OUTCOME 1

Understand the environmental legislation, working practices and principles which are relevant to work activities

Assessment criteria

1.1 Specify the current, relevant legislation for processing waste

1.2 Describe what is meant by the term environment

WASTE AND THE ENVIRONMENT

In the past, it was common for all waste produced on a construction site to be placed in a skip and for that waste to go to landfill. This practice has resulted in land pollution, ground water pollution and even climate change due to the greenhouse gases that are emitted from landfill sites.

European and UK laws have placed legal obligations on employers and operatives within all industry sectors to reduce waste, avoid pollution, reduce carbon emissions and recycle wherever possible.

What is waste?

ASSESSMENT GUIDANCE

The requirements of this section are set out in the title: 'Understand the environmental legislation, working practices and principles which are relevant to work activities'.

Waste is quite difficult to define but, in general terms, it is any item that is thrown away because it is no longer useful or required by its owner. Electrical installation work generates many forms of waste, from packaging materials that come with new equipment and excess materials that cannot be saved for future use, to stripped-out materials and equipment and, of course, general building waste such as brick rubble and timber.

However we define waste, its disposal is governed by legislation. Previously, the majority of construction waste went to landfill sites without any thought to the potential impact of the buried materials on the environment.

European Union laws, that have been applied in the UK, have led to radical changes in waste handling and disposal. If you work within the construction industry, you need to have an understanding of those laws.

What do we mean by the 'environment'?

Environment

The environment is the land, water and air around us.

The Department for Environment Food and Rural Affairs (DEFRA) defines the **environment** as the land, water and air around us. Any pollution of land, water or the air will affect the quality of life for all organisms living within that environment.

Waste and environmental legislation

The environment is under increasing pressure, not only because of our demand for resources, but also due to our need to dispose of waste. Both of these can lead to pollution. There are several legislative documents that determine how we deal with waste and limit our impact on the environment:

- Control of Pollution Act 1974 (COPA)
- Environmental Protection Act 1990 (EPA)
- Environment Act 1995
- The Hazardous Waste Regulations 1995
- Pollution Prevention and Control Act 1999
- The Waste Electrical and Electronic Equipment Regulations 2006 (WEEE Regulations)
- Packaging (Essential Requirements) Regulations 2003

Control of Pollution Act 1974 (COPA)

The aim of this Act is to deal with environmental issues including waste on land, water pollution, air pollution and noise pollution. If a person or organisation is found guilty under this Act, the maximum fine is £5000 plus £50 per day for each day the offence continues after conviction.

Local authorities require construction companies to apply for a permit under the Act prior to starting work. The construction company must carry out an analysis of the likely impact of noise and vibration on those in the surrounding area. The Act gives local authorities the power to impose restrictions on companies or individuals carrying out construction or demolition work, including imposing limits on noise levels and working times so as to avoid causing a nuisance to neighbours.

Environmental Protection Act 1990 (EPA)

The Environmental Protection Act (EPA) applies to England, Scotland and Wales. It deals with the disposal of controlled waste on land and sets out a framework for duty of care. The EPA specifically deals with:

- waste
- contaminated land
- statutory nuisance.

Controlled waste is domestic, commercial and industrial waste – in fact, all waste that is disposed of on the land. Under the EPA, it is an offence for anyone to deposit waste on any land unless a waste management licence authorising that deposit is held.

Land can be contaminated with naturally occurring substances, such as arsenic, or by industrial processes or by fly tipping.

ACTIVITY

A four storey block of flats built in the 1930s is to be totally refurbished. It still has the original imperial metal conduit but was rewired with pvc single core cables in the late 1960s. List five different materials which will have to be disposed of in the proper manner.

SmartScreen Unit 302
Handout 2

Part 2A of the EPA works on the principle of the 'polluter pays'. The 'polluter' is defined as the person who caused the pollution or who 'knowingly permitted' the contamination. 'Knowingly permitted' does not only apply to allowing the contamination to take place but also to having knowledge of the contamination and failing to deal with it. Where the polluter is unknown then the occupier or owner of the land is responsible.

