December 2019

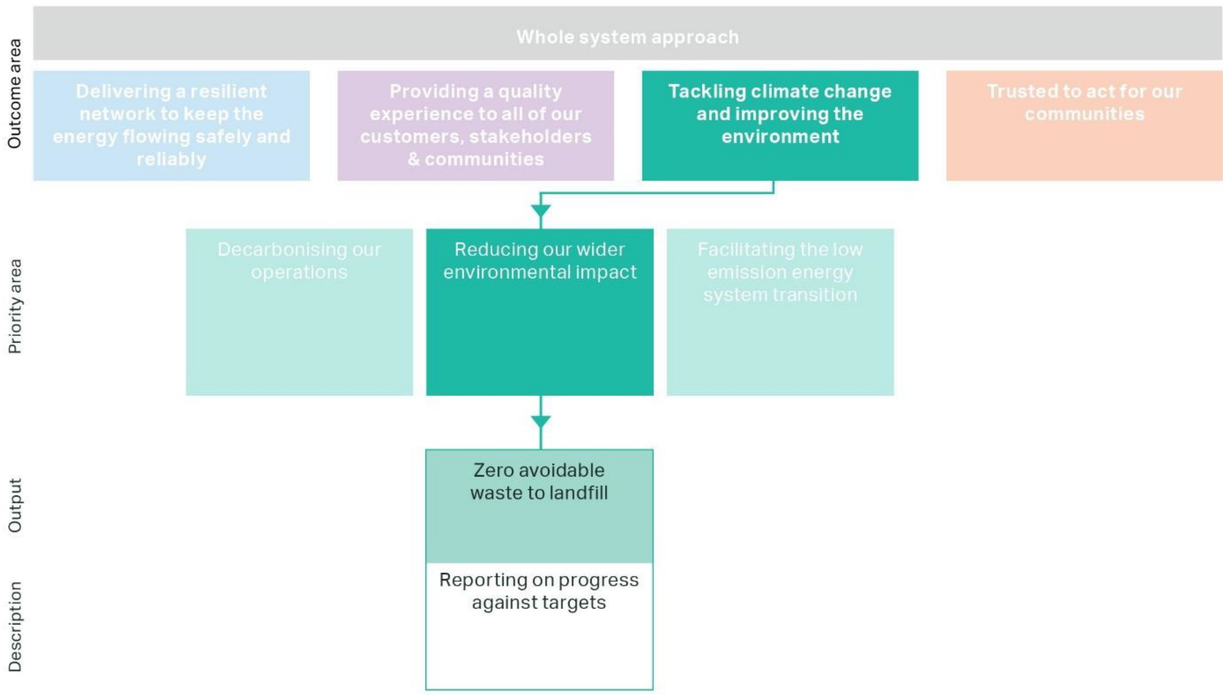
Appendix 07.04.06 Zero avoidable waste to landfill

This output case describes the way we plan to reduce the amount of avoidable waste that we send to landfill.

During RIIO-2 we will target zero avoidable waste to landfill through:

- The efficient use of materials in mains replacement
- Innovation to reduce the waste generated by our works.
- Avoiding single-use plastics.
- Encouraging our supply chain to avoid single-use plastics.
- Fostering a culture that supports resource efficiency.
- Diverting 95% of excavated soil from landfill.
- Reducing our purchase of first use materials for backfill and reinstatement.

We will deliver:



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How we have developed our proposals

1. **We considered the context** – The Government's 25-year plan for the environment envisages radically reducing the waste that we generate.
2. **We noted our role in producing waste** - Waste is our second largest environmental effect, after greenhouse gas emissions. The waste we generate is broadly grouped into two streams: the waste generated at sites, offices and depots, (around 3,000 tonnes per year) and the much larger amount of waste generated as a result of our mains replacement programme (around 416,000 tonnes per year).
3. **We reviewed our progress in this area** – In 2015/16, over 25% of our waste was being sent to landfill. This was reduced to 20% by 2018 and is currently below 14%.
4. **We considered best practice** - A number of organisations, including other gas networks, have set a target of sending zero waste to landfill. We considered the way that these organisations had achieved this aim:
    a. Gatwick Airport, the first airport to win 'zero waste to landfill' accreditation from the Carbon Trust.
    b. Unilever, which has a 'zero waste mindset'. In 2014, the company achieved its target to send zero non-hazardous waste to landfill at all factories. It aims to see waste materials as a resource that can be reused or recycled. Unilever also encourages factories to 'close the loop' and share resources with surrounding ecosystems and communities.
    c. Microsoft, which achieved certification from the US Zero Waste Business Council for diverting 90% of food, office and construction waste away from landfills at their Redmond Campus (the corporate headquarters).
    d. Fifco, which was the first company based outside of Europe to achieve the Carbon Trust (CT) Standard for zero waste to landfill.
    e. Waitrose, which achieved its target of zero food waste to landfill in 2012, by sending unavoidable food waste to an anaerobic digestion plant.
    f. Tesco, which has made a commitment that no food that is safe for human consumption will go to waste from its UK retail operations.
5. **We engaged with customers to understand their priorities** – Our engagement with customers highlighted that customers place a high priority on reducing waste.
6. **This provided us with a clear problem statement** – How can we reduce our waste to the point at which we are sending no avoidable waste to landfill.
7. **We considered two options:**
    - Option 1 – maintain the current approach
    - Option 2 – target zero avoidable waste to landfill through:
        - The efficient use of materials in mains replacement
        - Innovation to reduce the waste generated by our works.
        - Avoiding single-use plastics.
        - Encouraging our supply chain to avoid single-use plastics.
        - Fostering a culture that supports resource efficiency.

- Diverting 95% of excavated soil from landfill.
- Reducing our purchase of first use materials for backfill and reinstatement.

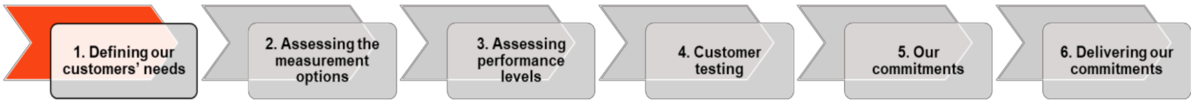
8. **We confirmed our proposal in our October plan** and have tested this along with other aspects of the plan in our acceptability-testing process.
9. **We expect this commitment to deliver a net cost saving of £696k in funding to deliver this.**
10. **What will the future look like after we embed our RIIO-2 commitments?** – We will be an organisation that embraces "circular economy" thinking and actively manages its waste.

