



Green Guide for Health Care™ **Strategic Visioning Report 2009**

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I. Executive Summary

“The Green Guide will develop a measurement tool to support the health care industry’s transformation towards a regenerative health care built environment by 2050.”

Strategic Visioning Retreat, June 2008

The *Green Guide for Health Care*, a project of Center for Maximum Potential Building Systems and Health Care Without Harm, is the first and only open-access, self-certifying best practices green building toolkit spanning design, construction and operations, customized for the healthcare sector’s unique operational and regulatory context. Since its initial release in 2003, the *Green Guide for Health Care* has been accessed by more than 22,000 website registrants representing every U.S. state and Canadian province, and more than 100 other countries. There are more than 150 *Green Guide* Pilot and Registered projects totaling more than 32 million square feet. The *Green Guide* is a foundational document for the U.S. Green Building Council’s LEED® for Healthcare rating system, anticipated for release in late 2009. In December 2008, the *Green Guide* released a significantly revised and expanded Operations section. A formal Pilot Phase for the *Operations* section is scheduled to begin during Fall 2009.

At this writing, the *Green Guide v2.2 Construction Section* and the *Revised Operations* sections continue to serve the healthcare sector’s sustainability guidance needs through the documents and associated educational materials, ranging from webinars to technical briefs and white papers. Design teams and health care systems that use the *Green Guide for Health Care* have celebrated environmental improvements ranging from energy demand reduction and increased daylighting to improved purchasing practices, healthier food and reduced transportation demands. These tools are clearly assisting the sector in the design and operation of environments that “do less harm.”

At the same time, innovative and forward thinking health care organizations are implementing environmental initiatives and celebrating continuous incremental improvements that are not captured well within the structure of these tools. The broader green building movement has developed a powerful vision of *living buildings*—buildings that move beyond “reducing harm” to achieve zero net energy, water balance, and zero waste. Recently, a US healthcare system announced it would become “carbon-neutral” by 2015, a major milestone in this energy intensive sector. Across the US, green hospitals are implementing restorative community strategies as part of their sustainability initiatives –partnering to develop staff housing near their facilities, restoring degraded sites and returning them to their communities, developing exercise trails and successfully advocating for expanded public transportation systems. Finally, recent extreme weather incidents are signaling that our health care infrastructure lacks resilience, revealing vulnerability. Sustainable design strategies linked to increased ‘resilience’ - whether to flooding, storm incidents, or grid disruptions- are capturing the interest of healthcare organizations across the country.

Taken together, these important trends signal a clear need for a next generation *Green Guide* tool that provides guidance to achieving “no harm” and beyond, recognizes continuous improvement, consolidates both design/construction and operation, and includes strategies that capture the broad array of community and health benefits these organizations are realizing. As

sustainable healthcare design enters its second decade, the time has arrived to customize a sustainability toolkit that recognizes both the unique challenges and the opportunities inherent in the healthcare industry's approach to sustainability—to bridge healthcare's core mission of *healing* with the evolving body of restorative, regenerative and resilient design thinking.

The *Green Guide* is responding to this opportunity through initiating the next generation of tool development. As with the initial *Green Guide* development, the goal is to leverage systemic change with a continued focus on achieving high performance healing environments (Fig 1). The next generation *Green Guide for Health Care* establishes a vision of a regenerative, restorative and resilient health care industry by 2050. The *Green Guide for Health Care* defines this as moving beyond a focus on reducing environmental and health burdens to promoting a holistic approach to appropriate levels of regeneration, restoration and resilience on three scales: occupant, community, and global—through design, construction and operations. These objectives of continuous improvement towards a regenerative goal are far-reaching and bold, consistent with the resourcefulness and vision of the *Green Guide for Health Care*.

This report summarizes the conclusions of a nine-month strategic visioning process aimed at defining a set of goals and principles that govern this vision, and outlining a basic tool structure that aids healthcare organizations and their design teams in realizing this transformation. One of the most significant differences between this and earlier generation tools is moving beyond a singular focus on the built environment and its operation to encompass the broader topics of community integration and public health, and from metrics that measure building performance to the broader topic of assessing the site or systems state of health.

In summary, the tool will define goals and strategies that move beyond “less harm” to a “no harm” goal, and map goals and strategies that move beyond “no harm” to a built environment that “heals” – development that aims to restore some of what has been lost. The tool development begins with defining these basic, measurable goals for a resilient, restorative, and regenerative health care system:

- carbon-neutral or negative
- zero-waste
- toxic-free
- water-balanced
- socially just
- aspirational

During the visioning process, it became evident that the structure of existing tools was insufficient to capture and explore this broader set of goals. It also became evident that the development of such a tool or tools would be a significant undertaking, involving multiple stakeholders and participants beyond the world of the built environment – ecologists, hydrologists, medical and public health practitioners. In addition, its significant breadth and scope demands a phased development process using a suitable web-enabled platform that supports a learning community. The decision was made to develop the tool as a series of modules, prioritizing the issues of climate change impacts and resilience.