Part 2A of the EPA applies where significant harm to the land has taken place or where the possibility of significant harm could take place or where rivers or groundwater are or could be affected.

ASSESSMENT GUIDANCE

It is not only man-made pollution that causes problems. Effluent from farm yards (slurry) causes pollution of waterways, often with disastrous effects on aquatic life.

The EPA also covers statutory nuisance and applies to any premises that may be detrimental to health or that cause a nuisance. This section is used by local authorities when dealing with anti-social behaviour, but it also applies to work procedures and covers such things as the emission of:

- dust
- steam
- smells
- **effluvia**
- noise.

Effluvia

Emissions of gas, or odorous fumes given off by decaying waste.

When someone complains about any of the above, the local council must investigate. If the investigation reveals that a statutory nuisance does exist, a *notice of abatement* will be issued containing a list of steps that must be followed to reduce the nuisance. In the case of construction, this action could have a serious impact on the completion of the work.

Environment Act 1995

The Environment Act 1995 set new standards for environmental management and led to the creation of a number of agencies to oversee this management. The agencies created by this Act are:

- The Environment Agency
- The Scottish Environment Protection Agency
- The National Park Authorities.

The Act required that the Government prepare strategies on air pollution, national waste and the protection of hedgerows.

The stated purpose of the Environment Agency is to 'enhance or protect the environment and promote sustainable development' and 'to create a better place for people and wildlife'. The Agency looks after everything from fishing rod licences to waste disposal, from flood defences to air pollution.

The Environment Agency has been given the powers to:

- stop offending taking place
- restore and/or remediate, for which it will seek to recover the costs
- bring under regulatory control
- punish and/or deter, whether that be by criminal or civil sanctions.

The Environment Agency publishes all prosecutions and associated fines on their website and these range from a couple of thousand pounds for fishing without a licence to many hundreds of thousands of pounds for operating without a waste licence.

The Hazardous Waste Regulations 1995

The Hazardous Waste Regulations set out a regime of control for the tracking and movement of hazardous waste, and deal with the production and disposal of that waste.

Hazardous waste includes such items as:

- fluorescent tubes
- television sets
- fridges
- PC monitors
- batteries
- aerosols and paint
- contaminated soils.

When hazardous waste is moved from one location to another, a consignment note must be completed and passed to the licensed waste carrier. Hazardous waste must be kept separate from general waste.

Electrical wholesalers generally run schemes whereby fluorescent tubes can be returned to them for safe disposal. It is a requirement of the Hazardous Waste Regulations that records are kept for a period of three years.

Pollution Prevention and Control Act 1999

According to this Act, industries that emit certain substances can only operate with a permit issued by the local authority or the Environment Agency. Included in the schedule of industries requiring a permit are those involved in metal and waste processing.

SmartScreen Unit 302
Handout 2

SmartScreen Unit 302
Handout 4 and Worksheet 4

The Waste Electrical and Electronic Equipment Regulations 2006 (WEEE Regulations)

The WEEE Regulations are the implementation of a European Directive to address the environmental impact of unwanted electrical and electronic equipment, namely to reduce the amount of WEEE that is sent to landfill sites and to encourage recycling, reuse and recovery before disposal in an environmentally friendly manner.

You must comply with the WEEE Regulations if you manufacture, import, rebrand, distribute or dispose of electrical and electronic equipment. While it may seem obvious that manufacturers and distributors must comply, WEEE Regulations apply to *anyone* who disposes of such equipment.

As electricians frequently remove redundant electrical equipment and have surplus materials for disposal, compliance with the WEEE Regulations is an obligation that must be met.

Under the WEEE Regulations, electrical and electronic items are divided into 10 categories:

1. Large household appliances, for example refrigerators, fans and panel heaters
2. Small household appliances, such as vacuum cleaners and toasters
3. IT and telecommunications equipment
4. Consumer equipment, such as radios and televisions
5. Lighting equipment, for example fluorescent tubes and discharge lamps
6. Electrical and electronic tools, such as drills
7. Toys, leisure and sports equipment
8. Medical devices
9. Monitoring and control instruments, such as smoke detectors and thermostats
10. Automatic dispensers, for example vending machines.

