STEP-BY-STEP GUIDE TO:

ENERGY EFFICIENCY AND CARBON REDUCTION IN RETAIL WAREHOUSING

BRC CLIMATE ACTION ROADMAP

MITSUBISHI ELECTRIC

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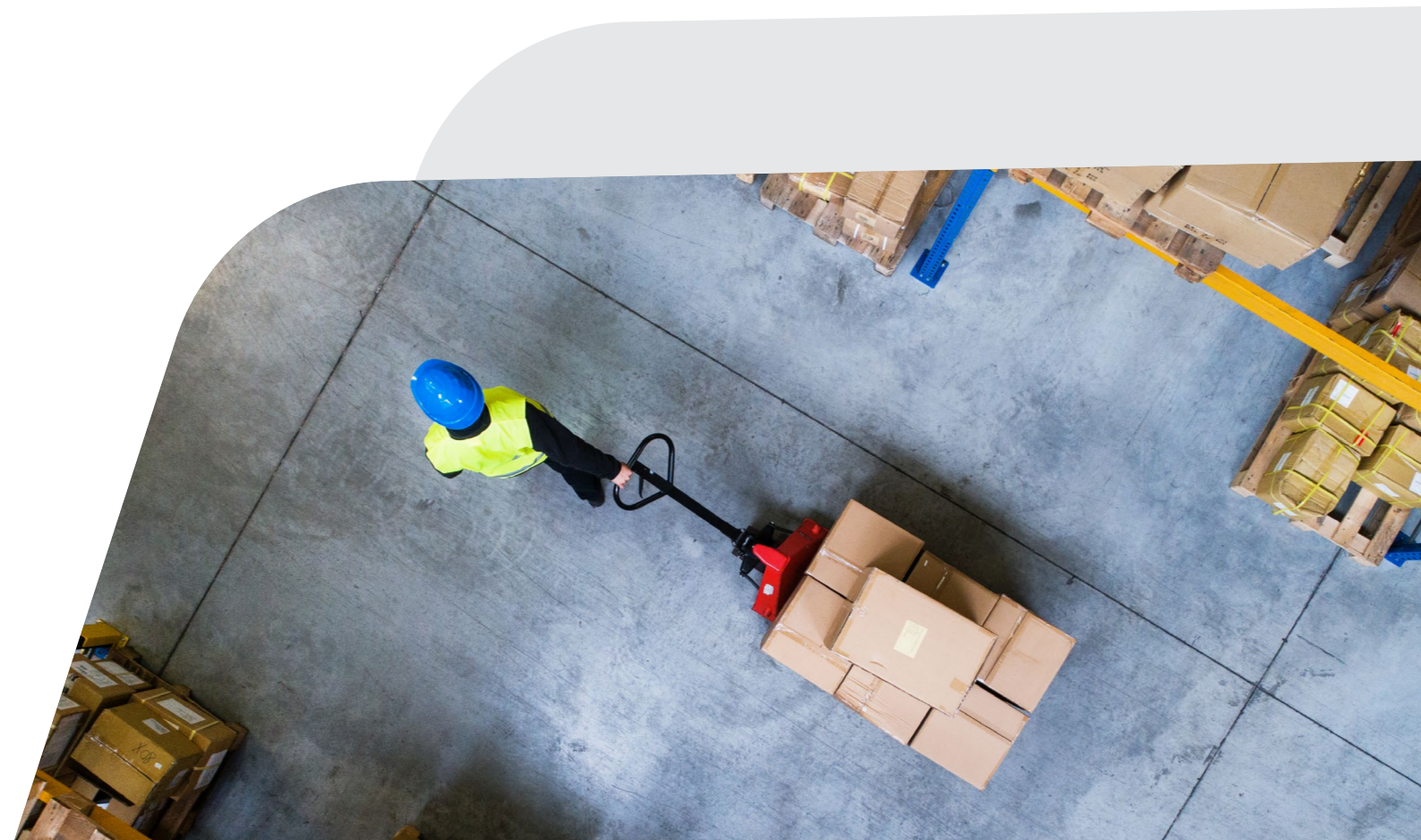

ABOUT THIS GUIDE

In 2020, the British Retail Consortium (BRC) launched its ground-breaking Climate Action Roadmap[1] for the UK retail industry. It aims to bring all of UK retail to Net Zero by 2040, ten years ahead of the UK government target of Net Zero by 2050.

