
A SYNTHESIS OF BEST-VALUE PROCUREMENT PRACTICES FOR SUSTAINABLE DESIGN-BUILD PROJECTS IN THE PUBLIC SECTOR

Keith R. Molenaar,¹ Nathaniel Sobin,² and Eric I. Antillón³

ABSTRACT

Research in sustainable building practices suggests that integrated project delivery methods can more successfully deliver green buildings as measured by cost, schedule, and quality objectives. Design-build is an integrated project delivery method that has increased in use in the public sector. Design-build projects are commonly acquired through best-value procurement, which includes factors in addition to price. However, the procurement process of green buildings requires specific selection factors that are not accounted for in conventional buildings. This study synthesizes the current state of practice for best-value procurement of sustainable design-build projects within the public sector. The findings are based upon a content analysis of procurement documents for 26 projects. The results of this study reveal that procurement opportunities exist to improve best-value award algorithms. The findings show that owners are missing opportunities to evaluate design-builders on sustainable building experience and sustainability of the proposed design in project management plans. Modifying the solicitation documents to include these elements could improve the overall success of delivery.

KEYWORDS

procurement, project delivery, sustainable development

INTRODUCTION

The industry demand for “going green” has increased exponentially since its inception. The design and construction industry predominantly uses the United States Green Building Council’s (USGBC®) Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ as a metric for green building performance. Recent studies suggest that the future market value of green building may reach up to \$140 billion dollars by 2013 (McGraw-Hill 2008) and that one out of five architecture, engineering and construction (AEC) firms have participated on at least one LEED certified project as of 2006 (BDC 2006). Furthermore, LEED certification points are now being implemented and mandated by public agencies at all

levels. Municipal level actions such as the Chicago Standard require several LEED points that can easily lead to certification. State level mandates, such as Title 24 in California, have parallel measurement systems to LEED that allow state building requirements to count as LEED points. National agency mandates such as Executive Order 13423 now require sustainable aspects as measured by LEED to be included in all new projects built by most government agencies. Clearly, sustainability as measured by the LEED rating system has proliferated the design and construction industry.

A recent study showed that integrated project delivery methods, including design-build, are being used to deliver 75 percent of current new construction projects seeking LEED certification (Molenaar,

¹Associate Professor, Civil, Environmental and Architectural Engineering, University of Colorado, 428 UCB, Boulder, CO 80309-0428, tel (303) 735-4276, fax (303) 492-7317, email keith.molenaar@colorado.edu

²PhD Candidate, Civil, Environmental and Architectural Engineering, University of Colorado, 428 UCB, Boulder, CO 80309-0428, tel (303) 735-0185, fax (303) 492-7317, email sobin@colorado.edu

³Research Assistant, Civil, Environmental and Architectural Engineering, University of Colorado, 428 UCB, Boulder, CO 80309-0428, tel (303) 735-0185, fax (303) 492-7317, email eric.antillon@colorado.edu

et al. 2009). Within that same study it was found that the largest proportion of the design-build population was public projects that used a best-value procurement procedure. With this in mind, the design-build, best-value market becomes of particular interest. While previous studies have attempted to quantify the performance of design-build in comparison to other delivery methods in achieving LEED points (Carpenter 2005, Bilec 2008), few if any have investigated how sustainability objectives are communicated in requests for proposals (RFPs). Communication through design-build RFPs is particularly important because the RFP forms the basis for design-builder selection and becomes the basis of the design-build contract. This study performs this analysis at the finest level of granularity: the language used in the procurement documents. As more information is known about the current trends in design-build procurement, changes to the existing design and construction industry procurement techniques can be suggested.

