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## ANALYSIS &amp; COMMENTARY

# Using Green Building As A Model For Making Health Promotion Standard In The Built Environment

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**ABSTRACT** The built environment—the constructed physical parts of the places where people live and work—is a powerful determinant of both individual and population health. Awareness of the link between place and health is growing within the public health sector and among built environment decision makers working in design, construction, policy, and both public and private finance. However, these decision makers lack the knowledge, tools, and capacity to ensure that health and well-being are routinely considered across all sectors of the built environment. The green building industry has successfully established environmental sustainability as a normative part of built environment practice, policy making, and investment. We explore the value of this industry's experience as a template for promoting health and well-being in the built environment.

**R**ecognizing the impact of social, economic, and environmental determinants on health, the Robert Wood Johnson Foundation and other leading public health organizations are striving to establish a culture of health—a society in which all people have the opportunity to live healthier lives. The foundation's framework for achieving a culture of health consists of making health a shared value, fostering cross-sector collaboration, and creating healthier and more equitable communities.<sup>1</sup> Creating such communities will require addressing social and economic development; policy and governance; and the built environment, including physical conditions that promote or hinder health for residents. The built environment—the constructed physical parts of places where people live and work, including homes, schools, transportation systems, parks, and retail stores—is one key factor that determines whether people have opportunities to make healthy choices and, on a population level, whether residents are as healthy as they could be.

## Valuing Health In The Built Environment

Physically, communities are composed of a number of individual built environment projects. While there is rarely an opportunity to create an entirely new community, there are many opportunities to influence the design and construction of new or renovated individual projects.

The decision makers who determine the built environment cut across sectors and industries and fall into three categories: practitioners, policy makers, and financiers. Built environment practitioners include architects, urban planners, real estate developers, construction engineers, and technical consultants. Policy makers at the local, state, and national levels influence how and where neighborhoods and communities are designed, built, and maintained through zoning, code regulations, and tax incentive programs. Financing for built environment projects comes from private- and public-sector real estate investors and owners that supply and control the flow of capital to fund development. Defining opportunities for public health engagement within each level of decision making will be es-

sential to drive progress toward the goal of creating healthier communities at a national scale.

Awareness of the links between the built environment and health is growing among built environment practitioners, policy makers, and financiers. For example, the American Institute of Architects,<sup>2</sup> the Urban Land Institute,<sup>3</sup> and the American Society of Interior Designers<sup>4</sup> recently launched large-scale initiatives focused on helping their constituents consider health and well-being more intentionally in their practices. These initiatives create new opportunities for practitioners in the public health and health care sectors to partner with a broad set of built environment practitioners.

Policy makers at the local, state, and national levels are also beginning to target health, well-being, and equity in fields related to the built environment, such as urban planning. These efforts are not new: They stem from long-standing research and advocacy partnerships between the public health and urban planning sectors.<sup>5,6</sup> Specific policies that target health in urban planning include Complete Streets guidelines, which have been adopted in many states and which are aimed at making sure that the transportation system accommodates pedestrians and bicyclists as well as people driving cars.<sup>7</sup> Other examples include tax incentives to encourage the inclusion of healthy food stores in real estate development projects. Such incentives have been used to address food deserts in the District of Columbia, Maryland, and Nevada.<sup>8</sup>

Public and private financiers are also starting to explore mechanisms to support health-promoting built environment projects. In Georgia a health impact assessment recently examined opportunities to improve public health through changes in affordable housing policy and financing, as dictated by the state's Qualified Allocation Plan. These opportunities include incentivizing the adoption of design and construction practices for affordable housing developments that encourage pedestrian activity and decrease exposure to pollution for residents.<sup>9</sup>

Innovative community development financing institutions, such as the Low Income Investment Fund,<sup>10</sup> are working to make health and well-being more intentional focuses of their environmental, sustainability, and governance activities. Within private commercial real estate, leading large-scale owner and development groups, such as the British Land Company, are working to implement health-focused design guidelines for their development projects, as well as partnerships with tenants to support the implementation of policies and on-site programming to improve health and well-being.<sup>11</sup>

As a result of innovative initiatives such as

these, some built environment projects have been developed with input from the public health sector. Examples include the Mariposa affordable housing project in Denver, Colorado, which used a health impact assessment to guide the processes of site planning and architectural design;<sup>12</sup> the Atlanta BeltLine project, which used a health impact assessment to consider options for the city's large-scale multiyear investment in public space, parks, and walking and biking trails;<sup>13</sup> and the renovation of schools in Buckingham County, Virginia, which used novel guidelines for architectural design that are specifically focused on promoting healthy eating and physical activity.<sup>14,15</sup>

These are promising steps toward the goal of building healthier and more equitable communities. However, such exemplary projects and collaborations, which frequently depend on public and nonprofit funding, remain the exception—not the rule.