The Roadmap, in collaboration with its partners, provides retailers with practical advice on decarbonising direct operations and supply chains and engages with governments to create the right policy landscape for success.

As part of the retail industry's journey to Net Zero, signatories to the Climate Action Roadmap have committed to Net Zero emissions from purchased electricity by 2030 and Net Zero emissions from direct operations by 2035.

With a growing body of government legislation on energy use in buildings; greater consumer awareness of the environmental impact of their shopping habits; and rising energy prices, now is the time to embrace energy efficiency and low-carbon technologies to take the lead in helping retail to reach Net Zero by 2040.

The BRC has set out several milestones that it recognises as good practice for mapping out a route to net zero for retailers:

BY 2025

All buildings powered by renewable energy

100% LEDs in all new buildings

Only low impact refrigerant gases (Max GWP 150) for all new refrigerant installations

BY 2030

Sourcing 100% renewable electricity

BY 2035

Renewables to cover the total energy use on all sites

Only low impact refrigerant gases (Max GWP 150) in use for ALL systems

100% LED lighting across all buildings

While people outside the sector might view 'retail' as consisting of supermarkets, high street stores or small local shops, there is much more to the industry than most of its customers ever see.

The efficient and effective transfer of goods from farms or factories to shelves and into customers' hands is a fast-paced and highly technical industry. Warehouses, where many of these processes are handled, are a crucial element of the UK's retail ecosystem.

There are over 50 million square metres of warehouse space in the UK; much of this is owned, leased or shared by retailers. These are often large-scale buildings, so tackling their energy efficiency to make effective use of renewable energy sources and reduce carbon emissions is a significant challenge.

This guide is intended to provide advice and some practical ideas for retailers taking their first steps towards energy efficiency to reduce the carbon footprint of their warehouse and logistic facilities.

THE GROWTH OF UK WAREHOUSING

AND ITS CARBON FOOTPRINT

UK warehousing is one of the fastest-growing sectors in the UK economy. According to figures from Savills[2], between 2015 and 2021, there was a 32% increase in the number of warehousing units. Furthermore, there has been significant growth in larger units (those over 90,000m^2).

The main driver has been the move to online retailing. High-street stores and supermarkets have extended their online offerings, while digital-only sellers have also seen exponential market gains. Savills notes that the e-commerce sector expanded warehouse occupancy over the same six-year period by 614%.

What's more, with more customers buying more goods online – from electronics and clothing to food and furnishings – an efficient warehousing sector has become more important than ever. Online shoppers expect fast and efficient deliveries.

As Katy Clark, Head of Retail and Ecommerce at Meta, notes in her article for The Retailer[3] digital customers have high expectations: "Shoppers expect to receive quick and seamless experiences from checkout to fulfilment with 'Same Day Delivery' hashtags growing by 34% on Instagram."

The result of this physical growth, and the enhanced sophistication of the warehouse sector in its use of digital tools, such as data and automation, mean that its carbon footprint is increasing. The BRC highlights the impact that warehousing has on the overall carbon emissions of the retail sector in its Roadmap[4], with figures from the Building Energy Efficiency Survey (BEES) of 2016.

The BEES states that the retail sector consumes 17.1% of the total non-domestic building stock energy (slightly ahead of offices at 17%). However, the 'Storage' sector identified by BEES, which includes retail cold stores and warehouses, accounts for a further 8.1% of national energy use.

Another important figure is that most of the sector's site emissions are from electricity use (84%). This is one of the reasons that operating efficient sites powered by renewable energy is a core action area in the BRC's Climate Action Roadmap.

SUSTAINABLE WAREHOUSING

A NEW FOCUS

As retailers focus more on sustainability and environmental issues along their whole supply chains, they are looking for ways to include their warehouse properties in their plans.

One recent example has been the construction of a new warehousing and logistics centre for the Co-Op by Tritax Symmetry (in Bedfordshire)[5], which achieved BREEAM[6] Excellent and has been hailed as their most sustainable to date. They are not the only brand to prioritise 'greening' their warehouse properties. Retailers also want to establish or work with warehouse facilities that can show their sustainable credentials.

