

# Pipework insulation equipment

A guide to equipment eligible for  
Enhanced Capital Allowances



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## Introduction

ECAs are a straightforward way for a business to improve its cash flow through accelerated tax relief. The scheme encourages businesses to invest in energy saving plant or machinery specified in the ETL to help reduce carbon emissions, which contribute to climate change.

The Energy Technology List (ETL) is a register of products that may be eligible for 100% tax relief under the Enhanced Capital Allowance (ECA) scheme for energy saving technologies<sup>1</sup>. The Carbon Trust manages the list and promotes the ECA scheme on behalf of government.

This leaflet gives an overview of pipework insulation equipment specified on the ETL and aims to help businesses present a sound business case for purchasing energy saving equipment from ETL manufacturers and suppliers.

## Background

The ETL comprises two lists: the Energy Technology Criteria List (ETCL) and the Energy Technology Product List (ETPL). The ETCL defines the performance criteria that equipment must meet to qualify for ECA scheme support; the ETPL is a qualified list of products that have been assessed as being compliant with ETCL criteria.

However, pipework insulation is an exception to the rule and is not listed on the ETPL; spending on all pipework insulation plant and machinery which meets the appropriate criteria in the ETCL can qualify for an ECA. Businesses should therefore seek confirmation from their pipework insulation installer that the installation complies with ETCL criteria prior to purchase.

<sup>1</sup> Eligibility for ECAs is based on a number of factors. Visit [www.eca.gov.uk/energy](http://www.eca.gov.uk/energy) to find out more.

## Setting the scene

Carbon savings from the use of pipework insulation can be realised on both heated and cooled pipework. Typically, heated pipework is used for hot water delivery, heating systems and processes. Chilled pipework is mostly associated with air conditioning systems, but is also used in commercial refrigeration (supermarket display cabinets) and numerous other process applications.

Because most materials used for manufacturing pipes are highly conductive, heat losses and gains can be very large when pipes are left un-insulated. This is particularly the case when pipework runs at a temperature very different to its surroundings and is in use for large proportions of the year. These heat losses and gains increase the amount of energy needed to maintain the pipework at the required temperature and can therefore lead to increased energy bills.

The Thermal Insulation Manufacturers and Suppliers Association (TIMSA) reported that, in 1999, emissions that were saved through the existing use of pipework insulation exceeded 300 million tonnes of CO<sub>2</sub><sup>2</sup>. It also reported that the potential exists for at least a further 15-20 million tonnes of savings by tackling the remaining un-insulated pipes and upgrading insulation levels in the process sector beyond the thicknesses required for personnel protection (a health and safety provision) to the levels prescribed in BS 5422 (1990).

If the further revision of BS 5422 in 2001, which is the standard now recognised by the ECA scheme, was fully implemented, it is estimated that a further 5-8 million tonnes of CO<sub>2</sub> per year could be saved, which is equivalent to 1-2% of the overall UK baseline emissions in 1990<sup>3</sup>. BS 5422 (2001) is still a voluntary/optional standard, but pipework insulation has been included within the ECA scheme to encourage compliance to the upgraded 2001 standard owing to its considerable carbon saving potential.

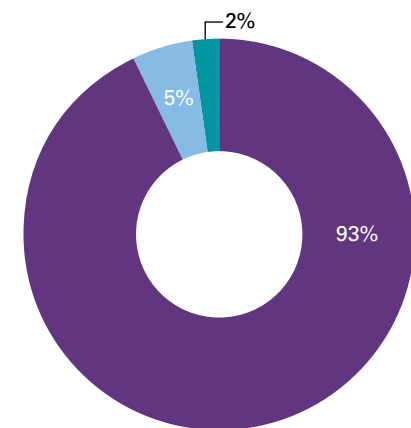
### Energy losses from a typical five metre pipe run operating continuously at 75°C

A typical 25mm heating pipe loses heat at a rate of 99Watts/m. This means that if it runs continuously for 24 hours it accounts for 11.88kWh of lost energy. This is equivalent to running a three-bar heater for nearly four hours per day at a cost of up to 88 pence per day, or nearly £325 per year.

