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Bottom line thinking on energy.

Guide to the Design and Construction of High Performance Hospitals

"Integrated design is the smartest way to build. We use our natural resources responsibly, we reduce our energy costs and as a result we can put more money back into patient care and the community."

– Richard Beam, System Utilities Manager Providence Health & Services

INTRODUCTION

This Guide was prepared for in-house hospital facility directors, construction managers, and owners' representatives who oversee the complex process of design, construction and start-up of new hospital facilities and major renovations.

This Guide describes why and how to use "Integrated Design" as a technique and process essential to helping achieve high performance facilities on time, within budget and with less risk.

This Guide defines a **High Performance Hospital Facility** as one that delivers superior energy, economic, and environmental performance benefiting patients, staff and the bottom line.

Integrated Design is instrumental to successfully developing high performance facilities. It synthesizes climate, facility use, loads, and systems, resulting in a more comfortable and productive interior environment and a substantially more energy-efficient building than current best practice. These benefits are accomplished through the early and close collaboration of a cross-disciplinary team that includes facility directors, operators, medical staff, architects, engineers, cost estimators, contractors and construction managers.

Benefits of a High Performance Hospital

A high performance hospital differs from traditional hospital construction in many ways:

- **Annual energy savings of 25% or more** than a facility built just to meet code
- **Superior infection control** due to better mechanical systems, more outside air and more filtration
- **Water savings of over 40%** due to efficient fixtures and irrigation systems
- **Enhanced healing and working environment** due to natural light, access to outside views, high-quality lighting and good indoor air quality

