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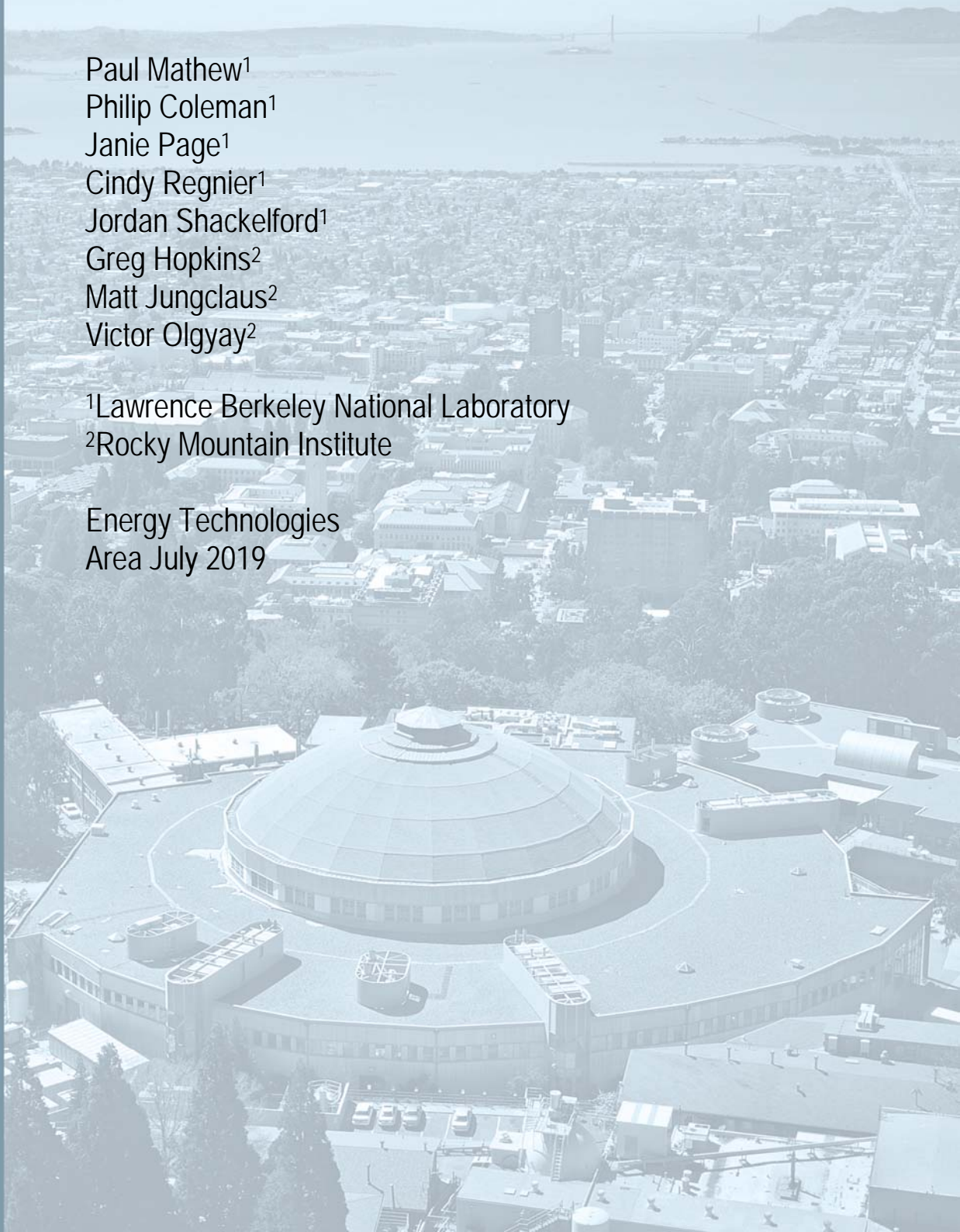
Energy Efficiency and the Real Estate Lifecycle: Stakeholder Perspectives

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TABLE OF CONTENTS

Executive Summary	4
1. Introduction and Context	6
2. Background	8
Real estate life cycle events	8
Literature review	9
3. Approach: Stakeholder Discussions	11
4. Stakeholder Perspectives in Seven Themes	13
1. Payback is (almost always) still important	13
2. Packaging and standardization are valuable	13
3. Get in the specs	14
4. Timing is critical	14
5. Lease and ownership structure (and term) matter	15
6. Organizational priorities and practices vary widely	16
7. The key influencer is ... not obvious	17
5. Takeaways for Developing Energy Efficiency Packages	18
6. Conclusions	20
7. References	21

Executive Summary

This report characterizes opportunities and pitfalls for leveraging key building lifecycle “events” as intervention points to enhance energy efficiency in real estate portfolios. It is based primarily on 33 interviews conducted with key industry stakeholders, including commercial real estate owners, operators, tenants, investors, developers, vendors, architecture/engineering firms, and construction managers. We focus on the following key events in the real estate life cycle because they are likely to present an opportunity for energy efficiency improvements: a) purchase or sale of a property; b) renovation; c) major equipment replacement; d) lease turnover or renewal; and e) refinancing. The stakeholder interviews covered business roles and processes, priorities, and sensitivities in these commercial real estate events.

We identified seven themes:

1. Payback is (almost always) still important

How long of a payback period is acceptable? The most common responses fall in the *three- to five-year* range. However, several organizations and individuals that we talked to clearly steer go/no-go project decisions away from energy and toward proposed projects’ ancillary or non-energy, occupant-facing benefits.

