Programme Area: Bioenergy

Project: Energy From Waste

Title: Key Legislation and Constraints for Energy from Waste Technologies

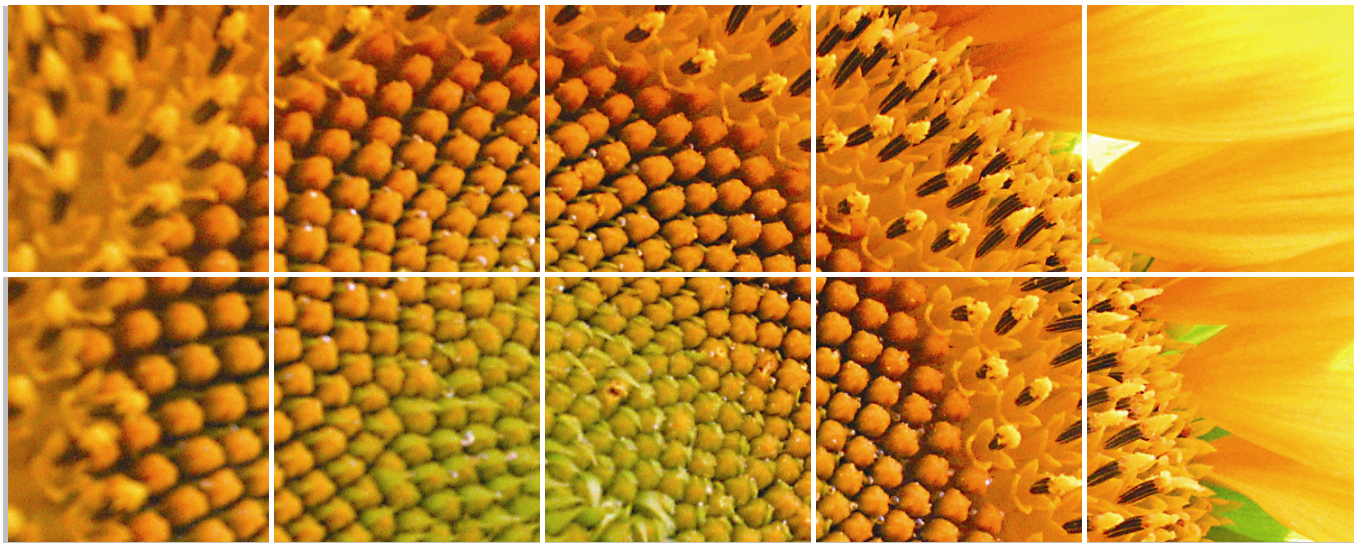
Abstract:

This report provides an overview of key current and future policies, legislation and regulation that could have influence on the deployment of EfW schemes in the UK (at the time of writing, 2010). This report was used to assist the assessment of overall system performances in WP3 by highlighting potential constraints on certain EfW technologies. Furthermore, the report informed the selection process for technology types to investigate further and the formulation of a UK Benefits Case for Energy from Waste in WP4.

Context:

The Energy from Waste project was instrumental in identifying the potential near-term value of demonstrating integrated advanced thermal (gasification) systems for energy from waste at the community scale. Coupled with our analysis of the wider energy system, which identified gasification of wastes and biomass as a scenario-resilient technology, the ETI decided to commission the Waste Gasification Demonstration project. Phase 1 of the Waste Gasification project commissioned three companies to produce FEED Studies and business plans for a waste gasification with gas clean up to power plant. The ETI is taking forward one of these designs to the demonstration stage - investing in a 1.5MWe plant near Wednesbury. More information on the project is available on the ETI website. The ETI is publishing the outputs from the Energy from Waste projects as background to the Waste Gasification project. However, these reports were written in 2011 and shouldn't be interpreted as the latest view of the energy from waste sector. Readers are encouraged to review the more recent insight papers published by the ETI, available here: http://www.eti.co.uk/insights

AEA



Key Legislation and Constraints for Energy from Waste Technologies

Report to Caterpillar

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Executive summary

This project was funded by the Energy Technology Institute (ETI)[1], and is being delivered by a consortium involving Caterpillar UK Ltd. (lead organisation), EDF Energy Ltd, Cranfield University, Centre for Process Innovation (CPI) and Shanks Waste Management. The ETI is a private sector organisation, funded equally by industrial member companies and the UK Government.

The ETI launched this study in October 2009 to assess the waste produced in the UK and to address the need for the next generation of enhanced Energy from Waste (EfW) technologies in each UK region. The project was designed to determine specifically the need for fuel flexible power systems capable of operating on a range of waste materials and streams. It characterised and mapped the UK waste landscape and identified technology development opportunities for Energy from Waste technologies in order to inform the ongoing strategic development of the ETI's Distributed Energy (DE) programme.

AEA was appointed by Caterpillar to provide an overview of key current and future policies, legislation and regulation that would have influence on the deployment of EfW schemes in the UK. The report has been divided into the following three areas:

- Planning
- Environment
- Sustainable Energy

As some aspects of the above policy areas are the responsibility of the devolved administrations this report has sought to address policies separately for England, Wales, Scotland and Northern Ireland where appropriate.

Section 2 of the report reviews key planning policies. It addresses guidance in England, Wales, Scotland and Northern Ireland for local authorities in the development of waste and renewable energy policies. It also covers conditions under which environmental impact assessments are required for planning consent applications.

Section 3 covers policy and legislation relating to environmental permitting in the nations. It also addresses key pollution prevention and control legislation that EfW facilities may be subject to.

Section 4 policies and incentives for the development of renewable and sustainable energy projects. This is due to the fact that EfW can benefit from these support measures when utilising wastes containing biomass.

Section 5 covers anticipated future developments in policy and legislation relating to EfW and section 6 provides a summary of the policies reviewed and highlights key features from the three areas that parties should consider in approaching the development of EfW.

Through this review a number of key factors have been identified that are relevant to investment decisions for EfW projects. In terms of planning the key issues are:

- *Plant power output capacity.* The electrical output capacity will influence the level of authority at which consent will need to be granted. Consent for small and medium scale schemes will be granted by local planning authorities but for larger schemes (i.e. greater than 10MW in Northern Ireland or 50MW in Britain) consent will need to be sought from central government authorities.

[1] http://www.energytechnologies.co.uk

- *Local land-use and waste planning policy.* Developers should be mindful of regional and local policies for land-use and waste management as individual projects will be assessed on the basis of how projects contribute to local waste objectives. Where possible projects should be developed to align with identified objectives in the local waste plan. Developers should also be mindful of future developments in national waste strategies. For example, the devolved administrations in Scotland and Wales both indicate that limits are to be introduced on the maximum amount of municipal solid waste (MSW) that may be treated by thermal EfW facilities. The Welsh Assembly Government (WAG) has indicated that it will limit treatment of MSW by EfW to 30% by 2024/25 while in Scotland this would be 25% by 2025.

- *Requirement for an Environmental Impact Assessment.* Projects may be required to undertake an environmental impact assessment (EIA) and provide an environmental statement (ES) in support of the consent application. The requirement for an EIA will vary dependent on the scheme size and process technology involved together with the relevance of particular risk factors.

With regards Environmental Legislation the following are key issues must be considered:

- *Requirements for Environmental Permitting.* In the majority of cases EfW projects will be required to obtain an environmental permit or licence in order to operate. However, developers should be aware of regulatory reforms to facilitate lighter-touch regulation where this is appropriate.

- *Demonstration of Best Available Techniques.* Projects will need to demonstrate the use of Best Available Techniques (BAT) for achieving pollution prevention and control. A particular area highlighted by PPC authorities in their guidance is the need for EfW processes to demonstrate BAT in regard to energy efficiency. It should be noted that regulators in different nations each adopt varying positions with some nations (currently Scotland and potentially Wales in the future) identifying specific, quantitative, energy efficiency targets for EfW plants.

- *Application of the Waste Incineration Directive.* The WID sets specific and rigorous requirements on the design, operation and management of applicable thermal EfW processes. As such it is desirable for operators to determine at the earliest stages whether the process will be subject to the WID and implications this will have on the process.

Finally, central government policy widely recognises the role that EfW, as part of a sustainable waste strategy, has a role to play in meeting renewable energy targets. As a result EfW technologies can receive support from the following sources:

- *The Renewables Obligation.* Provides benefits in the form of Renewables Obligation Certificates (ROCs) for power output attributable to the biomass content of the wastes fuels. Enhanced support is given for projects utilising advanced conversion technologies and for Good Quality CHP. Importantly ROCs are available only for combustion EfW schemes where they demonstrate Good Quality CHP. Advanced thermal processes such as pyrolysis and gasification will need to meet specific quality criteria for fuel gases/liquids produced in order to be eligible for the enhanced support available.

- *Climate Change Levy Exemption for electricity generated.* Some schemes may be able to receive benefits in the form of Levy Exemption Certificates.

- *Enhanced capital allowances (ECA) for EfW plant operating as Good Quality CHP.* Additional ECA benefits are also available for EfW CHP schemes utilising solid recovered fuel (SRF). This additional benefit for SRF-fuelled CHP schemes is to support the development of a market in the UK for SRF produced by Mechanical Biological Treatment (MBT) processes.

EfW schemes would also be expected to benefit through the future introduction of Feed-in Tariffs for small-scale renewable energy projects and the Renewable Heat Incentive in Great Britain.

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Appendix 1 Glossary of Terms

1 Introduction

This project was funded by the Energy Technology Institute (ETI)[2], and is being delivered by a consortium involving Caterpillar UK Ltd (the lead organisation), EDF Energy Ltd, Cranfield University, Centre for Process Innovation (CPI) and Shanks Waste Management. The ETI is a private sector organisation, funded equally by industrial member companies and the UK Government.

The ETI launched this study in October 2009 to assess the waste produced in the UK and to identify the need for the next generation of enhanced Energy from Waste (EfW) technologies in each of the UK regions. The project was designed to determine specifically the need for fuel flexible power systems capable of operating on a range of waste materials and streams. It will do this by characterising and mapping the UK waste landscape and identify technology development opportunities for EfW technologies in order to inform the ongoing strategic development of the ETI's Distributed Energy (DE) programme.

In the context of this project the term Energy from Waste (EfW) has been used to refer to any treatment technology that uses waste as a fuel stream for the generation of heat or power. This includes traditional combustion with energy recovery, gasification, pyrolysis and anaerobic digestion (AD).

The overall project was divided into four separate but interlinked Work Packages with the completion of the whole project scheduled for early 2011. The 4 packages under investigation are:

1. Waste Assessment – to deliver a statistically representative view of the UK waste arisings, using existing data wherever possible and identifying representative waste streams with supporting chemical analysis.

2. Technology Assessment – assessing how these waste streams would interact with a wide range of conversion technologies, supported by detailed rig tests, including gasification, pyrolysis, digestion, and power generation tests. This will lead to the identification of significant technology development opportunities to increase the conversion potential and/or efficiency of the technologies.

3. Technology Performance Modelling and Assessment – technology performance data collected in Work Package 2 in relation to the wastes assessed in Work Package 1 will be modelled at an end-to-end system level. These models will assess systems in terms of their overall performance potential. The models were optimised to incorporate the identified technology improvements to determine their impact on overall system performance.

4. UK Benefits Case – assessing the UK potential for Energy from Waste technologies, and providing a business guide regarding the value of any investment required in developing these technologies. This will include an assessment of the commercial deployability of the technologies to determine the market and economic potential for Energy from Waste in the UK.

AEA was appointed to provide an overview of key current and future policies, legislation and regulation that would have influence on the deployment of EfW schemes in the UK. This will assist the assessment of overall system performances in WP3 by highlighting potential constraints on certain EfW technologies. Furthermore, the overview will inform the selection process for technology types to investigate further and the assessment that will be undertaken in Work Package 4 in order to formulate a UK Benefits Case. The report has been divided into the following three areas:

- Planning
- Environment
- Sustainable Energy

[2] http://www.energytechnologies.co.uk

As some aspects of the above policy areas are the responsibility of the devolved administrations this report has sought to address policies separately for England, Wales, Scotland and Northern Ireland where this is appropriate.

2 Planning Legislation

Energy from Waste projects will generally need to obtain planning consent prior to the commencement of development works on site in question. Planning is a devolved matter and so varying guidance is provided to Local Planning Authorities (LPAs) on the development of local planning policy with respect to EfW and the assessment of individual planning applications. The process of obtaining planning consent and environmental permits for a development are closely associated. As a result it is typically recommended that developers make both applications in parallel. While responsibility for granting consent will normally lie with the local planning authority, in the case of large-scale schemes consent may be granted by central government.

2.1 Large-scale Projects (Great Britain only)

Developers seeking to construct/extend a power generating station with a generating capacity of more than 50 megawatts (MW) are required to obtain consent from the Secretary of State under Section 36 of the Electricity Act 1989. Consent applications in England and Wales are dealt with by the Department for Energy and Climate Change (DECC) while the Scottish Government handles applications in Scotland. Any such applications are submitted via the local planning authority with the authority, local people and statutory bodies consulted before a decision is made.

Under the Electricity Works (Environmental Impact Assessment) Regulations[3], developers seeking Section 36 consent may be required to undertake an Environmental Impact Assessment and provide an Environmental Statement (ES) as part of their consent application. This requirement will be mandatory for generating stations greater than 300MW. However, below this level developers should contact the central government authority to obtain a determination of whether an EIA is required. Specific guidance on the completion of EIAs for Section 36 consent is available from DECC[4] and the Scottish Government[5].

Further guidance was published in December 2006 by the then DTI requiring developers in England and Wales to explore the potential for generating stations to be operated as combined heat and power (CHP) plants. Developers are thereby expected to provide a separate statement detailing the extent to which it has explored potential heat supply opportunities and the economic feasibility of these being served by the proposed plant operating as CHP.

2.2 Small and Medium-scale Projects

Projects not meeting the threshold for Section 36 consent will be required to obtain planning permission from the local planning authority (LPA). As responsibility for development and waste planning lies with the devolved administrations separate guidance is given for England, Wales, Scotland and Northern Ireland. Developments at this scale may also be subject to the need to undertake an environmental impact assessment in support of their planning application; this is addressed in Section 0.

2.2.1 Guidance in England

Planning guidance for England is maintained by the Department for Communities and Local Government (CLG). Specific guidance is provided in the form of Planning Policy Statements (PPSs), which are used by LPAs to guide policy development. Details of PPSs relevant to renewable energy projects (including EfW) are given below.

[3] In England and Wales this is SI 2000/1927 amended by SI 2007/1977. In Scotland this is SSI 2000/320 amended by SI 2008/246.
[4] Available from: http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/consents_planning/electricity/electricity.aspx
[5] Available from: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance

Supplement to PPS 1: Planning and Climate Change

This provides an overarching guidance, to regional and local planning authorities, in developing planning policies to deliver sustainable development. PPS1 advises that regional/local planning bodies should seek to make good use of opportunities for decentralised and renewable/low-carbon energy (which it defines as including EfW).

