Lower carbon concrete assets

Purpose: This performance commitment incentivises the company to reduce the carbon associated with concrete used in the delivery of the capital programme. This will be achieved through either avoiding emissions through adapting project scope or re-purposing existing assets whilst meeting customer or environmental need, or improving the design or switching components of our concrete assets to reduce the carbon emissions whilst not resulting in other types of emissions increasing.

Benefits: Concrete emissions represent a significant proportion of all greenhouse gas emissions associated with capital programme delivery. This performance commitment helps on the journey to carbon neutrality by reducing greenhouse gas emissions associated with the use of concrete in the construction or the refurbishment of assets. This performance commitment will act as an industry pathfinder on how best to deliver less concrete-intensive infrastructure projects through extensive collaboration with our partners in the supply chain. It could contribute to the development of a common capital/embedded carbon performance commitment at PR29.

Response to the Draft Determination: Anglian Water welcomes the response in the outcomes appendix with support to continue progressing the lower carbon concrete assets performance commitment. We have provided updates below in response to comments raised and deleted specific sections as requested.

Performance commitment definition and parameters

1.1 Detailed definitions of performance measure

Percentage reduction in the greenhouse gas emissions associated with concrete and reinforcement used in the construction of capital assets against a 2022 baseline. The baseline is the methodology and approach used to deliver an outcome or output for customers and the environment.

For each scheme where a concrete-based solution is identified within the business plan, a carbon baseline has been created based on the need and the traditional approach to designing and construction techniques used for concrete assets in the UK water sector (as of 2022). This will then be compared to the solution delivered in AMP8. The company will only include changes in emissions that are driven from the company's activities, it's partners and contractors, use of materials or supply chain specific emissions factors. Unless supplier specific emissions factors can be obtained; emissions factors will be frozen at their 2022 (or earlier) versions.

Each regulatory year the company will report the baseline emissions associated for standalone capital projects delivered in the year, cumulative for the AMP. The company will calculate the actual modelled emissions, accounting where relevant for activities that impact emissions (noted below), cumulative for the AMP. The difference between these figures will be reported as a percentage change. A single percentage change figure will be reported each year for the whole investment programme. For transparency, the company will publish total figures (in tCO_2e) as well as the percentage changes

The measure will cover, for example, the following areas of the company's carbon footprint:

1. Avoid emissions by delivering the customer or environmental need without building new assets:
    - Adapting project scope or introducing an alternative design solution between the initial promotion to the capital vehicle from Anglian Water to outline design.

    - Re-purposing existing assets to avoid concrete being required to build new assets.
2. Improving the design of our concrete assets:
    - Reducing the mass of concrete or reinforced steel within design between the baseline and build phases of a project.
    - Using lower carbon alternative materials (e.g. Glass coated steel tank)
3. Switching components of concrete to use lower carbon alternatives:
    - Changing supplier (i.e. switching to a supplier that uses lower carbon materials).
    - Changing the product from our suppliers, such as products with a higher proportion of lower carbon alternative components (e.g. GGBS) compared to Ordinary Portland Cement (OPC).
    - Using alternative materials to steel reinforcement
    - Encouraging suppliers to stock non-standard, lower carbon products and purchasing them.
4. Sequestration of carbon within concrete
    - It may be possible that in coming years, concrete could act as a medium to sequester carbon. If this can be proven and adopted in relevant standards then this could contribute to our emissions reductions.

1.2 Additional detail on measurement units

This performance commitment measures the percentage reduction of GHG emissions from both concrete and rebar. Rebar refers to reinforced concrete where additional components (such as metal wires and bars) are added to provide strength to the system. This performance commitment only applies to standalone schemes, in alignment with our PR19 Capital Carbon commitment. Standalone schemes are large individual schemes that are typically in one physical location. Standalone schemes represent the majority of our capital delivery schemes by financial value.