The challenge is defining and encouraging a new integrated approach to built environment practice, policy, and financing in which health promotion is standard, institutionalized, and pervasive.

### The Green Building Model

Fortunately, the green building industry provides a model that can help guide efforts to build a culture of health across the built environment system. *Green building* is generally defined as the planning, design, construction, and operation of buildings that prioritize environmental outcomes by increasing consideration of energy and water use, indoor environmental quality, and materials and building site selection.<sup>16</sup>

Residential and commercial buildings account for nearly 40 percent of carbon emissions in the United States,<sup>17</sup> which makes them a key target for efforts to mitigate the effects of climate change. Over the past twenty years, the green building industry has created tools and practices based on principles of market transformation to drive the adoption of sustainable built environment design and operation practices on a global scale. In the context of the green building movement, *market transformation* is defined as a strategic process of market intervention that aims to remove barriers to and create incentives for built environment decision makers' prioritizing energy efficiency and other aspects of sustainable building practices on a broad scale.<sup>18</sup> Put another way, the green building industry uses a systems-based approach that promotes the consideration of sustainability among all built environment decision makers.

At the practitioner level, elements of green

building market transformation include rating systems that define best practices, provide a basis for third-party review and certification of a project, and increase knowledge of and awareness about sustainable building strategies.<sup>19</sup> Collectively, these elements drive broad-scale change in design, engineering, construction, and facility management practice. Globally, more than 79,000 projects have participated in the US Green Building Council's Leadership in Energy and Environmental Design (LEED) framework since its inception in March 2000. The LEED framework can be applied to residential, education, health care, commercial, and industrial projects, among others. Additionally, more than 201,000 practitioners have been accredited as LEED professionals.<sup>20</sup>

At the local, state, and national levels, the green building industry works with policy makers to establish policies that promote sustainability. This has led to the introduction of sustainability goals and certification requirements into building codes; master planning requirements; and, in some cases, performance criteria for publicly funded projects such as schools at the local and state levels.

The green building industry has also worked to influence the flows of capital within real estate markets by establishing a well-defined value proposition for investing in green buildings. This has been accomplished in two ways: promoting awareness of the benefits of sustainability among financiers and creating mechanisms that allow savings from reduced operational costs and other benefits of green buildings to be more easily quantified and reaped by upstream investors.

For example, the creation of reporting standards by green building industry groups such as the Sustainability Accounting Standards Board<sup>21</sup> and the Global Reporting Initiative<sup>22</sup> has allowed for systematic reporting and monitoring of sustainability impacts across a variety of sectors. Within the built environment sector specifically, the Global Real Estate Sustainability Benchmark takes this a step further by allowing real estate investors to benchmark the sustainability performance of their investments and compare it to the performance of their peers' investments.<sup>23</sup> The market incentive to achieve a high benchmark score based on measured sustainability performance at the portfolio level has created significant change in the practices of the real estate investment industry. For instance, from 2009 to 2014 the portion of benchmark participants who tracked their buildings' energy consumption increased from 19 percent to 79 percent.<sup>24</sup>

## Health promotion objectives can be introduced into existing green building platforms.

### Applying The Green Building Model To Promote Health And Well-Being

The confluence of the growing demand for addressing health and well-being in the built environment and the proven template of the green building industry for systems-based change in the built environment creates an exciting set of opportunities to create healthier communities at a national scale.

Health promotion objectives can be introduced into existing green building platforms, and public health and health care stakeholders are well positioned to do so. In addition, these stakeholders can help define, develop, and support the early use of new building certification systems focused entirely on health promotion. For example, traditional green rating systems, such as LEED and Enterprise's Green Communities Criteria, have recently introduced multiple health-focused criteria, such as guidelines focused on physical activity,<sup>25</sup> worker safety,<sup>26</sup> social equity,<sup>27</sup> access to healthy food,<sup>28</sup> and the provision of healthy affordable housing.<sup>29</sup> At the same time, entirely health-focused building rating systems, such as the WELL Building Standard from the International WELL Building Institute<sup>30</sup> and Fitwel<sup>31</sup> developed by the Centers for Disease Control and Prevention and General Services Administration and administered by the Center for Active Design, are also being developed.