Electricians most commonly deal with items in categories 5 and 9 but, at times, other categories may also apply.

Bear in mind that some WEEE may also be classified as hazardous waste. Examples are smoke detectors which contain radioactive emitters and fluorescent tubes which contain mercury and cadmium as well as old discharge lighting control gear, which can contain PCBs (polychlorinated biphenyls), which are also hazardous to persons and the environment. If in doubt regarding any of these items, always seek advice.

ACTIVITY

Look around your own house and name at least five items which would come under the WEEE regulations.

ASSESSMENT GUIDANCE

In years gone by it was common practice for virtually all rubbish to be placed in the dust bin. This is no longer allowed and many items must be sorted into specific categories for recycling.

KEY POINT

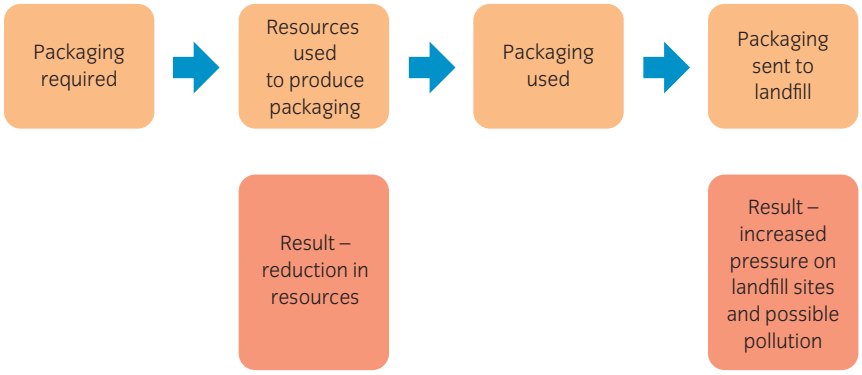
The WEEE Regulations apply to electricians when disposing of old electrical equipment.

Packaging (Essential Requirements) Regulations 2003

This Act requires anyone, but generally manufacturers of products, who place packaging into the marketplace, to take certain steps to:

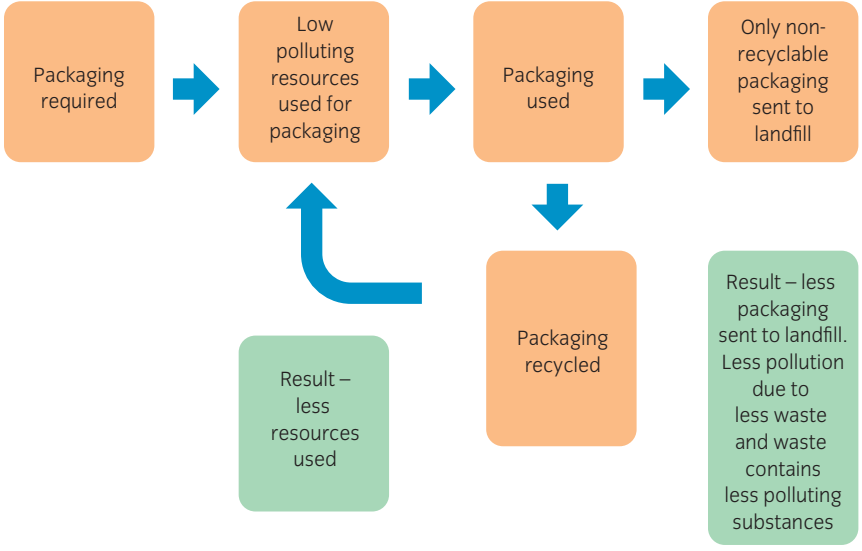
- minimise the amount of packaging used
- make sure packaging can be recovered (recycled)
- ensure that packaging has the minimum possible impact on the environment
- ensure that packaging does not contain high levels of hazardous materials or heavy metals.

