

Chapter 15, 16 Health, Safety, and Environment

15 Health and Safety

Warehousing covers a whole range of activities, all of which have their own hazards and risks. Employers need to ensure effective health and safety management, looking at the risks involved in the workplace and then putting in place effective control measures to manage health and safety.

了解與降低風險

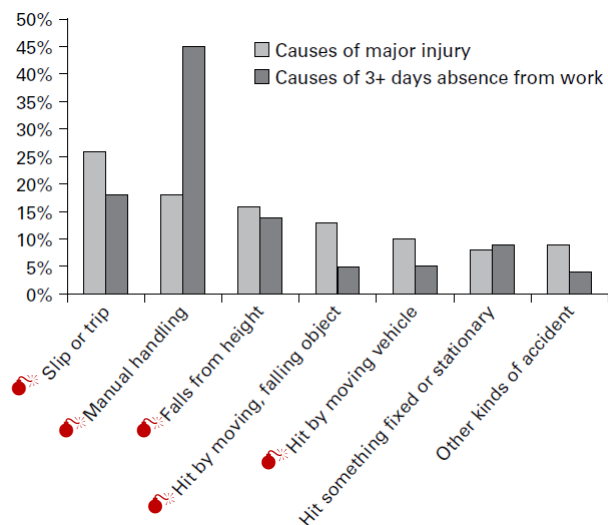
16 Environment

Environmental and waste issues have affected us all, both at home and at work. 節能減碳、回收再利用

Legislation is likely to result in **carbon becoming a 'new currency'** within a new 'carbon economy'... aware of 'carbon footprints' to gain a better understanding of where missions come from and how to reduce them.

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Main Accidents in the Warehouse



The highest number of accidents occurred on a Monday and most accidents took place between 8 am and noon.

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Occupational Safety and Health Administration

OSHA[®] also cite the following causes of accidents/injuries:

- unsafe use of forklifts; 危險操作堆高機
- improper stacking of products;
- failure to use proper personal protective equipment; 安全防護不足
- failure to follow proper lockout/tagout procedures, i.e. prevent equipment from being accidentally energized; 未防範設備意外啟動
- inadequate fire safety provisions;
- repetitive motion injuries.

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Responsibility for Health and Safety

僱主 employer responsibilities:

- provision of a health and safety statement policy;
- provision of safety equipment; 安全設備
- commitment to train staff. 員工訓練

員工 employee responsibilities:

- obligation to cooperate with their employer;
- obligation to undertake training, report issues and not to misuse equipment. 回報問題、不濫用設備

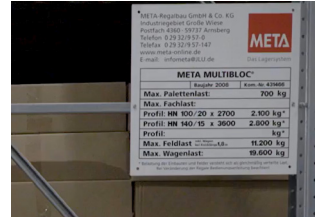
設備製造商 manufacturers' responsibilities:

- ensure product is safe to use and fit for purpose.

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Racking Inspection

- Is the equipment on sound, level flooring?
- Are double-sided runs connected properly? 兩排料架的固定
- Are the beam connector locks securely fastened? 年度檢查
- Are the racks aligned properly?
- Are the correct pallets being used?
- Are the pallets in good condition? 棧板堪用
- Is there any **visible damage**? 堆高機擦撞
- When was it last inspected?
- Are there signs on the end detailing **weight capacities**?
- Are there any receptacles for rubbish? 垃圾放置



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Slips and Trips

- **Enforce good housekeeping.** Don't allow spills to stay on the floor.
- Don't let your aisles become cluttered. 走道勿堆放貨物
- Remove or strictly control the use of cell phones.
- Provide anti-slip mats in areas known for wet or oily conditions. Install carpet mats at entrances.
- Make sure workers wear appropriate footwear on plant floor. 安全鞋
- Be sure handrails are installed wherever possible.
- Be certain that lighting is adequate. (>100 lux)
- Make sure people understand that running isn't allowed.
- Keep floors and traffic routes **free from obstruction**, particularly near stairs, on emergency routes or in/near doorways. 樓梯口、出口

www.youtube.com/watch?v=v2FNbuPR01Y 4:30-7:30

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Manual Handling

Manual handling can often cause back pain and neck pain.