These health-focused resources are welcome and demonstrate the demand to address these issues more intentionally. However, for many built environment practitioners—who were trained in architecture, design, engineering, construction, or real estate development and received no formal public health training—the accelerating number and diversity of health-promotion tools can be overwhelming.

To help address this problem, public health researchers from the University of Virginia and the US Green Building Council partnered with Enterprise Community Partners and the Health

# Policy interventions to support healthy communities constitute an active area of ongoing innovation and research.

Impact Project, a collaboration of the Robert Wood Johnson Foundation and the Pew Charitable Trusts, to define a process and set of resources for use within the familiar framework of green building certification systems to guide built environment practitioners through this evolving landscape. Borrowing from principles of health impact assessment and mirroring existing green building practice frameworks for encouraging the integrated consideration of energy and water management, the resulting integrative process for health promotion guides built environment practitioners through a systematic consideration of the potential health impacts of their projects. It also defines and requires a formal and integrated role for public health professionals as part of the core project team.

Development and marketing of this new integrative process for health promotion represents the first attempt to integrate a public health process into green building certification in a meaningful way that is relevant to practice. Tailored adaptations of this new integrative process for health promotion are available for use within Enterprise's 2015 Green Communities Criteria and the US Green Building Council's library of new LEED pilot credits. The process can be applied to new construction projects of all types, including housing, retail, and education.<sup>32,33</sup>

Of course, the availability of health promotion tools for practitioners does not automatically mean that the tools will be used. Mandates and incentives such as policies and financing strategies will likely be required to bring the new tools into standard practice.

Policy interventions to support healthy communities, particularly in sectors such as land use and transportation planning, are reasonably well established and constitute an active area of ongoing innovation and research. For instance, zoning regulations specifically intended

to promote physical activity by encouraging active forms of transportation, such as walking and biking, have been implemented in multiple states, including Pennsylvania, Virginia, and Washington.<sup>34</sup> In contrast, efforts to create financial mandates and incentives for health-promoting communities remain less developed.

Financial mandates and incentives within the built environment system come largely from public and private real estate investors who make investment decisions based on risk-adjusted returns. These decisions first affect the actions of real estate fund managers who manage portfolios of numerous built environment projects, and they ultimately affect the budgets of built environment practitioners who deliver individual projects. To date, there is no expectation that the costs or savings associated with the health impacts of built environment projects will influence these financial decisions, nor is there a mechanism for such influence. This allows health and well-being to function largely as economic externalities<sup>35</sup> within built environment systems and prevents them from receiving specific weight in decision making, particularly among financiers.<sup>36</sup> As a consequence, it is difficult for teams working on built environment projects and attempting to use new health promotion tools to fund these efforts through traditional financing mechanisms. Thus, the teams must rely on special funding, such as grants.

Establishing industry metrics for measuring the health and well-being performance of built environment projects is a critical next step toward the goal of having health and well-being impacts count in built environment decision making. Striking the correct balance among the validity, practicality, and practice relevance of metrics will be challenging.<sup>37</sup> Stakeholders in the fields of public health and health care need to play an active role in this evolving negotiation within the built environment industry about how to value and monitor health impacts in a holistic manner, to ensure that critical yet difficult-to-quantify issues such as equity and social justice are sufficiently addressed.

## Toward A Culture Of Health In The Built Environment

The importance of the built environment as a determinant of health and well-being is well established. However, traditional public health approaches used in isolation will not be enough to make the consideration of health and well-being normative practice among the diverse set of decision makers who determine the form and function of communities. The success of the green building movement demonstrates that driving

broad-scale change in the built environment requires a systems-based approach that simultaneously reaches project-level practitioners such as architects, technical consultants, and developers; policy makers; and public and private financiers.

Green building principles of market transformation provide an important framework for organizing efforts to make the consideration of health and well-being standard among built environment decision makers. But ultimately, the most practical way in which people in the public health and health care sectors can help make health promotion standard in the built environment is through direct engagement with built

environment decision makers. Architects, traffic engineers, urban planners, and public and private real estate financiers are increasingly ready to engage with and learn from public health and health care professionals. However, to make the most of these new partnerships, people in the fields of public health and health care must better understand and work within the constraints and incentive structures of the built environment sector. Working together, people in the public health, health care, and built environment sectors can provide the necessary physical infrastructure for healthy communities that allows the vision of a national culture of health to become a reality. ■

