of motor.

Controllers in which the speed of the motor rotor cannot be sustained for at least one hour, at 70% of the rated speed indicated by the motor manufacturer, without causing motor overheating, and those controllers which alter the speed of a shaft connecting to the driven load independently from the motor rotor shaft are not eligible under the scheme.

The table shows an extract from ABB's Drives and Motors Catalogue and highlights the Enhanced Capital Allowance that can be obtained for a selection of ACS 400 and ACS 600 drives.

Table			
Power kW	Drive Ref	List Price/£	Incorporated ECA/£
7.5	ACS401-0009-3	£912	£1,628
15	ACS401-0016-3	£1,429	£2,494
30	ACS401-0030-3	£2,437	£4,057
55	ACS601-0070-3	£5,086	£7,178
75	ACS601-0100-3	£5,766	£8,102
90	ACS601-0120-3	£6,495	£9,889
132	ACS604-0170-3	£10,004	£12,469
160	ACS604-0210-3	£12,092	£14,911
200	ACS604-0260-3	£14,117	£19,980
250	ACS604-0320-3	£15,837	£19,980



Drives & Motors in Action

AC drives save over 20 million tons of CO₂

ABB has delivered almost one million AC drives during the last 20 years. It is believed that most of the units delivered during the last 10 years are still in use. Adding together the savings in pumps, fans, conveyors, mixers etc. results in:

- **Energy saved = 46 billion kWh/year**
- **Reduction in CO₂ emissions = 20 billion kg/year**
- **Other benefits:**
 - Improved process controls*
 - Reduced maintenance cost*
 - Reduced reactive power*



Manufacturer changes from throttling to AC drives

A UK domestic appliances manufacturer invested in AC drives to pump borehole water directly into the mains using a 30 kW motor. The drive installed on this motor resulted in a 30% saving and the drive installed on the raw water pump produced savings of 88%

- **Energy saved = 191,000 kWh/year**
- **Reduction in CO₂ emissions = 84,040 kg/year**
- **Other benefits:**
 - Payback period of 14 months*
 - Reduced stress to the supply*
 - Reduced reactive power*



Bakery changes from constant speed to AC drives



In a bakery, two depanners use a vacuum system to remove bread from the baking trays and tins. The vacuum is generated in chambers using fans driven by standard 15 kW AC motors. AC drives were installed to control the fan motors, and hence the vacuum generated.

- **Energy saved = 135,000 kWh/year**
- **Reduction in CO₂ emissions = 59,400 kg/year**
- **Other benefits:**
 - Bread roll damage minimised*
 - Reduced maintenance cost*

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Bank chooses drives for computer centre cooling pumps



A British bank has invested in four AC drives in the cooling system of its computer centre to control the speed of four pumps, totalling 240 kW. The pumps previously operated at constant speed.

- **Energy saved = 1,000,000 kWh/year**
- **Reduction in CO₂ emissions = 440,000 kg/year**
- **Other benefits:**
 - Improved cooling control*
 - Payback in less than a year*
 - Reduced reactive power*

Sugar centrifuge uses AC multidrive instead of two-speed

A sugar mill replaced its two-speed motor control of six centrifuges - each rated 200 kW - with an AC multidrive with PLC control. The benefit of a common dc-bus transferring electrical energy from the decelerating centrifuges to accelerating ones resulted in remarkable energy savings.

- **Energy saved = 2,880,000 kWh/year**
- **Reduction in CO₂ emissions = 1,267,200 kg/year**
- **Other benefits:**
 - Optimum speed for process*
 - Smooth starting - less wear*
 - Less reactive power required*



Wastewater pumping changes from on-off control

The efficiency of a Scottish wastewater pumping station has more than doubled since two AC drives were installed. This arrangement replaces simple on/off control of the motors, with the level monitored with a mechanical float.

- **Energy saved = 130,000 kWh/year**
- **Reduction in CO₂ emissions = 57,200 kg/year**
- **Other benefits:**
 - Pumping index up from 14 m³/kWh to 30 m³/kWh*
 - Maintenance cost reduced*
 - Risk of overflowing is minimised*



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Water booster pump uses two AC drives

A UK water utility designed a booster pumping station to maintain a minimum suction head and to output a maximum of 17 million litres per day. Two variable speed pumps (total 680 kW) were needed instead of four fixed speed pumps. The energy saving is approximately 34%.

- **Energy saved = 990,000 kWh/year**
- **Reduction in CO₂ emissions = 435,600 kg/year**
- **Other benefits:**
 - Lower construction cost*
 - Better water pressure control*
 - Less reactive power*



Boiler extract fans replaced dampers



At a UK power plant, the induced draft (ID) fans (200 kW + 150 kW) were running at full speed with flow control by dampers. As the boiler ran at low loads for long periods energy could be saved using variable speed control.

