Department for Business, Energy & Industrial Strategy

Energy Technology List
ECA SCHEME

Air-to-air Energy Recovery

A guide to energy efficient equipment listed on the Energy Technology List (ETL), that is eligible for Enhanced Capital Allowances (ECAs)

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Introduction

The ETL is a government register of energy saving products that may be eligible for 100% tax relief under the Enhanced Capital Allowance (ECA) scheme for energy saving technologies. This means that businesses can write off the whole cost of the equipment against taxable profits in the year of purchase. When you select products from the list you are choosing from amongst the most energy efficient products in the marketplace.

When replacing equipment, businesses are often tempted to opt for equipment with the lowest capital cost. However, such immediate cost savings may prove to be a false economy. Considering higher energy efficient products, means that life cycle costs are reduced, improving cash flow in the longer term.

This leaflet illustrates the benefits of investing in air-to-air energy recovery equipment which qualifies for the ETL.

The ETL comprises two lists:

- **Energy Technology Criteria List**: defines the performance criteria that equipment must meet to qualify for the ETL and for ECA scheme support;
- **Energy Technology Product List**: is the list of products that have been assessed as being compliant with ETL criteria.

Eligible air-to-air energy recovery products on the ETL can be searched at:
https://etl.beis.gov.uk/engetl/fox/live/ETL_PUBLIC_PRODUCT_SEARCH

Products must be on the list at the time of purchase in order to qualify for an ECA.

** Please note that on 29 October 2018, the Chancellor announced that the ECA and First Year Tax Credits Scheme (FYTC) will end from April 2020. Government has no plans to stop the Energy Technology List and manufacturers will be able to continue to list their energy efficient products.*

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Setting the scene

Did you know?
New air-to-air energy recovery products, such as those listed on the ETL, can deliver 10%-20% energy savings relative to older versions of the same technology.

On average, 25-35% of the energy delivered to buildings is lost through departing ventilation air streams. In more modern buildings, the proportion of airborne energy loss can be even greater due to the higher standards of thermal insulation[1]. Mechanical extract ventilation systems can account for a significant proportion of overall building heat loss, or gain.

Air-to-air energy recovery devices recover energy from warm exhaust air and transfer it to the incoming fresh air supply, or pre-cool incoming air when the conditioned space is at a lower temperature than the external environment. Selecting ETL qualifying air-to-air energy recovery devices in the air-handling units of building ventilation systems could help reduce your business' energy costs.

This could lead to significant reductions in the energy usage that would normally be needed to heat or cool air to the temperature required to achieve thermal comfort for the building occupants, or to meet precise conditions for processes.

As of 2016, under the EU Ecodesign directive, all new bidirectional ventilation units must have a heat recovery system incorporated within their design. These requirements for ventilation units were updated in 2018 and outline minimum thermal efficiency requirements (73%) for heat recovery systems in air handling units.

[1]Carbon Trust – Building Fabric guide.

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Setting the scene – air to air energy recovery devices

Air-to-air energy recovery devices

There are two types of air-to-air energy recovery devices listed on the ETL:

- **Plate heat exchangers** (or recuperators). These products comprise a heat exchanger with alternate channels for the supply and exhaust airflows that are separated by plates through which heat is conducted. They must not contain any moving parts. This category includes both cross-flow type, and counter-current flow type, plate heat exchangers. The product may be designed to recover only sensible heat, or it may incorporate a specialist material (such as treated paper or a polymeric membrane) to enable it to recover both latent and sensible heat.
- **Rotating heat exchangers** (including thermal and desiccant heat wheels). These products must consist of a circular heat transfer medium (or 'wheel') that is designed to slowly rotate within an airtight container, and to pass the exhaust air stream over one section of the wheel, and the supply air stream over the other section of the wheel in counter flow direction. The product may be designed to recover only sensible heat, or it may incorporate a desiccant material to enable it to recover both latent and sensible heat.

In this document, the baseline scenario below, has been used to calculate the potential financial (£), energy (kWh) and carbon savings (tonnes CO_2) unless otherwise indicated:

- Electricity fuel price is 12.1p/kWh and Carbon emissions is 0.35156 $kgCO_2$/kWh
- Natural Gas fuel price is 2.7p/kWh and Carbon emissions is 0.18416 $kgCO_2$/kWh

Data from BEIS 2017

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Products on the Energy Technology List:

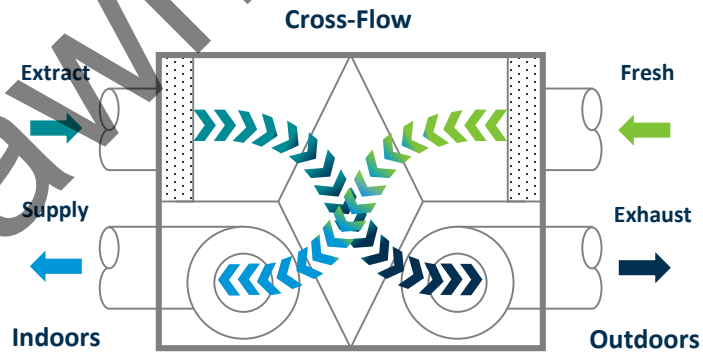
Plate heat exchangers (recuperators)

Plate heat exchangers

Plate heat exchangers are the most common type of heat exchanger found within residential ventilation heat recovery equipment. The units are relatively compact and can be easily incorporated into air handling ductwork.

Plate heat exchanger units operate by transferring thermal energy from outgoing to incoming air streams via plate heat exchange surfaces. Two types of plate heat exchangers exist: counter-flow and cross-flow. Cross-flow units are typically simpler in design, cheaper and more common, yet counter-flow offer greater efficiencies.

The construction of the unit ensures that supply and exhaust gas streams are physically separated so that cross-contamination and leakage is minimal. This can be an important consideration in certain applications such as in pharmaceutical clean rooms and hospitals.



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Products on the Energy Technology List:

Plate heat exchangers (recuperators)

Installing a specified energy saving ETL plate heat exchanger at a cost of £1,925 rather than a non specified product with a cost of £1,750, the estimated potential annual savings are:

- £165
- 1,500 kWh
- 1.5 tonnes CO_2e

With a typical additional capital cost of £200 and lifetime energy and ECA benefits of around £1,800 at today's prices, the financial benefit of choosing an ETL listed product is over 10 times the additional cost. Furthermore with an approximate ECA of £370 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.

Important
Plate heat exchangers must now have a dry heat recovery efficiency of greater than or equal to 71% to be listed on the ETL.

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Products on the Energy Technology List:

Rotating heat exchangers (including thermal and desiccant heat wheels)

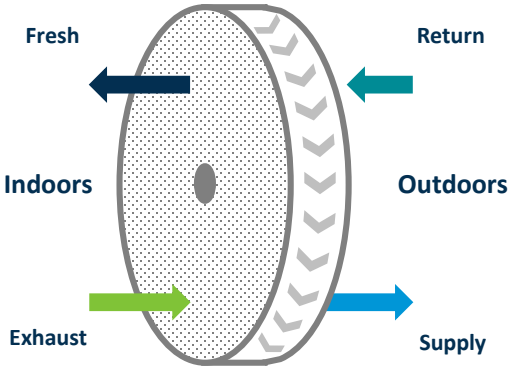
Rotating heat exchangers

Rotating heat exchangers operate by collecting thermal energy from the outgoing extract air stream and transferring it to the incoming, fresh air stream as the porous wheel slowly rotates into the fresh air path.

Thermal wheels recover sensible heat, while desiccant wheels recover both sensible heat and latent heat.

The disadvantage of rotating heat exchangers is the greater cross-contamination between exhaust and fresh supply air. In many applications, such as offices, warehouses, retail premises and factory spaces this is not a problem and recirculation of the air is commonplace. However, cross-contamination means that this technology is unsuitable for situations such as hospital operating theatres and food production environments.

Important
Rotating heat exchangers must now have a dry heat recovery efficiency of greater than or equal to 74% to be listed on the ETL.



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Future designs

- Most plate heat exchanger designs solely address sensible heat recovery, that is the heat associated with the change in temperature of the air itself.
- Innovative designs aim to recover latent heat too, that is the heat recovered through condensing the water vapour in the exhaust air.
- To address latent heat recovery in plate heat exchangers, technologies include using water absorbent paper or polymers to form the heat exchange membrane – achieving potential thermal efficiencies of up to 90%.
- Rotary heat exchangers are being redesigned too to capture more latent heat – new hygroscopic rotors incorporate a capillary surface structure providing them with a high capacity to absorb and emit water molecules, yielding thermal efficiencies of 85%.

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Where can I find more information?

For information about the ETL please visit: https://www.gov.uk/guidance/energy-technology-list and see our Information for Purchasers factsheet. Or contact the ETL Help Line on 0300 330 0657; email ECAQuestions@carbontrust.com

For more information on the ECA scheme:

For tax questions please visit the HM Revenue & Customs website:
https://www.gov.uk/capital-allowances/first-year-allowances

To search for a product on the ETL please visit:
https://etl.beis.gov.uk/engetl/fox/live/ETL_PUBLIC_PRODUCT_SEARCH

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