policy connect

NO TIME TO WASTE

RESOURCES, RECOVERY, & THE ROAD TO NET-ZERO

> Until we reach a point where we no longer produce residual waste, we need to be managing it in the most efficient way.

Professor Margaret Bates

July 2020

This report follows a six month-long inquiry and was written by Oliver Feaver, Policy Manager, Sustainability at Policy Connect.

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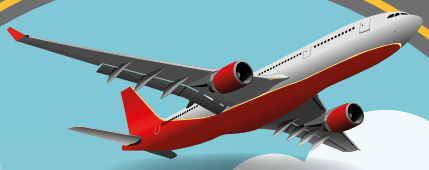

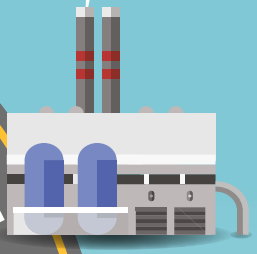

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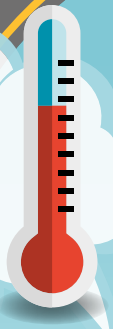

JET-ZERO: SUSTAINABLE TRANSPORT AND AVIATION FUELS

AVOID 4 MILLION TONNES OF CO_2 IN 2030 BY DISPLACING LANDFILL

WHAT MUST WE DO?

1. Keep driving up recycling
2. Get plastics out of the residual waste stream
3. Stop sending waste abroad and use it for UK heat/energy
4. Reduce landfill reliance
5. Keep reviewing waste treatment capacity and requirements
6. Allow sufficient EfW investment
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Appendix 1 contains assumptions and the basis of calculations for these figures.

Foreword

For us as parliamentarians, this inquiry brings home the fact that half of the waste we produce in the UK is not recyclable. Instead, it ends up largely in landfill or being sent overseas, or even being fly-tipped on our precious green spaces. This aspect of waste management would shock many citizens, but the reality is that we will continue to produce large volumes of non-recyclable waste for years to come. It is an urgent issue that we must manage as a nation, in the most resource efficient way, whilst also considering both net-zero and the post-COVID 'Build Back Better' agenda.

This report from Policy Connect comes at a key time for waste management and public health, when the need for safe and effective removal of our waste has never been more important. As the UK embarks on our Build Back Better movement, we must no longer simply bury or export the problem. Instead, we should, as other European economies do, treat residual waste as a valuable resource to produce lower carbon heat and energy, alongside a focus on achieving our important recycling targets and investing in innovative recycling technology. Energy from Waste (EfW) is not the perfect long-term solution for residual waste. But accompanied by a drive to increase heat use and to decarbonise EfW further, it is the best available technology, and is an essential part of the transition ahead of us.

The recommendations in this report build upon the direction of travel set by the Government's 2018 Resource and Waste Strategy, to put the UK at the forefront of global resource efficiency and to increase utilisation of the heat generated from waste. The report concludes that the appropriate location of plants is the key to unlocking greater heat use, and proposes cross-governmental, local authority, and industry collaboration to determine future locations and potential heat off-takers.

Energy from Waste can support low-carbon domestic heating, energy-intensive industries, aviation, and more. At the same time, it could attract important investment into communities and create jobs across the country as we recover from the economic shock of COVID-19. To help to provide certainty for the infrastructure investment needed, the Government should clearly set out the future role of EfW, and provide a stable, long-term, and ambitious policy framework.

This report addresses these difficult issues head on, and has involved partners across sectors; those who manage our waste; carry out research into new and innovative methods; and from the energy and construction sectors. Given our shared desire to maximise resource efficiency and value for the UK, the research conducted here aspires to provide practical recommendations for productively incorporating residual waste management into the UK's move to net-zero and a circular economy.

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Conservative, Scarborough and Whitby,
Former Minister at Defra

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All-Party Parliamentary Net Zero Group

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Labour, Southampton Test,
Shadow Minister for Energy

Kerry McCarthy MP
Labour, Bristol East, Shadow Minister
for Green Transport

Mark Pawsey MP
Conservative, Rugby

The Rt Hon the Lord Smith
Cross bench, Former Chair
of the Environment Agency

Barry Sheerman MP
Labour, Huddersfield, Co-Chair of the All-Party
Parliamentary Sustainable Resource Group

Jacob Young MP
Conservative, Redcar

Baroness Jones of Whitchurch
Labour

Lilian Greenwood MP
Labour, Nottingham South

Fleur Anderson MP
Labour, Putney

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The Government should revise the National Planning Policy Framework's presumption in favour of sustainable development to include proposed developments using EfW heat.

Executive Summary

This inquiry, supported by the broad membership of the Sustainable Resource Forum, takes as its start point that waste management must be a key consideration as the UK's focus shifts to net-zero carbon by 2050 and to addressing the long-term impacts of COVID-19. As we set out below, there are good reasons why resource management and improving resource efficiency has been a central theme throughout a wealth of recent legislation. Our inquiry concludes that EfW has an important role to play in the transition ahead of us: both as the lowest carbon solution for managing residual waste, but also by providing low carbon heat and supporting other sectors' decarbonisation efforts. It also recognises that the UK can do more to further decarbonise EfW, by getting fossil-based plastics out of the residual waste stream, and with government support to explore new carbon capture and storage technology (CCS).

Our investigations consider the three options for managing residual waste: sending it to EfW, burying it in landfill or shipping it abroad, and firmly conclude that EfW is the best available option. By sending the waste to EfW, it is pushed up the waste hierarchy, diverted away from environmentally damaging landfill, and can support the UK's heat and power needs. At the same time, it helps to maintain a clean and hygienic waste service; something the public has come to expect; the need for which has been reinforced during the COVID crisis. The inquiry proposes that the UK should move towards a Scandinavian style approach to residual waste, viewing it as a valuable resource to generate heat, to ensure that landfill reliance is driven down to as low as is feasible.

The UK is currently introducing an ambitious range of measures to address resource challenges and encourage recycling. It is not yet clear exactly what impact these will have on future levels of waste arisings, but stakeholders are clear that continuing to drive recycling and waste prevention should be central to future innovation across the sector. There is also a need for greater public awareness of the links between personal waste responsibility and climate change.

Calculations show that even if the UK does meet its 2035 recycling targets, there will continue to be large volumes of residual waste produced long into the future. The UK should therefore frequently reassess projections for future waste volumes, to account for the impact of new measures and externalities, and to allow necessary investment into EfW capacity. This will enable maximum use of low carbon waste heat generated by EfW to support housing, industry, and other sectors.

The inquiry concluded that there is no time to waste. The UK is disproportionately lagging behind much of Europe in harnessing EfW heat, with less than a quarter of plants connected to heat networks. We found that there are currently a number of barriers preventing this on a larger scale, but that the primary challenge is finding the right sites for plants, located near to a potential heat off take. Our firm conclusion is that Government needs to play a greater role to realise this opportunity, working collaboratively with industries and local government to determine suitable sites and potential heat customers.

