

initiative 1



Initiative 1: Replace Old Equipment

Identify the most appropriate time to replace air conditioning equipment.

Defining when it is better to replace, rather than repair, equipment.

Encourage usage and uptake of the Enhanced Capital Allowance (ECA) scheme.

Managing the disposal of old equipment in the most effective and environmentally appropriate way.

Work with ethical finance companies to develop financial support packages that enables accelerated customer uptake.

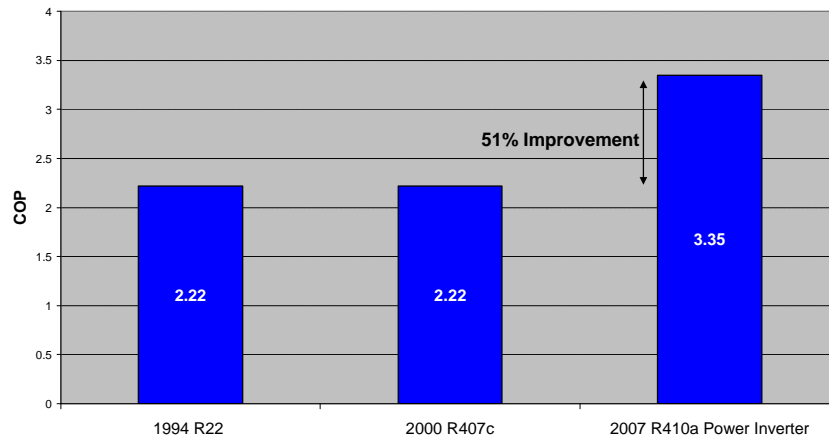
Implement and launch a full Replacement Programme.

Many owners of air conditioning equipment do not replace their old equipment until they encounter major problems, or it stops working altogether. Understandable behaviour.

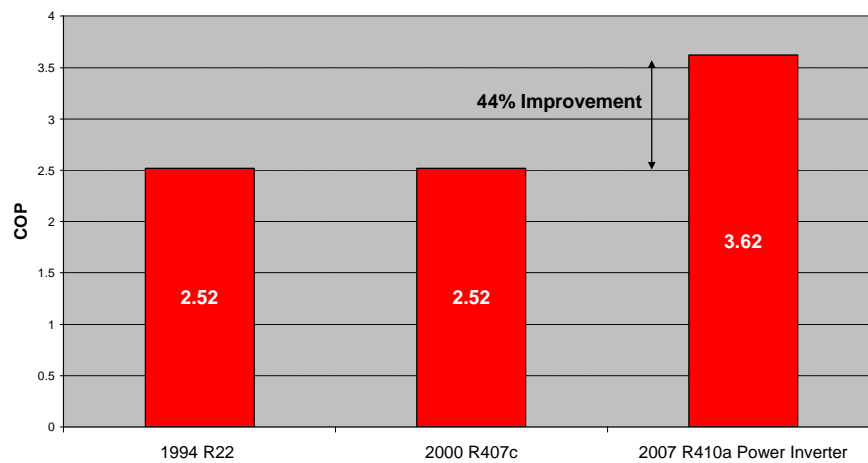
This has a direct impact on CO₂ emissions as older forms of air conditioning equipment run much less efficiently than the current equipment available in today's market. There have been significant innovations in technology in recent years.

The following graphs illustrate the improvement in energy efficiency and CO₂ emission reduction when comparing equivalent products from 1994, 2000 and 2007. This demonstrates the benefits to customers of upgrading on a single unit base:

7 kW Split Air Conditioning System in Cooling Mode



7 kW Split Air Conditioning System - Heating Mode



Identify the most appropriate time to replace air conditioning equipment.

It is accepted that the efficiency of Air Conditioning Systems declines with age. A number of factors contribute to this decline including compressor wear and tear, debris embedded on the heat exchangers and bearings wear.

From calculations, the Company estimates that with normal usage patterns the energy efficient life of air conditioning equipment is between 8 and 10 years.

