CASE STUDY: Anglian Water - Reducing Embodied Carbon in Mainlaying

SECTOR TYPE: Utilities

CLIENT: Anglian Water

PRINCIPAL DESIGNER: Anglian Water/@one Alliance

PRINCIPAL ENGINEER: Anglian Water/@one Alliance

PRINCIPAL CONTRACTOR: @one Alliance

CONTRACT DURATION: Ongoing

The Project

In supplying water and wastewater services to over 5 million customers, Anglian Water operates over 80,000km of water and wastewater pipelines. A significant proportion of annual capital spend and embodied carbon emissions relate to the installation, repair and replacement of these pipelines.

In line with goals to reduce embodied carbon against a 2010 baseline, the company has successfully implemented a strategy of measurement, management and reduction of carbon within its mainlaying programme.

Anglian Water worked together with @one Alliance framework partners and pipeline suppliers to understand the embodied carbon impacts of installing water mains, rising mains and gravity sewers through open cut trenches and a variety of ‘no dig’ techniques. The information provided was used to develop a range of embodied carbon models, taking into account the quantity of material excavated and reinstated, equipment used, labour requirements and products and raw materials used.

The modelling identified that a significant proportion of the carbon emissions are a result of the excavation and reinstatement of trenches. For example, with a 180mm HPPE SDR 17 water main laid through an open cut trench in a road, only 11% of the embodied carbon is contained within the pipe.

The benefits of the modelling tool include cost savings through reduced embodied carbon, better use of finite resources and reduced installation time and disruption to customers and road users.
The Benefits

- **Reduced carbon** – Significant reductions in embodied carbon through the re-use of the void in the ground and avoidance of trench excavation and reinstatement.

- **Materials** – Reduced use of finite quarried materials from the environment that can’t be returned.

- **Customers and community** – ‘No dig’ techniques also mean less time (approx. 25% less than open cut) is taken in installing new pipelines, resulting in less disruption to customers, the general public and road users in urban areas.

- **Cost** – There is strong evidence of the correlation between embodied carbon and capital expenditure, demonstrated by the integration of carbon measurement and management into the delivery of all water and wastewater mainlaying schemes.

- **Project selection** – Within Anglian Water, the proportion of water mains installed through a ‘no dig’ method such as directional drill, pipebursting or sliplining has increased from around 6% in 2005-2010 to over 60% from 2010-2012.

The Process

The principles underlying the embodied carbon modelling:

- Predicted changes in weather patterns, rising sea levels and meeting the needs of a growing population has meant that Anglian Water is one of the most vulnerable UK water companies to be affected by climate change.

- Over 30% of Anglian Water’s annual carbon emissions arise from embodied carbon in the products and materials used in building and refurbishing assets. In response to the challenge of climate change, it has set the goal of halving embodied carbon in assets built by 2015 from a 2010 baseline.

- With an embodied carbon baseline provided for each scheme, engineers are challenged with reducing the emissions associated with their designs. The level of reductions available through different ground conditions and changes in diameters of pipes are calculated through an in-house carbon modelling tool. This allows the design engineer to optioneer between, and identify the optimal route, pipe material and diameter, and installation technique.

- The designs are challenged on three separate occasions prior to works commencing on site using a robust governance process to ensure the lowest practical embodied carbon solutions are taken forward.

Key Learning Points

- Measuring and understanding the embodied carbon reduction opportunities for ‘no dig’ techniques is vital for making informed decisions.

- Targeting embodied carbon, as well as cost, early in the design gives opportunities for multiple project benefits.

- Robust governance is required to reinforce the process and to measure and challenge carbon reductions.

End User Feedback

With the open cut traditional approach to mainlaying, there was some initial resistance to the significant increase in ‘no dig’ demanded. However, with a robust governance process in place, and benefits clearly explained and understood, ‘no dig’ techniques are now becoming business-as-usual with pipeline design engineers.

Learn more

www.anglianwater.co.uk/_assets/media/GHG_report_2012.pdf

For more information on
The Green Construction Board
visit www.greenconstructionboard.org
or email green.board@bis.gsi.gov.uk