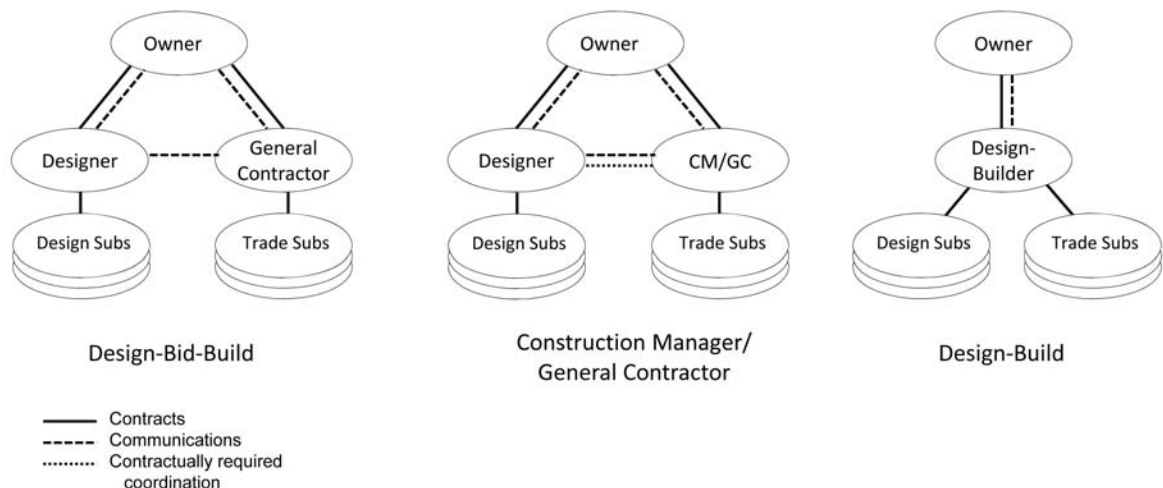
BACKGROUND

The LEED rating system was developed by the USGBC in 1998 to act as an assessment tool for evaluating sustainability performance from a design and construction standpoint. Specifically, the system focuses on the use of durable or recycled materials, reduction of energy consumption, reuse of land

resources, and cooperation with other sustainable infrastructure goals. The current levels of certification include (in ascending order) Certified, Silver, Gold, and Platinum and are based on the number of points that are acquired in meeting these focuses (USGBC 2007). The LEED rating and certification system has become one of the most successful and accepted programs of its kind in the U.S. and has influenced similar international programs. The efficacy of this system is demonstrated by the fact that in just three years (2003–2006) the number of designers that have designed a building with LEED certification went from one in ten to one in five and continues to grow (BDC 2006). As of April 2009, there were nearly 2,500 LEED certified projects and more than 81,000 LEED Accredited Professionals. The USGBC's membership has in fact more than quadrupled since 2000 (USGBC 2009). A study performed by the U.S. General Services Administration revealed that green buildings provide, on average, 13 percent lower maintenance costs, 26 percent less energy usage, and 33 percent lower CO₂ emissions than buildings that are not considered “green” (GSA 2008).

A project delivery method defines the sequence of events, contractual obligations, participant relationships, and specific mechanisms for overseeing time, cost, and quality (Dorsey 1997). However, terms surrounding project delivery methods can be

FIGURE 1. Project Delivery Methods—Contracts and Communications.



confusing and experienced professionals often misuse them. Standardizing the definition the three major components of design and construction contract operations is essential to understanding project delivery and the facts involved in this paper (Molenaar, et al. 2009).

- Project delivery method: the comprehensive process by which designers, constructors, and various consultants provide services for design and construction to deliver a complete project to the owner. Figure 1 synthesizes the models presented in a number of industry documents (Molenaar, et al. 2009) and depicts the three main delivery methods. While names can vary in the industry and owners often create hybrid delivery methods, there are essentially three primary project delivery methods: design-bid-build, construction manager at risk, and design-build.
- Procurement procedure: the process of buying and obtaining the necessary property, design, contracts, labor, materials, and equipment to build a project. The four primary procurement procedures are low-bid, best-value, qualifications-based, and sole-source procurement.