Development of the first module(s), the *Climate Footprint Reduction and Resilience Tool(s)*, will commence in the fall of 2009, with an initial estimated release date by late 2010. To support the next phase of development, the *Green Guide for Health Care* will convene new workgroups for

each of the seven content areas (see below), assessed through the lenses of *Climate Change Impact and Resilience*. Together, these content workgroups will be responsible for developing the multi-scale, design-construction-operation continuous improvement tool for the healthcare sector:

- a. Community Integration & Public Health
- b. Ecosystem Services
- c. Water Systems
- d. Building Energy & Comfort
- e. Spatial Structure & Form
- f. Material Life Cycle
- g. Supply Chain Health

The hallmark of a sustainable continuous improvement framework consists of establishing appropriate metrics to measure performance. Quantitative measures, benchmarks, and process improvement goals facilitate discovery and validation of practices. Embedding measurement into the culture of healthcare performance assessment is a necessary prerequisite towards a successful continuous improvement model. Established, familiar measurement methods currently in use by the US health care system may be adapted to monitor and manage sustainability performance. Furthermore, defining what is to be measured, why, and how, become equally important determinants. In the process of establishing sustainability performance goals, the health care sector can begin to define what *regenerative* means, vis-à-vis its role in the larger community.

II. Overview

The *Green Guide for Health Care*, a project of Center for Maximum Potential Building Systems and Health Care Without Harm, was established in 2002 to create an open access, self-certifying best practices green building toolkit spanning design, construction and operations, customized for the healthcare sector's unique operational and regulatory context.

The *Green Guide for Health Care* was initiated, in part, to accelerate the development of the US Green Building Council's LEED® for Healthcare. Developed, with permission, using the basic structure of LEED-NC Version 2.2, the *Green Guide Version 2.2* has been used as the foundation for the healthcare specific modifications to the LEED® for Healthcare tool. The upcoming launch of LEED® for Healthcare, in development since 2004, represents a milestone in the partnership between USGBC and the *Green Guide*. With LEED for Healthcare imminent, the *Green Guide* is initiating its next level of effort to leverage systemic change within the healthcare sector with a continued goal of high performance healing environments

The next version of the *Green Guide for Health Care* establishes a vision of a regenerative, restorative and resilient health care industry by 2050. The *Green Guide for Health Care* defines this as moving beyond a focus on reducing environmental and health burdens to promoting a holistic approach to appropriate levels of regeneration, restoration and resilience on three scales: occupant, community, and global—through design, construction and operations. These objectives of continuous improvement towards a regenerative goal are far-reaching and bold, consistent with the resourcefulness and vision of the *Green Guide for Health Care*:

- Achieve a safe, effective, appropriately scaled and accessible healing healthcare system (both clinical and public health).
- Provide a series of measurement tools (which will measure at different scales, and against different performance indicators) to assist healthcare facility operators to measure progress towards the regenerative end.
- The precautionary principle, social equity, health & healing are guiding principles that underpin tool development and decision making.
- The series of regenerative/restorative modules will establish aspirational goals focused on five topics: toxic chemicals, water, energy/carbon, materials/waste, and community integration.

As a tool developer, the *Green Guide* sets an aspirational framework for its next generation tool, with intention to engage a broad group of stakeholders and attract the state of the art thinking from around the world on many of these issues. Development of the first module(s), the *Climate Footprint Reduction and Resilience Tool(s)*, will commence this year, with an initial estimated release date by late 2010.

With this evolved focus, the *Green Guide* sets in motion a new framework and system of measurements to support its heightened commitment to market transformation within the healthcare sector. To this end, the *Green Guide for Health Care* Steering Committee and associated work groups began a strategic visioning process in 2008 to determine the scope and

structure for a new toolkit. This report summarizes the work completed to date and describes a proposed development plan for the next generation of the *Green Guide* over the next 18 months.

Building upon the work of existing tools such as LEED and Green Guide Version 2.2, this toolkit will define a continuum of best practices that achieve both “net-zero impacts” as defined by the Cascadia Green Building Council Living Building Challenge and beyond. The ultimate goal is to categorize strategies that move beyond simply ‘no harm’ to describe buildings that ‘heal’—regenerative buildings, as depicted in Figure 1. The work of such pioneers as Sim Van der Ryn and Bill Reed are beginning to chart regenerative principles and strategies – the Green Guide intends to build upon this groundbreaking work to evolve healthcare’s unique response.



Figure 1. Regenerative Hospitals

There is an immediate need for improved environmental performance of healthcare buildings. Climate scientists cite how our climate is changing in ways that exceed International Panel on Climate Change (IPCC) worst case estimates. The concentration of greenhouse gases to prevent catastrophic climate change is reportedly even lower than that cited in the IPCC report. In the spirit of doing no harm, the healthcare industry has a self-imposed mandate to improve its environmental performance. As the largest service sector in the US, comprising approximately 16.5% of GDP, largely governmental and non-profit, healthcare is uniquely positioned to deliver measurable reductions in climate change impacts both through upstream leverage (supply chain) and downstream influence (community). At a community level, many health care organizations are now the largest local employers: health care systems are in the advantageous position to lead by example. In order to support the industry in their role as effective community leaders, it is imperative to provide health care organizations with the necessary tools to incorporate sustainable practices across design, construction and operation.