Insulating the pipework to the standards set out in BS 5422 (2001) reduces heat losses by nearly 90% and will save between £50/year and £300/year in energy costs depending on fuel type for this nominal five metre pipe run.

All this would be achieved for an initial investment cost of around £32. Even when pipework is not operational throughout the year or when some of the heat lost through the pipework heats occupied spaces, the payback periods are typically between one and two years.

**Figure 1** Potential annual savings from installed UK pipe insulation (330 million tons CO<sub>2</sub>-equivalent)



- Estimated pre-2000 annual savings
- Increasing compliance to pre-existing BS 5422 (1990) standard
- Upgrading of BS 5422 in 2001 to make additional savings

<sup>2</sup> Current environmental benefits arising from BS 5422 and the identification of areas for further gains (Caleb Management Services Ltd. for TIMSA – 1999).

<sup>3</sup> As determined by the UK Government's reporting to the United Nations Framework Convention on Climate Change (UNFCCC) for the reference year of 1990.

## Benefits of purchasing ETL-listed products

Although the potential energy and cost savings are substantial for most pipework insulation installations, in some instances, arguments emerge to suggest that the heat lost by a pipe within a building envelope serves to provide 'useful heat' to a building. Although this is theoretically valid at certain times of the year, it is rarely the case in practice. In commercial buildings, 'zoning' is often practised, and the key element in this approach is control over sources of heating and cooling. For example, it is unfavourable to have air conditioning units working against heat losses from un-insulated hot water pipes.

The following example outlines the benefits of specifying pipework insulation equipment eligible under the ECA scheme on an actual insulation project involving a small pharmaceutical laboratory building. The table provides information on the pipework involved and indicates that compliance with BS 5422 (2001) created an overall energy saving of 38% based on a utilisation value of 3,360 hours/year when compared to BS 5422 (1990).

When replacing pipework insulation, businesses are often tempted to opt for that with the lowest capital cost; however, such immediate cost savings can prove to be a false economy. Considering the life cycle cost before investing in new pipework insulation can help reduce costs and improve cash flow in the longer term.

The ECA scheme provides businesses with 100% first year tax relief on their qualifying capital expenditure. This means that businesses can write off the whole cost of the equipment against taxable profits in the year of purchase. This can provide a cash flow boost and an incentive to invest in energy saving equipment which normally carries a price premium when compared to less efficient alternatives.

Using this leaflet you can calculate the benefits of investing in qualifying ETL energy saving equipment over non qualifying equipment. The calculation includes the benefits of accelerated tax relief, reduced running costs, increased efficiency, lower energy bills and reduced Climate Change Levy payments (if applicable), which in turn helps reduce payback periods.

## Pipework insulation equipment eligible under the ECA scheme<sup>4</sup>

BS 5422 (2001) covers four applications: frost protection, condensation control, personnel protection, and energy saving. Although all four applications rely on the thermal insulating value of the material, only pipework insulation for energy saving is covered within the scope of the ETL.

The standard contains specific tables targeted at energy saving, and the insulation thicknesses defined within the tables have been termed 'environmental thicknesses'. The following table indicates the relevant tables within the current standard:

BS 5422 (2001) Reference	Energy saving
Refrigeration (Clause 6)	Table 6
Chilled water (Clause 7)	Table 9
Non-domestic heating/hot water (Clause 8)	Tables 12 & 13
Domestic heating/hot water (Clause 9)	Table 14
Process pipework (Clause 10)	Table 15
Additional guidance	Annex A & F

As specific products are not included in the ETL, suppliers of pipework insulation are asked to provide evidence to their purchasers to show the following:

1. Relevant thermal conductivity data at mean temperatures as determined by the environmental tables.
2. Confirmation that their staff are suitably trained to provide confirmation of compliance to BS 5422 (2001) when pipework insulation scenarios are presented to them.

Space limitations often impact on the thickness of insulation that can be used, meaning that the choice of available materials is limited. The result is that to comply with ECA criteria, more efficient insulation types may be required.