This study focuses on design-build. Design-build is a delivery method that combines the design and construction entities, typically for the purpose of integrating contractor experience into the design, decreasing the schedule duration, and decreasing the number of contractual relationships (ASCE 2000).

While the design-build delivery concept has been in existence for more than two millennia, its use in modern U.S. public contracting is more recent (Beard, et al. 2001). Previous federal contracting laws typically required a separation between the design entity and the construction entity. Additionally, procurement of design services on federal projects

was restricted to only qualifications-based selection by the Brooks Act (Public Law 92-582) while procurement of construction services was restricted to low bid by the Miller Act and numerous public bidding statutes respectively (Cushman and Loulakis 2001, Bartholomew 2002). The first example of design-build delivery occurred in the late 1960's and did not truly become an oft used delivery method in the public sector until 1997 with the amendment of Federal Acquisition Regulations (Beard, et al. 2001). Changes to Part 15 of the Federal Acquisition Regulations allowed for a two part procurement system in which the "best value" to the public is available for the procurement of design-builders (Cushman and Loulakis 2001). Figure 2 shows a spectrum of procurement approaches from low bid to qualifications-based selection.

As noted by Scott et al. (2006), best-value procurement can be disaggregated into four primary concepts: parameters, evaluation criteria, rating systems, and award algorithms. The parameters that encompass best-value procurement can be grouped into categories of cost, time, qualifications, quality and design (or technical approach) (Scott, et al. 2006). Owners score, rate or rank proposers ability to meet project objectives that are defined by the best-value parameters in a project RFP. For example, the ability to shorten the overall project duration may be an important owner objective. By communicating best-value procurement parameters to proposers, an owner can score each separate proposal on the basis of their proposed project duration and make a time-cost tradeoff in its final selection. It is within these best-value parameters that owners communicate sustainable project objectives and define how proposers can provide the best value to the owner.

As the design-build concept utilizing a best-value procurement strategy began to proliferate, so did studies on its performance. One study comparing

FIGURE 2. Procurement Methods.



the performance of delivery methods showed that the design-build delivery method was superior to other delivery methods in terms of time, cost, and quality (Konchar and Sanvido 1998). In addition, a study that evaluated differing procurement systems within the realm of design-build specifically found that best-value procurement performed better than low bid projects in both schedule and cost growth (El Wardani, et al. 2006). A study also investigated the performance of one and two-step best-value procurement and found that the two-step procurement was superior in both cost and schedule growth (Molenaar, et al. 1999). This finding is significant because it showed that the two-step best-value procurement system mandated by the federal acquisitions regulations for public projects was indeed the most effective means of performing best-value procurement.

Integrated design is a key component for effectively delivering LEED rated buildings (Yudelson 2009; Korkmaz et al 2010). While integrated delivery methods are inherently more capable of facilitating integrated design, few if any studies had quantified delivery method trends in the green building sector. A recent study of 230 LEED rated projects found that integrated delivery methods, such as design-build and construction management at risk, are used in 75 percent of projects seeking LEED certification (Molenaar, et al. 2009). Notably, 74 percent of the design-build data points used in this study were publicly funded. While the 2009 study addressed commonalities and potential shortcomings within design-build procurement, a highly focused study on the public sector design-build market was not possible.

As previously stated, best-value procurement uses an RFP process to procure design-build services. This process involves formal solicitations for project delivery services which stipulate the owner's requirements that define the desired outcome of the project. For sustainable projects seeking LEED certification, the RFP documents contain a new set of emergent sustainable selection criteria. By thoroughly examining these emergent criteria, a determination can be made regarding how public sector owners are incorporating sustainability concepts into best-value procurement of design-builders for sustainable public sector projects. Current language trends in procurement documents can show how owners and

designers articulate sustainable objectives both qualitatively and contractually. Furthermore, a study of procurement document language will provide owners, architects, engineers, and constructors with a greater understanding of common trends, potential advantages and pitfalls to avoid when authoring procurement documents for future design-build projects.

