



NEBOSH INTERNATIONAL DIPLOMA IN ENVIRONMENTAL MANAGEMENT

Unit IDEM2: Environmental Regulation



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NEBOSH INTERNATIONAL DIPLOMA IN ENVIRONMENTAL MANAGEMENT

UNIT IDEM2: ENVIRONMENTAL REGULATION

Element 1: Enforcement of Environmental Legislation

Element 2: Pollution Prevention and Control Multilateral Treaties

IDEM2: Practical Assignment

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RRC: IDEM2.1

Second edition Spring 2019

ACKNOWLEDGMENTS

RRC International would like to thank the National Examination Board in Occupational Safety and Health (NEBOSH) for their co-operation in allowing us to reproduce extracts from their syllabus guides.

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Unit IDEM2: Practical Assignment

Course Structure

This textbook has been designed to provide the reader with the core knowledge needed to successfully complete the NEBOSH Diploma in Environmental Management. It follows the structure and content of the NEBOSH syllabus.

The NEBOSH Diploma in Environmental Management consists of two units of study. ED1 is assessed by a 3-hour written examination and IDEM2 by an 8,000 word project. You need to pass both units to receive the NEBOSH Diploma in Environmental Management.

Unit ED1: Controlling Environmental Aspects

Element 1	Key Environmental Cycles and the Effects of Human Activity on the Environment
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Element 11	Hazardous Substances and Contaminated Land
Element 12	Energy Use

Unit IDEM2: Environmental Regulation

Element 1	Enforcement of Environmental Legislation
Element 2	Pollution Prevention and Control Multilateral Treaties



More Information

As you work your way through this book, always remember to relate your own experiences in the workplace to the topics you study. An appreciation of the practical application and significance of environmental health and safety will help you understand the topics.

Keeping Yourself Up to Date

The field of environmental health and safety is constantly evolving and, as such, it will be necessary for you to keep up to date with changing legislation and best practice.

RRC International publishes updates to all its course materials via a quarterly e-newsletter (issued in February, May, August and November), which alerts students to key changes in legislation, best practice and other information pertinent to current courses.

Please visit www.rrc.co.uk/news/newsletters.aspx to access these updates.

Element 1

Enforcement of Environmental Legislation



Learning Outcomes

Once you've read this element, you'll understand how to:

- 1 Explain the mechanisms available for the enforcement of environmental law.
- 2 Outline the role and influence of the United Nations and how key international treaties can influence local legislation in member states.

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Enforcement of Environmental Law

IN THIS SECTION...

- Government policy can be implemented by the setting of legislation, law, therefore, is a policy instrument.
- Enforcement notices are issued by regulators if they believe an operator is in non-compliance with a permit or its conditions.
- A formal caution is written acceptance that an offence has been committed where a prosecution could have been brought.
- Where a local authority has identified a statutory nuisance, or a statutory nuisance is likely to occur or recur, it is required to serve an abatement notice.
- Suspension notices can be submitted by a regulator if a permit is breached or there is a risk of serious pollution.
- Following designation of land as being contaminated, the enforcing authority is required to serve a remediation notice on the appropriate person(s).
- Civil sanctions can be applied to specified environmental offences as an alternative to criminal sanctions; they include compliance notices, restoration notices, variable monetary penalties, enforcement undertakings, third party undertakings, fixed monetary penalties and stop notices.
- Each country or region has one (or more) enforcement agency responsible for enforcing environmental law.
- The top level of law is international law; this may be in the form of a Treaty, Convention, Protocol or Declaration. European (and other groups of nations) and national law also play an important role in environmental management.
- It is common in many countries for industrial installations to require an environmental permit to operate.

The Role, Function and Limitations of Legislation As a Means of Promoting Environmental Performance

Government policy can be implemented by the setting of legislation; law, therefore, is a policy instrument. Law tends to work on the basis of 'command and control', stating in most cases the level of performance that must be achieved in addition to how the achievement is to be made.

Law can best be described as the set of rules that regulate and control the conduct of citizens; it is laid down by those in authority and enforced by its agencies.

The approaches to setting law can vary widely around the world, however, common types of legislative approaches to environmental management include:

- Environmental permits.
- Prohibitions or restrictions on substances or products.
- Regulatory authorisations.
- Standards of performance.

DEFINITION



POLICY INSTRUMENT

The method or mechanism used or proposed by government, political parties, businesses or individuals to implement policy aims. Instrument types include law, information provision, market-based or voluntary.

The use of law, as with any policy instrument, has both its advantages and disadvantages. The advantages include:

- The rule based approach of some legislation provides for a consistent means of regulation by enforcing authorities.
- Specific content enables a reasonable degree of certainty.

The disadvantages include:

- Law can sometimes be lacking in speed to changes in technology, politics or science and as such new legal requirements can take a considerable period of time to be implemented.
- There is need for some form of enforcement of legislation which can be costly.
- Having the same standards for all relevant organisations may not be reflective of differing cost of abatement in different organisations.
- May unintentionally encourage poor environmental behaviour as playing by the rules may be costly or time-consuming.

Mechanisms That May Be Used to Enforce Environmental Law

The following is largely based around methods of enforcement of environmental law in England, it should be noted that methods of enforcement will differ in other countries, although will share some similarities.

Prohibition and Enforcement Notices

Unlike health and safety, there are many different types of notices that are made under various environmental Acts and Regulations, although some of them are very similar in nature.

Enforcement notices under the **Environmental Permitting (England and Wales) Regulations 2016 (EP Regulations)** (Reg. 36) are issued by regulators if they are of the opinion that an operator is in non-compliance with a permit or its conditions. The notice is required to state:

- the breach/potential breach;
- remedial steps to be taken; and
- the period within which remedial measures must be undertaken.

The notice can be withdrawn by the regulator at any time.

The Environment Agency (EA) (a key environmental regulator in England) may issue a prohibition notice under the **EP Regulations 2016** concerning an activity that might lead to pollution of groundwater. The notice requires the activity causing the discharge to be stopped. Additionally, a landfill closure notice or mining-waste facility closure notice can be served under the **EP Regulations**.

Under the **EP Regulations**, appeal to the relevant authority is allowed when an enforcement notice, revocation notice, or suspension notice is served.

Other Forms of Notice

Formal Caution

A formal caution is written acceptance that an offence has been committed where a prosecution could have been brought. It can be produced before a court if further offending occurs. They are specific deterrents to an offender and are seen as being suitable where factors mitigate against a prosecution being initiated. If a caution is not accepted then normally prosecution for the offence will occur.

Abatement

Where a local authority has identified a statutory nuisance or a statutory nuisance is likely to occur or recur, it is required to serve an abatement notice on the person who is responsible for the nuisance or, if that person cannot be located, the owner or the occupier of the premises.

The notice can impose one or both of the following:

- Abatement of the nuisance, or stopping or restricting its occurrence or recurrence.
- The carrying out of works and other steps to abate the nuisance.

The notice must identify the time or times within which the notice should be complied with. It should also state the right and mechanism of appeal (within 21 days).

Failure to comply with the conditions of an abatement notice may result in prosecution in a Magistrates' Court (Sheriff Court in Scotland).

If the notice is not complied with, the local authority can take measures to abate the nuisance itself and can recover costs from the person responsible for the nuisance in doing so.

Suspension

Suspension notices under the **EP Regulations** (Reg. 37) can be submitted by a regulator if they consider that:

- the operation of a regulated facility contravenes a permit condition and that the contravention involves a risk of pollution; or
- the operation of a regulated facility under an environmental permit involves a risk of serious pollution.

The notice must state:

- the risk of pollution;
- the remedial steps to be taken;
- where a contravention has occurred, the nature of the contravention; and
- the period within which remedial measures must be undertaken.

Revocation

Under the **EP Regulations**, where permit conditions are being breached, or the activities covered by a permit are causing or likely to cause serious harm to the environment or human health, then the EA may serve a notice stating that it intends to partially/completely revoke a permit.

Variation

Prior to making changes to an installation, operators are required to notify regulators of planned changes, giving 14 days' notice. Such notifications tend to be used for minor changes to an installation. If substantial changes (those that may have significant negative effects on human beings or the environment) are required then an application to vary a permit can be made to the regulator.

An application to vary a permit must be made in writing to the regulator and must be accompanied by the relevant fee. The operator must advertise the application for a variation in a local newspaper, or, for Part A installations, the London Gazette (Edinburgh/Belfast Gazette) within 28 days of receiving notification from the regulator to do so.



Installation changes can have an impact on the environment

Permit conditions can also be varied by regulators at any time, e.g. following:

- A scheduled review of a permit to take into account new developments in Best Available Techniques (BAT).
- Notification by the operator that he is intending to make changes in the way that the installation is operated.

Remediation

Following designation of land as being contaminated, the enforcing authority is required to serve a remediation notice on the appropriate person(s) specifying what needs to be done and the period within which various items of work need to be completed. The **Contaminated Land (England) Regulations 2006** specify the contents of the notice:

- Name and address of the person to whom the notice is being served.
- Reasons for serving the notice.
- Location and extent of the land in question.
- Substances with which it is contaminated.
- Particulars of the harm or pollution of controlled waters.

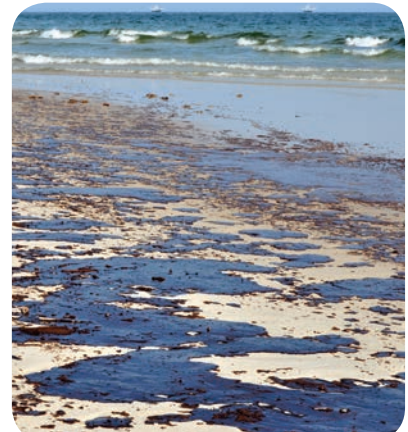
The appropriate person will normally be the person(s) who knowingly caused or permitted the presence of a substance in, on or under the land, thereby causing it to become contaminated. If this person cannot be found, then the owner or current occupier of the land will become the appropriate person.

Cost Recovery

Under the **EP Regulations**, the regulator has powers to carry out work necessary to prevent or mitigate serious pollution. If the regulator intends that steps are taken, it must inform the operator of the steps five working days before they are taken. It may also recover the cost of taking those steps from the operator, unless the operator can prove that there was no risk of serious pollution, or that costs were unnecessarily incurred by the regulator.

Fines and Imprisonment and the Right to Compensation

Non-compliance with criminal law can lead to a number of penalties, such as fines and, for more serious offences, imprisonment. In the UK for example, non-compliance with the **Environmental Protection Act 1990** (a key environmental law) can lead to an unlimited fine and/or two years in prison. Non-compliance may also lead to the polluter having to pay compensation to the person who has been wronged in relation to an environmental incident. Examples of compensation that might have to be paid include payment of the costs incurred for cleaning up an oil spill or restocking a river with fish.



Compensation may include paying the cost of cleaning up an oil spill

DEFINITION

CRIMINAL LAW

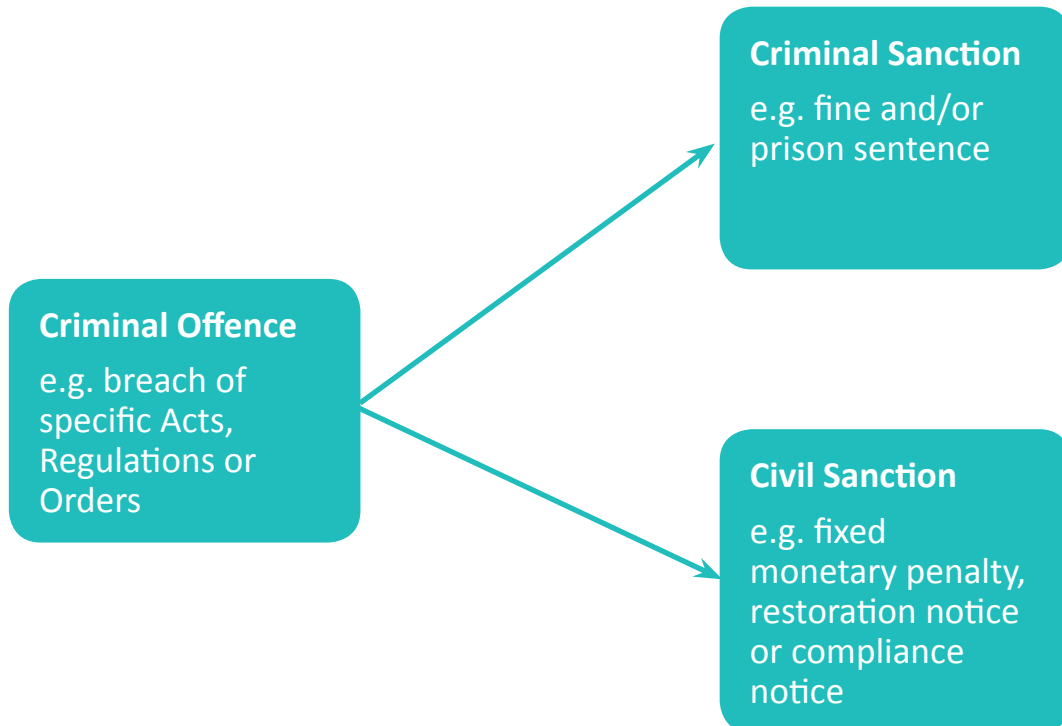
Criminal law is closely allied to statute law. It has the objectives of punishing, deterring or reforming - usually through the imposition of fines and/or prison sentences. Prosecutions are brought by the state.



Civil Sanctions

Background to Civil Sanctions

Civil sanctions can be applied to specified environmental offences as an alternative to criminal sanctions (such as fines and prison sentences) as can be seen in the diagram below:



Sanctions for breach of specific criminal offences

Following the introduction of the **Regulatory Enforcement and Sanctions (RES) Act 2008**, a number of civil sanctions for various offences have been enabled. From an environmental perspective, civil sanctions have been introduced by the following:

- The **Environmental Civil Sanctions (England) Order 2010**.
- The **Environmental Civil Sanctions (Miscellaneous Amendments) (England) Regulations 2010**.
- The **Environmental Civil Sanctions (Wales) Order 2010**.
- The **Environmental Civil Sanctions (Miscellaneous Amendments) (Wales) Regulations 2010**.
- The **Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2016**.

The above laws make civil sanctions available for various offences for use in England and Wales by the Environment Agency, Natural Resources Wales and Natural England.

The Macrory Report and a review by the UK Government identified that the current framework for dealing with environmental offences was not satisfactory, as:

- There is no proportionate middle ground between issuing a warning and taking criminal proceedings.
- The legal system concentrates mainly on criminal sanctions, which can be disproportionate.
- Fines do not always cover the cost to society of harm from non-compliance and therefore do not act as an appropriate deterrent.
- Damage to the environment is not always put right.

- The current system does not take into account or encourage a good record of compliance, or deter non-compliance. It was discovered that those who do not comply with environmental law can sometimes gain a competitive advantage, which is unfair to those who take compliance seriously.

Following identification of the above problems, the Government introduced the **RES Act**, enabling civil sanctions for environmental offences. It should be noted that regulators will still be able to use other approaches to environmental enforcement that were in place prior to introduction of the **RES Act**, with civil sanctions filling gaps where they exist.

Types of Civil Sanction

A civil sanction can only be used where it is identified in a statutory instrument that a civil sanction is available for a particular offence. For example:

- The Environment Agency has powers to issue civil sanctions in relation to parts of the **Environmental Protection Act 1990** and the **Hazardous Waste Regulations 2005**.
- Natural England (a UK government conservation body) has powers to issue civil sanctions for numerous offences relevant to protected species and habitats and breaches of the **Environmental Damage (Prevention and Remediation) (England) Regulations 2015**.

The types of civil sanction that have been introduced are:

- Compliance notices.
- Restoration notices.
- Variable Monetary Penalties (VMPs).
- Enforcement undertakings.
- Third-Party Undertakings (TPUs).
- Fixed monetary penalties.
- Stop notices.

A decision by the former Department for Business, Innovation and Skills (BIS) has limited regulators' powers to impose Restoration notices, VMPs and fixed monetary penalties to undertakings with more than 250 employees.

Compliance Notice

This is a written notice that is issued by the regulator to ensure that a person takes steps within a specified time period to ensure that an offence will not continue or happen again. In general, a compliance notice could be served for numerous situations, such as:

- Investment in a specific area, e.g. secondary containment for a tank to prevent chemicals from entering the environment.
- Training staff.
- Altering or updating a process.

Restoration Notice

This is a notice issued by the regulator requiring an individual to take steps to restore harm that has been caused by non-compliance, such that the position is restored to what it would have been (or as close as possible) if the offence had not taken place.

A restoration notice is appropriate where action is required to address environmental damage. This could include temporary or permanent loss to the quality of the environment (e.g. air or water quality), or resources and services that are provided by the ecosystem. Such a notice would not be used where action is taken under the **Environmental Damage (Prevention and Remediation) (England) Regulations 2015**.

Restoration notices will sometimes be able to be used to take action to improve resources or services away from the site of damage itself. For example, if a population of a species is reduced by damage, it may be appropriate to take action at another location.

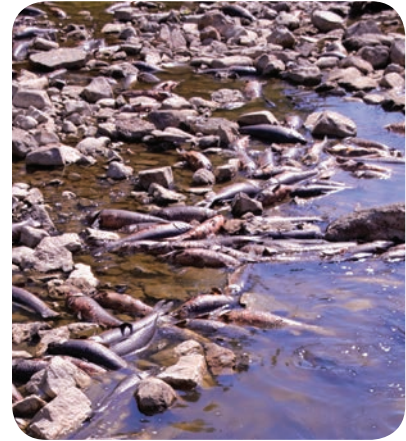
Typical restoration activities deemed suitable for a restoration notice include:

- Removal and/or treating of contaminants to reduce impacts on natural resources or local communities.
- Removing or protecting against other pressures on natural resources and services or local communities (e.g. non-native species and/or development-related pressures).
- Restocking or re-introductions of damaged species (e.g. fish).
- Developing and implementing strategic management plans.
- Implementing restrictions to access, or improvements to access.
- Providing monitoring capacity.

Where local communities are affected, e.g. through loss of amenity, damage to habitats or nuisance, regulators are advised to seek the views of local people.

