

STATE OF OREGON

INTEROFFICE MEMO

BUILDING CODES DIVISION

OCTOBER 13, 2010

To: Reach Code Advisory Committee

From: Staff

Subject: Recommendations for Chapter 3

Background:

Currently, the IGCC is structured around a continual decrease in the Total Annual Net Energy Use (TANEU) of a building. The original IGCC goal was to cut the energy use of an IGCC building by 30% compared to the 2006 IECC. IGCC approached this by developing the TANEU which uses the 2006 IECC as its baseline number. Improvements over the code were shown as a reduced TANEU. The 2006 IECC was considered to be 100; the 2009 IECC was considered to be a TANEU of 77. The current code sets a base TANEU of 70 and allows the jurisdictions to choose a lower number if desired. A base TANEU of 70 is equal to 30% better than the 2006 IECC and 10% better than the 2010 OEESC.

However, the IGCC appears to be moving away from TANEU and moving toward either a zero energy performance index (zEPI) or energy use intensity (EUI). Staff believes that EUI will likely be the measurement chosen because it is the preferred measurement for the AIA 2030 goal and other organizations.

Baseline energy Use:

The debate is not centering on the amount of energy improvement that the IGCC should represent but rather what the baseline for that improvement should be. In other words, if the goal is to cut energy use by 50% what is the starting point (i.e. 100%)?

The baseline could be a code, as the TANEU utilized the 2006 IECC. However, there are differences in the “energy use” of each individual building type under each version of the code. At the national level there is no agreement between the stakeholders on which code should provide the baseline.

Another possible baseline is the Commercial Buildings Energy Consumption Survey (CBECS). This is a database of actual buildings across the country. The current 2003 data is based on information gathered in the year 2000. The CBECS data serves as the baseline for the EUI. EUI is generally expressed in KBTU/Square-foot-year (thousands of BTU per area per year). EUI is used by the AIA 2030 challenge, and the Federal Energy Star program.

There is a free tool available provided by the US Environmental Protection Agency, Target Finder, that allows for determination of a median energy use of U.S. building stock. From that median an owner can model a building to set a goal for a proposed project's energy usage. The data in the Target Finder program can recalculate the EUI for building type, size, location, number of occupants, occupied hours, and number of PCs (an indicator of plug load intensity). The Target Finder tool is utilized by those participating in the Energy Star Program for buildings. The Target Finder program gives a figure in the site energy use EUI (what is actually used by the building) and the “source” energy use (adjusts the total energy for losses in the delivery of power to a site):

The AIA 2030 challenge utilizes EUI and CBECS data as a baseline. The 2030 challenge would require that all buildings designed in 2010 consume 60% less energy than a CBECS building.

The IGCC, like the AIA 2030 Challenge and the EPA Energy Star program, appear to be moving toward using the “Target Finder” to set the baseline.

There is an issue with determining whether a modeled building performs as modeled, particularly in cases where the division is unable to require continued monitoring of a building as operated. Modeling is not an accurate predictor of a building’s actual performance. Modeling can be used to determine whether a particular building has increased its theoretical efficiency over a set code, however.

A zEPI can be correlated to an EUI under target finder. zEPI is the % energy used by a building related to a year 2000 baseline/median being 100% (a zEPI of 70 means the building uses 70% of the annual energy used by a median baseline building). Target Finder can express results as a zEPI equivalent, as the EUI for the baseline and proposed building, and as a “Score” where the building is rated in percentile ranking relative to “baseline” buildings. A 90 score means that the building is in the top 10% of buildings for lowest energy use.

IGCC energy comparisons

The IGCC has two energy comparison goals: a comparison to the median year 2000 building (X% relative to this median) and a parallel comparison to the 2006 and 2009 IECC codes (attaining 30% more than the 2006 and/or 10% better than the 2009). At the national level, the 2006 IECC was deemed equal to a zEPI of 73 (73% of the energy use of the year 2000 baseline). If the zEPI is the unit of measurement at the national level the goal would be a 30% reduction (a zEPI of 51). A 51 zEPI is nearly equal to the first AIA 2030 benchmark (50% reduction in energy use). The zEPI of 51 is also generally equivalent to 10% improvement over the 2009 IECC (the baseline for the 2010 OEESC).

Staff Recommendations:

Staff recommends utilizing an EUI (in standard KBTU/SF-year). It is the likely outcome of the IGCC hearings. It is the commonly used measurement for energy use in buildings. It is also easily understood by building owners. The IGCC will most likely will be setting up a system which requires a building to be at least 10% better than the 2009 IECC. This should be comparable to a building that uses 50-55% less energy than the CBECS 2003 database. This is also roughly equivalent to the goal set by the 2030 challenge.

The staff recommends setting the 2010 as the baseline for the EUI target. That will allow for a comparison of code features to code features.

Staff recommends measurements based solely on site energy: the energy used by the building. Cost comparisons, as used by ASHRAE, are generally used as a surrogate to get at source energy. However, the source of energy tomorrow may not match today’s energy sources. Additionally, the division does not have jurisdiction to address what sources of energy a building should be tapping.

Utilizing an EUI and requiring at least a 10% improvement over the 2010 OEESC will likely align us with the national IGCC, the AIA 2030 challenge and be roughly equivalent to LEED Gold. Aligning with the LEED energy portion may open the Reach Code up as a viable alternative to LEED for the purposes of incentives through federal, state and local jurisdiction programs.