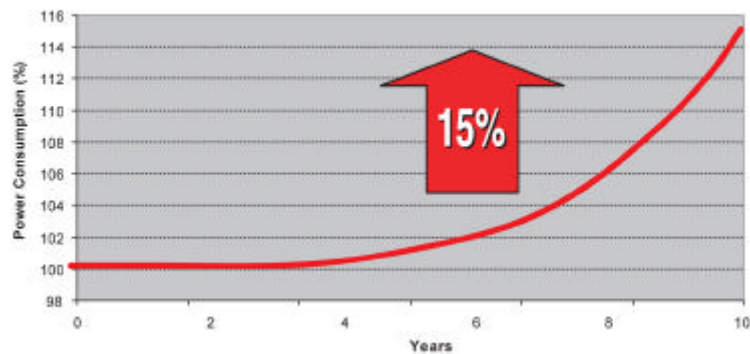
In general, if an air conditioning unit is used for 10+ years:

- a. The performance efficiency drops due to corrosion and the deterioration of the fins of the heat exchanger
- b. The performance efficiency drops due to the wear and tear of the piston cylinder of the compressor.

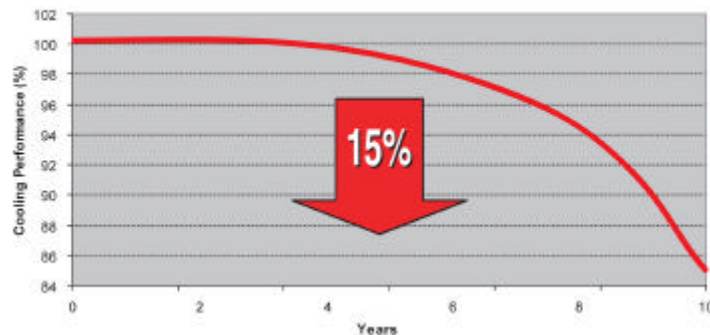
Regular maintenance will extend the life and reduce the energy losses.

Examining cooling performance and power consumption for a direct expansion split system, the former decreases over 10 years, with the latter increasing, as shown in the following graphs:

Power Consumption Increases Over 10 Years



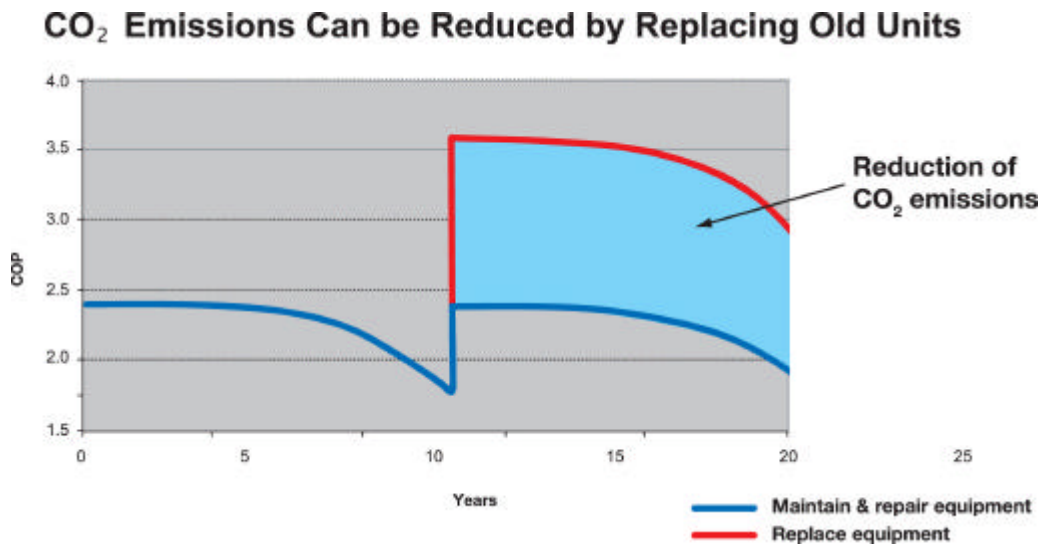
Cooling Performance Decreases Over 10 Years



What this effectively means is that by approximately year 10, rated capacity has reduced by 15% and energy consumption has increased by 15%. The conclusion being that the efficiency of the equipment will reduce by 74% ($0.85/1.15 = 74\%$).