### Information for purchasers

For further information about the ECA scheme, the Energy Technology List (ETL) and other Technology Information Leaflets in the series please visit [www.carbontrust.co.uk/eca](http://www.carbontrust.co.uk/eca), contact the Carbon Trust on **0800 085 2005** or email [customercentre@carbontrust.co.uk](mailto:customercentre@carbontrust.co.uk)

<sup>4</sup> The descriptions of the pipework insulation equipment given in this leaflet are examples only. The formal criteria and details governing the ECA scheme can be found at [www.eca.gov.uk/energy](http://www.eca.gov.uk/energy).

## Calculating the payback of your investment

Based on the operating conditions above, indicative savings can be calculated for replacing your existing equipment with either ETL-listed equipment or non-ETL-listed equipment.

The accelerated tax relief and cash flow benefit provided by the ECA, together with the life cycle cost savings from ETL-listed equipment, aid in bridging the price premium and shortening the investment payback period<sup>5</sup>.

To calculate the payback period for ETL-listed equipment and non-ETL-listed equipment for comparison you will need:

- The unit price (kW) of the energy your business consumes.
- Estimated energy usage (kW) for the ETL proposed equipment solution(s), which the manufacturer or supplier should be able to help you with.
- Estimated energy usage (kW) for the non-ETL proposed equipment solution(s), which the manufacturer or supplier should be able to help you with.
- Estimated annual maintenance costs incurred by your business for the ETL-listed equipment (your manufacturer or supplier should be able to help you with estimates).
- Estimated annual maintenance costs incurred by your business for the non-ETL-listed equipment (your manufacturer or supplier should be able to help you with estimates).
- The value of the proposed capital expenditure.
- Your business's corporation tax rate.

In addition, the following information is also required:

- A copy of the Carbon Trust fact sheet *Energy and carbon conversion* (CTL004).
- Incorporation of the fact that capital allowance (CA) tax relief for non ETL equipment is 20% (10% if allocated to the 'special rate' pool) and that enhanced capital allowance (ECA) tax relief for ECA equipment is 100%.

**Step 1:** To prepare your business case for investment you first need to estimate annual energy consumption of the ETL-listed equipment and non-ETL-listed equipment.

$$\text{Annual energy consumption (kWh/y)} = \text{Equipment consumption (kW)} \times \text{Number of operating hours/year}$$

Additionally, you can calculate the carbon emissions associated with the energy consumption using either the Carbon Trust fact sheet *Energy and carbon conversion* (CTL004) or by using the tool at [www.carbontrust.co.uk/conversionfactors](http://www.carbontrust.co.uk/conversionfactors) by simply multiplying the energy consumption by the carbon emission factor for that fuel type.

$$\text{Carbon emissions} = \text{Annual energy consumption (kW)} \times \text{Emission factor (kg CO}_2\text{/kWh)}$$

**Step 2:** Calculate the annual running cost (ARC) of ETL-listed equipment and non-ETL-listed equipment.

$$\text{ARC} = \text{Annual energy consumption (kW)} \times \text{Pence/kWh} + \frac{\text{Annual maintenance cost}}{\text{cost}}$$

Step 1 and 2 can also be done for your existing equipment to calculate an ARC, in order to allow comparisons of the annual saving (step 3) between the existing equipment, the ETL-listed equipment, and the non-ETL-listed equipment.

**Step 3:** Calculate the annual saving between the ETL-listed annual running costs and non-ETL-listed annual running costs.

$$\text{Annual saving} = \text{ARC of new equipment} - \text{ARC of existing equipment}$$

**Step 4:** Calculate the tax allowance for ETL-listed equipment and non-ETL-listed equipment which will be business-specific based on the following:

- The value of your capital expenditure
- Capital allowance (CA) tax relief for non-ETL equipment is 20%. If allocated to the special rate pool it is reduced to 10%.
- Enhanced capital allowance (ECA) tax relief for ECA equipment is 100%
- The rate of corporation or income tax for your business.

