

Measures to reduce CO₂ emissions for warehouses and factories



Introduction

This document offers guidance on the immediate steps that warehouse and factory-based businesses can take to help tackle climate change by reducing their carbon emissions through:

- Direct energy use associated with buildings
- Indirect energy use in buildings
- Emissions associated with commuting, business and customer travel.

The information is extracted from a detailed technical report 'Review of Measures to Reduce Carbon Dioxide Emissions', produced in January 2020 by the Tyndall Centre for Climate Change Research in partnership with Electricity North West.

Summary

Warehousing and factory units consist of a wide range of business types with a mix of spaces including warehouse, workshop production and office areas. Within the warehouse sector there is likely to be diversity in energy use depending on the flow of goods (storage to rapid fulfilment centres) and whether there is refrigeration onsite.

Factories cover a wide range of activities including food products and manufacturing which have different process and energy needs, and goods storage requirements.

The following measures are recommended:

1. Replace lighting with LEDs and fit motion sensors
2. Replace space heaters with infrared heaters
3. Fit solar panels and charge equipment during the day
4. Electrify onsite transport and fit electric vehicle (EV) charge points.

Detailed guidance

Ensure best practice lighting

Lighting may be a significant contributor to onsite electricity consumption in large facilities with near continuous operation, eg multi-shift factory and warehouse settings. For a non-refrigerated warehouse, 65% of energy demand may be related to lighting. Where older sodium or metal halide discharge lighting is replaced by LED lighting, the same illumination (lumens) can be provided with around 50% less electricity.

Similarly, replacing fluorescent tube lighting with LEDs will cut electricity use for lighting by around 30%. The specified operating lifetimes of LED light bulbs is also significantly longer than for discharge and fluorescent bulbs providing further cost savings over time. Coupling improved lighting sources with occupancy and ambient light sensors to avoid over-lighting can reduce the energy used for lighting even further.

Heating, ventilation and cooling (HVAC)

Large volume buildings with regular air flow due to ventilation and open entrances/exits are a particular challenge for efficient space heating and cooling, but the following interventions are recommended:

- Increase the thickness of insulation materials on external walls and roofs. This may improve the U-value of a building by 50-70%, meaning that improved thermal comfort in a building can be achieved with less energy for heating
- Radiant (or infrared) heat panels are a particularly good option for buildings that have high ceilings and a lot of air flow. This is because, instead of increasing the overall air temperature of a building like a standard convection heater, the heat from a radiant heat panel is absorbed only by the bodies it interacts with, therefore achieving the same level of comfort for occupants at a lower temperature
- Passive and active chilled beams can provide direct cooling of building space with less energy and background noise than ventilation air conditioning.

Improve energy efficiency of electrical equipment

Where a warehouse/factory unit has a number of appliances with inductive loads such as motors, compressors, welding sets and induction heaters, carbon emissions could be reduced through power factor correction.

Voltage optimisation is another strategy for improving the energy efficiency of electrical appliances in factories. If implemented this has the potential to save around 13% in electricity bills and resultant carbon.

Increase direct use of renewables

Warehouse and manufacturing locations typically have sufficient roof space to support significant solar panels for electricity generation.

Utilising EV charge points for onsite EVs such as electric forklifts, and running equipment such as compressors at times of peak solar panel output, can help to maximise onsite self-consumption of renewable energy. This also provides wider air quality benefits by reducing direct emissions of pollutants from fossil fuels.

Renewable heat can also be supplied onsite through heat pumps or biomass heaters.

Transport and travel emissions

Decarbonising surface transport (road and rail) is a significant priority for meeting emissions targets. In terms of carbon reporting, commuting and business travel fall into what are called Scope 3 emissions (indirect emissions that occur throughout a company's value chain).

Best practice for reducing these cover three areas:

Colleague commutes

- Shift journeys to 'active' modes such as cycling or walking
- Shift car journeys to public transport
- Shift car use to electric vehicles by creating workplace travel plans.

Business travel

- Reduce the need to travel by using technology instead of meetings
- Reduce travel distances by optimising meeting locations
- Reduce greenhouse gas emissions by using low carbon modes of travel
- Hold meetings in places easily accessible by public transport and rail.

Customer travel

- Use colleague shuttle buses to bring customers to out-of-town sites
- Encourage use of public transport for accessing city centre sites.

Recommendations common to all business sectors

Some of the key recommendations listed in the report apply to more than one business sector, for example, monitoring energy usage, using low-energy control systems and installing rooftop solar panels. Key points relating to these recommendations which apply across sectors are listed below.

Leases

For many businesses, issues with energy and lighting management, and with rooftop solar installation can arise due to the ownership arrangement of the space in buildings eg if it rents rather than owns the building. This is particularly the case for non-supermarket retailers and offices. The Better Building Partnership highlights the relationship between owners and occupiers in terms of the responsibilities and benefits for procurement and control of energy as a key barrier to improving the environmental performance of buildings. One approach to overcome this is through the use of a 'green lease'. This is a standard lease with additional clauses that address the environmental management and improvement of a building, making clear the responsibilities for the owner and the occupier, and is legally binding. Alternatively, a non-legally binding memorandum of understanding can be agreed between owner and occupier.

Gains without adverse impact

Evidence suggests that reductions in energy use for lighting, temperature and air quality can be made without any adverse impact on the service being provided.

Financial support

Qualifying heat pumps and biomass boilers can benefit from the Renewable Heat Incentive (RHI) which provides financial support to adopt low carbon heating.

Additional low carbon power generation

Best practice for buying in renewable energy is that it should be additional low carbon power generation that wouldn't otherwise have been installed, for example, with direct purchase through a power purchase agreement (PPA). Where businesses are closely located there may be opportunities to pool resources and develop technologies that can supply multiple sites with renewable energy. Just switching to an energy retailer specialising in renewables does not directly reduce the carbon emissions of the building.

Carbon emissions reduction potential

The potential carbon emissions reduction that could be achieved if all of the best practice recommendations are implemented for warehouses and factories is 24-34%. It should be noted that this is an average figure for diverse sectors. Even optimum reductions for an individual business will depend on a number of factors.

To see the full report, please visit www.enwl.co.uk/decarbonise-your-business.