PPS10: Planning for Sustainable Waste Management

This provides guidance to regional/local planning authorities on the development of waste management policy. It advises that waste planning authorities should identify sites suitable for waste management facilities to satisfy the needs of their areas. PPS10 goes on to provide advice in assessing planning applications in which it advocates close working between the local planning authority and the relevant pollution control authority. Here the LPA should be concerned with determining whether the development presents an appropriate use of land while the pollution control authorities should be concerned with the control of risks to human health and the environment. PPS10 specifically advises that developments should be assessed on the basis of their ability to contribute to the delivery of local waste plan objectives. The PPS is accompanied by a companion guide providing further details.

PPS22: Renewable Energy

Guidance in this document advises that LPAs should seek to create local strategies that encourage (rather than restrict) the development of renewable energy resources and that authorities should recognise the full range of renewable sources (including energy from waste).

PPS22 is accompanied by a companion guide that includes a technical annex detailing the technical features of various renewable energy technologies and the associated potential planning issues that LPAs should be conscious of in assessing applications. Section 2 of the annex covers biological EfW processes such as AD, sewage gas and landfill gas while Section 3 covers thermal EfW processes such as combustion, pyrolysis and gasification. Advice is given that LPAs should consider developments in relation to the local waste management plans for the area. Issues such as visual effects, nuisance odours and non-stack dust emissions need to be given particular consideration. The annex advises that LPAs should expect the following information to be provided with a planning application for a thermal or biological EfW plant:

- Site plan and elevation drawings to help determine visual impact
- Photomontage of plant building(s) and chimney stack with clear indication of building material
- Information on grid connection works, including transformer and transmission lines
- Details of vehicular access and vehicular movement
- Landscaping provisions
- Site management measures during the construction phase
- Model of emissions dispersion[6]

The annex also notes that a development may need to carry out an Environmental Impact Assessment (EIA) and submit an Environmental Statement (ES) as part of its planning application.

[6] Guidance on modelling emissions can be found in EPR *'H1 Environmental Risk Assessment Part 2 Assessment of point source releases and cost-benefit analysis'*. A copy can be found at http://www.environment-agency.gov.uk/static/documents/Business/h1_part_2__2002416.pdf.

See also guidance on the site management in '*H5 Site condition report*'. A copy can be found at http://www.environment-agency.gov.uk/static/documents/Business/h5_scr_guidance_2099540.pdf.

The document also advises that the following conditions may be applied to planning permission granted to thermal biological EfW plants:

- Work to be carried out in accordance with method statement agreed by local authority
- Plans of powerhouse and contractors compound to be agreed by local authority
- Building and stack design to be approved by local authority
- Time limits to be set on use of contractors' compound
- Time limits to be set on hours of working
- Prevention of pollution (including odour) procedures to be agreed with local authority
- Noise limits from the plant to be set by
- Environmental Liaison Officer procedures to be agreed with local authority (on sensitive sites)
- Monitoring requirements to be agreed with local authority and carried out (on sensitive sites).

Noise Limits

There are two areas of noise control applied to industrial facilities such as an EfW plant. Firstly the noise level outside the site boundary (i.e. to limit the impact the facility has on the noise that the general public are subject to) and secondly the noise level for various items of plant and/ or equipment.

The allowable noise level off site is dependent on numerous factors such as existing background noise levels and the proximity of sensitive receptors (such as residential dwellings, hospitals, schools, residential care homes etc). The allowable level is often stipulated in the planning or permit conditions. Examples of levels include:-

A) Noise level at residential or the nearest sensitive receptor shall not exceed the recommended WHO (World Health Organisation) 1999 levels:-

- Daytime - 07:00 to 23:00 hours – 55dBA outside the nearest dwelling window
- Nightime - 23:00 to 07:00 hours - 45dBA outside the bedroom window

It is noted that guidelines issued in 2009 by the WHO and EU (Night Noise Guidelines for Europe ISBN 978 92 890 4173 7) extend the WHO guidelines referenced above and may result in a lower yearly average level of 40dBA at night and outside (as defined in the Environmental Noise Directive) being applied in the future as acceptable night time noise limits. An Interim Target of 55dBA at night and outside is suggested by the WHO where other factors make reaching a 40dBA level impractical. Applying these latest guidelines has yet to become widespread.

B) Local Authorities often require that the noise level post construction does not increase the background noise level that existed prior to construction of the facility.
C) There shall be no audible tonal frequencies at the nearest sensitive receptor.

Due to topographical effects (e.g. a plant erected in a valley often has a detrimental noise impact on dwellings on the valley sides) what constitutes relevant sensitive receptors is very site specific.

The noise levels on site are constrained or managed through health and safety legislation (e.g. The Control of Noise at Work Regulations 2005 (the Noise Regulations)) and are imposed to protect the site operators and visitors to site. Various noise levels are usually set depending on the specific use of particular areas on a site; levels typically vary from 45-55 dBA for control rooms / canteens to areas where ear defenders are mandatory (e.g. plant rooms). The H&S legislation require management to consider the use of ear defenders where noise levels on site are 80dBA or above, and their use is mandatory if the noise level is 85dBA or above. Whilst on-site noise levels are important it is not common for the planning conditions or permit to impose noise levels within the site boundary.

PPS25: Development and Flood Risk

The Environment Agency requires that a Flood Risk Assessment is submitted alongside any planning application in areas that are known to be at risk of flooding. Flood Risk Assessments are required to be completed according to PPS25 in order to take into account the impacts of climate change and flood risk at all stages in the planning process to prevent inappropriate development in areas at highest risk.

Where new development is necessary in such areas, existing policy aims to make it safe without increasing flood risk elsewhere, and, where possible, reducing flood risk overall.

The guidance gives the following responsibilities that any owner or developer must undertake with regards to the flood risk of the proposed development:

- Demonstrate consistency with PPS25 and Local Development Documents
- Provide a Flood Risk Assessment that demonstrates:
    - Whether or not it will be affected by current/future flooding
    - Whether it satisfies safe development and reduces overall flood risk
    - Whether it increases flood risk anywhere else
    - The mitigation measures to deal with any effects and risks associated with any necessary development in a flood risk area
- Reduce flood risk on the site and elsewhere using sustainable urban drainage and/or flood resilience measures
- Seek collective flood risk solutions (enhancing biodiversity, amenity and historic environment protection)

The EA website outlines the procedure and different models that are used to forecast flooding.
http://www.environment-agency.gov.uk/research/policy/109126.aspx

Planning Policy guidance, including compliance with the Water Framework Directive in England and Wales can be found from the 'The Water Framework Directive: Initial Advice to planning authorities in England on the EA website. http://www.environment-agency.gov.uk/research/planning/33102.aspx

2.2.2 Guidance in Wales

Planning guidance for developments in Wales is maintained by the Welsh Assembly Government (WAG). Guidance for local planning authorities is provided in the document *Planning Policy Wales*[7] which was publish by the WAG in March 2002. The main references pertinent to EfW developments are in Sections 12.5 (Planning to reduce and manage waste) through to 12.10 (Development Control and Sustainable Energy).

[7] Available from http://wales.gov.uk/topics/planning/policy/ppw2002/?lang=en

The WAG has also provided an Interim Statement on Renewable Energy[8] which states that:

> *"Renewable energy projects should generally be supported by local planning authorities provided environmental impacts are avoided or minimised, and nationally and internationally designated areas are not compromised."*

In this context the definition used for "renewable energy" includes agricultural, forestry and wood wastes/residues but does not go on to explicitly include other wastes (e.g. biomass component of municipal waste).

Flood Risk Management

Planning Policy guidance for development and flood risk management in Wales is the same as for England (as described in Section 2.2.1). Further information can be found from the 'The Water Framework Directive: Initial Advice to planning authorities in England on the EA website. http://www.environment-agency.gov.uk/research/planning/33102.aspx

2.2.3 Guidance in Scotland

Planning policy in Scotland is set by the Scottish Government. Planning policy guidance to LPAs is provided by a series of Scottish Planning Policy (SPP) documents together with Planning Advice Notes (PANs) that describe best practice.

SPP6[9] entitled "Renewable Energy" addresses provision for renewable energy and advises that EfW should be only considered once prevention, including reuse, and recycling and composting options have been realised. It goes on to advise that EfW sites should be located dependant on the source of waste used and likely to be more appropriately developed within industrial/brownfield sites close to the electricity grid or other potential users. The policy goes on to advise that an LPAs development plan policy framework should support the identification of sites or provide criteria against which planning applications for new waste management development can be assessed.

PAN45[10] provides advice on renewable technologies in support of SPP6. It provides a technical overview of the principal renewable energy technologies including biological and thermal EfW. In particular, it advises that LPAs should consider visual intrusion, noise and traffic issues as well impact on local ecology in considering applications. It also draws attention to the need for EfW plants to require a supply of water, either for steam production in combustion processes using steam turbines, or as make-up for AD processes.

SPP10[11] entitled "Planning for Waste Management" address development of waste management plans and assessing planning applications for waste management facilities.

Highlights of the policy document are the need for LPAs to assess individual proposals against the development plan and national waste plan. The benefits of EfW plants in a combined heat and power (CHP) mode are also highlighted and indicate that locating EfW plants close to energy grids or heat users should be seen as being consistent with model policy.

Flood Risk Management

The Flood Risk Management (Scotland) Act 2009 was enacted in June 2009 updating previous legislation and transposing the requirements of the EC Floods Directive domestically. This legislation takes account of the different organisations and local authorities that are responsible for flood defence and drainage functions in Scotland[12].

[8] Availabe from http://wales.gov.uk/topics/planning/policy/mipps/?lang=en
[9] http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/newSPP#a1%23a1
[10] http://www.scotland.gov.uk/Topics/Built-Environment/planning/publications/pans/Q/editmode/on/forceupdate/on
[11] http://www.scotland.gov.uk/Publications/2007/08/28161910/0
[12] http://www.sepa.org.uk/flooding/flood_risk.aspx

Specific measures in the Act include:

- The assessment of flood risk and preparation of flood risk management plans
- New methods to enable stakeholders and the public to contribute to managing flood risk
- A framework for co-ordination and co-operation between all organisations involved in flood risk management
- New responsibilities for SEPA, Scottish Water and local authorities in relation to flood risk management

2.2.4 Guidance in Northern Ireland

Developers seeking to construct, extend or operate a generating station whose capacity exceeds 10 MW will need to obtain consent from the Department for Enterprise, Trade and Investment (DETI) under Article 39 of the Electricity (Northern Ireland) Order 1992. Developments below this level will need to obtain consent from the local planning authority for the site.

General planning guidance is maintained by the Northern Ireland Planning Service, which maintains a suite of planning policy statements (PPS). Relevant documents are PPS11[13] on Waste Management which contains the following guidance relating to EfW:

- In considering incineration facilities the visual impact of the proposed plant is an important aspect. Modern energy from waste incineration plants comprise substantial buildings with a high chimney stack and may form a prominent feature in the local townscape. When proposed within the rural area, careful consideration will be given to the impact of the facility on the landscape. In all cases, a suitable landscaping scheme will be required.

- Other emerging thermal treatment technologies include gasification and pyrolysis. Anaerobic digestion is a further technology which produces energy from the treatment of organic wastes. These technologies involve processes carried out in enclosed plant which limit emissions to the atmosphere. Some of these processes could therefore play a more significant future role in waste management.

- For all EfW facilities, proximity to waste arisings, the significant traffic generated and heat and energy considerations point to locations within or close to urban areas with good accessibility to the main road network. It is important that waste is delivered and residues removed in properly designed vehicles to avoid spillages. Significant environmental and economic advantages may accrue when large EfW facilities are located adjacent to rail heads and ports.

PPS18[14] provides guidance on Renewable Energy. This is accompanied by a best practice guide which shares much of its content with the companion guide to PPS22 maintained by CLG in England (this is covered in greater detail in Section 2.2.1).

Flood Risk Management

The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009 came into operation in December 2009 and transposes the requirements of the EC Floods Directive domestically. This legislation takes account of the different organisations and local authorities that are responsible for flood defence and drainage functions in Northern Ireland.

[13] http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/pps11-waste-management.pdf
[14] http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18__renewable_energy.pdf

2.2.5 Habitats Directive

During the planning process the following regulations should be consulted in relation to the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora[15]). The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. The following Legislation and Regulations must also be considered in conjunction with the Habitats Directive:

- The Wildlife and Countryside Act 1981 (and amendments) provides protection to animals (e.g. birds) and flora as well as their habitats and Sites of Special Scientific Interest (SSSIs)
- Conservation (Natural habitats) Regulations 1994 (and amendments) provides conversation for natural habitats and wild fauna and flora
- Countryside and Rights of Way Act 2000 considers countryside access, off road vehicle driving and areas of outstanding natural beauty
- EU Regulation on the Protection of Species of Wild Fauna and Flora by Regulating Trade 338/1997 and the Natural Environment and Rural Communities Act 2006.

As part of the planning application, the developer will be required to produce an 'Appropriate Assessment' in order to consider facility and technology impacts as well as mitigation measures. This is required under Regulation 48 of the Habitats Directive.

The Appropriate Assessment must include:

- Site location
- Ecological / Conservation designations at the site or surrounding area
- Description of the proposed works
- Outlines of impacts that the development may have
- Mitigation measures that will be put in place by the developer/owner

Examples of impacts:

- Increased vehicle movements
- Increased noise
- Habitat disruption
- Travel routes to habitats/feeding/breeding grounds disturbed

Examples of mitigation measures include:

- On-site surveys to obtain realistic population numbers
- On-site vegetation surveys to help influence any landscaping/vegetation of final development appropriate to what was there before
- Take seasonal factors into account
- Translocation of fauna and/or flora and appropriate surveys (site itself and translocation site) to ensure appropriate substitute site is found
- Ecological Management Plan to be developed
- On site and receptor site monitoring during pre-construction translocation, during operational phase and post construction and translocation

The Environmental Damage Regulations 2009 seeks to achieve the prevention and remedying of environmental damage, via the polluter-pays principal, to:

- Habitats and species protected by EC law
- Water resource damage
- Contaminated land human health threats

[15] http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

Any project, no matter what scale or location, must consider a baseline ecological survey as part of their initial planning application and site development phases to ensure that all required actions have been identified at the beginning of a project. If these are identified at later stages, the costs and time delays can be extensive and seriously damage the overall project completion.

