CIWEM Chartered Institution of Water and Environmental Management

Policy Position Statement

Energy Recovery from Waste

Purpose

In the context of the Waste Framework Directive, requiring waste policy to reflect the waste hierarchy, energy from waste represents a recovery option above disposal. This Policy Position Statement (PPS) considers the potential for expansion of energy from waste as a renewable energy solution and sets out the position of CIWEM on how best to progress this issue. This PPS can be read in conjunction with the PPS on Mechanical Biological Treatment of Waste; anaerobic digestion of waste is covered in a separate PPS.

CIWEM considers that:

1. Energy recovery from waste has a legitimate role to play in meeting renewable energy objectives for truly residual waste (that which cannot be reused or recycled).
2. There should be greater uptake of the most efficient method of energy recovery from waste and a greater consideration of the role that it could play in reducing our reliance on conventional fossil fuels.
3. Investment in improved and expanded energy from waste technologies will not hamper efforts to increase recycling rates or reduce waste production.
4. The European Commission should support a Europe-wide standard for waste derived fuels. A proper functioning European market cannot work without a legally defined standard.
5. The planning system should encourage power and heat recovery as this is far more efficient than power only. There is a need for strategic planning to deliver heat networks. Planning policies and guidance on energy recovery from waste need to be more specific and integrated to assist Local Planning Authorities.
6. The Government's call for evidence on the current and likely future market for waste derived fuels is timely. CIWEM urges the findings to support further development of energy from waste.
7. The government should consider further fiscal measures as a means to discourage the development of low efficiency technology and stimulate the delivery of more efficient energy from waste technologies generating heat and power.
8. The stringent emissions standards that now apply are such that energy from waste provides no greater risk than many widely accepted sources of power generation.

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector.

Glossary

CHP	Combined heat and power
EfW	Energy from waste
MBT	Mechanical biological treatment
MSW	Municipal solid waste
RDF	Refuse derived fuel
SRF	Solid recovered fuel

Context

Energy recovery from waste or 'energy from waste' (commonly abbreviated to EfW) is a generic term for a range of different thermal treatment processes and technologies. It describes the process in which energy (in the form of heat) is recovered from the combustion of waste, and used to generate electricity. This is then fed back into the National Grid or local heat and power networks, or provides both electricity and heat (combined heat and power (CHP)) to nearby communities or industrial users.

Waste may be in the form of an individual waste stream, generally from a commercial or industrial activity, which is used in existing plant as a fuel; it may be the residue left after recyclables are separated from a general waste stream; or it may be a specially produced refuse-derived fuel (RDF) or Solid Recovered Fuel (SRF) from a Mechanical Biological Treatment (MBT) plant. RDF can be made from a mixture of municipal and commercial waste which includes biodegradable material as well as plastics, and generally has a lower and more variable calorific value than SRF. SRF is produced to reach a defined standard, such as that set by European Committee for Standardisation (CEN), so that is it able to be burnt in plant such as cement kilns or power station furnaces.

Energy from waste in the UK has suffered from low public confidence and acceptance attributable to early poor quality waste incinerators, mainly disposal-only plants, used to burn waste to reduce its volume. Uptake of modern EfW treatment has also been slow due to the predominance of landfill from the 1970s. A key driver today is the Waste Framework Directive's waste hierarchy that has statutory backing. This places a priority order on the management of waste with the aim to prevent, reuse and recycle it; hence deriving energy from waste should only be applied to truly residual waste that cannot meet these methods.

The range of techniques includes incineration, combustion of waste derived fuels and the more advanced technologies of pyrolysis and gasification (producing fuel gas from the waste by heating either a zero or low-oxygen environment). The overall environmental benefits will depend not only on the thermal treatment but the energy conversion technology to which it is coupled. The overall efficiency will be also dependent on any energy required to run the process.

The first commercial scale gasification plant opened in the UK in 2013, capable of generating 6MW of electricity. Waste derived renewable electricity from thermal combustion in England

is forecast to grow from the current 1.2TWh to between 3.1TWh and 3.6TWh by 2020i, depending on how much of the solid recovered fuel produced is utilised in the UK.