These are the significant facts that demonstrate that the proactive replacement or maintenance of equipment, in a sustainable manner, in advance of a drop-off in performance is appropriate. With the continual advance of ever more efficient equipment the case for early replacement is enhanced due to the compound effect of reduced energy consumption and better performance for the end-user combined with cheaper overall running costs.

By replacing, rather than repairing equipment, the Coefficient of Performance (COP) of the equipment is significantly increased, therefore reducing the CO₂ emissions. In the graph below, the blue line represents equipment that is maintained and repaired beyond 10 years. The red line represents the replacement of old equipment with new equipment, therefore providing a significant improvement in COP. The shaded area represents the amount of CO₂ emissions saved by replacing, rather than repairing, the equipment:



Defining when it is better to replace, rather than repair, equipment.

In considering whether to replace or repair air conditioning equipment the price for the parts will need to be considered. An example is given in the following table with typical prices for a direct expansion split system (excluding labour) as well as the average price for replacing the unit:

INDOOR UNIT	Direct expansion split system	OUTDOOR UNIT	Direct expansion split system
SPARES	AVG PRICE	SPARES	AVG PRICE
Fan Motor	£135	Compressor	£725
Bearing	£30	Check Valve assy	
Air Filter	£32	4 Way Valve	£75
Drain Pan	£48	LEV (inc coil)	£75
Drain Pump	£60	Heat Exchanger	£350
Drain Sensor	£15	IMP	£103
Linear Ex Valve	£72	Contactora	£65
Heat Exchanger	£300	Fan Motor	£168
Remote Control	£65	Solenoid Valve	£80
PCB's	£200	Pressure Switch	£20
Thermistor Set	£20	PCB's	£140
		Thermistor Set	£25

*SPARES LIKELY TO FAIL IN 10 YEARS (not including labour)	£317	*SPARES LIKELY TO FAIL IN 10 YEARS (not including labour)	£1,003
AVG PRICE OF REPLACEMENT	£421	AVG PRICE OF REPLACEMENT	£670
		*The spares in the red boxes are the parts that are likely to fail in 10 years of usage	

Air Conditioning is a significant investment, the equipment should be expected to last for at least 10 years. Some of the parts of an air conditioning unit can be replaced, such as the compressor and fan motors and the condenser. However, depending on the age of the equipment (at the point that the component part replacement is required), a judgement is required whether it is economical and environmentally appropriate to replace the part.

It would seem sensible, given all of the environmental and economic facts, to consider replacing equipment if a costly failure occurs after 10 years and in addition replace equipment after 10 to 15 years if the current equipment available is significantly more energy efficient. In addition, as shown in the table above, it is anticipated that a proportion of the components could fail in 10 years, and therefore require replacement.

The challenge for a manufacturer like Mitsubishi Electric LES is that it is possible these arguments could be viewed as cynical encouragements to purchase more equipment. Obviously, this is not considered to be the case. It is important to remember that customers will benefit from a payback period as new equipment with its increased efficiency will use less energy, resulting in lower energy bills. In addition, to encourage replacement, Mitsubishi Electric LES will encourage the uptake of incentives or financial packages to offset the equipment replacement costs.

Encourage usage and uptake of the Enhanced Capital Allowance (ECA) scheme.

The Enhanced Capital Allowances (ECA) scheme was introduced by the Government in April 2001, in parallel with the Climate Change Levy (CCL). The CCL imposes a levy on energy tariffs for businesses (excluding very small businesses), while the ECA scheme enables these businesses to reclaim the tax if they invest in energy efficient equipment.

The ECA scheme is managed by the Carbon Trust, for the Government in collaboration with the Department for Environment, Food and Rural Affairs (DEFRA) and the Inland Revenue.

Enhanced Capital Allowances are used to encourage businesses to invest in particular types of equipment by providing up-front tax relief

- as 100% of the allowances can be reclaimed in the first year. So, of a £1000 investment in equipment that qualifies for ECA, the company could reclaim £300 in the first year.