The table below summarises our commitment in this area:

Table 1 Summary of our commitment

Output: Zero Waste to landfill	
Common / Bespoke	Bespoke
Output type	ODI(R)
Comment	Reporting on progress against targets
Target	Zero avoidable waste to landfill from the start of RIIO-2
Cost implications (annual)	£139k saving
Incentive range	N/A
CVP	N/A

1. Defining Our Customers' Needs



The UK Government's 25-year plan for the environment[1] states "We must tread more lightly on our planet, using resources more wisely and radically reducing the waste we generate. Waste is choking our oceans and despoiling our landscapes as well as contributing to greenhouse gas emissions and scarring habitats."

Waste is our second biggest environmental effect, after greenhouse gas emissions. Cadent has already made significant progress in managing its waste. The waste we generate is broadly grouped into two streams:

- the wastes generated as a result of Cadent's direct operations at sites, offices and depots (~3,000 tonnes)
- the wastes, predominantly excavated spoil and other waste by-products, as a result of our mains replacement programme (~416,000 tonnes)

The second of these waste streams is subject to a regulatory target through RIIO-1. Our contract partners are routinely exceeding Ofgem's target of sending less than 10% of waste spoil and excavation by-products to landfill.

In parallel, as a responsible business driving more sustainable outcomes, we have also achieved significant reductions in the amount of waste generated by our direct operations being sent to landfill.

In 2015/16, over 25% of our waste was being sent to landfill, this was reduced to 20% by 2018 and is currently below 14%. However, these headlines disguise the fact that significant volumes of recoverable or recyclable materials and natural resources may be being either landfilled or incinerated as fuel, losing the intrinsic value of the materials.

Cadent is already deploying elements of best practice. We are committed to zero avoidable waste to landfill by 2021 and are continuing programmes to reduce the amount of waste generated. We are also committed to zero single-use plastics in our offices and depots by 2019 and zero avoidable plastic in our supply chain by 2025.

In addition, we will take further actions, set out in our Environmental Action Plan, in support of these outcomes. These actions are intended to improve the transparency of our delivery and drive longer-term innovation and resource efficiency.

1.1. What insights are shaping our thinking?

As a responsible business, we are responsible for becoming more productive in our use of resources, to manage our consumption of finite natural resources and reduce the amount of material we deem as waste and dispose of.

The benefits of embedding this approach for Cadent are to reduce exposure to the increasing costs of material disposal and risks, which have come about due to the reducing numbers of appropriate landfill sites, and to reduce our impact on our environment. Reducing the amount of waste destined for landfill also reduces the costs from landfill tax by exploiting lower-cost or more cost-effective solutions to managing our waste. We believe that our impact on the environment is also important to our customers. This is demonstrated by the engagement described below.

[1] https://www.gov.uk/government/publications/25-year-environment-plan

1.2. Sources of insight

3,254
Stakeholders and customers engaged

9
Sources of insight

9
Tailored RIIO-2 engagement activities

We have summarised each activity, the questions asked (where applicable), the numbers involved, and a robustness score based on the following criteria:

Criteria	Robustness score		Relevance
The score shown is based on a combination of the robustness of the source information (judged on whether it was recent, direct and representative) and the relevance to this area.	<1.5	One or zero criteria met	Limited relevance
	1.5 - 2.0	Two criteria met	Significantly relevant and contributory
	>2.0	All criteria met	Highly relevant and contributory

Table 2 Engagement activities

Phase	Date	Source name	Source description	Questions asked	# of stakeholders	Score
Historical Engagement	Aug-18	Cadent's Environment & Sustainability Commitments - Executive Summary	We commissioned Enzen to compile a report on Cadent's environmental and sustainability commitments.	N/A	0	1.5
	Oct-18	Focus groups with hard to reach groups	We held focus groups with individuals considered 'hard to reach' in each of our regions. Each group contained 8-10 participants and lasted two hours. Participants covered three groups: urban customers with English as a Second Language, Future Generations and Non-Customers (predominantly from rural areas). These built on our previous deliberative workshops, whose voices could otherwise become 'lost within the crowd'.	Participants were asked what they expected of Cadent. The four draft outcomes for the business plan were shared with participants and they were asked for their views on these, what they wanted to see from Cadent and whether there were additional outcomes that Cadent should include.	57	2.0
	Sep-19	Deliberative workshops	We delivered full day deliberative workshops in each of our regions to discuss what services customers find important, find our customer expectations of GDNs and gather feedback on our (at the time) four draft customer outcomes. The sessions began with information-giving and building knowledge of Cadent, then eliciting participants' views of services and priorities.	Participants were asked about their awareness of Cadent and expectations of a GDN. Participants were also asked for their views on the four draft outcomes in Cadent's business plan: keeping your energy flowing safely, reliably and hassle free; protecting the environment and creating a sustainable energy future; working for you and your community safeguarding those that need it most; value for money and customer satisfaction at the heart of all our services. The aim of the discussions was to shape these draft outcomes and identify any gaps.	206	2.0

BAU Insights	Sep-19	Feedback from DNVGL	Brief feedback on our plan was provided by DNVGL who noted that references to hydrogen as a "renewable" gas were not accurate.	N/A	1	2.0
Business Options Testing	Jun-19	Cadent customer forum, round 4, Traverse	We held our fourth customer forum in Ipswich, London, Birmingham and Manchester to get customers' views on their priorities on a range of issues. This cross section of customers discussed with us various options (some proposed by us, some suggested by them) in a deliberative style session. Key topics discussed included: customer service, replacing pipes, reinstatement, interruptions, fuel poverty, carbon monoxide, decarbonising energy and becoming carbon neutral.	Participants were asked questions about a range of topics. On customer service, we explored what "great" looks like. We also asked about timeliness and communication with respect to reinstatements. We also tried to understand the level and type of service customers want during an unplanned interruption, including views on provisions, length of time without gas, and timeslots for getting the gas turned back on. We also asked for views on our options for addressing fuel poverty and carbon monoxide. With regards to resilience, we sought to understand what risks customers prioritise when replacing mains pipes and how this is influenced by bill impact as well as views on minimum standards of service. On the environment, we discussed: whether the theft of gas should be a priority (and who should benefit from successful recovery), whether connecting off-grid communities was a good way to decarbonise (and who should pay for this) and customer views on our plans to make our business operations carbon neutral.	200	1.0