A report from JLL in May 2022[7] points to several features of larger warehouses that offer opportunities for low-carbon adaptation: "The simplicity of industrial and logistics buildings in comparison to other sectors makes them relatively easy to adapt to high levels of energy efficiency. The nature of these buildings, with large roof spaces, also provides significant opportunities for solar PV installation."

This point was also raised by the UK Warehousing Association (UKWA) in research it carried out into the solar PV in the warehouse sector with consultant Delta-EE. The findings[8] show that roof space on UK warehouses amounts to 18,500 acres. Applying solar panels in that space could generate more than 13.8 TWh (Terawatt hours) of electricity – and cut warehousing electricity costs from 80% to 40% per year.

As the UKWA points out: "Occupying a third of all commercial roofspace, the warehousing sector alone could double the UK's solar PV capacity and deliver the entire UK requirement for 2030, forecast by the National Grid future energy scenarios." In addition, solar PV installations on warehouse roofs do not compete with farmland – reducing pressure on the agricultural sector.

This significant potential for harnessing solar power in the warehouse sector sits well with the BRC Climate Action Roadmap and its goal of shifting retail to renewable energy. However, the adoption of renewables must be accompanied by energy efficiency. Using less energy makes renewables targets easier to achieve and can also reduce the capital cost of solar PV as smaller installations can be applied.

ENERGY EFFICIENCY IN RETAIL WAREHOUSING

A CHALLENGE WORTH TACKLING

The size, design and operation of warehouse buildings mean that they present challenges when it comes to achieving energy efficiency:

- Large open spaces
- Narrow corridors between tall racking systems
- Perishable items that require exact temperatures
- Tall ceilings and roof materials that may create the risk of high indoor temperatures from solar gain
- Large external doors which are frequently opened and closed

However, energy efficiency should be high on the agenda for the warehouse sector. Not only does it make sense to cut energy consumption while switching to renewable sources, but it also reduces operational costs.

When finding areas for potential energy savings, the BRC has identified[9] the dominant emissions sources in the retail sector as heating, lighting and refrigeration: "Sourcing renewable energy and installing efficient technologies can make zero emission operations a near term reality."

New warehouses are increasingly designed and constructed with energy efficiency in mind. However, JLL figures show that almost half of the market was built before 1995[10], so solutions must include existing warehouse stock.

Retrofitting should therefore be a top priority for owners and tenants. This is also supported by JLL's view that there is a higher market value for energy-efficient and low-carbon warehouse facilities. Added benefits are that updating an existing building will generally result in lower embodied carbon than a new construction, while reducing the energy use and operational carbon of the updated project.

Another consideration is that while the market has seen the development of large-scale warehouses, smaller units still make up more than half of the sector. They are essential in the 'last-mile' delivery arena and must be considered when it comes to reducing the carbon footprint of the whole supply chain.

The owners of smaller-scale warehouse units may have smaller budgets to invest in on-site renewables or energy efficiency upgrades. Nevertheless, with retailers looking to calculate (and reduce) their Scope 3 emissions, the impact of these smaller operators is magnified.

A typical warehouse facility will usually consist of more than the storage and stock handling buildings. Office space is needed for management teams, and in the increasingly digitised world of logistics, it is not unusual to find on-site server rooms to support IT requirements. These areas of the business can also be ripe for energy savings.

For example, energy efficient cooling for IT server rooms can help to ensure robust operation and save significant energy costs. A smart approach is to use the heat extracted from these cooled spaces and apply it to other areas of the building, such as domestic hot water (DHW) for use in staff toilets and showers. This 'heat recovery' approach uses heat that would otherwise be wasted.

And in office space, providing a comfortable working environment helps to support staff. Good indoor air quality (IAQ) has been shown to encourage productivity as well as keeping occupants safe from pollutants and viruses.

Again, modern ventilation equipment can be applied with the latest filters to provide good IAQ while meeting energy efficiency goals. Heat recovery can also be applied, using heat captured from outgoing 'stale' air to pre-warm incoming air and reduce the need for heating.

A further challenge is that warehouses are not always directly owned by a retailer, but leased. Retailers and warehouse owners must work together to achieve energy efficiency and reach carbon reduction targets. As the BRC notes in its Roadmap, engagement along the supply chain is key to success: "A net zero retail industry can only be achieved by the establishment of net zero product supply chains."[11]

Every business, no matter its size, can take steps to improve energy efficiency. So whether the building is a 90,000m^2 warehouse giant or a small logistics centre on the edge of a city, there are savings to be made. And the argument for saving energy is even stronger in the 2020s. All organisations face ballooning energy bills which are becoming a more significant proportion of operational costs. This means that investments in efficiency have shorter payback periods, making them much easier to justify at the board level.