When a restoration notice is submitted, the following must be clearly identified:

- The damage or losses.
- The actions required to restore the position.
- The period within which those actions should be taken.
- Outcomes to be obtained and any monitoring requirements.



Typical restoration activities include re-introducing damaged species, e.g. fish

Variable Monetary Penalties

Variable Monetary Penalties (VMPs) are monetary penalties that can be used by regulators for cases of more serious non-compliance where they decide that a prosecution is not in the interest of the public. VMPs are used in cases where any financial benefit that has accrued from non-compliance is removed, to deter future non-compliance. They are used where any other costs of a person co-operating with enforcement action (e.g. compliance notice, restoration notice, etc.) do not achieve these objectives. Legal compliance, restoration of damage and compensation to parties affected are required to take priority above monetary penalties.

To work out the cost of a VMP, three factors are taken into account:

- **Regulator estimate of financial benefit from non-compliance**, for example:
 - the costs of any fees not incurred;
 - the costs of any investments considered to have been necessary to avoid non-compliance; and
 - the costs of staff resources, expert or commercial services considered necessary to carry out the activity in a compliant manner.
- **An appropriate deterrent cost is added** (as reducing the financial benefit gained is often not sufficient to deter offending). It takes into account a person's effort to prevent non-compliance and address it where it does happen.

This is worked out by taking a starting point figure and applying an adjustment to it based on presence or absence of various factors. The starting sum will be chosen depending on the characteristics of the offence, and might include:

- Restoration costs.
- Financial benefit.
- Maximum criminal fine that a Magistrates' Court may impose.

The adjustment will be based on factors that indicate the effort the person has put into avoiding non-compliance and the effects that this will have, such as:

- Degree of blameworthiness.
- Non-compliance history.
- Attitude to non-compliance (e.g. lack of prompt action).
- Foreseeability of environmental risk and harm.
- Ignorance of previous advice.

It is estimated that the maximum decrease will usually be up to 80% but might be up to 100% in exceptional circumstances.

- **Deduct other costs incurred** - in cases where a person has already incurred costs as a result of enforcement action, this is taken into account by deducting the costs already incurred from the estimate of financial non-compliance and the deterrent component. Where the cost already incurred is equal to, or exceeds the previously calculated cost level, a VMP is not applied.

The amount of a VMP when heard in a criminal court is limited by the maximum fine that magistrates can impose. For hybrid offences that can be heard in a Magistrates' or Crown Court, the maximum level of a VMP is £250,000. A VMP can also be applied for more than one offence.

Enforcement Undertakings

These are voluntary, written agreements made by a person to take steps that would make amends for non-compliance and its impacts. It is the regulator's decision whether to accept such an agreement in a particular case.

A prosecution or other civil sanction is not allowed to be imposed if the regulator accepts it and the agreed undertaking is carried out. An enforcement undertaking would be appropriate when a person wants to take a proactive approach and is in a position to identify measures to address the non-compliance and issues it raises. These agreements are relevant where a person has committed a relevant offence and highlights this to the regulator or the regulator suspects that an offence has occurred.

Action that could be offered to be undertaken includes:

- action to ensure that the offence does not continue or recur;
- action to ensure that the position is restored, so far as possible, to what it would have been if the offence had not been committed;
- compensating a person affected by the offence (e.g. individuals, groups of individuals and/or communities); or
- where restoration of actual harm is not possible, making equivalent restoration to another environmental resource or service.

If a regulator is satisfied that an enforcement undertaking has been carried out, then a completion certificate should be issued. A person can apply for a completion certificate and the regulator must decide whether or not to issue one within 28 days.

The **EP Regulations** give powers for the EA to issue enforcement undertakings in England for various offences, such as operating without a permit, failure to comply with permit conditions and offences by third parties.

Third-Party Undertakings (TPUs)

When a person receives a notice of intent to impose a compliance notice, restoration notice or VMP, they may offer a Third-Party Undertaking (TPU). This involves taking action that benefits a third party who has been affected by the offence. Where such an undertaking is offered, it is the decision of the regulator whether to accept it or not. The regulator must also decide the way it takes it into account when sanctioning a decision. A person could pay compensation to persons affected and a regulator could reduce a VMP to take into account the offer. Such an undertaking cannot be offered following imposition of a final notice (see **Enforcement Process for Civil Sanctions**).

A TPU could be used where there is identifiable harm to communities or local people, such as:

- Loss of amenity.
- Nuisance with no concrete effect (e.g. odour).
- Nuisance with impacts (e.g. dust, soot).
- Damage to local economic activity.

Measures identified in a TPU could include those that:

- Directly reduce or restore the harm.
- Compensate for the harm by providing or making improvements to the local environment or amenities.
- Reduce other pressures on local communities, e.g. by helping to reduce other sources of nuisance, where possible.
- Involve financial payment of compensation.



Stone cutting can cause a dust nuisance

Fixed Monetary Penalties (FMPs)

Fixed Monetary Penalties (FMPs) are a relatively low-level fixed penalty that the regulator can impose for specific minor offences. An FMP is a stand-alone sanction that cannot be used with any other sanction. Various activities where an FMP could be used include failure to monitor or document activities as requested by the regulator.

FMPs are required to be mainly used where guidance has previously been given but ignored. It is planned that these will be used sparingly and they are not appropriate for more serious cases of non-compliance. Offences where FMPs may be imposed include less serious examples of the following:

- Breach of a permit for water abstraction - **Water Resources Act 1991**, Section 24(4)(a) and (b).
- Failure to furnish a certificate of compliance in respect of packaging recovery and recycling obligations.
- **Producer Responsibility Obligations (Packaging Waste) Regulations 2007**, Regulation 40(1)(c).

In a similar way to other notices covered, the regulator must issue a notice of intent to impose a penalty, and there is a period of 28 days during which the recipient must raise any objections or make representations. Following this, the regulator must decide whether or not to issue a final notice of the penalty.

For all offences for which an FMP is relevant, the following figures are set:

- £100 for individuals; and
- £300 for all other persons (including limited companies).

Stop Notices

A stop notice is another form of written notice that prohibits a person from undertaking an activity that is causing (or is likely to cause) serious harm. It also prohibits situations that present (or are likely to present) a significant risk of causing serious harm until the person has undertaken specified steps stated in the notice to remove the risk of serious harm, or to return to full compliance with the law.

A stop notice can require a person to stop carrying out processes and will be linked to the activities or parts of activities that are responsible for the risk of harm. A stop notice can be issued with other civil sanctions (apart from an FMP) and may also be served as part of steps leading to a criminal prosecution. It can be issued when a person is carrying out (or is likely to carry out) an activity that the regulator reasonably believes:

- is causing (or will cause) serious harm or presents (or will present) a significant risk of causing serious harm to human health or the environment (including the health of animals and plants); or
- involves (or will involve) or is likely to involve (or will be likely to involve) committing an offence for which a stop notice is available.

A stop notice must include:

- the grounds for serving the stop notice;
- the actions the person must take to comply with the stop notice;
- rights of appeal; and
- the consequences of non-compliance.

Non-compliance with a stop notice is a criminal offence.

The person to whom a stop notice is served can appeal against the decision to serve it within 28 days of receiving it. A stop notice cannot be suspended unless a First-Tier Tribunal directs otherwise. If a regulator is satisfied that a stop notice has been complied with, then it is required to issue a completion certificate. A person can apply for a completion certificate at any time and the regulator must decide whether to issue one as soon as possible and at least within a maximum limit of 14 days from when the notice is served.

A regulator is required to compensate a person if the service of the notice or refusal to issue a completion certificate leads to loss and:

- The stop notice is withdrawn or amended, as the decision to serve it was unreasonable or steps stated within it were unreasonable.
- A successful appeal is carried out against the refusal of a completion certificate and a tribunal rules that the refusal was unreasonable.
- A person successfully appeals against the stop notice and the tribunal finds service of the notice was unreasonable.

Compensation would not be payable where an appeal was successful on a technical or minor matter but a tribunal stated that a notice was reasonably served, or that the regulator acted reasonably on the basis of information that was provided by the person at the time when it was served.

Enforcement Process for Civil Sanctions

Notice of Intent

Prior to issuing a compliance notice, restoration notice or VMP, the regulator is first required to issue a notice of intent detailing what is proposed. The notice must contain the following information:

- Grounds and key facts that led the regulator to consider that an offence has been committed.
- Right to make representations and objections within 28 days from when the notice is received.
- The circumstances when the regulator cannot impose the sanction (e.g. defences available under relevant legislation).
- The fact that the person can offer enforcement undertakings or third-party undertakings.

Following the reception of a notice of intent, the person has the right to make written representations and objections. This will allow them to raise a defence or other concerns that they may have. The regulator must then decide to impose the sanction or impose a different sanction, which must be completed as soon as possible after the period for making objections or representations has ended.

Final Notice

If the regulator makes the decision to impose a compliance notice, restoration notice and/or VMP, then a final notice must be submitted. This must include:

- Grounds for imposition of the sanction.
- How payment of a VMP is to be made, when it must be made, early payment discounts, or late payment penalties.
- Right of appeal.
- Consequences of failure to comply.

Failure to Comply

The **Environmental Civil Sanctions Order 2010** specifies powers and process open to regulators when a person fails to comply with a notice, or does not pay a monetary penalty:

- VMP, FMP or other monetary penalty - when a person does not pay, no prosecution can be brought for the original offences. Unpaid penalties will, however, be enforced through the civil courts, and regulators will be able to recover unpaid sums.
- Enforcement undertakings - should a person fail to comply or only partly comply, the regulator has the choice of extending the period of the enforcement undertaking, imposing a different civil sanction, or pursuing a criminal prosecution for the original offence.
- Restoration notice or compliance notice imposed without a VMP - a prosecution would normally result from non-compliance with these notices. Where there are mitigating factors, a Non-Compliance Penalty (NCP) notice can be served, which is a written notice issued by the regulator imposing a monetary penalty. As the original notice remains in place, the regulator will be able to prosecute whether or not the NCP is paid.
- Restoration notice or compliance notice imposed with a VMP, or a third-party undertaking accepted by the regulator - in such cases, no prosecution is allowed, as the VMP will give immunity. The regulator can instead impose an NCP - this will also be required if the person has failed to fulfil a third-party undertaking. The restoration notice, compliance notice or third-party undertaking would remain in force.
- Stop notice - non-compliance will normally result in prosecution owing to the serious nature of the notice.
- Enforcement cost-recovery notices (see below) - this will be pursued through the civil courts.

Section 53 of the **RES Act** allows regulators to recover certain costs incurred in imposing a sanction through an Enforcement Cost-Recovery Notice (ECRN). The power only applies to VMPs, compliance notices, restoration notices or stop notices. The costs that are recoverable include regulators' administration costs, investigation costs, in addition to costs accrued through obtaining legal or other specialist advice. An ECRN is served at the same time as the imposition of the civil sanction. The regulator will keep the money that it gains through the cost-recovery process.

If the regulator decides to impose an ECRN, this must contain the following:

- the grounds for imposing the notice;
- the amount to be paid;
- how payment may be made and the period within which it must be made;
- rights of appeal; and
- the consequences of failing to comply with the notice.

The operator has 28 days to pay the ECRN unless the regulator states a longer period.

Appeals

Appeals can be made to a First-Tier Tribunal against:

- Compliance notices.
- Restoration notices.
- VMPs.
- FMPs.
- Stop notices.
- Regulator's reasons for not issuing a completion certificate for a stop notice or an enforcement undertaking.
- Non-compliance penalties.
- ECRNs.

The Environmental Civil Sanctions Order sets out specific grounds on which an appeal can be heard. An appeal may be made for reasons including:

- That the decision was based on an error of fact.
- That the decision was wrong in law.
- In the case of a monetary penalty, that the amount of the penalty is unreasonable.
- In the case of non-monetary requirements, that the nature of the requirements is unreasonable.
- Other specific grounds depending on the particular sanction.
- Any other reason.

An appeal must be made to the General Regulatory Chamber of the First-Tier Tribunal within 28 days of the date when the sanction or other decision was received.

The composition of a tribunal is decided on by the Senior President of Tribunals and may include non-legal members with suitable expertise or experience in the issues in an appeal, in addition to Tribunal Judiciary.

Role and Function of Enforcement Agencies

There is no harmonised global standard for the enforcement of environmental law, so legal and enforcement systems vary between countries. There are, however, some general principles that normally apply. Each country or region has one (or more) enforcement agency responsible for enforcing environmental law. Such an agency is effectively the 'environmental police force'. In some circumstances, the agency may be, or may enlist the help of, the national or regional police.

These agencies often:

- Provide advice.
- Investigate environmental incidents.
- Take formal enforcement action to force organisations to comply with the law.
- Start criminal proceedings against persons or organisations they believe have committed offences.

Enforcement agencies are also often involved in authorising activities that can have an impact on the environment. This usually takes the form of an environmental permit (depending on the legal system of a country, this may alternatively be called a consent, licence or authorisation, as there is no worldwide standard terminology used). An environmental permit will set conditions on activities that could impact on the environment. For example, before an organisation may discharge potentially polluting materials to rivers, streams and other types of watercourses, they will, in many countries, have to apply for a permit. If the permit is granted it will set limits on polluting parameters associated with the discharge, such as pH, suspended solids and heavy metal, etc. Other activities that are often permitted in many countries include:

- Discharge to groundwater.
- Keeping, treating and disposing of waste.
- Emissions of pollutants to air.
- Integrated permits (where more than one activity is controlled by a single permit).

An enforcement agency will often be tasked with undertaking inspection of workplaces to check compliance with environmental legislation. However, as resources are often limited for governments to fund such inspections, it is often the case that sampling is used. In this context, organisations that present a high environmental risk owing to the activities that they undertake will be inspected more frequently than those that present a low environmental risk.



Emissions of pollutants to air

Different Levels of Standards

The top tier of law in many countries is that of international environmental law. International law can take many forms, including the following:

- **Treaty** - this term is used for matters of high importance that require a solemn agreement.
- **Convention** - describes a multilateral agreement with numerous parties. Conventions are usually open for participation by many nations, or the full international community.
- **Protocol** - generally, this is an agreement that is more detailed than a treaty or convention. One type of protocol provides more detailed implementation of the general requirements of a convention. For example, the Montreal Protocol on Substances that Deplete the Ozone Layer 1987 provides further implementation of the Vienna Convention for the Protection of the Ozone Layer 1985. Another type of protocol is one that is subsidiary to a treaty.
- **Declaration** - this is a term used for numerous, usually non legally-binding, agreements made where the parties do not want to create a legally-binding agreement but do want to declare aspirations, e.g. the Rio Declaration on Environment and Development 1992.

Adoption is the term that is used when an international agreement is developed and established. This is achieved by the consent of states that have participated in development of the agreement usually by a vote. **Ratification** is the formal act whereby a state is bound by the requirement of an agreement. The time prior to ratification gives states a time period to gain approval of the agreement at the national level. **Entry into force** is the date by which states are bound by the requirements of the agreement.

The next level of law is that of a group of nations, often in a regional area. An example is the European Union (EU). Types of European law include:

- **Directive** - binding on EU member states with respect to the objectives to be achieved, but the method for achieving this is left open. Directives are normally implemented by national regulations made in each member state. They must be implemented by a defined date referred to in the directive.
- **Regulation** - applies directly to the intended target (normally member states). There is no requirement to assimilate into national laws.

Finally, individual nations will have some form of national (and possibly more localised) legal system in place. This may be influenced by the international legal systems covered earlier, but individual countries will have powers to implement other environmental laws as well, providing they do not contradict these two influences on the nation's legal system.



European Union (EU)

Such legal systems can differ substantially around the world. It is important that a good understanding of local legislation is gained in order to effectively manage environmental issues. The breach of environmental law is often a criminal offence and may result in a fine or a prison sentence.

As well as the criminal-law consequences, there is also the matter of compensation for those affected by environmental issues. Depending on the region/country concerned, this might involve taking legal action against the person who has caused the environmental problem through the civil legal system, and having to prove a negligent act has been carried out and was to blame for the incident.

As well as the criminal-law consequences, there is also the matter of compensation for those affected by environmental issues. Depending on the region/country concerned, this might involve taking legal action against the person who has caused the environmental problem through the civil legal system, and having to prove a negligent act has been carried out and was to blame for the incident.

The role of an environmentally responsible business is to ensure that, as a minimum, it complies with all the relevant environmental legal requirements. However, a progressive organisation will go beyond this and look at further improvements, all of which will help ensure its long-term success.

Use of UN Statutory Instruments in Relation to Transboundary Pollution and Water Abstraction Issues

The United Nations (UN) have developed numerous international legal requirements that provide significant influence on a nation's legal system. Two key areas of UN environmental legislative activity are the control of transboundary pollution and the control of water sources.

There are numerous UN requirements for the control of transboundary pollution through various pollution sources and pathways, examples of such conventions include:

- Convention for the protection of the ozone layer (Vienna Convention) 1985.
- Convention on the long range transboundary air pollution (Geneva Convention) 1979.
- Convention on the control of transboundary movement of hazardous waste and their disposal (Basel Convention) 1992.
- Framework Convention on climate change (New York Convention) 1992.

The UN Convention on the protection and use of transboundary watercourses and international lakes (Helsinki) 1992 aims to provide protection for the quantity, quality and sustainable use of water courses that are transboundary in nature.

Permitting/Consent Requirements for the Operation of Industrial Installations

It is common in many countries for industrial installations to require an environmental permit to operate. In the EU, for example, under Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control), often known as the IED, it is a requirement for the following industrial sectors listed in Annex A to gain an environmental permit (example installations in each sector are provided):

- **Energy industries** - refining of mineral oil and gas and production of coke.
- **Production and processing of metals** - metal ore roasting or sintering and processing of non-ferrous metals.
- **Mineral industry** - production of cement, lime and magnesium oxide and manufacture of glass exceeding 20 tonnes per day.
- **Chemical industry** - production of organic and inorganic chemicals and production of explosives.
- **Waste management** - recovery of hazardous waste exceeding 10 tonnes per day and landfills receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes.
- **Other activities** - a very broad category including production of paper and pulp, treatment of animal and vegetable raw materials, disposal of animal carcasses or animal waste with a capacity of over 10 tonnes per day and intensive rearing of pig or poultry (quantities apply).