Business Options Testing	Aug-19	Future generations workshops, Traverse	We commissioned Traverse to hold workshops with 45 "future generations" participants (aged between 13 and 18) to understand their priorities. This mainly involved younger people to specifically ascertain their input, given that decisions that we make in RIIO-2 will ultimately impact them. They supported the views of other customer segments but stressed more urgency and a higher priority on our EAP. Most saw this area as a core requirement (on their hierarchy of needs), whereas other customers saw it less as core and more as a psychological need.	Customers were asked about their priorities. We also sought to understand how they thought Cadent should best decarbonise their assets and services, and minimise environmental impact, how Cadent should best approach pipe replacement, their views of new proposals for length of interruptions, provisions and compensation for MOBs, and their views of our proposals to protect customers in vulnerable situations.	45	2.0

Business Options Testing	Aug-19	Workshops with ESL and non-English speakers, Traverse	We commissioned Traverse to hold three workshops with ESL and non-English speaking customers: 22 Polish-speaking participants with English as a second language and 9 Bengali speaking participants. During this session we asked customers to tell us what role they thought that we should play in relation to carbon monoxide safety, provisions during an interruption and responding to climate change. They agreed that communication was critical with respect to interruptions. For provisions, all agreed oil filled radiators were important, but there were interesting differences too: the Bengali group prioritised hot meal vouchers & kettles, both given low priority by the Polish group which favoured shower access & hot plates. They confirmed that they believed, we as other big businesses should be acting responsibly and seeking to reduce our carbon footprint. The specific intention of this session was to ascertain the views of a different (typically hard to reach) group of customers to check if their views were consistent with other customer segments.	Customers were asked about their priorities. We also sought to understand their views on our business options in relation to carbon monoxide, provisions during interruptions, and decarbonisation.	31	2.0

Business Options Testing	Aug-19	Employee workshop, Traverse	We commissioned Traverse to engage with 80 Cadent employees (across grades and geographies) in a full day workshop. We sought views on our July draft business plan and held a number of exercises to gain input into further iterations. We gained a number of useful insights: influencing contractors was highlighted as a challenge for achieving carbon reductions, communication was noted as critical to great customer service, internal silos were highlighted as a barrier and some argued that greater ambition was possible for interruptions and reinstatements.	We sought views on our July draft business plan and held a number of exercises to gain input into further iterations. Topics discussed included: improving the environment (including future hydrogen and carbon neutral options), achieving a quality customer experience (including the length of, and provisions during, interruptions; and reinstatements); what trusted to act for society means and our obligations to customers and society; and safety and resilience (including our business plan options and how realistic / ambitious they are).	80	1.5
	Aug-19	Public consultation, BOT, qualitative phase, Traverse	We commissioned Traverse to conduct a survey of 2,605 members of the public to understand views on certain aspects of our business plan in each of the 4 outcome areas (environment, quality experience, trusted to act for society and resilience). The survey revealed strong support for utilities working together to minimise disruption and for outstanding customer service, as well as providing useful information on the relative importance to customers of different types of information and different environmental initiatives.	Participants were asked questions to understand their views and preferences on issues within each of the four outcome areas. On resilience, customers were asked which one single improvement we should make to reduce disruption the most. In relation to a "quality experience", customers were asked what level of service they'd love the most and how much they'd be willing to pay to ensure a vulnerable customer could get enhanced help if their gas stopped working. On the environment, customers were asked their relative preference for initiatives to achieve carbon neutrality and eliminate avoidable waste to landfill. Customers were also asked how much they knew about the decarbonisation challenge. Finally, for "trusted to act for society", customers were asked what the most important information to know about Cadent was and how we can help the customer / Cadent conversation flow. We also asked about their awareness of Cadent.	2,605	2.5

Acceptability Testing	Oct-19	Verve business plan consultation	We commissioned Verve to gather views on our plans to reduce our carbon footprint from 25 customers. We did this through an online forum with customers and stakeholders to discuss the key components that we shared on our EAP. This included our intentions to support our employees to make a positive difference to tackling climate change.	Participants were asked about their awareness of cadent, discussed the three outcome areas (environment, quality experience and resilience), discussed the bill impact breakdown (both at present and as a result of the plan), risks and uncertainties and innovation funding.	25	3.0
	Oct-19	Phase 4 - Business interviews and surveys	We commissioned Traverse to test the acceptability and affordability of Cadent's proposed plan amongst business customers. This consisted of an on-line / face to face survey of 504 business customers and in-depth qualitative telephone interviews with 45 business customers. This showed that the plan had achieved high levels of acceptability and affordability from a business customer perspective.	Business customers were asked about the acceptability and affordability of Cadent's overall plan. If they said that the plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Business customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the plan.	549	2.0

Acceptability Testing	Oct-19	Acceptability testing - final survey report on domestic customers,	We commissioned Traverse to test the acceptability and affordability of Cadent's proposed plan amongst domestic customers. This consisted of surveying 4,446 domestic customers through on-line and face to face methods. This showed that the plan had achieved high levels of acceptability and affordability amongst domestic customers, including those who are fuel poor.	Customers were asked about the acceptability and affordability of Cadent's overall plan. If they said that the plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the plan.	4,446	2.0
	Oct-19	Acceptability testing - focus groups with the general population	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 79 members of the public in regional focus groups. Participants were supportive of our plans for quality experience and resilience, but no consensus was reach on our environmental plans.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	79	2.0
	Oct-19	Acceptability testing - customer forum	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 109 customers who had attended previous customer forums. Overall, participants found our plans to be both acceptable and affordable.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	109	2.0

Acceptability Testing	Oct-19	Acceptability testing - focus groups with future customers	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 20 "future customers" (16-18-year olds) in 2 focus groups. Participants were supportive of our plans for the environment and resilience but questioned whether helping vulnerable customers was part our remit.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	20	2.5
	Oct-19	Acceptability testing - interviews with CIVs	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) by interviewing 20 CIVs. Overall, our plans were supported, and all found the plans affordable.	Throughout the interviews the CIVS were explained the elements of the plan, asked to comment on whether they found each outcome acceptable, which elements were important to them, and whether they had any additional comments. They were also asked whether the new business plan was affordable.	20	2.5
	Oct-19	Acceptability testing - fuel poor focus groups	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 35 customers in fuel poverty in regional focus groups. Overall, participants were supportive of our plans in all three areas.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	35	2.5
	Nov-19	NFU Meeting	We had a meeting with the NFU to discuss environmental and sustainability related topics	N/A	N/A	2.0

1.3. How engagement has shaped our thinking

The customers we have engaged with expressed their overall support for efforts to reduce our impact on the environment in general. We have addressed this by putting forward challenging proposals to reduce the impact of our two biggest environmental impacts: greenhouse gas emissions and waste — particularly net-zero targets for those elements we can directly control.