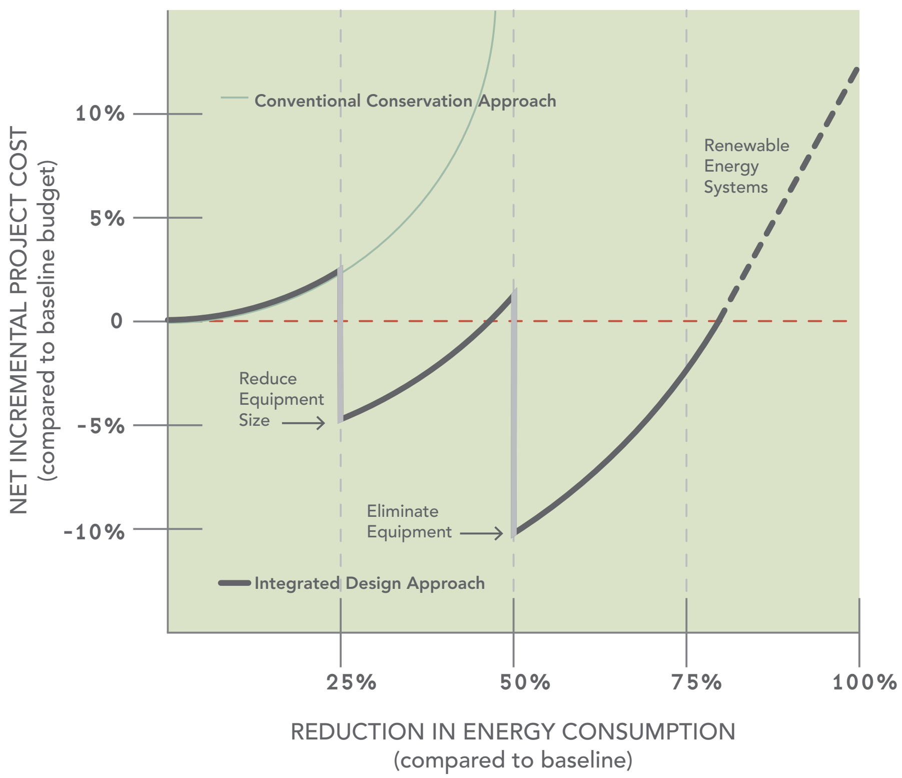
GUIDE CONTENTS

KEY INTEGRATED DESIGN BENEFITS: REDUCED OVERALL COST AND REDUCED RISK

Reduced overall project costs: Through Integrated Design, loads are minimized and equipment is right-sized or eliminated, resulting in lower mechanical, electrical, and plumbing (MEP) costs than for a conventionally designed building. These lower MEP costs will more than offset any cost increase that may result from additional design activities and the purchase of high efficiency equipment. With conventional energy conservation strategies, individual efficiency measures are added incrementally, cumulatively adding cost. With Integrated Design, the opportunity to downsize or eliminate equipment leads to substantial cost reduction as efficiency increases. After these reductions, to achieve further improvements in efficiency, there may be some cost increases resulting from improved materials or higher efficiency equipment, but typically the overall cost still remains below a conventional budget. This is illustrated in the upward sloping curves in the graph below. The OHSU Center for Health and Healing building is an example of where a 10% reduction ($3.5 million) in MEP costs far offset the $1.86 million incremental cost for high efficiency equipment (see story page 12).

> "Many high performance 'green' buildings cost no more, and even less, than their 'brown' equivalents—the key is integrated design."
>
> —Robin Guenther, Guenther 5 Design and steering committee member of the Green Guide to Health Care

Construction Cost Impacts of Integrated Design*



This graph compares the effect on total project cost from a conventional conservation approach (i.e. adding individual efficiency measures and accumulating cost) versus an integrated design approach.

*Curves are conceptual and represent approximate results. Source: BetterBricks, based on review of literature.

"Convening and integrating the entire design team is critical to the success in energy efficiency…It doesn't work to apply these goals after design has begun."

– Victoria Nichols, Project Architect, Mahlum Architects, Providence Newberg Medical Center

Reduced operating costs: Hospitals designed using an integrated approach have been shown to achieve reductions in energy use (and energy costs) of 25% or more compared to hospitals just built to code. A good example is Providence Newberg Medical Center. Annual energy costs are projected to be 26% less than code, resulting in annual energy costs savings of $179,000 (see story page 5). The OHSU Center for Health and Healing building is projected to perform 60% better than code, delivering annual energy costs savings of $660,000 per year. Dell Children's Medical Center in Austin, Texas is projected to use at least 60% less energy than the norm.

Reduced risk of costly re-design and change orders: In an Integrated Design process the full team—including architects, designers, engineers, contractors, commissioning provider, construction managers, facility director, building operators, medical staff, board members, financial managers and a utility representative—is convened early to identify and prioritize needs and goals for the new hospital facility, and consider design concepts. Following this initial meeting, the identified team lead, usually a high-level construction manager or facility director within the hospital organization, coordinates team activities and communication throughout the project delivery process (i.e. design, construction, and start-up). (See "Leading the Integrated Design Process" on page 8.) Team members should all be motivated to creatively contribute to design solutions. This ensures that relevant team members are involved in and informed of key decisions and issues in a timely manner, reducing the risk of miscommunication and misunderstandings that can lead to costly and time-consuming modifications during Design Development or construction.

Reduced risk of start-up and operational issues: With Integrated Design, building operators and users are involved from the start—even at the master planning stage—to voice their needs and identify potential operational and functional problems as well as opportunities. Processes and protocols are established in anticipation of the building hand-off to operators, and operators are trained on systems and controls, with a particular focus on HVAC function and efficiency. In addition, the commissioning provider is involved as early as the Schematic Design stage to ensure the hospital's operating requirements are maintained through design, construction and start-up operation.

Financial incentives and tax credits: Incentives available from utilities, non-profits, state and federal agencies for high efficiency equipment can be substantial and further strengthen the already powerful financial case for Integrated Design. For example, the OHSU Center for Health and Healing building garnered over $1.6 million in incentives and tax credits for its high performance design (see story page 12).

