

Managing the Risks of Third-Party Sustainability Certification Failures

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Abstract: The environmental risk levels are on the increase worldwide. As a result, building construction projects have been witnessing a paradigm shift in the way their development plans are approached, with more buildings being designed and constructed to sustainability standards that are higher than those customarily applied for traditional buildings. This experienced change has contributed to adding new challenges to the management of such projects, primarily due to the more stringent specifications being used and certifications sought. As such, the risks pertaining to third-party certification failures rank among the top challenges that arise on a sustainable building project (SBP). This is owing to the importance of certification in terms of materializing an array of projects benefits, including securing capital funding, providing better social publicity, achieving higher market values, and taking advantage of tax incentives. This paper studied SBP certification risks by examining how such risks are addressed through the contract terms and inquiring about the perspectives of concerned professionals as to the approaches being adopted for dealing with these risks. The adopted methodology involved (1) examining relevant contract terms found to be used by three standard contract forms, and (2) conducting a survey study that aimed at reflecting the state of practice in relation to addressing certifications and their related risks. The findings based on the response of participating professionals ranked the preferred approaches that are being followed in the case of certification failure as follows: (1) retaining control by the project owner in dealing with the ensued damages, (2) obliging the participant principally responsible for seeking certification to cure the situation, (3) waiving damages, and (4) applying green liquidated damages. The paper concludes with a proposed framework that can be followed by SBP owners for deciding on the appropriate basket of remedies for dealing with sustainability certification-failure risks. DOI: [10.1061/\(ASCE\)LA.1943-4170.0000407](https://doi.org/10.1061/(ASCE)LA.1943-4170.0000407). © 2020 American Society of Civil Engineers.

Introduction

Together with the technological and economic advancements that are affecting every aspect of human life, new practices are evolving every day. The engineering and construction industry, particularly in connection with the building sector, is undergoing parallel and continuous changes due to many factors, related primarily to the environment, society, and economics (Lam et al. 2010). These changes came about after the end of the twentieth century, when the idea of sustainability started gaining momentum and rapidly spreading, with primary application in the building sector. Today, sustainable buildings—also known as green buildings—are the trend in the industry, and the number of projects involving such applications is increasing steadily (Dodge Data & Analytics 2016). For this research, the term sustainable building project (SBP) will be used to designate a project seeking sustainability certification. This is in line with the definition given for sustainable project development by the US Environmental Protection Agency: “[It] is the practice of creating structures and using processes that are

environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction” (EPA 2016). The term sustainable has been chosen over green because not all green buildings are proven to be sustainable (Aftab Usman 2017).

Under the application of such a relatively novel concept in the building construction sector, new specifications and processes have been developed, which have in return created new risks for project participants to deal with. In 2012, the International Green Construction Code (IgCC) was established as a result of the joint efforts of the International Code Council (ICC) with its collaborating sponsors, including the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), the United States Green Building Council (USGBC), and the American Institute of Architects (AIA). Additionally, rating systems and certification programs were developed to measure the level of sustainability in the development of a project. In that respect, the USGBC created the Leadership in Energy and Environmental Design (LEED) rating system, which certifies projects according to the level at which these projects address issues related to energy, water, and waste, among several other aspects that pertain to sustainability (Perkins 2009). Note that LEED is the number one rating system in North America and one of the most widely used systems worldwide (Kibert 2010).

Risks associated with sustainable building projects are more complex than those related to traditional building projects, and that is the result of the added complexity layer in the planning and execution phases of the former (Perkins 2009). In this regard, new risks are being experienced on sustainable projects, including the failure to achieve third-party certifications, perform as required, control the budget, and secure green materials. Mohammadi and Birgonul (2016) show that the risks related to third-party certification rank first, followed by the legal and contractual risks, then the

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financial risks (including those related to lost incentives), and finally the professional liability risks.

The main reason that the third-party certification risks are top-ranked is that they are key to market-based and performance-based benefits (Matisoff et al. 2014). For instance, when considering LEED certified projects, these projects (1) prove to be more energy and water efficient (despite the disagreement on the extent of such better efficiency), (2) retain higher property values, and (3) benefit from multiple incentives such as receiving tax rebates and zoning allowances (USGBC 2018). In a report by Dodge Data & Analytics (2016), a survey was conducted to identify the benefits of using green building rating systems. The results revealed the following: rating systems provide an ability to create better-performing buildings; provide marketing and competitive advantage; create opportunity to learn about detailed specifications; encourage the use of an integrated design team; provide common language in the industry; and offer local or governmental financial incentives and rebates (Dodge Data & Analytics 2016).

During the last decade, a number of complementary standard contract terms were introduced by professional organizations that specifically address sustainable projects and their risks (DBIA 2010; AIA 2017; ConsensusDocs 2011). However, as such documents have adopted various approaches toward tackling certification risks, it is yet to be learned which approach is (1) better in helping control the certification process risks, and (2) more effective in allowing recovery of losses in case of failure to achieve the targeted sustainability certification objective for a project on hand.

Research Scope and Methodology

The research study presented in this paper focuses on addressing issues related to the third-party certification process as applied to sustainable building projects. It aims to examine and compare the relevant standard contract clauses currently in use and soliciting the perspective of professionals engaged in sustainability-related work as to the measures believed to be more suitable for dealing with sustainability certification risks.

The methodology followed in attempting to achieve the objectives of this research entailed the following steps: (1) comparing the standard terms adopted by the American Institute of Architects, Design-Build Institute of America (DBIA), and ConsensusDocs in relation to sustainability certifications by third parties, (2) conducting a questionnaire survey targeting professionals who have had the chance to deal with SBPs to infer on both the current practices and the professionals' opinions regarding the treatment of certification risks, and (3) contemplating a mechanism that can inform owners of the array of options that are potentially available for controlling the risks of third-party certifications for SBPs.

Standard Contract Language for Sustainability Certification

Sustainable building projects continue to be a rapidly evolving area of interest in the construction industry. Accompanying such an evolution are new risks and responsibilities for project participants, namely including owners, architects, and contractors (AIA 2013). Multiple standard contract documents have been devised in order to meet the requirements of SBPs, especially in relation to the achievement of third-party certification. This section examines the SBP-related contract documents drafted by the AIA, ConsensusDocs, and DBIA, with a particular emphasis on the respective approaches that are adopted for dealing with the failure to achieve desired or targeted certification.

AIA E204: Sustainable Projects Exhibit

The AIA has been a leading entity in keeping up with the growth of the sustainable buildings market, and it has pioneered the development of new contract standards specifically tailored for SBPs. Accordingly, the AIA released its guide for sustainable projects in 2011 and its first set of sustainable projects versions of key 2007 AIA contract documents in 2012 (AIA 2013). These were followed by the release of "E204: Sustainable Projects Exhibit" in 2017 (AIA 2017).

This updated AIA's standard document states that no party can ensure for the owner the achievement of the sought third-party certification, as such an endeavor is dependent on many factors that may be out of the control of any of the main concerned project participants. To this end, this exhibit clearly stipulates in Section 6.1 that, "The Owner, Contractor and Architect acknowledge that achieving the Sustainable Objective is dependent on many factors beyond the Contractor's and Architect's control, such as Owner's use and operation of the Project; the work or services provided by the Owner's other contractors or consultants; or interpretation of credit requirements by a Certifying Authority. Accordingly, neither the Architect nor the Contractor warrant or guarantee that the Project will achieve the Sustainable Objective."