The IED takes an integrated approach to environmental permits meaning that the full environmental performance must be taken into account such as air, water and land emissions, waste management, raw materials usage, energy efficiency, noise and accident prevention.

The conditions that are within the permit and emissions limits are required to be based around the Best Available Techniques (BAT). BAT is defined in BAT Reference Documents (BREFs). The IED sets requirements for mandatory environmental inspections by the competent authority, the schedule being based on risk. It also ensures that the public are allowed to participate in decision making by having access to permit applications, permits and the results of monitoring.

The Role and Influence of the United Nations

IN THIS SECTION...

- The United Nations Environment Programme (UNEP) is an Agency of the United Nations that plays an important role in the global environmental agenda.
- The UNEP is involved in the development of international environmental law, principles and guidance.
- International agreements are legal obligations that must be enforced. National governments are generally responsible for ensuring that this occurs.
- An example of the implementation of an international agreement is EC Regulation 1005/2009 on substances that deplete the ozone layer, which implements the Montreal Protocol 1987 in the European Union Member States.

The United Nations

The United Nations Environment Programme (UNEP) is an Agency of the United Nations (UN) that plays an important role in the global environmental agenda. It was founded in 1972 as a result of the United Nations Conference on Human Development in Stockholm. It addresses environmental problems at both the global and regional levels. Its key aims are to be an authoritative advocate for the environment, promote environmental components of sustainable development within the UN and to promote the development and implementation of international environmental law.

The UNEP has a history of contributing to the development and implementation of environmental law through its work and facilities platforms that enable the development of international environmental law, principles and guidance. Key activities undertaken by the UNEP in this field include:

- Preventing transboundary environmental crime - improvement of international co-operation on issues such as trafficking hazardous waste, wildlife and illegal timber, often committed by organised criminal groups and worth billions of dollars every year.
- Scheduled development of environmental law - environmental law is developed to the schedules stated in the ten year Montevideo Programme that sets a strategy for the UN's environmental law activities.
- Supporting instruments for the sustainable use of freshwater resources - facilitating the effective governance of freshwater resources that are affected by overexploitation, pollution and other human activities.
- Human rights and the environment - in addition to other departments of the UN, the UNEP will identify, promote and exchange views on best practices to provide support and strengthening of human rights obligations related to the environment.
- Law and Environment Ontology (LEO) - a web tool to assist nations with international environmental law and internationally agreed targets or goals.
- Green Customs Initiative - a partnership of international organisations that has been developed to increase the capacity of customs in facilitating legal trade and stopping illegal trade of environmentally sensitive items.



United Nations Environment Programme (UNEP)

The Influence of Key International Treaties

International agreements are legal obligations that must be enforced. National governments are generally responsible for ensuring that this occurs. An international agreement, therefore, must be implemented into a nation state's own legal system.

In the EU, an international agreement may be implemented as a Directive first and then into a nation's own legal system. However, if it's implemented as a Regulation at the EU level, then there is no need for a nation to implement it in its own legal system as an EU regulation is immediately binding on EU member states.

For example, the Protocol on Substances that Deplete the Ozone Layer (Montreal) 1987 bans the trade of certain substances that deplete the ozone layer (along with other related requirements). It is implemented in the EU by EC Regulation 1005/2009 on substances that deplete the ozone layer. The requirements of this EU Regulation are applicable to all EU member states. However, as the EU Regulation is broad in nature and does not specify detailed information on enforcement, an enforcement law within a member state is often developed that adds these requirements to enable enforcement, such as scale of penalties and the name of the regulator. In the UK, for example, the Ozone-Depleting Substances Regulations 2015 provide enforcement provision for EU Regulation 1005/2009.



Summary

Key topics covered in this element:

- Government policy may be implemented through legislation.
- Notices that can be issued for breaches of environmental law include prohibition notices, enforcement notices, cautions, abatement notices and suspension notices.
- Civil sanctions can be issued for non-compliance with environmental law, examples include variable monetary penalties, stop notices and restoration notices.
- International law may be in the form of a Treaty, Convention, Protocol, or Declaration.
- Industrial installations often require an environmental permit to enable them to operate.
- International environmental law development is usually administered by the United Nations Environment Programme (UNEP).
- International laws must be implemented into a country's legal system for example EC Regulation 1005/2009 on substances that deplete the ozone layer implements the Montreal Protocol 1987 in the European Union Member States.

Pollution Prevention and Control Multilateral Treaties



Learning Outcomes

Once you've read this element, you'll understand how to:

- 1 Explain the relevant international statutory instruments relating to waste management.
- 2 Explain the relevant international statutory instruments for managing emissions to the atmosphere.
- 3 Explain the relevant international statutory instruments for the prevention and control of discharges to, or abstraction from, watercourses.
- 4 Explain the relevant international statutory instruments affecting the storage, use and transport of hazardous substances.
- 5 Explain the relevant international statutory instruments relating to contaminated land and pesticides.
- 6 Explain the relevant international statutory instruments relating to energy usage.

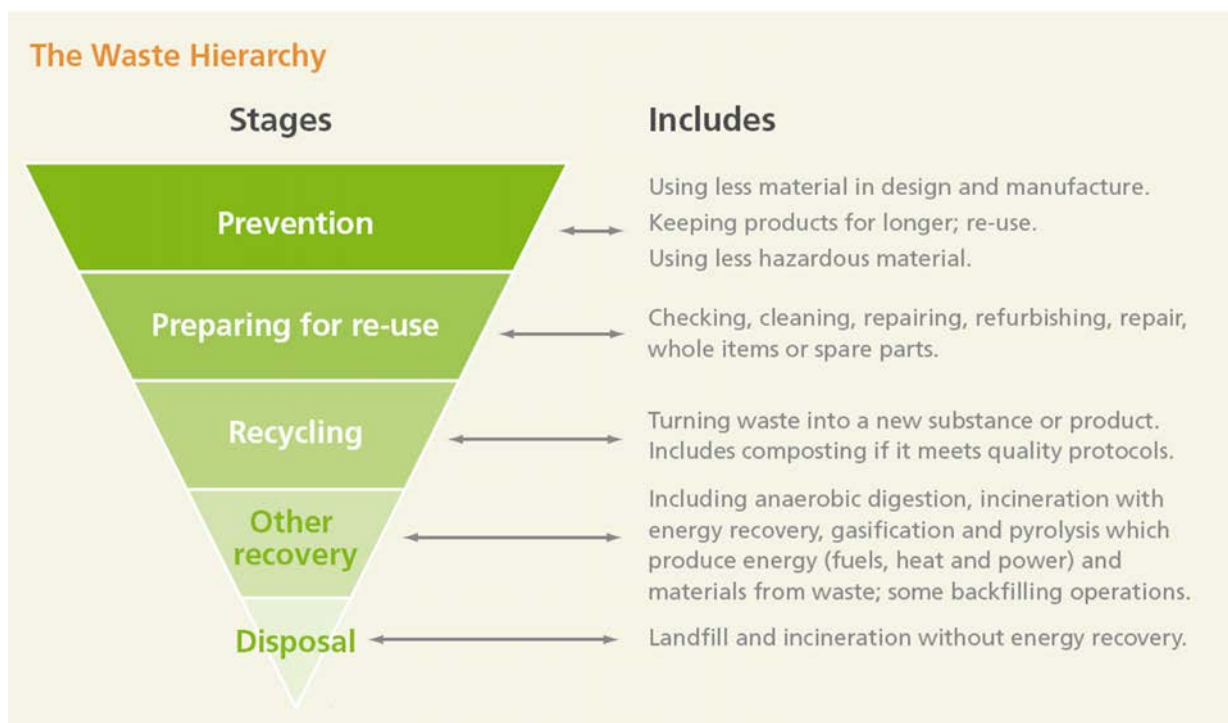
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Waste Management Multilateral Treaties

IN THIS SECTION...

- The hierarchy for the control of waste is prevention/source reduction; preparing for reuse; recycling/composting; other recovery/energy recovery; and treatment and disposal.
- The key waste categories are non-hazardous, hazardous, inert, clinical, toxic and radioactive.
- Waste must be classified and coded; in the EU, for example, the six-digit European Waste Classification system is used.
- Waste carriers must be registered with a competent authority in most countries.
- Landfill sites are required in the EU to be classed as hazardous, non-hazardous or inert.
- Laws have been developed to discourage the production of waste electrical equipment, waste batteries, end of life of vehicles and packaging.
- The Basel Convention sets requirements for the transboundary shipment of hazardous waste.

Hierarchy of Control Applied to Solid Wastes



Source: Government Review of Waste Policy in England 2011, DEFRA, 2011
(www.gov.uk/government/publications/government-review-of-waste-policy-in-england-2011)

A number of methods are available for disposal of waste. To some extent, the choice of which one to use will depend on the form of the waste, i.e. solid or liquid; its chemical properties, i.e. acidity, alkalinity, toxicity, etc.; its physical properties, i.e. dry, dusty, sticky, sludges, etc.; and the difficulty in finding opportunities for recovery, recycling, etc.

Within this broad definition of disposal there are numerous options, e.g. the waste may be taken to a waste transfer station for bulking, or taken directly to a waste management site for treatment or disposal. Disposal may be to a landfill site, a landfill site with gas recovery systems, or to an incinerator. Treatment may take a variety of forms, e.g. chemical treatment.

So, the opportunities for reduction, re-use and recycling will vary across different industries and should be examined on a case-by-case basis.

Prevention/Source Reduction

The best thing that can be done to reduce the amount of waste produced is to try to prevent it from happening at all - for example:

- Using close-tolerance forging so that metal components need no machining.
- Not printing e-mails or reports in an office.

If waste cannot be prevented, the amount that is produced should be kept to a minimum, e.g. a printer could be set to print double sided or a design standard could be developed and implemented for packaging such that it provides the optimum, but not excessive, amount of material to protect the product. You should be aware that raw materials eventually become waste, so if you reduce the amount of raw material incorporated into a product, then you reduce the amount of waste at the end of the product's life.

Preparing for Re-use

Consideration of the re-use of articles or materials is an important conceptual step in any waste management programme. Re-use implies the direct use of an article or substance without the need for treatment beyond, perhaps, collection or cleaning. As an example, the re-use of glass milk bottles represents a huge saving in manufacture and energy costs. Similarly, the re-use of printed paper as rough note-paper represents a re-use scheme offering potential savings. Indeed, after re-use the paper can be recycled.

The scope for the re-use of materials is probably most marked in the packaging field. Several manufacturers have arranged for the outer transport packaging element, which protects their goods in transit to their customers, to be returned to be re-used, thus achieving savings.

Recycling/Composting

Recycling of materials is distinct from the re-use of materials or articles, in that recycling involves some form of treatment. The recycling of aluminium drinks cans is a good example of the environmental advantages of recycling. The consumption of drinks in aluminium cans has increased as consumers prefer to purchase drinks and consume them at home. A recycled can is produced using only about 5% of the energy required to produce a can from bauxite (aluminium ore).

It is true that the environmental and financial advantages are not always so clear-cut. Materials that are recycled usually have to be collected, then treated to become a secondary raw material before they can re-enter the commercial cycle. Collection and treatment introduces costs and environmental penalties which may outweigh any advantages. Companies considering recycling should consider this aspect when they are planning recycling schemes, and an energy and mass balance should be carried out before deciding on a recycling route for waste.

Waste composting is the aerobic bacterial processing of biodegradable wastes to produce a reasonably stable, granular material, usually containing valuable plant nutrients. Composting can also be carried out anaerobically, but the process is more expensive, although it has the advantage of recovering energy.

Other Recovery/Energy Recovery

Recovery techniques generally concern gaining energy from waste. These include:

- Incinerating waste in a waste-to-energy plant.
- Selecting certain wastes for processing into fuel.
- Burning methane produced from the decomposition of biodegradable waste, i.e. landfill gas.
- Anaerobic digestion, as in sludge, at a sewage-treatment works.

Raising energy from waste produced by the community is seen as an important option, as the increased environmental standards demanded of landfills raise the prices for what has traditionally been seen as a relatively inexpensive option for waste disposal. Also, the adverse long-term environmental effects of landfill sites are now better known, which has caused a decrease in their availability as an option for the disposal of biodegradable materials.

Treatment and Disposal

The landfilling of industrial waste is the least desirable waste management option because it uses up valuable land resources, offers few environmental benefits to the disposing company or the disposal site, and may present future environmental or health hazards and liabilities.

Recent advances in landfill technology have vastly improved the safety of sites, and many sites now also recover landfill gas (which contains methane). This is an improvement over the older sites, some of which pose long-term environmental or pollution liabilities. Landfill is also likely to become increasingly expensive as the standards of landfill engineering, operation and statutory control become more stringent and national landfill capacity decreases.

Burying wastes, especially non-biodegradable wastes, is fundamentally unsound as toxic and harmful residues may leach back into the environment in the future. There is, therefore, strong national and international backing for introducing taxes or levies to discourage disposal to landfill and encourage waste reduction, re-use and recycling.

The incineration of waste without operating waste to energy is also a poor option for waste and is viewed as a disposal technique.



Advances in landfill technology have vastly improved the safety of sites

Sources of Waste

The key sources of waste can be generally identified as being municipal and non-municipal. **Municipal wastes** include waste streams that arise from households or commercial premises such as shops, offices and other commercial units. **Non-municipal wastes** would be waste streams that are generated from industry, mining and agriculture.

Categories and Definitions of Waste

Directive waste is defined in the **Waste Framework Directive (2008/98/EC)** as being:

"Any substance or object which the holder discards, intends to discard, or is required to discard."

Waste can be categorised in numerous ways. Key categories include:

- **Non-Hazardous Waste**

This means waste that is not covered by the definition of hazardous waste below, including household waste, paper, wood and other degradable waste.

- **Hazardous Waste**

The categories (which are mirrored in other chemical legislation) broadly include:

- Explosive.
- Flammable.
- Oxidising substances.
- Irritants.
- Corrosives.
- Biohazards (infectious, carcinogenic, mutagenic, teratogenic).
- Ecotoxics.

Examples include: waste oil, photographic chemicals, acids, alkalis, industrial solvents, fly ash, pesticides, batteries, prescription-only medicines and wood preservatives.

- **Inert Waste**

This is waste which is stable, i.e. it does not degrade physically, chemically or biologically, nor does it dissolve, burn, chemically react or leach out to any degree. Examples would include: uncontaminated bricks, sand, glass, concrete and tiles. If there is any suspicion of contamination, these items cannot be considered inert waste.

- **Clinical Waste**

Clinical wastes are healthcare wastes which could harm people if they come into contact with them. The definition is wide-ranging, but includes:

- Soiled surgical swabs, dressings, etc.
- Excretions.
- Blood or body fluids.
- Human and animal tissues, carcasses, etc.
- Syringes, needles or other sharps.
- Drugs or other pharmaceuticals.

Clinical waste should be segregated from general waste; separate bins, signage and training should be provided to encourage this.

- **Toxic Waste**

Toxic wastes are those that present a significant danger to human health and/or the environment. They are wastes that may cause death, injury or birth defects in living organisms. Examples of toxic wastes include some pesticides, carcinogens (waste that contains cancer-causing agents) and mutagens (an agent that causes a genetic mutation).

- **Radioactive Waste**

Radioactive waste is a special category of hazardous waste that is governed by specific legislation. The International Atomic Energy Agency (IAEA) defines radioactive wastes as being:

"waste that contains, or is contaminated with, radionuclides at concentrations or activities greater than clearance levels as established by the regulatory body".

In practice, this definition covers:

- High volumes of waste from the nuclear power industry where the level of radioactivity may vary from low to very high.
- Low volumes of waste produced by other businesses that use small quantities of radioactive materials in laboratories, and in sensing and monitoring equipment.

Waste Framework Directive

The key law covering waste management in the EU is the **Waste Framework Directive (2008/98/EC)**. The main provisions are:

- It applies to all waste except radioactive wastes, waste from extraction and prospecting of mineral resources, non-dangerous agricultural wastes, waste waters, decommissioned explosives and unexcavated contaminated land.
- To encourage the implementation of the following hierarchy: firstly, the prevention or reduction of waste production and its harmfulness; secondly, the recovery of waste by means of recycling, re-use or reclamation or the use of waste as a source of energy.
- It ensures that waste is recovered or disposed of without endangering human health or the environment.
- It establishes an integrated and adequate network of disposal installations.
- Member states are required to establish or designate the competent authority or authorities to be responsible for implementing the Directive; the competent authority is required to draw up a waste management plan.
- Undertakings which carry out waste operations are required to obtain a permit from the competent authority.
- Establishments or undertakings which collect or transport waste on a professional basis are required to be registered with competent authorities.
- In accordance with the 'polluter pays' principle, the cost of disposing of waste must be borne by the holder or producer.
- Setting new recycling targets to be achieved by EU member states by 2020, including recycling rates of 50% for household and similar wastes and 70% for construction and demolition waste.
- Strengthening provisions on waste prevention through an obligation for member states to develop national waste prevention programmes and a commitment from the EC to report on prevention and set waste prevention objectives.
- Setting a clear, five-step 'hierarchy' of waste management options, according to which prevention is the preferred option, followed by re-use, recycling and other forms of recovery - with safe disposal as the last recourse
- Clarifying a number of important definitions, such as recycling, recovery and waste itself. In particular, it draws a line between waste and by-products, plus defines when waste has been recovered enough - through recycling or other treatment - to cease being waste.
- Member states must implement legal arrangements to ensure that holders of hazardous waste do not mix different categories, holders of waste keep records, and movements of hazardous waste are accompanied with manifests.

There are also numerous European Directives aimed at making the producer responsible for the environmental impacts of a product. This 'producer responsibility' theme of law is mainly aimed at reducing waste to landfill and promoting re-use, recovery and recycling. It has been applied in numerous areas including packaging waste, electrical and electronic equipment waste and batteries. We will cover the requirements of these laws later in this course.

Classification and Coding of Waste

Waste must be classified and coded to ensure that arrangements can be made for its safe storage, transportation and disposal. Waste codes will often be used on waste manifest so that the next person in the waste chain is aware of the waste type. It will also be quoted in environmental permits for waste management and industrial sites, be used to make a decision about the recyclability of a waste and be the basis of waste statistics.