During focus groups, with 48 'hard to reach' people, participants were concerned that we should use recycled or recyclable plastics in our pipes. This concern was echoed by some of the 206 customers in the deliberative workshops.

At the "future generations" workshops, the 45 participants were asked to rank the following environmental priorities: 'removing avoidable plastics from our operations', 'use more recycled materials' and 'set a target of 95% of spoil to be diverted from landfill'. These scored second, third and fourth highest respectively (out of a total of 14 options) with resilient and reliable network receiving the highest ranking.

Many of the 200 participants at our fourth customer forum thought the initiatives in this commitment were generally low-cost and easy to deliver, even if they would be limited in their impact. The majority of our employees, 80 of whom participated in an August 2019 workshop, understood the need to improve Cadent's environmental footprint. Many participants felt that Cadent was already doing a lot to achieve this but that these initiatives were not being publicised enough internally. Examples included removing single-use plastics and not handing out stationery unnecessarily.

At one of the workshops for ESL and non-English speakers, different environmental measures were discussed. The ranking of importance of measures varied among different groups. All groups ranked 'Use more recycled materials and recycle more' somewhere within their top priorities, with some viewing it as the most important because it is a simple and achievable measure.

'Use less paper, water, energy and fuel' was also ranked highly, with many participants saying that achieving 'zero-waste' is an effective way to proactively become carbon neutral. 'More efficient use of pipes to reduce the amount of plastic we need' was also ranked as high priority due to the large scale of Cadent's pipelines.

As stated above, we have made significant progress across our supply chain during RIIO-1. We have actively engaged with our strategic delivery partners, Balfour Beatty and tRIIO (Skanska and Morrisons) to ascertain their learning and thoughts on our plan, both in terms of its ambition, innovative thinking and deliverability.

During our engagement with customers in vulnerable situations, protecting the environment was raised as an important outcome by some who noted its benefit to everyone. This view is in line with what stakeholders told us at our regional workshop, stating that Cadent should take their environmental obligations more seriously.

Stakeholders engaged by the Energy Networks Association mentioned that innovation in environmentally friendly solutions was one reason for positive views on gas networks. The stakeholder advisory panel also discussed long-term commitments and targets for the environment, such as the use of carbon-based accounting methods, and the need to communicate these.

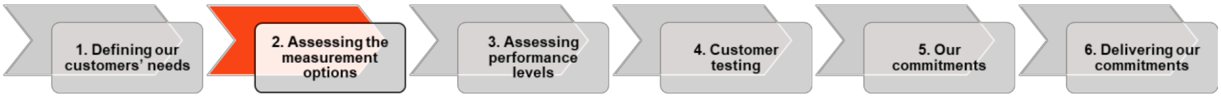
During acceptability testing with customers, this was an area that has been generally supported. The key challenge that we raised during this time was whether stating 'zero' waste to landfill was possible and therefore disingenuous. We have taken this feedback on board, which matches some of what we heard as we tested the costed options with customers and our employees during our Business Options Testing phase (see 4.1 below).

Feedback from non-customers

At a meeting with the National Farmers Union in October 2019, it was noted that Cadent's activities to improve biodiversity need to be more clearly highlighted and consideration given to working with farmers alongside the Cadent network e.g. supporting new / extended hedgerows. The NFU also said that Cadent could do more to ensure the story around the recycling and re-use of excavated material is prominent. It was also noted that Cadent should consider the impact of more extreme weather events on their network and consider working with farmers to provide "soft" flood defences e.g. types of perennial energy crops, which have a greater surface roughness / hydrological resistance than annual crops or pasture grassland.

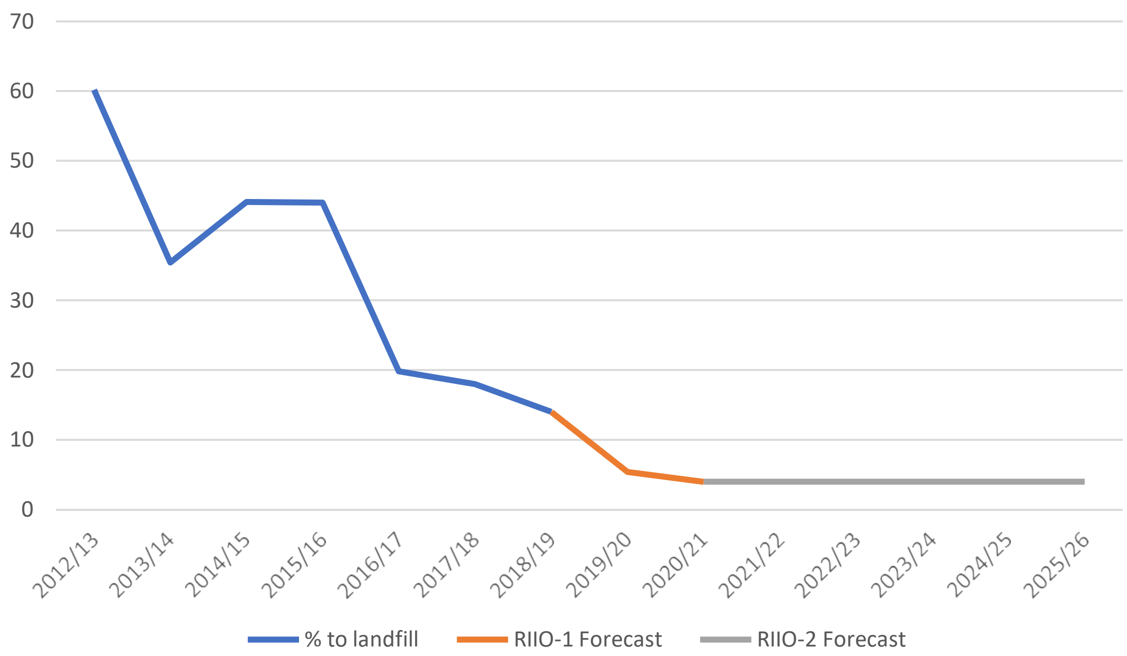
September 2019 feedback from DNVGL noted that EV charging and waste management should receive less emphasis than the urgent need to decarbonise and converting natural gas to hydrogen to reduce uncaptured GHG emissions.

