



Sustainability and asset management – carbon foot-printing a capital improvement program (CIP)

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References:

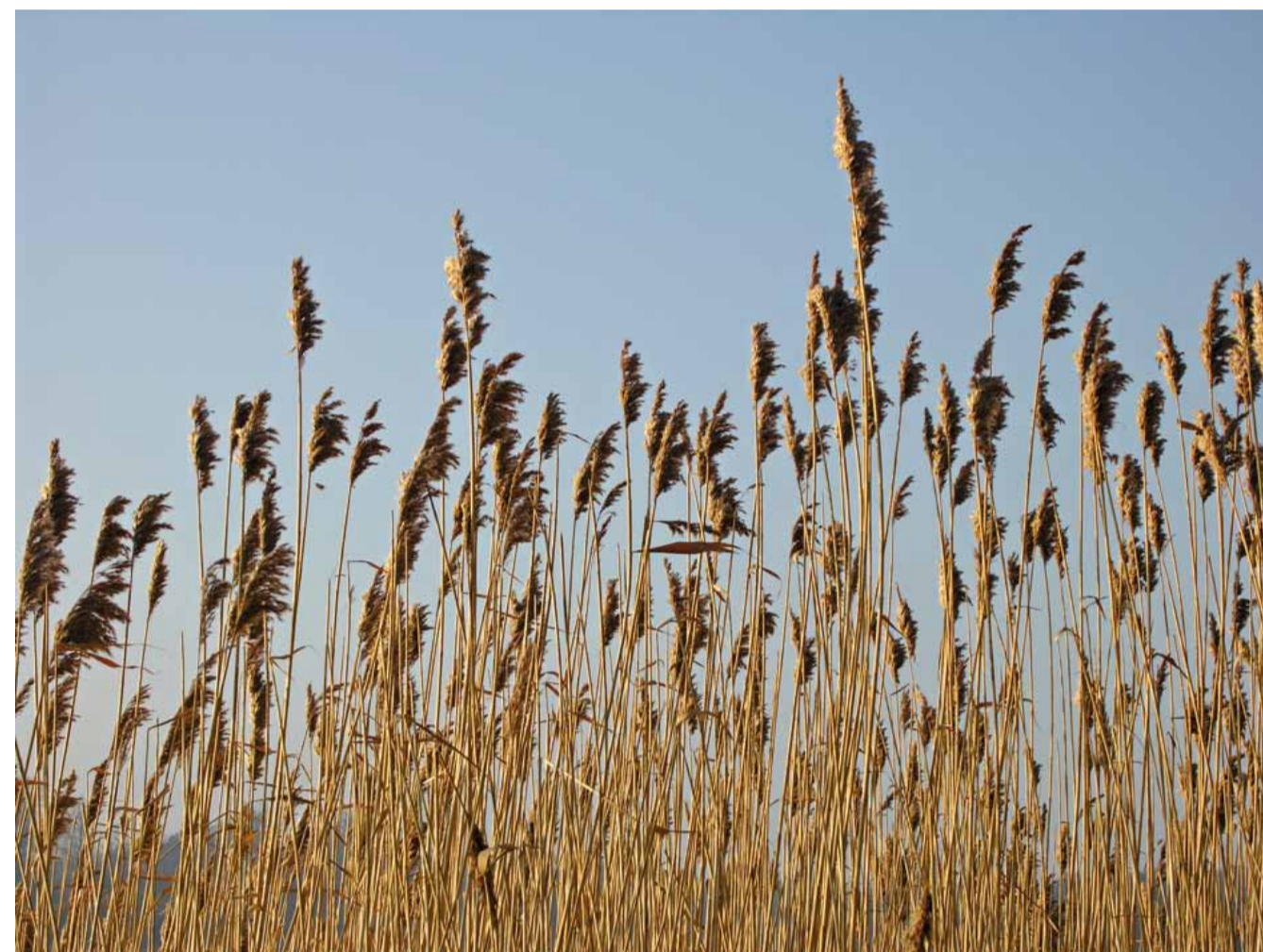
Carbon accounting in the UK water industry: Guidelines for dealing with ‘embodied carbon’ and whole life carbon accounting – UK Water Industry Research 2008.

Supplementary Information on Justification For Proposed Investment – Including Cost Benefit Analysis and Carbon Accounting – Company Guidance, Office of Water Services 2008.

Introduction

With increasing global focus on the environmental impacts of climate change and specifically the anthropogenic contribution, water and sewerage service providers, as major materials and electricity consumers need to start to consider the sustainability of their investment decision making.

