

## ENERGY FROM WASTE AND A CIRCULAR ECONOMY

### A RESPONSE FROM THE RESOURCE RECOVERY FROM WASTE PROGRAMME TO THE POLICY CONNECT CALL FOR EVIDENCE ON ENERGY FROM WASTE

*RRfW is a £7M strategic investment by NERC, ESRC and DEFRA. Running from 2014 to 2019, the programme brought together more than 300 partners from academia, government and industry to provide evidence and tools for a radical change in resource and waste management. RRfW envisioned a circular economy in which resources and wastes contribute to a resilient environment, human well-being, and clean growth. The programme actively contributed to public debate around circular economy and offered evidence from academic research for the development of government strategies, policies and regulations – such as the Industrial Strategy and the Resources and Waste Strategy – and coproduced circular economy solutions with companies in mining, manufacturing and resources sectors.*

**Main message: The resources sector should strive for economic, social and environmental benefits at a whole system level. The energy from waste (EfW) sector should avoid sectioning itself off from the resources sector. The resources sector perceives EfW as a transition technology. While EfW can reduce adverse environmental and social impacts, it cannot provide the morally – and soon anticipated legally – expected absolute improvements for social well-being and environmental quality that general public, government and indeed the resource sector itself wants. The sector should articulate a proactive and integrated plan to minimise residual waste and dependency on EfW in increasing measures, shifting emphasis to more sustainable solutions such as recycling and waste prevention as soon as possible. Tremendous progress within the sector has been realised shifting mind-sets from being perceived as the collectors of rubbish to becoming the custodians of resources. This must now be followed by coherent sector-wide action.**

#### **What does the future of waste management in the UK look like? What is the role of energy from waste in achieving a circular economy?**

*How can EfW be compatible with a circular economy, and avoid negative knock-on effects for the environment, both at a local and global scale? (Q6)*

1. A sustainable circular economy aims for net-gains in social well-being and environmental quality while strengthening economic prosperity at a whole system level<sup>i</sup>. This moves beyond reducing the adverse impacts of our current economy, such as growing inequality and on-going environmental degradation. EfW has potential to reduce some environmental impacts and there is potential for some social benefits, but at a whole system level it creates a negative trade off in maintaining a higher demand for raw materials than would be the case in a circular economy based on material recovery and reduced material consumption (Figure 1).
2. While the use of EfW has been useful to divert waste from landfill, it is not part of a long-term circular economy as it destroys resources, making them unavailable for future use. The scale of this destruction is startling; for instance, in the municipal waste stream, 3 times as much plastic and textiles and 5 times as much food waste are incinerated than are collected for recycling each year<sup>ii</sup>. The reporting of EfW in government figures is

- lumped into a ‘recycling and recovery’ category, which effectively masks both the parlous state of recycling and the prevalence of incineration.
3. EfW offers potential for the creation of benefits in parts of the resource system, named in the inquiry are for example job creation and dealing with fuel poverty. However, the job potential for a high-value and sustainable circular economy is far higher than that of a low-value end-of-pipe solution offered with EfW; activities such as reuse and remanufacturing are already employing more than 4 times as many people than disposal, EfW and recycling combined, and have potential to grow by over half a million jobs<sup>iii</sup>.
  4. EfW was responsible for emitting ca 5 million tonnes of CO<sub>2</sub> in 2017<sup>iv</sup>. This in contrast to a high-value circular economy – a circular economy by design with greater emphasis on dematerialisation and durability – which is estimated to save 200MtCO<sub>2</sub> by 2032 and considered to be a necessary contributor to achieving the 4<sup>th</sup> and 5<sup>th</sup> carbon budget<sup>v</sup>. It is also the only strategy to curb the degradation of natural capital caused by the astronomical exploitation of resources that recently surpassed 100 billion tonnes per year<sup>vi</sup>.
  5. A sustainable circular economy that can create social and environmental net-gains at a whole system level also offers significant opportunities for economic prosperity, with conservative forecasts for circular economy to add 10Bn to the UK economy<sup>vii</sup> and globally \$4.5 trillion<sup>viii</sup> by 2030.

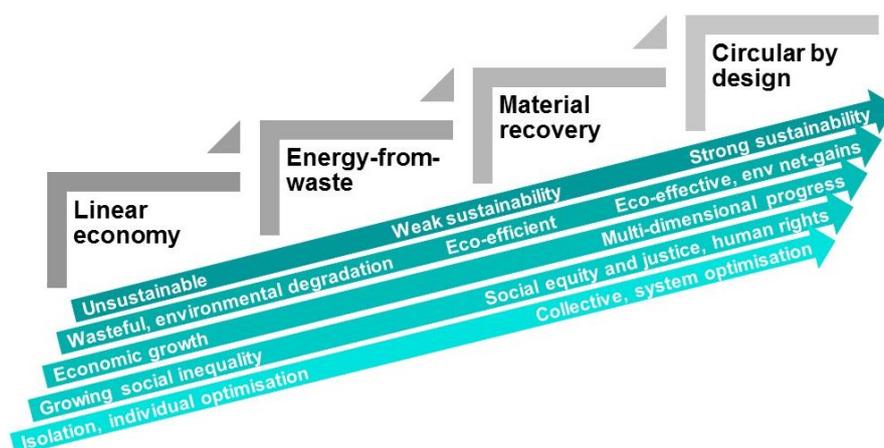


Figure 1: ©RRfW. RRfW identified 3 types of circular economy, all with different economic, social and environmental costs and benefits profiles and potential to contribute to sustainability (from: Velenturf and Purnell (in preparation)).