TAKING ACTION:

5 STEPS TO ENERGY EFFICIENCY FOR WAREHOUSES

The steps and questions outlined here are designed to apply to a warehouse facility of any size or type. Facilities teams with access to more sophisticated tools may be able to automate some of these steps, such as data collection. However, there is no reason that these proposals cannot be applied in smaller warehouses.

1. Establish a baseline - audit your building and HVAC equipment

Knowing where you are starting from is crucial when putting in place an energy reduction strategy. Billing information will provide the annual consumption of electricity and gas (if used in the building). This will provide a baseline and allow you to track savings going forward.

Most large warehouse operators will have a regular programme of equipment service and maintenance in place. This should include checks on equipment such as heating, ventilating, and air conditioning (HVAC) in the warehouse and any attached space such as offices.

For smaller facilities, it is equally important to check on this equipment. Even if it is operational, poor maintenance can lead to higher energy use as parts such as fans are overworked. Some signs that your HVAC is struggling include:

1. **Less reliability:** if your air conditioning has been failing more in the past few months and you are calling in repair teams more often. This is usually an indication that equipment needs an overhaul or even replacement.

2. **Fluctuating temperatures:** if staff complain about discomfort, it's time to look closer. These problems may not be equipment related. If changes are made to a space (e.g. partition walls added or removed), this will affect how heat and cooling move around. But it is a good idea to look at the equipment as one of the earliest signs that heating and cooling systems are malfunctioning can be hot or cold spots around the building.

3. **Changes to building use:** your business may have changed working patterns over the past couple of years, meaning that spaces are used differently. Heating and cooling equipment may even have been switched off for some time, affecting performance when reactivated. Also, if occupancy patterns have changed (e.g. working shift times have altered), it is important to check that the timings for heating and cooling equipment reflect this – or you may be operating them when they're not needed.

Checking equipment is not simply about functionality. It is a change to ensure you have the correct information on what is in your warehouse. It is easy for information on equipment to be lost over time. Understanding exactly what models you have, their ages and previous maintenance dates will be very valuable in establishing a new programme.

2. Set your target – aiming higher on energy efficiency

Many new warehouse developments are adopting BREEAM certification to demonstrate sustainability credentials. The BREEAM scheme is helpful to building owners and designers because it provides clear guidance on design requirements to achieve a rating of 'Good' or 'Excellent'.

However, for existing buildings, finding a benchmark to aim for is currently more challenging. For example, no 'Net Zero' schemes are presently designed specifically for warehouses. The JLL report[10] points out that a lack of targets for this sector is "one of several hurdles the industrial and logistics sector faces in the transition to Net Zero, although this is currently being reviewed, and we can expect to have different targets in the future."

One place to establish an energy performance target with an existing building may be its Energy Performance Certificate (EPC). Commercial buildings are required to have an EPC, so even smaller logistics centres should have access to one.

Currently, the law sets a minimum EPC rating of E. Without this rating, a building cannot be sold or leased. According to research from Savills[11], 78% of industrial and logistics properties have a rating of C or D. While this is currently acceptable, the government is raising those minimum ratings soon. By 2027, the minimum required EPC rating will be C, and in 2030, that will rise to a B rating.

As EPC ratings are a requirement that can significantly impact a warehouse's leasing value, it would make sense to use them to set an initial target for energy efficiency. It may be useful to have an EPC assessment by a qualified professional[12], particularly if your certificate is a few years old. Assessors can also advise on energy efficiency improvements for the building.

3. Make a business case for improvements – prioritise investments

A further benefit of using the building EPC as the basis for energy efficiency targets (at least in the first stages of developing an energy and carbon reduction strategy) is that the assessment includes recommended improvements.

The EPC certificate should include these recommendations and the estimated payback period. The recommendations are listed as 'High', 'Medium' or 'Low' impact, which can help identify the most impactful steps. You can find the EPC for a building online and the recommendations included with the certificate.[13]

The changing requirements for EPC ratings are a strong argument for improvements to achieve the new minimum standards. It's also important to note that rising energy costs will reduce the payback periods for investments in efficiency.