2. Assessing the Measurement Options



Embedded good practices have resulted in high performance that has driven down the amount of waste we send to landfill. This reduction over RIIO-2 is measured on a monthly basis and annual progress is outlined in Figure 1 below.

Figure 1 Percentage of direct operations waste sent to landfill



While our ambition is to send zero waste to landfill, Figure 1 reflects our recognition that a small proportion of waste may be unavoidable.

2.1. How does the current measure deliver against customer outcomes and priorities?

Our current internal measures have driven good practice and the resulting strong performance will, at current performance levels, deliver zero avoidable waste to landfill by 2021/22. For this reason, we are confident that we can continue to deliver zero avoidable waste to landfill throughout RIIO-2.

Implementing a common output measure across GDNs would provide us with an additional external reputational incentive to continue achieving our high performance levels.

2.2. Assessing Good Practice

Best practice in waste management is demonstrated by targeting and achieving zero waste to landfill. A number of organisations, including other gas networks, have set this as a target:

- Gatwick Airport was the first airport to win 'zero waste to landfill' accreditation from the Carbon Trust. It targeted reducing initial waste created and finding ways to reuse or recycle materials. The airport also has an energy-from-waste plant.

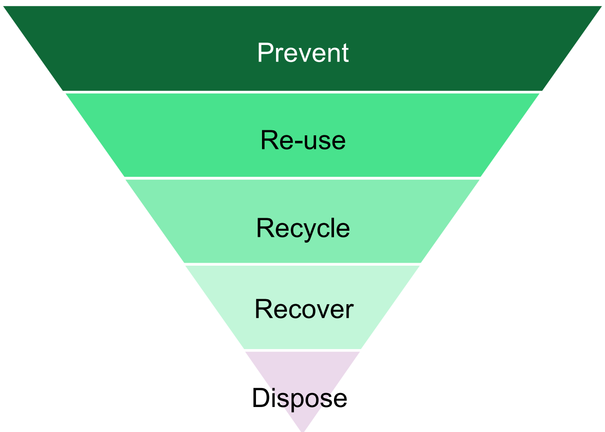
- Unilever has a 'zero waste mindset', aiming to do more and better with less. In 2014, the company achieved its target to send zero non-hazardous waste to landfill at all factories, through refusing to generate waste and reducing the amount of waste involved in their processes. It aims to see waste materials as a resource that can be reused or recycled. Unilever also encourages factories to 'close the loop' and share resources with surrounding ecosystems and communities. For example, by-products of one factory in Argentina are shared with local farmers to use as fertiliser.
- Microsoft achieved certification from the US Zero Waste Business Council for diverting 90% of food, office and construction waste away from landfills at their Redmond Campus (the corporate headquarters). This was achieved through employee-driven reuse, recycling and composting, and working with local communities. Examples of initiatives include using compostable or recyclable packaging in all on-site restaurants and offering waste frying oil to local recyclers to produce biodiesel.
- Fifco was the first company based outside of Europe to achieve the Carbon Trust (CT) Standard for zero waste to landfill. To achieve this, over 70% of waste is effectively recovered and reused, a further 23% is recycled and less than 5% is used for energy recovery. 0.22% of the remaining wastes were then sent to landfill (below the maximum of 1% allowed by the CT).

Across a number of sectors, particularly the retail and food sectors, more granular and specific targets underpin a zero-waste ambition. Plastic waste is a highly topical area, due to global media attention and the policy direction set in the UK Government's 25-year plan for the environment. A number of food retailers have removed all single-use plastics and plastic packaging in relatively short timescales. For example:

Waitrose achieved its target of zero food waste to landfill in 2012, by sending unavoidable food waste to an anaerobic digestion plant. It is now trialling 'packaging free' supermarkets in some areas to cut single-use plastic and packaging waste. Waitrose also provides advice on its website for customers on how to reduce food waste[2].

Tesco has made a commitment that no food that is safe for human consumption will go to waste from its UK retail operations. Food is reduced-to-clear if it is close to its expiry date, and if it cannot be sold it is offered to charity and community groups who help people in need. Bakery surplus that cannot be donated to charity is made into animal feed, and chicken fat and cooking oil are converted into biodiesel. The company is also trialling a new online shopping service based on refillable rather than recyclable containers, with empty product containers being collected, cleaned and then refilled.

Figure 2 Waste hierarchy



One aspect to note from these examples is that, in some cases, completely zero waste is not always possible (e.g. Unilever, in the case of unavoidable hazardous waste that must be disposed of via a particular route). While the ambition is zero waste, some elements may be unavoidable.

Best practice embeds the waste hierarchy across all waste streams: reduce, reuse, recycle, and, as a last resort, dispose, with or without recovery of energy. This puts the focus on all stages of management, not just on the

[2] https://www.waitrose.com/home/inspiration/about_waitrose/the_waitrose_way/how-to-reduce-foodwaste.html

end-product or how materials deemed as waste are dealt with. The waste hierarchy promotes resource productivity – procuring, using and managing only the resources that are needed through their full life cycle which then, in turn, minimises the amount of material deemed as waste.

A number of organisations have sought to significantly improve their resource efficiency, particularly in their process use of natural resources.

- Coca-Cola has set an ambition to return an equal amount of safe water to communities to that used in finished beverages. It is currently achieving this goal ahead of schedule. This goes above and beyond using water efficiently. The company examines water risks to communities where they operate and helps to address them.
- Adidas uses recovered ocean plastic to manufacture trainers. 1 million were produced in 2017, and the company is now targeting 11 million for 2019.
- Clothing manufacturer Patagonia encourages wearers to repair and refurbish items of clothing and return unrepairable clothing to them as feedstock for new garments as key elements of their ambitious resource-productivity programmes.

Much of this best practice is epitomised in the 'circular economy' championed by the Ellen Macarthur Foundation and EU Regulation. The circular economy seeks to abandon the concept of waste, viewing these materials as resources for other processes. It promotes closed loops or material recovery and recycling where the value of materials is preserved through remanufacturing.

Our understanding is that zero avoidable waste is a common ambition across other GDNs.

The August 2019 Enzen research report notes that all GDNs have reduced the volume of waste sent to landfill. In addition, our percentage volume of imported virgin aggregate has not reduced as much as that of others. There is a range of initiatives to reduce the use of plastics in all sectors of the utility industry.