**What are the Government’s ambitions for waste management and targets for the future? (Q3)**

6. Government aspires to implement a sustainable circular economy in the UK that regenerates environmental quality and strengthens the economy<sup>ix</sup>:
  - The Industrial Strategy (2017) states that the government is “committed to moving towards a more circular economy – to raising productivity by using resources more efficiently, to increasing resilience by contributing to a healthier environment, and to supporting long-term growth by regenerating our natural capital” (p148).
  - The Clean Growth Strategy aims to achieve decarbonisation objectives (enshrined in the Climate Change Act) at low cost to UK taxpayers, consumers and businesses while maximising social and economic benefits for the UK, and as such is championing a circular economy in which renewable energy fuels economic growth.
  - The 25 Year Environment Plan (2018) aims to improve the environment, to be enshrined in law via the Environment Bill. Amongst other objectives, 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).

- The Resources and Waste Strategy (2018) states that “A more circular economy will see us keeping resources in use as long as possible, so we extract maximum value from them” (p7). The government aims to preserve materials by minimising waste, promoting resource efficiency and moving towards a circular economy; complementing the Industrial and Clean Growth Strategies to double resource productivity and eliminate avoidable waste by 2050.
- 7. Government actions must be aligned with its ambitions. Published plans for Government “domestic recycling infrastructure” (Resources and Waste Strategy, WIDP) list only EfW and/or BMBT plants; there is barely any mention of actual recycling infrastructure. UK EfW capacity is expected to grow to around 18 Mtpa (83% direct EfW and 17% preparation of RDF). The municipal waste demand on EfW (currently 75%) will drop below 60% even if household waste arisings remain stable and all combustible waste currently sent to landfill is sent to EfW. The combustible fraction of C&I waste would only add a further 15% at most, leaving an over-capacity of some 25%. This has to be filled with something: “it is not inconceivable that business models for planned EfW capacity assume waste could be diverted from current reuse and recycling processes to reduce the investment risk, exacerbated by the increasing reduction in export markets as traditional destinations ban waste imports. On top of the concerns surrounding the ‘circularity’ of incinerating potentially useful resources in the first place, either within England or via exports of RDF, this does not bode well for achieving a truly circular economy. This is not helped by official statistics recording ‘recovery and recycling’ as a single category, implying that they are of equal value in achieving circularity.”<sup>x</sup> Any expansion of recycling, reuse or demand reduction – the true heart of a circular economy – will reduce demand for EfW (and hence the danger of diversion) still further.

*How should residual waste be managed across the regions/countries within the UK, both in the short and longer term? (Q9)*

- 8. The resource sector considers EfW as a transition technology. A step on the way towards a sustainable circular economy. Indeed, industry voted for “Design for durability, reuse and recyclability embedded in supply chains” as the most important aspect of realising a circular economy<sup>xi</sup>. Great strides forward have been made in the resource sector in recent years, moving from a perception of being the collectors of rubbish to becoming the custodians of resources. Members at the heart of the resource sector itself are now an active voice in reducing resource consumption. This fits within the picture of a longer-term transition from “closing” loops at end end-of-pipe with EfW to a sustainable circular economy with emphasis on new markets for example for responsible consumption, products-as-a-service, reuse, repair, and remanufacturing.
- 9. In the immediate term, the resource sector should prepare a transition plan including an inventory of current resource management solutions and innovations that are at various technology readiness levels to reach the market. This plan must include commitments – set out in time – to phasing out the current overreliance on EfW. The plan should also include commitments to investment into physical infrastructure for recycling, remanufacturing, repair and reuse, and supporting infrastructure such as data systems, centres of excellence, governance structures, and education plans for both decision-makers and communities. The required scale for investment into physical infrastructure has been estimated at £5-£25Bn, and that excludes the supporting infrastructure<sup>xii</sup>. This is a burden too great to carry by the resource sector alone, especially considering the risks associated with investments other than EfW and that a part of the measures is outside of the control of the resources sector to realise, and hence a joined effort with Government is advisable. The Sector Deal for Resources offers an ideal opportunity moving forward<sup>xiii</sup>.

