

8.4

Productivity in the Workplace

Productivity involves the health, comfort, and well-being of people living and working in Federal facilities as well as how those factors affect their performance. Maximizing health and productivity through proper building design is increasingly recognized as a critical aspect of sustainability and global competitiveness. The economic impacts of productivity are much greater than commonly assumed, even among building professionals. A productivity increase of just 1% can completely offset a building's entire energy bill. Thus, while it may sometimes be difficult to defend certain green design investments (such as daylighting, natural ventilation, and passive solar heating) solely on the basis of energy savings, these investments may be easily justified when their effects on productivity are considered.

Opportunities

Human health and productivity can be maximized when the project team addresses the following issues in an integrated manner at the beginning of a project:

- Thermal comfort (HVAC design);
- Indoor air quality (interior finish materials, construction detailing, and HVAC design);
- Visual comfort (daylighting);
- Acoustic comfort (site placement and interior materials and systems);
- Ergonomic comfort (furniture selection);
- Connection to nature (windows for view, interior landscapes); and
- Potential for both privacy and networking (space configurations).

Opportunities for boosting productivity should be considered whenever significant renovation or reconfiguration is being done in a facility. Some productivity-enhancing measures can be implemented even when major modifications to the building are not being done. The widest range of strategies and most comprehensive measures to boost productivity can be incorporated into *new* buildings, especially if addressing productivity is a high priority right from the start.

Technical Information

Our understanding of productivity and all the factors that influence it is still growing. Members of the integrated design team for a project should keep abreast of the latest findings regarding the productivity benefits of building design and construction strategies,

such as daylighting (see box below). They should also be aware of the added benefits most such strategies offer in reducing energy consumption and improving the overall environmental performance of a building.

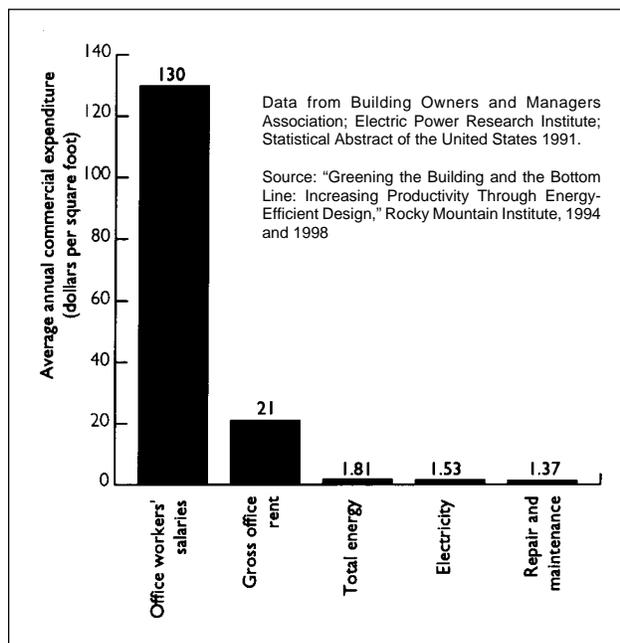


Daylighting and Productivity: Detailed, statistically rigorous evidence that daylighting helps boost human performance has long been claimed, but most evidence has been anecdotal or of limited statistical significance. That has changed. Two recent studies conducted by the Heschong Mahone Group of Fair Oaks, California, for Pacific Gas and Electric demonstrate that daylighting can measurably benefit productivity. One study found a dramatic improvement in sales performance in retail stores with natural daylighting; another found that elementary school students in daylit classrooms learned faster than students in rooms lit only by electric lighting (see Section 4.1.2 – Daylighting Design). Explanations for these results range from improved visibility and enhanced moods to better and more attentive service by employees and teachers. Studies and findings in other areas of human health and productivity are being examined at the Carnegie Mellon Center for Building Performance and Diagnostics and several other institutions.

Strategies that can maximize human health and productivity should be addressed at each stage of a project. At the outset, potential outside influences at a site should be considered, such as outdoor air quality and proximity to sources of noise (e.g., flight paths, highways, industrial facilities). These site characteristics should be taken into account in the building design to minimize negative impacts on building occupants.

High levels of ventilation, good air distribution, and thermal comfort can be addressed during design and then be specified, implemented, and ultimately tested before occupancy. Daylighting, careful selection of materials and cleaning products, contaminant isolation (to avoid noxious odors), and minimization of noise are most effectively addressed during the design phase.

Construction scheduling, detailing, and installation techniques are extremely important. In particular,



While a great deal of attention has been focused on reducing energy costs in commercial buildings, even a very small improvement in productivity can offset the entire energy bill of a facility. Some studies have found 5–15% improvements in productivity as a result of green design.

preventing construction conditions and practices that can cause wet materials and mold growth should be a high priority. Delay installing highly absorptive materials, such as fabrics and upholstery, until building products that may offgas VOCs have been in place for a while. Avoid using a building's permanent ventilation system during painting, floor finishing, carpet installation, and other procedures that may release high quantities of VOCs—because those VOCs may get into the ventilation system and then be released into the building when it is occupied.

Post-occupancy considerations, such as permanent air quality monitoring systems with feedback mechanisms and responsible O&M procedures, also play an important role in maximizing health and productivity. These should be given serious attention in the design process.

Access floors and individual controls that function well with them are good examples of design for productivity. Access floor systems provide a floor cavity that serves both as a place to run wiring and as a plenum for conditioned air delivery. An access floor greatly improves the ability to reconfigure workspaces over time (saving many thousands of dollars for a facility with a high churn rate). Access floors enhance comfort by allowing workers to individually control the diffusers that deliver conditioned air beneath the floor—the diffuser openings can be enlarged easily, for example, if the employee wants to boost airflow to keep his or her space cooler. Personal workstations with integrated

environmental controls work very well with access floors. Occupancy sensors in workstations can further reduce energy use by turning equipment off when workstations are unoccupied. Individualized controls can be coordinated with natural and mechanical heating and cooling systems, daylighting, and operable windows for effective thermal, visual, and acoustic comfort.

ENVIRONMENTAL IMPLICATIONS

Several strategies that increase health and productivity have direct impacts on larger environmental considerations. For example, daylighting design with high-performance electric lighting improves occupants' performance while conserving energy. High-performance glazings specified to enhance occupants' thermal comfort also conserve energy.

Finally, human health and performance can be enhanced by avoiding materials with high levels of VOCs and other indoor pollutants. Such pollutants are commonly introduced in paints, adhesives, sealants, cleaning products, and carpeting, as well as manufactured wood products produced with medium-density fiberboard or particleboard.

References

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