While the approach taken to reduce carbon emissions associated with concrete will vary by project, the following is the calculation that would be performed to determine the percent change for a particular scheme highlighting some of the parameters enabled

$$\boldsymbol{Reduction\ for\ an\ example\ scheme} = \frac{W - [K + 0 + T + (Y - B - C)]}{W}$$

Key :

W = The concrete carbon baseline of the proposed solution/asset as of 2022.
K = Increase in concrete carbon emissions of the solution/asset
0 = A no build Solution identified with zero concrete carbon emissions.
T = Concrete carbon emissions associated with the refurbishment or re-purposing of an existing asset
Y = The concrete carbon emissions of a brand new asset including innovations in using alternative materials.
B = The reduction in concrete carbon emissions through innovation in design reducing the volume of material in excavating and constructing the solution/asset
C = The reduction in concrete carbon emissions through the use of alternative cement and rebar replacement materials.

The commitment will include a consistent methodology, scope and boundary in modelling and measuring baseline and solution concrete carbon emissions. This will also confirm and allow for consistency in reporting between suppliers in line with guidance from the Low Carbon Concrete Group (Institution of Civil Engineers).

To ensure we have robust, auditable, high quality models AW uses the best available data within its carbon models. One of the main sources of material carbon data is from the University of Bath Inventory of Carbon and Energy (ICE database). In delivering this commitment, any market decarbonisation reported through the ICE database updates between 2022 to 2030 will not be captured or measured as part any concrete carbon reductions. Therefore changes in emissions associated with cement will only be included that are as a result of direct action taken by suppliers working in collaboration with Anglian Water and our supply chain. Care will be taken to ensure no credit or benefit for off-sets purchased within the supply chain. Our internal carbon team will supervise the use any supplier specific numbers and provide technical expertise to ensure that only appropriate data is used.

The dominant carbon source in concrete is the cement component and the manufacture of cement does not primarily use electricity. Indeed the Minerals Production Association roadmap to 2050 (published 2020) state that offsets, green tariff energy purchases and renewable energy delivered though the grid do not make up future carbon reduction plans. The Low Carbon Concrete Routemap published by Institute of Civil Engineers (2023)[1] does not feature the decarbonising electricity grid as a factor in the sectors transformation.

1.3 Specific exclusions

Specific exclusions:

- Parcel schemes – parcel schemes are those which are not considered 'stand alone' as defined above.
- Major infrastructure projects which are delivered through DPC or SIPR rather than through our traditional delivery routes.
- Projects that transition between AMP periods

[1] MPA-UKC-Roadmap-to-Beyond-Net-Zero_Oct20.pdf (mineralproducts.org)

1.4 Reporting and assurance

The company will provide external third-party assurance detailing all data required to maintain the PAS 2080 'Carbon Management in Buildings and Infrastructure' standard, including quantification, baselining, monitoring and reporting of emissions related to concrete assets.

Table 1 Definition parameters

Measurement unit and decimal places	Percentage reduction of tonnes CO_2e reported to two decimal places compared to the 2022 baseline approach
Measurement timing	Reporting year
Incentive form	Revenue
Incentive type	Underperformance and outperformance payments (underperformance incentive rate set at half the outperformance incentive rate)
Timing of underperformance and outperformance payments	Annual (financial year)
Price control allocation	Water resources: 2.7% Water network plus: 36% Wastewater network plus: 54.5% Bioresources: 6.8%
Frequency of reporting	Annual, on a reporting year basis
Any other relevant information	
Links to relevant external documents	

1.4 Governance

AWS has robust governance processes to ensure schemes delivered through the capital programme meet stringent health, safety and environmental standards. This governance process, ensures new technologies, innovations & design approaches will not allow the unintended consequences of creating other pollution types or detrimentally affect the performance of new/upgraded assets.

Our governance processes are chaired by AWS directors including any adaptations developed to enable the measurement & the targeted performance improvement against this ODI.

1.5 Additional Supporting Information

Since 2008 Anglian Water have openly and consistently shared it's approaches to driving toward net zero carbon within water and across the wider infrastructure sector. This has included chairing the steering group of the HM Treasury Infrastructure Carbon Review, scoping and supporting the creation of PAS2080 carbon management in buildings and infrastructure and more recently the sharing of carbon approaches through the Institute of Civil Engineers Infrastructure Carbon Group of which it currently chairs.