- **Energy saved = 1,000,000 kWh/year**
- **Reduction in CO₂ emissions = 440,000 kg/year**
- **Other benefits:**
 - Noise level reduced from 89 dBA to 77 dBA*
 - Payback period of just 16 months*

Broadcasting studio fans replace on-off control

A television studio's air conditioning fan motors ran at constant speed and were manually started and stopped. This was unsatisfactory for many reasons and an AC drive was installed for two 7.5 kW motors.

- **Energy saved = 30,000 kWh/year**
- **Reduction in CO₂ emissions = 13,200 kg/year**
- **Other benefits:**
 - Stable pressure control*
 - Lower air conditioning noise level*
 - Improved working environment*



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Mining company uses high efficiency motors



A Swedish mining company is using a database over its motor population to ensure that failed motors are replaced with new high efficiency ones. The aim is to reduce energy consumption over the life cycle, which in many cases extends well over a decade.

- **Energy saved about 2,000,000 kWh/year**
- **Reduction in CO₂ emissions 880,000 kg/year**
- **Other benefits:**
Lower energy consumption cuts the cost of cabling and associated equipment by up to 20%.

Energy waste identified by water company

A UK water company cut its motor electricity costs by 6% following the introduction of a motor management policy. The utility uses about £25 million of electricity per year, a large proportion of which is consumed by pump motors. This followed a test, which showed that in several cases, a fully functional motor could be replaced with a high efficiency unit and still achieve payback in less than two years.

- **Energy save about 24,000 kWh/year**
- **Reduction in CO₂ emissions 10,560 kg/year**



Refinery introduces motor management policy

A petrochemicals complex in Scotland has introduced a motor management policy, aiming to gradually upgrade its equipment for better efficiency when a motor fails. Rewinding is considered for large motors and motors with short running hours, while small motors and motors with long running hours are replaced.

- **Energy save about 780,000 kWh/year**
- **Reduction in CO₂ emissions 343,200 kg/year**
- **Additional benefits:**
A consignment stock held by a distributor within half a kilometre of the complex ensures speedy motor replacement.



How to make an impact on

Throughout 2001 and beyond, ABB, along with its Channel Partners, will be hosting and participating in a series of events including:

Breakfast Briefings

Discover the very latest information on Climate Change Levy, Enhanced Capital Allowances and how you can save your company substantial sums of money. These Breakfast Briefings are designed for all those who have responsibility or an interest in the energy policies of a business. Please complete the form below or visit www.abb.co.uk/energy to register your interest.

Technology Days

Join one of ABB's cutting edge technology presentations, designed to bring you up to speed with all the latest drives and motors thinking, standards, product technology and more. These stimulating and thought provoking days are limited to 50 persons. Please complete the form below or visit www.abb.co.uk/energy to register your interest.

Energy Systems Trade Association (ESTA)

ESTA is the UK's leading Energy Management trade association and focuses on demand side energy efficiency of buildings, building services and process services in the non-domestic sector. ABB is one of the members of its Energy Efficient Drives Group.

ESTA has had significant involvement in the consultation processes with UK Government and the numerous initiatives such as Climate Change Levy, Building Regulations and Enhanced Capital Allowances and can advise on how to achieve savings greater than the cost of the Climate Change Levy.

A series of seminars, conferences and exhibitions are planned throughout 2001. For more details, please complete the form below or visit www.abb.co.uk/energy to register your interest.

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Please photocopy this page and faxback to 0161 434 9317

I am interested in receiving dates for the forthcoming event.

Name _____

Job title _____

Company _____

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Alternatively send a blank email to energy@gb.abb.com for a list of all dates

Useful websites

- www.environment.detr.gov.uk/climatechange - offers information about the Climate Change Levy
- www.unfccc.de - general information on climate change and the Kyoto agreement
- www.eca.gov.uk - latest updates from the Government on Enhanced Capital Allowances
- <http://iamest.jrc.it/projects/eem/eurodeem.htm> - about the European scheme for labelling of energy efficient motors (CEMEP)
- www.pumpcentre.com/wimes.htm - about the Water Industry Mechanical & Electrical Specifications
- www.energy-efficiency.gov.uk - the Energy Efficiency Best Practice programme
- www.esta.org.uk - information about the Energy Efficient Drives Group

Useful publications

- "Energy savings with motors and drives" - Good Practice Guide available from the Energy Efficiency Best Practice Programme
- "Energy saving with variable speed drives" - produced by the Energy Saving Trust
- Direct Torque Control - Technical Guide No.1 - an ABB publication
- Guide to Variable Speed Drives - Technical Guide No. 4 - an ABB publication

