LOW CARBON LIVING CRC

# Precinct Information Modelling

## Collaboration:

## Integrated Carbon Metrics Project

## Work to date

The Integrated Carbon Metrics (ICM) research project has taken a top-down approach to determining embodied carbon metrics based on national sector-based economic data. The challenges encountered in applying all such data to precinct-level objects are:

- the comprehensiveness of the data — that is, are there available metrics for enough materials or elements of the built environment to allow for calculating a meaningful summation of the embodied carbon of a precinct?; and,
- the level of detail at which the metrics are available — that is, can the metrics be applied at an aggregated level in the same way that building costs can be applied per square metre of functional area?.

Since ICM provides per dollar carbon metrics, it is first of all necessary to calculate the cost of each component of a precinct (entity or material of which it is composed) then multiply by the embodied carbon measure. For a precinct designer, for example, this requires the intersection of the two sources of reference data (costs and embodied carbon) as shown in figure 1. The ICM GUID and Cost GUID labels in the diagram (Figure 1) refer to globally unique identifiers (GUIDs) that allow particular entries in the respective databases to be unambiguously accessed.

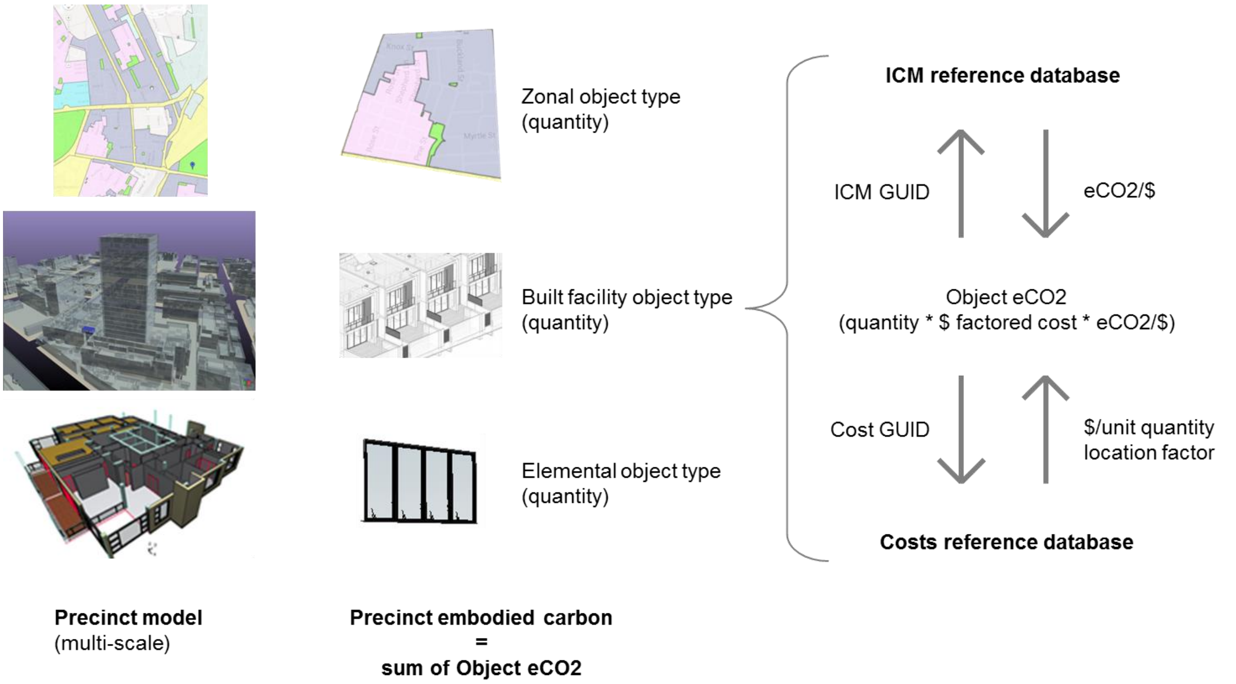


Figure 1 Calculating embodied carbon using ICM metrics

To date, the ICM project has developed metrics for a very limited set of materials and elements used in construction. The PIM team have created a prototype web service to house ICM data, thus allowing access through the web, but have not populated that repository with the latest ICM dataset.

## Continuing work

Several areas of work are indicated for realizing the applicability of ICM data to actual precinct information models.

- **To develop aggregated metrics that are suitable to be applied at a precinct scale**. For example, typical housing types (either as a whole or on some measurement basis such as per bedroom, or per number of occupants), per kilometre of typical roadway types, or per hectare of open space (parkland etc). This work has been hampered to date by an insufficient palette of available carbon metric data. The work requires the creation of type objects at a sufficient level of detail that the components of those objects intersect with what carbon data is available, and then the calculation of an aggregated embodied carbon metric for each object type from the summation of its parts. The type object can subsequently be simplified geometrically for use in large scale planning applications. Note that it may only be possible to do a prototype set of object types given what reference data is currently available.

- **To show the interface between an embodied carbon reference source and a precinct information model**. This has already been prototyped by the PIM team using external references from entities in a PIM model to the PIM web service. There is also another web-based methodology gaining momentum that should be prototyped for our embodied carbon use case. This is the linked data format (promoted as a basis for the Semantic Web, and being adopted by governments around the world as a means to publish their data in an openly accessible form). Reference data created and made available using this format can be accessed using ontological queries through the internet. How such queries work relative to the interface between a BIM or PIM formatted model and the open reference data source is a subject for further research.