Through wider infrastructure groups such as the Infrastructure Client Group (ICG) and Green Construction Board and focussed sector groups such as the carbon network with Water UK and UKWIR, the progress and learning with lower carbon concrete will be shared including innovations in materials and construction techniques through to inviting and organising presentations from leading suppliers. We would also welcome the opportunity to share our developments with Ofwat or other organisations recommended.

More broadly, through engagement with these groups & others, we will work to ensure there is consistency of reporting between our suppliers by driving the wider sector in this direction.

Lower carbon concrete assets – blank line version

Purpose: This performance commitment incentivises the company to reduce the carbon associated with concrete used in the delivery of the capital programme. This will be achieved through either avoiding emissions through adapting project scope or re-purposing existing assets whilst meeting customer or environmental need, or improving the design or switching components of our concrete assets to reduce the carbon emissions whilst not resulting in other types of emissions increasing.

Benefits: Concrete emissions represent a significant proportion of all greenhouse gas emissions associated with capital programme delivery. This performance commitment helps on the journey to carbon neutrality by reducing greenhouse gas emissions associated with the use of concrete in the construction or the refurbishment of assets. This performance commitment will act as an industry pathfinder on how best to deliver less concrete-intensive infrastructure projects through extensive collaboration with our partners in the supply chain. It could contribute to the development of a common capital/embedded carbon performance commitment at PR29.

Response to the Draft Determination: Anglian Water welcomes the response in the outcomes appendix with support to continue progressing the lower carbon concrete assets performance commitment. We have provided updates below in response to comments raised and deleted specific sections as requested.

Performance commitment definition and parameters

1.1 Detailed definitions of performance measure

Percentage reduction in the greenhouse gas emissions associated with concrete and reinforcement used in the construction of capital assets against a 2022 baseline. The baseline is the methodology and approach used to deliver an outcome or output for customers and the environment.

For each scheme where a concrete-based solution is identified within the business plan, a carbon baseline has been created based on the need and the traditional approach to designing and construction techniques used for concrete assets in the UK water sector (as of 2022). This will then be compared to the solution delivered in AMP8. The company will only include changes in emissions that are driven from the company's activities, it's partners and contractors, use of materials or supply chain specific emissions factors. Unless supplier specific emissions factors can be obtained; emissions factors will be frozen at their 2022 (or earlier) versions.

Each regulatory year the company will report the baseline emissions associated for standalone capital projects delivered in the year~~.~~, cumulative for the AMP. The company will calculate the actual modelled emissions, accounting where relevant for activities that impact emissions (noted below~~).~~), cumulative for the AMP. The difference between these figures will be reported as a percentage change. A single percentage change figure will be reported each year for the whole investment programme. For transparency, the company will publish total figures (in tCO_2e) as well as the percentage changes

The measure will cover, for example, the following areas of the company's carbon footprint:

5. Avoid emissions by delivering the customer or environmental need without building new assets:
    - Adapting project scope or introducing an alternative design solution between the initial promotion to the capital vehicle from Anglian Water to outline design.
    - Re-purposing existing assets to avoid concrete being required to build new assets.
6. Improving the design of our concrete assets:
    - Reducing the mass of concrete or reinforced steel within design between the baseline and build phases of a project.
    - Using lower carbon alternative materials (e.g. Glass coated steel tank)
7. Switching components of concrete to use lower carbon alternatives:
    - Changing supplier (i.e. switching to a supplier that uses lower carbon materials).
    - Changing the product from our suppliers, such as products with a higher proportion of lower carbon alternative components (e.g. GGBS) compared to Ordinary Portland Cement (OPC).
    - Using alternative materials to steel reinforcement
    - Encouraging suppliers to stock non-standard, lower carbon products and purchasing them.
8. Sequestration of carbon within concrete
    - It may be possible that in coming years, concrete could act as a medium to sequester carbon. If this can be proven and adopted in relevant standards then this could contribute to our emissions reductions.

1.2 Additional detail on measurement units

This performance commitment measures the percentage reduction of GHG emissions from both concrete and rebar. Rebar refers to reinforced concrete where additional components (such as metal wires and bars) are added to provide strength to the system. This performance commitment only applies to standalone schemes, in alignment with our PR19 Capital Carbon commitment. Standalone schemes are large individual schemes that are typically in one physical location. Standalone schemes represent the majority of our capital delivery schemes by financial value.