White papers

- "Reducing an energy bill that costs the earth" - technical article written by ABB
- "The Power to Choose" - a guide to assist the development of your own corporate motor management policy
- "Improving motor efficiency for a better environment" - Ian Rennie, ABB Automation, ABB Review 1/2000

Further references

For the most up to date details on energy efficiency issues or for contact information for any of the above references visit:

www.abb.co.uk/energy

Or Peter Myatt on 0161 445 5555

Email: energy@gb.abb.com -

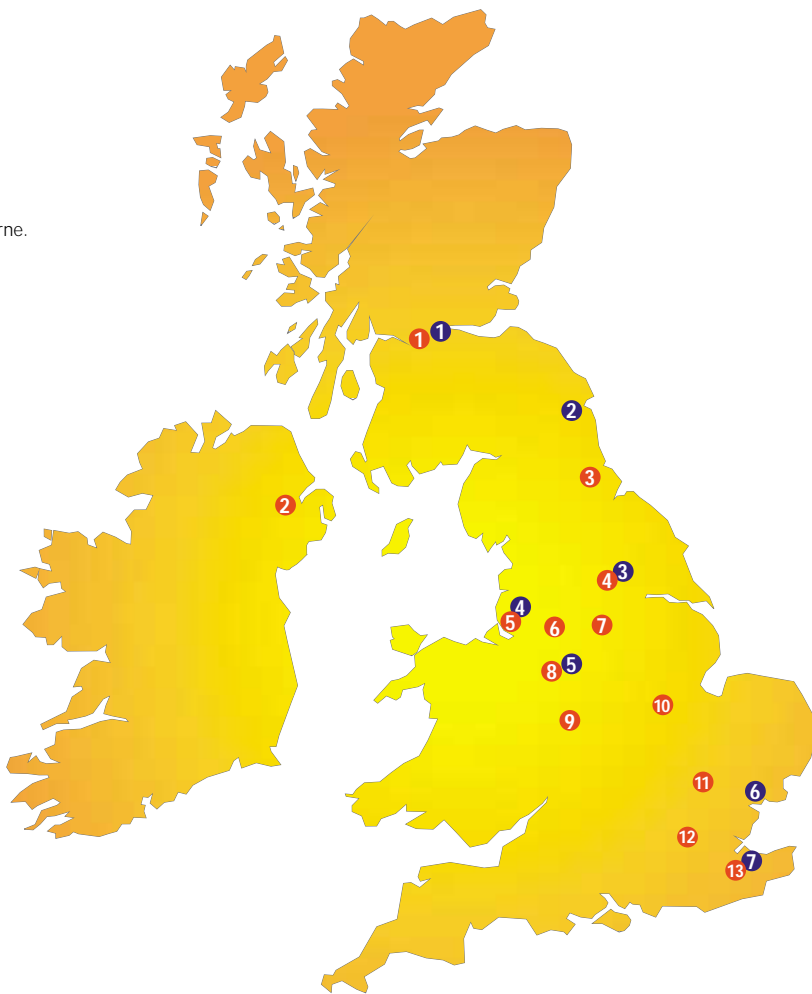
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- 1 Fraser & MacDonald Electric Motors, Glasgow.
Tel: 0141 445 3874
- 2 Thrige-Scott, Belfast.
Tel: 028 9045 7225
- 3 Team Rewinds, Gateshead.
Tel: 0191 482 3374
- 4 Halcyon Electrical Components, Pudsey, W Yorks.
Tel: 01132 361 509
- 5 Central Electrical (Armature Winding) Co, Liverpool.
Tel: 0151 546 6000
- 6 Beta Power Engineering, Stockport, Cheshire.
Tel: 0161 432 9995
- 7 Francis Chambers & Co, Rotherham.
Tel: 01709 522 175
- 8 H.G. Rewinds, Stoke On Trent.
Tel: 01782 262 525
- 9 Aston Edwards Electrical, Birmingham.
Tel: 0121 327 4064
- 10 Coventry Elect Repairs (Leics), Leicester.
Tel: 0116 242 2322
- 11 F A Heasell & Sons, Royston, Herts.
Tel: 01763 243 298
- 12 EMR Silverthorn, Wembley.
Tel: 020 8908 4070
- 13 Mid-Kent Electrical Engineering, Sittingbourne.
Tel: 01795 471 089

- 1 EDC (Scotland) Ltd, Scotland.
Tel: 01294 835 000
- 2 Slater Drive Systems, North.
Tel: 01661 835 566
- 3 Halcyon Drives, Pudsey, W.Yorkshire.
Tel: 01132 361 509
- 4 Central Electrical, Merseyside.
Tel: 0151 546 6000
- 5 Sentrige Control, Midlands.
Tel: 024 7655 3303
- 6 Gibbons Drive Systems, East Anglia.
Tel: 01621 868 138
- 7 MKE Drive Systems, South East.
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