With regards the implementation of the Habitats Directive:

- In England the process is regulated by English Nature and Defra.
- In Wales the process is regulated by the Countryside Council for Wales.
- In Scotland the process is regulated by the Scottish Natural Heritage. The Conservation (Natural Habitats) Amendment (No.2) (Scotland) Regulations 2007 came into force on 29 June, and extended the requirement to assess proposals potentially affecting Natura 2000 sites to **all** plans and projects[16].
- In Northern Ireland the process is regulated by the Department of the Environment. There are a number of controls in place in Northern Ireland to protect habitats. The Environment (Northern Ireland) Order 2002 gives the Department of Environment for Northern Ireland the power to designate areas of land as Areas of Special Scientific Interest (ASSI) due to its flora, fauna geological, physiographical or other features and needs to be protected[17]. The Conservation (Natural habitats) Regulations (Northern Ireland) 1995 (as amended) provides for the protection of European Sites as listed under both the EC Habitats Directive and the EC Birds Directive[18].

2.2.6 Environmental Impact Assessments

In certain circumstances developers will need to carry out an Environmental Impact Assessment (EIA) and submit an Environmental Statement (ES) together with their consent application. This requirement is in accordance with European Directive 85/337/EEC and is implemented through separate legislation in England and Wales, Scotland and Northern Ireland.

Developments will certainly be required to provide an Environmental Statement, if the development is of the following types:

- Hazardous waste incinerator
- Incinerator handling non-hazardous waste with a capacity exceeding 100 tonnes per day.

In both the above cases incineration will typically refer to any thermal treatment process. Therefore these requirements will apply to gasification and pyrolysis processes as well as conventional combustion technologies.

In addition to the above, the following development types may be required to provide an environmental statement:

- Installation for the production of electricity and/or heat where the area of the development is greater than 0.5 hectares.
- Installations for the disposal of waste that meet one or more of the following criteria:
    - Disposal is by incineration
    - Area of the development is greater than 0.5 hectares
    - The installation is sited within 100 metres of any controlled waters

In such circumstances the developer should contact the local planning authority in order to determine whether an EIA will be necessary.

[16] http://www.snh.org.uk/about/directives/ab-dir02.asp
[17] http://www.jncc.gov.uk/page-3175
[18] http://www.jncc.gov.uk/page-3175

Scoping requirements for a typical EIA (in the UK)

A formal environmental impact scoping assessment should be produced in conjunction with the other parties of the clients Environmental Team. The overall scoping process will be applied across all the relevant assessment segments in order to ensure consistency of approach.

The scoping assessment will be undertaken in compliance with relevant UK EIA regulation and international best practice (*e.g.* EC guidance[19]) and will cover the full project lifecycle. A scoping assessment report would be produced comprising the following elements:

- A description of the project.
- Identification of the potential impacts throughout the lifecycle of the project. This will be undertaken through a systematic consideration of the aspects/pathways and receptors/resources potentially impacted during each project phase/activity. This will be recorded through an issues scoping matrix based on the following form (for illustration purposes only):

	Aspect/Pathway							Resources/Receptors													
	Physical presence	Emission to air	Liquid emissions	Light	Noise & vibration	Energy usage	Resource usage	Air Quality	Climate Change	Visual/landscape	Noise/Vibration	Flora	Fauna	Habitats	Commercial Resources	Protected areas	Physical processes	Water quality	Soils/seabed	Geology/hydrology
Activities																					
Construction																					
Site preparation	✔				✔						✔	✔	✔	✔			✔	✔	✔	✔	
Power generation		✔			✔	✔		✔	✔		✔										
Piling					✔						✔										

The assessment would include consideration of both the impacts resultant from routine operations/activities and from incidental/abnormal events.

- Assessment of characteristics of the project environment. In particular, the identification of:

  - Residential areas.
  - Commercially exploited areas (*e.g.* industrial facilities or agricultural land).
  - Internationally protected areas and other ecologically sensitive or important areas.
  - Areas used by protected or sensitive flora or fauna.
  - Areas of high scenic value.
  - Public access and transport routes.
  - Features of archaeological or cultural importance.
  - Recreational or tourist areas.
  - Existing levels of pollution.

- Assessment of the significance of the impacts. This will involve a qualitative/semi-quantitative assessment of the impacts through consideration of:

  - The magnitude of the change to the environmental conditions.
  - The spatial extent of the impacts.
  - The potential for transboundary impacts.
  - How many people are likely to be affected?
  - How many receptors of other types will be affected?
  - Whether valuable or scare resources or biota will be affected.
  - Whether environmental standards are likely to be breached.
  - Whether protected or sensitive areas are likely to be affected.
  - The likelihood of the impact occurring.
  - The duration/permanence of the affect.
  - The reversibility of the impact.
  - The avoidability of the impact through mitigation.

[19] Guidance on EIA: Scoping. European Commission, June 2001

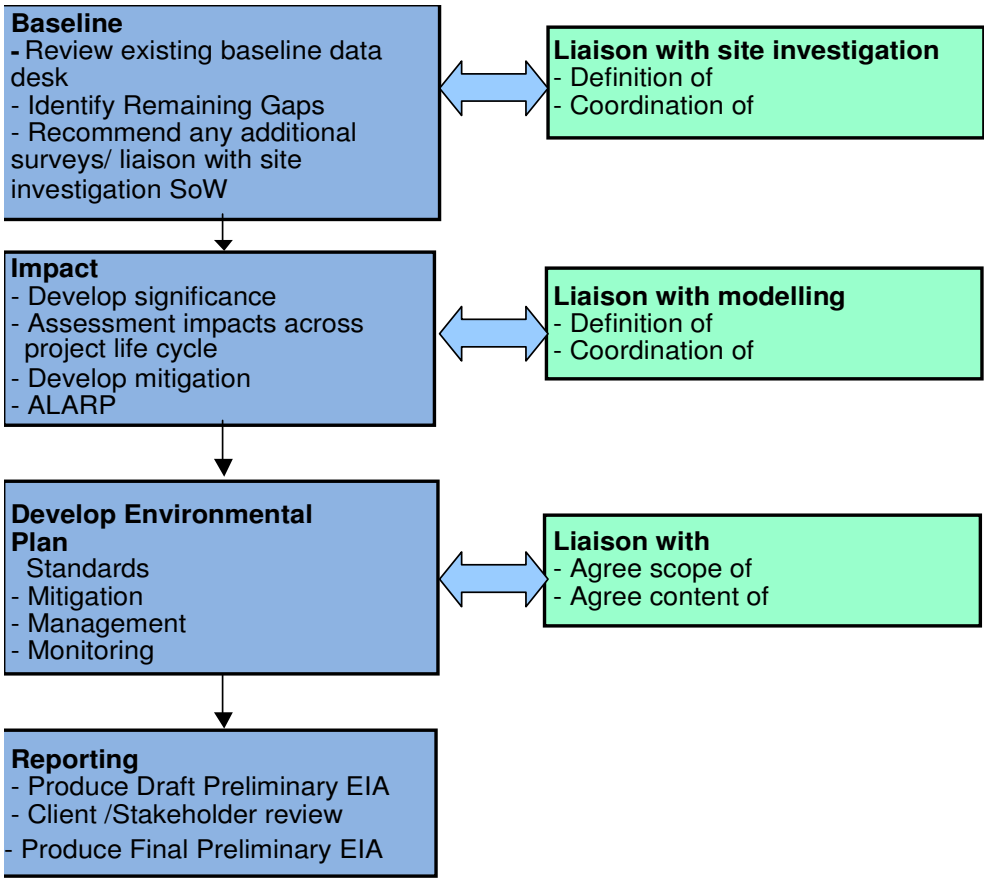
The most significant impacts will be identified and their detailed assessment will form the basis of the Scope of Work for the EIA.

- Assessment of the quality and availability of the baseline data relevant to the significant aspects.
- An overview of the project alternatives.
- An overview of the mitigation measures.
- Summary of the conclusion of the assessment and the development of the Scope of Work (SoW) for the EIA.

The scoping report would be submitted in draft form to the Client and their representatives for review. Following this review process, the report would be updated and amended as required following the consultation period and the final version of the report be produced and issued.

EIA Development

The development of the Environment Impact Assessment will require the following elements:



The environmental impacts would be assessed for the entire project lifecycle including construction, commissioning, and operation and, as far as practicable, decommissioning. The following are important in ensuring the impacts are fully representative for the project:

- Coordination of the baseline surveys, including air quality and any site investigation works.
- Consistency in the approach to the assessment, for example in:
    - The definition of impact significance criteria.
    - The approach to the development of mitigation measures and ALARP demonstration.
    - Reporting.

- Identification and coordination of cross-component issues. There may be a number of issues that will affect more than one environmental component and hence the approach to the issues must ensure that all such issues are fully and adequately addressed in an efficient and cost-effective manner.

The results of the EIA should be considered during the development of the Environmental Management Plan (EMP) which establishes the framework in which the future environmental management of the facility should be conducted. The EMP should include details of the environmental standards to be applied by the Project, outline mitigation measures and management controls, and the proposed monitoring programme.

Typically a preliminary EIA report will form the basis of any Public Consultations and Environmental Statement. The EIA comprises both a technical document and a non-technical summary report.

Development of the Environmental Statement

Following the Public Consultation and review by Stakeholder bodies, the EIA would be revised in the light of comments as necessary and the final ES developed for submission as part of the Planning submission.

As part of such EIA considerations and planning condition decisions, the following must be taken into account for the Environmental Statement:

- Site access
    - The location of access areas in relation to current public traffic infrastructure (diagrams)
    - Nature of signage, footpath/cycle access, security of access
    - Will impacts be during the construction phase only or also during the operational lifetime of the plant?
- Vehicle movements
    - Numbers per day
    - Need for time restrictions (such as rush hour or other peak times – schools)
    - Seasonal variations on numbers
    - Type of vehicles and the impact on sensitive or unsafe routes
    - Will impacts be during the construction phase only or also during the operational lifetime of the plant?
- Waste storage
    - Identification of all waste streams and their predicted volumes
    - Nature of each waste stream (hazardous, mobile, volatile, common)
    - Appropriate storage volumes, containers,
    - Frequency and mode of collection (contingency measures)
    - Wastes associated with construction and operational phases separately where appropriate
- Pollution prevention
    - As part of the development and installation planning applications, if the site is not a Greenfield site then consideration will need to be in terms of both the potential for contamination at the site with respect to construction activities and workers, operational phase for workers, and the potential for impacts on the local environment (human health and controlled waters)
    - An Application Site Report will be required as part of the environmental permit (see Section 3.1) which will require the above to be itemised, mapped, for all primary, secondary and tertiary mitigation measures to be detailed as well as the provision of the environmental management plan for the site once operational for approval from the EA or relevant devolved administration
    - See Section 3.1 below for routine monitoring associated with pollution prevention once operational.

3 Environmental Legislation

3.1 Environmental Permitting

Separate regimes exist for environmental permitting in England and Wales, Scotland and Northern Ireland. Each of these regimes implements the requirements of EC Directive 96/61/EC on Integrated Pollution and Control (IPPC).

Furthermore, during the application stage for any environmental permit, consent or licence the potential impact on Natura 2000 sites, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) need also to be considered. These sites are a network of protected areas around the European Union of national and international importance and protected under the Habitats Directive. However, the impact of a new EfW facility on Habitats Directive sites and appropriate mitigation measures depend entirely on the type of facility, waste material processed, and capacity but also on local issues including location, proximity to sensitive areas, geology and hydrogeological condition etc. The impact and mitigation measures need also to be considered already during the planning stages as part of the Environmental Statement (see Section 2.2.6) Technical requirements as well as a monitoring programme will be imposed on the environmental permit as necessary depending on local circumstances.

Similarly, implications and mitigation measures of site access, waste movements and on-site storage requirements are key factors of the planning approval process and need to be considered as part of the Environmental Statement (see Section 2.2.6). However, the environmental permitting regime will also impose any technical requirements and monitoring programme as deemed necessary under local circumstances. This will have to be discussed with the regulatory body during the permit application process.

3.1.1 England and Wales

The system of Environmental Permitting (EP) in England and Wales is regulated by the Environment Agency (EA) and was introduced through the Environmental Permitting (England and Wales) Regulations 2007[20]. This system combines the previously separate regimes for waste management licensing and pollution prevention and control. One of the key drivers for this change was to allow for proportionate regulation and for monitoring and control to be focussed on the most demanding operations.

The EP Regulations place a requirement on installations that carry out activities listed in Part 2 of Schedule 1 of the regulations to hold an environmental permit. In the majority of cases, EfW facilities are classed as Part A(1) facilities thereby requiring them to obtain an Environmental Permit from the Environment Agency in order to operate. It is not possible to detail the specific processes that will be considered under the regulations, because this will be dependant upon the nature of the waste and a detailed search of Part 2 of the regulations 'Activities' would then be referenced. Schedule 1 Part 1 section 2 details the considerations where a site may be considered as being under both Part A(1) and Part A(2).

Part A1 processes are regulated by the EA, Part A2 processes by Local Authorities (with EA support) and Part B processes by Local Authorities.

The Environmental Permit will identify the facility or facilities to which it relates and the person authorised to operate the facility. It will also identify the conditions which must be met by the operator in operating the plant. Under the current EP system the regulator is able to issue either a standard permit or a bespoke permit. Standard permits refer to a set of common rules that have been developed that apply to entire classes of facilities (e.g. recycling centres) with relatively straightforward control requirements.

[20] SI 2007/3538 amended by SI 2009/1799

In contrast, bespoke permits will be used for more complex facilities where standard permits would not be able to deliver required level of environmental protection or where standard rules cannot be complied with.

Guidance[21] provided by the Environment Agency advises the following with regards to the suitability of EfW operations to the issue of standard permits:

> *'…we do not consider the following waste activities under Schedule 1 of the Environmental Permitting Regulations to be eligible for the low-impact approach:*

- Section 5.1 – Incineration and Co-incineration of waste,
- Section 5.2 – Disposal of waste by landfill,
- Section 5.3 – Disposal of waste other than by incineration or landfill,
- Section 5.4 – Recovery of waste.'

As such it is expected that EfW operators will need to obtain bespoke permits for their operations. EfW-specific guidance for obtaining and complying with EPs is provided by the EA in the following technical guidance notes[22]:

- EPR 5.01 - The Incineration of Waste
- EPR 1.01 - Combustion Activities

With guidance note EPR5.01 it advises that thermal (i.e. combustion, gasification and pyrolysis) EfW facilities will need to comply with the Waste Incineration Directive (WID). The IPPC Directive requires that operators use Best Available Techniques (BAT) in the design, operation and management of its operations. The above EPR guidance notes also include statements on what the EA constitute to be BAT and as such applicants seeking a permit should refer to this guidance. Where an applicant proposes to use an alternative measure or where there are a choice of options the applicant will need to explain their choice on the basis of costs and benefits.