Moreover, Article 5 specifies a mutual waiver of claims among the parties for consequential damages in the case of failure to achieve the sustainable objective or one of the sustainable measures, as follows: "The Owner, Contractor and Architect waive claims against each other for consequential damages resulting from failure of the Project to achieve the Sustainable Objective or one of the Sustainable Measures."

This type of language, expressing an explicit waiver, clearly protects the interests of the architect and contractor, but not necessarily those of the owner. That is, any owner who is consciously keen on achieving such an intended certification would prefer some type and level of recovery or remedy. This is particularly relevant for owners where such sustainability-related certification is actually required by law, as the case is nowadays in many cities across the United States (Everblue 2019).

ConsensusDocs Guidebook 310: Green Building Addendum

The addendum document published by ConsensusDocs in 2011 represents a similar source also addressing sustainability objectives and certification issues (ConsensusDocs 2011). This reference, "ConsensusDocs 310—Green Building Addendum" (referred to subsequently as GBA), has gained a widespread use as an SBP contract document, owing to the different approach adopted toward SBP-related issues. That is, this addendum is unique in that it introduces the role of a green building facilitator (GBF) and enables the application of a limited recovery mechanism for consequential damages (CD).

As for the GBF designation, it represents a unique ConsensusDocs feature, portraying a varied dimension for assigning the responsibility for dealing with the SBP certification process. The GBA views the GBF as a role that may be designated to any party except the owner; therefore, it can be performed by the architect/engineer, contractor, construction manager, or a third-party consultant. Article 4 of the GBA specifies the details and limits of the GBF responsibility. In that respect, it is stated under Section 4.5 that, "The GBF shall coordinate and facilitate the process of obtaining the Elected Green Status, including identifying Green Measures, alternatives and providing such other services, advice and guidance as provided in this Addendum. The GBF is not, however, assuming the role or responsibilities of the Design Professional, who shall retain

responsibility for the design of the project and other services to be performed by Design Professional.”

As a result, the GBA states in Section 8.3 that the GBF will be the only party “liable or responsible for the failure of the Elected Green Measures to achieve the Elected Green Status or intended benefits to the environment or natural resources” including failure of the project to achieve an intended third-party certification (ConsensusDocs 2011).

As for the recovery mechanism, ConsensusDocs GBA gives the owner the option of including SBP-certification damages in any recovery clause stipulated in the general conditions document between the owner and the GBF. This is mentioned in Section 8.2 of the GBA alongside the waiver of consequential damages (ConsensusDocs 2011):

Owner’s loss of income or profit or inability to realize potential reductions in operating, maintenance, or other related costs, tax, or other similar benefits or credits, marketing opportunities and other similar opportunities or benefits, resulting from failure to attain the Elected Green Status or intended benefits to the environment, shall be deemed consequential damages subject to any applicable waiver of consequential damages in a Governing Contract unless specifically excluded from such a waiver in the Governing Contract. Liability and limits of the liability of GBF, Design Professional and Contractor, if and to the extent applicable, shall be as set forth in the Governing Contract between Owner and GBF, and are neither expanded nor diminished by this addendum.

For instance, considering the “ConsensusDocs Document 200: Standard Agreement and General Conditions between Owner and Constructor” (ConsensusDocs 2019), the GBA affords the owner the option of including certification damages within liquidated damages (LD), as specified in “Section 6.5: Liquidated Damages.” This section lists LD for substantial completion (Subsection 6.5.1) and final completion (Subsection 6.5.2), which are both duration or time sensitive. However, the means for applying green LD are not specified, and it is thus kept for the parties to decide on the way that is suitable for incorporating such an additional form of LD. As for the consequential damages for failing to achieve SBP certification, ConsensusDocs Document 200 states in “Section 6.6: Limited Mutual Waiver of Consequential Damages” that all CD are waived except those included within Section 6.5 as LD, those covered by insurance required by the contract document, and those excluded within this section, as follows (ConsensusDocs 2019): “Except for damages mutually agreed upon by the Parties as liquidated damages in 6.5 and excluding losses covered by insurance required by the Contract Documents, the Parties agree to waive all claims against each other for any consequential damages that may arise out of or relate to this Agreement, except for those specific items of damages excluded from this waiver as mutually agreed upon by the Parties and identified below. . . . The following are excluded from this mutual waiver: [____].”

This makes the GBA terms a more favorable option for owners seeking better control over the process of achieving their project’s targeted certification.

DBIA Sustainable Project Goals Exhibit

Similar to the previously discussed exhibit and addendum adopted by the AIA and ConsensusDocs, respectively, the DBIA has also developed its own exhibit targeting SBPs (DBIA 2010). This Sustainable Project Goals Exhibit (SPGE) by the DBIA can be regarded as unique in that it incorporates, under Article 4, a full

section on remedies that can be enforced in case an SBP fails to achieve the intended sustainable goal.

The DBIA’s SPGE describes in Section 4.2 of its “Article 4: Remedies” three approaches for dealing with the failure to achieve the sustainable goal or certification. The first is a waiver of claims by the owner toward the design-builder under which such failure is not considered a breach of the contract. The second is to agree on a fixed amount of liquidated damages in case of the project’s failure “to achieve other sustainable standards as are identified, or as required by the Legal Requirements, provided the Owner has fully satisfied its obligations in relation thereto” (DBIA 2010). This provision further stipulates that the design-builder “shall not be liable for any other related damages including, but not limited to, consequential damages.” The third method, for dealing with an SBP certification failure, is to agree that the design-builder shall be responsible for curing such failure. In this regard, the DBIA’s SPGE states that this is to be accomplished “through the addition, replacement, or correction of materials, configurations, systems, or equipments in order to obtain the level of LEED certification indicated above and/or to satisfy or achieve other sustainable standards as are identified, or as required by the Legal Requirements” (DBIA 2010). Furthermore, in order to facilitate or control the implementation of this type of remedy, the exhibit clearly identifies three limits to choose from: (1) any contingency balance remaining in the design-builder’s guaranteed maximum price (GMP) contract, (2) the design-builder’s share of the savings considering that the GMP is not reached, or (3) a fixed sum agreed upon by the parties (Prum and Del Percio 2010).

Comparison among Relevant Standard Clauses

The previous discussions of the examined contract standards reveal that a number of alternative approaches are available for treating the case of SBP certification failure. Fig. 1 summarizes how the three reviewed special documents deal with the assignment of responsibility for achieving SBP certification and the consequences and/or remedies that may be applicable in the case of failure to achieve the intended sustainability objectives.

Contrary to the approach adopted in the AIA’s SPE, the Consensus’ GBA and the DBIA’s SPGE make an explicit designation of the participant responsible for achieving the targeted certification. In this respect, whereas this responsibility is placed with the design-builder in the case of the DBIA’s SPGE, this assignment—under the Consensus’ GBA—goes to a facilitating entity, other than the owner’s organization. To this end, while this facilitation role can be entrusted with one of the traditional project participants (either the designer or the contractor), this role may also be fulfilled through the construction manager or another third-party consultant who is not involved in, and will not therefore be responsible for, design and/or construction.