Case Study—Providence Newberg Medical Center

The Providence Newberg Medical Center was designed and constructed using mostly an integrated design process. Providence and the rest of the design team worked together early to determine high performance goals and strategies. They held "charrettes" on energy and building performance. The project will deliver an estimated $179,000 annual operational savings. The team calculated the life-cycle cost benefits over a 10-year period, selected the best efficiency measures and presented the results to senior management. Due to capital budget constraints, Providence elected to finance the net incremental cost for design and efficient equipment of $357,000 outside of the construction budget. The financial analysis showed a 54% rate of return on the investment based on operational savings and incentives from local utilities and the Energy Trust of Oregon. Providence Newberg Medical Center was the first hospital in the nation to receive a LEED® Gold certification.

LOCATION: Newberg, Oregon

SIZE: 180,636 sf hospital, medical office and administrative facilities ($63.5 million construction budget)

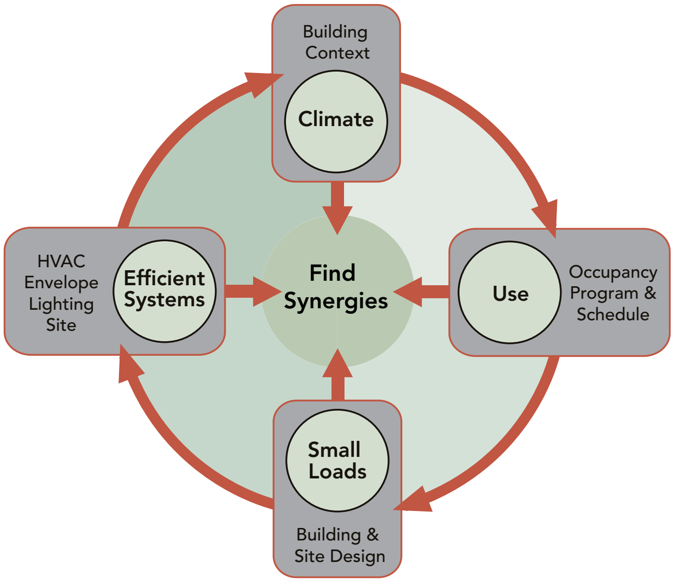
CONSTRUCTION COMPLETION: 2006

PROJECTED ENERGY SAVINGS: 26% less than Oregon Energy Code

DAYLIGHTING STRATEGIES: High performance glazing; sloped ceilings at the building perimeter let in more daylight without increasing floor-to-floor height; high-quality, efficient lighting on dimming and occupancy sensor controls

ENVELOPE STRATEGIES: Increased roof and wall insulation; ENERGY STAR® roof

MECHANICAL STRATEGIES: High-efficiency HVAC system provides 100% outside air with 70% exhaust heat recovery; condensing hot water boilers for space heating and small steam boilers for sterilization and process loads; high-efficiency centrifugal chillers of different sizes for greater load matching flexibility; separate cooling loops for kitchen refrigeration and imaging equipment; efficient cooling tower with variable-frequency drives



RETHINKING DESIGN: A METHOD FOR INTEGRATION

Once the team agrees on high performance goals, including an energy performance target, they can start strategizing to find the best-integrated and most cost-effective design solutions. The illustration at left shows the synergistic relationship between climate, building use, building loads and building systems. At the top is understanding **climate** and local context, which is the beginning of the process. As the team moves clockwise to defining **use**, reducing **loads** and designing the efficient **systems**, they will also find synergies between these aspects to further increase energy efficiency while meeting project requirements and budget. This is an iterative process from planning through Design Development. **The goal is to arrive at the alternative with the smallest loads possible and then size systems to meet these loads. These steps are discussed in more detail below.**

Climate

A thorough analysis of the site including wind direction, solar access, topography, temperature and humidity profiles is important to understanding the opportunities for efficiency, comfort and occupant well-being. This step includes assessment of the potential for daylighting and for renewable energy production on site. The team gathers information on zoning restrictions, covenants and building context. It is also important to determine the local utility's energy costs as well as the availability of incentives, technical assistance and tax credits.