Guidance note EPR5.01 provides indicative BAT on Energy Efficiency but, unlike in Scotland, does identify specific quantitative energy efficiency targets. However, it should be noted that the Welsh Assembly Government is in the process of considering imposing energy efficiency requirements for EfW plants in Wales by means of the planning system. Section 5.1.2 covers this in further detail.

In England & Wales, a water abstraction license must be obtained prior to any abstraction activities. In some cases, separate consents may be required for groundwater well installations and testing, contact should be made with the EA directly in these cases. There are three types of license: temporary, transfer and full. Applications are made to the EA with further guidance provided at http://www.environment-agency.gov.uk/business/topics/water/32020.aspx.

The H1 Risk Assessment covers health and environmental risks when applying for a bespoke operational permit under the Environmental Permitting Regulations (EPR). Operators applying for a permit (under the IPPC Directive) need to show that they use appropriate BAT measures to manage these risks. It covers point source releases for all other sectors, integrated multimedia assessments (where applicable) and a cost benefit analysis methodology. A copy can be found at http://www.environment-agency.gov.uk/static/documents/Business/h1_part_2__2002416.pdf.

[21] EA *'Form Guidance EPB: How to apply for an environmental permit – Part B New Permit guidance notes'* EPB Version 4 July 2009. Available at: http://www.environment-agency.gov.uk/business/topics/permitting/32318.aspx
[22] Available from http://www.environment-agency.gov.uk/business/topics/permitting/36414.aspx

3.1.2 Scotland

Environmental permitting is implemented in Scotland through the Pollution Prevention and Control (Scotland) Regulations 2000[23]. Under these regulations the majority of EfW facilities are deemed to be Part A installations requiring an environmental license from the Scottish Environmental Protection Agency (SEPA). Since its introduction the PPC regulations have been amended by the Waste Incineration (Scotland) Regulations 2003[24], which implements requirement for EfW plants Scotland to comply with the WID.

SEPA Thermal treatment of waste guidelines 2009

SEPA has provided guidelines[25] outlining its expectations upon operators seeking to obtain environmental licenses for EfW facilities. It identifies the following key requirements for applicants:

- Demonstration that the facility complies with Best Available Techniques (BAT). In particular the following factors (identified in Schedule 2 of the PPC regulations) are highlighted as having particular importance in determining what constitutes BAT for an installation:
    - the use of low-waste technology
    - the use of less hazardous substances
    - the furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate
    - comparable processes, facilities or methods of operation that have been tried with success on an industrial scale
    - the nature, effects and volume of the emissions concerned
    - the consumption and nature of raw materials (including water) used in the process and the energy efficiency of the process
    - the need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it
    - the need to prevent accidents and to minimise the consequences for the environment

- As a minimum, applicable incineration plants will need to comply with the requirements of the WID. Furthermore, more stringent conditions than those in the WID may be set where necessary in order to comply with local environmental standards.

- New EfW plants will need to demonstrate that energy is recovered as far as practicable and that energy is used efficiently. As a minimum, new plants will need to demonstrate a power (or equivalent) efficiency of at least 20% on a gross calorific value (CV) basis at first operation.

With respect to the need to demonstrate BAT for energy efficiency, SEPA has identified quantitative energy efficiency targets for EfW plants based on the CHP Quality Assurance (CHPQA) Standard. Applicants are advised to provide a 'heat and power plan' that demonstrates increasing levels of energy recovery such that, within a period of five to seven years, the facility would achieve the CHPQA Quality Index (QI) values identified in Table 1. It should be noted that the use of the CHPQA methodology in this context is limited to establishing the energy efficiency of a facility for permitting purposes. This is unrelated to the use of CHPQA by facilities throughout the UK to obtain benefits such as ROCs, LECs and ECAs, which is discussed in Section 4.

[23] SSI 2000/323
[24] SSI 2003/170
[25] SEPA's Thermal treatment of waste guidelines 2009, SEPA, Available at: http://www.sepa.org.uk/waste/waste_regulation/energy_from_waste.aspx

Table 1: Heat and Power Plan Targets for EfW plant in Scotland			
	Thermal treatment plant not including ACT[26] plants		ACT[26] plants
	Capacity ≤70,000 tonnes per year	Capacity >70,000 tonnes per year	Any Capacity
QI Value	85	93	100
Indicative Overall Efficiency (Gross CV Basis)	30 – 35%	35 – 40%	45%

In order to demonstrate the feasibility of this plan the applicant will need to address matters such as the location of the facility with respect to potential heat users and provision within the plant design for the supply of heat (e.g. inclusion of heat distribution infrastructure).

To summarise, typical requirements on a PPC permit granted by SEPA are likely to include, amongst other things, to:

- Achieve a minimum power (or equivalent) efficiency of at least 20% on a gross CV basis from initial operation.
- Operate and maintain the plant in such a manner to avoid prejudicing additional energy recovery over that achieved on initial commencement of operation.
- Maintain and update the heat and power plan, including a requirement to make annual reports on progress towards targets.
- Achieve the corresponding QI threshold value for operations by the end of the heat and power plan.

3.1.3 Northern Ireland

The pollution prevention and control (PPC) regime in Northern Ireland is established by the Pollution Prevention and Control Regulations (Northern Ireland) 2003[27]. Much like the systems in Scotland and England and Wales, the PPC regulations identify those activities which must obtain a permit in order to operate. It is expected that the majority of EfW facilities will be deemed to be Part A installations under the regulations thereby requiring a permit from the Northern Ireland Environment Agency (NIEA).

The administration in Northern Ireland has acknowledged that Energy from Waste has a role to play in achieving renewable energy and sustainable waste objectives. However, limited guidance appears to be available for developers of EfW projects. One reference to EfW is given by the Department of the Environment in its Waste Management Strategy for 2006 to 2020[28]:

> *'Proposals for the development of energy from waste facilities in Northern Ireland must set out all reasonable measures to maximise energy recovery in the form of both heat and electricity…"*

In contrast to the EA and SEPA, the NIEA does not provide sector-specific guidance for EfW facilities seeking to obtain a PPC permit. The WID is implemented in Northern Ireland by means of the Waste Incineration Regulations (Northern Ireland) 2003[29]. However the Department of the Environment does not provide guidance on compliance with the WID.

[26] Advanced Conversion Technology. Includes AD, Advanced Gasification, Advanced Pyrolysis, Standard Gasification and Standard Pyrolysis processes as defined in the Renewables Obligation (see Section 4.1.1)
[27] NI SR 2003/46
[28] Towards Resource Management, The Northern Ireland Waste Management Strategy 2006-2020, Department of the Environment. Available at: http://www.doeni.gov.uk/index/protect_the_environment/waste.htm
[29] NI SR 2003/390

3.2 The Waste Incineration Directive

The European Community (EC) Directive 2000/76/EC on the Incineration of Waste[30] (also known as the Waste Incineration Directive or WID) was agreed by the European Parliament in December 2000. The requirements of the directive are implemented by means of the Environmental Permitting or Pollution Prevention and Control regimes in place in England and Wales, Scotland and Northern Ireland (discussed above).

3.2.1 Scope of the Directive

Article 2 of the Directive states that all incineration and co-incineration[31] plants come under the Directive. In this case, incineration has the following meaning:

> *'any stationary or mobile technical unit and equipment dedicated to the thermal treatment of wastes with or without recovery of the combustion heat generated. This includes the incineration by oxidation of waste as well as other thermal treatment processes such as pyrolysis, gasification or plasma processes in so far as the substances resulting from the treatment are subsequently incinerated."*

Thermal EfW process based upon combustion, gasification and pyrolysis of waste come under the WID. It is important to note that the combustion of biogas generated by anaerobic digestion does not fall under this definition and so AD does not come under the WID.

The Directive goes on to say that the above definition covers the entire incineration plant, incorporating the following systems:

- Incineration lines
- Waste storage
- Waste fuel supply system
- Boiler
- Onsite residue treatment
- Stack
- Monitoring systems
- Waste reception
- Onsite pre-treatment
- Air supply systems
- Exhaust gas treatment
- Waste water treatment
- Control systems

In interpreting the above, it should be noted that the WID includes other thermal treatment processes including gasification and pyrolysis if the products of these processes are subsequently combusted. Where pyrolysis/gasification products were combusted away from the production plant the WID can apply to both the production plant and the plant subsequently using the products.

The WID advises that plants handling the following wastes alone or in combination with conventional (i.e. non-waste fuels) are excluded from having to comply with the Directive:

- Vegetable waste from agriculture and forestry.
- Vegetable waste from food processing industry if the heat generated is recovered. UK interpretation of this is that in order to comply with this exclusion the vegetable waste cannot be contaminated by any product of animal origin.
- Fibrous vegetable waste from pulp-making and paper production from pulp where the waste is incinerated on site where the waste was generated and where heat generated is recovered.

[30] http://eur-lex.europa.eu/LexUriServ/site/en/oj/2000/l_332/l_33220001228en00910111.pdf?lang=_e
[31] Co-incineration refers to processes that carry out incineration of waste but whose primary purpose is not waste treatment (e.g. cement kilns).

- Wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals due to treatment with coatings or preservatives (e.g. construction and demolition waste).
- Cork waste
- Radioactive waste.
- Animal carcasses which are separately regulated by EC Directive 90667/EEC. UK interpretation is that this exemption extends to plant that treat only animal carcasses and/or unprocessed parts of carcasses. This generally includes incinerators at slaughterhouses, knacker yards, wholesale butchers and pet crematoria but not retail premises or distribution depots. The exclusion does not extend to process wastes such as tallow or MBM (meat and bone meal) or catering or foodstuff waste. Animal carcass incinerators exempted from the WID would still require approval under EC regulation 1774/2002 ("The Animal by-products regulation"[32])

The WID also excludes experimental plant used for research and development and for testing of incineration processes but not including the testing of commercial plants. To be exempt a plant must be limited to the treatment of less than 50 tonnes of waste per year.

3.2.2 Technical Requirements of the Waste Incineration Directive

Articles 4 through 11 of the WID stipulate a series of technical requirements to aspects of the design and operation of EfW plants with which facilities subject to the Directive must comply. These requirements address the following areas:

- Process requirements
- Operating conditions
- Air emissions limits
- Water emission limits
- Monitoring requirements

Any measures (e.g. specific monitoring equipment, operating limits etc.) necessary to achieve compliance with these requirements, will be identified in the plant's environmental permit/license. The following sections outline the requirements identified by the WID[33]. However it should be noted that these identify minimum requirements and that the local PPC/EP authority (e.g. EA, SEPA or NIEA) may set more stringent limits/conditions in certain circumstances depending on local issues.

Process Requirements

Article 4 of the directive stipulates that an incineration plant's permit should specifically identify what wastes a plant can accept and how they will be delivered and received. Typical details that will be included on a permit are:

- A full list of waste categories permitted at the plant. Categories will be based on the identification system used in the European Waste Catalogue given to six digit resolution.
- The total waste incineration capacity of the plant expressed as mass quantity of waste handled per hour taking into account the expected calorific value (CV) of the wastes being handled.
- Sampling and measurement requirements relevant to the permitted wastes.

[32] This regulation is implemented in England through the Animal By-products Regulations 2003 (SI 2003/1482), in Wales by the by the Animal By-products (Wales) Regulations (SI 2003/2756) in Scotland by the Animal By-prodcts (Scotland) Regulations 2003 (SSI 2003/441) and in Northern Ireland by the Animal By-products (Northern Ireland) Regulations 2003.
[33] http://eur-lex.europa.eu/LexUriServ/site/en/oj/2000/l_332/l_33220001228en00910111.pdf?lang=_e

- For plants handling hazardous wastes the quantities of the different categories of permitted wastes, the minimum and maximum mass flows, their highest and lowest CV permitted and the maximum pollutant content.

Article 5 of the WID requires that operators take all necessary precautions regarding delivery and reception of waste to prevent or limit "as far as practicable" negative impacts on the environment (especially pollution of air, soil, surface water and groundwater as well as odours and noise). Specific requirements that may be made on the operator include:

- Providing a means of determining the mass of each waste category to be received prior to acceptance of a delivery.

- Obtaining documentary or analytical details of hazardous waste prior to acceptance to confirm compliance with permit conditions.

- Hazardous waste operations will need to check consignment notes and take representative samples to verify the waste type. These samples may also need to for be held for a period after incineration.

Operators may be afforded some relaxation of the above requirements by the regulator in the case of industrial plants handling waste generated at the site of waste generation.

Operating Conditions

The WID specifies a number of operating conditions that operators must adhere to. These include the following:

- **Combustion temperature-time requirements.** Typically all incinerators must operate such that the combustion gases resulting from the process are raised to a temperature of 850°C[34] for at least 2 seconds. The operator will also need to demonstrate the absence of cold spots preventing these conditions from being achieved at any time while waste is being treated.

- **Properties of residues produced.** Total organic carbon (TOC) for slags and bottom ashes must be kept below 3%[35]. The WID also requires that residues are subject to appropriate physical/chemical testing to determine their pollution potential prior to determining their disposal/recycling route.

- **Conditions under which waste feed must be halted.** The plant should be fitted with interlocks to prevent waste from being fed into the incinerator when the above temperature-residence time conditions are not being met (e.g. during start-up or shut-down). Waste feed will also need to be stopped where emission limit values are not being met due to issues with the abatement system except in the case of abnormal operating conditions (see below).

- **Energy recovery from the plant.** Article 6(6) of the Directive requires that any heat generated by the process should be recovered as far as possible. The interpretation of this requirement differs significantly between the UK authorities and as such applicants should refer to local guidance. Any such opportunities must be considered in the context of pollution control (e.g. avoiding reformation of dioxins due to de novo synthesis).

- **Stack height calculation.** Exhaust gas stack heights must be determined such that significant ground level concentrations of pollutants are avoided and that relevant air quality standards are met.

[34] This temperature increases to 1100°C in the case of hazardous waste with more than 1% of halogenated organic substances (expressed as chlorine).
[35] Or 5% when determined on a Loss on Ignition (LOI) basis.

- **Handling of infectious clinical waste.** Infectious clinical waste should not be directly handled or mixed with other categories of waste and instead should be fed directly into the plant.

Article 6(4) of the WID allows the members states to grant derogations from the above combustion temperature-residence time conditions in certain circumstances (e.g. gas turbine or gas engines burning gas from a pyrolysis/gasification process) as long as emissions limits for TOC and carbon monoxide are met at all time. These conditions vary between UK authorities and so applicants should refer to local guidance. All authorities advise that derogations will not be granted without robust justification. The regulator must advise the European Commission of any cases where a derogation is granted.