When the UK National Health Service measured its Ecological Footprint in 2001, energy expended in transportation exceeded direct energy use of buildings -- resulting in a fundamental Green Guide Strategic Visioning Report 2009 –090724

shift in delivery of primary care services to service communities more directly. With climate change impacts or Ecological Footprint as the measurement parameter, footprint reduction can be quantified and managed with a broad range of policy and system measures. Gundersen Lutheran Medical System, the first US system pledging carbon neutrality by 2015, is engaging in a series of renewable energy community partnerships to satisfy peak energy demand -- a first step in defining a fundamental shift in the way hospitals fundamentally view the operation of their 24/7 campus energy needs. No tool effectively captures this fundamental shift - a shift that is happening not only with energy, but is mirrored in service delivery.

Many in the healthcare industry are seeing a fundamental shift in the delivery of medical services in the US. The keynote speaker for the 2009 ASHE Planning, Design and Construction conference predicted such a shift, towards radically less acute treatment, and radically more in-home, electronic, preventive, and outpatient care, in coming years. Indeed, Kaiser Permanente has shown that, by implementing Electronic Communications between members and medical professionals, physician visits are reduced, thus decreasing both building area and transportation energy; the reduction in visits allows more time for the caregivers per person served, which in turn leads to better care, with fewer referrals to specialists, diagnostic tests, and in-patient facilities. In summary, changing the way medicine is practiced reduces both the area of buildings and the energy consumption per member served to a far greater extent than using energy efficient devices alone. The urgent need, then, is for a tool that will support healthcare organizations as they move to less building, less travel, and dramatically less energy consumption per person served, while improving the overall health of the patient population.

This next generation of tools needs to support the urgent imperative to assist healthcare organizations and designers address climate change alongside other environmental imperatives -- water, ecosystem restoration, material sourcing --for example. These must be viewed as systems, viewed first and foremost through a climate change impact lens. No currently available tools directly or comprehensively tackle reduction of greenhouse gas emissions across a spectrum of sources -- ranging from community planning to material sourcing. While some tools are designed as rating systems used to validate a bundle of various performance metrics, others generally benchmark a single dimension of environmental performance. As hospitals move from "do less harm" to "do no harm", tools that benchmark the carbon-neutral, water-balanced, zero-waste, toxic-free healthcare system are required.

III. The Strategic Visioning Team and Process

In 2008, *Green Guide* Co-Coordinator Robin Guenther, Walt Vernon, and Gail Vittori led an appointed, volunteer Committee comprised of recognized professionals in the building services, health care delivery, government, and non-profit sectors through a one-year Strategic Visioning process for the next generation of the *Green Guide*. This Strategic Visioning Committee provided technical expertise and engaged other volunteers in workgroup format to define the scope of the future framework for a sustainable health care industry. The goal of the exercise was to recognize the broadest range of content areas embedded in a “restorative, regenerative, resilient” design framework, viewed through multiple lenses reflecting healthcare’s priorities and context.

The conversation about the *need* for a regenerative framework for the health care sector began with recognizing the limitations of current “greening” practices and available tools. The difference between “greening” and “regenerative” strategies is significant and merits definition. While green can be described as doing less harm or no harm, regenerative describes a framework for generating more than it takes, creating a net positive outcome... (See Figure 1) Furthermore, regenerative approaches optimize the effectiveness of individual technologies by seeing them as interactive and interdependent elements of an integrated whole. **As a result, sustainable practice decisions turn buildings and infrastructure into vehicles for regenerating the health and increasing a site’s economic and environmental value.**

Enhancing the generative capacities of both human and natural resources helps to restore that which has been lost through human activity, and increases the resilience of all systems. For the health care sector, a regenerative framework requires creatively exploring sustainable pathways that continue to improve performance. What became evident to the Steering Committee in 2008 was the opportunity to evolve the two-dimensional, linear methodologies such as *Green Guide* v2 or *LEED™ for Healthcare* into a multi-dimensional matrix methodology to recognize the complex web of system interdependencies. This led to matrix framework for the next generation of the *Green Guide*.

The Strategic Visioning Committee’s collective recommendations were represented in a comprehensive matrix spanning seven content areas and seven cross-cutting ‘lenses,’ shown in Figure 2. The lenses provide focus and serve as filters. Each workgroup defined and contributed goals and objectives in both a primary content area and associated ‘lenses.’ The matrix in Figure 2 illustrates the content areas and lenses. Committee names are indicated in parentheses below the title of the content area and assigned a color; the color dots indicate which ‘lenses’ the strategic visioning committees brainstormed.