Use

This step includes developing a building program, establishing the preliminary construction budget and determining the hours of use and the degree of flexibility for comfort standards or criteria for each occupancy type. The team will use this information to look for opportunities to group spaces efficiently, to anticipate building forms that will be conducive to daylighting and to respond to the climate.

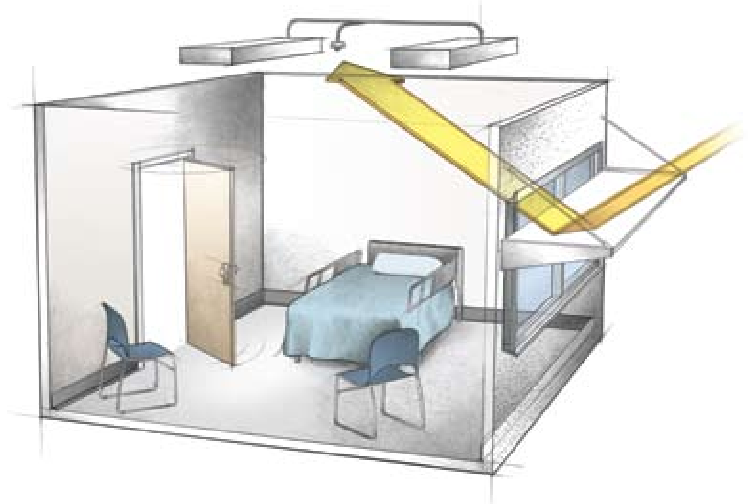
> "Often design strategies for energy efficiency can also have direct benefits for patient outcomes. A recent study has found that daylight in patient rooms helped surgery patients maintain lower stress levels and feel less pain resulting in use of less pain medication and reducing medication costs for these patients by 22%."
>
> – Jeffrey Walch, University of Pittsburgh Montefiore Hospital

Small Loads

The team next looks for ways to minimize the heating and cooling loads of the building. Ideally, energy modeling is used early on to measure the effectiveness of these strategies on the total loads. Orienting and configuring the building to take advantage of natural light while avoiding heat gain is an important consideration. Designing a high performance envelope reduces both heating and cooling loads, and may include shading devices, selective glazing appropriate for each orientation and optimized insulation levels. Other strategies include setting appropriate lighting levels and daylighting. Utilizing solar pre-heat of air or water, natural ventilation, and nighttime pre-cooling are useful passive strategies.

Efficient Systems

Once the use patterns and envelope design arrive at the minimum heating, cooling and lighting loads for the program, the HVAC and lighting system is then "right-sized" to address the loads while taking into consideration future capacity needs. Efficient systems should then be selected. Examples include high efficiency lighting integrated with daylighting through use of controls, heat recovery to pre-heat or cool air and water systems, thermal storage, radiant heating and cooling systems, variable speed drives, condensing boilers, centrifugal chillers, and solar electric panels to reduce peak loads.



Integrating Daylighting

Interior light shelves and exterior overhangs block direct sunlight and reduce glare while bouncing daylight deeper into interior spaces. The combined effect saves money by boosting worker performance and reducing energy costs.

A Story of Climate and Building Orientation

Assembling climate data early in the process helped a design team working on the St. Luke's Regional Medical Center in Twin Falls, Idaho. The data on prevailing wind showed they had problems with the locations of the entrance, healing garden, helipad and air intakes. Using the wind data, they re-oriented the building to shelter the entrance and healing garden from winter winds and located the helipad to prevent exhaust fumes from entering the building through the air intakes.

An Example of Creating Small Loads

As part of an integrated design process for St. Luke's, the team looked for ways to reduce the heating and cooling loads on the new building. They analyzed climate data, determined the occupancy of each programmed area and then developed several design options. Heat gain in the summer was one of the larger loads in the first pass of energy modeling. So the team developed suggestions for high performance glazing and external shading devices. Along with other measures to reduce internal loads, the total load reduction was over 30%.

Who Are the True "Owners"?