While waste feed should be halted upon ELVs being exceeded due to issues with the air pollution control system this does not have to be the case where quick remedial action can be achieved. These circumstances are termed "Abnormal Operating Conditions" where a time-limited derogation can be granted and is conditional on, amongst other things:

- The maximum allowable for any one episode of abnormal conditions not being more than 4 hours.
- The total period of abnormal conditions in a given year not exceeding 60 hours. If the allowance of 60 hours has been used, further failures will require the plant to be shut down until normal conditions can be resumed.
- The period of abnormal operations is kept to a minimum. In particular if it is clear that the fault cannot be rectified within the permitted period then the operator should shut down as soon as possible rather than wait until the end of the period before initiating shutdown.

Air Emission Limit Values

Article 7(1) of the WID requires that, as a minimum, all incinerator plants are designed and operated to meeting the Emission Limit Values (ELVs) for emissions to air as set out in Annex V of the WID. The annex identifies the following types of ELVs that plants will be subject to:

- Daily Average Values - see Table 2
- Half-hourly Average Values - see Table 3. The regulator can select either one of two options; the first (Column A) identifies an ELV that must be met by 100% of all recorded values while the second (Column B) identifies an ELV that must be met by no less than 97% of all recorded values during a year.
- Average Values taken over a sample period of between 30 minutes and 8 hours for selected heavy metals and their associated compounds. The heavy metals concerned and their associated ELVs are given in Table 4.
- Average values taken over a sample period of between 6 and 8 hours for Dioxins, Furans and Dioxin-Like PCBs. The ELV is 0.1 ng/m^3 calculated on the basis of *toxic equivalence (TEQ)*. Defra[36] provides local guidance on how reporting on the bases of TEQ is implemented.

[36] Environmental Permitting Guidance – The Directive on the Incineration of Waste, Defra, updated October 2009. Available from: http://www.defra.gov.uk/environment/policy/permits/guidance.htm

- ELVs for carbon monoxide (CO) determined on the following bases:
  - 50 mg/m^3 of combustion gases determined as daily average value
  - 150 mg/m^3 of combustion gas for at least 95% of all measurements determined as 10-minute average values *or* 100 mg/m^3 of combustion gas for all half-hourly average measurements in a 24-hour period.

Table 2: Daily Average Air ELVs	
Total dust	10 mg/m^3
Gaseous/vapourous organic substances (expressed as TOC)	10 mg/m^3
Hydrogen chloride (HCl)	10 mg/m^3
Hydrogen fluoride (HF)	1 mg/m^3
Sulphur dioxide (SO_2)	50 mg/m^3
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2) expressed as NO_2 – New plants or existing plants with a capacity ≥ 6 tonnes per hour	200 mg/m^3
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2) expressed as NO_2 – Existing plants with a capacity less than 6 tonnes per hour	400 mg/m^3

Table 3: Half-Hourly Average Air ELVs		
	Column A – 100%	Column B – 97%
Total dust	30 mg/m^3	10 mg/m^3
Gaseous/vapourous organic substances (expressed as TOC)	20 mg/m^3	10 mg/m^3
Hydrogen chloride (HCl)	60 mg/m^3	10 mg/m^3
Hydrogen fluoride (HF)	4 mg/m^3	2 mg/m^3
Sulphur dioxide (SO_2)	200 mg/m^3	50 mg/m^3
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2) expressed as NO_2 – New plants or existing plants with a capacity ≥ 6 tonnes per hour	400 mg/m^3	200 mg/m^3

Table 4: Air ELVs for Heavy Metals	
Cadmium (Cd) and its compounds, expressed as Cd	Total 0.05 mg/m^3
Thallium (Tl) and its compounds, expressed as Tl	
Mercury (Hg) and its compounds, expressed as Hg	0.05 mg/m^3
Antimony (Sb) and its compounds, expressed as Sb	Total 0.5 mg/m^3
Arsenic (As) and its compounds, expressed as As	
Lead (Pb) and its compounds, expressed as Pb	
Chromium (Cr) and its compounds, expressed as Cr	
Cobalt (Co) and its compounds, expressed as Co	
Copper (Cu) and its compounds, expressed as Cu	
Manganese (Mn) and its compounds, expressed as Mn	
Nickel (Ni) and its compounds, expressed as Ni	
Vanadium (V) and its compounds, expressed as V	

In all of the above cases the ELVs identified are set at the following reference conditions: temperature – 273 K, pressure – 101.3 kPa, 11% oxygen (or 3% oxygen if burning waste oils), dry gas.

In addition to the above, UK guidance stipulates that operators are to monitor and report on 16 identified polycyclic aromatic hydrocarbons (PAHs) on the same basis as for dioxins and furans. However, operators are not required to meet ELVs for these substances at this time.

The EA may also require continuous measurement of: N_2O specifically if fluidised bed technology is used; Ammonia if used in a Denox system; and Hg if present in the fuel.

Water Emission Limit Values

Article 8 of the WID addresses the discharge of waste water from air pollution control (APC) systems resulting from the cleaning of exhaust gases. It advises that any such discharges shall be subject to an environmental permit granted by the relevant regulator and that emissions shall be limited as far as practicable in accordance with ELVs set in Annex IV of the Directive. In addition to the identified ELVs, the permit should also identify operational limits for parameters including (but not limited to) pH, temperature and flow.

Article 7 also addresses design requirements for preventing the accidental release or discharge of polluting substances to soil, surface water or ground water from any source (not just water associated with air pollution control). These requirements will generally be fulfilled if using Best Available Techniques (BAT).

The Directive specifically identifies that a plant should possess storage for contaminated rainwater run-off or water from spillage or fire fighting operations where "contaminated water" refers to water collected from areas where there is a risk of contamination from the installation.

Annex IV refers to emission limits for discharge water from air pollution control systems but the control parameters for pH, temperature and flow apply to any effluents generated. ELVs are set for where waste waters are discharged by the plant to sewer or controlled water and so the use of effluent treatment prior to discharge is permitted to achieve the identified levels.

ELVs are given in Annex IV for a number of pollutants; these are given in Table 5.

Table 5: ELVs for Waste Water from Air Pollution Control Systems	
Total suspended solids (as defined by Directive 91/271/EEC[37])	95% of samples under 30 mg/l and 100% of samples under 45 mg/l
Mercury (Hg) and its compounds, expressed as Hg	0.03 mg/l
Cadmium (Cd) and its compounds, expressed as Cd	0.05 mg/l
Thallium (Tl) and its compounds, expressed as Tl	0.05 mg/l
Arsenic (As) and its compounds, expressed as As	0.15 mg/l
Lead (Pb) and its compounds, expressed as Pb	0.2 mg/l
Chromium (Cr) and its compounds, expressed as Cr	0.5 mg/l
Copper (Cu) and its compounds, expressed as Cu	0.5 mg/l
Nickel (Ni) and its compounds, expressed as Ni	0.5 mg/l
Zinc (Zn) and its compounds, expressed as Zn	1.5 mg/l
Dioxins and furans, determined on a *toxic equivalence* basis	0.3 ng/l

The Directive excludes dilution of effluent as a permitted method of complying with water ELVs. Therefore, if APC effluent is mixed with other effluents prior to discharge, the ELVs will be adjusted accordingly to account for any dilution taking place.

[37] Council Directive **91/271/EEC** of 21 May 1991 concerning urban waste-water treatment

Monitoring Requirements

Articles 10 and 11 of the WID cover the monitoring that operators must have in place to demonstrate compliance with ELVs. In summary, the environmental permit for an incineration plant must specify the sampling/measuring requirements to be implemented. It should include the substances to be measured, the frequency they should be measured/reported, the methods to be used, compliance criteria and calibration methods. Other requirements are that:

- Monitoring equipment should be installed and not temporary.
- Where possible monitoring should be to CEN standards. If this is not possible then ISO or national/international standard may be used.

The WID stipulates that monitoring must be carried out for the following process parameters:

General Process Parameters

- Temperature within combustion chamber on a *continuous* basis.
- Pressure, velocity, temperature, water vapour content and oxygen concentration of the exhaust gas on a *continuous* basis.
- Mass of each waste category received segregated as per European Waste Catalogue where possible.
- Composition, calorific value and waste samples where hazardous wastes are being handled.
- Total organic carbon[38] of slag and bottom ash residues.
- Soluble fraction of residues and the heavy metal content of this fraction.
- Verification of residence time and location of temperature monitoring points.

Emissions to Air

- Emissions to air of NOx, total dust, TOC, HCl, HF and SO_2 air are to be monitored *continuously.* It is possible that ammonia (NH_3) and N_2 may also need to be monitored.
- Air samples are to be taken at least twice per year for monitoring of heavy metals, dioxins and furans together with monitoring for PAHs. During the first year of operation it should be expected that this frequency will increase to at least once every three months.

Emissions to Water

- pH, temperature and flow of discharge water on a *continuous* basis.
- Total suspended solids: Daily spot samples should be taken or alternatively measurements of a representative sample over a period of 24 hours.
- Heavy metals: At least monthly measurements of a representative sample of the discharge over a period of 24 hours.
- Dioxins and furans to be measured at least every six months. During initial operation this will be reduced to every three months for the first year.

[38] Or Loss on Ignition (LOI)

- Regulators may also set tests for PAHs or other pollutants.

Any continuous emissions monitoring (CEM) systems should be MCERTS certified to denote compliance with applicable international standards. CEM systems should be proven over a suitable operational range for the process and should be subject to at least an annual surveillance test and calibrated at least every three years. The location of sampling/measurement points will be specified by the regulator[39].

Measurements of HCL, HF and SO_2 may be measured periodically rather than continuously if it can be demonstrated that ELVs for these pollutants can not be exceeded under any circumstances. As these pollutants are dependant on the sulphur, chlorine and fluorine content of the wastes received by the plant the operator will need to demonstrate this through ensuring levels in wastes do not exceed pre-determined levels. Compliance will then be demonstrated through frequent sampling and analysis of the waste streams received.

Operators will be required to ensure that results of monitoring, sampling and analysis are recorded, processed and presented in a way to allow verification of compliance with the requirements of the permit. If measurements taken show that emission limit values for air or water have been exceed the regulator is to be informed without delay.

In order to demonstrate compliance with ELVs for air the operator will need to ensure that:

- None of the daily average values exceed identified ELVs.
- 97% of daily average values over the year for CO do not exceed the ELV of 50mg/m^3.
- Half-hourly average values do not exceed identified ELVs.
- None of the average values over sampling period for heavy metals, dioxins and furans exceed identified ELVs.
- At least 95% of CO measurements on basis of 10-minute average values meet an ELV of 150mg/m^3. If CO is measured on the basis of half-hourly averages all measured values in a 24-hour period must meet an ELV of 100mg/m^3

The above compliance requirements apply at all times when waste is being burnt except when under abnormal operating conditions.

In order to demonstrate compliance with ELVs for water the operator will need to ensure that:

- 95% and 100% of the measured values do not exceed the respective ELVs for suspended solids.
- No more than one measurement per year exceeds the ELVs for heavy metals or, where more than 20 samples are taken per year, no more than 5% of these samples exceed these ELVs.
- The bi-annual measurements for dioxins and furans do not exceed the corresponding ELVs.

The WID does not make clear whether the above monitoring conditions apply during commissioning. There is no specific guidance document available on commissioning, however, under pollution prevention and environmental management systems there is an onus on the operator to ensure the least environmental impact of their processes. Operators will need to submit a commissioning plan estimating anticipated emission levels and the resulting environmental impact.

[39] Typically this will be the Environment Agency in England and Wales, SEPA in Scotland and NIEA in Northern Ireland.

Any breaches during commissioning would then be reported to the regulator as usual but would not be expected to result in enforcement action unless it was found that management of commissioning was lacking or that the operator had been negligent.

3.2.3 Other WID Requirements

Provision of additional information at application stage

Under article 4(2) applicants for an environmental permit for a waste incineration installation are required to provide the following information in addition to standard information required:

- Evidence that the plant is design, equipped and operated to meet the requirements of the WID recognising the categories of waste to be received.
- Plant capacity, categories and quantities of waste (as per European Waste Catalogue) to be received by the plant.
- Systems for receiving, storing and handling of waste on site.
- The quality (TOC/LOI) and quantity of residues produced by the process. Provision for handling and storing these residues including proposals for recycling/minimising and their disposal. Also information on chemical composition of the residues.
- Information on temperatures and residence time (including measurement and validation methods) waste feed interlock and provision of auxiliary burners including description of the proposed auxiliary fuel.
- Where derogation from the temperature or residence time requirements is being requested justification for the proposal and its effect on the quality and quantity of residues and the emissions to air.
- Information on the use of heat generated by the process (e.g. CHP or District Heating). Includes proposals for future improvements in heat utilisation.
- For cases of abnormal operation how dust emissions will be controlled.
- Information on predicted emissions to air and water and show how ELVs will be complied with at all times.
- Stack height calculations, dispersion calculations and environmental impact of emissions from the plant to demonstrate that human health and the environment will be protected.
- Information on the ELVs that the plant will be subject to.
- Information on methods and handling and treatment waste waters on the site and design features to prevent unauthorised/accidental releases of polluting substances.
- Details on the monitoring techniques that will be employed to meet the requirements of the WID.

The above list is not exhaustive and pollution control authorities may require further details to be submitted.

Provision of Information to the Public regarding Incineration Plants

The WID directs regulators to include as a permit condition the need for incinerator plants with a capacity of over 2 tonnes/hour to provide the regulator with annual reports on the operation of the plant. This report will in turn be made available to the public.

In addition to the above the regulator is required to make available to the public a list of incinerator plants with a capacity of less than 2tonnes/hour.

3.2.4 Monitoring Standards

CEN standards[40] have to be used as part of the monitoring programme. Some standards such as BS EN for continuous emission monitoring systems specify acceptable performance limits in respect to uncertainties of measurement to ensure demonstration of compliance with the requirements of WID.

The Environment Agency's Technical Guidance Note (TGN), M2, Monitoring of Stack Emissions to Air provides information on up-to-date lists of monitoring standards. This note can be accessed from the Environment Agency's website (www.environmentagency.gov.uk/epr) or through the MCERTS website (www.mcerts.net).

Table 6 and Table 7 have been taken from version 2 of the Defra Guidance on Directive 2000/76/EC on the incineration of waste (http://www.defra.gov.uk/environment/policy/permits/documents/wid-guidance.pdf).