RESEARCH APPROACH

The primary objective of this study was to identify current trends in procurement documents for public sector design-build projects in which sustainability was a goal. To objectively identify trends in the language and techniques used to select project teams, a content analysis methodology of solicitation documents was used. A content analysis is defined as, "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Holsti 1969). While content analysis is typically used in social science studies, it is also a proven and effective method for classifying language characteristics and commonalities in construction procurement documents (Gransberg and Molenaar 2004). The documents used in the study were acquired from industry contacts, public construction solicitation websites, and internet search engines. As a controlled sample would be difficult to obtain, the sample was made by convenience (a non-probability sample). The documents are generally representative of the wide variety of sustainable projects within the current public design-build construction market from 2006–2009. While the non-probability sample limits the extrapolations that may be made to industry as a whole, the sample population does provide valuable quantitative and qualitative insight into the current state of the procurement process. The LEED certification level demographics, budget size, and owner classification of the procurement documents analyzed are shown in Table 1. Collectively they represent over \$1.2 billion dollars in vertical construction work from 16 different states.

Project demographics (e.g., location, size, cost, LEED level sought, etc.) were acquired from each RFP. In addition, four categories of interest were identified in a pilot study of the procurement documents:

TABLE 1. Demographics of the Procurement Documents.

Project #	Project Location & Time	LEED Certification Sought	Budget Size (\$)	Project type	Project Size (SF)
1	MS – 2008	Gold	\$16M	Military	70,000 SF
2	MD – 2006	“Cert. or higher”	\$45.5M	Military	140,000 SF
3	TX – 2009	Silver or Better	Not Listed	Local Government	187,000 SF
4	CA – 2009	Silver	Not Listed	Health Care	900,000 SF
5	AZ – 2006	“Basic LEED Stds.”	\$50-70M	Educational	200-260K SF
6	TX – 2006	“Cert. Reqt’s”	\$57M	Educational	150,000 SF
7	CO – 2009	Silver	\$31M	Military	138,000 SF
8	CO – 2009	Silver	\$35M	Military	224,000 SF
9	VA – 2008	Max Level Possible	\$20.63M	Educational	65,000 SF
10	UT – 2009	Silver	\$28.8M	Military	Not Listed
11	OR – 2009	Certified	\$10-12M	Local Government	10,000 SF
12	NC – 2009	Silver	\$19.3M/\$22.3M	Military	21,948/30,979 SF
13	NJ – 2009	Silver	\$40M	Educational	Not Listed
14	GA – 2007	Certified	\$4.1M	Educational	20,000 SF
15	AZ – 2008	*Not Specified	\$7-8M	Educational	29,000 SF
16	CA – 2007	*Not Specified	\$100M	Health Care	115,000 SF
17	CA – 2006	*Not Specified	\$29M	Educational	45,000 SF
18	CA – 2007	*Not Specified	\$32.7M	Educational	48,000 SF
19	CO – 2008	*Not Specified	\$41M	Educational	127,700 SF
20	AK – 2007	*Not Specified	\$6.5M	Local Government	Not Listed
21	CA – 2008	Silver	\$547M	Health Care	Not Listed
22	FL – 2007	*Not Specified	\$7.5M	Health Care	39,000 SF
23	VA – 2007	Silver	\$1.5M	Local Government	Not Listed
24	NM – 2007	Silver	\$10.3M	Local Government	Not Listed
25	NM – 2009	Silver	\$7.9M	Health Center	31,500–53,500 SF
26	OK – 2009	Silver	\$61.6M	Military	275,000 SF
Total:			\$1,235M		2,927,200 SF

*A specific LEED level was not specified in the procurement documents, but the LEED process was discussed.

- LEED related experience of the company/personnel;
- If the certification level (i.e. silver, gold, platinum) was set at the time of procurement;
- If and how specific LEED points or sustainable objectives were communicated; and
- The inclusion of LEED criteria in required project management plans.