Typically, those who provide capital for a new project are thought of as the owners of a hospital. But who are the true "owners"? The patients, doctors, nurses, facility operators who live in and operate the hospital 24/7. They know what makes a hospital function well. They should be integral members of the design team from the earliest stage.

LEADING THE INTEGRATED DESIGN PROCESS

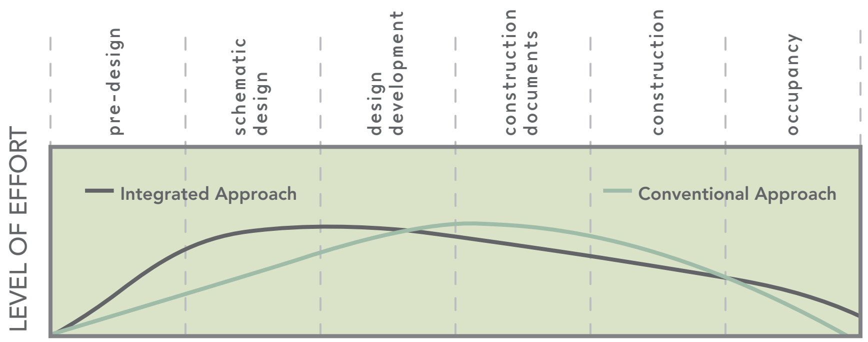
It is essential to have a champion from within the hospital organization (i.e. on the "owner's" side) to drive the Integrated Design process throughout project delivery (i.e. planning, budgeting, design, construction, commissioning and start-up). The champion is usually a high-level facility director or construction manager within the hospital organization, or an owner's representative. The architect serves as leader and coordinator.

Key roles of the integrated design champion include the following:

- **Executive buy-in:** Get early executive buy-in on the value of high performance facilities to achieving hospital goals, and on Integrated Design as the means to achieve that value.
- **Adequate budget:** Work with the capital budget manager and the construction cost estimator to set an adequate budget.
- **"Life-cycle" approach:** Establish "life-cycle" cost analysis (or "total cost of ownership") as the agreed upon method for the financial evaluation of design alternatives, so that long-term operational costs and savings, not just first costs, are considered.
- **Team selection:** Choose a qualified design and construction team with Integrated Design experience (See sample RFQ, pg. 9).
- **Team building and coordination:** Assemble the full team early including facility directors, operators, medical staff, as well as architects, engineers, cost estimators, contractors and construction managers. Develop a common vision and encourage close collaboration and open sharing of information, even outside their own disciplines. Establish a periodic meeting schedule for creative problem-solving and to coordinate communication and activities.
- **Measurable goals:** Work with the team to commit early on to measurable energy performance goals (e.g. 25% better than code).
- **New tools:** Encourage use of software tools such as Building Information Modeling (BIM) or 3-D modeling to enhance design productivity and also energy performance modeling.

- **Adequate initial time:** Allow time in the early phases, especially Pre-Design and Schematic Design, for the team to set goals, identify challenges, allocate and test the budget, and develop and evaluate design alternatives. This early effort will reduce work later and help keep the rest of the project schedule and budget on track. In other words, the total amount of effort may be the same between the conventional approach and the Integrated Design approach. It is just distributed differently, as shown in the following graph.

Design Team Activity*



* Curves are conceptual and represent approximate results.
Source: BetterBricks, based on review of literature.

Traditional Versus Integrated Design

A traditional design process is based on a sequential "hand-off" from owner, to architect, to engineers and to the contractors. Often engineers are not brought into the process until Design Development or later. This process results in limited interaction and discussion about design and engineering considerations that can greatly affect operating costs, health and comfort. Integrated design brings the design team, hospital administration, operations staff and building users together early, avoiding budget, functional and operational problems.

Sample RFQ

An RFQ for design team selection should include requirements for integrated design experience, and ask for examples of high performance projects the team has completed. A sample RFQ is on the BetterBricks website.

www.BetterBricks.com/healthcare

More detail on the Integrated Design steps and the role of the team lead and team members is provided on pages 10–11. The description includes recommendations for strategies that are consistent with the Green Guide for Health Care™ which requires Integrated Design as a pre-requisite. See also "Links and Resources" on page 14 for obtaining information and tools to help support the activities described above, such as the BetterBricks Guide to Optimizing Hospital Facility Investments and a sample RFP for Integrated Design services.