Table 6: Monitoring Standards for Releases to Air

Parameter	Frequency	Method/ Specification	WID Ref.
Nox (NO and NO_2 as NO_2)	Continuous (provided emission limits are set) Periodic: extractive, wet chemical method – 2 per year but every 3 months in first year of operation	ISO 10849:1996 [1] BS ISO 14792	11.2(a) Annex V Annex III
CO	Continuous	ISO 12039[1]	11.2(a) Annex V
	Periodic	BS EN 15058	Annex III
Total dust	Continuous	BS EN 13284-2 & prEN 15267-3[1]	11.2(a) Annex V
	Periodic – 2 per year but every 3 months in first year of operation	BS EN 13284-1:	Annex III
VOC (expressed as TOC)	Continuous	BS EN 12619 (low concentrations)[2]	11.2(a) Annex V
	Periodic – 2 per year but every 3 months in first year of operation	BS EN 12619	Annex III
HCl	Continuous or,	MCERTS Performance Standards for CEMs[2]	11.2(a) Annex V
	Periodic – 2 per year but every 3 months in first year of operation (only where raw flue gas cannot exceed ELV)	BS EN1911, parts 1-3 Standard 15_01	11.6 Annex III
HF	Continuous	MCERTS performance standards for CEMs, [1]	11.2(a) Annex V
	Periodic – 2 per year but every 3 months in first year of operation (providing treatment stages for HCl ensure ELV for HCl is complied with or where raw flue gas cannot exceed ELV)	ISO/FDIS 15713	Annex III 11.4 11.6
SO2	Continuous	BS 6069-4.4 (ISO 7935)[1]	11.2(a) Annex V
	Periodic	BS EN 14791	Annex III

[40] Standards developed by the European Committee for Standardisation (CEN – Comité Européen de Normalisation)

	exceed ELV)		
Hg	Periodic – 2 per year but every 3 months in first year of operation. Average value over sample period of between 30 minutes and 8 hours.	BS EN 13211	11.2(c) 11.7 Annex V Annex III
Cd, Tl, Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V	Periodic – 2 per year but every 3 months in first year of operation. Average value over sample period of between 30 minutes and 8 hours.	BS EN 14385	11.2(c) 11.7 Annex V Annex III
Dioxins and Furans (TEQ as per Annex I of the Directive)	Periodic – 2 per year but one every 3 months in first 12 months of operation. Average value over sample period of between 6 and 8 hours. Determination in accordance with CEN standard.	BS EN 1948 parts 1-3	11.2(c) 11.7 Annex V Annex III Annex II
PAHs and other pollutants	Frequency to be specified at the discretion of the regulator.	ISO 11338, parts 1 and 2	11.2(c)
Combustion chamber gas temperature	Continuous (temperature measured near the inner wall or agreed representative point)	MCERTS Performance Standards for CEMs	11.2(b)
Exhaust gas oxygen concentration	Continuous Note: Verification of oxygen content required under "most unfavourable conditions" (Article11(3)) Periodic – whenever other periodic measurements are performed	ISO 12039[1] Using equipment which complies with ISO 12039 within an accredited method[1]	11.2(b) 11.3
Exhaust gas pressure	Continuous	MCERTS Performance Standards for CEMs	11.2(b)
Exhaust gas velocity	Continuous	BS ISO 14164[1]	
	Periodic – whenever other forms of periodic monitoring are carried out.	ISO 10780[3]	
Exhaust gas Water content.	Continuous (not required if sampled exhaust gas is dried prior to analysis)	MCERTS Performance Standards for CEMs[1]	11.2(b)
	Extractive	BS EN 14790	11.5

(1) CEN standards are currently being developed and these should be used when published.
(2) BS EN 12619 is primarily a reference method although it can also be used for permanent CEMs subject to certain operational requirements. These requirements are being clarified in a new CEN standard prEN 15627-3. Until this is published, BS EN 12619 applies.
(3) ISO 10780 is recommended, unless there is a sound reason to justify the use of BS 1042-2.1.

Table 7: Frequency of Sampling, Monitoring Standards for Releases to Water

Parameter	Frequency of Sampling	Standard/ Method
pH	Continuous	BS 1647-2:1984
Temperature	Continuous	Traceable to national standards
Flow	Continuous	BS 3680 series
Total suspended solids (as defined by (91/271/EEC)	Daily spot sample **or** flow proportional sample over 24-hours	BS EN 872:1996
Mercury and its compounds, expressed as Hg	Monthly flow proportional sample over 24-hours	BS EN 13506:2002
Cadmium and its compounds, expressed as Cd	Monthly flow proportional sample over 24-hours	BS ISO/DIS 17294-1, 2
Thallium and its compounds, expressed as Tl.	Monthly flow proportional sample over 24 hours	BS ISO/DIS 17294-1, 2
Arsenic and its compounds, expressed as As.	Monthly flow proportional sample over 24-hours	BS EN ISO 11969:1996
Lead and its compounds, expressed as Pb.	Monthly flow proportional sample over 24-hours	BS EN ISO 11885:1997

Chromium and its compounds, expressed as Cr	Monthly flow proportional sample over 24-hours	BS EN ISO 11885:1997
Copper and its compounds, expressed as Cu.	Monthly flow proportional sample over 24-hours	BS EN ISO 11885:1997
Nickel and its compounds, expressed as Ni.	Monthly flow proportional sample over 24-hours	BS EN ISO 11885:1997
Zinc and its compounds, expressed as Zn.	Monthly flow proportional sample over 24-hours	BS EN ISO 11885:1997
Dioxins and Furans (I-TEQ)	Every 6 months, but every 3 months during the first year of operation.	USEPA Method 1613
Other pollutants – PAH	As appropriate based on site-specific assessment.	USEPA Method 0610
Other pollutants – Dioxin-like PCBs	As appropriate based on site-specific assessment.	USEPA Methods 0680, 1668

3.3 Handling of Residues from EfW Facilities

In the case of thermal EfW plants the WID does not set specific requirements for how ash and other residue are to be dealt with. However, any residue to be landfilled will be subject to the requirements of the EU Landfill Directive[41]. Fly ash will be deemed to be a hazardous waste and so will need to be disposed at a hazardous landfill site. Bottom ashes should be handled separately to fly ash and APC residues in order to avoid heavy metal contamination. Where bottom ashes are not contaminated they may be landfilled separately or recovered for use as a construction material.

Source-segregated AD plants will need to comply with the PAS110 standard in order for residue streams (e.g. whole digestate or separated fibre) produced are not deemed to be waste and are suitable for sale on the market.

[41] Council Directive 99/31/EC on the Landfill of Waste

4 Sustainable Energy

The UK Government has introduced a number of policies to support the development of projects generating electricity from renewable sources and also the co-generation of heat and power. Furthermore, incentives are expected to be introduced in the future to encourage the supply of heat from renewable sources. These are all with a view to achieving 15% of primary energy consumption coming from renewable sources by 2020, which the UK is seeking to achieve through its 2009 Renewable Energy Strategy. As such EfW projects can be well placed to take advantage of these support measures where the waste streams handled contain biomass.

4.1 Renewables Obligation

The Renewables Obligation (RO) is the UK Government's principal policy mechanism for supporting the generation of electricity from renewable sources. The principal features of the obligation are as follows:

- Licensed suppliers of electricity are required to obtain a prescribed proportion of their total energy from renewable sources of energy. This proportion increases in successive obligation periods.
- Renewables Obligations Certificates (ROCs) are issued for demonstrated generation of electricity from renewable sources. ROCs can then be retained or traded between companies in order to meet their supply target, thereby creating a market for renewable electricity generation.
- As an alternative to obtaining the necessary volume of ROCs, suppliers are entitled to pay a "buy-out" fee for each ROC against their target which is not submitted. The "buy-out" fee is adjusted against inflation for each 12-month obligation period.
- All "buy-out" payments are then pooled and redistributed to parties that have produced ROCs during an obligation period.

The RO is implemented separately in England and Wales, Scotland and Northern Ireland.

4.1.1 England and Wales: The Renewables Obligation Order 2009

The RO was originally introduced in England and Wales in 2002 and has been reviewed and amended since then on a number of occasions. The RO in its current form is implemented by the Renewables Obligation Order (ROO) 2009[42], which came into force 1st April 2009. The Obligation is administered by the Office for Gas and Electricity Markets, Ofgem.

A key change introduced in the 2009 Order was the concept of "banding" whereby different types of generation receive were afforded differing levels of support. In previous versions of the RO all types of generation would receive 1 ROC for every megawatt-hour (MWh) of electricity generated from renewable sources. However, in the 2009 Order the number of ROCs issued per unit of electricity varies dependent on the banding, which in turn is determined on the basis of generation technology. The ROC allocation rates relevant to EfW technologies are given in Table 8.

[42] Statutory Instrument (SI) 2009/785. Available from Office of Public Sector Information, www.opsi.gov.uk

Table 8: ROC Allocation Rates for Various Renewable Electricity Generation Types	
Generation Type	ROCs Issued per MWh electricity generated
Energy from Waste with CHP	1
Standard Gasification	1
Standard Pyrolysis	1
Dedicated Biomass	1.5
AD (Anaerobic Digestion)	2
Advanced Gasification	2
Advanced Pyrolysis	2
Dedicated Biomass with CHP	2

The definitions for the above generation types are given in the 2009 Order as follows:

Energy from waste with CHP. Electricity generated from the combustion of waste (other than fuel produced by means of anaerobic digestion, gasification or pyrolysis) in a qualifying combined heat and power generating station in a month in which the station generates electricity only from renewable sources and those renewable sources include waste which is not biomass.

Standard gasification. Electricity generated from a gaseous fuel which is produced from waste or biomass by means of gasification, and has a gross calorific value at standard conditions[43] which is at least 2 MJ/m^3 but is less than $4MJ/m^3$.

Standard pyrolysis. Electricity generated from a gaseous fuel which is produced from waste or biomass by means of pyrolysis, and has a gross calorific value at standard conditions which is at least $2MJ/m^3$ but is less than 4 MJ/m^3.

Dedicated biomass. Electricity generated from regular biomass in a month in which the generating station generates electricity only from regular biomass or only from biomass.

AD. Electricity generated from gas formed by the anaerobic digestion of material which is neither sewage nor material in a landfill.

Advanced gasification. Electricity generated from a gaseous fuel which is produced from waste or biomass by means of gasification, and has a gross calorific value at standard conditions of at least $4MJ/m^3$.

Advanced pyrolysis. Electricity generated from a liquid or a gaseous fuel which is produced from waste or biomass by means of pyrolysis, and:

- In the case of a gaseous fuel, has a gross calorific value at standard conditions of at least $4MJ/m^3$.
- In the case of a liquid fuel, has a gross calorific value at standard conditions of at least 10MJ/kg.

Dedicated biomass with CHP. Electricity generated from the combustion of biomass in a qualifying combined heat and power generating station in a month in which the station generates electricity only from regular biomass or only from biomass.

In the above definitions 'biomass' is deemed to be a fuel where at least 90% of its energy content is derived directly or indirectly from plant matter, animal matter, fungi or algae.

Under the order waste fuels can be deemed to be a renewable source as long as no more than 90% of the energy content of the fuel is attributable to its fossil fuel content. In such cases EfW will only receive ROCs for the power output that is attributable to the biomass content of the fuel. The operator will be required to implement a fuel metering and sampling (FMS) system with the approval of the regulator to determine on an auditable basis the biomass content of the fuels being handled.

[43] Standard conditions are at 25°C and 0.1 megaspascals.

Advanced thermal processes such as pyrolysis or gasification will be required to demonstrate compliance with the above defined calorific values for the fuel gases or liquids produced in order to be eligible for the 2ROCs/MWh allocation rates available.

References in the above definitions to 'qualifying combined heat and power' generating stations mean schemes that are registered with the CHP Quality Assurance (CHPQA) programme. In such cases the '..with CHP' banding will be applied to the power output of the scheme qualifying as Good Quality (GQ) CHP. Where a power-only banding exists this can be applied to the remaining power output from a CHP station.

It should be noted that combustion EfW schemes can only receive ROCs for power output which qualifies as GQ CHP. As such power-only combustion schemes are ineligible for ROCs.

The 2009 Order identifies that suppliers are required to submit a set number of ROCs per unit of electricity supplied in Great Britain[44]. The total volume of ROCs to be provided by suppliers for each successive 12-month obligation period is determined based on the relationship between the following three values:

A. The value given in Table 9 for the relevant obligation period multiplied by the forecasted amount of electricity to be supplied to customers during the obligation period.

B. The volume of ROCs expected to be issued based on the forecasted amount of renewable electricity generated during the obligation period *plus an additional 8% (known as headroom)*.

C. The volume of ROCs that would be required based upon the forecast amount of electricity to be supplied and a rate of 200 ROCs per GWh of electricity supplied.

Table 9: ROCs Obligation for Suppliers in Great Britain

Obligation Period	Number of ROCs required per GWh of Electricity Supplied
1st April 2009 - 31st March 2010	97
1st April 2010 - 31st March 2011	104
1st April 2011 - 31st March 2012	114
1st April 2012 - 31st March 2013	124
1st April 2013 - 31st March 2014	134
1st April 2014 - 31st March 2015	144
1st April 2015 - 31st March 2016	154
Each subsequent 12-month period through to 31st March 2027	154

Using values A, B and C defined above the total volume of ROCs to be provided is as follows:

- Where **Value A** is greater than **Value B**, the total volume of ROCs is equal to **Value A**
- Where **Value B** is greater than **Value A** but smaller **Value C**, the total volume of ROCs is equal to **Value B**
- Where **Value B** is greater than **Value A and Value C,** the total volume of ROCs is equal to **Figure C**

This three-part method is used to regulate the ROCs market by incorporating the following controls:

- Acting to mitigate the risk of ROC supply exceeding demand, leading to a drop in ROC value. This is achieved through the inclusion of the 8% headroom figure in determining Value B.
- Ensuring that the obligation cannot rise beyond 200 ROCs per GWh of electricity supplied (Value C). This is in line with the stated UK aspiration of achieving 20% renewable electricity.

The 2009 Order identifies the buy-out price for the April 09 to March 10 obligation period is £37.19 and will be adjusted each year in accordance with the Retail Prices Index.

[44] It is important to note that the RO is harmonised with the Scottish RO in this respect.

4.1.2 Scotland: The Renewables Obligation (Scotland) Order 2009

The Renewable Obligation Scotland (ROS) was originally implemented in 2002 in parallel with the RO in England in Wales. The current form of the ROS is the Renewable Obligation (Scotland) Order 2009[45], which came into effect 1st April 2009. As with the RO in England and Wales the ROS is administered by Ofgem.

The 2009 Scottish Order matches the 2009 Order in England and Wales with respect to key features including banding and buy-out price. The method for determining the total number of ROCs to be submitted by for suppliers in Scotland also matches that described in the England and Wales order (see Section 4.1.1). While ROCs issued to generating stations in Scotland are termed SROCs they are interchangeable with ROCs in meeting a supplier's obligation in England and Wales, Northern Ireland or Scotland.

4.1.3 Northern Ireland: The Renewables Obligation Order (Northern Ireland) 2009

The Northern Ireland Renewables Obligation (NIRO) was introduced in 2005. The Obligation is currently implemented by the Renewables Obligation Order (Northern Ireland) 2009[46], which came into effect on 1st April 2009. While management of the Obligation in Northern Ireland is the responsibility of the Northern Ireland Authority for Utility Regulation (NIAUR), it has assigned administration of the NIRO to Ofgem.

