

## Appendix E-0: Suggested Implementation for All Energy and Atmosphere Guidelines

### E.1 Energy Use (pre-SB2030 projects only)

Comparative analysis is required for all buildings over 5,000 square feet that are heated. The required process is similar for all buildings, though there is a different path to compliance for buildings less than 30,000 gross square feet. Buildings entering Schematic Design after August 1, 2009 are exempt from 30% energy use reduction, and must instead apply energy standards defined by Minnesota Sustainable Buildings 2030 (website at [www.mn2030.umn.edu](http://www.mn2030.umn.edu)).

#### E.1A, E.1B (30% energy use reduction)

##### Agency Planning

- Budget for building performance at 30% better than code
- Verify with B3 Guidelines help at [msbghelp@umn.edu](mailto:msbghelp@umn.edu) that your project will be pre-SB2030 project.

##### Pre-design-Programming

- Use Daylight Factor Calculator to proportion and characterize programmed spaces and areas where daylighting is desirable and/or allowable.
- Review guidelines for building geometry and daylighting design
- Identify and review potential energy conservation strategies for your building type

##### Pre-design-Site Selection

- Evaluate building geometry, daylighting depth and site development implications for primary north and south exposure

##### Schematic Design

Buildings over 30,000 Square Feet:

- Use Daylight Factor Calculator to confirm proportion and characterize programmed spaces and areas where daylighting is desirable and/or allowable.
- Provide base building characteristics for an hourly energy performance simulation model based on a specific building geometry.
- Perform baseline energy simulation modeling to establish a Code Base Case that meets the minimum prerequisite standard of the Minnesota State Energy Code and the IAQ standards identified within this guideline.<sup>1</sup>
- Establish energy strategies to investigate in each of the following categories<sup>2</sup>
  - Envelope
  - Lighting Control
  - Lighting Design
  - HVAC system efficiency levels
  - Load Responsive control
  - Outside Air control

<sup>1</sup> Allowable software for buildings over 30,000 GSF includes calculation tools that meet the criteria for simulation tools as per Appendix G of ASHRAE 90.1-2004.

<sup>2</sup> Variables must be sufficient to allow meaningful comparative analysis. At least three options per category must be evaluated.

Buildings under 30,000 Square Feet:<sup>3</sup>

- Use Daylight Factor Calculator to confirm proportion and characterize programmed spaces and areas where daylighting is desirable and/or allowable.
- Calculate building envelope metrics using the Small Buildings Methodology for pre-SB2030 projects, Appendix E-1f .
- Evaluate building envelope and system options in the Small Buildings Methodology included in this guide.

### Design Development

Buildings over 30,000 Square Feet:

- Use the baseline energy simulation model and simulate isolated Energy Conservation Measures (ECMs) (strategies) to compare with the Code Base Case
- Develop, document and distribute modeling parameters for use in comparative cost estimating
- Develop incremental costs for each ECM based on the difference of the cost of constructing the ECM versus the cost of constructing the code level requirement for the strategy.
- Bundle and compare ECMs to approximate lowest life time cost
- Select a bundled ECM option to implement
- Enter results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit with DD package. (See Appendix P-0a for details of reporting processes.)

Buildings under 30,000 Square Feet

- Develop net incremental cost estimates to compare bundled options to the cost of constructing the code level requirement
- Select bundled option to implement
- Comply with building envelope and system options in the Small Buildings Methodology included in this guide.
- Enter results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit with DD package. (See Appendix P-0a for details of reporting processes.)

### Construction Documents

- Design team includes all ECMs from the selected bundle
- Guideline Leader and Commissioning Team review construction documents at 95% completion to verify design progress against modeling assumptions and reports findings back to design team. (See Appendix P-0a for details of review processes.)
- Design team makes additions, deletions or corrections, if any, and bids project.
- Enter updated results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit with CD package. (See Appendix P-0a for details of reporting processes.)

### Construction

- Review shop drawings to assure compliance with ECMs

### Correction Period

- Guideline Leader for ongoing occupancy provides benchmarking data
- Commissioning Leader reviews execution of Measurement and Verification protocol during commissioning phase. (See Appendix P-0a for details of review processes.)

---

<sup>3</sup> The model presented here is for small office buildings. For other building types or for variations to the prescriptive bundles presented, you may use the methodology for buildings over 30,000 gross square feet.

### **Ongoing Occupancy**

- Guideline Leader (or possibly Utility Provider in future) sends monthly energy consumption to benchmarking collection team each year. (See Appendix P-0a for details of reporting processes.)