“Bringing in the core team early should not result in any additional design cost due to efficiencies later in the design process resulting from early integration.”

- John E. MacAllister, FAIA, Former CEO, Anshen+Allen, lead architect on large hospital projects

INTEGRATED DESIGN STEPS

The following steps describe key points of involvement for the Integrated Design champion. The steps are organized as a checklist for each of the traditional phases of design. These phases are defined in the Glossary at the end of this Guide.

Pre-Design

- ○ Hold an early pre-design meeting (or Charrette) with the planning team (owner, facility staff, designer and planning consultants)
- ○ Develop high performance goals, including a measurable energy performance goal, such as 25% less energy use than required by code
- ○ Commit to an Integrated Design process
- ○ Hire design professionals experienced with Integrated Design
- ○ Identify roles and responsibilities for team members, including a champion for the Integrated Design process
- ○ Determine financial criteria and priorities for design decisions
- ○ Assess adequacy of the project budget and schedule, allow for additional time during Schematic Design for Integrated Design
- ○ Contract with a commissioning provider beginning with documentation of design intent and owner’s project requirements during Schematic Design
- ○ Talk to local utilities, non-profits, state and federal agencies about available incentives and tax credits

Schematic Design

- ○ Hold a full design Charrette with all team members, including the hospital side (facility director, operator, medical staff), design side (architects, engineers, specialty consultants) and construction side (contractors, construction manager), to kick-off the conceptual design
- ○ Confirm and refine high performance goals and criteria
- ○ Refine the building program and space functions
- ○ Ask the design team to gather climate and utility cost data
- ○ Schedule periodic team meetings and support brainstorming and collaborative problem-solving
- ○ Encourage the design team to develop several design options that reduce loads on the building
- ○ Support simplified energy modeling and Life-Cycle Cost Analysis for design alternatives in order to make objective choices between options
- ○ Remind the design team to compare results of this phase to the high performance goals

Design Development

- Participate in discussions about potential building systems
- Ask for whole-building energy modeling to confirm the design meets the high performance goals, and to confirm eligibility for rating systems, incentives and tax credits
- Verify that the design documents at this stage contain the strategies to meet the performance goals
- Ask the whole team to help assess the preliminary cost model
- Vigorously defend the value of high performance features during value engineering

Construction Documents

- Invite the commissioning provider, and maintenance and operations staff to conduct a document review of building systems
- Hold frequent coordination meetings to keep communication flowing among team members
- Update the cost model and schedule with input from the team
- Request documentation from the team that indicates how the project compares to the high performance goals set in Pre-Design
- Verify that the construction documents contain the strategies to meet the performance goals (consider asking the commissioning provider and contractor, to conduct this review)

Construction

- Conduct a construction kick-off meeting with the contractors and subcontractors to secure their commitment to the high performance goals
- Ask the architect to review submittals and substitution requests for impact on the performance goals
- At the end of construction and prior to occupancy, allow time for the commissioning provider to complete functional testing and O&M training
- Review the commissioning report and have the contractor address any recommended repairs or alterations

Occupancy

- Establish an ongoing energy management program, including training and periodic re-commissioning
- After the warranty period shakedown, verify that high performance goals were met, assess occupant satisfaction, and share feedback with the whole team

Pointers on Commissioning

- An independent commissioning provider should contract directly with the owner.
- Bring the commissioning provider on board at the beginning of the project, ideally in Pre-Design, but at least in Schematic Design.
- Make sure that the specifications include commissioning and all the trades understand their responsibilities related to commissioning. The General Contractor should be obligated to pay for any repeated commissioning work resulting from construction problems and defective equipment.