While the 2009 Northern Ireland Order matches the 2009 Order in England and Wales with respect to banding and buy-out price it differs with respect to the volume of ROCs to be submitted by suppliers in Northern Ireland. In determining Value A (see Section 4.1.1) the forecasted amount of electricity to be supplied is multiplied by the corresponding figure as given in Table 10. Values A and C are determined as in the England and Wales Order and the method for which of Values A, B and C is to be used.

Table 10: ROCs Obligation for Suppliers in Northern Ireland

Obligation Period	Number of ROCs required per GWh of Electricity Supplied
1st April 2009 - 31st March 2010	35
1st April 2010 - 31st March 2011	40
1st April 2011 - 31st March 2012	50
1st April 2012 - 31st March 2013	63
Each subsequent 12-month period through to 31st March 2027	63

While ROCs issued to generating stations in Northern Ireland are termed NIROCs they are interchangeable with SROCs and ROCs and can be used to meet a supplier's obligation in England and Wales, Scotland or Northern Ireland.

4.2 Climate Change Levy

The Climate Change Levy (CCL) was introduced in 2001 to encourage the business and public sectors to improve energy efficiency and reduce emissions of greenhouse gases through a price based signal on energy usage. The Levy takes the form of a charge placed upon the non-domestic supply of electricity and other selected fossil fuel supplies within the UK. The Levy rate for supplies of Electricity is index-linked and is currently (as of April 2009) £4.70 per megawatt-hour (MWh)[47].

[45] Scottish Statutory Instrument (SSI) 2009/140.
[46] Statutory Rule of Northern Ireland (SR NI) 2009/154
[47] http://www.ofgem.gov.uk/Sustainability/Environment/cclrenexem/Pages/CCLRenewablesExemption.aspx

Under the original legislation[48] electricity generated from qualifying renewable sources is exempted from the CCL. In 2003[49] this exemption was extended to electricity from Good Quality (GQ) CHP. Levy Exemption Certificates (LECs) are issued to accredited generating stations for each MWh of qualifying electricity generated. In the case of CHP schemes LECs are issued for electrical output qualified as Good Quality (GQ) CHP under the CHP Quality Assurance (CHPQA) programme. As a LEC exempts the bearer from having to pay Levy on the electricity concerned they can be traded to generate revenue for the generator.

The issue of LECs is administered by Ofgem, who provide further guidance on obtaining these benefits. Generators can only claim for a CHP LEC or a Renewable LEC for single unit electricity and not both, as such the total volume of LECs awarded cannot exceed the amount of electricity generated.

HM Treasury has made known through the 2009 Budget that it intends to extend the CCL exemption for sales of GQ CHP electricity through to 2023. Furthermore, no indication has been made for moves towards the withdrawal of CCL exemption for renewable electricity at this time.

4.3 Enhanced Capital Allowances

Enhanced Capital Allowances (ECAs) permit UK businesses to write-off 100% of their investment in selected energy saving technologies against the taxable profits of the period during which they made the investment. ECAs are claimed in the same way as other capital allowances. In general terms, the Net Present Value (NPV) presented by an ECA can be between 6% and 10% of Capital Expenditure dependent on factors such as rates of Corporation Tax and plant operational life.

EfW schemes with CHP capacity that is certified by the CHP Quality Assurance (CHPQA) programme as Good Quality CHP are entitled to ECAs against capital expenditure on selected plant and machinery within the CHP scheme. ECAs for CHP are available where the main intended business will be to provide heat and power for clearly identified users on site or identified third parties. As such ECAs are not available for companies whose core business is power generation (i.e. supply of electricity to unknown end users).

Where a Good Quality CHP scheme is fuelled by a Solid Recovered Fuel (SRF) the scope of the ECA can be expanded to include additional equipment items associated with the usage of SRF. In order to be deemed SRF the fuel will need to meet the following specification set out by the Defra Waste Infrastructure Delivery Programme[50]:

- SRF is prepared from non-hazardous waste and classified using CEN/TS 15359
- SRF has a maximum Respiratory Index (RI) value from point of production to point of use of no greater than 1500mg O_2/kgVS/h
- SRF has a maximum particle size of 150mm

Claimants of ECAs for CHP facilities using SRF will need to maintain qualification as Good Quality CHP with the CHPQA programme for at least five consecutive years from Plant Acceptance in order to avoid the forfeit of the monetary value of the ECA. Therefore, the need to secure and maintain long-term heat supply contracts in order to maintain qualification will be critical for schemes seeking such support. Further details on ECAs for GQ CHP (including provision for SRF schemes) can be found in CHPQA Guidance Note 42[51].

While ECAs are due for renewal of state aid approval in 2011 this is expected to be forthcoming such that this form of support will continue to be available.

[48] Climate Change Levy (General) Regulations 2001, SI2001/838
[49] Climate Change Levy (General) (Amendment) Regulations 2003, SI 2003/2633.
[50] Waste Infrastructure Delivery Programme Information Note on Combine Heat and Power, January 2009. Available at http://www.defra.gov.uk/environment/waste/residual/widp/index.htm
[51] CHPQA Guidance Note42 v2, July 2008. Available from www.chpqa.com

5 Future Policy and Legislation

While sections 2, 3 and 4 address current policy and legislation relevant to Energy from Waste projects this section seeks to identify expected future changes to the policy areas previously considered that will influence EfW developments.

5.1 Planning

5.1.1 Nationally Significant Infrastructure Projects

A new consenting process is in the process of being introduced for Nationally Significant Infrastructure Projects (NSIPs) in England and Wales. This regime will apply to the following types of infrastructure developments:

England and Wales

- Energy
- Harbour facilities

England Only

- Airports
- Highways
- Railways
- Waste water
- Water
- Hazardous Waste

The regime will be presided over by an Infrastructure Planning Committee (IPC) [52] which will examine planning consent applications against established National Policy Statements (NPSs). The IPC was set up under the Planning Act 2008, and commenced operation in the October 2009. The IPC is set up to deal with large scale facilities such as railways, large wind farms, power stations, reservoirs, harbours, airports and sewage treatment works. It will not deal with private housing, residential and retail planning or smaller infrastructure projects (unless requested to be considered by the Secretary of State).

The regime is to be implemented in a staged manner with NSIPs in the energy and transport sectors moving to the new regime in March 2010. NSIPs in the waste water and hazardous waste sectors will move to the new regime in April 2011.

EfW facilities will be deemed to be energy NSIPs where they have a generating capacity of greater than 50 megawatts. As such this is expected to take over from the existing Section 36 consenting process discussed in Section 2.1 although the current process in Scotland is to be unaffected. At the time of writing the Department for Energy and Climate Change had recently issued for consultation the draft NPSs for energy infrastructure. EfW projects are covered by NPSs EN-1[53] (overarching statement for all energy projects) and EN-3 (statement for Renewable Energy projects including EfW).

In the case of hazardous waste projects located in England these will be deemed to be NISPs where they have a capacity of more than 30,000 tonnes per year. The NPS for hazardous waste projects is to be developed by Defra and is expected to be published for consultation in summer 2010 with the aim of it being adopted during 2011.

Developers for looking to bring forward applications for NSIPs in 2011 are currently being recommended to contact the IPC[54] to understand the transitional arrangements.

[52] http://infrastructure.independent.gov.uk/
[53] Draft NPSs EN-1 and EN-3 are currently available from https://www.energynpsconsultation.decc.gov.uk/
[54] IPC_Implementation@communities.gsi.gov.uk

As far as we are aware the consenting process applies to all activities associated with these infrastructure developments, within reason. But as the body in question is new we expect a significant amount of change in terms of remit, operation and control over the next 5 years, and as such it will be critical that any planned investment in EfW technologies reviews the requirements of this body at the time in question. .

5.1.2 Changes to National Planning Policy and Policy Guidance

Some of the authorities responsible for maintaining planning policy guidance for local planning authorities have advised their intention to update guidance pertaining to EfW in the near future. In England CLG has advised that it intends to merge its PPS22 document on Renewable Energy with the supplement provided to PPS1 on Sustainable Development. At the time of writing CLG advised that a draft document would be submitted for consultation in late 2009.

The Scottish Government advises that it is currently in the process of consolidating its suite of SPP documents into a single document. This has been published in draft for consultation but is still to be formally adopted. References made to EfW in the draft document do not vary substantially from those given in the existing SPP6 and SPP10 documents. The Scottish Government has also advised its intention to rationalise the series of planning advice notes (PANs) currently offered with individual notes being combined or withdrawn in the future. The future plans regarding PAN45 on Renewable Energy have not yet been made clear at this time.

The devolved administrations in Scotland and Wales have both recently consulted upon their respective waste strategies. In both cases the administrations indicated their intention to limit the proportion of municipal solid waste (MSW) that can be treated by EfW facilities (excluding AD). The Welsh Assembly Government (WAG) has indicated in its consultation document *Towards Zero* Waste[55] that it would intend to limit treatment of MSW by EfW to 42% in 2015/16 falling to 30% by 2024/25 in order to meeting identified sustainable development targets. In Scotland the Scottish Executive has indicated in its consultation on its zero waste plan[56] that it expects no more than 25% of municipal waste to be treated by EfW by 2025; here Mechanical Biological Treatment, Mechanical Heat Treatment and AD as specifically excluded from this cap. In both cases the setting of specific caps of the type described would constrain the deployment of thermal EfW technologies directly utilising MSW.

In addition to the above, the aforementioned WAG waste strategy consultation identifies as an objective the 'phasing out of landfill and the development of "high efficiency" energy from waste plants for residual waste'. While the consultation document does not identify quantitative efficiency targets it is known that the WAG is exploring the attainability of a 60% efficiency target for EfW plants on the basis of *'total energy in* divided by *total energy out'*.

$$\text{Process Efficiency} = \frac{\text{[Total Energy In]}}{\text{[Total Energy Out]}}$$

AEA were appointed by the WAG to conduct an assessment contributing to the evidence base for setting minimum thermal efficiency targets for EfW facilities on this basis in 2009. Details of this work were reported in the December 2009 edition of the *Warmer Bulletin* published by Residua[57]. In light of the following it is anticipated that the WAG will seek to introduce quantitative efficiency targets for EfW facilities in Wales in the future although the timescales for adoption of these targets have not been advised at this time.

[55] *Towards Zero Waste – A Consultation on a New Waste Strategy for Wales*, Welsh Assembly Government, April 2009. Available from: http://wales.gov.uk/consultations/environmentandcountryside/wastestrategy/?lang=en
[56] *Scotland's Zero Waste Plan: Consultation,* Scottish Government, August 2009. Available from: http://www.scotland.gov.uk/Publications/2009/08/19141153/0
[57] www.residua.com

5.2 Environmental Legislation

5.2.1 Changes to Environmental Permitting Regulations

The next key change in Environmental Permitting will be the introduction of water discharge activities into the Environmental Permit Programme. Consultation on this draft proposal is due to close 18/02/10. For further details on the proposals and consultation documents, see the following link http://www.defra.gov.uk/corporate/consult/env-permitting-guidance-water/.

A further forthcoming amendment to the Environmental Permitting regulations in England and Wales is expected to simplify the regulatory regime for low environmental risk waste recovery and disposal operations. The current intention advised by the Environment Agency is that the amendment will lead to the creation of a consolidated statutory instrument to be known as the Environmental Permitting (England and Wales) Regulation 2010.

The main impact of this change in relation to EfW operations is that certain anaerobic digestion plants will be deemed to be "exempt waste operations" whereby an environmental permit would not be required to undertake operations where standard conditions were being met. Operators meeting the conditions given in the regulations would still be expected to register their operation with the Environment Agency and may still need to obtain an environmental permit for other activities on their site. The two exempt waste operations that are proposed to be added in the amended regulations are:

- AD of waste at a premises used for agriculture and burning of resultant biogas
- AD at premises not used for agriculture and burning of resultant biogas

These exemptions will be granted to schemes using specific wastes and satisfying particular conditions. The wastes in question and the conditions for both exemptions are given in Table 11.

At the time of writing the draft amendment was open for consultation with this expected to close in January 2010 with the new regulation coming into force in April 2010. Copies of the draft regulation[58] are currently available from the Office of Public Sector Information.

Table 11: Waste Types and Operating Conditions for Exempt AD Operations in draft EP (England and Wales) Regulations 2010

	Exemption T24 - Anaerobic digestion of waste at a premises used for agriculture and burning of resultant biogas	Exemption T25 - Anaerobic digestion of waste at a premises not used for agriculture and burning of resultant biogas
Scope of Exempted Operation	The treatment by anaerobic digestion of relevant waste at premises used for agriculture and associated prior treatment with the burning of any resultant biogas.	The treatment by anaerobic digestion of relevant waste at premises not used for agriculture and associated prior treatment with the burning of any resultant biogas.
Permitted Waste Types	• Plant tissue waste • Horse and farmyard manure, slurry only	• Plant tissue waste • Horse and farmyard manure, slurry only • Paper and cardboard • Biodegradable kitchen/ canteen waste • Animal tissue waste • Materials unsuitable for consumption or processing • Biodegradable waste from markets only

[58] http://www.opsi.gov.uk/si/si2009/draft/pdf/ukdsi_9780111487112_en.pdf

Exemption Conditions	• Total quantity of waste treated or stored at any one time is less than 1,250m^3 • Minimum retention time for waste in the digester is 28 days • Any gas produced is burnt in an appliance with a thermal input of less than 400kW for the purposes of producing energy	• Total quantity of waste treated stored at any one time is less than 50m^3 • Minimum retention time for waste in the digester is 28 days • Any gas produced is burnt in an appliance with a thermal input of less than 400kW for the purposes of producing energy

In terms of contaminated land related issues it is difficult to foresee any potential changes in legislation and policies within the planning and permitting regime.

5.2.2 New European Directive on Industrial Emissions and Integrated Pollution Control (IPPC)

During 2007 the European Commission undertook a review of the Waste Incineration Directive (WID) in parallel with a wider review of the IPPC Directive. A recommendation of this review was that the EC would seek to introduce a new Directive on Industrial Emissions (Integrated Pollution and Control) that would replace seven existing directives relating to industrial control including the WID and IPPC Directives.

The summary proposal for this Directive identifies the following changes with respect to waste incineration plants:

- The proposed Directive would seek to introduce further derogations to the requirements for monitoring of certain emissions generated by incineration plants. These could be granted by the relevant pollution control authority under specific conditions.
- Introduction of continuous monitoring for emissions to air of heavy metals, dioxins and furans.
- Derogations, in specific circumstances, for continuous monitoring of total dust emissions.
- Setting of average emissions levels for sulphur dioxide (SO_2).