This inquiry has found that when integrated into communities, and with the addition of local heat supply, EfW has the potential to offer significant community value across the country. Whether this is by attracting local investment, creating new skilled jobs, or by providing low carbon heating to help address fuel poverty, EfW can play a critical role as the UK builds back better from the impact of COVID-19 on our society and economy.

This inquiry, which covers EfW in England, received contributions from 50 organisations, through parliamentary roundtables, interviews, and written submissions. The following chapters examine the future role of EfW, the opportunities for EfW in tackling the UK's long-term challenges, increasing resource efficiency through heat utilisation, and maximising community value.

CHAPTER ONE

ENERGY FROM WASTE AND THE CLIMATE AGENDA

Energy from waste and the climate agenda

In recent years, the climate agenda and focus of government has shifted significantly, and public concern for the environment has never been greater.[1] The UK has committed to net-zero carbon emissions by 2050, and adopted ambitions to reach a circular economy.[2] There now needs to be a focus on how every sector and industry adapts to this, where previously many had assumed they could fall outside of the scope of the less ambitious Paris Agreement.[3]

Resource and waste management policy is critical to this agenda, and has been a central theme throughout a wealth of new legislation:

- The **Industrial Strategy** (2017) outlined that the Government is *"committed to moving towards a more circular economy – to raising productivity by using resources more efficiently"*.[4]
- The **Clean Growth Strategy** (2017) aims to achieve decarbonisation objectives for each sector (in accordance with the Climate Change Act) at low cost to UK taxpayers, consumers and businesses while maximising social and economic benefits for the UK.[5]
- The **Resources and Waste Strategy** (2018) outlined how England will preserve material resources by minimising waste, promote resource efficiency and move towards a circular economy in England.[6]
- The **25 Year Environment Plan** (2018) outlined ambitions to improve the environment via the Environment Bill. The Plan strives to use natural resources more sustainably and efficiently, minimise waste and pollution, and mitigate and adapt to climate change (aligned with the Clean Growth Strategy).[7]
- The **Environment Bill** (2020) gives provision for targets, plans and policies for improving the natural environment and around waste and resource efficiency.[8]

Energy from Waste (EfW) has an important role to play in this transition, and this report outlines the future of this suite of technologies. EfW is the lowest carbon solution for managing residual waste, by diverting landfill and generating useable electricity and heat. Every tonne of waste diverted from landfill to EfW saves 200kg of CO_2, while generating low carbon energy and heat.[9]

EfW technology

Within the wider framing of EfW, there are different technologies for certain waste streams. For example, anaerobic digestion is the preferred technology for managing residual food waste, whilst combustion EfW is used for mixed residual waste. Additionally, Advanced Thermal Treatments (ATT) including gasification and pyrolysis are being increasingly explored with financial support through Contracts for Difference (CfDs). However, this inquiry found limited support or evidence of ATT being currently proven on a large, sustainable scale. EfW can therefore be taken to refer to available and proven combustion technologies.

Wider decarbonisation

> **The question is how could we be using waste: could we use it to decarbonise really difficult sectors? To get there you need strong, stable policy support. That doesn't mean subsidies but it means a long-term vision.**
>
> Mark Sommerfeld, Renewable Energy Association

EfW is primarily a waste management tool. Whilst often considered a transitional technology until a point where residual waste ceases to arise, there are additional roles that existing and emerging EfW technologies can play. These roles should be utilised fully to contribute to the decarbonisation efforts for often-difficult sectors, and the broader UK climate agenda.

The Government's Clean Growth Strategy praises the resources and waste sector for its decarbonisation efforts, which has seen a 69% reduction in carbon emissions since 1990. The Strategy highlighted, however, the lack of progress achieved by other sectors. The Strategy stresses the need to replicate similar progress, in particular across the transport, industry, and domestic heating sectors.[10]

Heating

Significantly, the EfW process generates vast quantities of heat, which can and should be utilised as far as possible. Decarbonising domestic and industrial heating is already proving to be one of the most challenging aspects of the drive towards net-zero.[5]

EfW also presents a significant opportunity to provide heat to non-domestic buildings. By 2050, non-domestic buildings are projected to represent 53% of heat network demand, despite the fact that they will only account for 28% of the UK's general heat requirements.[11] As a high temperature process, EfW heat is ideally placed to serve lower efficiency buildings and industrial plants with high heat demand.

In 2018, the Government identified at least 0.2tWh of accessible EfW waste heat, which alone would double the proportion of UK heat provided through heat networks if utilised. Chapter two of this report explores the opportunities and challenges of EfW heat.

Helping other sectors

In addition to heat, EfW technology can present opportunities in other often difficult-to-decarbonise sectors. There are emerging technologies utilising residual waste and unique EfW processes to produce alternative products; syngas for transport fuels, jet fuel, or chemicals manufacturing such as naphtha.

Due to a general lack of clarity, it is unclear exactly how government perceive the future role of EfW, and where the priorities are for the different technologies. This was demonstrated through varying levels of government subsidy support for different outputs over a number of years, with EfW transport fuels currently receiving the greatest level of financial support through the Renewable Transport Fuel Obligation.

> **Net-zero is this big thing we need to talk about. How does waste management contribute to the transition to net-zero carbon by 2050?**
>
> Roundtable participant

The Government should provide clarity on the future role of EfW both in terms of residual waste management and also the decarbonisation agenda, to help stimulate the market and investment accordingly.

RECOMMENDATION: RESIDUAL WASTE TREATMENT

The Government should release a policy statement outlining the future role of EfW as the best available residual waste treatment as well as its role in helping to decarbonise other sectors.

Carbon footprint

This inquiry has found EfW to be the lowest carbon option for managing residual waste, avoiding 200kg of CO2 for every tonne of waste diverted away from landfill.[9] There are still carbon emissions released during the process, however, with 10.7Mt reported in 2018.[12] Whilst this figure does not offset for the heat and electricity generation, it is still key to drive down these levels in line with reaching net-zero by 2050. This can be categorised into controlling two factors: what is being inputted - the feedstock; and what is being released - the emissions. A two-pronged approach to tackle both of these factors will be most effective.

Eliminating plastics from the residual waste stream

In order to drive EfW decarbonisation, the level of fossil carbon in the waste must be minimised, and the biogenic (renewable) component must make up the majority of residual waste. At present biogenic content makes up around two thirds of residual waste.[43] Burning fossil-based plastics is the most environmentally damaging material commonly treated by EfW, and removing plastics from the residual waste stream will be key to decarbonising EfW further.

The Environment Bill provides powers to introduce new measures higher up the supply chain, including new extended producer responsibility (EPR) measures, alongside an incoming deposit return scheme (DRS), as well as a drive towards a refill/reuse society.[8] These measures will target the removal of plastics, which will help to eradicate this issue and the environmental impact of our resources and waste arisings. However, if these measures do not achieve this, introducing a future carbon tax would be another effective way to drive down the levels of plastic* ending up in the residual waste stream, in turn driving decarbonisation of the waste stream.

Emissions

There are similarly emerging technologies to help capture and reduce the carbon impact of EfW emissions. Carbon Capture and Storage (CCS) technology is increasingly being trialled for different industries across the world. Recently a number of EfW plants across Europe have incorporated CCS both during the design and retrospectively.