This also highlights the importance of tracking energy use 'before' and 'after' improvements. Energy cost savings can be invested in further improvements or technology to maintain energy efficiency, such as building controls.

4. Engage your staff – finding energy savings around the business

Making energy efficiency part of your business strategy is an excellent way to achieve better outcomes. Engage staff at all levels of the organisation to raise awareness of the importance of the energy-saving objective and reach your target faster.

It could also be a good idea to put together an 'Energy Efficiency Team' of staff from across the business to help drive change and improvements.

Good practice can be made part of everyday working operations. For example, encouraging employees to turn off lights, heating and cooling in empty offices is simple but effective. Building controls are great for energy efficiency, but often a manual override is used and then forgotten, leaving equipment to operate when not required. It is also important to discourage wasteful behaviours such as leaving computers on overnight or using portable heaters, which consume significant amounts of energy.

The Energy Saving Trust[14] recommends using internal business communications to inform staff about why saving energy and reducing carbon is important. It can also be helpful to provide advice about how they can save energy at home.

The EST also notes that asking staff for energy-saving ideas around the business can identify areas that might otherwise be missed. The Carbon Trust[15] *Better Business Guide to Energy Saving* also recommends the 'energy walk-round' as an ideal way to spot savings opportunities and maintenance issues (there is a downloadable checklist in the Carbon Trust guide).

5. Focus on long-term energy savings – maintenance and monitoring

Service and maintenance are critical to managing the carbon footprint and energy use of a building in the long term. Engaging with your in-house or external maintenance team will help them understand your goals and ensure that they incorporate energy-focused servicing as part of their work.

In smaller buildings, simple maintenance checks on filters in vents or air conditioning outlets can reduce the pressure on fans which are significant energy users. Considering energy use as part of maintenance and servicing equipment may help ensure it stays top-of-mind.

If you are operating a smaller building, it can be helpful to diarise activities such as monthly checks on external air conditioning units. Ensuring the area around them is clear of leaves and other debris will retain good airflow, which is better for energy use and indoor air quality.

Businesses, small and large, should monitor energy use closely. Large organisations can access advanced meters, but smaller organisations can ensure that staff who need to know where energy meters (electricity and gas) are located.

The Carbon Trust points out: "Looking at energy bills and taking regular meter readings should be considered a key activity for every business. Analysing energy consumption will help identify where energy wastage can be minimised."

Monitoring energy use can also identify unusual patterns of energy consumption that can be spotted and addressed to cut waste. It may also be possible to shift the timing of some operations to make better use of off-peak electricity rates.

TECHNOLOGIES THAT CAN HELP

Improving the energy efficiency of an existing warehouse or logistics centre need not be complicated. A growing range of heating, ventilation and air conditioning technologies can reduce operational energy while providing better indoor environments for occupants and stock.

Controls

Logistics managers are already well-versed in using advanced controls for their operations. But there is a growing range of warehouse control technology that can focus on energy efficiency as well as product handling.

The ability to use IT to visualise energy consumption across the whole process, from automation equipment to lighting and heating, puts real control into the hands of the facilities team, and enables them to quickly address areas of energy waste.

Building controls play a crucial role in managing energy in all buildings. They are an increasingly sophisticated area of building management that can support strategies such as remote monitoring for multiple warehouses or across large sites. Equally, they can be applied at a smaller scale to ensure that cooling and heating in smaller buildings operate only when required, cutting energy waste.

Mechanical Ventilation with Heat Recovery (MVHR)

Mechanical ventilation uses fans to extract and supply air from or to a space. The result is consistent and controllable airflow and effective ventilation to all spaces in a building.

With MVHR, there are two separate air flows. One extracts stale and polluted air from inside the building. This is exhausted to the outside atmosphere. The second airflow introduces air from outside the building. An MVHR system places a heat exchanger where these two airflows pass. This recovers a significant amount of the energy that would otherwise be lost as air moves in and out of the building.

The benefit is that MVHR captures heat energy that would otherwise be lost to the atmosphere. The air, which is pre-heated from recovered heat, doesn't need much extra energy to achieve the required temperature – saving energy in the HVAC system.

Depending on the application, the fans used to move air are low-powered, typically consuming 1-2 Joules for every litre of air. The energy saved through the heat recovery process easily outweighs the small amount of energy the fans use. The ventilation rate can also be controlled by monitoring indoor air quality with a CO^2 sensor, so fans are only used when needed.