The List of Wastes (LoW) was established by the List of Wastes Decision 2000/532/EC. This list is commonly known as the European Waste Catalogue (EWC) and is used to identify and classify hazardous and non-hazardous waste. It provides a commonly known and understood way of characterising wastes. In the EWC there are twenty overarching categories of waste, such as:

Overarching categories of waste	
01	Waste resulting from exploration, mining, dressing and further treatment of minerals and quarry.
05	Waste from petroleum refining, natural gas purification and pyrolytic treatment of coal.
09	Waste from the photographic industry.
14	Waste from organic substances used as solvents.
17	Construction and demolition wastes (including road construction).

The overarching categories are divided up into other categories until the six digit code for a waste type is achieved as can be seen from the example below:

Overarching categories of waste divided further	
17 01	Concrete, bricks, tiles, ceramics, and gypsum-based materials
17 01 01	Concrete
17 01 02	Bricks

EWC codes marked with an asterisk on the list of wastes are considered as hazardous waste if they consist of a listed hazardous category.

Hazardous Waste Classification - A National Example

The key UK regulators have developed a guide detailing how hazardous waste should be classified. The guide specified the system of hazardous waste identification as consisting of seven steps, these are:

Step 1 - Check If the Waste Needs to Be Classified

Only wastes that are classed as being covered by the **Waste Framework Directive** (controlled wastes in the UK) can be hazardous. These are commercial, industrial and household wastes.

Examples of materials that are excluded from the scope are radioactive wastes, decommissioned explosives, pollutants emitted to the atmosphere and waste waters.

Step 2 - Identify the Code or Codes That May Apply to the Waste

The next step involves determining how the waste is classified in the LoW, outlined above. The most appropriate code(s) must be selected. The LoW identifies the following wastes:

- Absolute non-hazardous waste - those entries that are given in black and have no *.
- Absolute hazardous entries - those that are given in red and have an *. These are always hazardous waste.
- Mirror Hazardous (MH) entries - those that are given in blue and have an *. These are only hazardous waste if dangerous substances are present above threshold concentrations.
- Mirror Non-hazardous (MN) entries - those labelled in green.

- Mirror entries are those that are not automatically hazardous or non-hazardous waste. A hazardous mirror consists of a specific or general reference to a substance within its LoW reference. Mirror references come in pairs, with the mirror hazardous entry stating the general reference to a dangerous substance. The non-hazardous mirror must be chosen if the hazardous mirror is not relevant and it is specified in the hazardous mirror - for example:

Example of mirror entries	
07 01 11*	Sludges from on-site effluent treatment containing dangerous substances MH.
07 01 12	Sludges from on-site effluent treatment other than those mentioned in 07 01 11 MN.

Another example is:

Another example of mirror entries	
17 03 01*	Bituminous mixtures containing coal tar MH.
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01 MN.

Step 3 - Identify the Assessment Needed to Select the Correct Code(s)

Now, whether or not an assessment of the waste is needed and how this affects its classification needs to be determined. Whether an assessment is needed depends on the waste type.

If a waste is classed as an absolute entry then that code must be used. However, in order to determine whether a mirror entry is hazardous or non-hazardous and the correct code is thus selected, the levels of specific substances in the waste will need to be determined. If a waste is classed as absolute non-hazardous, then in most cases it will be non-hazardous and step 7 can be followed.

Step 4 - Determine the Chemical Composition of the Waste

In order to determine whether waste has properties rendering it hazardous, its composition must be determined to identify hazardous substances and their quantities. (This may be achieved by reference to safety data sheets, understanding fully the chemistry of the process that creates the waste, or through analysis.)

Step 5 - Identify if the Substances in the Waste are 'Hazardous Substances' or 'Persistent Organic Pollutants'

After the chemical composition of the waste has been identified, the next task is to determine whether any of the constituents are 'hazardous substances' or Persistent Organic Pollutants (POPs).

The hazardous nature of the substance in the waste is determined by referencing Table 3.1 of Annex VI of the **European Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation)**.

POPs are environmental long-lasting substances which can cause significant impacts on environmental health and include substances such as DDT, endrin, aldrin, toxaphene and polychlorinated biphenyls (PCBs).

If substances in the waste are identified as being 'hazardous' or POPs, then step 6 should be followed. If no substances are found to be POPs or 'hazardous' then step 7 should be followed.

Step 6 - Assess the Hazardous Properties of the Waste

All hazardous properties of the waste must be considered (these are listed from HP1 to HP15). Hazardous properties of the waste can be determined by calculation, testing or referencing the safety data sheet. At this stage the hazard statement codes for the substances in the waste should be understood and these can be used to determine the hazardous properties of the waste.

Step 7 - Assign the Classification Code and Describe the Hazardous Properties

For waste that has an absolute hazardous entry, that classification code must be used and the waste is a hazardous waste. If the waste displays a hazardous property generally or those associated with specific hazardous substances, or contains POPs above set concentrations, then the waste is hazardous and the mirror hazardous code should be used. Where the waste does not consist of POPs, or does not display a hazardous property, then the mirror non-hazardous code can be used. If the waste is absolute non-hazardous then the absolute non-hazardous code must be used.

Other Systems of Hazardous Waste Classification

In the USA, the system for classifying hazardous waste is known as the Hazardous Waste Listings. Listed wastes originate from manufacturing and industrial processes, and must exhibit one or more of the following hazardous properties: ignitability, corrosivity, reactivity or toxicity.

MORE...

More information on the USA Hazardous Waste Listing can be found at:

www.epa.gov/hw/defining-hazardous-waste-listed-characteristic-and-mixed-radiological-wastes

www.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1992, as we will see in more detail below, covers restrictions on the import and export of hazardous waste. The Convention identifies hazardous wastes types and a coding system in the following Annexes:

- Annex I - categories of waste to be controlled.
- Annex II - categories of wastes requiring special attention.
- Annex III - lists of hazardous characteristics.
- Annex IV - disposal operations.
- Annex VIII - List A (waste contained in this annex must be characterised as a hazardous).
- Annex IX - List B (waste not covered by the Convention unless it contains listed materials that cause a hazardous characteristic).

Registration of Waste Carriers

There are often specific duties on producers of waste to ensure that wastes are only transferred to persons who are registered with a competent authority to accept or transport the particular types and quantities of waste involved. This increases the likelihood that the waste will be dealt with in a manner that does not cause harm to human health or the environment and is recycled, recovered or disposed of in an appropriate manner. To fulfil this duty, it is not sufficient simply to ask the transporter if he/she is registered to transport and dispose of that type and quantity of waste.

Regulatory Documentation

Whenever waste is removed from a premises, there is often a requirement to produce and ensure that information regarding the waste is transferred with it. The name for the information varies but it can be known as a waste manifest, transfer note or written information.

In England and Wales, some form of written information must be legally completed. Written information can be electronic or paper-based. The requirements for written information for waste are that it:

- Describes the waste (quantity, whether it is loose or in a container, time and place of the transfer, SIC code of the transferor).
- Identifies the waste by use of the appropriate code stated in the LoW.

- States:
 - The name and address of the transferor and transferee and is signed (electronic signature for electronically stored information) by them.
 - Other relevant information, such as who is the producer, importer or transporter of the waste, the permit number if the transferor or transferee holds an environmental permit, etc.

Copies of written information should be retained for two years. For repetitive transfers, where the parties involved in each transfer and the description of the waste transferred remain the same, a season ticket can be used, which will cover multiple transfers over a given period of time of up to 12 months.

It is also often a requirement (e.g. of the **Waste Framework Directive (2008/98/EC)**) that undertakings that carry out operations with waste obtain a permit from a competent authority.

Landfill Disposal

Hazardous and Non-Hazardous Landfill

EU Landfill Directive 1999/31/EC (as well as other EU Directives) requires that a competent authority classify a landfill site for:

- Hazardous waste.
- Non-hazardous waste.
- Inert waste.

In developed countries, the number of hazardous waste sites is few, and disposal to them is expensive. So, there is a much greater incentive in the correct classification and separation of hazardous wastes by producers. The Directive also requires some level of pre-treatment to waste before going to a landfill for final disposal. The thinking behind the Directive involves a move away from the co-disposal of hazardous and non-hazardous waste and the progressive diversion of biodegradable waste away from landfills.

Key requirements of the Directive include:

- Landfill sites to be classified for hazardous waste, non-hazardous waste and inert waste.
- There will be a ban on the landfilling of liquid wastes (but not sludges), also wastes that are explosive, corrosive, oxidising, flammable and highly flammable, and clinical wastes that are infectious.
- There will be an end to the practice of disposing of hazardous and non-hazardous wastes together.
- The tipping of whole tyres was banned from July 2003, and of shredded tyres from 2006.
- Banning from landfill of new or unidentified waste from research and development establishments and laboratories whose effects on man or on the environment are unknown.
- Banning from landfill of any waste that does not meet acceptance criteria.
- It is not permissible to dilute or mix waste in order to make the waste acceptable.

Landfill Taxation

Waste sent to landfill may also be taxed so as to discourage disposal in this manner. In the UK, for example, the Landfill Tax was introduced in 1996 to impose a tax on all waste disposed of at permitted landfill sites after 1 October 1996. In England and Northern Ireland, Landfill Tax is now chargeable on waste from both permitted/licensed and non-permitted/licensed sites such as those where illegal disposal of waste has occurred.

The current standard rate is £88.95 per tonne. Lower-risk wastes are taxed at £2.80 per tonne and include:

- Naturally-occurring rocks and soils.
- Ceramic or cemented material.
- Processed or prepared mineral material.

- Furnace slags.
- Certain ash.
- Low-activity inorganic compounds (e.g. calcium carbonate, aluminium hydroxide).

(The above list is not exhaustive.)

There are certain wastes that are exempt from the Landfill Tax, including:

- **Dredgings**

Waste removed from inland waterways and harbours by dredging, and disposed of to landfill, is exempt from landfill tax. To qualify for the exemption, the material removed from the bed of the waterway, including the banks of canals and rivers, must have been dredged from a river, canal, watercourse, dock or harbour, or the approaches to a harbour, and removed in the interests of navigation.

To qualify as a watercourse, a body of water must demonstrate the following characteristics:

- A natural source of surface or underground water.
- A flow of water under the action of gravity.
- A reasonably well-defined channel of bed and banks.
- A confluence with another watercourse or tidal waters.

- **Mining and Quarrying**

Waste arising from mining and quarrying operations and disposed of to landfill is exempt from landfill tax. To qualify for exemption, the waste must:

- Be naturally occurring in the course of a commercial mining or quarrying operation, including the reworking of tailings to extract further minerals. Commercial does not mean that a profit has to be made but the operation has to be a business activity.
- Have the same chemical composition as it had when it was in the ground.
- Not be produced from a process separate from the mining or quarrying operation, but the process giving rise to the waste does not have to take place at the mine or quarry. So, the exemption can apply to waste arising from winning the primary material from the spoil. However, the exemption does not apply to waste arising from the working of minerals from mines or quarries.

- **Pet Cemeteries**

These are licensed as landfill sites under the **Environmental Protection Act 1990**, Part II. However, burials of domestic pets at such sites will not be taxable.

Environmental Bodies Credit Scheme

In the UK, the Environmental Bodies Credit Scheme was set up to encourage landfill site operators to fund projects that benefit the environment. Under the scheme, landfill site operators can claim a tax credit for contributions made to approved environmental bodies. These bodies are enrolled by Entrust, the regulatory body specifically set up to oversee the scheme.

Landfill site operators may claim a tax credit worth 90% of any contribution made to an enrolled environmental body for spending on an approved object, subject to a maximum credit of 5.3% of the landfill tax paid during the year.

Specific Waste Types

Electrical and Electronic Waste

The **Directive 2012/19/EU** on Waste Electrical and Electronic Equipment (WEEE) aims for the prevention of WEEE. If this cannot be achieved, re-use, recycling and other forms of recovery of such wastes should be undertaken so as to reduce the disposal of such waste (reuse of WEEE as whole appliances is favoured over treatment, recycling and recovery).

The Directive also seeks to improve the environmental performance of all operators involved in the life cycle of EEE. Ultimately, the aim is to minimise the quantity of such items ending up in landfill. The target is for member states to collect 20kg per person per year, on average.

Categories of WEEE defined in the Directive are:

Categories of WEEE	
1.	Large household appliances.
2.	Small household appliances.
3.	IT and telecommunications equipment.
4.	Consumer equipment.
5.	Lighting equipment.
6.	Electrical and electronic tools.
7.	Toys, leisure and sports equipment.
8.	Medical devices.
9.	Monitoring and control equipment.
10.	Automatic dispensers.

Key requirements of the Directive include the following:

- Member states must develop and maintain a register of EEE producers.
- Householders must be able to take WEEE to a collection facility at no cost.
- Developing targets for the WEEE collected separately from households.
- Distributors and retailers are responsible for making arrangements to take back WEEE for free, in a way that is convenient for the customer.
- Introduction of recovery and recycling targets for WEEE for various categories.
- Producers to mark EEE products with the 'crossed-out wheellie-bin' symbol.

The aim of **Directive 2011/65/EU** on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment is to contribute to the protection of human health and the environmentally sound recovery and disposal of WEEE.

The Directive applies to equipment in the following categories:

- Large household appliances.
- Small household appliances.
- IT and telecommunications equipment.
- Consumer equipment.
- Lighting equipment.
- Electrical and electronic tools (except large-scale stationary industrial tools).
- Toys, leisure and sports equipment.

- Automatic dispensers.
- Electric light bulbs.
- Luminaires for use in households.
- Medical devices.
- Monitoring and control instruments, including industrial monitoring and control instruments.
- Other EEE not covered by the above.

New EEE put on the market must not contain more than the permissible maximum concentration values of hazardous substances. These are:

- 0.1% by weight in homogeneous materials for each of the following substances:
 - Lead.
 - Hexavalent chromium.
 - Mercury.
 - Polybrominated biphenyls.
 - Polybrominated diphenyl ethers.
- 0.01% by weight in homogeneous materials for cadmium.

Waste Batteries

Directive 2006/66/EC on Batteries and Accumulators and Waste Batteries and Accumulators (accumulators are rechargeable batteries) has the following requirements:

- The use of cadmium and mercury is prohibited above certain limits in batteries (this varies for different battery types; some battery applications have exemptions).
- Specific labelling is required to facilitate recycling (the 'crossed-out wheelee bin' symbol; 'Pb', 'Cd', 'Hg' if it contains lead, cadmium or mercury, respectively).
- Appliances that use batteries are designed so that the batteries can easily be removed.
- Battery producers have to register with the regulator, join and finance a battery compliance scheme (which will carry out waste battery collection, treatment and recycling obligations).
- Portable-battery sellers have to take back waste (i.e. spent) portable batteries (free of charge) but may pass these onto a battery compliance scheme.
- Waste industrial and automotive batteries must not be disposed of by landfill or incineration.

End of Vehicle Life

The **End-of-Life Vehicles (ELV) Directive (2000/53/EC)** is designed to prevent or reduce the quantity of waste that is produced from ELVs and improve recovery and recycling levels for ELVs that are produced. The end of life of vehicles is defined as motor vehicles and their components that are classed as waste. As you might remember from earlier in the element, Directive waste is any item that is discarded, incorporating items that are sent for re-use or recycling.

The ELV laws mainly apply to cars and vans below a 3.5-tonne threshold ("passenger cars" and "light goods vehicles"). Various bodies have responsibilities under the ELV regime, including:

- **Producers (Vehicle Manufacturers)**
 - Marking of components to aid identification of those that are suitable for reuse and recovery.



End of life of vehicles is defined as motor vehicles and their components that are classed as waste

- Restrictions on the use of certain heavy metals in vehicle manufacture - limits are set on the use of lead, mercury, cadmium or hexavalent chromium included within components, materials or accessories of vehicles covered by the Directive.
 - Free take-back of vehicles paid for by producers.
 - Producers are obligated to provide accessible networks of Authorised Treatment Facilities (ATFs) and collection points.
 - Producer and ATF obligations in respect of achieving recovery and recycling.
- **Vehicle Owners and Operators**
 - When an ELV is sent for dismantling or disposal, it must be ensured that the site has an environmental permit or a waste management licence and is classed as an ATF.
 - A car or van can be taken to an ATF free of charge providing it has the essential components of a vehicle.
 - **Sites Accepting Motor Vehicles**
 - These sites must be classed as an ATF - this involves complying with various environmental standards relating to storage, depollution, recycling and segregation of waste.
 - Only ATFs are allowed to issue Certificates of Destruction (CoDs) to the final holder, owner or company representative. This shows that a vehicle has been taken to an approved treatment site and enables the Deregistration of the vehicle.

Packaging Waste

EU Directive 94/62/EC on Packaging and Packaging Waste covers packaging that is placed on the market in the EU. Member states must take measures to stop the production of packaging waste, including programmes to encourage the re-use of packaging. Originally, the Directive set a target of between 50 to 65% of packaging to be recovered by 2001, and 25 to 45% to be recycled. It also sets out a number of essential requirements for packaging, such as requirements specific to the:

- Manufacturing and composition of packaging.
- Reusable nature of packaging.
- Recoverable nature of packaging.

Packaging must also comply with a 100 ppm limit by weight for cadmium, lead, hexavalent chromium and mercury.

The Basel Convention

When transporting waste internationally, the requirements of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1992 should often be considered. In the EU, this is implemented through **Regulation (EC) 1013/2006**, the requirements of which include:

- Hazardous waste for recovery is not permitted to be exported to non-OECD (Organisation for Economic Co-operation and Development) countries.
- Non-hazardous waste for recovery can be freely traded between EU member states and OECD countries. It is subject to controls stated in the regulations.
- Hazardous waste shipped for recovery between emerging states and OECD countries must have prior written notification from the competent authority of despatch, destination and transit and their consent prior to shipment beginning.
- Possible controls for non-OECD countries include prohibition, prior written notification and consent (these are set out separately in **Regulation 1418/2007**).

Multilateral Treaties for Managing Emissions to Atmosphere

IN THIS SECTION...