Many have avoided the use of plastic within their supply chain, including banning plastic cups and using plastic cases for tools, which are now supplied in cardboard boxes. In London, Thames Water and Balfour Beatty have saved over one million plastic bags, and these have been used with an asphalt mix on key cycle routes in London. This is a far greener alternative than regular asphalt, and it has reduced waste to landfill. Many companies employ or nominate green teams who encourage employees to minimise waste, both at work and at home.

2.3. What options have we considered?

We have considered two options:

Table 3 Options for waste to landfill

Option 1: Maintain the current approach			
Elements	**Description**	**Pros**	**Cons**
Current approach	We could maintain our current approach to waste management in RIIO-1, which currently costs approximately £760k per year.	• Simplest approach without the need to change existing processes.	• This is not in line with our ambitions as a business • Does not support our desire to reduce our environmental footprint as a business.

			• Fails to realise potential efficiencies through new approaches to waste management. • Rising costs of disposal and landfill tax

Option 2: Target zero avoidable waste to landfill in RIIO-2			
Elements	**Description**	**Pros**	**Cons**
Efficient use of materials in mains replacement	All GDNs, including Cadent, use significant quantities of PE pipe and fittings through mains replacement projects. This brings wider societal gain in terms of safety risk and emissions reductions. We will, however, drive greater efficiency in our usage, particularly addressing more efficient use of short or part coils of pipe. We propose to undertake a research programme to examine how we can benchmark and reduce the environmental and embedded-carbon impacts of plastic pipe and fittings. This programme will report before the end of RIIO-1. On the basis of this research, we will work with our supply chain to propose informed targets for resource and/or embedded carbon efficiency to be delivered through RIIO-2	• Reduction in our environmental footprint • Achieves efficiencies through new waste management practices, including reduced costs to deliver to landfill and recovery and reuse of appropriate materials where possible. • The TEEP test drives a sharp focus on minimising waste to landfill through rigorous application of the waste hierarchy and innovation in addressing problematic waste streams. • Embedding more application of the circular economy promotes innovation, resource efficiency and supply-chain engagement.	• Relies on cultural change within the organisation and in our supply chain to deliver targets • Changes in Environment Agency requirements to assess and classify wastes from utility excavations may drive more waste to landfill in the short term due to uncertainty in implementation. • Following Brexit, the export of waste to partners within the EU for energy recovery will be problematic, impacting on the whole waste management sector and putting our zero waste to landfill targets at risk. • The lack of spoil recycling plants in some geographical areas will affect our targets for diversion and first-use aggregates. Delivery of these
Zero avoidable waste to landfill	Our preferred option is to meet a target of zero avoidable waste from our direct operations to landfill by 2021/22 and maintain this throughout the next regulatory period. We will drive further innovation in our works, building on low-dig and no-dig technologies and keyhole repairs to reduce waste generation at source. Our ambition will be to achieve 0% spoil sent to landfill. These targets		

	reduce our environmental impacts through responsible management of our largest waste stream and minimise exposure to costs such as landfill tax for disposal. Imposing a higher level of ambition nevertheless has the potential to introduce unavoidable wider environmental impacts and costs by requiring significant additional transport to where the required infrastructure is not currently available.	• Promotes a cross-business approach to considering the whole lifecycle of goods. • Significant reduction in exposure to landfill taxation. • Supports a more circular approach to the management of a high-volume waste stream • Promotes effective management of spoil by-products especially segregation of wastes to minimise any fractions deemed as hazardous and subsequently reducing costs to manage these fractions. • Supports further innovation to reduce spoil by-products from no- or low- dig approaches to mains replacement and repair.	targets may be possible on average across Cadent but not at an individual network level. • Change in the acceptability of spoil due to a change in regulation or policy exposes Cadent to significant financial impact. • Lack of specific tools to plan the most environmentally or economically favourable route for disposal or recycling of spoil in some geographical areas. • For networks where this is a challenge we propose that we maintain the current RIIO-1 target of 90% diversion from landfill, with a stretch target of 95%. We will also undertake to provide transparent narrative to explain if and why we have not met our stretch target.
Zero single-use plastics in our office and depots	We will remove all single-use plastics from our offices and depots in 2019. This will be coupled with a behaviour and culture change within our organisation, particularly in the provision of engineer orders in multiple layers of packaging.		
Zero avoidable plastic in our supply chain	Meet our target of zero avoidable plastic in our supply chain by 2025. We will introduce more concepts from the circular economy into our procurement activities, particularly high-volume uses of plastics such as road barriers and cones, by working with suppliers to recover all damaged units for processing and remanufacture as new. We will work with our up- and down-stream supply chain to introduce a programme of substitution and innovation to remove avoidable plastics, against a Technically, Economically, Environmentally Practicable (TEEP) test, reducing our indirect consumption of materials.		
Delivering a culture that supports resource efficiency	We will continue to develop a culture that supports more sustainable outcomes. This is driven by encouraging behavioural change from all our people and aiming for an organisational culture that reduces waste. We will use resource-productivity approaches and embed the circular		

	economy to build a culture and practice which minimises our use of paper, water, utility energy, fuel for transport and other non-renewable natural resources.		
Diverting at least 95% of excavated spoil from landfill	We propose to embed a more challenging target in our mains replacement and other REPEX/CAPEX works and set a target of at least 95% of spoil and other by-products from these programmes to be diverted from landfill. In the target above, our ambition will always be to achieve 100% diversion from landfill. However, in a number of instances, contaminated or hazardous materials may be encountered for which the only viable route of treatment will be disposal to landfill (according to the TEEP test). Setting an explicit target of 100% would be unachievable and drive wrong behaviours in fully compliant waste management. Additionally, the infrastructure to support fully recycled materials for backfill and reinstatement is not available across all our network areas (particularly in East Anglia).		
Importing less than 10% first use materials for back fill and reinstatement	On average, our contractors import around 10%-12% of materials for backfill and reinstatement, compared to a target of 30%. While we will aim for zero imported material, this will not be possible in all cases. Central to achieving this target will be the recovery or re-use of material that would otherwise have been seen as waste (e.g. using enabling technology like vacuum excavators to place spoil directly back into excavations).		