Heat pumps

A heat pump extracts low-level heat energy from the air and uses small amounts of electricity to raise the temperature. This is then applied to water or air to create heating for a building.

The process is very energy efficient, with 1kW of electricity producing an average of 3kW of heating or more. Some heat pumps can also operate in 'reverse', providing energy efficient cooling when required. This can mean that 'heat' from an area being cooled, such as an IT Server room, can supplement the heating requirement in another area, reducing overall energy consumption.

Heat pumps are an increasingly popular technology since they utilise the UK's increasingly green grid in a highly energy efficient way. They can also be used alongside on-site electricity generation, for example, solar PVs. This reduces their carbon footprint further and provides a very low-cost approach to heating, cooling and hot water generation if required.

Heat pump technology can be found in a growing range of products that can be applied around warehouse buildings, for example, heat pump air curtains.

Air curtains can be significant energy users for warehouses. Heat pump air curtains can provide the same temperature control while reducing electricity consumption. This approach results in reduced CO^2 emissions and running costs, allowing warehouses to open doors for deliveries when needed in the most energy efficient way possible. Heat pump air curtains also allow the 'waste' heat to be captured and re-used, for example, for hot water needs, further optimising energy use.

Another option is the air-to-air heat pump system, which also taps into the benefits of heat pump technology. The air-to-air option can deliver heating and cooling and is ideal for smaller buildings to provide heating and cooling for employees and other internal spaces.

The latest chiller technologies address this by harnessing the capability of heat pumps to take low-temperature heat from one source and apply it to another – also known as heat recovery. For example, a heat pump can use the condenser water or return chiller water as its source of heat to provide heating or supplement hot water production, reducing the load on boilers.

Low GWP refrigerants

Warehouse owners and operators using commercial fridges in their stores and warehouses will already be aware of changes in the refrigerant landscape driven by the F-Gas Regulations.

F-gases are powerful greenhouse gases which trap heat in the earth's atmosphere, contributing to global warming and climate change. The Regulations aim to cut the use of F-gases and reduce their release into the atmosphere. The F-Gas rules also apply to air conditioning systems in all buildings.

Air conditioning manufacturers have been adopting new types of lower-GWP refrigerant, such as R32. During your building and system review, you must include refrigerants in air conditioning systems across your estate. As the F-Gas regulations set lower GWP standards over the next few years, some refrigerants will become harder to access as they're withdrawn from the market. This could have severe implications for maintenance and operational costs.

Modern air conditioning systems are designed to use less and different less impactful refrigerants. This not only reduces the carbon footprint of the system but also reduces the ongoing maintenance costs as less refrigerant is required. Discussing this option with your contractor if you consider updating your air conditioning systems is a good idea.

DRIVING INNOVATION ON THE WAREHOUSE FLOOR

To improve throughput and space utilisation, warehouses use stacker cranes for the automated retrieval and storage of goods. While operating at high speed, these devices effectively locate, pick, transport and unload cargo. Variable speeds drives (VSDs) play a key role in determining their correct and effective operations.

The first features that businesses should look for when specifying VSDs for stacker cranes is accuracy and repeatability. These are achieved by different types of control that work together to precisely position loading platforms, forks and trolleys.

Position awareness for efficient, effective and safe operations

Using a variable speed drive that allows users to create operation patterns based on key parameters, such as frequency as well as s-curve acceleration and deceleration time, is a good starting point to deliver advanced position accuracy. Moreover, a drive that can support closed-loop and dual feedback control via encoders as well as laser sensors, can enhance both tracking and spatial accuracy. Stacker cranes with VSDs that incorporate these controls can shorten the time required to get to a defined location and avoid unnecessary adjustments to fine-tune their positioning.

Another key function that can help warehouses realise high-speed and accurate operations is anti-sway control, which minimises swinging once the stacker crane has reached its destination. In effect, since the device remains stable, loading and unloading can occur quickly while positional accuracy is improved.

By choosing a VSD that can interpret laser distance measurements, stacker cranes can also adapt to their environments and operational changes. For example, obstacles between the crane and the laser reflector can be detected, with an advanced VSD able to flag the anomaly and initiate an emergency stop. Additional sensor-based functionalities that can contribute to system safety include detection of crane overspeed, position deviation or close proximity to the reflector.