Table of common technologies and efficiencies

Conventional technologies	Efficiency
Direct combustion (incineration of dry biomass)	15-27%ii
Combustion of waste-derived fuel	25%iii
CHP	40%+iv
Advanced thermal treatment	
Gasification	Up to 30%
Pyrolysis	Up to 30%

Key Issues

EfW as a Sustainable Waste Management option

The waste hierarchy aims to promote sustainability. Energy from waste can be counted as either recovery or disposal in the context of the waste hierarchy. To be classed as recovery, facilities must meet the requirements set out in the Waste Framework Directive through demonstration of "R1" status, relating to the energy efficiency of the process.

The UK Government asserts EfW must at the very least not compete with recycling, reuse and prevention and should ideally support themv. Recovering energy from waste represents a practical way of treating it.

CIWEM considers that, particularly if combined with heat recovery through CHP, EfW has a role to play in sustainable waste management. There is ample evidence from Europe1 that EfW coexists with high levels of recycling and does not undermine it.

CIWEM also considers that investment in improved and expanded EfW would not hamper efforts to increase recycling rates or reduce waste production.

Energy

Most EfW plants produce energy in the form of electricity. Increasingly operators are seeking to use the heat generated, known as combined heat and power (CHP). EfW could play a limited, but increased role in generating electricity and providing heat to communities. It is also important as a domestic energy source contributing to energy security.

1 In 2010 Austria achieved 70% recycling (including composting) alongside 30% waste which was incinerated; Germany achieved 62% recycling alongside 38% incineration; while Belgium achieved 62% recycling alongside 37% incineration. This compares to the UK with 39% recycling and 12% incineration. Defra 2014. Energy from Waste

CIWEM considers that wider utilisation of the energy value of residual waste before final disposal would make a sensible and more sustainable contribution to our energy policy. Refuse derived fuels could, with the right development, provide energy at stable prices for industrial purposes. EfW has the added advantage that it is non-intermittent, so it can complement other renewable energy sources such as wind or solar.

The Renewables Obligation Order 2006 made EfW derived CHP eligible for Renewables Obligation Certificates (ROCs) and those which are compliant with Combined Heat and Power Quality Assurance are eligible for ROCs on all their biomass-generated energy. Government guidance states that municipal waste management strategies should drive proposals for new EfW plant, within the context of diverting wastes further up the waste hierarchy, and seek to maximise the benefits of any new plant such as CHP for neighbouring communities. The Waste Incineration Directive states that heat should be used 'as far as practicable'.

The Government's energy market reforms propose a system of auctions for the more established technologies from the start of the Contracts for Difference (CfD) regime including CHP. For the less established technologies such as advanced thermal conversion technologies there will be no requirement to allocate contracts for difference competitively from the beginningvi. Between the CfD scheme's introduction and the scheduled closure of the RO to new capacity in 2017 (the transition period), generators will be able to choose between the schemesvii.

Exporting a fuel source

MBT plants in Europe have been configured over time to meet the fuel requirements of end users, both for traditional EfW/CHP schemes and industry users such as cement. In the UK capacity for using RDF/SRF is not matched by outputs from MBT and at the present time there is some overcapacity in European energy facilities that has generated an economically viable export market for RDF/SRF produced in the UK. In 2013 just over 1.8Mtonnes of RDF/SRF was exported to European facilities, mainly to the Netherlands and Germany.

These exports are permissible under law, however the energy recovered from the biogenic component of the waste does not contribute to UK renewable energy targets and is a lost resource to the UK.

CIWEM urges the Government to promote the development of domestic infrastructure to make further use of UK produced RDF/SRF ensuring that the UK benefits from the energy generated from UK waste.

Economics/ Taxation

UK EfW gate fees are generally higher than those for EfW in other Member States, hence it is economically attractive to export RDF/SRF. The cost advantage can be in excess of £20/tonne compared with treatment in the UK. In certain areas of the UK where landfill space is still readily available and EfW infrastructure underdeveloped, gate fees for landfill will also be a cheaper option when factors such as haulage are taken into account.