		Energy & Climate Change	Health & Wellbeing	Social Equity	Resilience	Biophilia	Toxics	Integrated Design & Operations
COMMUNITY	Community Integration & Public Health (Scale/Scope)	●			●	●	●	●
	Ecosystem Services (TBD)	●	●	●	●	●	●	●
	Water Systems (Water)	●	●	●	●	●	●	●
RESOURCES	Building Fabric & Comfort (Energy & Climate)		●	●	●	●	●	●
	Spatial Structure & Form (Catalyst)	●	●	●		●	●	●
	Material Life Cycle (Toxics/Material Health)	●	●	●	●	●		●
OPERATIONS	Supply Chain Health (Waste/Operations)	●	●	●	●	●		

Figure 2. Sustainable Health Care Framework – Summary Matrix

In 2008, the following three *focus* and four *content* workgroups were convened to develop the matrix content:

- Three focus groups, *Catalyst*, *Scale and Scope*, and *International*, were tasked with researching and developing ancillary and cross-cutting issues to better inform the work of the content groups.
- Four *content* workgroups were tasked with establishing metrics to catalyze and gauge continuous improvement: *Energy and Climate*, *Water Balance*, *Materials*, and *Waste*.

The work of each group is summarized below.

Catalyst Focus Group

This group developed a working definition of the “regenerative framework,” to identify potential partners to advance this work, to identify gaps in content groups, and to propose overall structure for the next generation tool(s). This workgroup consisted of the Co-Coordinator and the workgroup chairs, identified in Table 1. The Catalyst group, working with the Strategic Visioning Committee, developed the matrix that became the overall structure for the toolkit development. As the content areas and lenses evolved, the Catalyst Group evolved the content area ***Spatial Structure and Form: Derive spatial structure and form from natural and***

social systems contexts to maximize integration of the built and natural environments for all inhabitants and the *Resilience* lens.

A second focus group, Scale and Scope, worked with the Catalyst Focus group and identified the need for a content area related to **Ecosystem Services: Maximize and mimic the benefits of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.** The Scale and Scope Focus Group outlined the content area as well as the related **Nature/Biophilia** lens. In response, the Catalyst Focus Group recommended that, moving forward, a dedicated content workgroup be established for **Ecosystem Services**, including a roster of landscape architects, ecologists, and participants with background in ecosystem services valuation. Drawing upon the case studies of sustainable healthcare projects that have proactively restored degraded sites and the rapid uptake of healthy food in healthcare, ecosystem service improvement is an area that may yield significant interest and participation from healthcare organizations.

The Catalyst Focus Group will continue to serve as the ‘gap analysis’ monitor, and will seek partners in the development of the tool as it evolves.

<i>Name</i>	<i>Affiliation</i>	
Robin	Guenther	Perkins + Will
Walt	Vernon	Mazzetti Nash Lipsey Burch
Gail	Vittori	Center for Maximum Potential Building Systems
Ray	Pradinuk	Stantec
Jamie	Harvie	Institute for a Sustainable Future
Jerry	Smith	MSI Design

Scale and Scope Focus Group

This group addressed physical activity and hospital built environments, food strategies, methods to leverage primary prevention efforts, rational deployment of resources and healthcare, the health and wealth of communities, and disproportionate socioeconomic burdens. In the aggregate, the work of this group translated to a content area defined as **Community Integration and Public Health: Support connectivity and interconnectedness among and between natural and social systems to build natural and social capital.** The focus group also contributed the *Health and Wellbeing* and *Social Equity* lenses. In terms of measuring success, this group suggested that community health measures be considered alongside more qualitative corporate social responsibility measures. *Community Integration and Public Health* included siting and transportation planning as it relates to the built environment; i.e., urban design issues, as well as bioethics issues surrounding access to care and costs.

Members of the Scale and Scope Focus Group are listed in Table 2.

Table 2. Scale and Scope Focus Group

<i>Name</i>		<i>Affiliation</i>
Jamie	Harvie	Institute for a Sustainable Future
Jerry	Smith	MSI Design
Ted	Schettler	Science and Environmental Health Network
Andrew	Jameton	University of Nebraska Medical Center
Loel	Solomon	Kaiser Permanente
Leslie	Mikkelsen	Prevention Institute

International Focus Group

This focus group examined the questions: a) How will the *Green Guide* learn from and build upon international practice in the design of healthcare buildings and green healthcare buildings; and (b) How will the *Green Guide* be made more relevant to a broader international audience, including those in developing countries?

The International Focus Group did not structure a single committee to examine these questions, as a single committee would necessarily have restricted participation to individuals from a small number of countries. Instead, the committee, consisting of two GGHC Steering Committee members, chose to convene telephone calls with a broad spectrum of individuals interested in healthcare and sustainable healthcare design from around the world. The purpose of the calls was to obtain a general understanding of the tools in use in each locale and their effectiveness in transforming practice, and to gauge the interest on the part of each individual and/or organization to participate in the content phase of the development of Version 3.0. In general, this group found few international tools upon which to build or model the proposed *Green Guide*. Those that do exist are point-based systems, similar to LEED™ or *Green for Health Care v2.2*. In addition, few tools or databases exist globally to measure the environmental impact of healthcare organizations around the world. Conversely, there is unmet demand globally for locally relevant green-building tools, and considerable interest in assisting in their development.