<sup>5</sup> The values used in the examples given are for illustrative purposes only and do not reflect specific case studies. Anyone considering purchasing this type of equipment would be advised to also analyse the benefits that would be available based on their own circumstances. It should also be noted that the use of formally trained pipework insulation equipment technicians can provide significant energy saving benefits.

$$\text{CA tax allowance} = \text{Capital expenditure} \times 20\%^* \times \text{Rate of corporation tax}$$

$$\text{ECA tax allowance} = \text{Capital expenditure} \times 100\% \times \text{Rate of corporation tax}$$

**Step 5:** Calculate the pay back for ETL-listed equipment and non-ETL-listed equipment.

$$\text{Payback period} = \frac{\left[ \text{Capital expenditure} - \text{Tax allowance} \right]}{\text{Annual saving}}$$

To calculate the available CA tax allowance on capital expenditure beyond Year 1 you need to decrease the capital expenditure by 20% per year (10% if allocated to the special rate pool) on a reducing balance basis. Over the nine years the available CA tax allowance are shown in the table below.

**Table 1** The cash flow boost to your business of an ECA over a CA for a capital investment of £10,000

	Year								
	1	2	3	4	5	6	7	8	9
Capital Expenditure (£)	10,000	8,000	6,400	5,120	4,096	3,277	2,621	2,097	1,678
Capital Allowance (CA) @ 20% (£)	2,000	1,600	1,280	1,024	819	655	524	419	336
CA Tax Allowance	560	448	358	287	229	184	147	117	94
Enhanced Capital Allowance @100% (£)	10,000	0	0	0	0	0	0	0	0
ECA Tax Allowance	2,800	0	0	0	0	0	0	0	0

Calculations are based on 28% corporation tax/income tax and a capital allowance rate of 20%.

\* Replace with 10% if allocated to the special rate pool.



# Go online to get more

The Carbon Trust provides a range of tools, services and information to help you implement energy and carbon saving measures, no matter what your level of experience.

**Carbon Footprint Calculator** – Our online calculator will help you calculate your organisation's carbon emissions.

—▶ [www.carbontrust.co.uk/carboncalculator](http://www.carbontrust.co.uk/carboncalculator)

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**Interest Free Loans** – Energy Efficiency Loans from the Carbon Trust are a cost effective way to replace or upgrade your existing equipment with a more energy efficient version. See if you qualify.

—▶ [www.carbontrust.co.uk/loans](http://www.carbontrust.co.uk/loans)

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**Carbon Surveys** – We provide surveys to organisations with annual energy bills of more than £50,000\*. Our carbon experts will visit your premises to identify energy saving opportunities and offer practical advice on how to achieve them.

—▶ [www.carbontrust.co.uk/surveys](http://www.carbontrust.co.uk/surveys)

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**Action Plans** – Create action plans to implement carbon and energy saving measures.

—▶ [www.carbontrust.co.uk/apt](http://www.carbontrust.co.uk/apt)

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**Case Studies** – Our case studies show that it's often easier and less expensive than you might think to bring about real change.

—▶ [www.carbontrust.co.uk/casestudies](http://www.carbontrust.co.uk/casestudies)

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**Events and Workshops** – The Carbon Trust offers a variety of events and workshops ranging from introductions to our services, to technical energy efficiency training, most of which are free.

—▶ [www.carbontrust.co.uk/events](http://www.carbontrust.co.uk/events)

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**Publications** – We have a library of free publications detailing energy saving techniques for a range of sectors and technologies.

—▶ [www.carbontrust.co.uk/publications](http://www.carbontrust.co.uk/publications)

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## Need further help?



### Call our Customer Centre on 0800 085 2005

Our Customer Centre provides free advice on what your organisation can do to save energy and save money. Our team handles questions ranging from straightforward requests for information, to in-depth technical queries about particular technologies.

**The Carbon Trust was set up by Government in 2001 as an independent company.**

**Our mission is to accelerate the move to a low carbon economy by working with organisations to reduce carbon emissions and develop commercial low carbon technologies.**

We do this through five complementary business areas:

**Insights** – explains the opportunities surrounding climate change

**Solutions** – delivers carbon reduction solutions

**Innovations** – develops low carbon technologies

**Enterprises** – creates low carbon businesses

**Investments** – finances clean energy businesses.

[www.carbontrust.co.uk](http://www.carbontrust.co.uk)

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