Other innovative processes are utilising accelerated carbonation technology (ACT) during the flue gas treatment, to turn air pollution control residues (APCr) into aggregate construction products. This utilises waste CO2 and is typically carbon-negative, representing another form of CCS.[13]

RECOMMENDATION: DECARBONISING EFW

The Government should support the development and integration of Carbon Capture and Storage technology into EfW facilities, in anticipation of a future carbon tax.

CASE STUDY

Fortum Oslo Varme

Location: Oslo, Norway
Input: 400,000 tonnes per year
Output: District heating and cooling to Oslo, electricity
Interest: Klemetsrud is building and integrating full scale CCS. A pilot demonstrated the possibility to capture 90% of all CO2 in the flue gas.

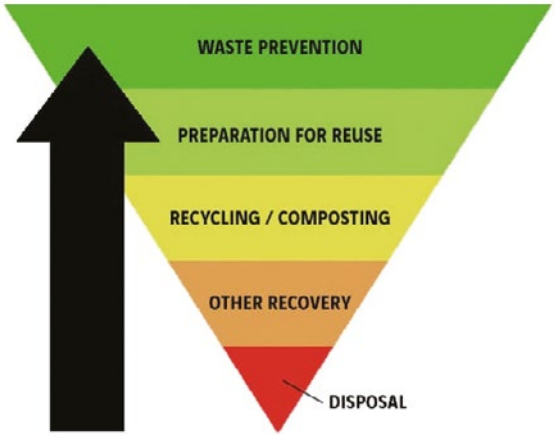
CHAPTER TWO

THE ROAD TO RECOVERY

The road to recovery

The majority of current waste legislation has derived from the European Union. The UK's departure from the European Union has presented the opportunity for the governments of the UK to be in full control of their waste policies, although details of the exact future relationship arrangements with the EU are not yet known.[14] Waste policy spans different levels of government within the UK. The UK Government has full responsibility for waste and resources across England, whilst the Northern Irish, Scottish, and Welsh Governments largely oversee their respective waste in most areas including managing municipal waste.[14] This inquiry references both England and the UK throughout, although is directly aimed at England's waste policy. The themes and technologies are nevertheless relevant and applicable to each devolved nation.

The Resources and Waste Strategy (RWS) set out the UK Government's ambitions for the future of the sector. Whilst largely focusing on recycling and reuse, there were new details on residual waste. The main aim was to drive up the efficiency of Energy from Waste plants, to ensure that they reach ***R1 Recovery status***. The simplest way to drive greater efficiency of EfW plants is to ensure heat generated by the process is being utilised rather than released into the atmosphere as waste heat.



The EU Waste Framework Directive ***(Directive 2008/98/EC on waste)*** developed the concept of the waste hierarchy, alongside the concepts of EPR and the polluter pays principle.[15] The hierarchy ranks five steps for waste management according to their environmental impact.[16] Whilst this is an EU Directive, the UK Government has reaffirmed that residual waste will continue to be treated in accordance with the hierarchy outside of the EU.[17]

The Waste Framework Directive (Article 3) also provides specific definitions of each step. EfW plants can typically be classified as either disposal or recovery, depending on their efficiency and output. The Directive distinguishes between disposal and recovery for EfW plants as the following:[18]

Recovery means any operation the principal result of which is waste serving a useful purpose by replacing other materials that would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. [Article 3(15)]

Disposal means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. [Article 3(19)]

It is vital to ensure EfW plants reach recovery status, in order to drive residual waste up to the highest possible level of the hierarchy. This is determined using the R1 Energy Efficiency Formula, which calculates the efficiency at which the energy generated by EfW is utilised. Some plants in the UK reach recovery status by solely generating electricity. If waste heat is utilised through district heating or another offtake, the R1 measure will be significantly higher than through electricity generation alone. As of January 2019, 28 out of the total 47 existing EfW plants in the UK were R1 Recovery accredited.[19]

Projections and capacity

Various factors will significantly affect future residual waste arisings, and as a result it is difficult to project volumes and required capacity. The Resources and Waste Strategy (RWS) presented Defra modelling, which projected residual waste arisings through to 2035. This modelling showed there to be an appropriate EfW treatment capacity, but also made a number of assumptions, as follows.

RDF exports

Exporting waste in the form of refuse derived fuel (RDF) for disposal abroad is prohibited.[20] However, RDF can be exported for recovery depending on the country's regulations, and the UK exported 3,137,266 tonnes in 2018[21]. The RWS modelling assumed RDF exports would be maintained at a similar level. However, since it was published, a number of European countries including the Netherlands and Sweden have introduced RDF export taxes.[22,23] Initial trends are already beginning to emerge of the levels of RDF exports reducing, with Environment Agency data for 2019 reflecting a fall to 2,714,225 tonnes.[24] It remains unclear exactly how this will affect UK export levels, but it appears unlikely that the volumes exported will remain stable as the RWS suggested.

Additionally, £280 million is being spent by the UK each year to export waste for other countries to recover energy from; often the same countries that the UK then imports energy from.[25] In our 2019 Plastic Packaging Plan, Policy Connect called for an end to plastic waste exports for recycling by 2030. The Government has followed this advice, committing in their 2019 Manifesto to an end to plastic exports, albeit only to non-OECD countries.[26] Whilst this is positive progress, export destinations must be judged on domestic environmental regulations for waste rather than economic status, to ensure exports are managed at the highest environmental standards. We now additionally believe that the UK should no longer be exporting RDF waste and should instead prioritise ensuring EfW is more acceptable through greater heat offtake.

RECOMMENDATION: MANAGING OUR OWN WASTE

The UK should stop sending its waste abroad. Rather than paying other countries to recover energy from our waste and buying energy back, the UK should deal with our own waste and recover more of our energy and heat needs.

Recycling targets

The RWS reaffirmed a recycling target for England of 65% municipal solid waste recycling by 2035, in line with the EU's Circular Economy Package.[6,27] Government projections for residual waste arisings assume that this will be met, however there is mounting expectation that these targets will be missed. DS Smith and Central Saint Martins' report ***Tipping Point*** shows the UK set to miss both short-term and long-term recycling targets, only expecting to meet 65% recycling by 2048.[28]

This inquiry heard a broad spectrum of views relating to if and when the UK would achieve the 65% target recycling rate. Regardless of exactly when 65% is met, this will leave a baseline of 35% residual waste. The volume of waste that 35% represents is likely to continue growing as population increases. Sufficient EfW capacity is key to avoiding reliance on landfill into the future.