No decisions were made on how an internationally relevant *Green Guide* might be structured, nor on how it could be made relevant to both developed and developing countries. One method discussed to make the next generation *Green Guide* toolkit internationally relevant is to structure it to assess each performance aspect of a healthcare building against both its local standard, and against a compilation of the most demanding international standards. It was also suggested, as a first step, that an attempt be made to adapt the *Green Guide* to a single developing region in collaboration with a cross section of local groups and individuals.

The two Steering Committee members who comprised the International Focus Group consisted of Ray Pradinuk of Stantec Architecture and Walt Vernon of Mazzetti Nash Lipsey Burch.

Energy and Climate Workgroup

This content workgroup recommended a framework and metrics for measuring progress towards a health care environment that is not only carbon negative or “zero net energy” but also absorbs CO₂ and/or generates more renewable energy than it requires for base loads—climate

positive, and adopted the following target scope and definition: ***A carbon neutral healthcare facility is one that is designed and operated efficiently, uses no fossil fuel power sources, uses only renewable energy sources, and produces no other direct greenhouse gas emissions.***

The workgroup proposed developing and incorporating a Carbon Footprint Reduction (CFR) tool, to facilitate the measurement and reporting of progress toward carbon neutral healthcare, including the following components and utilizing MTCe (metric tons of carbon equivalent) as its units of measure:

Building-related operational greenhouse gas emissions

- Building energy consumption
- Building energy supply [on- and off-site]
- Medical gases
- Refrigerants
- On- and off-site waste disposal
- Plug loads

Non-building related operational greenhouse gas emissions

- Travel [employee, patient, fleet]
- Embedded energy in products used during construction
- Embedded energy in products used during operations

In defining this focus, the workgroup realized that the Energy and Climate issue crossed over all content areas; as a result, the matrix format is structured to position energy/climate as a cross-cutting lens.

The content area that applies most directly to direct building energy use is ***Building Energy and Comfort: 100% of thermal comfort and energy needs supplied by on-site or distributed renewable energy sources on a net annual basis.*** This content area includes the range of indoor environmental strategies that define the built environment's climate responsiveness (the building fabric) as well as the environmental quality factors that determine the level of thermal or lighting comfort within the built environment. In turn, the Energy and Climate lens will facilitate the extension of the CFR tool beyond direct building energy, incorporating greenhouse gas impacts associated with elements ranging from transportation to supply chain.

The workgroup prepared an analysis of existing tools in the marketplace to determine a starting point as well as potential linkages. The gap analysis yielded the need for a prescriptive tool to assist existing building operators to achieve a minimum of 50 percent reduction in greenhouse gas emissions (the 2030 Challenge goal for 2010) as a first step, recognizing that further reductions would be required to align with longer term goals.

Members of the Energy and Climate workgroup are listed in Table 3.

Table 3. Energy and Climate Workgroup		
<i>Name</i>		<i>Affiliation</i>
Steve	Guttman	Guttman & Blavoet PE
Clark	Reed	U.S. Environmental Protection Agency
Geoffrey	Glass	Providence St. Peter/Providence Health
Delbert	Reed	Shriners Hospital for Children
Joseph	Bialowitz	Kaiser Permanente
Bob	Moroz	Broadus & Associates

Water Balance Workgroup

The purpose of this workgroup was to establish a framework and metrics for measuring progress towards a health care built environment that is **Water Balanced: that is, 100% of inhabitants water use supplied by captured precipitation or recycled water that is appropriately purified without the use of chemicals.** The tool will

The intent is to restore and regenerate aquifers while reducing demand for potable water sources (particularly for process uses). The scope of work required establishing a baseline for water consumption and quality; accounting for all water that enters and leaves the site from all sources, developing water balance/restoration/regeneration metrics, goals and strategies, and establishing a staged accomplishment path.

As the work progressed, the linkages between energy and water became apparent. Energy associated with the treatment and transport of water will be considered as part of the CFR tool. In addition, the work group prioritized Resilience, recognizing that maintaining and managing potable water during times of infrastructure interruption is a key element of a resilient health care system.

Members of the Water Balance Workgroup are listed in Table 4.

Table 4. Water Balance Workgroup		
<i>Name</i>		<i>Affiliation</i>
Kim	Shinn	TLC Engineering for Architecture
Jim	Moler	Turner Construction

Material Life Cycle Workgroup

Originally conceived of as the Waste Workgroup, this group quickly shifted to two different focus areas: material life cycle and supply chain health. Material life cycle encompasses the entire life

cycle of all building materials, generally encompassing extraction, fabrication and associated transport prior to use, impacts during the use cycle, and finally “anything out the back door,” e.g. recycling, solid waste, construction and demolition waste. In addition, the material life cycle group reviewed issues surrounding the health implications associated with the life cycle of building materials. The goal was to establish a framework and metrics for measuring progress towards a health care built environment that is free of toxics and also contributes to the healing process, counteracts the environmental health burden, and/or eliminates toxic chemicals at the building occupant, local community, and global environment scales.