As for the certification-failure consequences or remedies, three classes are encountered, namely (1) a full waiver by the owner of all damages, as allowed under the AIA and DBIA terms; (2) liquidated damages that are excluded from a consequential damages waiver in the governing contract, as stipulated under the ConsensusDocs and DBIA terms; and (3) a cure to be implemented according to the DBIA conditions by the design-builder, up to a monetary limit that can be set using one of the three offered options of contingency balance, fixed sum, or GMP saving. It is evident that the AIA’s approach goes to the extreme in protecting the architect and the contractor from losses related to SBP-certification failure, leaving the owner with no instrument for ensuring the achievement of their set sustainable objective. Such protection can be compromised through possible LD recovery by the owner in case either of them

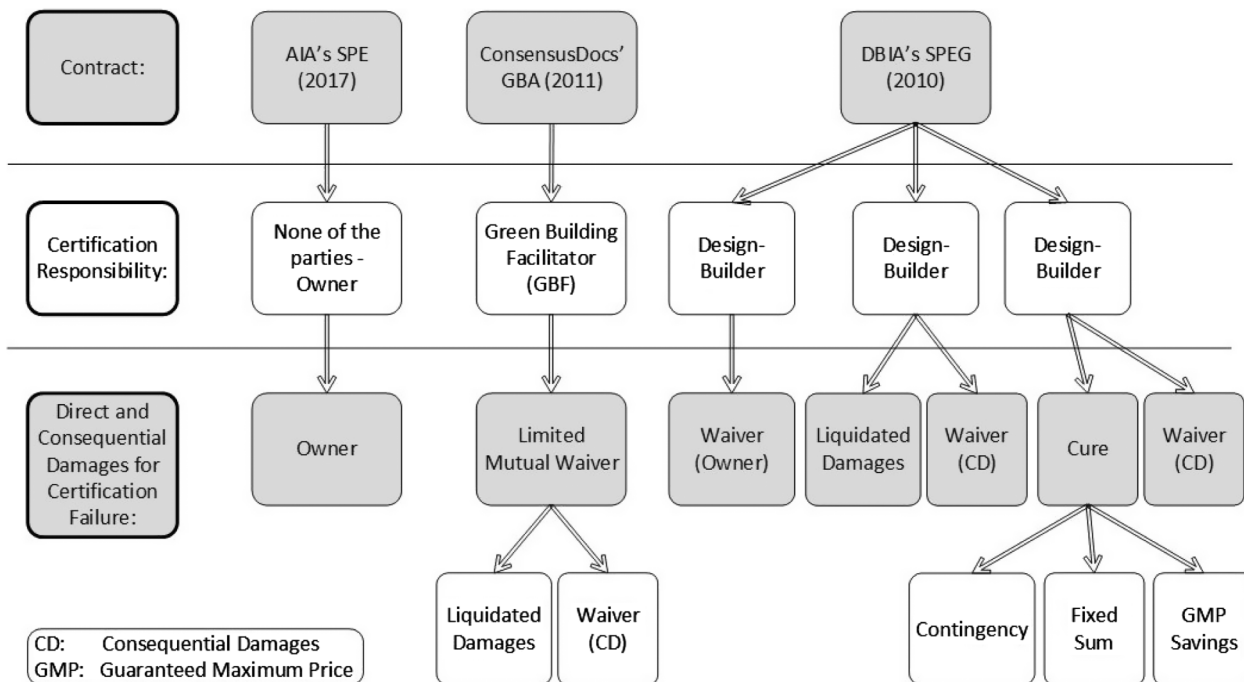


Fig. 1. Alternative standard contract approaches for treating SBP-certification risks.

is designated as the GBF, as per the ConsensusDocs' GBA terms. Alternatively, this risk is shifted to the construction manager or another third-party consultant, if so appointed by the owner to assume this GBF role. Finally, the design-builder, under the DBIA's SPEG terms, can be carrying the certification-failure risks, whether in the form of LD or additional costs that are necessary for curing the suffered failure.

In summary, the three examined standard SBP-related documents by the AIA, ConsensusDocs, and DBIA do greatly differ, with regard to both (1) specifying the participant responsible for achieving the sustainable objective, and (2) the measures to be taken in case of failure. Owners have the discretion of deciding which approach can be more viable or even practical, depending on the project conditions, own goals, and own perception of the factors likely to be affecting the achievement of the intended certification.

Practitioners' Perspective on Certification Failure Remedies

The previous section offered a comparative analysis of the contract language, by three national standard contract documents, used in support of addressing the responsibility assignment for achieving third-party sustainability certification and the possible liability exposure accompanying such an assigned role. This part of the paper is dedicated to discussing solicited industry-based insights as to the associated practices currently in use. As such, the findings of a questionnaire survey that was administered online for the previously indicated purpose are discussed, and a summary of the practitioners' received responses and raised recommendations is presented.

Questionnaire Structure and Targeted Professionals

The performed online survey was based on a questionnaire consisting of seven questions, three of which are related to the occupation and SBP involvement of respondents whereas the other four address the SBP contractually-related aspects or measures. As such,

the questionnaire revolved around (1) the respondent's profession, (2) degree of involvement in SBPs, (3) years of experience on SBPs, (4) types of standard contracts used on SBPs, (5) the party made responsible for obtaining the third-party certification, (6) the approach followed in case of failure to achieve the intended certification, and (7) problems faced and/or suggestions proposed by the responding professional that might help in improving the contractual language pertaining to certification-seeking SBPs.

The survey targeted LEED Accredited Professionals (APs) who—according to USGBC—are experts in implementing sustainability criteria in the building construction sector. LEED was chosen due to its importance worldwide, being the most widely used rating system across the globe. To reach out to LEED APs, the USGBC's website was utilized where information about all registered users can be found. Two filters were applied on the People page containing all the names, in order to target the right base. Of interest were the credentials achieved (i.e., being a LEED Accredited Professional in any major) and the domain of work (i.e., being related to contracts). The first filter was built-in on the page while the second was accessed by keying the word "contract" in the Search bar, resulting in highlighting those LEED APs with the word "contract" appearing in their USGBC profile.

By applying the two aforementioned filters, a total of 202 profiles were shown, and their emails were retrieved into a datasheet. The distribution of the questionnaire and collection of responses were administered using the online survey tool by SurveyMonkey. The survey was circulated on a Friday, and it was kept open for 5 days. Upon the expiration of this 5-day period (inclusive of a weekend), a total of 50 responses were in total recorded, reflecting a fair response rate of 25%.

Received Questionnaire Feedback

The received responses were carefully reviewed and analyzed, and various indicative results were generated. The following subsections present and discuss the survey findings along each of the concerned questions that formed the basis of this inquiry.

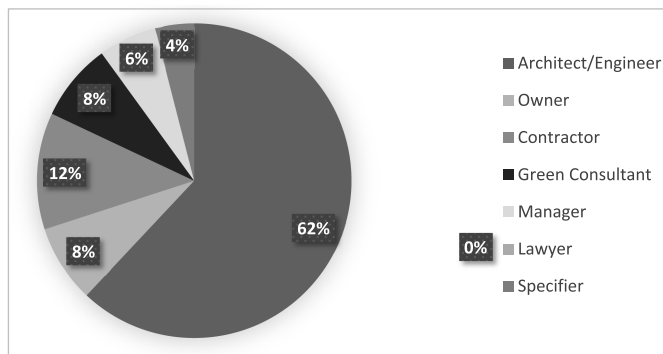


Fig. 2. Profession of participating LEED APs.

