

Building Commissioning: Analyzing Costs and Benefits

Excerpted and adapted from *National Best Practices Manual for Building High Performance Schools*, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy
Revised February 2007

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SUMMARY

The value of commissioning is directly related to savings earned from the efficiency of the building. Efficiency is most recognizable when detailed documentation occurs.

THE VALUE OF COMMISSIONING

Commissioning is a systematic process of ensuring that all building systems perform interactively according to the contract documents, the design intent, and the building's operational needs. By establishing sound building operation and maintenance practices and by training equipment operators to observe these practices, commissioning may actually save money by avoiding the costs of poor practices and deferred maintenance. In addition, properly functioning buildings with reliable equipment maintained in good condition are worth more than their noncommissioned counterparts.

DOCUMENTING THE COSTS AND SAVINGS

Currently, no standard accounting method exists for calculating the cost of commissioning and measuring the savings. For many projects, commissioning costs are not separated from other project costs. When these costs have been tracked separately, various methods have been used to report both the costs and the benefits. The table below lists some common cost estimating methods. Whichever method is used, commissioning accounts for only a small portion of overall construction and retrofit budgets.

Table 1. Estimated Commissioning Costs for New Equipment¹

Commissioning Scope	Estimated Cost Range
Whole building (controls, electrical, mechanical; predesign through warranty)	0.5% to 3% of total construction cost
HVAC and automated controls system only	1.5% to 2.5% of mechanical contract
Electrical system only	1% to 1.5% of electrical contract

SAVINGS FROM BUILDING COMMISSIONING

Building owners and their energy utility providers are interested in the savings in kilowatt hours (kWh) that may result from the commissioning of energy systems and equipment. Just as commissioning costs may vary from project to project, so do commissioning savings, which, in turn, may depend on the scope of the commissioning. Table 2 shows the reported savings for three types of commercial buildings commissioned in recent years. When commissioning is done properly, the savings can be quite substantial for schools as well.

Table 2. Annual Savings from Commissioning New Equipment² (Mechanical Systems)

Building Type	\$ Savings	Energy Savings
110,000 ft ² office	\$22,320	279,000 kWh
22,000 ft ² office	\$13,080	130,800 kWh
60,000 ft ²	\$26,880	336,000 kWh

Many building owners question how they can pay for commissioning within a limited design and construction budget. Many of the potential savings in construction-related costs occur during the first year of operation, when contractor callbacks are most frequent and operational difficulties are most acute. By recognizing these immediate postoccupancy costs as construction-related costs, a cost/benefit analysis is likely to reveal that the cost of commissioning compares favorably.

Including first-year postoccupancy costs in the construction budget may demonstrate that increasing the design team's fees by 3 percent of the total project cost and adding a commissioning provider at an additional 2 percent will likely reduce the overall cost.³

NOTES

1. Estimated costs adopted from PECI Data and Ron Wilkinson's article, "Establishing Commissioning Fees," *ASHRAE Journal*, February 2000.

2. Annual energy savings calculated from three Northwestern U.S. commissioning projects. Cost savings estimates based on a blended 2000 California kWh rate of \$0.10 for smaller office buildings and \$0.08 for larger offices and industrial facilities.

3. The Farnsworth Group, as presented in “How to Achieve Top Performance in Your Building: Commissioning Benefits, Process and Performance,” a workshop series by the Association of State Energy Research and Technical Transfer Institutes, 1998.

To obtain a complete copy of the *National Best Practices Manual for Building High Performance Schools*, visit the following Web site:

www.chps.net/manual/index.htm



RESOURCES

More Best Practices

The following AIA Best Practices provide additional information related to this topic:

- 16.01.01 Green Roofs
- 11.08.01 Building Commissioning and Maintenance
- 11.08.02 The Building Commissioning Provider

For More Information on This Topic

See also “Commissioning,” by Larry Lord, FAIA, *The Architect’s Handbook of Professional Practice*, 13th edition, Chapter 19, page 663.



See also the 14th edition of the *Handbook*, which can be ordered from the AIA Bookstore by calling 800-242-3837 (option 4) or by email at bookstore@aia.org.



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Key Terms

- Building Performance
- Sustainability
- Sustainable business practices
- Maintenance