During the visioning process, the content area associated with this group was renamed **Material Life Cycle: 100% of the materials are replenishable and support human and ecosystem health in all phases of their life cycle - remaining biological and technical nutrients in “cradle to cradle” cycles.** Recognizing that the material life-cycle issues are not confined to the built environment, the workgroup also recommended a content area for **Supply Chain Health: 100% of supply chain materials are sustainably sourced from socially and environmentally responsible vendors; all waste is recycled, returned or eliminated (zero-waste to landfill).** In addition, this workgroup reviewed the Integrated Design and Operation lens, recognizing that the built environment and its operation are linked together with regard to material supply chain and health.

Members of the Waste Workgroup are included in Table 5. The Toxics Workgroup was led by Gail Vittori of CMPBS. Both were later combined into the Material Life Cycle workgroup.

Table 5. Material Life Cycle Workgroup		
<i>Name</i>		<i>Affiliation</i>
Greg	Roberts	WHR Architects, Inc.
Gary	Liss	Gary Liss & Associates
Rachael	Baker	Kaiser Permanente
Laura	Brannen	Waste Management
Janet	Brown	Practice Greenhealth
Jim	Moler	Turner Construction
Julie	Moyle	Boulder Community Foothills Hospital
John	Ebers	Metro Health
Lisa	Hardesty	Hardtek Auditing Solutions

IV. From Strategic Visioning to phased toolkit development

By early 2009, the workgroups populated the expanded matrix based on the best information available about existing tools, knowledge gaps, and global progress in the arena of defining goals and principles aligned with regenerative health care. In Spring 2009, the Strategic Visioning Committee moved into a post-Strategic Visioning phase that consisted of one-on-one conversations with the workgroup chairs and others to prioritize the tool development needs for the next generation of the *Green Guide*. Based on the matrix developed during the Strategic Visioning process, the framework for a “toolkit” emerged. While the toolkit as a whole is organized around the seven content areas (i.e. rows), each "module" of the tool views the content area through a distinct "lens" (column). Listed below are the content areas and the respective lenses that form the matrix.

The Committee agreed on a modular approach to tool development, with the first phase of the next generation of *Green Guide* to focus on the development of the *Climate Change Impacts* and *Resilience* module(s), defined as viewing the seven content areas through the Climate Change Impacts and resilience lenses.

Content Areas

- Community Integration & Public Health≈
- Ecosystem Services
- Water
- Spatial Structure & Form
- Building Energy & Comfort
- Material Life Cycle
- Supply Chain Health

Lenses

Module 1

- Climate Change Impacts
- Resilience

Module 2

- Social Equity
- Health & Wellbeing

Module 3

- Nature & Biophilia
- Toxics

Module 4

- Integrated Design/Operations
- Safety
- Quality
- Cost

Moving forward with development of the *Climate Change Impacts* and *Resilience* module, content-specific workgroups will examine their content area in greater depth, encompassing

aspects of community integration (e.g., site planning and location of services) through supply chain health (e.g., climate footprint of supplies and pharmaceuticals), through an explicit focus on climate change impacts and system resilience.

In the context of achieving necessary and dramatic reductions in energy use and greenhouse gas emissions, health care facilities have an opportunity to establish an integrated energy-water management scheme. The next generation of the *Green Guide* will offer an accounting tool, customized for the healthcare sector for both design and operational phases to establish a baseline and benchmark conditions to move towards energy and water security, and, by doing so, measurably reduce greenhouse gas emissions and associated toxic releases and criteria air pollutants.

Importantly, the tool will continue to provide a basis for health care decision makers to measure and manage these critical issues at a scale they directly influence. This customized tool for the health care sector is necessary to accurately reflect the health care sector's unique water use profile, reflecting health care-specific technology/equipment coupled with requisite domestic water fixtures.

In summary, the *Green Guide* is uniquely positioned to lead the development of a toolkit focused on *Climate Change Impacts and Resilience*. In addition to both capturing and introducing a broad range of green building and operational strategies rapidly being implemented by healthcare systems and individual facilities across the U.S., the *Green Guide* is also regarded as an authoritative source of prescriptive and performance methodologies used as the basis to advance the healthcare sector's potential to realize dramatic energy and water savings, without compromising patient safety or quality of service. With an audience that includes healthcare facility owners, facility managers, design professionals, general contractors and local, state and federal policymakers, the *Green Guide's Climate Change Impacts and Resilience* tools, as part of the next generation *Green Guide for Health Care* toolkit, will provide a necessary pathway for healthcare facilities throughout the U.S. to measure and manage their energy and water footprints as part of a multi-sector climate change mitigation initiative.

Measures of continuous improvement: Performance metrics

During the Strategic Visioning process, the workgroups identified metrics tracked by other healthcare systems to derive meaningful comparison data. For instance, the Carbon Energy Group suggested estimating the metric tons of Carbon Equivalent (MTCe). The Water Group recommended measuring gallons/square foot/patient day instead of gallons/square foot/year. The metrics for solid waste were more challenging. Conventional measures of solid waste are generally in annualized units of pounds or cubic yards. Further research is required to develop a "waste equivalent" or carbon footprint metric.