Subcategories for the aforementioned areas of interest and a coding system were developed to

quantify the language differences through a pilot study of the procurement documents. The requirement and amount of LEED related experience to both the company and/or specific personnel was found to vary significantly, therefore necessitating three subcategories: quantitative experience requirements, qualitative experience requirements, and no experience requirements. The manner in which the owner communicated the sustainability objectives and goals of the project was also found to vary. This finding necessitated three subcategories: higher

FIGURE 3. Content Analysis Categories and Subcategories.



LEED levels rewarded through procurement, LEED level set at procurement, and LEED level unspecified at procurement. Several solicitation documents mandated explicit LEED points or sustainable objectives to be met. Others were either silent on the topic or presented “suggested” points that were contractually superseded by a performance specification regarding the required LEED certification level to be achieved. Three subcategories were used to delineate differences in this area: specific LEED points required, specific LEED points discussed, and no discussion of LEED points. The incorporation of LEED requirements and submittals into a project management plan was also found to vary. Three subcategories were developed accordingly: management plans required that include LEED objectives, management plans that do not include LEED objectives, and no project management plan required. Figure 3 shows the categories and subcategories that emerged from the content analysis approach. The remainder of this paper discusses the results from this categorization system.

RESULTS

Twenty-six (26) procurement documents were analyzed by content analysis. The content analysis examined each solicitation document through the coding system described in Figure 2. The results of this analysis describe the trends in procuring public sector design-build projects that incorporate sustainable objectives in the best-value procurement.

Experience and Qualifications

The experience and qualifications category represents how owners communicate sustainable experience and qualifications criteria for both company and personnel. The results show that owners are communicating best-value requirements of sustainable design and construction both quantitatively and qualitatively. The results of this analysis category are presented below in Table 2.

Quantitative LEED experience is defined by measurable experience, such as the number of successfully LEED certified projects that the company has completed or the number of projects in which the LEED AP has participated. Other examples found in the content analysis for this category include the number of years experience with the LEED certification process, the number of LEED APs in the company, and the type of experience with a specific LEED certification level (e.g., “...*the LEED AP assigned to the project shall have completed at least one LEED platinum project...*”). Quantitative results most often include statements like “*the selected design-builder must have at least one project that has received a LEED certification, or at least one LEED AP required on the design and construction teams.*”

Qualitative LEED experience is defined by company or personnel experience in implementing LEED sustainable design and development. However, the requirement does not make a quantitative distinction on experience related to LEED. This may include demonstrating experience by means of

TABLE 2. Experience and Qualifications Category Results.

	Company LEED Experience (%)	Personnel LEED Experience (%)
Quantitative	27%	23%
Qualitative	23%	23%
None	50%	54%

past project experience that has implemented LEED sustainable design, or the LEED AP's previous experience itself. A typical qualitative LEED experience requirement found was "...include a list of projects currently underway or completed that demonstrates sustainable LEED experience by including the LEED certification level obtained or expected."

The results for this category show that over half of the projects analyzed do not include LEED experience for the company or personnel, despite the fact that LEED certification is a stated goal of the project. This may indicate that owners do not see the need for LEED experience of the design-builder for the successful delivery of the project. This finding may also be a function of the relatively brief period in which sustainability goals have been included within public sector projects. This relatively brief period could indicate an owner's perception of a lack of experience in the industry or an indication that procurement techniques did not advance as quickly as did the requirements for LEED certification. Regardless of the causal interpretation, this finding represents a significant opportunity often missed by owners for helping make certain that the sustainable aspects of the project are realized.

Quantitative and qualitative experience methods were also used with approximately the same frequency for both company and personnel experience. This indicates that a clear consensus on how to best qualify designers and constructors through sustainable construction experience does not currently exist.