- The Geneva Convention on Long-Range Transboundary Air Pollution 1979 aims to gradually reduce pollutants that can cross national boundaries.
- The Convention has been extended to cover numerous other substances by the development of eight protocols.
- The Vienna Convention for the Protection of the Ozone Layer 1985 requires nations to take appropriate measures to protect people and the environment against the impacts resulting from human activities that modify, or are likely to modify, the ozone layer.
- The Montreal Protocol on Substances that Deplete the Ozone Layer 1987 covers the phase out of ozone-depleting substances and fluorinated greenhouse gases.
- The United Nations Framework Convention on Climate Change (UNFCCC) 1992 has been the focus of international efforts to reduce greenhouse gases. It is largely implemented by the Kyoto Protocol.

The Significance and Function of the 1979 United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution and its Protocols

The Geneva Convention on Long-Range Transboundary Air Pollution 1979 (and associated protocols) aims to limit and gradually reduce pollutants that can cross national boundaries. The Convention applies to the countries within the United Nations Economic Commission for Europe (UNECE) - this currently includes 56 member states across Europe, Canada, the USA, Central Asian republics and Israel. The Convention was initially developed as a response to acidic wet deposition (acid rain), that caused destruction of forests and fish loss in lakes from pollution often many thousands of kilometers away from the source. It has since been extended to numerous other substances such as ground-level ozone, persistent organic pollutants, heavy metals and particulate matter. It has created a framework for reducing the risk to human health and the environment caused by transboundary air pollution. The Convention is broad in covering issues, such as:

- Develop strategies and policies to combat transboundary air pollution by means of consultation, research, monitoring and exchanges of information.
- Exchange information on, and review, policies, scientific activities and technical measures to combat transboundary air pollution.
- Consultations held between contracting parties at risk of transboundary air pollution.
- Research, exchange of information and monitoring of the cost effectiveness of methods to reduce air pollution.
- Initiation and co-operation in research and/or development of technology for reducing air pollutants; instrumentation and techniques for monitoring and measuring emissions; the effects of air pollutant on the environment; economic, social and environmental assessment of alternatives for achieving emission reductions; and education and training programmes.
- Various types of data must be exchanged between contracting parties, such as control technologies, cost of emission controls and major changes in national policy.

The convention has been extended to cover numerous other substances by the development of eight protocols:

Title	Entry into force
The 1984 Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	28 January 1988 (amended 2014)
The 1985 Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	2 September 1987 (amended 2007)
The 1988 Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes	14 February 1991 (amended 1996)
The 1991 Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	29 September 1997 (amended 1996)
The 1994 Protocol on Further Reduction of Sulphur Emissions	5 August 1998
The 1998 Aarhus Protocol on Heavy Metals and its 2012 amended version	23 October 2003 (amended 2012)
The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs)	23 October 2003 (amended 2009)
The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone	17 May 2005 (amended 2012)

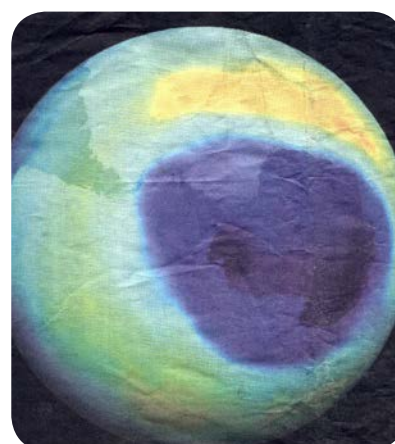
The Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone 1999, for example, sets national emission ceilings for sulphur dioxide, oxides of nitrogen, Volatile Organic Compounds (VOCs) and ammonia (see annex 1 for the emission ceilings for 2010 up to 2020). It builds on previous protocols that addressed these pollutants. Such ceilings have been developed based on scientific assessment and the abatement options for the pollutants. Those countries whose emissions have the greatest impact and can be reduced in a cost effective manner must make the largest cuts. The protocol also sets emission limits for specified emission sources such as combustion plants, dry cleaning and vehicles. VOCs from paints and aerosols must also be reduced. Parties must report their progress on an annual basis.

An amendment to the protocol in 2012 sets emission reduction commitments to be achieved by 2020 and beyond. The revised protocol is also extended to cover fine particulate matter emissions (including black carbon).

Phase Out of Harmful Substances to the Atmosphere

International law plays a key role in the phase out of harmful substances released to atmosphere; the Vienna Convention for the Protection of the Ozone Layer 1985, for example, requires nations to take appropriate measures to protect people and the environment against the impacts resulting from human activities that modify, or are likely to modify, the ozone layer. The main aim of the Convention is to ensure that countries undertake research, exchange information and monitor chlorofluorocarbon (CFC) production. The convention acts as a framework for international efforts to combat ozone depletion.

More specific requirements on the banning and phasing out of Ozone-Depleting Substances (ODS) are present in the Montreal Protocol on Substances that Deplete the Ozone Layer 1987. Since it was initially opened for signatures in 1987 (coming into effect in 1989), the protocol has undergone a number of revisions.



Protection of the ozone layer

This has resulted in the phase-out date for ODS as identified in the table below:

Ozone-depleting substances	Developed countries phase-out dates	Developing countries phase-out dates
CFCs	1995	2010
Halons	1993	2010
Methyl Chloroform	1995	2015
Carbon Tetrachloride	1995	2010
HCFCs	2020	2030
Hydrobromofluorocarbons (HBFC)	1995	1995

EU Regulation 1005/2009 (which consolidates and replaces previous provisions) implements within the EU commitments agreed by the parties to the Montreal Protocol. Except in certain cases/applications, production, placing on the market and use of controlled ODSs is prohibited. Essential laboratory and analytical uses are exempt (subject to registration and licensing requirements), in addition to other critical uses, such as military and aerospace (although these will be phased out for specific halons by 2040). ODSs are prohibited from use in new refrigeration and air-conditioning equipment and strict controls are placed on existing equipment that contains ODSs in order to prevent release to the atmosphere.

In particular, key controls include:

- The supply and use of CFCs and halons is banned in the EU.
- Virgin hydrochlorofluorocarbons (HCFCs) cannot be used in any new refrigeration equipment, or for maintenance of existing equipment.
- Reclaimed or recycled HCFCs may have been used for plant maintenance until 31 December 2015.
- Leak-testing for ODSs must be carried out as identified in the table below:

Frequency	Normal system (kilograms)	Labelled as hermetically sealed (kilograms)
None	Fewer than 3	Fewer than 6
Annual	3 to 29	6 to 29
Six-monthly*	30 to 299	30 to 299
Quarterly	300 or more	300 or more

* Half this frequency, if automatic leak detection is installed.

- If a repair to a leak has been made then the system should be checked within a month to ensure the repair has been successful.
- Minimum qualifications must be held if specific tasks are undertaken - the list of qualifications is identified in Schedule 2 of the **Ozone-Depleting Substances Regulations 2015**.
- Disposal of equipment containing ODS must be carried out in compliance with the Duty of Care and other relevant waste legislation.
- There are other controls in place under the Regulations that cover ODSs for other uses, some of the key points being:
 - ODS use for fire-fighting equipment is now banned apart from essential uses.
 - The use of solvents containing ODSs is banned for any solvent cleaning activities, such as electronic circuit boards and metal-component degreasing.

The Kigali Amendment 2016 to the Montreal Protocol 1987 sets legally binding targets that specify the phased reductions of the hydrofluorocarbons (HFCs), a potent group of fluorinated greenhouse gases (F-gases). HFC reduction is measured in overall CO_{2e} (carbon dioxide equivalent). The Kigali Amendment enters into force on 1 January 2019.

The HFC phase-down schedule under Kigali Amendment is provided in the table below:

	Non-A5 (developed countries)	A5 (developing countries) Group 1	A5 (developing countries) Group 2
Baseline HFC component	2011-2013 (average consumption)	2020-2022 (average consumption)	2024-2026 (average consumption)
Baseline HCFC component	15% of baseline	65% of baseline	65% of baseline
Freeze	-	2024	2028
1st step	2019 - 10%	2029 - 10%	2032 - 10%
2nd step	2024 - 40%	2035 - 30%	2037 - 20%
3rd step	2029 - 70%	2040 - 50%	2042 - 30%
4th step	2034 - 80%	-	-
Plateau	2036 - 85%	2045 - 80%	2047 - 85%
Notes	Belarus, Russian Federation, Kazakhstan, Tajikistan, Uzbekistan, 25% HCFC component and 1st two steps are later: 5% in 2020, 35% in 2025	Article 5 countries not part of Group 2	GCC (Saudi Arabia, Kuwait, United Arab Emirates, Qatar, Bahrain, Oman), India, Iran, Iraq, Pakistan

HFC Phase-Down Schedule under the Kigali Amendment

Source: adapted from eia-international.org/wp-content/uploads/EIA-Kigali-Amendment-to-the-Montreal-Protocol-FINAL.pdf

Prior to the introduction of the Kigali Amendment, the EU had stringent laws present for the control of F-gases under **EC Regulation 517/2014** on fluorinated greenhouse gases (repealing **Regulation (EC) No. 842/2006**). The key requirements are:

- Bans - restriction on the placing on the market of specific refrigeration and air-conditioning equipment, propellants and foams that use F-gases, in addition to the use of sulphur hexafluoride for die-casting in magnesium foundries. Limits are also placed on the use of high global warming potential F-gases (such as R404A and R507A) in current refrigeration units from 2020. Sale of F-gases is only allowed to those who have relevant certification or have attended a specific training programme.
- Cap and phase down - from 2015, the amounts of HFCs that producers or importers are allowed to place on the market will be limited. The limit will be reduced every three years until 2030. By this time, the supply of HFCs will have reduced to 21% of the 2009-2012 baseline.
- Leakage prevention - where it is technically possible and does not involve disproportionate cost, leakage must be prevented and leaks repaired as soon as possible.

- Check for leaks - the frequency of checks is dependent on the system (e.g. stationary refrigeration, air-conditioning, heat pumps and refrigerated trucks are covered) and amounts of F-gases used, as can be seen in the following table:

F-gas amount	Frequency of leak check (no leak detection system present)	Frequency of leak check (leak detection system present)
500 tonnes CO _{2e}	3 months	6 months
50 to 499.99 tonnes CO _{2e}	3 months	12 months
5 to 49.99 tonnes CO _{2e}	3 months	24 months

- Inspection - the system is required to be inspected within a month following detection and repair of a leak to ensure successful repair.
- Automatic leak detection - a leak detection system must be fitted to equipment that contains 300 kilograms or more of F-gas refrigerant. This system must be checked annually.
- Maintaining records - records must be retained for systems with 3 kilograms or more of F-gases, such as amount and type of F-gas in the system and amount of refrigerant added to the system.
- Recovery of gas - the Regulation prohibits the release of F-gases into the atmosphere. If F-gases are removed from a system, they are required to be appropriately recovered by certified persons during decommissioning and servicing. All F-gases reclaimed must be correctly disposed of if they are not being recycled.
- Certification - personnel undertaking leak checking, installation, servicing and maintenance must be appropriately qualified. Businesses that offer such services must hold a relevant company certificate issued by a designated certification body.
- Labelling - a new system must be properly labelled identifying the quantity and type of refrigerant.

Sulphur Content of Fuels

The **Sulphur Content of Certain Liquid Fuels Directive 99/32/EC** (amended by **Directive 2012/33/EU**) sets the maximum permitted concentration for sulphur in heavy fuel oil used in the EU at 1% by mass, and for gas oils at 0.1% by mass.

United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) 1992 has been the focus of international efforts to reduce GHGs. Its requirements are very generic in nature and largely set an overall framework for international efforts to combat climate change. It recognises that the climate system is made up of shared resources that can be affected by emissions of GHGs. The Convention specifically requires that governments:

- Obtain and share information on GHG emissions, policies and best practices.
- Launch national strategies for addressing GHG emissions and adapting to climate-related impacts (this includes providing financial and technological support to developing countries).
- Co-operate in the preparations required for adapting to the impacts of climate change.

The Kyoto Protocol was adopted by parties to the UNFCCC in 1997, with the intention of establishing a legally-binding framework of GHG emission reductions, but was the subject of protracted negotiations. As a result, the Protocol did not enter into force until 2005, and the so-called "first commitment period" did not commence until 2008. Signatories to the first commitment period (2008-2012) agreed to meet binding reductions in their emissions of GHGs. The Marrakesh Accords is a series of agreements that were developed at the UNFCCC meeting in 2001. They cover issues related to land use, land-use change and forestry (LULUCF). Removal of GHGs from forestry can be accounted for in the Kyoto Protocol under certain circumstances.

The Doha amendment to the Kyoto Protocol was adopted in December 2012 and sets out the binding agreements that will cover the “second commitment period”, to run from January 2013 to December 2020. The first commitment period was adopted by 37 industrialised countries and the EU, who committed to reduce emissions of a set of six GHGs by an average of 5% against 1990 levels. Signatories to the second commitment period have agreed to reduce GHG emissions by at least 18% below 1990 levels. However, a number of countries (Japan, Russia, New Zealand) that participated in the first commitment period have not agreed to participate in the second, and other countries (notably the USA and Canada) have either never ratified the Protocol, or have subsequently withdrawn. It should also be noted that developing countries do not have any binding reduction targets under the Protocol.

Key aspects of the agreement:

- Participant countries will have to review climate plans on a regular basis and ensure that action is taken to deal with climate change.
- Development of an aim of net zero emissions by the end of the century.
- A specific legal requirement to reduce emissions on a five-yearly basis from 2025. All participant countries must be independently reviewed for progress towards their emission reduction pledges.
- Developed and emerging economies must mobilise \$100 billion per year from public and private funding to assist vulnerable and poor countries in protecting themselves against the consequences of climate change.

The Paris Agreement was developed at the Paris climate conference in December 2015 and formally entered into force in November 2016, when a sufficient number of countries (representing at least 55% of the world’s GHG emissions) had ratified the agreement. The agreement is planned to enter into force in 2020.

The Paris Agreement provides a framework to reduce global warming to well below 2°C above pre-industrial levels and plans to achieve climate-neutrality by the end of the century. Other key requirements include:

- A specific legal requirement to reduce emissions on a five-yearly basis from 2025. All participant countries must be independently reviewed for progress towards their emission reduction pledges.
- Governments must report to the public and each other on progress towards achieving their targets in a robust, transparent and accountable way.
- Developed and emerging economies must mobilise \$100 billion per year from public and private funding to assist vulnerable and poor countries in protecting themselves against the consequences of climate change.

The Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) (COP24) was held in December 2018 in Katowice, Poland. The key outcome of the conference was to agree and adopt a series of decisions to ensure the implementation of the Paris Agreement. This is known formally as the Paris Agreement Work Programme (PAWP), or more informally as the Paris rulebook.

Multilateral Treaties for the Management of Water Courses

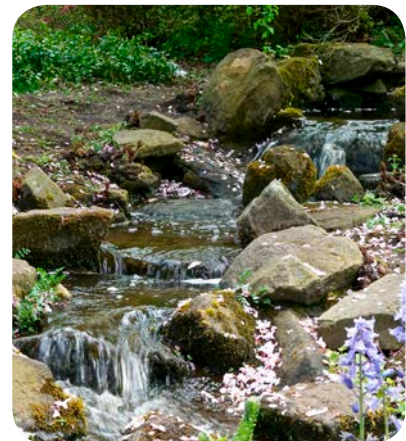
IN THIS SECTION...

- The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki) 1992 introduced a legal framework for international co-operation on shared water resources.
- Emission limit values are often set for discharges of liquid effluent into surface water. They are used to acknowledge the presence of a pollutant and ensure that levels conform with legal requirements.
- The **Directive on Environmental Quality Standards (2008/105/EC)** sets standards for priority substances discharged to surface waters.
- A licence is often needed to abstract or impound water.

Watercourses Convention

The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki) 1992 entered into force in 1996. It introduced a legal framework for international cooperation on shared water resources including both groundwater and surface water. Key requirements of the Convention include:

- States must take all appropriate measures not to cause significant harm to other watercourse states.
- Although no specific use of a transboundary watercourse takes priority, special regard must be allocated to human needs and the protection of ecosystems of international importance.
- Each riparian state (party bordering an international watercourse) is entitled to notification, consultation and negotiation (in some circumstances) when a proposed use may result in significant harm to its rights or interests.
- Co-operation must occur for planned measures that may affect international water courses.
- States must ensure that new sources of pollution are prevented and must reduce and control existing sources.
- States must take necessary measures to prevent the introduction of invasive species into an international watercourse, which could result in significant harm to other watercourse states.
- The marine environment is required to be protected and preserved.
- States are required to co-operate to regulate the flow of international watercourses.
- Both individually and jointly, states must take measures to prevent or mitigate conditions that cause harm, from both human conduct and natural causes (e.g. floods and droughts).
- States are required to notify affected states and competent international organisations of emergency situations, and states should co-operate to prevent, mitigate and eliminate the consequences of such emergency scenarios.
- States and international organisations must also prepare a contingency plan to respond to emergency situations.
- Requirements for dispute settlement, conflict management and security are stated in the Convention.



Watercourses must be protected

Water Framework Directive 2000

Directive 2000/60/EC is claimed to be the most significant piece of EU water legislation. The Directive embodies the concept of integrated river-basin management and sets objectives for water status, including:

- Ecological and chemical parameters.
- Common monitoring and assessment strategies.
- River-basin administration and planning.
- Measures to meet the objectives.

It takes an inclusive approach to water management, encompassing water flow through catchments from lakes, rivers and groundwater to estuaries and to the sea. It rationalises and updates current water legislation, replacing five existing directives. Its aims are to promote sustainable water consumption, prevent further deterioration, and protect and enhance the status of aquatic ecosystems and associated wetlands.

DEFINITIONS



CATCHMENT

An area that serves a river with rainwater. Every part of land where the rainfall drains to a single river is in the same catchment. For this reason, hills and high ground are often the boundaries between catchments - rain falling one side of the hill drains to one river; rain falling the other side drains to another river.

RIVER BASIN DISTRICT

Describes a wide regional area, dominated by a major river, which contains a number of tributary or subsidiary rivers and their individual catchments.

The Directive introduces the concept of river basin districts and analyses the state of the rivers, and the human and natural needs in them. It establishes monitoring programmes and management plans, and introduces measures to bring about the desired improvements. River basin management plans set statutory objectives for water bodies and, as water is linked to land, they can also affect land-use planning.

This Directive has implications for many sectors, including the water industry, agriculture, development and construction, and all businesses with discharge consents, trade-effluent consents, or abstraction licences.

