RetroFit

Integrative Design Checklist

An integrative design process allows for the introduction of more variables and "what-if's" than a conventional project development process, thus leading to increased levels of performance when compared to a more traditional design process. Design teams make decisions based on a variety of factors ranging from benefits (energy reduction, cost reduction, LEED points, aesthetics, comfort), to upstream and downstream affects on other building systems and infrastructure and the degree to which certain measures achieve overall project goals.

If you are a building owner or member of a design team, the following questions can help you assess the viability of various design solutions. Building owners can use this checklist during the early stages of the design process to encourage the design team to think less linearly and create whole-systems solutions. In addition, answers to these questions can supplant typical value engineering (where designers make decisions based primarily on capital cost and savings for individual measures, not accounting for the synergies in an integrated system). Answering the questions below can help the team understand how well a particular design measure meets the ultimate needs of the project across a range of topics and metrics.

Step 1. Define Service and Need

- ☐ What is the purpose of the space and who or what is prescribing this?
- ☐ Are these appropriate purposes and/or demands for the space?
- ☐ How do you need to design the space to meet the purpose? What are the variables that you could change?
- ☐ What could you do to increase the flexibility of these space needs?
- ☐ Would the needs for the space be different if you put it somewhere else in the building?

Step 2. Reduce Needs through Passive/Whole-Systems Measures

- ☐ Is it possible for a passive system to replace an active system?
- ☐ What would it take to eliminate an active system?
- ☐ What passive measures would reduce the size/use of an active system?
- ☐ What other systems are directly affected by this system?
- ☐ What other systems directly affect this system? Are there opportunities to reduce those effects? Or to benefit from them?

Step 3. System Design: Multiple Benefits from Single Expenditures

- ☐ What is the best layout, placement, or location for this system?
- ☐ Have you questioned typical rules of thumb about the design of this system?
- ☐ If multiple people designed the system components, has one person thought about the whole picture?
- ☐ What are the boundaries/limits of this system? Would the design change if the boundaries (or zoning) changed? What are the optimal boundaries for this system?
- ☐ Is each individual component optimized and is the system as a whole optimized? Can you make one component "worse" or "better" to improve multiple other components, and thus make the whole system better?

- ☐ How many functions does this system/component serve? Could it be adapted to serve more than one purpose (and eliminate the need for another system)?
- ☐ Is the system flexible? Can it adapt as building needs change?

Step 4. Efficient Technology

- ☐ Is this the most efficient technology available? What would the system look like if you used a more or less efficient product? What is the cost/benefit of doing so?
- ☐ Will a more efficient technology be available in the next 1, 2 or 5 years?
- ☐ Can the system be adapted or modified when new technologies become available?
- ☐ Does this technology use an appropriate energy supply source?
- ☐ Could this technology use a renewable energy supply?

Step 5. Controls and Demand Response

- ☐ Does this system/equipment need to be on all the time?
- ☐ Can this system be shut off or turned down some of the time in response to varying operating parameters or factors it may be dependent on (For instance, periods of low occupancy, evening or weekend)?
- ☐ Can this system be shut off or turned down to reduce operating costs that are based on demand charges or peak utility charges?

Step 6. Use of Waste Streams

- ☐ What waste does this system create?
- ☐ Can this waste be used in the building as a feedstock for another process?
- ☐ Is there a local service that can recycle or reuse this waste?
- ☐ Would a different system/design approach generate less waste?
- ☐ What is the lifespan of this product/system? How can this product/system be replaced in 5, 10, or 20 years?

Step 7. Appropriate Metrics

- ☐ What metrics are you using to analyze this system and measure its performance?
- ☐ Do these metrics include all values and costs? Are all the life-cycle costs and benefits captured?
- ☐ What is the purpose of this system? Is there a reason to spend more or less on this system? Are there exceptions for this system?
- ☐ Is this system replicable within the building? In other buildings?
- ☐ What are the risks of implementing this system?
- ☐ What would be the absolute best and worst application of this system?