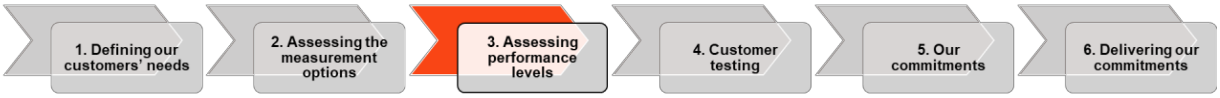
2.4. How the options deliver against our objectives

Table 4 Options appraisal against objectives

	Option 1: Maintain the current approach	**Option 2:** Target zero avoidable waste to landfill in RIIO-2
To reduce our environmental impact as a business and achieve best practice in waste management.		
To embed a culture within Cadent to focus on the value of resources that it uses		
To achieve efficiencies through our approach to waste management		

No delivery	Weak delivery	Some delivery	Delivery	Strong delivery

3. Assessing Performance Levels



We have considered how we best continue high performance by considering the options outlined in section 2 against the following objectives:

- To reduce our environmental impact as a business and achieve best practice in waste management.
- To embed a culture within Cadent to focus on the value of resources that it uses.
- To achieve efficiencies through our approach to waste management.

By assessing the options against these objectives, initial customer feedback on the importance of environmental protection, customer expectation that we reduce our impact on the environment and our own ambition, we decided to further scope each of the elements of Option 2 with customers.

Aside from the environmental gain, the approaches laid out in Option 2 would drive financial efficiency. The management of waste, including recyclables, general wastes and hazardous wastes costs Cadent approximately £760k per year (2017/18 figures). These costs are comprised of the provision of facilities such as skips and bins, transport of waste and processing as well as incurring tax for every tonne of waste to landfill. Costs per tonne of recyclable materials and materials sent for energy generation are lower due to the value of the end product.

In addition:

- Diversion of all avoidable waste from landfill will reduce disposal costs by up to £120k per year.
- Taking more involved action to ensure that all appropriate materials are recovered and recycled for reuse or remanufacturing will save up to £153k per year.
- Disposal of waste to landfill (2017/18 figures) cost Cadent about £190k.
- If we treat waste as a resource, we can sell or recycle it to reduce costs elsewhere.

Therefore, we do not expect a net cost increase from implementing our proposals to implement a programme to divert all avoidable wastes arising from Cadent's direct operations from landfill.

4. Customer Testing

It is important that we reconcile the views of customers, Government, Ofgem and Cadent to consider which option we should take forward.

To do so we have engaged customers through various mediums including surveys, detailed interviews, deliberative workshops and focus groups.

The initial feedback we received demonstrated that customers are interested in environmental protection, and 83% thought that green company policies were ‘very’ or ‘quite’ important.

This ambition is also reflected in the direction provided by our Customer Engagement Group who have indicated their desire that Cadent match this ambition and put in place targets that do not just prevent environmental damage, but which also improve the environment.

4.1. Business Options Testing (BOT)

When customers and experts were asked about their views on Cadent’s plans to reduce its business carbon footprint by Verve for their August 2019 report, Cadent's current plan was not enthusiastically received by either group. Some customers thought that 14% of waste being sent to landfill seemed high, and there was concern that recyclables were sent to landfill. Many experts felt that nothing should be going to landfill, and one expert said that 5% should be the maximum. Some also expected to see more emphasis on reuse.

Some of the 2,605 respondents to our BOT public consultation said that Cadent should aim to have zero waste and to recycle more. Respondents were asked which of two improvements they loved the most: Cadent becoming the UK's first carbon-neutral emergency service by switching our engineering vehicle fleet to electric and hydrogen or sending no avoidable waste to landfill and eliminating single-use plastics. The percentage split was 46% and 54% respectively.

4.2. Acceptability testing

As part of the Traverse quantitative acceptability testing of business customers (October 2019), 85% of business customers surveyed said that they found the environmental aspects of Cadent's business plan important and 83% found it acceptable. Similarly, 83% of domestic customers surveyed found the environment section of the plan acceptable, and only 1% found it unacceptable.

At our acceptability testing focus groups with future customers, there was a mix of opinion on how ambitious Cadent’s environmental plans are. Some believed that Cadent was setting a positive example, encouraging their staff and customers to change behaviours. Others were sceptical, believing that the government should take the lead and that Cadent should set earlier deadlines for the targets, even if they are smaller targets.

Almost all participants at our acceptability testing focus groups with future customers agreed with the Cadent’s plans to improve recycling and divert waste away from landfill. The only concern around this was the lack of alternatives to plastic pipes that are being used in their network.

While most Customers in Vulnerable situations interviewed as part of acceptability testing were keen about diverting materials away from landfill, some raised concerns about the environmental impact of using plastic for pipework replacement across the network and suggested environmentally friendly alternatives.

Participants at our acceptability testing focus groups with fuel poor customers felt that Cadent should be leading the way for other large organisations, setting the precedent for how to improve the environment.

Recycling and avoiding plastics were seen favourably across all groups during our acceptability testing focus groups with those in fuel poverty, although in Liverpool, customers queried whether zero waste to landfill was possible.

Cadent's current plan was not enthusiastically received by either customers or experts. Some customers thought that 14% of waste being sent to landfill seemed high and there was concern that recyclables were sent to landfill. Many experts felt hat nothing should be going to landfill, and one expert said that 5% should be the maximum. Some also expected to see more emphasis on reuse.

With regards to the proposed plan, whilst the removal of single-use plastics from offices and depots in 2019 was universally liked by customers, the target of zero "avoidable" plastic in the supply chain by 2025 wasn't considered ambitious enough. The use of the term "avoidable" waste (defined as waste that is not financially viable to be recycled) in the target was felt by some as a loophole which could give Cadent too much leeway.

There were also some concerns that landfill wasn't being further reduced. Waste management plans were considered ambitious by some experts and only acceptable by others. The single-use plastic reductions were viewed positively, but there was some uncertainty over the use of the term "avoidable" plastic. Experts from the construction industry wanted greater emphasis on recycling and reuse.

4.3. Managing Competing Priorities

We are cognisant of the feedback received from customers regarding avoidable / unavoidable waste. While we acknowledge this could be perceived as a loophole it is instead an honest recognition that not all waste is recyclable with the processes that currently exist. This recognition of reality will not preclude us from endeavouring to reduce waste to zero.

The feedback we received from customers on carbon neutrality was positive but tempered with concern about the impact on customer bills. The ambition to move to zero waste is more straightforward, given that our ambition would be cost-neutral.