There are many ways to measure improvement. For example, performance may be measured against known endpoints, i.e., Energy Star ratings. In addition, it may be necessary to measure across different scales, e.g. kilowatt-hour per person served. How measurements are structured is critical to the success of the metrics they represent. In the post-Strategic Visioning tool development phase, the need for review of available metrics and their applicability has been noted as a priority.

The next version of the *Green Guide* will investigate creative approaches to measure health care's sustainability performance. One methodology under consideration is an adaptation of the methodology used by the Joint Commission in evaluating health care facility performance relative to safety and the Environment of Care. For example, the Joint Commission's system is based on continuous improvement in patient safety, and represents an established set of metrics that have undergone intense scrutiny and review. Together, these metrics and scoring are well understood and accepted as a gold standard across US health care institutions.

An effective and sustainable performance measurement system for continuous improvement incorporates multiple types of metrics that encompass both qualitative and quantitative measures, thereby providing a total picture of the strengths and weaknesses inherent in system design and actual practice. The following examples illustrate the type of scoring measures that could be considered for development into the next generation of the *Green Guide* version.

Type I: Based on presence or absence of a practice (i.e., Yes or No).

Example: Does the hospital maintain an updated environmental management plan?

Type II: Based on the quality of the practice (i.e., inadequate, partial, adequate)

Example: What parts of the hospital campus and satellites are integrated into the water use reduction plan (i.e., <25%, ~50%, over 90%)

Type III: Based on a (statistical) sampling of quantitative quality improvement measures

Example: Of the 10 areas checked, how many had achieved energy use reductions in excess of X per cent? (degree of success based on self-imposed performance measure)

This scoring methodology can be expanded to include performance measures in multiple content areas and intersections. It may be non-linear and weighted in accordance to different societal and regional needs. While it may remain specific enough for self-assessment by decision makers, it may be generalizable across the scale, size, and services provided by the health care sector.

V. Stating the problem, offering a *Green Guide* solution

A new beginning focused on Carbon Impacts.

A coordinated management strategy for energy and water resources is an imperative for U.S. health care facilities. This comprehensive approach, supported by the *Green Guide for Health Care's Climate Change Impacts and Resilience* tools, will be a key contributor to position the U.S. health care sector towards a more reliable and resilient energy- and water-secure future, and an essential climate change mitigation strategy. This initial module will build upon a growing body of initiatives undertaken by US healthcare systems to develop and track their carbon emissions and water demands with a customized set of calculators, including the *Carbon Footprint Reduction* tool.

The provision of health care is based on a fundamental premise to “do no harm.” This guiding principle applies not only to a patient receiving individual care, but also to the workers, surrounding communities, and the natural environment that is impacted by health care practices. Taken literally, doing no harm requires that each activity associated with health care be sustainable. In current U.S. health care practices, the demand for energy and water is both significant and unsustainable at existing levels. Hospital energy intensity per square foot is second only to the food service industry, and is twice that of commercial office buildings (CBECS). Compounding the healthcare sector's energy demand is water intensity, estimated to average over 139 thousand gallons per bed per day. (<http://www.swfwmd.state.fl.us/conservation/waterwork/checklist-hospital.html>). The impact of this enormous energy and water demand is compelling: hospitals and related healthcare buildings inflict a disproportionate harm on the natural environment relative to other building types.

Many fragmented efforts are now underway to measure the energy performance of healthcare buildings. *Energy Star* has been benchmarking hospital energy performance for years through Portfolio Manager. ASHE is in the process of developing a *2030 Challenge* for healthcare. LEED for Healthcare is in development through the U.S. Green Building Council. These documents will create a series of performance improvement targets, with no measurement or implementation tracking tools. In this context, the *Green Guide for Health Care* is known as the premier sustainability toolkit customized for the health care industry. It summarizes the knowledge compiled from hundreds of hospitals, architects, engineers, and owner/operators. While each of these efforts is laudable, none assist hospitals in creating a roadmap to carbon-neutrality, measurable energy savings let alone restorative or regenerative facilities.

There is a paucity of data defining where health care energy is actually expended. Regional differences across the U.S. may be significant. The current confusion associated with uncoordinated efforts call out to a need for coherence in approach and mission. Clearly, building energy consumption is of paramount importance, but it is only one of numerous important energy consumption issues in health care delivery. Energy and associated carbon impacts related to land use decisions, transportation, water, and supply chain will be necessary to understand, quantify, and reduce.

VI. Next Generation *Green Guide* Goals

To meet the need for a timely carbon toolkit as well as to respond to widely divergent scope and metrics, the proposed toolkit is divided into a series of modules that will be individually developed but coordinated through a central management structure.