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## NOTES

- 1 Plough AL. Building a culture of health: a critical role for public health services and systems research. *Am J Public Health*. 2015;105 (Suppl 2):S150–2.
- 2 American Institute of Architects. Practicing architecture: design and health [Internet]. Washington (DC): AIA; [cited 2016 Sep 9]. Available from: <http://www.aia.org/practicing/designhealth/>
- 3 Urban Land Institute. Building Healthy Places Initiative [Internet]. Washington (DC): ULI; c 2016 [cited 2016 Sep 9]. Available from: <http://uli.org/research/centers-initiatives/building-healthy-places-initiative/>
- 4 American Society of Interior Designers. Health and wellness protocols [Internet]. Washington (DC): ASID; [cited 2016 Sep 9]. Available from: <https://www.asid.org/Protocols#.V9L2xIsrK00>
- 5 Dannenberg AL, Jackson RJ, Frumkin H, Schieber RA, Pratt M, Kochitzky C, et al. The impact of community design and land-use choices on public health: a scientific research agenda. *Am J Public Health*. 2003;93(9):1500–8.
- 6 Jackson RJ, Dannenberg AL, Frumkin H. Health and the built environment: 10 years after. *Am J Public Health*. 2013;103(9):1542–4.
- 7 Moreland-Russell S, Eyster A, Barbero C, Hipp JA, Walsh H. Diffusion of Complete Streets policies across US communities. *J Public Health Manag Pract*. 2013;19 (3 Suppl 1):S89–96.
- 8 Centers for Disease Control and Prevention. Healthier food retail: an action guide for public health practitioners [Internet]. Atlanta (GA): CDC; 2014 [cited 2016 Sep 9]. Available from: <http://www.cdc.gov/nccdpdp/dnpao/state-local-programs/pdf/healthier-food-retail-guide-full.pdf>
- 9 Rushing MJM, Dills JE, Fuller EJ. A health impact assessment of the 2015 Qualified Allocation Plan for low-income housing tax credits in Georgia [Internet]. Atlanta (GA): Georgia State University; 2015 Sep [cited 2016 Sep 9]. (Summary Brief). Available for download from: <http://ghpc.gsu.edu/download/an-hia-of-the-2015-qualified-allocation-plan-for-low-income-housing-tax-credits-in-georgia/>
- 10 Low Income Investment Fund. Health [Internet]. San Francisco (CA): LIIF; c 2014 [cited 2016 Sep 9]. Available from: <http://www.liifund.org/programs/health-2/>
- 11 Webster M. The pursuit of happiness [Internet]. London: British Land Company; 2016 Jan 4 [cited 2016 Sep 9]. Available from: <http://www.britishland.com/sustainability/stories/articles/2016/the-pursuit-of-happiness>
- 12 Christensen E, Runge C, Crangle K, Picard L, Powers S, Fulenwider D. The Mariposa Healthy Living Initiative, version 1.0 [Internet]. Seattle (WA): Mithun; 2012 Oct [cited 2016 Sep 9]. Available from: [http://mithun.com/special/Mariposa\\_Healthy\\_Living\\_Initiative/](http://mithun.com/special/Mariposa_Healthy_Living_Initiative/)
- 13 Ross CL, Leone de Nie K, Dannenberg AL, Beck LF, Marcus MJ, Barringer J. Health impact assessment of the Atlanta BeltLine. *Am J Prev Med*. 2012;42(3):203–13.
- 14 Brittin J, Sorensen D, Trowbridge M, Lee KK, Breithecker D, Frerichs L, et al. Physical activity design guidelines for school architecture. *PLoS One*. 2015;10(7):e0132597.
- 15 Huang TT-K, Sorensen D, Davis S, Frerichs L, Brittin J, Celentano J, et al. Healthy eating design guidelines for school architecture. *Prev Chronic Dis*. 2013;10:E27.
- 16 Kriss J. What is green building? [Internet]. Washington (DC): US Green Building Council; 2014 Aug 6 [cited 2016 Sep 9]. Available from: <http://www.usgbc.org/articles/what-green-building>
- 17 Department of Energy, Energy Information Administration. US energy-related carbon dioxide emissions, 2014 [Internet]. Washington (DC): EIA; 2015 Nov 23 [cited 2016 Sep 9]. Available from: <http://www.eia.gov/environment/emissions/carbon/>
- 18 Institute for Market Transformation. About IMT: what is market transformation? [Internet]. Washington (DC): IMT; [cited 2016 Sep 9]. Available from: <http://www.imt.org/about>
- 19 Pyke C, McMahan S, Dietsche T. Green building and human experience: testing green building strategies with volunteered geographic information [Internet]. Washington (DC): US Green Building Council; 2010 Jun 10 [cited 2016 Sep 9]. (Research Program White Paper). Available for download from: <http://www.usgbc.org/resources/green-building-and-human-experience-testing-green-building-strategies-volunteered-geograph>
- 20 US Green Building Council. This is LEED [Internet]. Washington (DC): USGBC; c 2106 [cited 2016 Sep 9]. Available from: <http://leed.usgbc.org/leed.html>
- 21 Sustainability Accounting Standards Board. Using SASB [Internet]. San Francisco (CA): SASB; c 2016 [cited 2016 Sep 19]. Available from: <http://using.sasb.org/>