In order to ensure that ECAs are only claimable against energy efficient equipment, the Carbon Trust has drawn up a list of approved technology categories - which form the Energy Technology List. Mitsubishi Electric LES has a significant number of products on the ECA list and intends to expand its presence by promoting more products to the list.

The following Mitsubishi Electric LES technologies are included in the Energy Technology List:

- a. Heat Pumps - VRF systems and Inverter driven heat pump systems
- b. Air to Air Energy Recovery - Lossnay Heat Recovery Ventilation Systems.

The Energy Technology List continues to grow and additional technology categories are introduced to the list on a regular basis. To ensure that products continue to comply with the energy efficiency criteria, the Carbon Trust carries out regular, random testing of products on the list.

Mitsubishi Electric LES intends, as part of its Green Gateway Initiative, to ensure that consultants, specifiers and end-users are further made aware of the cash flow benefits of ECA and the benefits of introducing replacement technology sooner, to save on running costs.

Managing the disposal of old equipment in the most effective and environmentally appropriate way.

At the end of the life of the equipment, the recovery ratio for Mitsubishi Electric LES' air conditioning units is very high, at 85 - 95%. The Company has already commenced the process of recycling metal for equipment that cannot be repaired.

Following a technical appraisal to determine the repair viability and/or equipment age, a product will enter a re-cycle path. Mitsubishi Electric LES' current practice in respect of product disposals is as follows;

- a. All refrigerant removed, (if outdoor unit) and returned to A-GAS in designated cylinders
- b. Units are despatched to a re-cycling centre partner near Milton Keynes
- c. Special machinery removes ferrous and non-ferrous metals by use of eddy current magnets
- d. The small amounts of plastic and paper are reduced to fine powder form which will be disposed of or recycled
- e. 100% of the metals, which constitute a high proportion of both the indoor and outdoor units are recycled. The process separates iron, steel, aluminium, brass and copper into shredded strips – suitable for furnaces
- f. Shipments of the recycled metals are then made to many manufacturing and processing plants throughout the world.

Work with ethical finance companies to develop a financial support package that enables accelerated customer uptake.

When they come under closer scrutiny many sustainability programmes can fail if considerations such as transportation, use of third world labour etc. aren't taken into account. The same applies to funding ethical ventures and ultimately capital equipment.

Mitsubishi Electric LES plans to further its discussions with financial institutions that offer system finance that is supported by sustainable and ethical investment initiatives. These final finance support packages will be made available to end-user customers via both Mitsubishi Electric LES' corporate sales and the Company's Partners.

Implement and launch a full Replacement Programme.

One of the most significant developments for buildings will be the introduction from 2009 of energy performance certificates (EPCs) on construction, sale or rent of homes or offices. In the words of a circular from the Department for Communities and Local Government (DCLG): “Implementing the EPBD will encourage owners and tenants to choose energy efficient buildings when seeking new accommodation and to improve the performance of buildings they occupy.” The EPC takes into account the energy used for heating, hot water, ventilation, cooling, humidification and lighting.

In order to reuse existing pipe work, Mitsubishi Electric LES offers a ‘Replace Technology’ enabling the upgrade of existing R22 and R407c systems to modern efficient inverter models (R410A inverter systems)¹. Previously, this was a difficult or expensive option, as the existing pipe work would either have to be replaced, or cleaned with dedicated specialist equipment. This was necessary as the chlorine residue from R22 system pipe work caused chemical reactions with the lubricating oils used in HFC compressors, the result being poor performance and system failure.

Mitsubishi Electric LES’ planned replacement programme will be a packaged programme enabling owners/occupiers of commercial properties to replace their old, inefficient and energy hungry equipment with energy efficient and environmentally friendly heating and cooling equipment.