LEED Level Category

The LEED level category was used to determine how owners communicate a desired level of sustainability through the LEED measurement system. In addition, this category also shows if and when own-

ers have a clear definition of the sustainable objectives. The results for this category are presented in Table 3.

The prevalent finding for this category (50 percent) was for the LEED level to be predetermined by the owner. Typical language used in such cases included "...project shall achieve a LEED silver rating..." or similar. However, 15 percent of the projects analyzed provided a baseline LEED level, but included a scored procurement criterion for higher levels than the baseline. This strategy gives the owner an extra sustainability versus cost tradeoff in the proposals they receive and represents a significant opportunity that other owners could potentially adopt. Interestingly, 35 percent of the projects analyzed did not require a LEED level. Proposals in this category often used phrases such as "...the building will achieve a level of LEED certification..." While the project appears to seek certification, the language used to communicate this can only be described as ambiguous.

Ambiguity in the procurement documents analyzed was also present in the required certification process. Several of the projects analyzed contained ambiguous language that did not clearly communicate the intent to certify. For example, a phrase such as "...shall meet the requirements of a LEED silver rating..." versus "...shall achieve USGBC certification at the silver level..." can be interpreted with vastly different outcomes. The first may intend that a silver certification will be achieved by the project but may also mean that the LEED rating system will be used to meet sustainability objectives without certification; thus meeting the "requirements". The second example leaves no doubt that an official certification via the USGBC is the contractual intent.

Other procurement documents specifically used the LEED evaluation system as a measurement for evaluating sustainable aspects of the design and

TABLE 3. LEED Level Category Results.

LEED Level	%
Procurement evaluates higher LEED levels (score or price)	15%
Desired LEED level is set	50%
LEED level is not specified	35%

construction while clearly not seeking official certification (e.g. “...project shall be registered with the USGBC but will not seek certification...”). These findings are perhaps symbolic of a risk-averse attitude by owners towards the third party evaluation system and/or a lack of understanding in how to incorporate the third party evaluation system into the procurement documents. An owner aversion to increased first cost may also explain these findings.

LEED Point Specification Approach

The specification category was designed to capture if and how owners communicate specific LEED points to meet their sustainable goals. Three sub-categories emerged to delineate this information: (1) specific LEED points required; (2) LEED points suggested but superseded by a certification level; and (3) no specific LEED points discussed. The “Specific LEED points required” subcategory is representative of a design specification while the “No specification regarding LEED points” subcategory is representative of a pure performance specification. Table 4 presents the results for this category.

The most common finding for this category (77 percent) was for owners to communicate sustainable objectives by performance; not by discussing specific LEED points. In these cases the performance requirement was most often expressed as a LEED certification level (e.g. “...project shall achieve a LEED certification at the gold level...”). This finding is unsurprising as an inherent benefit of the design-build delivery method is to allow the design-builder to apply different creative and innovative strategies for achieving a specified goal.

Twelve (12) percent of the projects analyzed did require specific LEED points or objectives to be met. This finding indicates that owners sometimes have very specific sustainability objectives (e.g., energy reduction, water use reduction, etc.). How-

ever, some projects discussed specific LEED points that were superseded by a performance specification (a LEED level). While this group represented only 12 percent of the procurement documents analyzed, this finding was somewhat perplexing. It would appear that owners utilizing this method of articulating their sustainable objectives are providing both a design requirement (the specific LEED point) as well as a performance requirement (the certification level). This practice does not seem advisable as doing so potentially introduces a double standard into the specification process. If this were the case, it is likely that the contracting entity may not be held liable for non-certification assuming they meet the design specification thus leaving the owner with a false sense of security regarding the certification liability.

Project Management Plans

Typical project management plans included in design-build RFPs demonstrate how the proposing team will approach certain features of the project that are deemed critical to success. The project management plan category examines how or if sustainable project requirements are included in the proposed work breakdown structure (i.e., organization of discrete work elements) and schedule; an oftrequired selection criterion of the design-builder. Results of this analysis category are presented below in Table 5.