10. The primary focus for residual waste management should be the prevention of its arising in the first place, through reduced demand (buy less, buy better, do more with less), reuse and refurbishment, and recycling. Investing the £3Bn planned for EfW in the hard and soft infrastructure required to support these activities would generate order-of-magnitude ‘bang for buck’ gains in terms of preventing waste from poisoning our land, water and air. Our current EfW capacity would be more than sufficient for our needs<sup>xiv</sup>. It would reduce fiscal expenditure on waste management and waste crime, and increase material security.
11. In the medium to longer term waste arisings could be prevented by at least 50%. This will require a sustained effort to change behaviour of citizens and companies in the UK, embedding more reduced and responsible consumption, reuse and repair, and recycling in normal daily practice. It will also require investment into a diverse set of physical and supporting infrastructure (see [9]) to retain the values of products and materials within the economy for longer. Leapfrogging towards the practices and infrastructure for a sustainable circular economy can significantly reduce the total amount of investment required while maximising economic, social and environmental benefits for the UK in a global context.<sup>xv</sup> The EU aims for a 50% reduction in waste by 2030<sup>xvi</sup> and the UK is committed to outperforming our European neighbours and showing global leadership.

*What are the current barriers that might prevent the UK from improving sustainability in the residual waste sector? (Q10)*

12. Government actions are critical to raise ambitions for the resource sector for greater sustainability, with significant benefits for UK plc (see [3-5])<sup>xvii</sup>. Government is in control to remove persistent barriers and should take the following supporting measures:
  - Align government ambitions for a regenerative circular economy with actions for a balanced investment into resource infrastructure for recycling, data systems, centres of excellence, innovation, governance structures, and education and behaviour change.
  - Set targets and agree metrics for holistic progress towards the regenerative circular economy that Government aspires to, including environmental, social and economic metrics to be considered in a joined up manner in assessment and decision-making.<sup>xviii</sup>
  - A major barrier is the lack of data on resource stocks and flows. Government should invest in the establishment of a National Materials Data hub via ONS.<sup>xix</sup>
  - Assess existing circular economy infrastructure and analyse capacity requirements, extending NIC’s assessment with insight into infra for reuse, repair & remanufacturing.<sup>xx</sup>
  - Set ambitious waste prevention measures and supporting actions in the revised Resource Security Action Plan and Waste Prevention Programmes.
  - Negotiate a Resource Sector Deal that commits to phasing out EfW and invest in infrastructure for a sustainable circular economy instead (see [9-11]) to maximise economic, social and environmental benefits.

<sup>i</sup> Velenturf, A.P.M., Purnell, P. (in preparation) Principles of a Sustainable Circular Economy.

<sup>ii</sup> [https://www.green-alliance.org.uk/resources/word/Methodology/circular\\_economy\\_infrastructure\\_methodology.pdf](https://www.green-alliance.org.uk/resources/word/Methodology/circular_economy_infrastructure_methodology.pdf)

<sup>iii</sup> [https://green-alliance.org.uk/building\\_a\\_circular\\_economy.php](https://green-alliance.org.uk/building_a_circular_economy.php)

<sup>iv</sup> <https://resource.co/article/uk-incinerators-released-11m-tonnes-co2-2017-says-ukwin-12922>

<sup>v</sup> [https://www.green-alliance.org.uk/less\\_in\\_more\\_out.php](https://www.green-alliance.org.uk/less_in_more_out.php)

<sup>vi</sup> <https://www.circularonline.co.uk/news/global-resource-consumption-passes-100-billion-tonnes-a-year/>

<sup>vii</sup> [https://www.bitc.org.uk/sites/default/files/resource\\_productivity\\_and\\_the\\_circular\\_economy\\_opportunities\\_for\\_the\\_uk\\_economy-compressed\\_1.pdf](https://www.bitc.org.uk/sites/default/files/resource_productivity_and_the_circular_economy_opportunities_for_the_uk_economy-compressed_1.pdf)

<sup>viii</sup> [https://www.accenture.com/t000101011000000z\\_w\\_/ao-pt/acnmedia/pdf-19/accenture-waste-wealth-transcript.pdf](https://www.accenture.com/t000101011000000z_w_/ao-pt/acnmedia/pdf-19/accenture-waste-wealth-transcript.pdf)

<sup>ix</sup> [https://resource.recoveryfromwaste.files.wordpress.com/2019/09/rfw-evidence-briefing-nmdhub\\_v2.0.pdf](https://resource.recoveryfromwaste.files.wordpress.com/2019/09/rfw-evidence-briefing-nmdhub_v2.0.pdf)

<sup>x</sup> Purnell, P., Velenturf, A.P.M. (in preparation) Circular Economy Infrastructure.

<sup>xi</sup> <https://rfw.org.uk/2018/09/26/actions-for-companies-to-take-for-a-circular-economy/>

<sup>xii</sup> <https://www.tandfonline.com/doi/full/10.1080/23789689.2017.1405654>

<sup>xiii</sup> <https://www.circularonline.co.uk/news/uk-resources-council-to-consult-on-waste-sector-deal/>

<sup>xiv</sup> Ibid III

<sup>xv</sup> Ibid III

<sup>xvi</sup> <https://www.euractiv.com/section/circular-economy/news/leak-eus-new-circular-economy-plan-aims-to-halve-waste-by-2030/>

<sup>xvii</sup> <https://www.sciencedirect.com/science/article/pii/S0048969718331887>

<sup>xviii</sup> Ibid IX

<sup>xix</sup> <https://datasciencecampus.github.io/downloads/69.pdf>

<sup>xx</sup> Ibid III