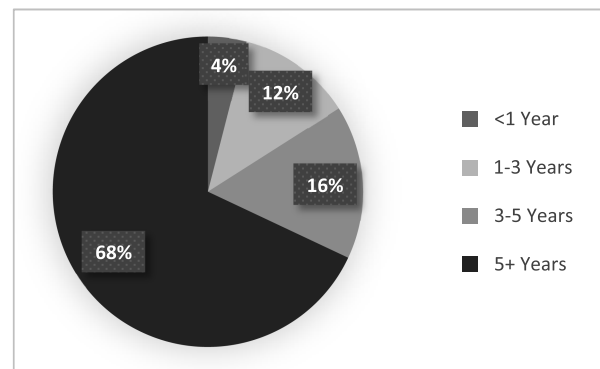


Fig. 4. Length of experience in SBPs.

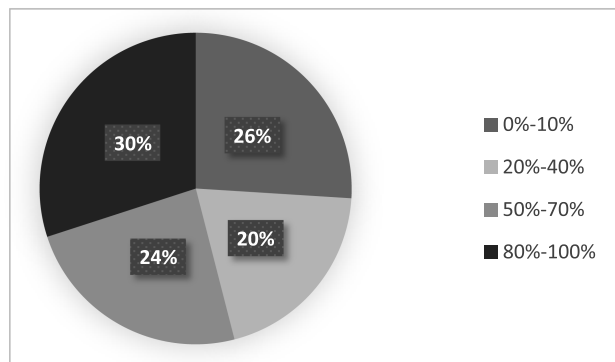


Fig. 3. Respondents' level of involvement in SBPs.

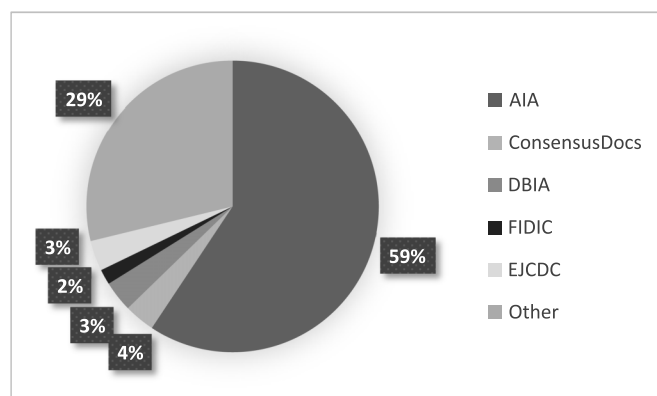


Fig. 5. Distribution of adopted standard SBP-related contract documents.

Profession of Responding LEED APs

The received responses show that 62% of the participating LEED APs came either from the architecture or engineering disciplines, as shown in Fig. 2. Participants from the contracting sector represented 12%, while the owner and green consultant groups contributed with 8% each. The manager and specifier groups had 6% and 4% shares, respectively, with no representation recorded for the lawyer group. The high percentage of participating architects/engineers could be an indication of the higher responsibilities traditionally assigned to these professionals in the implementation of sustainability programs.

Level of Involvement in SBPs

The participating LEED APs were asked to assess their levels of involvement in SBPs by selecting one of four classes that were designed based on a 10% increment between any two successive values. The results depicted in Fig. 3 reveal that an almost uniform distribution of participants can be observed among the four classes. The indication is that not all respondents exclusively work in the field of SBPs, and almost one-quarter (26%) of the respondents actually have a very low level (0%–10%) of involvement in SBPs.

Years of Respondents' Experience in SBPs

Years of experience in SBPs are indicative of the length of exposure that the responding LEED APs have had to SBPs, which in turn reflects the depth of expertise inherent in their expressed opinions. Fig. 4 displays the distribution of years of experience among the four adopted classes. The selected ranges were decided on while taking into account the importance of knowing the percent of respondents with less than 5 years of experience and their breakdown within this range.

The results indicate that the majority (68%) of the participating LEED APs had more than 5 years of experience in SBPs, allowing the establishment of reasonable confidence in the reliability of the received responses. Only 4% of the respondents happen to have been entry-level professionals, at least in terms of their exposure to SBP assignments, with less than 1 year of such exposure.

Contract Document Used on SBPs

The surveyed LEED APs were asked to give feedback as to the contract documents that were used on the SBPs, which they have had exposure to or been involved in, inclusive of specifying the name of the organization for any standard such documents. The results, presented in Fig. 5, show that the AIA standard contract documents received the highest reliance frequency (59%). The other standard contract documents by the ConsensusDocs, DBIA, Engineers Joint Contract Documents Committee (EJCDC), and International Federation of Consulting Engineers (FIDIC) had far less percentages, averaging around 3% each. The Other category, with a frequency of 29%, included documents such as "State of Texas Contracts & Forms," those by the Ontario Association of Architects, and custom-drafted contracts. The exceptionally high reliance on the AIA documents can be explained by the fact that AIA has had the lead (since 2007) in addressing sustainability requirements as part of their frequently updated basket of standard documents.

Responsibility for Obtaining Certification

As for enquiring about the project participant made responsible for achieving the intended third-party certification, the surveyed

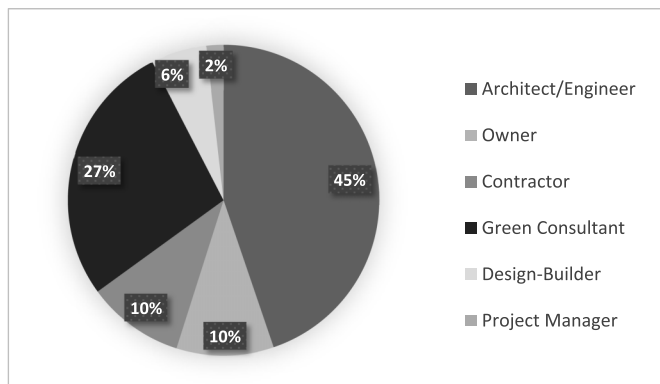


Fig. 6. Reported certification responsibility assignments.

professionals were asked to respond to the following question: “According to the contract documents used, who was directly responsible for obtaining the third-party certification (i.e., LEED, BREEAM, etc.)?” Fig. 6 summarizes the obtained responses, indicating that the architecture/engineering design consultant was the entity entrusted with the achievement of certification with a frequency of 45%. The second highest frequency (27%) was reported for the green consultant, followed by a modest frequency of 10% for the contractor. A similar frequency (10%) was expressed by the respondents to the effect that the owner was the party responsible for getting the project certified. Finally, the last two reported project participant choices were the design-builder and the project manager (PM), with 6% and 2%, respectively.

The observations suggest that design consultant has been the most preferred choice for championing the achievement of targeted certifications. When such a choice was not made, the green consultant, presumably of technical competencies equivalent to those of the design consultant, was selected for this critical role. Furthermore, the share of the contractor (including the case where the contractor was performing as a design-builder) was limited to only 16% of the reported certification-responsibility assignments. Finally, it is clearly evident that such a responsibility assignment, when falling onto the shoulders of a third-party project participant (outside the league of those responsible for design and/or construction), has been largely leaning toward specialized green consultants rather than project management professionals.