Landfill reliance

Finally, the model in the Resources and Waste Strategy assumed that even by 2035, there will continue to be a reliance on landfill, to dispose of 10% of residual waste. Whilst we recognise there are a few materials where landfill is necessary, this target can be more ambitious, and landfill still accounting for 10% of residual waste is too high. Since publication of the RWS, the Committee on Climate Change have recommended a more ambitious target for an end to landfill of biodegradable waste by 2025; a decade sooner than the RWS previously outlined and modelled towards.[29]

> **The Government may meet or even exceed their waste targets, or they might miss them. In the meantime, what I would expect is for Government to continually check how they are doing and progressing, and readjust.**
>
> Roundtable participant

This inquiry found a broad spectrum of varying views on future treatment capacities; if and when waste management targets will be met; and how much landfill and exports will be relied upon. Whilst there was not a clear consensus around this, the lack of clarity in itself is notable, and therefore future planning has become difficult due to uncertainty. We note that whilst over-capacity should be avoided, the greater risk is continued landfill due to insufficient capacity. Additional EfW capacity will be required if we are to be sufficiently ambitious on driving down landfill and ending RDF exports. The risk of insufficient feedstock for future EfW lies with the private investors; and market dynamics can be expected to avoid this.

RECOMMENDATION: WASTE PROJECTIONS

Defra should produce a waste and resources roadmap, outlining the targeted and managed transition to a circular economy and net-zero ambitions.

This should include five-yearly reassessments of residual waste volumes, treatment capacities, and regional requirements, beginning from 2025. The roadmap should include an aim to drive down landfill reliance to as near zero as feasible, and account for externalities such as foreign RDF export taxes.

A circular economy

The inquiry found evidence and justification as to how EfW can be compatible with, and a servant to circular economy ambitions. The EU action plan for the Circular Economy regards one as where:

> **The value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised" and where "waste and resource use are minimised, and when a product reaches the end of its life, it is used again to create further value.[27]**

Naturally, the priority and focus of a circular economy is waste minimisation and redesign. However, a uniformly and totally waste-free society is not realistic. The latter part of this definition therefore poses a clear role for EfW in providing a valorisation service; complying with the waste hierarchy by displacing landfill, and as the best available and proven technology to recover maximum value from end of life waste.

There is an additional recovery of materials from incineration bottom ash (IBA), representing around 20% of the feedstock volume.[30] This is typically in the form of aggregate used for construction materials, or through removal of metals for recovery (including ferrous and non-ferrous metals). This reduces the pressure for additional virgin materials, and keeps materials in a closed loop. There is also an advantage of further carbon savings, given that secondary production (recovery) is typically less energy intensive than primary production such as mining. This is particularly the case with certain scrap metal recovery, producing up to 90% fewer carbon emissions than primary production.[31]

The needs of the future

It is critical to all conversations about waste arisings and management, that reduce is the highest and most desirable step in the waste hierarchy. Whilst achieving the most appropriate waste stream and treatment is the main focus, it should be noted this inquiry frequently heard that waste minimisation must be the Government's driving factor, and that more emphasis on this is required.

All waste streams must be approached holistically, and treated at the highest possible level of the waste hierarchy in accordance with the material type and value. In addition to reducing and reusing where possible, recycling rates must be maximised if the UK is to meet its target for 65% recycling of municipal solid waste by 2035.[6] The UK is being rightly ambitious on recycling, and it should continue to drive higher levels of recycling. Emerging technologies including chemical recycling can play a role in assisting this drive, by separating out recyclable materials found in the residual stream.

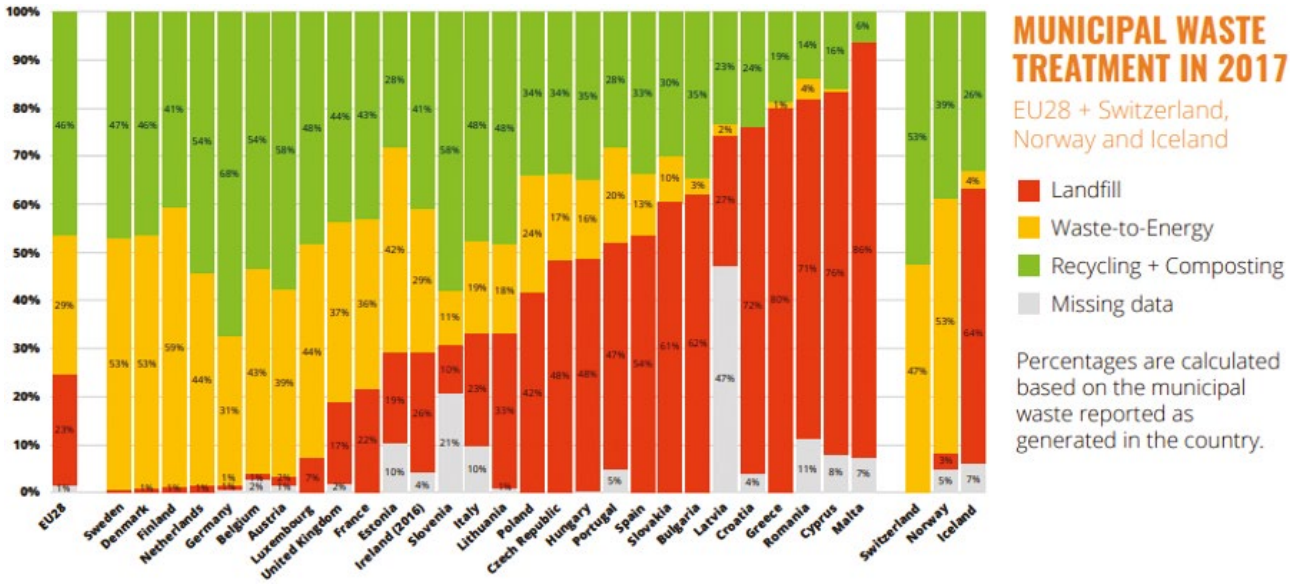
RECOMMENDATION: RECYCLING AND WASTE PREVENTION

The Government should drive a national public education campaign around personal responsibility and waste management, and its links to climate change. This should engage authorities and encourage communication of the end-process of residents' waste.

Equally, in aiming to reduce the volume of residual waste arisings, minimisation and recycling efforts need to be backed up by the necessary infrastructure being put in place. The implications of not doing so are evident in Scotland. The Scottish government introduced a target in 2012 for a ban on biogenic material going to landfill, to be effective from 2021.[32] However, as a result of insufficient alternative waste treatment capacity, there were reports of increased RDF exports, and the ban's inception date has since been extended.[33]

EfW and recycling rates

There are often claims that EfW inhibits recycling rates, however this inquiry found no evidence to support this. Conversely, countries with higher reliance on EfW than landfill, often provide evidence that EfW goes hand in hand with the best recycling performances. The below graph visualises the proportion of waste sent to either landfill, EfW, or recycled, by European countries in 2017.[34] In contrast to claims that EfW hampers recycling, the below shows that the countries with the highest and above average recycling rates, are the ones with more EfW and less landfill.



Municipal waste treatment in 2017. CEWEP graph based on Eurostat figures, 2019

Parts of the UK have replicated this trend albeit at a more localised scale. Buckinghamshire achieves well above average recycling rates (57% in 2014/15, compared to a national average of 43.7%), and this is alongside a move to EfW reliance for their residual waste, and the associated cost savings.[35,36]

Supporting recycling

Small amounts of potentially recyclable waste end up in residual waste streams. This problem often derives from mismanagement of waste at the producer and consumer level, and punitive measures on residual treatment infrastructure will not resolve this. As outlined in chapter one, a future carbon tax would be a more effective method to drive down plastics in the residual stream. Additional measures aimed at the production and design level in adherence with the polluter pays principle, alongside clarity and education for consumers are also key to avoiding this, and EPR reforms coming into effect from 2023 should help to address this.