Case Study – OHSU Center for Health and Healing

This project started with a two-day design charrette to establish goals and identify strategies to meet them. The team made extensive use of energy modeling to find synergies between the site, envelope and building systems. The team's philosophy was "embrace every opportunity." The result is a highly integrated project that uses 60% less energy than a code-compliant building. By reducing loads and right-sizing equipment, the MEP costs were 10% less ($3.5 million) than the baseline budget. The capital cost increase to achieve high performance was $1.86 million, resulting in a net capital savings of $1.64 million. With $1.6 million in incentives and tax credits, the total benefit is over $3.2 million. In addition, the annual energy costs are projected to be $660,000 less per year than if the building were designed to just meet the Oregon Energy Code. The OHSU Center for Health and Healing is the first healthcare facility in the nation to receive the LEED Platinum certification.

LOCATION: Portland, Oregon

SIZE: 400,000 sf medical office, research lab, surgery suites, wellness and educational center ($145 million construction budget)

CONSTRUCTION COMPLETION: 2006

PROJECTED ENERGY SAVINGS: 60% less than Oregon Energy Code and ASHRAE 90.1-1999

DAYLIGHTING STRATEGIES: Building orientation for best access to natural light; narrow floor plate to increase percent of spaces with daylight access; daylight controls

ENVELOPE STRATEGIES: Sun shades to reduce heat gain in summer; solar hot air preheat; 60 kW solar electric panels integrated with sun shades, high-efficiency glazing

MECHANICAL STRATEGIES: Load reduction (with an efficient envelope, daylighting, efficient lighting, etc.); right-sizing the systems; radiant floor heating and cooling system at ground floor; radiant cooling overhead for higher floors; thermal storage systems to shift peak loads; night-flush pre-cooling; heat recovery systems; displacement ventilation in exam and office areas; high efficiency boilers and chillers

BETTER INTEGRATION WITH EXISTING INFRASTRUCTURE

An expansion or renovation of an existing facility is a far more common hospital construction project than a completely new, free-standing building. Integration of new and existing structures, and the associated mechanical systems (i.e. HVAC and/or central plant), presents unique issues and opportunities for Integrated Design and must be a fundamental part of the project program. Below are some key considerations:

- As soon as a new construction project is planned, the facility operation staff, hospital construction project manager, and architect and engineering (A&E) team should determine how the project will interface with existing facility systems.
- While facility operations staff should always be involved in the design and construction process, it is particularly critical for them to be involved early and often when a project is a facility expansion or major renovation.
- If integration with existing facility systems is a possibility, the team should assess and document the condition and capacities of the existing systems. Often, a tune-up is needed and this may result in improved capacity of the existing system.
- Progress in assessing and meeting infrastructure needs in the new project should be continually monitored by a senior member of the facility operations team, because the integration of new and existing facilities can impact scope, budget, and timeline.

A Word on HVAC System Optimization

Correctly functioning controls are critical to achieving high performance. No matter how experienced and careful an HVAC designer may be, all control logic and set points will not be "just right" from the start. It will be necessary for facility operations staff and/or a commissioning provider or a qualified consultant to adjust and optimize HVAC operation through all seasons of the first year. Only by doing this can the building function effectively and realize the lowest cost of operation and the highest level of reliability.

SELECTED LINKS AND RESOURCES

Green Guide for Health Care: The GGHC's structure is borrowed by agreement from the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System™, but is tailored to healthcare and is self-certifying; it does not require third party certification. Download the GGHC at: **www.gghc.org**. GGHC is a joint project of the Center for Maximum Potential Building Systems **www.cmpbs.org** and Health Care Without Harm **www.noharm.org**. It is sponsored by Hospitals for a Healthy Environment (H2E) **www.h2e-online.org** and other organizations and utilities.

LEED: LEED is a nationally accepted, third-party rating and certification tool. LEED was developed by the USGBC, a coalition of building industry leaders. Website: **www.usgbc.org**.