When considering a manual handling operation, the following must be taken into account:

- the task;
- the load;
- the working environment; and
- individual capacity.



Wherever possible, you should try to use **mechanical handling** devices such as lift trucks, pallet trucks, trolleys or scissors lifts.

<https://www.youtube.com/watch?v=z7gPpHT1Blk>

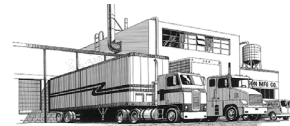
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Other Safety Issues

Working at height

- All work at height should be avoided; however, if this is impossible, ... to be carried out in as safe a way as possible.

攀登貨架或站立於牙叉上



Vehicles at the loading dock

Vehicle creep or the driver moves off before warehouse operatives have actually finished loading or unloading... 車輛滑動

- The vehicle/trailer can be immobilized in some way either by using **wheel locks**, clamps, chocks or trailer safety interlocks...
- A system of lights can be introduced on the loading bay indicating when it is safe for a driver to pull away ... 駕駛視線有死角

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Moving Vehicles In and Around the Warehouse

- managing deliveries and visitors;
- pedestrian safety: pedestrians and vehicles have to be able to circulate safely;
- traffic route: designed to minimize the need for reversing, avoiding sharp bends and blind corners; 避免急轉彎或倒退
- reversing vehicles: designed to reduce the risks from reversing vehicles wherever possible, for example a one-way system; 單行道
- coupling and uncoupling: ensure this is done safely; 聯結車



Forklifts

- Make sure that workers do not operate a forklift unless they have been trained and **licensed**.
- Establish a vehicle inspection and maintenance programme. 定期維修
- Separate forklift traffic and other workers.
- Install physical barriers where practical to ensure that workstations are isolated from aisles travelled by forklifts.
- Make every effort to alert workers when a forklift is nearby. Use **horns, audible reversing alarms and flashing lights** to warn workers and other forklift operators in the area. 蜂鳴器與警示燈



Risk Assessments

Managers have to take appropriate steps to identify potential areas where accidents can occur and take steps to avoid them.

Step 1: Identify the hazards.

Step 2: Decide who might be harmed and how.

Step 3: Evaluate the risks and decide on precautions.

Step 4: Record and communicate your findings and implement them.

Step 5: Review your risk assessment regularly and update if necessary.

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類別	風險	可能性	嚴重度	評分
生產設施無法運作	斷電	2	2	4
	停水	2	2	4
	鄰廠事故	3	3	9
	地震	3	2	6
	洪水	3	2	6
	圍廠	3	3	9
	火災	3	2	6
	化學品外洩	3	3	9
	違反環保法規	3	3	9
	違反工安法規	3	3	9

未戴安全帽被罰
越雙黃線超車被撞

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Risk Assessment Example

Location		Date:		Assessor:		
What are the Hazards? 種類	Who might be harmed and how? 受害者	What are you already doing? 現有措施	What further action is 待做 necessary? 必要?	Action by whom? 執行者	Action by when? 開始日期	Completed? 完成日期
Falls from height	Staff can suffer severe or even fatal injuries if they fall whilst climbing racking	All staff are given instructions never to climb racking – monitored by supervisors	Signage put in place to reiterate the point	Warehouse Manager	01/03/20–	Yes 01/03/20–
	Staff or contractor could suffer severe or fatal injuries falling through fragile roof lights when effecting repairs	No controls in place	<ul style="list-style-type: none"> Put up 'fragile roof' signs on each side of the building and at access points 	Facilities Manager	01/03/20–	Yes 8/02/20–
			<ul style="list-style-type: none"> Only trained contractors to access the roof 	Facilities Manager	02/04/20–	No
			<ul style="list-style-type: none"> Full risk assessment to be undertaken by contractor 	FM/Contractor	As required	