Packaging has a very short life cycle – being useful only from the time it leaves the manufacturer to when it arrives at the end user. While the Packaging (Essential Requirements) Regulations are not directly aimed at end users, they do reinforce the requirements for dealing with any waste product.



Poor waste model

It is obvious that the poor waste model for packaging is unsustainable. The sustainable waste model shown in the diagram below is a far better model.



Sustainable waste model

In the sustainable waste model, the packaging is made of materials that will cause minimum pollution in landfill sites. However, the materials are actually recyclable, thus cutting down waste and also reducing the demands on dwindling resources.

The key person in this cycle is the person who ensures that the waste product is recycled.

KEY POINT

Remember: Recycle and Reuse not Refuse!

Assessment criteria

1.3 Describe the ways in which the environment may be affected by work activities

THE IMPACT OF WORK ACTIVITIES

It is true to say that any work activity, especially construction work, will have some effect on the environment. Work activities can affect the land, air and waterways and, in turn, can impact on people and wildlife.

Land

ACTIVITY

State a typical use for turpentine.

The land around a construction site can easily become contaminated with chemicals due to spillages. Common chemicals that are found on construction sites include diesel, petrol, paint, turpentine, white spirit and various oil-based products and preservatives. Any of these, if spilled or poured onto the ground, will result in land contamination. Sending any of the above chemicals or their containers to landfill sites will also result in land contamination.

Other building products, such as asbestos cement sheets, gypsum-based products (such as plasterboard), artex and polystyrene, can be disturbed during building works and should not be sent to general landfill sites.

Air pollution

ASSESSMENT GUIDANCE

Air pollution can be carried a very long way by the prevailing wind, which tends to be from the west in the United Kingdom.

One of the major sources of air pollution is the combustion process. Plant machinery with internal combustion engines will have an effect on the air in and around a construction site. The burning of waste is banned on most sites due to the pollution it creates.

Apart from smoke particles, the burning process may also release harmful gases and chemicals that constitute a health risk or an environmental hazard. As the release of smoke is covered by the EPA, local authorities usually have policies in place that cover bonfires.

Pollution of water courses

Spillage of chemicals poses a great risk to water courses; however, the dumping of contaminated materials in landfill sites can also pollute the water supply. Both wildlife and humans are dependent on clean uncontaminated water for survival; fish stocks are particularly sensitive to water pollution.

BUILDING REGULATIONS AND THE CODE FOR SUSTAINABLE HOMES

Assessment criteria

1.4 Identify and interpret the requirements for electrical installations as outlined in relevant sections of the Building Regulations and the Code for Sustainable Homes

While the Building Regulations do not deal with waste products, they are concerned – along with the Code for Sustainable Homes and the EPC (Energy Performance Certificate) for Construction – with reducing carbon emissions, thus protecting the environment. The Building Regulations outline the minimum acceptable standards.

SmartScreen Unit 302
Handout 8 and Worksheet 8

The Code for Sustainable Homes is the national standard for the sustainable design and construction of new homes and classifies homes according to how much energy and water they use. It is a mandatory requirement that all new homes are rated against this standard. The Code contains information on the amount of waste that can be generated during the construction of the building, as a building's classification depends on its design and construction as well as on the future running characteristics of the property. The Code also includes guidelines on such things as external lighting and energy use.

Details of energy efficient lighting and appliance ratings can be found later in this chapter.

HAZARDOUS AND RECYCLABLE WASTE

Assessment criteria

1.5 State materials and products that are classed as:

- hazardous to the environment
- recyclable

What is hazardous waste? Hazardous waste is waste that can cause the greatest environmental damage. These wastes are listed in the Lists of Wastes (England) Regulations 2005 and include everyday items such as fluorescent tubes, TVs and computer monitors.

Heavy metals

Much waste is classified as hazardous due to the fact that it contains heavy metals. Heavy metals are natural components of the Earth's crust; small amounts of some heavy metals (such as iron and copper) are beneficial to human life, but arsenic, cadmium, mercury and lead can be poisonous or toxic. These, therefore, pose the greatest pollution risk.