There is also the opportunity for EfW to contribute to recycling and waste sorting infrastructure. EfW plants can be co-located alongside recycling or waste sorting facilities. This enables heat and energy generated by the EfW to be directly exported to power the energy intensive recycling processes. This would simultaneously improve EfW efficiency, and source easily available energy to enable recycling. Examples of this are already occurring in the UK, with new plants set to power co-located recycling plants.[37]

Resource efficiency

Resource efficiency is also a consideration when managing materials. Recycling a material is more desirable than sending it for recovery. There comes a point however, for example after a plastic has been recycled several times, where either more value can be recovered through effective recovery than another round of recycling, or where the material is no longer capable of being recycled without additional virgin materials. This demonstrates why flexibility and availability of both processes is key to maximising efficiency.

Incineration Tax

There is speculation that the Government could in the future introduce an incineration tax. Whilst this is not explicitly government policy, ministers have repeatedly stated that if long-term ambitions to maximise recycling are not met, an incineration tax may be considered.[38] This inquiry heard repeatedly that this would be detrimental primarily to local authorities' ability to manage residual waste, and that importantly such as step would not tackle the production of the waste higher up the supply chain. If the Government do in future proceed with this, they should provide clarity and demonstrate how this would be effective in achieving their aim. As part of this, they must calculate and reimburse the associated costs to local authorities, to avoid discouraging investment into necessary future infrastructure, and they should also consider the impact on heat decarbonisation ambitions.

As discussed in chapter one and recommendation two, there may be more appropriate measures that would drive the decarbonisation of the waste sector, including alternate taxes.

Public awareness

Over recent years, public awareness of appropriate waste management has risen up the agenda.[39] In particular, the popularity of BBC's Blue Planet II series at the end of 2017, which highlighted the impact of marine plastic pollution. This increased public consciousness of materials was termed the ***Blue Planet effect***, prompting retailers to introduce ambitious bans and targets on plastic packaging.[40] Despite this shift in public attitudes, this inquiry heard from several waste companies that they have seen little or no change to the volumes and materials composition of waste received in recent years. This is backed up in polling, showing that despite the growing concerns, individuals do not broadly intend to take responsibility for solutions.[39] Government should do more to turn attitudinal shifts into actions. Education around this should be driven at a national level to avoid regional variance. This should aim to improve understanding of both waste hierarchy/materials impacts, as well as the appropriate treatment infrastructure required.

The UK public has come to expect clean, waste-free streets, and the COVID-19 crisis has similarly reinforced the importance of safe management and appropriate disposal of waste. This basic but fundamental function of EfW should not be overlooked. There is also a level of disconnect between producing waste and requiring infrastructure to manage it, often leading to an 'out of sight, out of mind' approach on an individual level. To address this, the public education campaign should involve and engage local authorities. Councils are best placed to inform residents in a hard-hitting way how their waste is disposed, and some may wish to go further and communicate the specific end destination/site. Local authorities could achieve this by simply printing the relevant information onto their waste bins. Certain local authorities have already taken up this suggestion, but encouragement for all councils to do so would ensure a level playing field of information across the country.

RECOMMENDATION: WASTE AND PUBLIC AWARENESS

The Government should drive a national public education campaign around personal responsibility and waste management, and its links to climate change. This should engage authorities and encourage communication of the end-process of residents' waste.

CHAPTER THREE

FROM WASTE TO HEAT

From waste to heat

It is important to distinguish the EfW heat challenges from the wider heat network question. Heat networks appear a long-term ambition for the UK, as part of the net-zero heat decarbonisation strategy alongside debates around hydrogen and electrification. The timescales for addressing these two questions are also different, and EfW heat must be addressed sooner, as proposed plants that will be built over the next few years may well form some of the last generation of plants. Therefore, if the EfW heat challenge is not tackled now, this opportunity will pass.

> **It seems we need to use fairly blunt instruments in the short term if we want this to happen. We need to do things that will have an immediate effect rather than a long term strategic effect.**
>
> Roundtable participant

Resource efficiency

EfW facilities can ideally operate in CHP mode and connect to a heat network, to export the heat generated during the process directly to a suitable external heat demand. The previous Department for Energy and Climate Change compiled a list of these technologies.[41] Heat networks allow low carbon heat to be exported in the form of hot water or steam, and the length and total distance exported to can vary significantly. Similarly, the networks can serve different types of off taker, from entire communities to industrial parks.

As outlined in chapter one, the Government has ambitions for greater efficiency of EfW plants, to help ensure R1 recovery status is achieved. The most resource efficient method of extracting value from waste through EfW is to directly utilise this heat. This is because less energy is lost through heat export than through electricity generation. The Z Ratio or Z-factor calculation determines this, by comparing heat export and reduction of electricity generation for CHP plants. A high result demonstrates greater efficiency through heat supply.[42]

EfW heat displaces virgin energy - usually gas - by using wasted heat from a partly renewable source.[43] If communities do not harness this heat, it will continue to be produced by EfW plants but will instead be lost into the atmosphere as waste heat. Before thinking about generating new sources of low-carbon heat, it would be more resource efficient to harness existing heat already produced. Using EfW generated heat should be the first action taken by Government.

Decarbonising heat

As outlined in Chapter One, the Clean Growth Strategy outlines the need to decarbonise certain sectors in particular – including domestic heating, business, and industry. This inquiry found that EfW heat could play a role in the decarbonisation of all of these: decarbonising domestic heating through connecting to district heat networks, decarbonising industry through co-location and direct heat offtake, and helping more innovative and energy-intensive technologies emerging such as data centres and cooling systems. Similarly, the Committee on Climate Change's central scenario for the fifth carbon budget assumes heat networks will need to serve at least 18% of buildings heat demand by 2050.[44] Heat networks currently serve 2% of the UK's heat, and this inquiry heard that utilising the EfW heat already marked as "accessible" by Government would double this figure to 4%, which would be a great early win.

> From a strategic point of view, the UK needs to decarbonise heat. We will soon cease to use natural gas, but we do not yet have strategy. Now is a good time to incorporate EfW into a heat decarbonisation plan.
>
> Roundtable participant

RECOMMENDATION: A ROLE FOR WASTE HEAT

BEIS' upcoming Heat and Buildings Strategy should recognise a clear role for EfW heat to provide accessible low carbon heat, as a key early element on the road towards heat sector decarbonisation.