~~For simplicity~~

While the approach taken to reduce carbon emissions associated with concrete will vary by project, the following ~~example focuses purely on the concrete & not~~is the ~~reinforcing elements. This example also ignores any restrictions~~calculation that ~~might~~would be ~~imposed by which may prohibit options as presented in this idealised imagined example with a fair tailwind, such as:~~

- ~~Site safety configuration e.g. solutions being limited in height due local power lines~~
- ~~Layout e.g. existing site services including underground and maintaining a build with a working WRC~~
- ~~Local planning rules e.g. issues with the height & screening of assets~~
- ~~Access Restriction e.g. limitations on the size or type of vehicles which may prohibit certain types of materials~~
- ~~Land ownership/purchase e.g. space~~performed to determine the percent change for ~~temporary construction traffic or materials as well as for permeant locations of new assets.~~
- ~~Materials availability e.g. local supply chain capabilities to supply specified materials~~
- ~~People resources within organisation & supply chain e.g. to implement more complex design & construction processes~~

~~Time e.g.~~a particular scheme highlighting some of the ~~changes add duration to the design, construction of enabling programme which may not be possible on projects with tight obligation dates.~~parameters enabled

~~Step~~	~~**A worked example of the process in measuring and reducing the lower carbon concrete solution**~~		
~~1~~	~~Business Need – A water recycling centre requires additional storm water capacity to meet WINEP obligations~~		
~~2~~	~~Baseline solution would be a single concrete storage tank and associated pumping to meet the full additional volume stated by the EA as required.~~ $$Concrete\ Carbon\ Emissions = W$$		
~~3~~	~~A review of the site identified three partial solutions – which will be used together to meet the WINEP obligation~~		
	~~A) Measurement of the existing storm volume shows it is slightly larger or smaller than thought,~~	~~B) some unused old assets that could be repurposed (may be possible on some sites)~~	~~C) a space onsite for a new storage tank.~~
~~4~~	~~Either~~ ~~No further action taken – no build partial solution~~ $$Concrete\ Carbon\ Emissions = 0$$ ~~Or~~ ~~Additional volume is required, increasing the carbon of the scheme~~ $$Concrete\ Carbon\ Emissions = K$$	~~A more detailed structural & suitability review identifies refurbishment requirements – these have a lower carbon footprint of the conventional solution. However the construction program is more complicated with a greater range of contractors and detailed inspections are necessary collaborating with a broad supply chain (at additional financial cost)~~ $$Concrete\ Carbon\ Emissions = T$$	~~While the traditional solution to this new volume would be concrete tank (walls & floor), a possible innovate solution which may be suitable (subject to a range of site specific circumstances) is a concrete base with a glass coated steel tank (for example) – this alternative material lowers the Whole life carbon cost (even though it has a shorter lifetime) although requires a broader supplier base (and may require new suppliers)~~ $$Concrete\ Carbon\ Emissions = Y$$
~~5~~			~~Traditionally the tank would sit on a square concrete foundation as this is easy to design and construct – a possible the innovative engineering design solution is a a more complex shaped concrete floor shape . This requires more time on site to construct the formwork increasing labour costs as well as more time to complete a more complex design. Consideration is required of long term maintenance requirements to avoid creating operational issues~~ $$Concrete\ Carbon\ Emissions = Y - B$$
~~6~~			~~Normal industry standard practise is to use s 100% OPC mix due to fast setting time. Innovative, working in close partnership with the local supply chain a 30% GGBS (balance OPC) is identified. Due to the winter weather at the time~~

			~~of construction this will set slowly. Therefore the construction program is modified to allow a longer cure period (increases cost). Close collaboration with the supply chain is required both to supply materials and a suitably trained workforce to use these materials~~ ~~$Concrete\ Carbon\ Emissions = Y - B - C$~~

$$\textbf{Reduction } \sout{\textbf{on this}} \textbf{ for an example scheme } = \frac{W - [K + 0 + T + (Y - B - C)]}{W}$$

Key :

W ~~$= \frac{K+0+T+(Y-B-C)}{W}$~~ = The concrete carbon baseline of the proposed solution/asset as of 2022.
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