The proposed next generation of the *Green Guide* will create a platform for a sustainability toolkit that extends beyond physical facility operations, encompassing all aspects of healthcare service delivery and the built environment that supports it, with the following goals and objectives:

- Collaborate with the healthcare industry to develop high-performance, healing built environments that "do no harm" (i.e., carbon-neutral, water-balanced, zero-waste, toxic-free);
- Provide a cohesive framework for collection and dissemination of sector-wide healthcare performance data across a broad series of measures (i.e., energy use per adjusted patient day or per bed; transportation energy per visit);
- Leverage solutions that leapfrog the perception that environmental performance is a zero-sum game with respect to healthcare quality;
- Provide data in a form that provides for benchmarking outside the US (comparing other nations);
- Provide metrics that assess environmental performance beyond the level of an individual building, providing a series of measures that link to "community benefit" and health status of populations; and
- Provide a unifying framework, founded on the principles of human and natural systems health, as a foundational principle defining the performance of "safe and healthy" buildings that has relevance beyond healthcare.

These goals and objectives are far-reaching and bold, consistent with the resourcefulness and vision of the *Green Guide for Health Care*. As a tool developer, the *Green Guide* sets an aspirational framework for its next generation tool, with intention to engage a broad group of stakeholders and attract the state of the art thinking from around the world on many of these issues. Development of the first module, the *Climate Change Impacts and Resilience Module*, will commence in 2009.

In addition, the *Green Guide* will continue its commitment to an open-access, publicly available, voluntary, web-based, interactive tool with links to external supporting resources. The *Green Guide* will use and build upon other complementary tools, ensuring that the recommendations do not compromise either safety or effectiveness of care.

VII. Structure and governance of the *Green Guide* development

To support the next phase of development, the *Green Guide* will form seven new content workgroups, each focused on one of the seven content area dimensions assessed through the climate change lens for the *Climate Change Impact and Resilience* Module.

- Community Integration & Public Health
- Ecosystem Services
- Water Systems
- Building Energy & Comfort
- Spatial Structure & Form
- Material Life Cycle
- Supply Chain Health

Together, these content workgroups will be responsible for developing the multi-scale, design-construction-operation continuous improvement tool for the healthcare sector. If, after completion of an international interest survey, the Co-Coordinator determine that there is sufficient interest and demand for one or more international versions of the *Green Guide* toolkit, one or more workgroups may be created to complete this work in parallel to the development of the next generation toolkit.

Project governance

A *Green Guide Coordinating Council* will be established, consisting of the chairs of each of the seven Content Work Groups, the *Green Guide* Senior Director (who will also serve as Project Manager), and the three *Green Guide* Co-Coordinator. The *Coordinating Council* will guide, review, and coordinate the tool development work of the work groups, ensuring consistency of vision, and quality of results.

Advisory Committee

In addition to the content workgroups, an Advisory Committee will be formed consisting of health system participants and non-profit organizations working in the areas of tool development. The intent of this group would be to access the interest and expertise and sponsorship of potential users of the tool as well as the expertise of related organizations. This Committee will provide guidance concerning tool development, reference standards, and the like.

Workgroup participants

The Co-Coordinator and Senior Director will work during the summer of 2009 to recruit and populate the workgroups. An initial call for volunteers will be launched through the *Green Guide* newsletter and other communication to Practice Greenhealth, Health Care Without Harm, and *Green Guide* mailing lists. The first priority will be to recruit chairs for the seven work-groups, followed by active follow up to form their respective membership.

Core Governance Functions

It will be the responsibility of the Co-Coordinator, working with the Senior Director, to carry out all other necessary work required to ensure the day-to-day operation of the *Green Guide*, including website development, fund-raising, and educational programs.

VIII. The proposed *Green Guide* platform

Green Guide for Health Care will reside on a suitable host tool platform that will enable and promote conversations among workgroups to facilitate the creation and emergence of the next generation of the *Green Guide for Health Care* in the health care marketplace. The primary objective of this toolkit will be to support the learning community via document downloads, case studies, project registrations, sponsor and supporter pages, calendars, and links to other organizations (e.g. Health Care Without Harm, Practice Greenhealth). Also incorporated will be video clips, presentations, donations, fund-raising/purchase options, e-mails to all registrants, newsletters, and a venue for interactive participation by users. We currently have an estimated 20,000 users (from all US states and Canadian provinces and more than 100 other countries) who register their projects, and/or sign up for our listserv; approximately 500 new unique site registrants join each month. We expect our user population to grow substantially in 2009 and 2010.

To inform the tool development, the *Green Guide* will launch a *Regenerative Hospital Call for Case Studies*, seeking to collect the broadest set of examples from the US and abroad of health care organizations engaged in aspects of 'regenerative design.' This will ensure that the toolkit recognizes and incorporates the broadest range of strategies as well as recognizes regional and international differences.

The intended audience for the next generation of the *Green Guide* includes health care facility owner/operators, health care system executives, architects, planners, designers, engineers, policymakers and users engaged in the interactive portion of the tool. The proposed framework will not only house the current *Version 2.2* of the *Green Guide* (Construction and Operations), but will also provide a web-based platform where the next generation can reside onsite, users can navigate freely to and from the venue, into sister websites and back, and download other tool offerings in the marketplace. Capabilities will include visitor and project registration, document access, dedicated workspace for workgroups, interactive areas for information sharing (e.g., blogs, listservs), sales and donations, multimedia, links, mailing list/ e-mail management, and compilation of performance metrics.