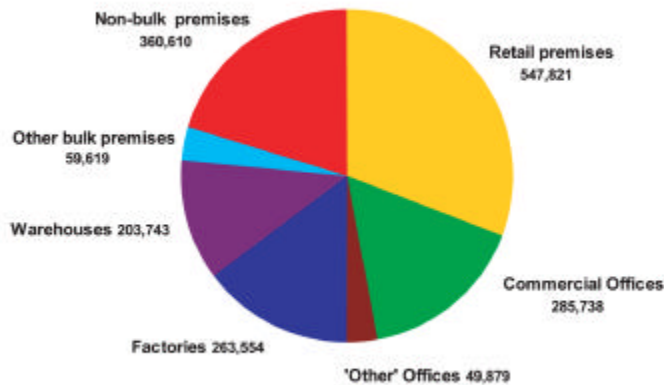
This programme will ensure that the correct and most efficient equipment is installed, commissioned and maintained. Ethically appropriate finance will be made available, if required, and installation is made as tax efficient as possible. This will mean the cost of ownership is controlled – both capital expense and running costs.

Customers who will benefit from this replacement programme will include landlords of commercial property who need to upgrade their property portfolio to a level that is fit for occupancy in an increasingly environmentally aware business community.

¹ Assuming existing pipework is suitable for R410A operational pressures

Looking at the types of commercial buildings in the UK, offices make up 19% of the floor-space in the UK, with retail premises accounting for a further 31% - both of which represent a significant opportunity for replacing old equipment.

Industrial Floorspace (000s m²)



Source: National Statistics, floorspace (000s m²)

In addition, companies who are focused on refurbishing properties to bring them up to levels that occupants are looking for in an increasingly environmentally aware business community.

This programme will also be of interest to national companies who are opening or refurbishing shops, offices and factories as part of the natural maintenance programmes.

Finally, this programme will be of benefit to occupiers who have responsibility for servicing the buildings they occupy and are trying to reduce operational costs and conform to emerging legislation and concerns of the public.

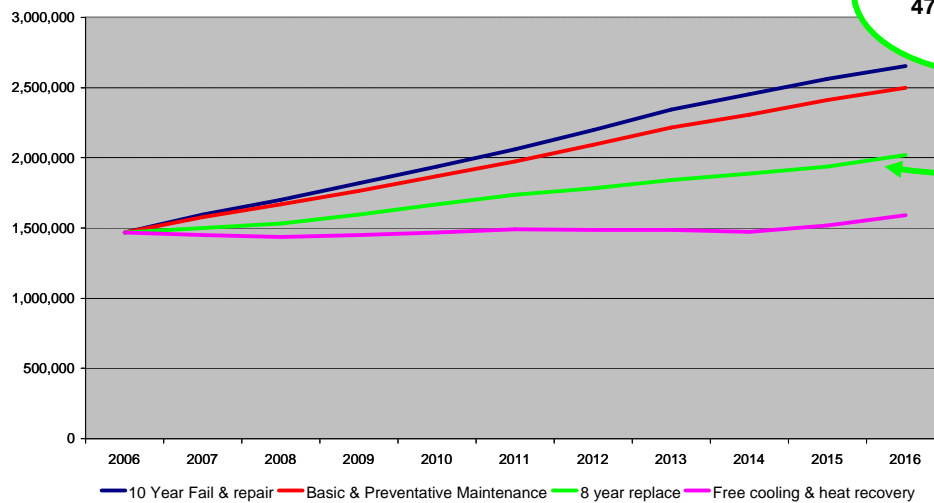
Mitsubishi Electric LES is planning the 2007 roll-out of this Replacement Programme to contribute to the Government's target of reducing CO₂ emissions to 60% of the 1990 levels by 2050.

For Mitsubishi Electric LES' customers it is a way of saving money and operational costs by running more efficient equipment and it is a way of enjoying improved environmental comfort in both heating and cooling from the most up-to-date technology available. The economic benefits will be lower energy costs due to more efficient equipment

and commercial property which has a reduced CO₂ impact is more attractive to businesses that are environmentally aware.

Expected outcomes from this initiative:

Annual CO₂ emissions in Cooling from the split system market



Market assumptions: 1.66 million split systems operating in the market in 2006, growing to 3.697 million units in 2016. This graph shows the potential cumulative effect if the principles of the Green Gateway Initiative were adopted across the whole market.