UK and abroad

EfW plants connected to integrated district heat networks are commonplace across much of Europe today, including in most large cities in Scandinavia. Naturally, the climate in the more northerly European countries lends them to requiring efficient heating systems. A common theme across northern European countries is also supportive policy towards CHP, including capital support (grants/tax relief) and power export support.[45] However, climate is not the sole explanation for better integration of EfW in Europe, particularly when countries such as the Netherlands, which has a similar climate to the UK, has effectively incorporated EfW into society. An extensive heat network grid across much of Europe additionally links to historical acceptance of the systems in these countries, as well as the fossil fuel price shock during the 1970s.[46]

The UK is a long way behind the rest of Europe when it comes to utilising EfW heat. Instead UK policy has historically favoured the adoption of gas network supplies for heat, and was until recently the world's largest market for boilers.[46] Most modern EfW plants are built CHP-enabled (Combined Heat and Power), in anticipation of finding a heat customer.[47] However, as of 2018, of the 40 EfW facilities in the UK only eight were actually operating in CHP mode.[6]

Despite this lack of progress, this inquiry found the waste sector to be almost unanimously supportive of the Government's EfW heat ambitions, and would welcome the opportunity to export their heat. Similarly, it was noted that when the EfW debate shifts away from emotional arguments around waste, and towards the opportunities and practicalities of heat, it becomes a much more constructive conversation.

There are however currently a number of barriers and challenges that are preventing heat offtake from being viable in many cases. In order to realise these ambitions, the Government needs to provide support to help address these barriers. These include the following measures, which should be regarded as an options menu (for example 5 and 7 overlap slightly):

1. **Statutory undertaker powers** should be extended to the heat network infrastructure. A contentious aspect of connecting EfW to a heat off-taker is often the need for a pipe to cross beneath a road or small piece of land. Without powers, landowners can refuse or demand a significantly high price to do so, to the extent that the connection ceases to be viable. Statutory undertaker powers would enable essential pipe connections to be made, in line with powers awarded to other utilities and infrastructure sectors.
2. **Permitted development rights** should be extended to EfW pipe work connections, as is being consulted on in Scotland.[48] This would create a more level playing field in terms of the planning system, enabling EfW heat networks to compete with traditional heat sources (gas and electricity).

3. **Building regulations** should be reformed, so that rather than penalising waste heat loss from a pipe, where the alternative is to waste all the heat; successfully exported heat is instead incentivised. Additionally, SAP methodology; Defra's life cycle analysis data on carbon emissions, should be updated. This should holistically view EfW and EfW heat networks together.

4. **Zoning** should be explored, as a solution to identifying demand and reducing risk. Zoning would enable regions to be identified according to their requirements and opportunities. This concept would typically be a wider programme incorporating a multitude of different sectors and interests across the energy industry, amongst which EfW would be a consideration. Alternatively, a smaller scale programme could focus solely on EfW, considering heat customers and demand, infrastructure relating for transporting waste, waste volumes etc., but finding heat customers must be the priority.

5. **Concession zones** are being increasingly used in European cities to develop and expand new heat networks, requiring developments within a certain radius of a plant/network to connect to the heat network, unless an alternate low-carbon heat source is used .

6. **A waste-heat incentive** to continue to provide an element of financial support for the development of low carbon heat infrastructure, and to reduce/underwrite some of the commercial risk. The 2020 Budget included announcements of an extension to the Renewable Heat Incentive, as well as investment in a new Green Heat Networks Scheme to follow on from the success of the Heat Networks Investment Project (HNIP). These are promising commitments, and more details on these measures will be welcome.

7. **A local planning requirement** should be introduced, obligating a feasibility assessment of any new development to either install a new heat network, or to connect to an existing heat network importing EfW heat. MHCLG should additionally consult with industry and developers to determine and set a challenging threshold for the number of houses in any new development, above which a heat network connection would be required.

RECOMMENDATION: ADDRESSING THE HEAT CHALLENGE

The Government should implement a package of aligned and complementary measures drawn from the menu in this report, to address identified barriers to the EfW heat challenge.

Location

This inquiry found that the most significant challenge and barrier to EfW heat use is location. The specific spatial location of a plant largely determines the feasibility of finding and connecting to a heat customer.[50] Location includes the proximity to potential heat off-takers, the length of any connection required, the surrounding land, and the local authority planning requirements.

Plant locations appear to be driven by suitable land availability to developers, focusing on land price and planning characteristics rather than a broader holistic approach. As a result, a disproportionate number of plants are located in Northern England where land values are typically lower.

Similarly, a large number of existing EfW plants in the UK are located rurally, away from housing or industrial developments.[50] This has largely been driven by local opposition to planning applications, which has led to these isolated locations and often-derelict former industrial land becoming the sites of least resistance. Whilst this community engagement is important in the planning stages and determining of the new plant locations, this historical opposition has meant there are now numerous sites in the UK where heat connections have not been viable, unless there are new development near to the sites in the future.

This contrasts with much of Europe, where this inquiry heard that it is commonplace for municipal authorities to influence waste and energy planning, to the extent that locations of EfWs and connection to heat networks are delivered. Given the RWS ambitions for greater use of EfW heat, the Government should help determine locations of future plants, and finding a suitable heat customer should be the priority.

RECOMMENDATION: FINDING THE RIGHT LOCATION

The Government should establish or actively participate in a cross-sectoral forum to consider the appropriate location of EfW infrastructure, prioritising finding potential heat customers.

This forum would aim to replicate the success of the Offshore Wind Industry Council. It would enable Government, industry, local authorities, and residents to approach opportunities and challenges collaboratively, considering aspects like regional resource requirements, waste volumes, heat demand, community engagement, transport, and local planning requirements. This would help avoid the lack of local planning coordination and emphasis on local authority boundaries, as well as the current high levels of spending on planning processes.

Given the need to engage across central and local government it would make sense for this to be a cross-sectoral board that sits within government machinery, such as the National Infrastructure Commission. Alternatively, the future role of the UK Resources Council (currently being established for the waste and resources sector as part of the Government's sector deal programme) could be extended to incorporate this forum.

Wider heat network development

The challenges for the development of EfW heat networks typically fall within two categories. Some of these challenges and barriers are directly related to EfW infrastructure and land, and these have been discussed.

Certain other challenges are more broadly relating to the UK's development of heat networks and a heat grid. During the course of this inquiry, a range of other major challenges were raised that can only be addressed as part of a wider development of heat network technology, markets, and frameworks. These are complex issues which require further discussion and investigation. Nevertheless these are still of relevance to EfW, and should serve to further facilitate the viability of EfW heat as Government addresses these, as well as stabilising any difficulties that arise in the short term. Below is a brief summary of some of the key challenges:

Commercial risk

From planning and construction stages, to contract writing, and throughout the operation there is the factor of waste-heat risk. This relates to the lack of standardised contracts, dependence of the parties on continued operation, the limited lifespan of CHP plants, and fixed heat prices. Some of this risk is likely to be reduced by contract standardisation and demonstration, and incentives from regulators (BEIS/Ofgem) could underwrite and further reduce this.