Certification Remedy Approaches

The certification remedy approach was a major enquiry in the administered questionnaire, as it aimed at identifying the remedial/recovery approaches followed on projects for which a third-party certification was pursued and failed. This was done by posing the following question: “According to the contract documents used, if the party responsible for achieving the intended certification fails, what would the remedy/consequence be?” The respondents were asked to choose what they view to be the top two out of the four scenarios that were identified and discussed in the previous section. As shown in Fig. 7, the choices listed for respondents to choose from were as follows:

- The owner is responsible for pursuing certification;
- Waiver of certification failure damages is explicitly expressed in the contract with the participant responsible for certification;
- Cure is specified as a remedy for certification failure; and
- Liquidated damages recovery is stipulated as a consequence of certification failure.

Note that the four aforementioned options represent two general classes of remedy: no action exercised by owner (the first two options), and a form of remedy expected by owner (the other two options). That said, and given that the length and level of experience individually enjoyed by the targeted LEED APs were not known beforehand, it was felt that requesting a potential respondent to state the top two options rather than give a ranking of all four options may be an easier and more objective task. Accordingly, the percentages reported in Fig. 7 reflect a ranking based on the frequency of each given option having been stated to be one of the top two options encountered by the respondents. The received feedback reveals that the frequency of owners retaining the responsibility for pursuing certification is around 40%, as compared to about 60% for the combined frequency (of 21%, 27%, and 13%) of such responsibility being assigned to other SBP participants. For one-third of the latter group (21% of the total reported responses), the party in charge of registering and documenting a project for certification was not made responsible for remedying the situation in case of failure, and as such a waiver of damages was in place. In the case of the remaining two-thirds (40% of the total reported responses), cure and green LD were specified as a remedy or consequence for not achieving certification, with corresponding frequencies of 27% and 13%, respectively. Note that, when the owner was responsible for certification or—alternatively—a waiver of damages was in place, it shall not be precluded that the owner, contrary to doing nothing, might have been able to recover from insurance and/or attempt to cure failure at their own cost.

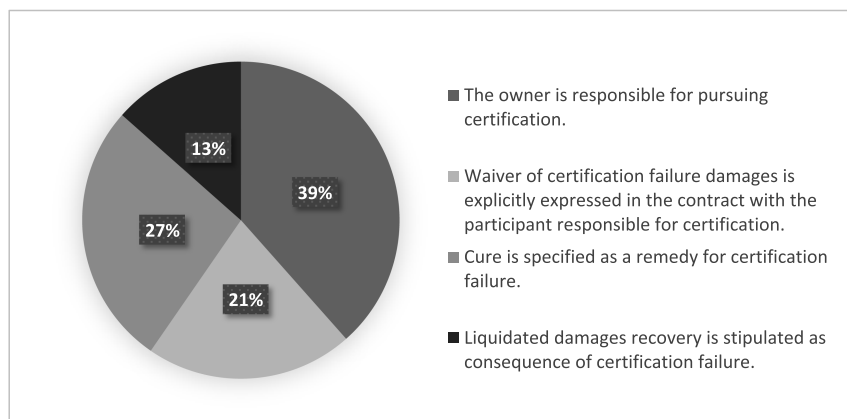


Fig. 7. Reported certification remedy or consequence.

Recommendations Offered by Respondents

The questionnaire incorporated an open-ended query through which propositions and recommendations for, or problems encountered on, SBPs was solicited from the surveyed LEED APs. To this end, the respondents' replies were in reaction to the following question: "What suggestions or problems would you like to share, in order to improve the contractual language used for sustainable building projects seeking certification (e.g., LEED, BREEAM, etc.)?" A total of 27 out of the 50 responding LEED APs provided some feedback in reply to this question, but five respondents answered with the word "none," thereby ending with a total number of effective responses of 22. These are fully documented in Table 1, along with the information corresponding to the occupation, years of experience, and level of SBP involvement of the concerned respondents. In the last column of Table 1, deductions are made in connection with the several comments or recommendations raised under the 22 effective responses. Note that in this case the attempt is merely to adopt common semantics for representing the respondents' remarks. It is also observed that more than 70% of these concerned respondents (16 out of 22) have at least 5 years of experience in SBPs. Moreover, about 60% of them (13 out of 22) are architecture/engineering design consultant professionals, with five or more years of experience in SBPs at the highest considered level of involvement of 80%–100% of their time.

A total of 20 distinct deductions were made, which had varying frequencies of applicability to the recorded comments and recommendations. All 20 deductions are presented in Table 2, according to their descending order of frequency. The total count of applicability frequency is 40, 25% of which (11 out of 40) are attributed to the need for (1) creating a sustainability plan delineating the responsibilities of all involved parties, with an applicability frequency of six; and (2) promoting and sustaining a collaborative work environment among all parties involved in attempting to meet the certification requirements, with an applicability frequency of five.

A careful analysis of the made deductions allowed their classification according to several aspects that are related to project and contract management. To this end, seven relevant classes emanated (Table 2), and these are summarized as follows: (1) planning and organizing, (2) project brief, (3) budgeting, (4) team building, (5) contract documents, (6) contract terms, and (7) control.

The proposed comments and recommendations and the corresponding inferred deductions, which hint to the need for instating proper *planning and organizing* for SBPs, call on the part of the SBP owner to:

- Create a sustainability plan delineating the responsibilities of all involved parties;
- Have proper understanding of, and improve proficiency in implementing, LEED certification requirements;
- Incorporate credit reserves in planning for the intended certification;
- Entrust green documentation tasks with the specialized green consultant; and
- Entrust building commissioning tasks with a third-party participant reporting to the owner.

On a related track, the owner shall be expected to account for sustainability requirements within the project development criteria and the owner's project requirements, as these shall be well elaborated early on as part of the *project brief*. Similarly, accounting for sustainability requirements within the project budget is an equally critical task to be duly observed by the owner when *budgeting* for an SBP. In addition, *team building* was emphasized through several comments, insinuating the necessity of "promoting and sustaining a collaborative work environment among all parties involved in attempting to meet the certification requirements," a deduction that

has received the second highest applicability frequency of five. When producing the *contract documents* by the project team, it has been recommended that sustainability requirements be incorporated as an integral part of the project specifications, as these are developed under the leadership of the architecture and engineering design consultant. In regard to *contract terms* that can be adopted by owners, three deductions have surfaced, to the effect of making construction progress payment certifications contingent on the fulfillment of sustainability submittal and update requirements, waiving certification failure damages in the design services agreement, and specifying the recovery of green LD in respect of certification failure. Finally, several deduced recommendations are found to address steps related to *control*, which require of the owner to:

- Be transparent about the awarded design-related credits and construction-related credits remaining to be achieved;
- Incorporate sustainability activities and milestones as an integral part of the construction schedule;
- Make sustainability progress and updates a constant item on the construction progress meeting's agenda;
- Recognize the impact of cost-cutting budget control measures on the chances of achieving targeted sustainability certification, through a combined cost/certification checklist;
- Ensure procurement of compliant products by the contractor; and
- Incentivize designers and builders through savings shared at the expiration of a stipulated performance payback period, which in turn can be the result of the owner's commitment and control also being driven through similar performance-based payback incentives, as these can be extended by the regulating authorities.

Certification Failure Risk Treatment

Based on the reviewed standard contract forms, the questionnaire survey feedback, and the analyses of both, as presented in the previous sections, it can be observed that an SBP owner has four main approaches at their disposal for treating certification failure risks. These are as follows:

1. Choosing to retain the responsibility for achieving certification to its own organization; and
2. Assigning such responsibility to others, while opting for one of the following mechanisms for dealing with the consequences of certification failure:
 - a. Waiving certification failure damages,
 - b. Curing certification failure, or
 - c. Stipulating green liquidated damages.