### **E.1C Follow requirements of the SB 2030 program**

#### **All Phases**

- For phase-specific guideline requirements, please refer to the SB 2030 project website, at [www.mn2030.umn.edu](http://www.mn2030.umn.edu) and Appendices E-1a through E-1f.

## **E.2 Renewable and Distributed Energy Evaluation**

### **Pre-design-Programming**

- Identify the potential investment value of on-site generation to offset 2% of predicted energy use

### **Pre-design-Site Selection**

- Evaluate building geometry and orientation for solar-based energy solutions.
- Investigate the viability and potentiality of other on-site renewable and distributed energy options.
- Investigate the proximity to nearby renewable and distributed energy generation sources and the transmission potential to your site and/or the investment potential for your project.

### **Schematic Design**

#### **On-site:**

- Locate renewable and distributed energy installation areas on plans, elevations and sections as appropriate.
- Investigate spatial and loading impact on site, architectural, mechanical and electrical systems.
- Develop preliminary performance specifications for the selected technology(s)
- Calculate available area and refine performance/cost assumptions based on installation intentions and anticipated system efficacy at this stage of design.
- Enter preliminary results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit at SD phase completion .

#### **Supplemental off-site:**

- Determine availability of resource relative to project demands
- Investigate spatial and loading impact on site, architectural, mechanical and electrical systems.
- Develop preliminary purchase contract language
- Refine performance/cost assumptions based on contractual intentions and anticipated system efficacy at this stage of design.
- Enter preliminary results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit at SD phase completion.

### **Design Development**

#### **On-site:**

- Develop dimensioned installation profiles on plans, elevations and sections.
- Refine performance specifications for the selected technology(s), identify and contact potential vendors
- Refine performance/cost assumptions based on installation profiles and anticipated system efficacy at this stage of design.
- Enter results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit at DD phase completion. (See Appendix P-0a for details of reporting processes.)

#### **Supplemental off-site:**

- Confirm availability of resource relative to project demands
- Develop design to accommodate spatial and loading impact on site, architectural, mechanical and electrical systems if any
- Develop final purchase contract language
- Refine performance/cost assumptions based on contractual intentions and anticipated system efficacy at this stage of design.
- Enter results in B3 Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit at DD phase completion. See Appendix P-0a for details of reporting processes.

### **Construction Documents**

#### **On-site:**

- Develop dimensioned installation details and specifications for the selected technology(s) and specify potential vendors
- Refine performance/cost assumptions based on installation profiles and anticipated system efficacy at this stage of design.
- Update results in B3- Guidelines Tracking Tool at [www.msbgtracking.com](http://www.msbgtracking.com) and submit with CD package. (See Appendix P-0a for details of reporting processes.)

#### **Supplemental off-site:**

- Re-confirm availability of resource relative to project demands
- Complete design to accommodate spatial and loading impact on site, architectural, mechanical and electrical systems if any
- Refine performance/cost assumptions based on contractual intentions and anticipated system efficacy at this stage of design.
- Update results in B3 Guidelines Tracking Tool [www.msbgtracking.com](http://www.msbgtracking.com) and submit with CD package. (See Appendix P-0a for details of reporting processes.)

### **Construction Administration**

- Review shop drawings to assure compliance with renewable and distributed energy equipment specifications.

## **E.3 Efficient Equipment and Appliances**

### **Agency Planning**

- Budget for energy efficient (Energy Star) equipment and appliances

### **Construction Documents**

- Provide drawings, cut sheets, and specifications highlighting compliance of equipment and appliances with Energy Star requirements. Document efficiency ratings of motors and drives, water service equipment, and other electrical load components.
- Enter data in B3 Guidelines Tracking Tool [www.msbtracking.com](http://www.msbtracking.com) and submit at CD phase completion. (See Appendix P-0a for details of reporting processes.)

#### **Construction**

- Review shop drawings to assure compliance with Energy Efficient equipment specifications.

## **E.4 Atmospheric Protection**

#### **Predesign-Programming**

- Determine on-site fire suppression requirements

#### **Schematic Design**

- Plan and organize building to minimize the need for the use of Halon fire suppression systems
- Using the tables below and other information as may be available at the time of design, identify candidate refrigerants that have a low Global Warming Potential, short Atmospheric Lifetime and a low Ozone Depletion Potential.
- Use one of the weighted evaluation metrics provided to evaluate the refrigerants.
- Prioritize the list in the order given.

#### **Design Development**

- Evaluate the economic impacts of the prioritized list
- Evaluate the community impacts of the prioritized list
- Adjust priorities pursuant to the analysis

#### **Construction Documents**

- Develop specifications based on adjusted priorities

#### **Construction Administration**

- Verify shop drawings to assure compliance