MORE...

River-basin management plans can be viewed at the following websites:

www.gov.uk/government/collections/river-basin-management-plans-2015

www.sepa.org.uk/environment/water/river-basin-management-planning/

WWW.

The **Water Framework Directive** identifies that water quality should be assessed using the ecological (e.g. fish and invertebrates) and chemical (e.g. heavy metals, pesticides and nutrients) status of the watercourse. The classification system must identify where the quality of water is good, where it needs to be improved, and what is required to improve it.

- **Chemical Status Classification**

The chemical status is determined from comparison with environmental standards for priority substances and/or priority hazardous substances as identified in Annex II of the **Environmental Quality Standards Directive (2008/105/EC)**. This list includes chemicals, pesticides, metals and other groups such as Polyaromatic Hydrocarbons (PAH) that are mainly incineration by-products, and Polybrominated Diphenyl Ethers (PBDE), which are flame-retardants (see Appendix 1 for the full list of substances). The chemical status of a watercourse is identified as 'good' or 'fail'. This is determined by the worst scoring chemical (known as the one-out-all-out approach). Monitoring for priority substances is generally undertaken in watercourses where there are known discharges of pollutants. Water bodies with no known discharges of priority substances are reported as being of a good chemical status.

- **Ecological Status Classification**

The ecological status of a watercourse may take into account up to four different types of assessment:

- Assessment status determined by biological quality elements, such as invertebrates, algae or fish, and the presence of invasive species.
- Compliance with environmental standards for physico-chemical pollutants such as oxygen, phosphorus and ammonia.
- An assessment of environmental standards for concentrations of certain pollutants, such as zinc or arsenic (known as Annex VIII substances).
- In determining high status only - a series of tests to determine that the hydromorphology is largely undisturbed.

DEFINITIONS



PHYSICO-CHEMICAL POLLUTANTS

These are mostly naturally occurring pollutants. They are required to be at a level that supports the optimum ecology for the watercourse. Examples include dissolved oxygen, temperature, nutrients and physical alteration to rivers.

ANNEX VIII

Substances in Annex VIII of the Water Framework Directive are 'specific pollutants' that have to be identified by individual member states.

HYDROMORPHOLOGY

This constitutes the character of water flow, energy, etc., and the physical shape and character formed by the flow of water through the catchment.

The ecological status of the water is classed as high, good, moderate, or bad. High represents largely undisturbed conditions. The other classes are based on the increasing trend towards disturbed conditions. This deviation is identified as an Ecological Quality Ratio (EQR), with zero being bad, to one being high status. Again, ecological quality follows the one-out-all-out approach.

Biological status is classed as a sub-set of ecological status, where the results of only biological quality elements are considered (not including physico-chemical and Annex VIII substances and hydromorphology) - the one-out-all-out rule again.

- **Overall Status of the Watercourse**

Overall status of the watercourse considers both ecological and chemical status. It therefore takes into account all four ecological assessment types (biological, physico-chemical, Annex VIII substances and hydromorphology), as well as including the chemical status assessment (priority substances). The one-out-all-out rule is applied; therefore, the watercourse must be good or better ecological status and good chemical status to be given an overall good status.

The Reasons for Establishing Emission Limit Values for Substances Released to the Water Environment

Emission limit values are often set for discharges of liquid effluent into either surface water, groundwater or public sewer. They are usually set by a Competent Authority and, as they quantify the quality and quantity of a pollutant, they enable it to be measured. Emission limit values are also used to acknowledge the presence of a pollutant and ensure that levels conform with legal requirements. They form the basis of controlling emissions to water and are essential for developing permits/consents for monitoring impacts of effluents on the water environment.

The **Directive on Environmental Quality Standards (2008/105/EC)** sets environmental quality standards for substances in surface waters (rivers, lakes, transitional and coastal). This Directive is often known as the **Priority Substances Directive**. In the Directive, substances are classed as priority substances and priority hazardous substances (a particularly hazardous subset of hazardous substances). In both the **Water Framework Directive** and the **Priority Substances Directive**, 'good' chemical status of water is reached for a watercourse when it complies with the limits stated in these Directives. At present, Annex I of the **Priority Substances Directive** identifies limits on 45 priority substances. In addition, three substances (the pharmaceuticals E2, EE2 and diclofenac) have been placed on the 'watch list', and may be added to the priority substance list in the future. For substances classified as priority hazardous substances, the legislation requires their use to be phased out.

The key objective of the Protocol on Water and Health 1999 is to provide protection of human health and well-being by effective water management, that includes the control and reduction of waterborne disease and the protection of water related ecosystems. The Protocol requires parties to provide adequate sanitation and safe supplies of drinking water. Requirements include:

- Minimisation of water borne diseases.
- Setting of national and local targets for drinking water quality and quality of discharges.
- Establishment of national and local targets for performance of wastewater treatment and water supply systems.

Procedures for Discharge of Substances with Limit Values

Considering a national example in England and Wales, under the **Environmental Permitting (England and Wales) Regulations 2016** a water discharge activity permit is required for discharge of materials into controlled waters (such as rivers, streams or lakes). Discharges of effluent made to the public sewerage system are regulated by the utility company that is responsible for the sewers and the operation of the sewage-treatment works through which the effluent will pass. Such companies are designated as Water and Sewerage Undertakers, and have the power to consent to discharges under the **Water Industry Act 1991**.

The terms of a consent will be set so that the effluent will not harm the:

- Sewage treatment process.
- People who work in the sewerage system.
- Sewerage system itself.

Conditions may therefore be set for:

- The sewer.
- Sampling/monitoring.
- pH.
- Temperature.
- Volume.
- Times of discharge.
- Chemical Oxygen Demand (COD).
- Toxic metals.
- Suspended solids.
- Ammonia.

No flammable substances are permitted to be discharged.

The Purpose and Use of Water Abstraction Licences/ Authorisations

Water may be taken from groundwater, surface water or tidal water. An abstraction licence issued by a competent authority specifies the amount of water that may be abstracted and the times at which it may be removed.

Water abstraction is defined in Section 221 of the **Water Resources Act 1991** in the UK as doing anything whereby any water contained in any source of supply is removed from that source, temporarily or permanently.

Abstraction licences are required (Section 24) for abstraction and for impounding water. An abstraction licence will not be granted if the rate of abstraction exceeds the annual average rate of replenishment.

There are common law riparian rights for a landowner to abstract water from flowing water (so long as this does not interfere with other owners having enjoyment of that flowing water).

The **Water Act 2003** and associated **Water Resources (Abstraction and Impounding) Regulations 2006** introduced changes to the system of water abstraction and impoundment, including:

- All abstractions under 20 cubic metres per day (m^3/d) do not require a licence.
- Dewatering of mines, quarries and engineering works and other activities that were previously exempt now requires a licence.
- Administration for making applications and transferring and renewing licences was simplified.
- All abstractors now have a responsibility not to let their abstraction cause damage to others.

The Supply, Storage, Use and Transport of Hazardous Substances

IN THIS SECTION...

- The United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is an internationally agreed chemical classification and labelling system.
- The ILO Convention on the Prevention of Major Industrial Accidents (C174) applies to accident prevention in major hazard installations.
- The ILO recommendation R181 - Prevention of Major Industrial Accidents 1993 provides additional requirements to the Convention.
- The Stockholm Convention on Persistent Organic Pollutants 2001 sets requirements to control persistent organic pollutants, including a ban on production, restriction of use and safe management of stockpiles.
- International agreements have been developed to ensure the safe transport of dangerous goods by air, land and sea.

The United Nations Globally Harmonised System

The United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is a non-legally-binding, but internationally agreed, chemical classification and labelling scheme. It standardises many elements of chemical management such as hazard-testing criteria, universally applied hazard warning pictograms and harmonised safety data sheets.

It establishes:

- New harmonised criteria for the classification of chemicals according to their hazardous properties.
- New harmonised labelling and provision of information requirements, including new hazard-warning symbols (pictograms) for labels.

Chapter 1.3.2 of GHS outlines the assessment of the intrinsic hazards of a chemical in three steps:

- Identification of relevant data regarding the hazards of a substance or mixture.
- Review of the data to determine the hazards.
- Decision as to whether the substance will be classified as hazardous.

For a large number of chemicals, there will already be data from previous tests - GHS acknowledges this and states that it should be accepted in order to reduce the number of tests conducted (and therefore the number of test animals affected). It also acknowledges that there may be reliable epidemiological data from human exposure which could be used.

The aim of GHS is to standardise the laws governing the classification and labelling of chemicals globally, the principle being 'one chemical - one label worldwide'.



A GHS sign for carcinogenic

Prior to the introduction of the GHS, there were many different systems around the world for hazard classification, with Europe adopting a different system from the US, for example - with the result that a substance imported into Europe from elsewhere in the world would potentially have to be reclassified and relabelled in order to meet the EU requirements. In an effort to standardise in this area, the UN created GHS. This has been implemented in different regions around the world through local legislation. In Europe, the standard of note is the **European Regulation (EC) No. 1272/2008** on Classification, Labelling and Packaging of Substances and Mixtures (CLP), which is aligned to GHS.

Under CLP, manufacturers and suppliers must:

- Classify dangerous chemicals using the new scientific criteria agreed under GHS.
- Provide information to the end user in the form of a label that will make use of new hazard warning symbols (pictograms) agreed under GHS.
- Package the chemical safely.

CLP fully replaced the UK classification system described by the **Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (CHIP)** in June 2015.

CLP consists of hazard statements and precautionary statements (covering prevention, response, storage and disposal) which are represented by H- and P- numbers respectively. Examples include:

- H401: Toxic to aquatic life.
- H410: Very toxic to aquatic life with long-lasting effects.
- H420: Harms public health and the environment by destroying ozone in the upper atmosphere.
- P273: Avoid release to the environment.
- P221: Take any precaution to avoid mixing with combustibles.
- P222: Do not allow contact with air.

Under CLP, specified hazard pictograms must also be used. These are in the shape of a red diamond with a white background, for example:



Hazardous to the aquatic environment pictogram

MORE...

Further information on CLP and the globally harmonised system can be found on the HSE website: www.hse.gov.uk/chemical-classification/index.htm

WWW.

The Purpose of the ILO Convention Prevention of Major Industrial Accidents Convention, 1993 (C174) and Associated Recommendation (R181)

The ILO Convention on the Prevention of Major Industrial Accidents (C174) is intended to apply to Major Hazard Installations (MHIs). An MHI is defined as an installation that “produces, processes, handles, uses, disposes of or stores, either permanently or temporarily, one or more hazardous substances or categories of substances in quantities which exceed the threshold quantity”.

A “threshold quantity” is simply an amount (specific to the substance type) which would trigger inclusion within the major hazard installation regulatory regime. These thresholds are set by national governments, as appropriate; there is no globally agreed figure, but it would typically be a number of tonnes, depending on the hazardous nature of the substances.

The basic responsibilities of employers at major hazard installations are to:

- Identify the MHI and notify the “competent authority” (i.e. the relevant government department).
- Produce a documented system of Major Hazard Control, covering:
 - Identification/analysis of hazards and assessment of risks.
 - Technical and organisational measures:
 - Technical measures: design, safety systems, construction, choice of chemicals, operation, maintenance and systematic inspection of the installation.
 - Organisational measures: training and instruction of personnel, the provision of equipment in order to ensure their safety, staffing levels, hours of work, definition of responsibilities, and controls on outside contractors and temporary workers on the site of the installation.
 - Emergency measures and procedures:
 - This consists of producing an on-site emergency plan (which is periodically tested and evaluated) and providing information to the authorities (so they can produce off-site emergency plans). Employers must consult with relevant authorities and bodies.
 - The on-site emergency plan is principally concerned with the control of the emergency using on-site resources. The employer has responsibility for producing it.
 - The purpose of the off-site emergency plan is for the protection of the public and the environment. The off-site plan is the responsibility of the authorities.
 - Consequence minimisation measures.
 - Consultation with workers and their representatives.
 - Continuous improvement of the system. This should include learning from accidents and near-misses, so it should cover the necessary data-gathering and analysis. The lessons learned should be recorded and also discussed with workers.
- Prepare a safety report (with reviews at planned intervals and also when there are significant changes). The safety report:
 - Is based on the information already described under “documented system”, i.e. hazard identification, plans, consequence minimisation, etc.
 - Needs reviewing just like a risk assessment, particularly where there have been significant changes (in the quantities of hazardous substances, etc.), new developments in technical knowledge, at planned intervals (as prescribed) or at the request of the competent authority.
 - Should be made available to the competent authority.
- Inform the competent authority in the event of a major accident and follow this up with a report (causes, consequences, action taken, etc.).
- Inform and train workers.

The basic responsibilities of competent authorities with regard to off-site emergency preparedness are to:

- Prepare an off-site emergency plan (for protection of the public and the environment). The off-site plan:
 - Will be based on information provided to the competent authority by the employer on the major hazard installation (and contained in the safety report).
 - Must be kept up-to-date and engage any necessary consultees.
- Inform the public about safety measures and the behaviour to adopt in an emergency. The information given to the public must also be kept up-to-date.
- Warn the public when a major accident arises.
- Inform other countries (in the event of transboundary incidents).

The ILO recommendation R181 - Prevention of Major Industrial Accidents 1993 provides additional requirements to the Convention. It sets requirements of the international exchange of information on issues such as:

- Effective safety practices in major hazard installations.
- Major accidents.
- Lessons learnt from near misses.
- Prohibited technologies that are prohibited on grounds of safety and health.
- Medical organisations and techniques for dealing with the aftermath of a major accident.
- How a Competent Authority implements the Convention and Recommendation.

It also states that national laws and other measures to implement the Convention are guided by ILO codes of practice, and that multinational organisations should provide safety measures related to the prevention of major accidents (and the control and developments likely to lead to major accidents) to all their employees, no matter what country they reside in.

The Purpose of the 2001 Stockholm Convention on Persistent Organic Pollutants in Respect of Chemicals

Persistent Organic Pollutants (POPs) are a group of substances that can accumulate in the fatty tissues of any organism and, as they degrade very slowly, can bioaccumulate in food chains, posing a high risk to human health and the environment. They are carbon-containing compounds - major sources are pesticides, industrial chemicals and unintentional by-products. Examples include:

- Aldrin.
- Chlordane.
- Dieldrin.
- Endrin.
- Toxaphene.
- Polychlorinated Biphenyls (PCBs).
- DDT.
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF).
- Hexachlorobenzene (HCB).
- Polycyclic Aromatic Hydrocarbons (PAHs).

The Stockholm Convention on Persistent Organic Pollutants 2001 defines a POP as a 'chemical substance that persists in the environment, bioaccumulate through the food web, and poses a risk of causing adverse effects to human health and the environment'. The Convention's requirements include:

- Ban on the production, use, import or export of intentionally produced POP chemicals that are listed in Annex A of the Convention.
- Restrict the production, use, import or export of intentionally produced POP chemicals that are listed in Annex B of the Convention.
- Reduce or eliminate releases from POPs that are intentionally produced and are listed in Annex C of the Convention.
- Ensure that stockpiles and wastes containing or contaminated with POPs are safely managed in an environmentally sound way.
- Detailed procedures are provided for the listing of new POPs in Annex A, B and C of the Convention.
- Other parts of the Convention relate to exchange of information between countries, making information available to the public, awareness and education, research, development and monitoring, technical assistance, financial resource provision and reporting.
- Measures implemented to reduce the formation of POPs from by-products.

The Specific Environmental Requirements Relating to the Transportation of Hazardous Substances

United Nations Recommendation on the Transport of Dangerous Goods

The **UN Recommendations on the Transport of Dangerous Goods - Model Regulations, 19th ed., 2015**, also known as 'the Orange Book', provide the basis for the development of all international regulations concerning the international transport of dangerous goods, as well as most national legislation. This publication covers all modes of transport - road, sea and air - and the following key areas:

- Classification of dangerous goods.
- Listing.
- Use, construction, testing and approval of:
 - Packaging.
 - Portable tanks.
- Consignment procedures, such as:
 - Marking.
 - Labelling.
 - Placarding.
 - Transport documentation.
 - Emergency response.

The **UN Model Regulations** cover all aspects of transportation necessary to provide international uniformity and a comprehensive, criteria-based classification system for substances that pose a significant hazard in transportation.

Material properties addressed include:

- Explosiveness.
- Flammability.
- Toxicity (oral, dermal and inhalation).
- Corrosivity to human tissue and metal.

- Reactivity (e.g. oxidising materials, self-reactive materials).
- Pyrophoric substances (substances that react with water).
- Radioactivity.
- Infectious substance hazards.
- Environmental hazards.

They prescribe:

- Standards for packaging and multimodal tanks used to transport hazardous materials or dangerous goods.
- A system of communicating the hazards of substances in transport through hazard communication requirements which cover:
 - Labelling and marking of packages.
 - Placarding of tanks, freight containers and vehicles.
 - Documentation and emergency response information that is required to accompany each shipment.

The European Agreement

The European Agreement concerning the International Carriage of Dangerous Goods by Road is referred to by the abbreviation ADR, and the agreement concerning rail by RID. Specific requirements of ADR and RID address issues such as:

- Training requirements.
- Compliance with safety obligations.
- Special requirements relating to the carriage of Class 7 (radioactive) goods.
- Appointment of Dangerous Goods Safety Advisers.
- Reporting accidents or incidents.
- Security provisions.
- Requirements relating to the construction and testing of packaging, receptacles and containers.
- Carriage, loading, unloading and handling.
- Vehicle crew training, equipment, operation and documentation.
- Construction and approval of vehicles.

Additional requirements to ADR and RID include:

- Attendant for, duration of and security for carriage of Class 1 (explosive) goods by road.
- Keeping of consignment information.
- Use of placards, marks and plate markings for carriage, as required nationally.

International Maritime Dangerous Goods (IMDG) Code

The International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended, provides controls for numerous areas of maritime safety. Chapter VII states mandatory requirements for the carriage of packaged dangerous goods where it is a requirement to comply with the provisions of the International Maritime Dangerous Goods (IMDG) Code. The Code is considered as an extension of Chapter VII of SOLAS.