Mighty, small efficient and smart

While delivering next-level performance is essential for VSDs in stacker crane applications, their overall footprint also needs to be kept to a minimum. Maximising storage space in warehouses is a must and therefore compact drives that can control multiple motors simultaneously are preferred. They can also help minimise capital expenditure while enhancing the overall synchronicity of the system.

A further aspect that needs to be considered when specifying VSDs is the ease of installation and use. Mitsubishi Electric's FR-A800 AWH, for instance, was specifically developed to provide a turnkey system for automated warehouse applications.

The drive contains dedicated algorithms and programs for stacker cranes, so that end users simply need to insert the key variables and parameters that apply to their intended system. Based on this input, the VSD will then determine the best process automatically and adjust settings accordingly. For example, users can benefit from the VSD's automatic creation of operation patterns without the need to spend time developing specific controller codes.

As a result, businesses can streamline drive installation as well as modifications to support changes in the application. In effect, setup times can be cut from days to only a few hours.

In addition, the FR-A800 Plus supports secure remote monitoring via a free app for laptops and mobile devices, fast-tracking troubleshooting and maintenance activities. Finally, the innovative drive was designed with a durable substrate coating and conductive plates to offer a rugged solution that prevents dust from entering its circuits. This maximises the VSD service life and resistance to warehouse environmental conditions.

A state-of-the-art VSD, such as the FR-A800 Plus, can help warehouses benefit from accurate, repeatable and easy-to-use stacker crane systems. These can address current and future challenges in the sector by offering advanced capabilities that contribute to the overall competitiveness of a business.

Conclusions

Warehouses and logistics centres are some of the most vital parts of the UK economy today – supporting retailers and online sellers with fast, efficient delivery to their customers.

There is growing pressure on warehouse owners and managers to meet higher targets for energy efficiency. Recent energy price rises increase the incentive to reduce energy waste wherever possible.

The sector also has much potential to adopt renewable and low-carbon technologies. As the retail supply chain looks to reduce its carbon footprint, warehouses will have to play their part.

HOW MITSUBISHI ELECTRIC CAN HELP

Mitsubishi Electric can help you achieve your low-carbon and energy efficiency goals with the latest technology designed for the future of building services.

At Mitsubishi Electric, our focus for retail clients is in three key areas:

Developing energy efficient heating and cooling systems for all sizes of property

Harnessing the power of techniques such as heat recovery

Providing low-carbon equipment that helps to save energy and deliver comfort

Heat pump technologies

Mitsubishi Electric's range of heat pumps can provide energy efficient cooling, heating and hot water to even the largest buildings. We also offer a range of solutions for smaller facilities, as well as heat pump air curtains developed for the retail sector.

Making use of new lower-GWP refrigerants – and less refrigerant

Mitsubishi Electric has developed a range of lower-GWP chillers that use refrigerants, such as 1234ze, with a GWP of 7. We have also introduced an Ecodan QAHV heat pump for commercial use that uses CO^2 as the refrigerant. This has a GWP of 1.

Using less refrigerant in an air conditioning system lowers its carbon footprint and reduces ongoing system maintenance costs (as there is less refrigerant to maintain). A good example is the Mitsubishi Electric Hybrid VRF (HVRF) approach. HVRF reduces the amount of overall refrigerant by using water as the medium for transferring cooling or heating into occupied spaces.

Good ventilation with energy efficiency

Mitsubishi Electric's MVHR Lossnay range simultaneously extracts stale air from a building and supplies filtered air. And while doing this, the units will simultaneously recover valuable heat energy for optimum efficiency. The Lossnay system uses a special paper core to transfer the heat energy without mixing the air flows.

The principles of MVHR can be used in buildings of almost any size, as systems come in various sizes, including for individual rooms. The additional benefit is that Lossnay MVHR systems can also be fitted with filters to remove many primary outdoor pollutants before the air enters the building – adding to the health benefits of the ventilation.

Energy Efficient Refrigeration Units

The ECOV Series refrigeration condensing units are inverter-driven and deliver reliability and energy efficient heat recovery through their use of proven Mitsubishi Electric technology. Utilising the natural and stable refrigerant CO2 (R744) and with a low global-warming potential of 1, the environmentally clean solution enables compliance with local planning laws and F-Gas Regulations. Designed with a compact footprint, these units can be easily installed in smaller plant areas and are capable of delivering chilling or freezing. With refrigeration duties ranging from 4.89kW to 17.5kW at an ambient temperature of 35°C, the ECOV Series is an ideal choice for small retail shops, convenience stores and cold storage rooms, including distribution/warehouse centres.