State hospital engineering associations:

- Washington State Society for Healthcare Engineering **www.wsshe.org**
- Oregon Society for Healthcare Engineering **www.oahhs.org**
- Idaho Society for Healthcare Engineering **www.isheweb.com**
- Montana Society of Healthcare Engineering

Local electric utilities and state departments of energy:

- Incentive programs
- Technical assistance and energy services
- Education and training

BetterBricks:

- Professional education
- Technical advisory support
- Information and tools at **www.BetterBricks.com/healthcare** including:
  - Sample RFP for Integrated Design Services
  - High Performance Facility Design Charrette Agenda
  - Guide to Optimizing Hospital Facility Investments
  - Purchasing Specifications for Energy Efficient Equipment
  - Case studies:
    - Providence Newberg Medical Center, Newberg, Oregon
    - Othello Community Hospital, Othello, Washington
    - Fred Hutchinson Cancer Research Center, Seattle, Washington
    - Mercy Medical Center, Roseburg, Oregon

DEFINITION OF KEY TERMS

Pre-Design (Programming): This phase identifies the program needs, assesses the feasibility and confirms the construction requirements for the project. It includes an initial study of site constraints and impacts, site-related design guidelines, diagrammatic floor and stacking plans, a space program, building systems description, a summary schedule and a preliminary budget.

Schematic Design: This phase is where an interactive process develops and explores a variety of alternatives both at the whole building level and at the component level. The primary objective of this critical phase is to develop a clearly defined design including scale and relationships among the project components. Budget and schedule are also established and the project is submitted for permits.

Design Development: This phase refines the scope of work started in Schematic Design, further developing the selected option. A clear, coordinated description of all aspects of the project is worked out. The Design Development phase is the last opportunity for significant design input, but any change to scope or program will likely incur budget and schedule impacts.

Charrette: A Charrette is an intense meeting, half a day or more, in which all participants in a building design project creatively focus on strategies for meeting the project's performance goals through efficient use of energy and resources. If not done in an earlier planning meeting, the group also generates specific measurable goals. For a description and sample agenda, see **www.BetterBricks.com/healthcare**.

Commissioning: "The basic purpose of building Commissioning is to provide documented confirmation that building systems function in compliance with criteria set forth in the Project Documents to satisfy the owner's operational needs." Building Commissioning Association **www.bcxa.org**

High Performance Hospital Facility: A facility that delivers superior energy, economic, and environmental performance benefiting patients, staff, and the bottom line.

Integrated Design: Integrated Design synthesizes climate, use, loads, and systems, resulting in a more comfortable and productive interior environment and a building that is more energy efficient than current best practice.

Life-Cycle Cost Analysis (LCCA): The total cost of owning, operating, maintaining, and (eventually) disposing of the building system(s) over a given study period. In other words, LCCA is a way of assessing the true cost of facility ownership throughout its lifetime. See the Guide to Optimizing Hospital Facility Investments on **www.BetterBricks.com/healthcare** for more information.

This Guide was produced by BetterBricks, the commercial initiative of the Northwest Energy Efficiency Alliance. Much of the content was adapted from material developed by GZ Brown (Energy Studies in Buildings Laboratory, University of Oregon), Jeff Cole (Konstrukt), Doug Bors (Sophometrics), and Kelly Karmel (Design Balance). Final design, illustrations, editing and layout were done by Coates Kokes. Special thanks to the members of the Washington Society of Healthcare Engineers (WSSHE). The case study for Providence Newberg was developed by BetterBricks. The case study for OHSU Center for Health and Healing comes from "Engineering a Sustainable World" by Interface Engineering, October 2005.

Photo Credits

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Photos for OHSU Center for Health and Healing: Sally Painter

BetterBricks is the commercial initiative of the Northwest Energy Efficiency Alliance, which is supported by local electric utilities. BetterBricks advocates for changes to energy-related business practices in the Northwest, including how hospitals can become more energy-efficient in their design and operation, save money and, as a result, help enhance the healing environment. On **www.BetterBricks.com/healthcare**, you'll find information, tools, training and resources to help your building project make a difference to your bottom line.

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