In the UK, the Economic Regulator (OFWAT) now requires each water company to report annual carbon emissions caused by their operations. In addition to this, reporting ‘embedded’ or ‘Capex’ carbon is for the first time a requirement of the 5 yearly Business Planning process. The 23 water companies are therefore required to account for any additional



carbon emissions resulting from the construction and/or maintenance of assets together with any increase of operational ‘Opex’ emissions caused by their planned capital investment program over the 2010-2015 period.

As well as these mandatory reporting requirements, companies have set themselves carbon reduction target of up to 25% by 2015. Halcrow carried out carbon accounting for one of the large water and sewerage service providers and produced a ‘toolkit’ to enable the client to carry out carbon optioneering of planned activities in the future, based on both greenhouse gas (GHG) emissions level and cost, using the DEFRA* ‘Shadow Price of Carbon.’



Methodology

Halcrow reviewed available information about the types of assets to be built over the 2010-2015 investment period

Models were built for desk-based work and maintenance work on site to calculate embedded carbon for spend

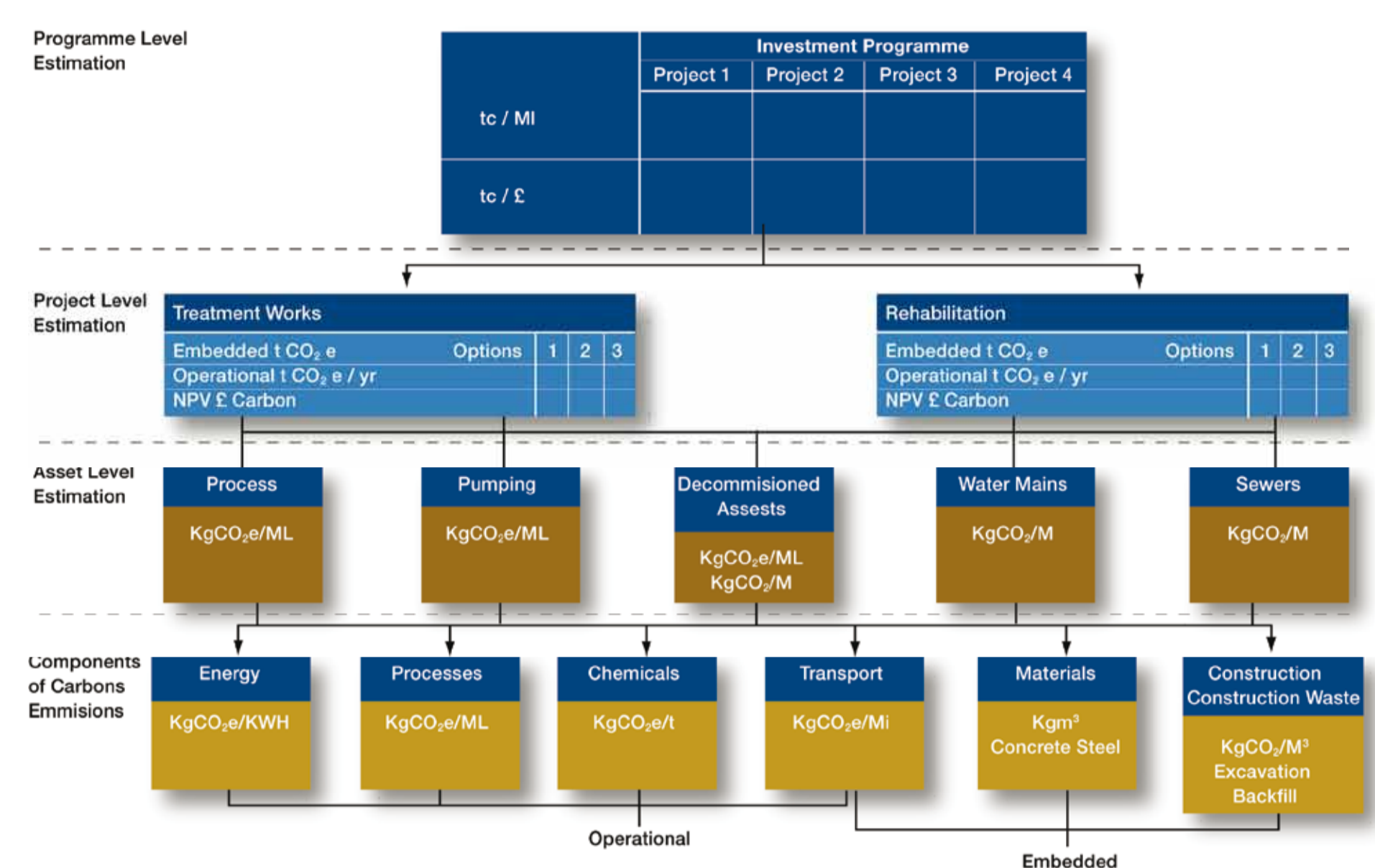
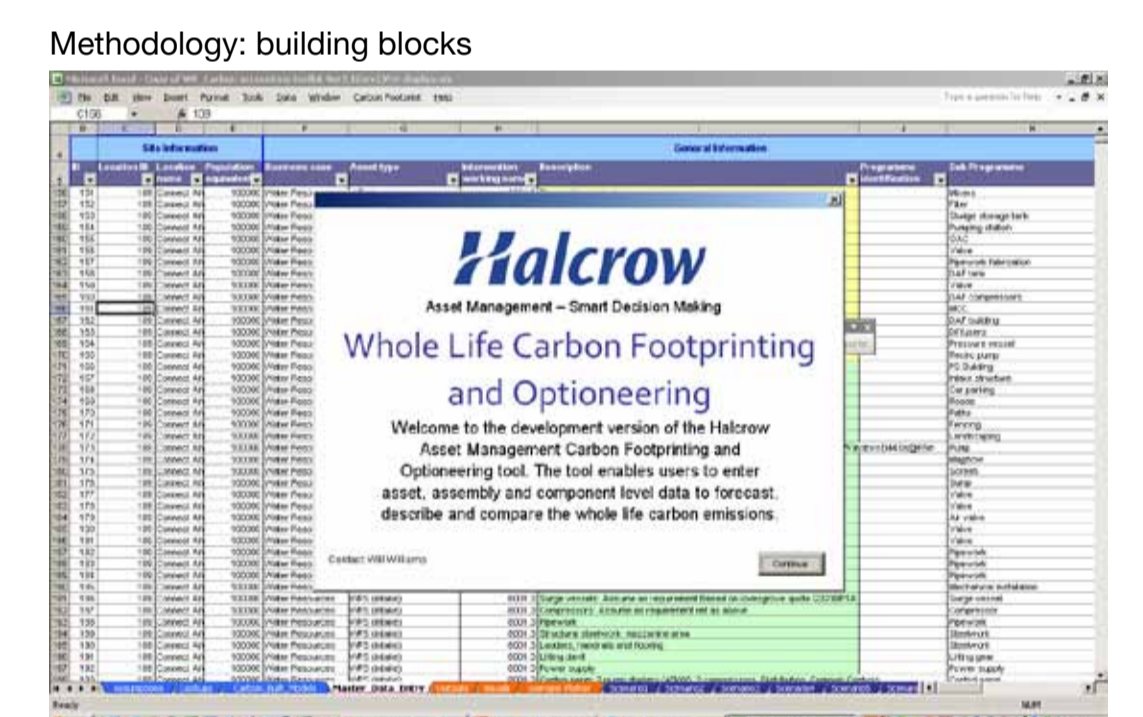