This section provides a brief comparison of the aforementioned approaches. The outcomes of the performed comparison then feed into a conceptualized framework delineating how the adoption of these approaches and their inherent recovery and/or remedy options may possibly be considered by an SBP owner.

Comparison of Remedy Approaches

As discussed previously, in relation to the frequency distribution depicted in Fig. 7, the feedback received for the 50 participating LEED APs revealed that owners often retain the responsibility for pursuing certification, with a frequency of 39%. The second most adopted approach (27%) is reported to be that which requires the incurred certification failure to be cured. The other two approaches involving waiver of damages and green LD recovery, pertaining to the case where certification responsibility was not that of the owner (similar to the conditions underlying the cure option), had 21% and 13%, respectively. A comparison of these possible risk treatment

Table 1. Summary of comments and recommendations raised by the responding LEED APs

Respondent occupation	Years of experience	Level of involvement in SBPs (%)	Raised comments/recommendations	Deductions related to project and contract management practices
Design consultant (1)	≥5 years	80–100	<ul style="list-style-type: none"> • “It [sustainability objective] should be tied to building code” and “any criteria exceeding this should be an owner[’s] driven criteria as it affects project cost.” 	<ul style="list-style-type: none"> • Account for sustainability requirements within the project development criteria • Account for sustainability requirements within the owner’s project requirements • Account for sustainability requirements within the owner’s project budget
Design consultant (2)	≥5 years	80–100	<ul style="list-style-type: none"> • “Incorporate certification checklist in contract specifications. LEED has design and construction credits. Show design credits awarded and construction credits to be achieved.” • “Include sustainability milestones in construction schedule.” • “Require sustainability submittals and updates as a requirement [prerequisite] for construction progress payments.” • “Include sustainability progress as a mandatory construction meeting agenda item.” 	<ul style="list-style-type: none"> • Incorporate sustainability requirements within the designer’s developed specifications • Be transparent about the awarded design-related credits and construction-related credits remaining to be achieved • Incorporate sustainability activities and milestones as an integral part of the construction schedule • Make construction progress payment certifications contingent on the fulfillment of sustainability submittal and update requirements • Make sustainability progress and updates a constant item on the construction progress meeting’s agenda
Design consultant (3)	≥5 years	80–100	<ul style="list-style-type: none"> • “Typically[,] there are many cost-cutting measures at the end of contract documents [preparation] that can impact the level of LEED certification the project can achieve.” • “A parallel cost estimating and LEED certification check-list would be beneficial for the client to understand the direct relationship.” • “LEED certification is an expensive process in itself[,] and the material/recycling/ construction methodology is typically more expensive.” • “We are finding clients want LEED friendly construction but don’t want to pay for the LEED costs.” • “Some clients are leaning toward using ‘One Planet’ type guidelines that are free and more flexible to implement.” 	<ul style="list-style-type: none"> • Account for sustainability requirements within the owner’s project budget • Recognize the impact of cost-cutting budget control measures on the chances of achieving targeted sustainability certification, through a combined cost/ certification checklist
Design consultant (4)	≥5 years	80–100	<ul style="list-style-type: none"> • “Follow the LEED recommendation[s].” 	<ul style="list-style-type: none"> • Have proper understanding of, and improve proficiency in implementing, LEED certification requirements
Design consultant (5)	≥5 years	80–100	<ul style="list-style-type: none"> • “Require at least three credits as backup to ensure certification level is achieved.” 	<ul style="list-style-type: none"> • Incorporate credit reserves in planning for the intended certification
Design consultant (6)	≥5 years	80–100	<ul style="list-style-type: none"> • “Make green consultants responsible for green documentation.” 	<ul style="list-style-type: none"> • Entrust green documentation tasks with the specialized green consultant
Design consultant (7)	≥5 years	80–100	<ul style="list-style-type: none"> • “Responsibility should be equitably assigned across the parties [involved] without one undermining the others.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties • Promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements
Design consultant (8)	≥5 years	80–100	<ul style="list-style-type: none"> • “Green building certification is a shared responsibility that all parties are responsible for, including the owner/operator.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties • Promote and sustain a collaborative work environment among all involved parties
Design consultant (9)	≥5 years	80–100	<ul style="list-style-type: none"> • “Contract should clearly describe owner intent.” • “We often struggled with the owner part of obtaining the certification.” 	<ul style="list-style-type: none"> • Account for sustainability requirements within the project development criteria • Account for sustainability requirements within the owner’s project requirements • Account for sustainability requirements within the owner’s project budget

Table 1. (Continued.)

Respondent occupation	Years of experience	Level of involvement in SBPs (%)	Raised comments/recommendations	Deductions related to project and contract management practices
Design consultant (10)	≥5 years	80–100	<ul style="list-style-type: none"> • “In the end, the achievement of certifications is not wholly in the control of the design team.” • “Active participation is necessary from both the owner and the constructor.” • “This being the case, our contracts state that we are to ‘design to meet the requirements of [targeted] certification’ rather than obligating us to actually achieve the certification. It is an important nuance to the owner-architect agreement that shouldn’t be overlooked.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties • Promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements • Waive certification failure damages in the design services agreement
Design consultant (11)	≥5 years	50–70	<ul style="list-style-type: none"> • “It [sustainable objective] should be phrased as an essential/functional aspect of buildings design rather a nice-to-have addition.” 	<ul style="list-style-type: none"> • Account for sustainability requirements within the project development criteria • Account for sustainability requirements within the owner’s project requirements
Design consultant (12)	1–3 years	80–100	<ul style="list-style-type: none"> • “Contractor [shall be] responsible for procuring compliant products.” 	<ul style="list-style-type: none"> • Ensure procurement of compliant products by the contractor
Design consultant (13)	1–3 years	50–70	<ul style="list-style-type: none"> • “Be clear/specific from the start and within the contract documents what is expected from all parties.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties
Contractor (1)	≥5 years	80–100	<ul style="list-style-type: none"> • “Incorporate the expectations into the contract.” • “Be open to discuss [the requirements] with the contractor.” • “Understand that part of the certification depends on the facilities/procurement team.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties
Green consultant (1)	≥5 years	80–100	<ul style="list-style-type: none"> • “The owner cannot be swayed by the construction contractor to reduce costs that are not fully vetted by the project team including the sustainability consultant.” 	<ul style="list-style-type: none"> • Create a sustainability plan delineating the responsibilities of all involved parties
Green consultant (2)	3–5 years	80–100	<ul style="list-style-type: none"> • “Require building commissioning by a third party reporting to the building owner.” 	<ul style="list-style-type: none"> • Entrust building commissioning tasks with a third-party participant reporting to the owner
Project manager (1)	≥5 years	50–70	<ul style="list-style-type: none"> • “Payment or LD should be tied to successfully achieving certification based on the design documents/intent.” 	<ul style="list-style-type: none"> • Make payment certifications contingent on the fulfillment of sustainability submittal and update requirements • Specify recovery of green LD in respect of certification failure
Project manager (2)	≥5 years	0–10	<ul style="list-style-type: none"> • “Certification should always be ‘attempted’[, but] never guaranteed.” 	<ul style="list-style-type: none"> • Waive certification failure damages
Project manager (3)	3–5 years	0–10	<ul style="list-style-type: none"> • “Construction Specifications Institute MasterFormat Sections 01 35 63 for Sustainability Certification Project Requirements, 01 35 66 for Sustainability Certification Project Procedures, 01 81 13 Sustainable Design Requirements, and 01 91 00 Commissioning should be of equal importance in the contract documents.” 	<ul style="list-style-type: none"> • Incorporate sustainability requirements within the designer’s developed specifications
Owner (1)	≥5 years	80–100	<ul style="list-style-type: none"> • “As a rule, LEED certification is a goal and cannot be guaranteed.” • “Rather than assess damages, we find as an Owner that it is better to resolve problems collaboratively.” 	<ul style="list-style-type: none"> • Promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements • Waive certification failure damages
Owner (2)	≥5 years	20–40	<ul style="list-style-type: none"> • “Nothing in our contracts would penalize our consultants if they were to fail certification. This[,] however[,] has never happened[,] and due to our close relationship, we don’t feel the need to change our contracts.” 	<ul style="list-style-type: none"> • Promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements • Waive certification failure damages

Table 1. (Continued.)

