Appendix 2 – Core & Shell Energy Modeling Guidelines

These guidelines are intended to ensure that projects in different markets with different project teams are approaching the energy modeling requirements in a similar manner and that a minimum benchmark for energy optimization is established.

1. **Create the ASHRAE 90.1-2004 baseline building model and proposed building model**
    1.1   Follow the ASHRAE 90.1-2004 Building Performance Rating Method. This is a whole building model inclusive of both shell and core, and tenant space scope. The following describes the prescriptive requirements for developing the whole building modeling of both the known shell and core work and unknown tenant space development.
    1.2   Tenant spaces are defined as meeting all the following conditions:
        1.2.1   Components exclusively serve the tenant space;
        1.2.2   Components specifically designed for the tenant space;
        1.2.3   Energy using components are metered and apportioned and/or billed to the tenant;
        1.2.4   The tenant will pay for the components.
    1.3   The core and shell building is all parts of the building that is not a tenant space.
2   **Proposed Building Model**
    2.1 Core and Shell Building
        2.1.1   HVAC Systems
            2.1.1.1 Model the building system as described in the design documents.
                - If the HVAC system is not yet designed, use the same HVAC system as the baseline model.
        2.1.2   Building Envelope
            2.1.2.1 Model the building envelope as shown on the architectural drawings.
        2.1.3   Lighting
            2.1.3.1 Model the lighting power as shown in the design documents for the core and shell spaces.
    2.2 Tenant Spaces
        2.2.1   Lighting
            2.2.1.1 Model separate electric meters for the lighting in the core building and the tenant spaces.
            2.2.1.2 Choose a space type classification for the building spaces. Use lighting levels shown in chart 9.3.1.2 of ASHRAE 90.1-2004 for the space type use classification.
                - If the tenant lighting is designed and installed as part of the core and shell work, the project team may model the designed or installed lighting systems.
        2.2.2   Receptacle and Other Loads
            2.2.2.1 Model separate meters for tenant plug loads and process loads.
            2.2.2.2 Use the following values to model tenant plug loads or provide documentation for the modeled loads (See the Process energy section on page 44 of this section):
            2.2.2.3 Computer intensive offices
                - 2.0 W/sq. ft.
            2.2.2.4 General office areas
                - 1.5 W/sq. ft.
            2.2.2.5 Large conference areas
                - 1.0 W/sq. ft.
            2.2.2.6 Corridors

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- 0 W/sq. ft.
    - 2.2.2.7 Server/computer rooms
        - 50 W/sq. ft.
    - 2.2.2.8 Other uses
        - Use diversity in calculations

3 **Baseline Building Model**
  3.1 Core and Shell Building
    3.1.1 HVAC system
      3.1.1.1 Model the baseline building HVAC system determined from Table G3.1.1A in ASHRAE 90.1-2004.
    3.1.2 Building Envelope
      3.1.2.1 Comply with the prescriptive requirements of ASHRAE 90.1-2004.
    3.1.3 Lighting
      3.1.3.1 Model the lighting power in the core and shell areas as determined by the space type classification in chart 9.6.1 of ASHRAE 90.1-2004.
  3.2 Tenant Spaces
    3.2.1 Lighting
      3.2.1.1 Model separate electric meters for the lighting in the core building and the tenant spaces.
      3.2.1.2 Use the same lighting power as modeled in the proposed building.
    3.2.2 Receptacle and other Loads
      3.2.2.1 Model separate meters for tenant receptacle loads and process loads.
      3.2.2.2 Use the same values for receptacle loads as used in the proposed building.

4 **Perform Energy Simulation of Baseline Building and Proposed Building**
  4.1 Simulate building performance for an entire year.

5 **Compare Annual Energy Costs of Baseline Building and Proposed Building**
  5.1 From the simulation, determine the annual energy costs of the budget building and design building.
  5.2 Verify that 25% of the overall energy cost is process load.
  5.3 Determine the percentage savings for annual energy costs