CIWEM considers that the government should consider taxation to promote the development of more efficient EfW plant. An incineration tax, for example, on non R1 compliant plant or

wider carbon taxation would provide additional stimulus for the development of high efficiency technologies.

Standards of fuel

The European Committee for Standardisation Technical Committee (TC343) has developed standards for SRF which defines envelopes for a number of parameters such as calorific value, chlorine content and mercury content. There is no defined standard for RDF; the standard for RDF is usually set by the end user. Recent changes in local authority procurement to let fuel production (waste services) and fuel use (energy generation) contracts, have driven a need to set fuel standards.

CIWEM considers that the use of defined quality RDFs is entirely prudent when aligned with the waste hierarchy. This should be achieved by cooperation between industry and regulators to agree protocols and minimum and maximum quality criteria for RDFs on a Europe-wide level.

Planning

The efficiency benefits of CHP should be encouraged through the planning system. This will need greater emphasis on its encouragement at a strategic level. More consideration is needed in the National Planning Policy Framework and the waste management plan for England. Considerable benefit would be gained if planning policies incorporated guidance on how new developments could take advantage of CHP technology at an appropriate scale.

Although the use of low carbon and renewable energy is currently promoted in new developments and many EfW plants are configured to be 'CHP ready' the reality is that without a strategic approach to energy use within our towns and cities there are too many barriers to the development of heat networks. These barriers include the cost of retro-fitting infrastructure to congested utilities corridors and the difficulty in securing reliable off take of heat at a guaranteed price to make the financial model work in practice. The planning system has the ability to facilitate this development through a strong policy framework.

Public Perception

Public perception of waste incinerators / EfW plant in the UK has been particularly negative in the past due to the public heath and environmental impacts of the pollutants emitted. The EU Waste Incineration Directive (2000) incorporated in the Industrial Emissions Directive (2010/75/EU) tightened emissions standards for waste incinerators and is implemented largely via the existing permitting requirements of the Pollution Prevention and Control (England and Wales) Regulations 2000viii. Consequently, levels of dioxins and other pollutants from incinerators are now amongst the lowest when compared to other sources of power generation.

The Health Protection Agencyix reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. It concludes "while it is not possible to rule out adverse health effects from modern, well regulated municipal

waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable".

Climate Change / Greenhouse Gas Emissions

Energy from waste has the potential to substitute a proportion of conventional fossil fuels with biodegradable waste thus reducing greenhouse gas emissions of electricity production. In carbon terms, energy from waste is generally a better management route than landfill for residual waste. Yet this does rely on the efficiency of the plant and the proportion and type of biogenic content of the waste (high biogenic content makes energy from waste inherently better and landfill inherently worse). There is an ongoing debate surrounding whether combustion emissions from biomass (biogenic or short-cycle carbon) should be considered carbon neutral.

Nevertheless, CIWEM considers it a positive move that EfW with CHP and advanced thermal conversion technologies with low emissions are eligible for ROCs and considers that a technology which diverts a proportion of waste from landfill and at the same time replaces conventional fossil fuel and generates electricity and usable heat should be supported.

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Note: CIWEM Policy Position Statements (PPS) represents the Institution's views on issues at a particular point in time. It is accepted that situations change as research provides new evidence. It should be understood, therefore, that CIWEM PPS's are under constant review, that previously held views may alter and lead to revised PPS's. PPSs are produced as a consensus report and do not represent the view of individual members of CIWEM.

References

i Defra Waste Review https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69401/pb13540-waste-policy-review110614.pdf

ii Defra. 2014. Energy from Waste

iii Defra. 2014. Energy from Waste

iv Defra. 2014. Energy from Waste

v Defra. 2014. Energy from Waste

vi Barker, G. 2014. Speech by Climate Change Minister, Greg Barker, at the Energy from Waste 2014 conference. https://www.gov.uk/government/speeches/energy-from-waste-conference

vii https://www.ofgem.gov.uk/ofgem-publications/86998/guidanceforgenerators.pdf

viii The Environment Agency regulates releases to the environment in England, as does SEPA, NRW and DOENI

ix Now Public Health England Health Protection Agency. 2010. The impact on health of emissions to air from municipal waste incinerators. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1266228112244