The Directive would seek to make more prominent the use of BAT Reference (BREF) documents that are maintained by the EC as a reference source for Best Available Techniques (BAT). The Directive continues to be developed by the EC and so there is no clear indication at this time of when the Directive will be implemented in the UK however indications are that this is not expected before 2013.

5.3 Sustainable Energy

5.3.1 Future Changes to the RO, SRO and NIRO

For clarity references to the RO in this section apply equally to the RO in England and Wales, Scotland and Northern Ireland unless otherwise stated.

The 2009 UK Renewable Energy Strategy confirms that the RO is to be extended from 2027 until 2037 and will limit the duration of support for individual projects to no more than 20 years. Both of the above measures are expected to be introduced within the next planned RO Order due to come into effect in April 2010. As such the risk of support under the RO being withdrawn is seen as low.

The 2010 Order is expected also include amendments to account for the introduction of Feed-in Tariffs (FiTs) in Great Britain for small scale generation schemes (i.e. under 5MW output capacity). FiTs and their implications for the RO are discussed further in section 5.3.2.

The method to determine the total number of ROCs to be provided by suppliers in any obligation period is also expected to be amended in the 2010 Order. In the current order this value is determined based on the relationship between values A, B and C (see Section 4.1.1). However, for future Orders it is expected that the 200 ROCs/GWh limit represented by Value C will be removed and that the headroom figure used in determining Value B will be increased from 8% to 10% for the obligation period commencing April 2011. The reason for the former amendment is to permit renewable generation to expand beyond 20% renewable generation but without imposing unnecessary restrictions on the ROCs market. The latter amendment has been proposed to seek to further mitigate the risks of demand for ROCs being less than forecast renewable electricity generation. Work conducted for DECC indicated that the current 8% headroom value presented an appreciable risk of supply exceeding demand, leading to a crash in ROC value. As such this move would be expected to lead to greater price security. It should be noted that the increase in headroom is dependant on other price stabilisation mechanisms currently being considered by DECC. Further details of the mechanisms under consideration can be found within the DECC consultation on Renewable Electricity Financial Incentives[59].

The 2009 RO includes provision for banding to be reviewed in October 2010 and at subsequent four-yearly intervals. The Government has indicated in its response to the Consultation on the 2009 ROO[60] that current schemes will not be fixed at current levels for the life of the facility (an approach known as "grandfathering"). Instead banding for such schemes will vary in line with future banding reviews. As such, it should be expected that the ROC award rates for these schemes will reduce over time to reflect the reduction in technology costs and maturing of feedstock supply chains.

Within the current RO enhanced support is given to schemes with CHP capacity in comparison to equivalent power-only schemes. This is in recognition of the fact that such schemes produce renewable heat as well as electricity. As such this provision may be subject to change upon the introduction of the Renewable Heat Incentive (RHI), which is discussed elsewhere.

Policy responsibility for the RO in England and Wales lies with the Department of Energy and Climate Change, in Scotland with the Scottish Government and in Northern Ireland with the Northern Ireland Executive. As such each administration has the capability to vary details of their respective Obligations to meet local objectives. For example, in 2008 the Scottish Government in its consultation on the introduction of banding into the ROS[61] proposed that in order for EfW plants using advanced conversion technologies (ACTs)[62] to be subject to a banding of 2ROCs/MWh only where scheme met minimum efficiency standards and/or fitment of CHP capacity. While this proposal was not actually implemented this requirement would have been in marked contrast to the orders in England and Wales and Northern Ireland, which had no such requirement. Despite the ability for the administrations to adopt varying approaches they have collectively acknowledged the benefits of maintaining a consistent approach across the UK and work together to deliver this wherever possible.

5.3.2 Feed-in Tariffs

Feed in Tariffs (FiTs) are due to be introduced in April 2010 for Great Britain to encourage the generation of renewable and low-carbon electricity at small-scale (i.e. up to $5MW_e$) in support of UK Renewable Energy objectives. Due to its focus on small-scale generation FiTs are to aimed at groups that are either unfamiliar or uncomfortable with working under the Renewables Obligation. This is expected to include individuals, community groups and small/medium sized-enterprises. DECC's consultation[63] on its proposals for FiTs closed in October 09.

[59] Consultation on Renewable Electricity Financial Incentives 2009, Department for Energy and Climate Change. Available at: http://www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx
[60] Available from: http://www.berr.gov.uk/consultations/page46710.html
[61] Introduction of Banding to the Renewables Obligation (Scotland), Preliminary Consultation, April 2008. Available at http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/ROSCons08BPRPDF
[62] In the ROS 'ACTs' refer to anaerobic digestion, advanced pyrolysis and advanced gasification technologies. See Section 4.1.1 for definitions of these technologies.
[63] Consultation on Renewable Electricity Financial Incentives 2009, Department for Energy and Climate Change, http://www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx

The submitted consultation document identified the following proposals with regards the intended structure for FiTs:

- The proposed Tariff structure will consist of two payments both made to generators by their electricity supplier. The first payment is a fixed rate payment (p/kWh) for all electricity generated irrespective of whether this is used internally or exported to the local distribution network. The second payment is an additional tariff paid for every unit of electricity exported to the wider energy market. Generators will be given a one-off choice to opt out of receiving a fixed tariff for exported electricity and for them to participate directly in the market for sale of their exports.

- At the time of introduction FiTs will be made available for generators with an installed capacity of less than $5MW_e$ using the following EfW technologies:
  - Anaerobic digestion
  - Biomass
  - Biomass CHP

  The consultation document does not explicitly lay out detailed definitions for the above technology types but does indicate that reference will be made to standards and definitions used within the RO in order to maximise consistency between the two regimes. As such, biomass processes may be subject to a lower limit for biomass content of the fuel stream in order to be eligible for FiTs.

- FiTs are not to be offered for sewage gas or landfill gas schemes.

- Existing eligible schemes that are currently operating under the RO with capacities between $50kW_e$ and $5MW_e$ will be given the option of choosing between the RO and FiTs. This opportunity will be offered only once so as to avoid repeated switching between schemes.

- Tariff will be paid for 20 years for new projects.

The proposed generation tariffs for the first year of FiTs (2010-11) are given in Table 12. Where tariffs have been identified for technologies with CHP it is expected that these would be withdrawn upon the commencement of the Renewable Heat Incentive as this would provide support for generation of renewable heat separately. Affected schemes would then be moved onto the equivalent 'power-only' tariffs. The proposed export tariff for schemes is still to be advised.

Table 12: Proposed Generation Tariff for First Year of FiTs (2010-11)

Technology	Scale	Proposed initial tariff (p/kWh)
Anaerobic digestion	Power-only	9
Anaerobic digestion	CHP	11.5
Biomass	<50kW	9
Biomass	50kW – 5MW	4.5
Biomass	CHP	9

It is anticipated that tariffs will be reviewed as costs of implementing projects may change in the future (particularly with regard to emerging technologies). However it has been proposed that support for existing projects will be "grandfathered" (i.e. receive the same level of support for as long as they are subject to the FiT).

The Northern Ireland Executive has yet to decide whether to implement FiTs in Northern Ireland.

5.3.3 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is a mechanism that is expected to be introduced in Great Britain in April 2011 to encourage the supply of heat generated from renewable energy sources, which currently account for only 0.6% of the total heat demand[64]. Enabling powers to permit the introduction of a RHI were included within the Energy Act 2008.

The Department for Energy and Climate Change (DECC) hope to consult upon the features including the design and operation of the RHI towards the end of 2009. So far DECC have indicated that the RHI would possess the following features:

- The RHI will be banded to give varying levels of support to different technologies and/or scales. This is expected to include biomass, biomass CHP and biogas from anaerobic digestion.
- It will cover all scales from large industrial sites down to domestic scale installations.
- DECC will take into account factors such as technology costs and generation yields (as opposed to carbon savings) in determining support levels for different technologies.
- The incentive will be funded by a levy on suppliers of fossil fuels for heat (e.g. natural gas, coal, heating oil and LPG).

The Northern Ireland Executive has yet to decide whether to implement a RHI in Northern Ireland.

[64] http://www.berr.gov.uk/energy/sources/renewables/policy/renewableheatincentive/page50364.html

6 Summary and Conclusions

In the preceding review of polices and legislation a number of key factors are identified that are relevant to investment decisions for EfW projects. With regards to planning and the need to obtain planning consent EfW developers need to be mindful of the following key aspects as these will have significant bearing on the consent application process:

- *Plant power output capacity.* The electrical output capacity will influence the level of authority at which consent will need to be granted. Consent for small and medium scale schemes will be granted by local planning authorities but for larger schemes (i.e. greater than 10MW in Northern Ireland or 50MW in Britain) consent will need to be sought from central government authorities. In future, large EfW projects in England and Wales may be deemed to be nationally significant infrastructure projects, which will come under the jurisdiction of the Infrastructure Planning Commission.

- *Local land-use and waste planning policy.* Developers should be mindful of regional and local policies for land-use and waste management as individual projects will be assessed on the basis of how projects contribute to local waste objectives. Where possible projects should be developed to align with identified objectives in the local waste plan. This will be particularly true of larger EfW plants as these will have a significant impact (positive or negative) on local objectives. National policy guidance advises that local planning authorities (LPAs) should seek to identify suitable sites for waste management facilities to achieve the delivery of the stated plan. This may place constraints on the development of projects with regards location. However, guidance to LPAs also states that locating an EfW project outside areas identified in the waste plan should not, by itself, be a barrier to consent being granted. Developers should also be mindful of future developments in national waste strategies. For example, the devolved administrations in Scotland and Wales both indicate that limits are to be introduced on the maximum amount of municipal solid waste (MSW) that may be treated by thermal EfW facilities. The Welsh Assembly Government (WAG) has indicated that it will limit treatment of MSW by EfW to 30% by 2024/25 while in Scotland this would be 25% by 2025.

- *Requirement for an Environmental Impact Assessment*. Projects may be required to undertake an environmental impact assessment (EIA) and provide an environmental statement (ES) in support of the consent application. The requirement for an EIA will vary dependent on the scheme size and process technology involved together with the relevance of particular risk factors (e.g. proximity to controlled waters).

With regards Environmental Legislation the following are key issues that developers should be mindful of:

- *Requirements for Environmental Permitting.* In the majority of cases EfW projects will be required to obtain an environmental permit or licence in order to operate. However, developers should be aware of regulatory reforms to facilitate lighter-touch regulation where this is appropriate. An example of this is the proposed move to allow selected anaerobic digestion facilities in England and Wales to register as exempt waste operations (see Section 5.2.1).

- *Demonstration of Best Available Techniques.* Projects will need to demonstrate the use of Best Available Techniques (BAT) for achieving pollution prevention and control. A particular area highlighted by PPC authorities in their guidance is the need for EfW processes to demonstrate BAT in regard to energy efficiency. Guidance provided identifies the recovery of heat as well as power (i.e. operating as CHP) where possible as indicative BAT. However, the extent by which applicants will need to go to demonstrate this requirement varies between the nations. It should be noted that guidance provided for projects in Scotland identifies quantitative standards for energy efficiency that developments will be compared against. This is in contrast to England and Wales and Northern Ireland, which do not identify quantitative targets at this time.

- In the future this situation is expected to change in that the Welsh Assembly Government are currently exploring the potential introduction of quantitative targets for energy efficiency for EfW plants although timescales for introduction are not known at this time.

- *Application of the Waste Incineration Directive.* The WID sets specific and rigorous requirements on the design, operation and management of applicable thermal EfW processes. As such it is desirable for operators to determine at the earliest stages whether the process will be subject to the WID and implications this will have on the process. In determining the applicability of the WID to particular projects it should be noted that it applies specifically to the thermal treatment of waste and so AD is not subject to the directive. Furthermore, thermal processes operating on specific wastes may not be required to comply with the WID.

Central government policy widely recognises the role that EfW, as part of a sustainable waste strategy, has a role to play in meeting renewable energy targets. As a result EfW technologies can receive support from the following sources:

- *The Renewables Obligation.* Provides benefits in the form of Renewables Obligation Certificates (ROCs) for power output attributable to the biomass content of the wastes fuels. Banding means that levels of support vary dependant on technology type. Enhanced support is given for projects utilising advanced conversion technologies and for Good Quality CHP. Importantly ROCs are available only for combustion EfW schemes where they demonstrate Good Quality CHP. Advanced thermal processes such as pyrolysis and gasification will need to meet specific quality criteria for fuel gases/liquids produced in order to be eligible for the enhanced support available. England and Wales, Scotland and Northern Ireland all operate separate obligations so developers need to check local guidance.

- *Climate Change Levy Exemption for electricity generated.* Some schemes may be able to receive benefits in the form of Levy Exemption Certificates.

- *Enhanced capital allowances for EfW plant operating as Good Quality CHP.* Extended benefits are also available for EfW CHP schemes utilising solid recovered fuel (SRF).

EfW schemes would also be expected to benefit through the future introduction of Feed-in Tariffs for small-scale renewable energy projects and the Renewable Heat Incentive in Great Britain.

Appendices

Appendix 1: Glossary of Terms

Appendix 1

Glossary of Terms

AD	Anaerobic Digestion
APC	Air Pollution Control
BAT	Best Available Technology/Techniques
BREF	BAT Reference
CCL	Climate Change Levy
CHP	Combined Heat and Power
CHPQA	CHP Quality Assurance
CLG	[Department for] Communities and Local Government
CV	Calorific Value
DECC	Department of Energy and Climate Change
DETI	Department for Enterprise, Trade and Industry
EA	Environment Agency
EC	European Commission
ECA	Enhanced Capital Allowance
EIA	Environmental Impact Assessment
EfW	Energy from Waste
ELV	Emission Limit Values
EP	Environmental Permitting
ES	Environmental Statement
FiT	Feed-in Tariff
GQ CHP	Good Quality CHP
IPC	Infrastructure Planning Commission
IPPC	Integrated Pollution Prevention and Control
LEC	[Climate Change] Level Exemption Certificate
LOI	Loss on Ignition
LPA	Local Planning Authority
MWh	Megawatt-hour
NIEA	Northern Ireland Environment Agency
NIRO	Northern Ireland Renewables Obligation
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PAH	Polycyclic Aromatic Hydrocarbon
PAN	Planning Advisory Note
PCB	Polychlorinated Biphenyl
PPC	Pollution Prevention and Control
RHI	Renewable Heat Incentive

RO	Renewables Obligation
ROC	Renewables Obligation Certificate
ROO	Renewables Obligation Order
ROS	Renewables Obligation Scotland
SEPA	Scottish Environmental Protection Agency
SRF	Solid Recovered Fuel
SROC	Scottish Renewables Obligation Certificate
PPS	Planning Policy Statement
SPP	Scottish Planning Policy
TOC	Total Organic Carbon
WAG	Welsh Assembly Government
WID	Waste Incineration Directive

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