Consumer protection

There are a range of considerations relating to consumer protections and challenges posed by heat networks which are addressed in different ways. This can relate to the natural monopoly and difficulty in switching suppliers, regulating the operator, bill composition and more. Regulations will likely be needed to guarantee consumer rights, for example giving the right for new operators to take over a network if standards are not met. A recent Energy Technologies Institute report identified regulating monopoly capital and consumer protections as the greatest barrier to heat network implementation in the UK.[46]

Development of a heat grid

The UK is developing heat grid infrastructure at a much slower rate than abroad. Only 2% of the UK's heat demand is currently served from heat networks, and the majority of these are in London. Large regions of England, including Yorkshire, have almost no current use of heat networks although a number of applications are beginning to be developed.[51] At the time of this inquiry, BEIS is consulting and developing a heat network market framework.[52]

Backup heat

Heat networks are typically powered by a main primary source (EfW or other CHP plants). These facilities inevitably need to be switched offline for a small part of the time each year, for maintenance and in line with their Environmental Permit conditions. Heat network customers will therefore require a backup source to provide heating during these downtime periods, or alternatively heat networks need to be built to facilitate multisource, enabling alternate heat sources to feed-in. This would promote the close location of a number of linked heat sources, and again this would require co-ordination and planning.

Thermal storage

This is providing a flexible solution to simultaneous heat and electricity generation, as well as intermittent heat demand. By storing heat during low demand periods, CHP plants are able to continue to generate and meet ongoing electricity demand, and the stored heat can then be released at a later point as required.[51] Thermal storage also has a role to play in providing continued heat during periods where generation is paused for maintenance or refurbishment. Further technological development and demonstration is required in this area, although strides are being made.

CHAPTER FOUR

UNLEASHING SOCIAL POTENTIAL

Unleashing social potential

This inquiry found that EfW facilities could offer a range of social benefits for the surrounding communities, if they are well-integrated. However, this community value can only be unlocked by ensuring plants are as efficient, well-regulated, and engaged with the community as possible.

Misconceptions

The greatest barrier to EfW planning permission is often opposition from small numbers of local residents. Engaging and communicating with the local communities throughout planning stages is critical in ensuring plants are well integrated. Recommendation eight would enable local authorities and resident groups to be part of the wider-scale discussions in determining the most appropriate locations for future plants.

Defra addressed a number of the common concerns and misconceptions around EfW in their 2014 ***guide to the debate*** publication.[53] The understanding of the purpose of EfW amongst the public appears to have broadly improved over recent years, and the main ongoing issue tends to be related to the location; a case of "why here?". Despite this, certain campaigns continue to oppose plants; building emotional cases that largely rely on inaccurate grounds:

Health and air quality

The most common concern is around the potential health and air quality implications of EfW plants, through emissions and particulates released into the atmosphere. There is a historical misconception that EfW emissions contain significant levels of pollutants, which are harmful to the health of the local community.

EfW emissions are closely regulated by the plant's Environmental Permit. This permit is awarded by the regulating authority which is either the Local Authority in the case of small facilities, or in most cases the Environment Agency. The authority then regulates the plant in accordance with the Environmental Permitting (England and Wales) Regulations 2010.[54] EfWs are required to submit strict Air Quality Assessments, to demonstrate that the plant meets emission limit values as set out in the Directive 2000/76/EC on the incineration of waste (Waste Incineration Directive).[55]

Public Health England commissioned research from the Small Area Health Statistics Unit (SAHSU) at Imperial College London, looking into the health impact of EfW plants. Three papers were published between 2018 and 2019. These found no evidence of an increased risk of infant mortality for children living close to ***Municipal Waste Incinerators***, and a causal association between an increased risk of congenital anomalies and close proximity to MWIs was not established.[53] The current PHE risk assessment and guidance is:

> **Modern, well run and regulated municipal waste incinerators are not a significant risk to public health. While it is not possible to rule out adverse health effects from these incinerators completely, any potential effect for people living close by is likely to be very small**

What is less well communicated is the balance of health risks. Nearby communities connected to district heating avoid the need for a natural gas boiler in the home, removing potential health risks associated with burning gas.[56] Health questions around EfW appear more frequently than any possible impacts of boilers, or nearby roads etc. despite no increased evidence. For example based on data from BEIS' National Air Emissions Inventory, bonfire night alone contributed 10 x more dioxin emissions in 2016 than all EfW plants throughout the year.[57]

The EfW operators have to play a role in this, through being as transparent and open with their emissions data as possible in order to build public confidence. It is becoming increasingly common for facilities to publish a live emissions tracker on their website for the public to view, as well as monthly reports.

It has become commonplace to dismiss EfW as dangerous and associate it with claims of health risks, despite no evidence to support this. What is less frequently recognised is the basic but fundamental service in maintaining hygiene that EfW first and foremost provides. Preventing waste build-up in the streets, reducing the spread of diseases, and the safe disposal of medical and hazardous waste would often be overlooked, but in a post-COVID-19 world will likely become more important and of greater public interest than ever.

Other concerns

Recycling

There is a continued perception often from local opponents to EfW that the process is detrimental and hampers efforts to increase recycling. Chapter two outlines why this inquiry found no evidence to support this, and in fact shows that areas with EfW often have the highest recycling performance.

Traffic

The other common ground of opposition is around traffic movements generated by waste imports. In addition to stack emissions from EfW outlined in the previous health section, Environmental Permits also assess fugitive emissions generated, which includes traffic fumes as part of the operation.[54]

There are also EfW plants across the county where waste is being transported to the plants via different means, such as on rail or water as seen on the Thames with tugs transporting 1,000,000 tonnes each year to the Cory Riverside plant.[58] These are all considerations linked determined to the plant location, which should be assessed holistically in line with recommendation seven.

Social value

Social or community value can be difficult to measure and ascertain. Certain community benefits are tangible and easily measured, often being required in planning applications through s.106 obligations.[59] However, others are less so, and it becomes increasingly difficult to consider these appropriately alongside more directly measurable factors. Despite this, many of these benefits remain invaluable to the strength, cohesion, and future proofing of communities. More effort should be made to recognise the contributions EfW could make to future sustainable communities.

Housing and new homes

The most significant source of social value is understood to stem from heat utilisation. When an EfW connects to a heat network and supports local communities, there are numerous benefits. Primarily, this is through improved efficiency and cost savings. EfW heat is in itself a by-product of waste management, in contrast with other sources of energy/electricity generation. As a result, this presents an opportunity to export the heat at a more affordable price.

> You've got to meet people where they are, and they want to see real examples. Is there somewhere people can go and visit to see how they are getting heat offtake into their home? They need to see something tangible that reassures them that they can get on board.
>
> Roundtable participant

MHCLG are currently consulting on the new Future Homes Standard, ahead of its implementation by 2025. This will aim to amend building regulations, to future-proof homes with low-carbon heating and greater energy efficiency.[60] It will ban gas-grid boiler installations, and replace these* with more efficient heat systems.[61]

The National Planning Policy Framework currently contains a presumption in favour of sustainable development.[62] This presumption should be extended so that it applies to new developments nearby to EfW plants, which intend to source low-carbon heat from the EfW plant. This would simultaneously help to access existing low-carbon heat, drive greater efficiency of both EfW and of domestic heating, and contribute to the Government's 'Build Build Build' agenda.

RECOMMENDATION: PLANNING AND NEARBY DEVELOPMENT

The Government should revise the National Planning Policy Framework's presumption in favour of sustainable development to include proposed developments using EfW heat.