Figure 1.1 - Overview of carbon model components and functionality

and produced carbon models for these assets. Mechanical equipment suppliers were contacted for material weights and compositions for varying sizes of plant. Emissions factors for the materials were sourced from UK Water Industry Research (UKWIR), The Institute of Carbon and Energy (ICE) based in Bath University, and DEFRA.

The emissions factors and the different plant sizes allowed the construction of models of embodied carbon to an appropriate yardstick, such as kW for pumps or mm diameter for valves. Civil structures were based on typical design drawings of assets, and were also modelled to allow for variation in sizes.

on the activities associated with running the day-to-day business. A carbon accounting Excel spreadsheet based ‘toolkit’ was designed to allow for detailed carbon modelling of schemes. Analysis of the



results provided a method for developing high level relationships linking capital expenditure to embodied carbon.

Results and discussion

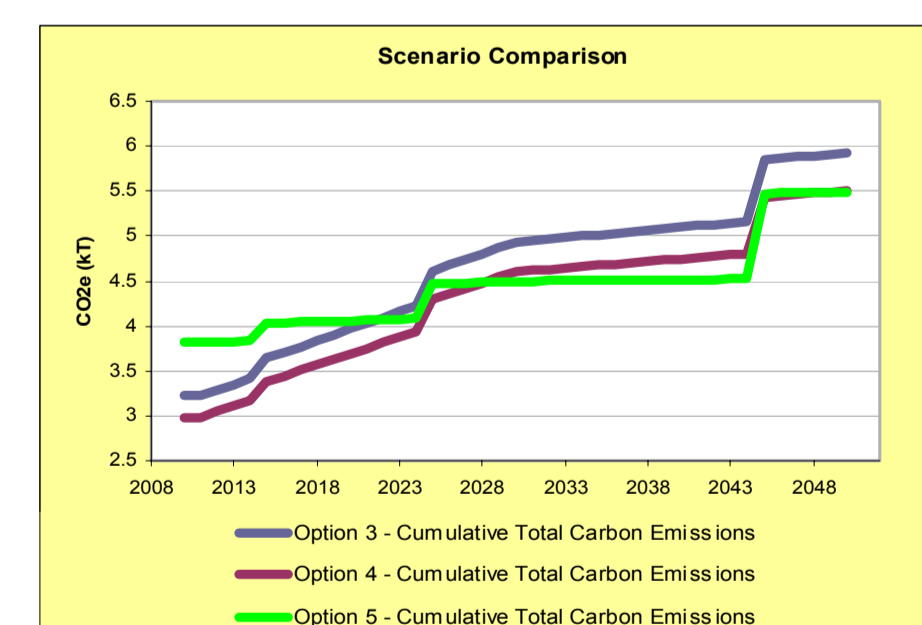
These carbon-capex relationships were used to account for over 1,500 capital interventions in the 2010-2015 investment program. In all, a carbon footprint for some \$2.2Bn of investment was developed.

information in to their Strategic Investment Planning System.

Halcrow assessed the Operational Expenditure relating to maintenance activities associated with the planned capital interventions. The energy used by individual assets was identified and published emissions factors were applied to determine the operational carbon emissions associated with energy use. For the client’s extensive carbon reduction investment programmes - sludge digestion and leakage reduction, Halcrow worked with individual programme managers to carry out an assessment of the operational carbon emissions savings and ensured they were adequately represented in reporting to Ofwat. Halcrow delivered the financial evaluation of the carbon emissions within the programme in accordance

The embodied carbon for each individual intervention was incorporated into the client’s project database, which was used to feed

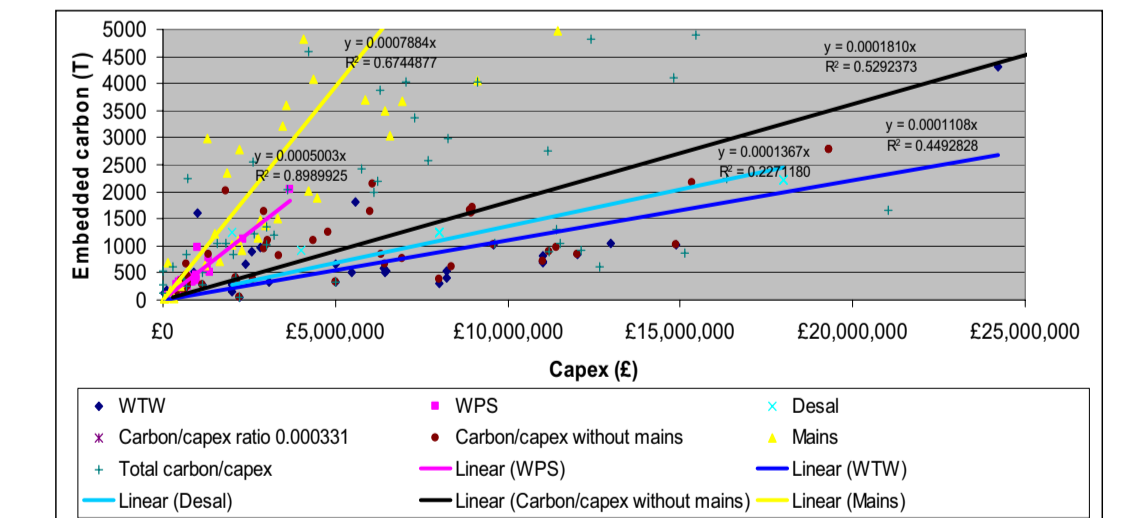
Emissions calculations and optioneering



with DEFRA guidelines on carbon accounting using the published Shadow Price of Carbon. The ‘Shadow Price’ of Carbon places a monetary value on the damage costs of climate change caused by each additional tonne of greenhouse gas emitted. The toolkit and approach enabled the client to assess the carbon emissions and costs at the asset, scheme and programme level. At present, however, because of the relatively low shadow price of carbon, it does not impact greatly on scheme selection, but the likely increases in the shadow price

mean that carbon could become one of the key parameters for investment prioritization in the future.

High-level relationships and sensitivity analyses



The toolkit will also enable an operational baseline to be established so that the benefits of carbon reduction programs can be quantified and possibly traded, once the mechanism for this has been developed and put in place by government.

Rather than just discharging their regulatory obligations, the client has chosen to embed carbon as part of their investment decision making process.