IT Cooling systems

Server rooms that support today's high-tech logistics sector must be maintained at steady temperatures across varying loads. As a result, they can be significant areas of energy use.

Mitsubishi Electric's close control systems are specifically designed for computer rooms which need highly accurate sensible cooling and close control of temperature and humidity. Our range of equipment is suitable for a small in-house server room, or large IT centres. All are focused on delivering robust performance with optimum energy efficiency.

Controls – on-site and for remote monitoring

Mitsubishi Electric's centralised controller range includes easy-to-use digital interfaces. Some can also monitor and control third-party equipment, making them a cost-effective solution for smaller stores.

For larger clients, the MELCloud Commercial cloud-based solution offers a single platform to monitor and control single buildings or an entire network, helping develop a multi-site strategy for the warehouse sector.

And for businesses that may already have remote monitoring services for their properties, Mitsubishi Electric's advanced interfaces allow third-party equipment to monitor and control our air conditioning units. This means they can easily slot into existing building management systems, saving time on installation and technology interfaces.

Mitsubishi Electric's Automation Systems Division also provides smart logistics solutions for the warehouse market, with technologies to support automation, materials handling and energy management. Real-time data collection is at the heart of the system, along with easy visualisation for facilities managers. This supports a preventative maintenance approach which, in turn, is ideal for optimising energy performance. Intelligent Building Software Solutions

Intelligent Building Software Solutions

Mitsubishi Electric's ICONICS Suite Intelligent Building Solution creates a virtual data-driven replication of a physical building, known as a digital twin. The solution models the inter-relationships between people, places and assets within the building environment, contextualising and enriching data to provide meaningful actionable information to different classifications of user of the building including visitors, maintenance staff, operators and managers.

From an operational performance perspective, by applying machine intelligence to large complex data from operational technology (OT) such as heating, cooling, ventilation, power, and lighting, hidden performance matters can be identified with ease. Compliment this actionable insight with automated workflows and digital tools to which mobilise operational staff, the construction and lifecycle service model can be supercharged with condition and prediction-based task management. Overall, leading to an optimised occupant experience, energy performance, operational resource, equipment life, asset performance, and financial return.

Mitsubishi Electric inverters: Provide energy savings for pump and motor control

Mitsubishi Electric inverters are real energy savers achieving maximum drive capacity utilisation with minimum power consumption. Flux optimisation ensures that the connected motor only gets exactly the amount of magnetic flux required for optimum efficiency. This is particularly important at low speeds as motors are normally using a voltage/frequency control system as used in many warehousing applications such as in conveying, hoists and cranes.

Mitsubishi Electric's advanced OEC (Optimum Excitation Control) technology helps to make their inverters masters of energy conservation. They can achieve maximum power savings of up to 60% compared to conventional mains operation, thus minimising system operating costs.

If you would like to know more about our advanced range of solutions for the retail warehousing and logistics sector, visit *https://les.mitsubishielectric.co.uk/end-users/application-by-sector/retail* or call 0870 3000 070 or email *corporatesolutions@meuk.mee.com*

The Mitsubishi Electric CPD library also provides in-depth Guides to a range of related topics, such as legislation on energy use in buildings, controls and monitoring, renewable heating options and lower-GWP refrigerants. Our Corporate Solutions team will also be happy to help with any further information and to chat with you about our technologies. Contact us on: *corporatesolutions@meuk.mee.com*

* Mitsubishi Electric CPD library

Covering topics from heat pump technology to low-GWP refrigerants and the latest legislation on Net Zero 2050:

https://library.mitsubishielectric.co.uk/pdf/directory/cpd_guides/current

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BRC CLIMATE ACTION ROADMAP

The retail sector has an ambitious goal to reach net zero by 2040, ten years ahead of the UK government's target. Almost 90 retailers have commited to the our Climate Action Roadmap which supports members through the process to reach this goal. We work with partners including Mitsubishi Electric to provide the insights and guidance to help members on their journey.

brc.org.uk/climate-roadmap

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