Heavy metals can be introduced into the air, soil or water following dumping of waste materials. The waste materials may be sent to landfill sites where the heavy metals may be dispersed into the air or can contaminate the land; they may, in turn, leach into the water courses or the sea.

Heavy metals have a tendency to **bioaccumulate** rather than pass through the body. This makes them especially dangerous to humans and wildlife. Pockets of concentration, such as may be found at landfill sites, are of the most concern.

Bioaccumulate

Bioaccumulation occurs when substances such as pesticides or heavy metals gradually build up in the body of an organism, such as a human or other animal. These substances are not flushed through the body and a damaging amount can collect over time.

Plants and animals may absorb these pollutants – this is how heavy metal contamination enters the food chain. For example, heavy metals in sea water are absorbed by small fish, which are eaten by medium-sized fish. These, in turn, are eaten by large fish. The greatest concentration of heavy metals is, therefore, contained in the largest fish in the sea, such as tuna. These are consumed by humans and, thus, the heavy metals accumulate in the human body and can seriously affect health.

Waste sources of heavy metals

- *Cadmium* is found in nickel–cadmium (NiCad) batteries. Health risks associated with cadmium include an increased risk of bone fractures and defects, and kidney damage.
- *Lead* is found in old paint, water pipes and old cables. Health risks associated with lead include effects on the gastrointestinal tract, joints, kidneys and the reproductive system, along with acute nerve damage and lowered IQ.
- *Mercury* is ranked as one of the most severe of polluting waste products and even small amounts can result in neurological damage or death. Excessive exposure to mercury can cause permanent brain or kidney damage. Mercury is found in fluorescent tubes; especially within the fluorescent powder which, if a tube is broken, will disperse into the air and could be inhaled. If old tubes are buried in landfill sites, the mercury can contaminate soil and water. It is estimated that the mercury contained in one fluorescent tube is enough to raise the mercury content of 30,000 litres of water beyond the recognised safe level for drinking water in the UK. Not surprisingly, fluorescent tubes are classified as hazardous waste in the UK.

ACTIVITY

In electrical work, where would the following scrap materials be found:

- lead
- steel
- brass
- copper
- aluminium
- PVC
- rubber
- cardboard?

Waste fluorescent tubes

Recyclable materials

Wherever possible, recycling must be the first option before sending waste to landfill sites. Many recycling and collection schemes exist and construction site managers will be keen for site waste to be sorted and recycled rather than being placed in general skips.

The following materials should be recycled on site:

- all metallic waste and products containing metal – this includes cable, metallic conduit and trunking, cable support systems and pipework (aluminium, steel and copper are commonly found in the metallic waste generated during the completion of an electrical installation)
- paper and cardboard – although manufacturers have, in recent years, worked hard to reduce the amount of packaging that comes with products, invariably a large amount of packaging material ends up on site
- lamps – including fluorescent tubes, sodium, mercury and metal halide discharge lamps.

Various recycling schemes, though not specific to electrical installation work, exist for:

- wood
- glass
- plastics, including pipe and conduit
- hardcore (bricks and concrete)
- batteries.

ASSESSMENT GUIDANCE

Even small items, such as batteries, should be disposed of properly. Many shops have a collection point for old batteries. Do not put them in the dust bin.

DEALING WITH WASTE

From the discussions in this unit, it is obvious that electrical contractors must have procedures in place to handle, store, recycle and dispose of all waste including hazardous, WEEE and recyclable waste.

Electrical contractors should:

- separate recyclable, hazardous, WEEE and general waste into separate and clearly identified containers
- arrange for collection of recyclable waste by a licensed waste carrier
- arrange for collection and processing of hazardous waste by a licensed waste carrier
- return WEEE to wholesalers or manufacturers or arrange for collection by a licensed waste carrier
- obtain waste transfer notes for all waste
- keep records.

Other procedures are needed to control statutory nuisance and other sources of pollution such as spillage.

Assessment criteria

1.6 Describe the organisational procedures for processing materials that are classed as:

- hazardous to the environment
- recyclable

ACTIVITY

Produce a simple flow chart to illustrate your company's procedure for dealing with redundant electrical equipment.