It is additionally worth considering the contribution that this affordable heat can have towards addressing fuel poverty.[63] BEIS' most recent figures for 2017 showed that more than 10% of households in England were experiencing fuel poverty.[64] Within this, rural areas typically experience the highest prevalence of fuel poverty.[65] As outlined in chapter two, a number of existing EfWs are located in remote rural locations. This planning presumption could help facilitate developments that both improve efficiency of EfW, and help address fuel poverty particularly within rural areas. Additionally, building developments near to existing EfW removes the community opposition, and likely enhances the community buy in to maximise social value.

Public services

Another opportunity is for local authorities or other public bodies to provide the initial heat load (anchor load) for a district heating scheme, thus supporting the development of the rest of the heat network and minimising investor risk. This heat load would be in the form of buildings and could therefore provide the basis for community infrastructure; either the main council buildings, or other energy intensive community facilities such as schools, hospitals, and swimming pools.

Employment

An EfW facility creates a range of skilled jobs, whether these are plant operators, engineers, drivers, managers, educators and tour guides or others. As is historically often the case with large industrial employers, the local communities can develop close links with the facility, through long-term employment often spanning multiple generations. Market analysis shows potential for the creation of both direct and indirect jobs for regions, with plants typically creating around 50 permanent skilled jobs, as well as hundreds of further jobs during the construction phase.[66]

The Department for International Trade is increasingly exploring opportunities to create jobs and capabilities in the UK to produce the necessary infrastructure for heat networks. In addition to the job creation, achieving this would both improve sustainability and avoid paying excess amounts to import products from abroad.

Education

Increasingly, EfW plants are integrating educational facilities into developments, as well as offering tours to develop greater public understanding of waste management. These facilities become a valuable resource for local schools and communities, and this practice should be encouraged as much as possible.

Investment

It is worth considering the potential investment awarded from EfW and district heat networks, at both a local and national level. As well as creating local jobs, new EfW plants are likely to bring about investment to the locality more broadly. Whether this is by levelling up transport infrastructure, developing community spaces or gardens, facilitating local education, or powering new sustainable communities, these are all elements that will only arise as a result of the EfW.

Developing the EfW heat market has additionally become increasingly important for Government at the scale of attracting foreign direct investment into the UK, as well as helping UK companies to export overseas. This potential investment presents an opportunity for EfW and heat networks to contribute to the economic recovery from the COVID-19 crisis. If done efficiently and in line with this inquiry's recommendations, this could also play a role as part of the much-discussed ***green recovery***.

Supporting local industry

As outlined in chapter one, co-locating an EfW near to an industrial park and exporting heat/energy to power the industrial processes, provides an opportunity to also help reduce the carbon impact of the industry. This future proofing of communities and existing infrastructure is key both to net-zero, but also to keeping the public on board and maintaining community ties.

Methodology

This project drew upon a wealth of research and reports from a large number of organisations, as well as primary data collected through one-to-one interviews and roundtable discussions with experts from industry, academia, government and NGOs.

A total of 16 interviews were undertaken between December 2019 and February 2020. Three parliamentary roundtables were held in January and February 2020 to discuss issues in more detail. 16 further written submissions were additionally received. A full list of contributors is outlined below.

The views in this report are those of the author and Policy Connect. Whilst these were informed by the listed contributors, they do not necessarily reflect the opinions of these organisations.

Roundtable A

Residual waste, a circular economy, and the future role of EfW. 14th January 2020 — Chair: Lord Teverson

Roundtable B

EfW heat opportunities and challenges. 28th January 2020 — Chair: Deidre Brock MP

Roundtable C

EfW and the community. 11th February 2020 — Chair: Alex Sobel MP

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Countryside Properties
Department for Business, Energy & Industrial Strategy
Department for International Trade
East London Waste Authority
Environmental Services Association
Extinction Rebellion
FCC Environment
Foresight Group
Greenpeace
Grundon
Homes England
Inspiring Sustainability
Keith Riley
Knowledge Transfer Network
Local Authority Recycling Advisory Committee
Lincolnshire County Council
Local Government Association
MVV Environment
National Association of Waste Disposal Officers
North London Waste Authority
OCO Technology
On Pack Recycling Label
Orsted
Renewable Energy Association
Suez
Tolvik
University of Birmingham, Energy Research Accelerator
University of Leeds (Resource Recovery from Waste Programme)
University of Northampton
University College London (Current Student)
Vattenfall
Velocys
Veolia
Viridor
Wales & West Utilities
Western Riverside Waste Authority
WRAP

About this report

This report is the culmination of a six-month inquiry into the future role of Energy from Waste in the UK. The project was carried out by the Sustainability team at Policy Connect, and was supported by industry stakeholders as members of the Sustainable Resource Forum.

The evidence gathered was from roundtables, interviews, and written submissions. The transcripts were then analysed using thematic analysis to identify themes, which were then developed through desk research and interviews to form the report and its recommendations.

The Sustainability Team

The All-Party Parliamentary Sustainable Resource Group (APSRG), The Sustainable Resource Forum, All-Party Parliamentary Climate Change Group (APPCCG), Carbon Connect, and the Westminster Sustainable Business Forum (WSBF) make up the Sustainability team at Policy Connect.

Policy Connect

Policy Connect is a membership-based, not-for-profit, cross-party think tank. We bring together parliamentarians and government in collaboration with academia, business and civil society to inform, influence and improve UK public policy through debate, research and innovative thinking, so as to improve peoples' lives.

We lead and manage an extensive network of parliamentary groups, research commissions, forums and campaigns. We are a London living wage employer and a Member of Social Enterprise UK, and have been operating since 1995. Our work focuses on key policy areas including: health & accessibility; education & skills; industry, technology & innovation; and sustainability. We shape policy in Westminster through meetings, events, research and impact work.

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Special thanks also to Professor Margaret Bates for her academic advice and support throughout.

Appendix 1: Assumptions and figures used to calculate the level of potential

> Generate enough EfW heat equivalent to the needs of **half a million homes** if we can address the heat challenge

- Using a central scenario for waste projections, with 24.5 million tonnes of residual waste in 2030, and 60% combined recycling rate
- Modelled as if EfW continues to increase its share of the residual waste market at a similar rate, and receives 80% of residual waste arising in 2030
- Modelled as if 70% of available EfW capacity were able to export heat in 2030
- Calculates the amount of heat generated per tonne of waste input, across the ten EfW plants in the UK exporting heat in 2018 - 450kWh$_{th}$/t – and extrapolated across the projected 2030 EfW capacity exporting heat
- Assumed an average household heat consumption of 12,300kWh$_{th}$ per year

> Afford to build **10 high spec plastic recycling facilities** each year with the money currently spent on shipping RDF abroad

- Based on a current national spend of around £280 million per year on RDF exports
- Assumed a cost of high specification plastic reprocessing facility of around £29 million

> **Avoid 4 million tonnes of CO_2** in 2030 by displacing landfill

- Based on 200kg of CO_2 saved for every tonne of waste diverted from landfill to EfW
- Applied to central 2030 scenario, assuming 80% of this waste goes to EfW
- The CO_2 savings are likely to be higher once offsetting from heat utilisation is factored in

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