The IMDG Code is an international code that standardises the safe carriage of dangerous goods and the prevention of pollution to the environment. The Code was adopted in 1965 as a recommendation, but in 2002 the International Maritime Organisation gave it mandatory status under SOLAS (although some parts of the code are still recommendatory). The Code has specific duties for each individual substance, material or article, covering issues such as packaging, container traffic and stowage, with particular emphasis on segregation of incompatible substances.

IATA Dangerous Goods Regulations

The International Air Transport Association (IATA) provides a set of regulations covering shipping cargo by air freight to ensure the safe handling and transport of dangerous goods. The first version of the Regulations were published in 1956. The **IATA Dangerous Goods Regulations (DGR)** incorporate a harmonised system for operators so that they can accept and transport goods in safe and efficient manner. The **IATA DGR** is based around the International Civil Aviation Organisation Technical Instructions for the Safe Transport of Dangerous Goods by Air. It also provides a list of individual articles and substances stating their acceptability and conditions for transport by air.

When shipping goods by air, there are four classifications:

1. Forbidden under all circumstances.
2. Forbidden under normal circumstances but may be carried with approval by states concerned.
3. Restricted to carriage on cargo aircraft.
4. May be carried on passenger aircraft providing certain requirements are complied with.

Classification of goods in the **IATA DGR** is based around the **UN Model Regulations** classifications that were covered previously. Labels used are usually the same as for the other applications of the **UN Model Regulations**, however, there are some labels that are only used for the international transport of dangerous goods, examples being lithium batteries, cargo aircraft only and magnetised material. The shipper has responsibility for providing the airline with information that applies to the goods. This may be provided in the form of a Shipper's Declaration for Dangerous Goods. This will contain information such as:

- Shipper's name and address.
- Consignee name and address.
- Airport of departure and destination.
- Nature and quantity of dangerous goods (e.g. UN number, proper shipping name, total number of packages and a certification statement)

The shipper may also provide the required information electronically.

Training is required to be provided or verified upon the start of employment of persons involved in specific roles stated in the **IATA DGR**, examples include:

- Shippers and packers.
- Freight forwarders.
- Operators and ground-handling agents.
- Security screeners.

The type of training depends on the job role, but examples of subjects include classification, general packing requirements, shipper's declaration documents, recognition of dangerous goods and emergency procedures, and labelling and marking.

Mercury and Mercury Compounds

The Minamata Convention on Mercury of 2013 provides restrictions on mercury and mercury compounds. Key requirements include:

- Prohibits mercury mining that was not undertaken prior to the entry into force of the Convention.
- Identification of stocks of mercury over 50 metric tonnes.
- Parties must not export mercury without written consent of importing parties. (Import must only be for environmentally sound interim storage or an allowed use.)
- Various phase-out dates are set for mercury-containing products.

- Phase-out or restriction of manufacturing activities where mercury or mercury compounds are released to land, air and water is stated.
- Mercury and mercury compounds must be stored in an environmentally sound manner.
- Each party is required to develop strategies for identifying, assessing and reducing the risks associated with mercury-contaminated sites.
- Science-based educational and preventive programmes on occupational exposure to mercury and mercury compounds.

The Convention is implemented in the EU by **Regulation 2017/852** on mercury.

Multilateral Treaties Relating to Land, Wildlife Preservation and Pesticide Use

IN THIS SECTION...

- The Convention on Biological Diversity 1992 covers the development of national strategies to enable the sustainable use and conservation of biodiversity.
- The Convention Concerning the Protection of the World Cultural and Natural Heritage 1972 is a key agreement that aims to provide protection of '**cultural heritage**' (e.g. monuments, groups) and '**natural heritage**' (natural features consisting of physical and biological formations).
- Key sites of international importance that are present on the World Heritage List include the Great Barrier Reef, Lake Malawi National Park and the Canadian Rocky Mountains Parks.
- The Rotterdam Convention on Prior Informed Consent 1992 controls the import and export of dangerous substances that are either banned or restricted.
- The Stockholm Convention on Persistent Organic Pollutants 2001 covers pesticides in addition to industrial chemicals.

Convention on Biological Diversity

The Convention on Biological Diversity (CBD) was opened for signatures in 1992, coming into force in December 1993. The Convention has three main goals, these being:

- conservation of biological diversity (biodiversity);
- sustainable use of its components; and
- the fair and equitable sharing of the benefits arising from genetic resources.

DEFINITIONS



GENETIC MATERIAL

Material of any plant, animal, microbial or other containing functional units of heredity.

GENETIC RESOURCES

Genetic materials of actual or potential value.

The key objective of the CBD is for the development of national strategies to enable the sustainable use and conservation of biodiversity. This is achieved by considering the following:

- Co-operation - contracting parties will co-operate on matters of mutual interest surrounding the conservation and sustainable use of biological diversity.
- General measures for conservation and sustainable use - national strategies, plans or programmes must be developed for the conservation and sustainable use of biological diversity, or current strategies adapted for this purpose.

- Identification and monitoring - each contracting party is required to identify components of biodiversity important for conservation and sustainable use considering guidelines set in Annex I of the Convention. It must also monitor the components of biodiversity.
- In-situ conservation - each contracting party is required to, as far as is possible and appropriate:
 - Establish biodiversity-protected areas.
 - Promote the protection of ecosystems and natural habitats.
 - Restore and rehabilitate degraded ecosystems.
 - Prevent the introduction of species that may threaten ecosystems, habitats or species.
 - Introduce legislation, etc. for the protection of threatened species and populations.
- Ex-situ conservation - measures are required to be implemented for the preservation of components of biological diversity outside their natural habitat.
- Sustainable use - consideration of conservation and sustainable use of biodiversity must be integrated into national decision making, and biological resources must be used in accordance with traditional cultural practices and support local populations.
- Research and training - programmes for the scientific and technical education and training in the identification, conservation and sustainable use of biological diversity must be developed, and research in these areas must be promoted.
- Impact assessment - contracting parties must introduce requirements for the environmental impact assessment of projects that are likely to have a significant adverse impact on the environment.

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international treaty made under the CBD that governs the movement between countries of living modified organisms that result from biotechnology.

MORE...

Further information can be found on the Convention on Biological Diversity's website:

www.cbd.int/convention/

www.

Convention for the Protection of World Cultural and Natural Heritage

The Convention concerning the Protection of the World Cultural and Natural Heritage 1972 is a key agreement that aims to provide protection of '**cultural heritage**', such as monuments, groups of buildings and sites, and combined works of man and nature (included in this are archaeological sites which are of an outstanding universal value) and '**natural heritage**', which includes natural features consisting of physical and biological formations, geological features and natural sites in areas that constitute the habitats of internationally threatened plant and animal species, and natural sites that have an outstanding universal value from the point of view of science, conservation or natural beauty. The key requirements of the Convention are:

- Each country must :
 - Identify, protect, conserve and rehabilitate cultural and natural heritage to ensure its transmission to future generations.
 - Develop services for the protection of natural and cultural heritage.
 - Take the necessary legal, scientific, technical and administrative measures, and create development centres for training in identification, protection, conservation, presentation and rehabilitation of its heritage.

- Such heritage relevant to the convention is defined as 'world heritage'.
- Protection of world heritage involves a system of internal co-operation and assistance.
- Establishment of the World Heritage Committee, to which countries must submit an inventory of property that forms cultural and natural heritage. The committee must establish, keep up to date and publish a World Heritage List which shall be distributed every two years. Inclusion on the list requires the consent of the state concerned. A List of World Heritage in Danger also needs to be developed. They must also define the criteria on which a site becomes a world heritage site.
- Establishment of a world heritage fund which provides financial support for the protection of world cultural and natural heritage, to which compulsory and voluntary contributions by states must be made.

MORE...

The world heritage list can be viewed at:

whc.unesco.org/en/list

WWW.

Protection Given to Areas/Features Considered to be of Outstanding Value to Humanity by World Heritage

The following sites are listed on the List of World Heritage as natural sites of outstanding international importance (apart from the Great Wall which is a cultural site of outstanding international importance).

The Great Barrier Reef

The Great Barrier Reef (GBR) is a highly biodiverse coral reef on the north east coast of Australia. It is of international importance as it contains the world's largest collection of coral reefs with 400 types of coral, 1,500 species of fish and 4,000 types of mollusc. It is also scientifically important as it is home to other species such as the large green turtle and the dugong (sea cow). Within the GBR there are 2,500 individual reefs and 900 islands, with the GBR extending 2,000 Kilometers along the Queensland coast.



The Great Barrier Reef

Lake Malawi National Park

The Lake Malawi National Park is located on the southern end of Lake Malawi in Malawi, south east Africa. It is of international importance as a result of biodiversity, in particular fish diversity. Residing in the Western Rift Valley, Lake Malawi is one of the world's deepest lakes. The area is also of exceptional natural beauty with rugged landscapes. The site is home to many species of cichlid fish, with most being only present in the lake. The cichlid fish provide significant indication of biological evolution - this results from Lake Malawi being isolated from other water bodies such that the fish have developed impressive adaptive radiation and speciation and are an outstanding example of this ecological process.



Lake Malawi National Park

Giant's Causeway

Giant's Causeway resides at the base of basalt cliffs, on the edge of the Antrim Plateau in Northern Ireland in the United Kingdom. It consists of 40,000 large black regularly shaped polygonal basalt columns that rise from the sea to form a pavement. The columns formed around 60 million years ago in the Tertiary period. The features of the causeway make it an internationally important area for the study of basaltic volcanism. The strata exposed in cliff faces being key to understanding the sequence of activities in the earth's geological history. The formation gets its name from the legend of giants passing on the causeway across the Irish Sea to Scotland.



Giant's Causeway

Canadian Rocky Mountain Parks

The Canadian Rocky Mountain Parks in South West Canada consists of Banff, Jasper, Kootenay and Yoho national Parks and Mount Robson, Mount Assiniboine and Humber provincial parks. The site provides classical examples of glacial processes such as icefields, remnant valley glaciers, canyons and important examples of erosion and deposition. The site consists of the Burgess Shale Cambrian and Precambrian sites that have provided vital knowledge regarding biological evolution. It provides examples of marine community of soft-bodied organisms originating from the rapid explosion of animal life around 540 million years ago.



Canadian Rocky Mountain Parks

The Great Wall

The Great Wall was built on a continuous basis from the 3rd Century BC to the 17th Century AD on the northern border of China. It was built as a military defence project by numerous Chinese empires and has a total length of over 2,000 kilometres. It begins in Shanhaiguan in Hebei province and ends in Jiayuguan in Gansu province to the west. It consists of walls, tracks for horses, watchtowers, wall shelters, fortresses and passes along the wall. It provides an example of far sighted political, strategic and military thinking of the central empires of ancient China. It is an excellent example of military architecture, technology and art of ancient China.



The Great Wall

Other Designations for Protected Sites

Ramsar Convention

The Convention on Wetlands of International Importance, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. The convention covers many types of wetlands such as swamps, marshes, lakes, deltas, tidal flats and mangroves.

The aims of the convention are achieved through the implementation of ecosystem approaches within the context of sustainable development. Those who are party to the convention must:

- Work towards the wise use of wetlands through land-use planning, policies and law.
- Designate suitable wetlands for the list of wetlands of international importance (the Ramsar sites list) and ensure that they are effectively managed.
- Internationally co-operate with regard to transboundary wetlands, shared wetlands systems and development that poses a significant risk to wetlands.

OSPAR Convention 1992

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention) entered into force in 1998 and has been ratified by 15 countries and the EU (under decision 98/249/EC). It works by identifying threats to the marine environment in the north-east Atlantic and implements programmes and measures that ensure national action is taken to combat them. It sets internationally agreed goals and monitors them to ensure that countries are complying with them. This part of the Atlantic is under intense pressure with regard to the marine ecosystem, pollution, maritime activities, oil and gas extraction and nuclear energy. Achievements since the Convention's introduction include:

- Significant reduction in phosphorus and heavy metals.
- Reductions in discharges from nuclear plants.
- Ban on waste dumping.
- Network of OSPAR marine-protected areas.

Natura 2000

Natura 2000 is the EU-wide network of nature conservation sites comprising Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (see later in this element). These designations were created under the Habitats Directive and the Birds Directive, respectively.

The SAC designation was created under the **European Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora (92/43/EEC)** (commonly known as the **Habitats Directive**), which was adopted in May 1992. Under the Directive, the member states agree to establish a series of protected sites (SACs) that are selected for:

- Their importance as natural habitat types and as habitats of the species listed in Annexes I and II of the Directive.
- Habitats and species of 'Community interest'.

Special Protection Areas (SPAs)

SPAs are created under Article 4 of the **EU Council Directive on the Conservation of Wild Birds (2009/147/EC)** (commonly known as the **Birds Directive**). This Directive repeals, consolidates and largely re-enacts earlier directives and amendments. The **Birds Directive** requires EU member states to identify and classify the most suitable territories in size and number for rare or vulnerable bird species, as listed in Annex I, and for regularly occurring migratory birds. Member states are required to pay particular attention to the protection of wetlands, especially those of international importance. These sites have become known as Special Protection Areas (SPAs). Within these areas, member states are required to take appropriate steps to avoid pollution or deterioration of the habitat and disturbance to the birds.

Illegally Harvested Timber

EU Regulation No. 995/2010 identifies requirements for those who place timber and timber products on the market in the EU. The requirements are designed to counter the trade in illegally harvested timber and timber products. This is achieved by:

- Prohibiting the placing on the market for the first time of illegally harvested timber and products derived from such timber.
- Requiring EU traders who place timber products on the market for the first time to exercise due diligence, including:
 - Having access to information about the timber.
 - Risk-assessing the likelihood of illegal timber supplies.
 - Implementing mitigation measures if there is significant risk of illegal timber.
- Traders keeping records of their suppliers and customers.

Rotterdam Convention on Prior Informed Consent

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 1992 has the following aims:

- Promotion of a shared responsibility of parties involved in the international trade of hazardous chemicals to protect the environment and human health.
- Contribution to the sound use of such chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process surrounding their export and import and by communicating this information to other parties.

The Convention provides coverage of a range of pesticides and industrial chemicals that have either been banned or are restricted for environmental or health reasons by parties to the Convention. A single notification from each of two specified regions will initiate a consideration of adding a chemical to Annex III of the Convention. Extremely hazardous pesticides that provide a significant risk under conditions of use in developing countries or countries with transitional economies can also be proposed to be included in Annex III.

Examples of chemicals in Annex III of the Convention include:

Chemical	Category
Aldrin	Pesticide
Chlordane	Pesticide
DDT	Pesticide
Dieldrin	Pesticide
Lindane	Pesticide
Mercury compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds	Severely hazardous pesticide formulation
Dustable powder formulations containing a combination of: <ul style="list-style-type: none"> • Benomyl at or above 7% • Carbofuran at or above 10% • Thiram at or above 15% 	Severely hazardous pesticide formulation
Asbestos: <ul style="list-style-type: none"> • Actinolite • Anthophyllite • Amosite • Crocidolite • Tremolite 	Industrial
Polychlorinated biphenyls (PCB)	Industrial

When a chemical is added to Annex III, a Decision Guidance Document (DGD) is developed that includes information surrounding the chemical and the regulatory decision to ban or restrict the chemical on health or environmental grounds. The CDG is then circulated to all Convention parties. Parties then have a nine month time period to develop a response to the DGD concerning the future import of the chemical. The response may consist of either a final decision to allow import, not to allow import or allow import subject to certain conditions. Or an interim response. The decision reached by a country is required to be trade neutral, in that it must apply on an equal basis to domestic production for domestic use as well as from importation. The import decision is then circulated and exporting country parties are obliged under the Convention to take appropriate measures for the assurance that exporters within the borders of a country adhere to the decision.

The Convention also promotes a mechanism for the exchange of information:

- A party must inform other parties of all national bans or severe restrictions of chemicals.
- A developing country or transitional country is required to inform other parties of the problems associated with the conditions of use of a severely hazardous pesticide formulation.
- A party that wants to export a chemical that is banned or severely restricted within its own borders must inform the importing party that a shipment will take place prior to the initial shipment and on an annual basis thereafter.
- When exporting a chemical that is used for occupational purposes, an exporting party must ensure that an up to date safety data sheet is sent to the importer.
- Labelling specifications for the export of chemicals that are included in the PIC procedure, in addition to other chemicals that are banned or severely restricted in the exporting country.

EU Regulation 649/2012 on Prior Informed Consent implements the Rotterdam Convention in the EU and covers the export of certain chemicals to non-EU countries. Generally, the law aims to protect human health and the environment by providing developing countries with information on how to transport, use, store and dispose of certain hazardous chemicals and pesticides. There are various sets of restrictions, depending on which chemicals are being exported, including:

- All chemicals must comply with general export requirements, such as EU requirements for packaging, labelling and safety data-sheet provision.
- Some chemicals are significantly restricted or banned for export in the EU. Banned chemicals include aldrin, DDT, PCBs and mercury-containing soaps.

Stockholm Convention on Persistent Organic Pollutants in Respect of Pesticides

You might remember from earlier that the Stockholm Convention on Persistent Organic Pollutants 2001 defines a POP as a 'chemical substance that persists in the environment, bioaccumulate through the food web, and poses a risk of causing adverse effects to human health and the environment'. Such POPs may be chemicals, pesticides or unintentionally produced substances. Examples of pesticides banned or restricted by the Convention include:

- Aldrin.
- Chlordane.
- Endrin.
- Pentachlorobenzene.
- Toxaphene.
- DDT(1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane).
- Mirex.

Multilateral Treaties Relating to Energy Use

IN THIS SECTION...