日本311地震對食品物流業的影響



日本冷藏Nichirei因設備損壞而損失32億日圓，包括肉品與冷凍食品加工廠以及物流中心。

Nichirei於2014年於東扇島興建全球第一座防震的冷凍倉庫。



日清食品Ajinomoto位於川崎市的自動倉庫因料架傾倒而無法運作，影響東京地區的食材供應，直到五月下旬才恢復運作。

仙台市的物流中心因為海嘯而嚴重毀損，影響東北地區的食材供應，五月下旬開始恢復部份營運。

Emergency Response Plan

Employers need to have an emergency plan that describes what is expected of employees in the event of an emergency. Businesses should have an 'appointed person' where necessary to take charge in the event of an emergency. 地震、颱風、水災、火災的應變計劃

Fire safety

provisions for emergency exit locations and evacuation procedures; procedures for accounting for all employees and visitors; and equipment location and use of fire extinguishers and other emergency

First aid

First aid training must be available to any first aiders and they must be retrained before the expiration of each three-year certificate in first aid at work.



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16. Warehouse and Environment

- World Economic Forum suggests that humans are responsible for greenhouse gas emissions of 50,000 mega-tonnes of CO₂e. 碳排放
- The logistics industry contributes around 6% of total emissions.
- Logistics industry emissions are not only caused by fuel consumption but also packaging and the energy used in warehouses.

社會壓力 Customer pressure, company image and differentiation together with regulatory compliance are the main driving forces for the introduction of sustainability measures.

成本壓力 Barriers to environmental initiatives include a lack of ROI, not prioritized by management, lack of or inconsistent standards and economic instability.

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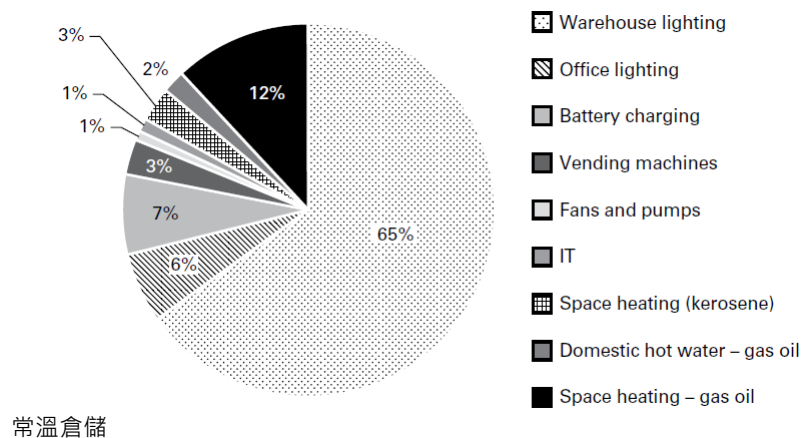


企業社會責任 Corporate Social Responsibility 是一種道德或意識形態理論，主要討論政府、股份有限公司、機構及個人是否有責任對社會作出貢獻。

永續性 Sustainability 是人們在滿足人類需求與未來發展時，在資源開發、投資方向、技術發展和制度變革中保持環境平衡與和諧的過程。永續性可以是想法、生活系統的性質、生產方法或生活方式。 **西班牙沙漠化**

- 92 per cent of companies believe that sustainable initiatives have the potential to save money and resources.
- Other benefits of sustainability are bringing greater awareness to the market, tax incentives, utility rebates, and a competitive edge.
- Green companies are investing in lighting fixtures/controls, recycling products and/or fans to circulate cool or warm air.

Warehouse Energy Usage



常溫倉儲

Ways to Reduce Lighting Costs

- introduce **energy efficient lighting**; 色溫<5000K · 照度>200 lux
- switch off all non-essential lighting out of business hours;
- install movement sensors and timers
- introduce and regularly clean skylights and clerestory windows to increase the use of **natural light**;
- switch off lights when daylight is sufficient;
- turn off external lights when daylight is sufficient;



<https://www.youtube.com/watch?v=rwORwpgQeUE>

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Potential Energy Savings 10 hours per day, 5 days a week

Key Reduction Areas	Savings	CO2 tonnes	Based Upon
Turn lights off in warehouse when an area is unoccupied 自動開關	£ 700	4.26	50% reduction in lighting
Turn lights off in warehouse when daylight is sufficient 善用自然光	£ 300	4.92	18% reduction in lighting
Replace 250W and 400W sodium or 400W metal halide lights	£ 550	3	鈉燈、鹵素燈 HID→LED
Install lighting controls	£ 70	0.4	T8 having controls added
Clean or replace roof lights	£ 300	4.92	18% reduction in lighting
Turn off external lights used for loading/unloading when daylight is sufficient	£ 420	2.5	50% reduction in lighting