While the primary focus of Government policy and Ofgem in RIIO-2 is carbon reduction, in line with the Government commitment that the UK become net zero in carbon emissions by 2050, this output case aligns with Ofgem’s wider aim, outlined in the RIIO-2 framework, that network companies take the appropriate steps to mitigate their own environmental impact and are ambitious in working to deliver an environmentally sustainable network.

Therefore, we are confident that our ambitious targets are supported by all key stakeholders and clearly align with Ofgem and the Government’s overarching environmental protection policy ambitions.

5. Our Commitments

1. Defining our customers' needs → 2. Assessing the measurement options → 3. Assessing performance levels → 4. Customer testing → **5. Our commitments** → 6. Delivering our commitments

We will continue to enact the commitments made by Cadent in 2018 to achieve a goal of zero avoidable waste to landfill by 2021 and remove all avoidable plastics in our supply chain by 2025. In addition, we are proposing to drive further improvement in the way in which waste and resources associated with the iron mains replacement programme is managed.

We have regulatory targets to ensure that we send no more than 10% of excavated spoil wastes to landfill and import no more than 30% virgin aggregate for backfill. We routinely divert more than 95% of our waste from landfill. This is achieved by initiatives such as using low-dig and no-dig techniques, inserting new plastic pipe into old metallic services, and using vacuum excavation which we will continue to develop in order to achieve our goal of zero waste.

The related actions we have included in our Environmental Action Plan (Appendix 07.04.00) are:

Action
During RIIO-2, across Cadent less than 5% of our waste from excavations will be sent to landfill. We will tailor this target to meet specific geographic challenges but report on the waste that is sent to landfill and the actions underway to reduce this further.

Action
During RIIO-2, less than 10% of our backfill will be first use aggregate in the North West and East of England, and 5% in the West Midlands and North London.

We have evaluated our proposal against our outputs framework to determine the most appropriate and effective option:

Table 5 Regulatory treatment

Regulatory treatment	Criteria	Rating	Further explanation of assessment
Reputational ODI	Demonstrate this is important to customers and/or stakeholders		This output is high on the government agenda as demonstrated by the 25-year environmental plan. It is also more broadly high on the customer agenda with increased media scrutiny.
	Funded elsewhere in our plan, or inappropriate for funding		This output and our proposed targets will be funded within our baseline Business Plan costs.
	Can robustly measure performance improvement		Our preferred option for this output has a range of measures which we currently monitor, both directly within our business and through our supply chain.

Regulatory treatment	Criteria	Rating	Further explanation of assessment
Financial ODI	Demonstrate this is important to customers and/or stakeholders and they are willing to pay		As described for reputational ODI. The costs to meet our ambition for this output are also already included in our baseline Business Plan costs.
	Not funded elsewhere in our plan		This output and our proposed targets will be funded within our baseline Business Plan costs.
	Can robustly measure performance improvement		As described for reputational ODI.
Price control deliverable	Specific deliverable with a clear timeline and targets		This output does not relate to a specific deliverable. Instead, it covers our ambition to continue improving our performance during RIIO-GD2.
	Demonstrable benefit to customers which they support		This output aims for a step-change in how we view waste management. This will bring environmental benefits which have customer and stakeholder support.
Licence Obligation	Absolute minimum, with significant customer harm if we do not deliver it		This output does not relate to a minimum standard. Instead, it relates to an ambition to introduce elements of best practice on waste management into how we operate.
	Applicable to all GDNs		While other GDNs may have regard for the environment in their waste management practices, this output is tailored to our business and reflects our current performance.
Business Plan Incentive	Adds to the quality of our plan, but not a specific deliverable or performance measure		This output is a specific performance measure.
	Funded elsewhere in our plan, or inappropriate for funding		This output and our proposed targets will be funded within our baseline Business Plan costs.

Does not meet criteria	Weakly meets criteria	Partially meets criteria	Meets criteria	Strongly meets criteria

We are therefore proposing a reputational ODI for this output. This recognises that the costs to deliver our ambition are already included in our baseline Business Plan costs and will incentivise us meet our stakeholder's expectation that we reduce our environmental impact.

5.1. How are we incentivised to perform?

We will measure our success in achieving this commitment by assessing our progress against a path to net-zero waste. While actual progress will not follow a smooth trajectory (instead depending on major step-changes) a more complex method of assessing our progress to net zero is not required.

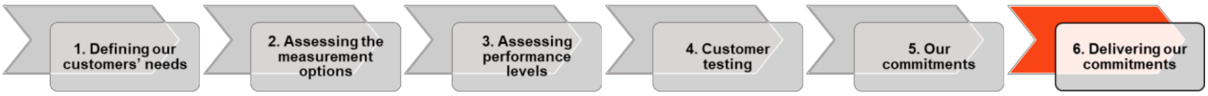
We propose to deliver significant step-changes in the way that we view, produce and manage waste across our direct and contract workforce activities.

Although we are proposing ambitious changes in the way we manage our wastes and promote resource productivity, for some wastes, disposal by landfill may remain the only practicable route.

We will take best-practice approaches and develop a waste hierarchy to embed wide-ranging and effective steps to enhance resource productivity and a culture that focuses on the value of the resources we use, rather than on the management of waste.

We will embed TEEP (technically, economically, environmentally practicable) tests to ensure that only wastes for which landfill is unavoidable and disposed of in this way. The TEEP test is a tool that directs a rigorous approach to applying the waste hierarchy to each component of our waste streams. We have already begun a program to map every component of our waste that is currently not routinely recycled. Working with our waste-management provider, this has triggered a detailed consideration of the options that could be deployed and whether they conform to TEEP. This approach, founded on the waste hierarchy, will help us deliver reductions in waste to landfill as well as innovative approaches to reduce waste at source. We will continue to work with our waste-management partners to review the TEEP criteria throughout the RIIO GD2 period.

6. Ensuring delivery of our commitments



There are no cost implications for customers if we fail to achieve our ambition of zero avoidable waste to landfill. However, it is important to note that, while we have an ambition to divert 100% of excavated spoil wastes from landfill, the impact of the uncertain volumes of some problematic wastes and the availability of the necessary treatment and recycling infrastructure across our networks may prevent achievement of this target. We will therefore report, by network, on instances where we are not achieving these targets and the reasons why we have had to send waste to landfill.

Furthermore, it is important that we address the whole resource lifecycle, and procurement decisions will increasingly focus on resource efficiency and waste minimisation. In support of this, we will report on the sustainability criteria and weightings used in our tender and other procurement events.