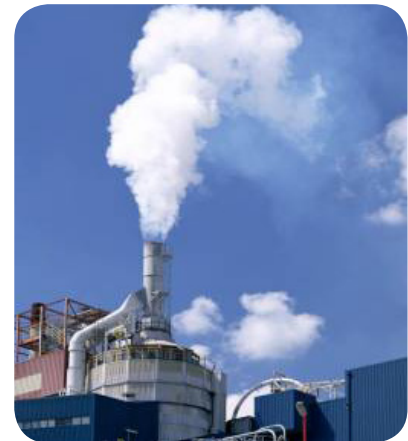
- One way for parties to comply with the requirements of the Kyoto Protocol 1997 is through the process of trading greenhouse gas emissions.
- Emissions trading involves the purchase or sale of credits that represent the greenhouse gases emitted by an organisation.
- The EU Emissions Trading System requires energy-intensive organisations to be involved in trading greenhouse gas emission credits.
- The **Energy Efficiency Directive 2012/27/EU** requires member states to use energy in a more efficient manner from production to consumption.
- The **Ecodesign Directive 2009/125/EC** and associated daughter directives state legal requirements for the design of listed electrical products to comply with environmental and energy-efficiency requirements at the design phase.
- **EU Regulation 2017/1369** requires that energy labels are provided at the point of sale of household electrical products.
- **Directive 2010/31/EU** on the energy performance of buildings sets requirements to reduce the energy consumption of buildings. These include provision of energy performance certificates and establishment of inspection schemes for air conditioning.

The Kyoto Protocol in Relation to Emissions Trading

One way for parties to comply with the requirements of the Kyoto Protocol 1997 (outlined earlier) and various amendments such as the Marrakesh Accords 2001 and the Doha Amendments 2012 is through the process of trading greenhouse gas emissions.

Background

Tradable allowances are derived for emissions of specific environmentally hazardous substances (e.g. tonnes of carbon dioxide) that can be bought or sold. The amount of allowances that can be allocated is, however, capped. Those that release over their cap can buy extra allowances on an open market where those that have emitted under their cap can sell allowances. This works as a financial incentive to organisations which have emitted under their cap and a financial disincentive to those which have emitted over their cap. This mechanism is used for schemes such as the EU emissions trading system where carbon emissions from energy-intensive organisations must be traded.



The Kyoto Protocol covers the process of trading greenhouse gas emissions

EU Emissions Trading System

The Emissions Trading System (ETS) is a European system with the objective of reducing carbon dioxide emissions and mitigating climate change. It is implemented by **Directive 2003/87/EC** (establishing a scheme for greenhouse-gas emissions allowance trading) and was significantly amended by **Directive 2009/29/EC** (improving and extending the greenhouse-gas allowance trading scheme of the Community).

This is viewed by the EU as a significant tool with which to decrease greenhouse-gas emissions and meet its Kyoto target of 20% below 1990 levels. Emissions trading works on the theory that emission reductions are carried out where the cost of the reduction is least, therefore lowering the overall costs of reducing climate change.

The EU ETS allocates a price on carbon that companies use and creates a carbon market. The system has been operating since 2005 and was the first of its kind in the world.

The ETS for energy-intensive installations consists of phases and all member states must produce a National Allocation Plan (NAP) approved by the EU. Such plans must set an overall 'cap' on the sum of emissions allowed from facilities included in the system. This is converted to allowances, with one allowance being equal to one tonne of CO₂. Installations included within the system must monitor and report emissions. At the end of the year, they must surrender allowances to account for the installation's individual emissions. Installations have flexibility within the system; they can use all or part of their allocation, and can 'trade' allowances by purchasing additional allowances, or selling any extra they have accumulated by reducing emissions below their allocation.

The EU ETS installation requirements are relevant to energy-intensive organisations such as power stations, iron and steel manufacture, food and drink, engineering and vehicle manufacture. Specified installations with low emissions (in addition to installations that primarily supply services to a hospital) are allowed to opt out of the ETS if they put in place equivalent measures to limit their emissions.

MORE...

Information on the EU Emissions Trading System can be found at the European Commission for Climate Action:

ec.europa.eu/clima/policies/ets/index_en.htm

WWW.

Aviation

Aviation is included in the ETS Directive. All aircraft operators allocated to a member state that are part of the ETS have to apply to a regulator for an emissions plan that identifies how their reportable CO₂ emissions will be determined. New operators must apply within a specified time period when becoming an aircraft operator. Regulators must issue an approved plan within a specified time period from receiving the application. Following approval, the operators must report and monitor CO₂ and benchmark emissions in accordance with the approved plan. The Directive requires that aviation operators undertake monitoring of their emissions of CO₂ in accordance with approved guidelines.

Every year, the competent authority will issue the amount of allowance to each aircraft operator. If, by the end of each year, the operator does not possess sufficient allowances to cover annual CO₂ emissions, it will be required to purchase more. If the operator does not surrender sufficient allowances for every tonne of CO₂ that is emitted, then a penalty will result.



Aircraft operators will be issued a yearly allowance

Production of Energy-Related Products and Energy Efficiency in Buildings

Energy Efficiency Directive

Directive 2012/27/EU on Energy Efficiency states mandatory requirements to assist the EU in achieving its 20% energy-efficiency target by 2020. Under the Directive, EU member states are duty bound to use energy in a more efficient manner from production to consumption. Requirements of the Directive include:

- Energy distributors or retail energy sales organisations must achieve a 1.5% energy saving every year by the implementation of energy-efficiency measures.
- EU countries may choose to achieve an equivalent level of energy savings via other means such as improving heating system efficiency, installation of double glazed windows or roof insulation.
- The public sector in EU member states must purchase energy efficient buildings, products and services.
- Every year governments of EU member states must undertake energy efficiency renovations on 3% (by floor area) of buildings that they own and reside in.
- Energy users are required to be empowered to more effectively manage consumption including free, easy access to energy consumption data through individual metering.
- National incentives should be provided that enable small- and medium-sized enterprises to undergo energy audits.
- Large companies are required to audit energy consumption to assist in helping them identify ways in which they could save energy.

Energy Efficient Products

Eco-design criteria has been specified for energy-related products, including:

- Household electrical and electronic equipment.
- Office equipment.
- Televisions.
- Boilers.
- Refrigerators
- Computers.
- Vacuum cleaners.

Ecodesign Directive 2009/125/EC

The **Ecodesign Directive 2009/125/EC** aims to reduce the environmental impacts of products (including energy consumption) through their full life cycle. It is estimated by the EU that 80% of all product-related environmental impacts are determined from the design phase. Therefore, by providing legislation at this initial stage of a product, the environmental impacts and the energy consumed can be reduced significantly across a product's life cycle.

The Directive is very much a Framework Directive, such that it sets requirements for generic principles of ecodesign and provides a system for the setting of more specific requirements that can be tailored to specific product groupings. These will apply to relevant product characteristics such as energy consumption.

The Directive applies to most types of energy use and energy-related products (but not transportation). However, as the Directive only provides a framework, there are no specific requirements for products within it until specific measures have been developed and published. It applies to all relevant products placed on the EU market and products that are imported. Examples of product groups covered by the Directive include:

- Air conditioners.
- Dishwashers.
- Fans.
- Set top boxes.
- Televisions.
- Washing machines.

When specific implementing measures have been developed for product groups, then the requirements are likely to include:

- Assessment of the product's impacts on the environment.
- Design and construct the product so that it complies with ecodesign requirements.
- Affix required ecolabels.
- Carry out a conformity assessment (this is usually a self assessment).
- Affix the CE mark to the product.

Ecodesign requirements contained within each implementing measure are either 'specific' or 'generic'. A generic measure is one that improves the overall environmental performance, being linked to reduction of the environmental aspects identified in the implementing measure. An example would be 'standby power' consumption requirements. Specific measures are those that are in the form of a limit value or threshold for an identified environmental aspect.

Conformity assessments are achieved by self assessment. The manufacturer will develop a technical document and accompanying test reports that support the declaration of conformity that they will make. The declaration of conformity must refer to the appropriate implementing measure and other information required for a declaration of conformity which would include other applicable CE marking directives. All technical documents are required to be retained for ten years and must be delivered to a competent authority when requested within ten days.

The product specific regulations that implement the **Ecodesign Directive** include:

- **EU Regulation 2016/2281** - Ecodesign requirements for air-heating products, cooling products, high temperature process chillers and fan coil units.
- **EU Regulation 617/2013** - Ecodesign requirements for computers and computer servers.
- **EU regulations 642/2009** - Ecodesign requirements for televisions.
- **EU regulation 666/2013** - Ecodesign requirements for vacuum cleaners.

Examples of specific ecodesign requirements for computers stated in **EU Regulation 617/2013** include:

- Total energy consumption of a category A computer not to exceed 94,000 kWh/year.
- Power demand in sleep mode shall not exceed 5,00 W in desktop computers and integrated desktop computers and 3,00 W in notebook computers.
- Power demand in the lowest power state shall not exceed 0,50 W.
- Power demand in off mode shall not exceed 1,00 W.
- The computer shall be placed on the market with the display sleep mode set to activate within 10 minutes of user inactivity.

Labelling

It has been widely recognised that consumers need access to accurate and simple information about the energy-consumption characteristics of equipment and appliances, so that they can make informed purchasing decisions and thereby reduce their energy consumption. **EU Regulation 2017/1369** sets out a framework for energy labelling and repealing **Directive 2010/30/EU** operates to provide a credible and consistent approach to labelling of a number of categories of household products, including:

- Refrigerators, freezers and fridge-freezer combinations.
- Washing machines.
- Electric tumble-dryers.
- Combined washer-dryers.
- Dishwashers.
- Lamps.
- Electric ovens.
- Air conditioners.

Advertisements and manufacturers' literature are required to have this information. It must be provided wherever these products are bought or hired.

The Regulation establishes a timeframe for the replacement of current A+, A++ and A+++ energy classes introduced by **Directive 2010/30/EU**, to be replaced with an A to G Scale. It also identifies a procedure for the rescaling of labels, as technological advances mean that the excessive application of higher energy efficiency classifications will be avoided in the future. It is hoped that this will also provide an incentive to innovation and provide a mechanism where inefficient products are pushed from the market. Rescaled labels must be shown from the following dates:

- Household equipment - November 2019.
- Heaters and boilers - Labels displayed between 2027 and 2032.
- Other product groups - 2024/2025.

The Regulation will also enable the general public to access product labels and information from a product registration database, so as to ease the comparison of the energy efficiency of electrical items. The Regulation also makes it a legal requirement for manufacturers to provide information to consumers if a software or firmware update decreases a product's energy efficiency. It also bans the use of devices that alter a product's performance during testing.

The key requirements of the Regulation from its introduction on 1st August 2017 are:

- Manufacturers - luminaires (complete electric light units) to be accompanied by a printed energy-efficiency label, manufacturers to provide free printed labels, efficiency classes and range of classes to be provided in advertisements (not radio advertisements) and suppliers prohibited from placing products on the market whose performance changes under test conditions.
- Dealers - traders can request printed energy-efficiency labels from manufactures, which must be provided within 5 days of request free of charge. Efficiency classes and range of classes to be provided in advertisements (not radio advertisements).

Energy Star

Energy Star is an initiative for electrical appliances. The label indicates that the energy consumption of an appliance is under an agreed level when the appliance is in standby mode. It can be found on office equipment such as printers, monitors and computers. The Energy Star initiative is a US scheme, but is used as a voluntary initiative within the EU under **EC Regulation 106/2008** on a community energy-efficiency labelling programme for office equipment. The key requirements of the Regulation are:

- Participation with the Energy Star programme is voluntary.
- Conformity assessments and conformity marking may be tested by the European Commission (EC) or member states.
- Application to be involved in the Energy Star programme must be submitted to the EC and will be accepted if the applicant agrees to comply with the Common User Guidelines in Annex B of the Energy Star Agreement (an agreement regarding the use of Energy Star between the EC and the USA).
- Other energy efficiency labelling schemes within the EU will co-exist with Energy Star.
- EC must establish an Energy Star Board that consists of national representatives and representatives of interested parties. The board will review the implementation of the Energy Star programme within the EC and provide advice and assistance.
- All member states are required to designate national representatives (e.g. national energy policy experts) who hold responsibility for carrying out tasks stated in the Regulation.
- A work plan must be established covering a strategy for development of Energy Star.

Energy Performance of Buildings

Buildings are one of the most significant sources of energy-use around the world. In the EU, for example, it is estimated that they are responsible for 40% of energy consumption and 36% of CO₂ emissions. To help improve energy efficiency in buildings, **Directive 2010/31/EU** on the energy performance of buildings has been developed. The directive's key requirements for EU countries are:

- Provide energy performance certificates in all advertisements for the sale or rental of buildings.
- Establish an inspection system for heating and air-conditioning systems or implement measures that have an equivalent effect.
- All new buildings by the 31 December 2020 (public buildings by 31 December 2018) must be close to zero energy.
- Minimum energy performance requirements must be developed and set for new buildings, major renovations of buildings and for the replacement or retrofit of certain building elements such as heating and cooling systems, roofs and walls.
- Develop a list of national financial measures that are designed to increase the energy efficiency of buildings.

The **Energy Efficiency Directive 2012/27/EU** also sets some requirements for buildings, these include:

- A requirement to make energy-efficiency related renovations to at least 3% of buildings that are owned and occupied by central governments.
- Governments to only purchase buildings that have a high level of energy efficiency.
- Development of long-term government National Building Renovation Strategies (NBRs) that are to be included with their National Energy Efficiency Action Plans. NBRs include an overview of a country's national building stock, identification of important policies that the country will use to stimulate building renovation and inclusion of an estimation of the savings in energy from the renovations.

Summary

Key topics covered in this element:

- The waste hierarchy consists of a series of measures to manage waste; it consists of prevention/source reduction; preparing for re-use; recycling/composting; other recovery/energy recovery; and treatment and disposal.
- Waste is often categorised by law; key categories include non-hazardous waste, hazardous waste, inert waste, clinical waste, toxic waste and radioactive waste.
- Waste is classified in the EU using the six-digit European Waste Classification system.
- Waste carriers will often be registered with a competent authority.
- Producer responsibility laws cover the production of waste electrical equipment, waste batteries, end of life of vehicles and packaging.
- Transboundary shipment of hazardous waste is controlled through the Basel Convention.
- The phase out of ozone-depleting substances and fluorinated greenhouse gases is covered by the Montreal Protocol on Substances that Deplete the Ozone Layer 1987.
- The United Nations Framework Convention on Climate Change and associated Kyoto Protocol provide international control of greenhouse gas emissions.
- Releases to the water environment are often legislated through emission limit values, for example, the **Priority Substances Directive** sets limits for releases of dangerous substances to surface water.
- In order to prevent confusion, a globally harmonised system of classifying and labelling chemicals has been developed by the UN.
- Emergency situations in major hazard industries are legislated by the ILO Convention on the Prevention of Major Industrial Accidents.
- The Stockholm Convention on Persistent Organic Pollutants 2001 covers the ban on production, restriction of use and safe management of stockpiles of persistent organic pollutants.
- There are a number of international laws covering the safe transport of dangerous goods by air, land and sea.
- The Convention on Biological Diversity 1992 covers the development of national strategies to enable the sustainable use and conservation of biodiversity.
- The World Heritage List consists of both natural and cultural heritage which is heavily protected by international law. Examples of such sites include Giant's Causeway and the Great Barrier Reef.
- The import and export of dangerous industrial chemicals is either banned or restricted under the Rotterdam Convention.
- The Stockholm Convention on Persistent Organic Pollutants 2001 covers pesticides in addition to industrial chemicals.
- One way for parties to comply with the requirements of the Kyoto Protocol 1997 is through the process of trading greenhouse gas emissions.
- Emissions trading involves the purchase and sale of credits representing emissions to atmosphere. It is a legal requirement for energy intensive industries to trade emissions within the EU.
- The **Ecodesign Directive** sets requirements for energy efficiency and environmental impacts to be considered in the design of listed electrical equipment.
- Energy labels must be provided at the point of sale of certain electrical equipment within the EU.
- Requirements are present within the EU to improve the energy efficiency of buildings, such as the provision of energy performance certificates in sales material and the mandatory inspection of air conditioning.



Introduction

The aim of this unit is to help you prepare for your NEBOSH Environmental Diploma Unit IDEM2: Practical Assignment.

Some people think this unit is simple, don't bother to prepare themselves properly, and fail as a result. Make sure you don't fall into this trap! While the process you have to work through is straightforward, in order to succeed you need to understand what NEBOSH expects. If you work carefully through these notes, we are confident that you'll be a successful candidate!

These notes are designed to give you guidance on completing your project, including:

- how you should go about planning it;
- what it should include; and
- what needs to be submitted when.

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Practical Assignment

Aims and Objectives

The key aim of the assignment is the review and critical analysis of an organisation's Environmental Management System (EMS) in eight different areas. The review must include a synopsis of environmental laws that are applicable to the organisation. From the review, a report must be produced for top management on the overall performance of the EMS. The report is required to highlight three environmental concerns. These may be gained from any of the areas reviewed and suggest recommendations for the improvement of these.

Content

You are expected to use your knowledge of both ED1 and IDEM2 when undertaking the review.

Assignment Requirements

A review and analysis of an organisation's EMS must be undertaken. Following the review, a report for top management on the overall EMS performance will be prepared. The report is required to highlight three environmental concerns - which may be gained from any of the areas reviewed - and suggest recommendations for the improvement of these.

The assignment must include the following:

- An executive summary.
- An introduction (including background on environmental regulation).
- Review and critical analysis of the organisation's EMS.
- Evaluation of the top three environmental concerns and identification of improvements to be made for each.
- Conclusions and recommendations which summarise the main issues identified and lead to justified recommendations.
- Bibliography and referencing.
- Appendices.

Assessment Location

The IDEM2 assessment should be carried out in your own workplace. You are not required to be supervised during the assessment, but must sign a declaration that Unit IDEM2 is your own work.

Students and employers should be aware that the assessment for IDEM2 is for educational purposes and is not undertaken for any other means.

Submission of Completed Work

The dates of submission are in February, May, August and November every year; exact dates will be published by NEBOSH on an annual basis. You must be registered with a course provider to be able to submit an IDEM2 assignment. Your name, or course provider information, should not appear anywhere on the assignment.

After registration, you will receive a pre-submission mail that includes information on electronic submission of the assignment. You must give permission for your work to be screened by Turnitin UK and understand that it will be added to the Turnitin database. You are also required to declare that it is your own work.

You must keep a copy of your assignment.

Marking

The IDEM2 is marked by qualified examiners appointed by NEBOSH. Students are required to achieve a 50% mark to gain a pass.

Detailed information on Unit IDEM2 including forms and mark schemes is present on the NEBOSH website available at www.nebosh.org.uk: 'Unit IDEM2 Assignment, guidance and information for students'.

Please ensure you read through the NEBOSH guidance carefully before you begin your assignment.