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Reduce the Impact on the Environment

- Natural ventilation systems 自然通風
- Ensure all doors have sufficient seals to prevent air and water entry.
- Rainwater collection for reuse in vehicle washing, toilets, etc.
- Low water use in sanitary appliances.
- Recycle where feasible and cost effective.
- Move to utilizing plastic totes/bins in place of cardboard. 重複使用
- Utilize plastic or aluminium pallets.
- Source materials locally such as packaging, paper, MHE, etc.
- Plant trees and shrubs to assist with the removal of emissions. 植樹



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Green Energy

- The self-production of energy is a potential option for warehouse operators to consider when looking to offset their CO₂ usage.
- Photovoltaic (solar) panels 太陽能發電 and small wind generators 風力發電 are still not cost efficient, but combined with subsidies and other government incentives they can have a reasonable ROI.
- Regulation plays an important role here... many local authorities require businesses to generate at least 10 % of their energy needs onsite, using renewable energy sources.
- 台灣：認購綠能發電



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Waste Management

Waste disposal 分類以降低處置成本

Look to reduce disposal costs by segregating the waste correctly and, where feasible, selling it to waste recyclers or re-processors.

- Waste Electrical and Electronic Equipment (WEEE)

Hazardous waste

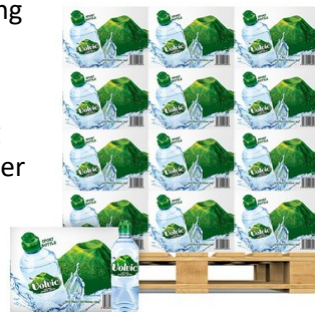
- Something is hazardous if it is dangerous to people, animals or the environment. First check the goods as stated in the consignment/transfer note and follow your own acceptance criteria.
- 有害事業廢棄物經過再處理後可被認定為一般事業廢棄物，或交由專業廠商代為處理 (要追蹤)

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Waste Management: Packaging

1. Primary (sales) packaging. This is the packaging around a product at the point of purchase by the user/consumer.
2. Secondary (grouped) packaging. This packaging groups a number of items together until the point of sale.
3. Tertiary (transport) packaging. This packaging allows handling and transportation of a number of grouped items as a single unit load.

Over recent years the mainstays of returnable transit packaging (RTP), including plastic pallets, tote boxes and metal cages. 可回收包裝材料



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Waste Management: Cartons and Pallets

Cartons

A significant trade-off is the strength of the packaging and potentially less damage versus the additional cost of the packaging. 紙箱強度

Where possible, cartons should be reused. The replacement of cardboard packaging with plastic totes is possible. (tracking system) 塑膠容器回收問題

Pallets

Utilizing recycled pallets ... likely to be cheaper and potentially stronger as a result of seasoning, which increases the strength of the wood.

Plastic pallets which are recyclable are also a potential alternative albeit they take more energy to produce, are more expensive... 節能?

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Example of ISO 14001 Environmental Policy

Case Study p.369

- Wood, plastic, paper, card and metal is separated and recycled and removed by three recycling companies.
- Two balers 壓縮打包機 are installed (one plastic, one cardboard) and staff trained to use.
- Office paper is shredded and used as packing materials in warehouse.
- No plastic/paper cups used in office areas.
- 90 % of incoming cardboard boxes are reused for packing.
- No general waste goes to landfill.



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綠建築：生態、節能、減廢、健康

什麼是綠建築？



資料來源/智慧綠建築資訊網 製圖/洪婉恬

Summary

- Managers need to be vigilant and undertake regular risk assessments. ... staff are working to the correct procedures and that equipment is maintained to the highest standards.
- By combining available technologies and solutions in terms of energy savings..., a warehouse can be designed that emits 70 % less CO₂ than the typical 15-year-old warehouse. (374)
- 自利 ⇒ 利他
- 為了節能而浪費更多成本？為了綠能而消耗更多資源？
電器開關 U-bike 電動車、太陽能

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