Respondent occupation	Years of experience	Level of involvement in SBPs (%)	Raised comments/recommendations	Deductions related to project and contract management practices
Owner (3)	1–3 years	0–10	<ul style="list-style-type: none"> • “Use some type of performance-based payback stipulation to incentivize owners to make the frontloaded investment in sustainable building (possibly with qualifications related to grant/government financial assistance [that] the owner would be required to obtain, changes in public utility rates, proper maintenance, contractor installation compliance, etc.).” • “Incentivize designers/design-builders/general contractors to enter contract by some type of shared savings at conclusion of agreed upon payback period based on building performance.” 	<ul style="list-style-type: none"> • Drive owner’s commitment and control through performance-based payback incentives • Incentivize designers and builders through savings shared at the expiry of a stipulated performance payback period

Table 2. Applicability frequencies of made deductions and their grouping

No.	Deductions related to project and contract management practices	Frequency	Deduction categories
1	Create a sustainability plan delineating the responsibilities of all involved parties	6	Planning and organizing
2	Promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements	5	Team building
3	Waive certification failure damages in the design services agreement	4	Contract terms
4	Account for sustainability requirements within the project development criteria	3	Project brief
5	Account for sustainability requirements within the owner’s project requirements	3	Project brief
6	Account for sustainability requirements within the owner’s project budget	3	Budgeting
7	Incorporate sustainability requirements within the designer’s developed specifications	2	Contract documents
8	Make construction progress payment certifications contingent on the fulfillment of sustainability submittal and update requirements	2	Contract terms
9	Be transparent about the awarded design-related credits and construction-related credits remaining to be achieved	1	Control
10	Incorporate sustainability activities and milestones as an integral part of the construction schedule	1	Control
11	Make ‘sustainability progress and updates’ a constant item on the construction progress meeting’s agenda	1	Control
12	Recognize the impact of cost-cutting budget control measures on the chances of achieving targeted sustainability certification, through a combined cost/certification checklist	1	Control
13	Have proper understanding of, and improve proficiency in implementing, LEED certification requirements	1	Planning and organizing
14	Incorporate credit reserves in planning for the intended certification	1	Planning and organizing
15	Entrust green documentation tasks with the specialized green consultant	1	Planning and organizing
16	Ensure procurement of compliant products by the contractor	1	Control
17	Entrust building commissioning tasks with a third-party participant reporting to the owner	1	Planning and organizing
18	Specify recovery of green LD in respect of certification failure	1	Contract terms
19	Drive owner’s commitment and control through performance-based payback incentives	1	Control
20	Incentivize designers and builders through savings shared at the expiry of a stipulated performance payback period	1	Control

approaches is offered in Table 3, also reflecting the obtained order of frequencies for their employment.

It can be argued that for an SBP owner’s organization to undertake the process of administrating sustainability certification through its internal workforce, it would entail a high degree of proficiency and commitment on the part of this in-house team. To this end, the contracts or agreements executed with the concerned project participants provide the means for properly prescribing the contractual obligations of these participants toward designing and/or constructing for meeting sustainability requirements. However, key to being able to administer such a process and, more importantly, control the performance of those involved are (1) the profound technical knowledge of the certification process and its requirements, and (2) the strong commitment of the owner’s team toward achieving the sustainable objective. When such needed technical capabilities cannot be extended through their own workforce, an external entity is therefore charged with this

responsibility. In this case, when opting to agree on a waiver of certification failure damages, the owner’s chance to possibly enjoy the advantage of avoiding being in claims or disputes with any of the concerned participant(s) is higher. Nevertheless, as such a waiver may act as a dis-incentivizing factor for those entrusted with designing and/or constructing for meeting sustainability requirements, the owner’s team commitment toward performance control would be equally critical.

Conversely, under the scenario where a cure or recovery mechanism is specified as a consequence of certification failure, an SBP owner can reasonably expect that such a stipulation acts as an enabler that steers the concerned participant to endeavor to satisfy the certification requirements. The former mechanism can lead to the incurred failure being corrected (at least partially), provided that the circumstances, including those pertaining to fund availability and the nature and cause of failure, are conducive for realizing the needed corrections. As for the latter mechanism, despite the fact

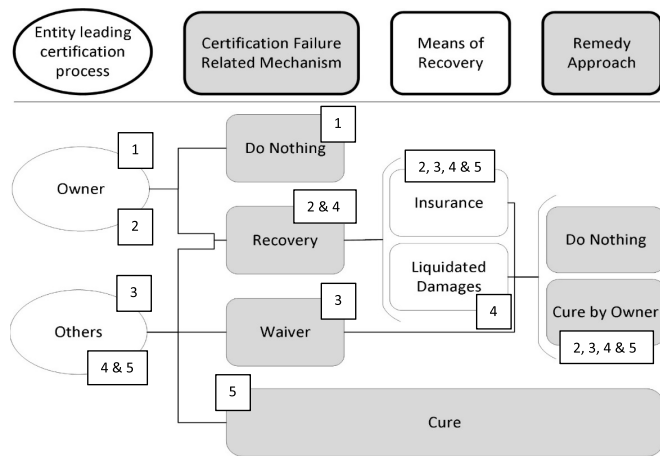


Fig. 8. Framework of interactions among the possible risk treatment mechanisms.

that it allows a more direct recovery, such recovery is monetary and may not be of such an amount that can incentivize the owner to subsequently pursue curing on their own, thereby leaving the works and certification failure unremedied.

Owner's Framework for Effecting Recovery and/or Remedy

The four contractual approaches compared in the previous section, possibly coupled with the procurement of insurance as it may be deemed desired or warranted, represent the basket of five choices that are available to SBP owners for treating the risks of third-party certification failure. Fig. 8 proposes how the interplay among these choices may need to be understood by the concerned SBP owner in devising an appropriate strategy for dealing with such risks.