The results of this category indicate that while project management plans are most often a required criteria for the selection of a design-builder, these plans usually do not include a selection criterion that addresses the sustainable aspects of the project (42 percent of the analyzed projects). This represents a missed opportunity on the part of owners, assuming they perceive such plans as an effective tool for ameliorating the project delivery process. The best-value procurement process provides an opportunity for comparing proposed project management plans. Including sustainable project characteristics within these plans provides a means for evaluating the designer/contractor approach for meeting the sustainable project requirements posed by the owner. This method may be most useful at the highest LEED certification levels due to the complex design and construction features that are often required at these certification levels.

TABLE 4. Specification Approach Category Results.

LEED Point Specification Approach	%
Specific LEED points/quantifiable objectives are required	11.5%
Specific LEED points are discussed but are superseded by certification	11.5%
No specification regarding LEED points	77%

TABLE 5. Project Management Plans Category Results.

Project Management Plans	%
LEED Requirements Included in PM Plans	23%
LEED Requirements Excluded in PM Plans	42%
Project Mgmt Plans Not Required	35%

Project management plans that do require the inclusion of sustainable design and construction aspects address the process, quality assurance, and execution of LEED requirements for the project. Several types of project management plans that included sustainable project characteristics were found. The most common type of project management plan requires a LEED approach narrative to determine the team's approach for incorporating, documenting, and obtaining LEED certification. A typical example of this language is "...discuss the process of design and construction for LEED-GOLD..."). A less common but more detailed approach was also found. Such examples required a specific work breakdown structure, schedule, and staffing plan for achieving LEED certification. It is hypothesized that more detailed project management plans may be most appropriate for addressing the complexities associated with high LEED certification levels.

Thirty-five (35) percent of the projects analyzed did not require project management plans of any kind. It is hypothesized that this may simply be due to owner preference towards the use of project management plans or that owners wish to keep proposal costs down, but no clear explanation is available.

CONCLUSIONS

The purpose of this paper is to provide information about green building delivery for owners and design-builders in the public sector in an effort to improve the confidence, efficiency, quality of work, and the overall success. The growing demand for green building has required many aspects of the design and construction industry to change in order to keep up with this demand. While the best-value procurement processes have adapted to accommodate these changes, significant opportunities for improvement still exist.

Communicating sustainable objectives in the public sector design-build market is most often accomplished through a set LEED certification level that usually does not include specific LEED points to be achieved. This practice is viable as many projects are successfully constructed by the use of this technique. However, a significant opportunity for competing higher LEED levels exists. Competition in LEED ratings can be achieved by requiring a base certification level and including a scored criterion in the best-value procurement process for higher certification levels. This allows the creativity of the design-builder for achieving sustainability to be included and could produce higher LEED levels; perhaps at a nominal cost.

A variety of criteria are currently used for measuring previous company and/or personnel experience with LEED projects. However, approximately half of the projects analyzed in this study do not include any procurement criteria to measure the previous design-builder LEED project experience. This finding represents a significant opportunity for vetting design-builders on LEED projects, especially for projects seeking the highest certification levels. While this study does not measure project success, it seems probable that design-builders with LEED project experience will deliver successfully on new projects. However, this suspicion may only be validated with future research.

The majority of projects analyzed in this study included a project management plan, but most plans did not include sustainable objectives. Assuming that the owner perceives the inclusion of project management plans in an RFP as an effective tool for evaluating design-builders, sustainable project objectives could be easily included.

The criteria that are incorporated into the best-value selection of design-builders for sustainable public sector projects should be designed to accommodate the objectives of the individual project. Selecting the design-build team with the highest potential to meet the owner's objectives is crucial to project success. The inclusion of the recommendations noted in this study in the solicitation documents could improve the confidence, efficiency, quality of work, and the overall chance of success of green building delivery.

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