- 22 Global Reporting Initiative. About sustainability reporting [Internet]. Amsterdam; The Initiative; [cited 2016 Sep 19]. Available from: <https://www.globalreporting.org/information/sustainability-reporting/Pages/default.aspx>
- 23 Green Real Estate Sustainability Benchmark. About GRESB Real Estate [Internet]. Amsterdam: GRESB; [cited 2016 Sep 16]. Available from: <https://gresb.com/realestate2015/assessment>
- 24 Kok N. The past, the present, and the future of sustainability reporting in the global real estate sector [Internet]. Amsterdam: Green Real Estate Sustainability Benchmark; [cited 2016 Sep 9]. Available from: <https://www.gresb.com/pastpresentfuture>
- 25 Lee KK. Developing and implementing the Active Design Guidelines in New York City. *Health Place*. 2012;18(1):5-7.
- 26 US Green Building Council. Prevention through design [Internet]. Washington (DC): USGBC; c 2106 [cited 2016 Sep 9]. Available from: <http://www.usgbc.org/credits/preventionthroughdesign>
- 27 Todd JA, Kaplan S. USGBC accelerates social equity with new LEED credits [Internet]. Washington (DC): US Green Building Council; 2014 Dec 5 [cited 2016 Sep 9]. Available from: <http://www.usgbc.org/articles/usgbc-accelerates-social-equity-new-leed-credits>
- 28 US Green Building Council. Local food production [Internet]. Washington (DC): USGBC; c 2106 [cited 2016 Sep 9]. Available from: <http://www.usgbc.org/node/2743606?return=/pilotcredits>
- 29 US Green Building Council. Housing types and affordability [Internet]. Washington (DC): USGBC; c 2106 [cited 2016 Sep 19]. Available from: <http://www.usgbc.org/node/2615723?return=/credits/neighborhood-development-plan/v4/neighborhood-pattern-%26amp%3B-design>
- 30 International Well Building Institute. WELL Building Standard [Internet]. Washington (DC): The Institute; c 2015 [cited 2016 Sep 9]. Available from: <https://www.wellcertified.com/well>
- 31 Center for Active Design. Fitwel [Internet]. New York (NY): The Center; [cited 2016 Sep 9]. Available from: <https://fitwel.org/>
- 32 Worden K. New LEED pilot credit establishes Integrative Process for Health Promotion [Internet]. Washington (DC): US Green Building Council; 2016 May 19 [cited 2016 Sep 9]. Available from: <http://www.usgbc.org/articles/new-leed-pilot-credit-establishes-integrative-process-health-promotion>
- 33 Green Health Partnership. LEED pilot credit [Internet]. Charlottesville (VA): The Partnership; [cited 2016 Sep 9]. Available from: <http://www.greenhealthpartnership.org/leed-pilot-credit>
- 34 County Health Rankings and Roadmaps. Zoning regulations for land use policy [Internet]. Madison (WI): County Health Rankings; c 2016 [cited 2016 Sep 9]. Available from: <http://www.countyhealthrankings.org/policies/zoning-regulations-land-use-policy>
- 35 Bleich SN, Sturm R. Developing policy solutions for a more active nation: integrating economic and public health perspectives. *Prev Med*. 2009;49(4):306-8.
- 36 Pyke C. Using information technology to transform the green building market. *Bridge* [serial on the Internet]. 2012 spring [cited 2016 Sep 9]. Available from: <https://www.nae.edu/File.aspx?id=57879>
- 37 Trowbridge MJ, Pickell SG, Pyke CR, Jutte DP. Building healthy communities: establishing health and wellness metrics for use within the real estate industry. *Health Aff (Millwood)*. 2014;33(11):1923-9.