The first choice that can be adopted by an SBP owner corresponds to the case where the owner's organization is the entity leading, and responsible for, the certification process. The associated contractual mechanism is designated by the do-nothing option. Under this contractual approach, the certification failure risks are thus carried solely by the owner and not by any of those engaged by him for designing and/or constructing the intended sustainable facility. By opting to accept these risks, the owner potentially ends up absorbing the consequences of not achieving the targeted sustainability certification. Note that the owner, despite accepting these contractual risks, can still choose to procure insurance coverage that

can help mitigate or minimize the losses incurred due to certification failure, indicated as the second choice in Fig. 8. Such SBP insurance packages, which have become available for both commercial buildings (since 2006) and residential buildings (since 2009), may include various types of coverage, as follows (Echeverria 2012):

- Sustainable upgrade coverage: Intended for buildings that are currently not sustainable and fail to rebuild according to the minimum level of a known sustainable rating system such as LEED or Green Globes;
- Sustainable certification coverage: Intended for buildings pursuing a second certification;
- Sustainable certification upgrade: Intended for buildings targeting the next level of certification from that already achieved;
- Vegetated roof and heat island effect coverage: Covering risks of collapse due to additional weights from vegetated roofs, inclusive of trees, shrubs, plants, and lawns planted to dissipate heat island effect;
- Broader protection beyond the building: Covering elements outside the building such as porous pavement systems, special irrigation and gray water collection systems, bike racks, and other furnishings;
- Coverage for sustainable reconstruction requirements: Covering costs for moving debris into recycling facilities instead of landfills and flushing out a building or contaminated area to ensure that air quality meets requirements;
- Green consultant services: Covering, in the case of a loss, the retention of an architect and/or engineer accredited by the green rating authority to help in the redesign or reconstruction of the damaged property, and the hiring of a commissioning agent, where the loss exceeds \$10,000, for ensuring an efficient operation of the facility;
- Cost to recertify: Covering registration and certification fees; and
- Financial incentives: Covering lost incentives, such as tax credits, utility discounts, and monetary grants subject to a sublimit and a maximum of 2 years.

The same risk acceptance and access to insurance coverage are characteristics of the case where the owner assigns others to be responsible for the certification process, but at the same time a waiver of damages in respect of certification failure is also put in place through the agreed contract terms, shown as the third choice in Fig. 8. The opportunity of procuring insurance coverage is also applicable under the remaining fourth and fifth choices, which both reflect an assignment by the owner to others to be responsible for sustainability certification, as depicted in Fig. 8. Under the fourth choice, an SBP owner has the chance of adopting the recovery-type contractual mechanism where the means for recovery is in the form

Table 3. Comparison of certification remedy approaches

Rank	Approach	Advantages	Disadvantages
1	Owner	Owner's contractual relationships with all entities involved in attempting to meet certification Owner's control over contracts' scope and work performance	Owner's level of commitment
2	Cure	Enabler for satisfying obligations by entities concerned Likely correction of works and of certification failure	Owner's knowledge and level of proficiency Complications due to multiple-entity involvement Partial cure owing to limited amount of funds potentially accessible to breaching entity(ies) Incurable unsatisfied requirements
3	Waiver	Avoidance of claims between owner and concerned entities	No recovery for owner Disincentivizing concerned entities
4	Liquidated damages	Enabler for satisfying obligations by entities concerned Direct recovery	Limited recovery owing to the set liability limit Monetary recovery, with likelihood that the works remain uncorrected and certification failure not remedied

of green LD. Such damages, being a fixed amount, are recovered at once, contrary to the manner with which the recovery of delay LD may be effectuated, which is normally based on a rate per day, or even a fraction of a day, of delay. The fifth choice involves contractually requiring the participant responsible for certification to cure the certification failure. This method involves “the addition, replacement, or correction of materials, configurations, systems, or equipment in order to obtain the level of LEED Certification indicated” (DBIA 2010). As discussed previously, the DBIA terms suggest that the extent of cure is governed by a monetary ceiling that can be limited to the remaining contingency, the concerned participant’s share of the GMP savings, or a fixed sum. As implied, this remedy has gained its applicability on design-build projects, where design and construction are entrusted with the same entity, leaving no room for any blame responsibility apportionment in case of certification failure. However, the enforcement of cure as a certification remedy is contingent on the owner having “fully satisfied its obligations” (DBIA 2010). This is particularly critical in respect of the commissioning- and operation-related credits that are under the control of the owner and affect certification. That said, the enforceability of this contractual remedy with any of the key entities involved in a design-bid-build project setting shall similarly be conditional on all other involved parties fully satisfying their obligations, inclusive of those by the owner.

To be reiterated is that the extent of exercising rectification under this cure mechanism is constrained by a monetary ceiling. As such, nothing precludes the owner from complementing such remedial steps, as exercised at his sole discretion or mandated by regulations, using amounts already recovered through insurance claims and/or enforced green LD, among other possible sources.

An intrinsic limitation of this cure approach, regardless of whether it is carried out by the owner or others, is that not all minimum project requirements (MPR), prerequisites, and credits (e.g., in LEED) can be fixed at later times, and they may ultimately be incurable. In reference to the case of LEED version 4 for Building Design and Construction for New Construction (USGBC 2018), examples of such problematic areas may include the following: permanent location on existing land, neighborhood development location, sensitive land protection, high-priority site, construction activity pollution prevention, site assessment, fundamental commissioning and verification, construction and demolition waste management planning, and construction indoor air quality management plan. Such challenging MPR, credits, and prerequisites shall—early on—be carefully addressed, and subsequently controlled, through the appropriate contract terms agreed upon with the involved participants.

In summary, the developed framework, as discussed previously, practically embeds all the possible factual scenarios that an owner may choose from, in order to treat the uncertainty of sustainability certification failure. In practice, it can be viewed as a decision-aid tool that lays down all interplays/tracks that can lead to adopting and effecting a recovery and subsequently a remedy, based on an owner’s preferred certification failure treatment mechanism(s).

With more cities having been requiring or supporting LEED certification, the adoption of a suitable approach for mitigating possible certification failure may no longer be optional or voluntary. As part of properly organizing and planning by SBP owners for achieving such required certification (as previously deduced from the respondent’s feedback), appropriate contract language needs to be drafted into design services agreement, requiring of professionals to provide sustainability-compliant designs together with the corresponding standard of care instrument.

Concluding Remarks

Sustainability issues have gained considerable attention worldwide, and serious progress has been achieved toward incorporating sustainability requirements in the development of projects for the building construction industry. However, accounting for such requirements has presented new complexities and risks, both technical and contractual ones, which today’s engineering professionals are bound to encounter and have to deal with.

In adapting to the new concept of sustainability for building projects, new standard contract language has been specifically developed. Such standard documents aim at helping SBP owners and concerned parties better account for the new complexities and risks present on SBP, especially in regard to those risks related to third-party certification failure. This has been particularly critical due to the fact that achieving sustainability certification is key to market-based benefits, such as tax incentives and subsidized loans.

The research study presented in this paper looked at the multiple approaches being adopted toward controlling third-party certification risks by examining the standard contract documents developed for that purpose and conducting a survey soliciting the feedback of LEED APs with experience on SBPs. It further compared the certification-failure risk approaches found to be in use, including a waiver of damages, recovery of liquidated damages, and the adoption of a cure contract requirement. The paper concluded with the development of a conceptualized framework that aims to guide SBP owners in better understanding the available remedies and their interplay and in devising the appropriate strategy to be adopted on a project in question. Regardless of the combination of options that may be preferred by an SBP owner, the outcomes of the performed research revealed the dire necessity for SBP owners to create a sustainability plan delineating the responsibilities of all involved parties and to promote and sustain a collaborative work environment among all parties involved in attempting to meet the certification requirements.

Data Availability Statement

Some or all data, models, or code that support the findings of this study are available from the corresponding author upon reasonable request.

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