2. Packaging and standardization of solutions are valuable

The prospect of standardized, drop-in energy efficiency solutions with well-vetted energy savings was welcomed by almost all interviewees. Time urgency was cited as a big obstacle/factor in fit-outs and renovations, and commoditization of solutions was seen as highly beneficial and much more likely to result in energy efficiency advances than customized approaches.

3. Get in the specs

The importance of having a hard-wired directive or preference — whether housed in a set of specifications, design standards, guidelines, 5-year plans, or even, in one instance, a purchasing portal — cannot be overstated. The predilection to avoid headaches and go with a known, replicated solution is a very strong one. As one respondent put it “what’s easy gets done.”

4. Timing is critical

The time pinch in construction is fairly obvious and easy to apprehend, but the phenomenon goes deeper, extending to the planning and design stages for these real estate events. As one developer said, “there’s a three- to four-week window” in which key decisions regarding capital outlays take place for property deal. He and others emphasized the importance of getting one’s desired outcome into the capital planning process such that these windows are not missed.

5. Lease and ownership structure (and term) matter

The well documented “split incentive” in energy efficiency projects (i.e., the conflicting motivations between those who use the energy versus those who pay the bills) was quite evident in the responses. Additionally, from the standpoint of investors, the “hold period” (i.e., the length of time the investor expects to retain the investment) also has a big impact on the payback period that those investors are willing to accept. Similarly, *tenant* lease period — and expectations/plans for renewal — also impact the amount of investment that building owners are willing to make.

6. Organizational priorities and practices vary widely

Cost reduction and payback are paramount for most organizations when considering energy efficiency. However, several organizations clearly evidence a “green lean” and a few see their savvy in energy as a

competitive, “bottom line” advantage. Some interviewees indicated that they were greener in some parts of their footprint than others, which could be driven by individual championing as much as organizational direction.

7. The key influencer is ... not obvious

The influencers are diverse, varying by event, organization, region, lease structure, etc. People across the entire spectrum of roles — owner, operator, tenant, asset manager, architect/engineer, project manager, vendor — can play the enabler (and sometimes disabler) of energy-efficiency decisions.

Based on this feedback, we identified the following takeaways to inform the development of energy efficiency packages optimized for the real estate life cycle.

1. Provide *context-specific guidance* to help users select packages, with easy-to-use tools (e.g., flow charts) to help select the right energy efficiency package and associated options.
2. *Modularize packages* to allow for options to account for building-specific characteristics and broaden their applicability. The options should be configured as standardized “plug-in” modules for the package.
3. Be *technology-agnostic*. Most stakeholders seem not to maintain favoritism for specific technologies — their criteria for cost-effectiveness, ease of implementation and market acceptance seem to be more important.
4. *Calculate cost-effectiveness with user-specific baselines*, based on *incremental* savings and costs from the customer’s actual situation (e.g., if motorized roller shades were going to be installed anyway, that planned shading system, not manual venetian blinds, should represent the baseline for cost and savings generated by a more advanced shading upgrade).
5. *Articulate the value of non-energy benefits*, ideally quantitatively. There are a multitude of these, such as higher quality space, smoother operations, easier installation, reduced risk (due to standardization and packaging), carbon footprint reduction, and a variety of occupant benefits like higher indoor air quality and enhanced productivity. These benefits can be critical to building buy-in within the owner organization, and “selling” projects to the tenant organization.
6. *Make it easy across the whole delivery chain*, by providing a comprehensive set of resources to reduce the burden in every step of the delivery chain — selection, specification, procurement, installation, commissioning, operations.

In sum, the stakeholder interviews fairly clearly point to the value of standardized packages of energy efficiency measures tailored to commercial real estate events. But at the same time, they also underscored the difficulty of creating these standardized packages in a way that appropriately addresses the challenges faced in these opportunities. They need to reliably pay back their incremental expense quickly and must be easy to routinely “drop in” to existing processes for design, installation, and operations.

1. Introduction and Context

There is a wide array of proven, commercially available energy efficiency technologies and strategies to achieve deep energy savings in new and existing buildings. According to the New Buildings Institute, there are almost 600 net zero energy buildings¹ in the United States [NBI 2019]. However, for most of the market, there remains a stubborn and persistent “adoption gap” for energy efficiency, i.e., the difference between the techno-economic potential and adoption of energy efficiency solutions is substantial. Various roadmaps and action plans over the years have identified a range of barriers and opportunities to address this gap [e.g., McKinsey 2009, CEC 2015], including awareness, cost-effectiveness, access to financing, workforce training, ease of use, etc.

One approach to address the adoption gap is to better coordinate and align energy efficiency with the actual business of real estate, potentially achieving “zero over time” for real estate portfolios [Jungclaus et al. 2018]. Toward that end, LBNL is leading a research project sponsored by the U.S. Department of Energy to develop and field-validate packaged solutions that *opportunistically incorporate energy efficiency within real estate life cycle events* that are happening every day in the building sector. The intent is to significantly reduce transaction costs² for owners and service providers through technology combined with business process integration, standardization, and streamlining throughout the real estate delivery chain. Current practice is to treat building energy retrofits as distinct and unique engineering projects, which are often too disruptive to building occupants and activities to execute because they are not aligned with the real estate life cycle. The project is developing a suite of integrated systems packages (ISPs) optimized for seamless incorporation into routine real-estate life-cycle events such as renovations, equipment replacements and lease fit outs. Each ISP will be laboratory-tested using LBNL’s FLEXLAB[®] facility³, and then field-validated in actual real estate life-cycle events in actual buildings with our partner, CBRE (Figure 1).

Our first task in this project was to understand and characterize the real estate life cycle from the perspective of intervention points for energy efficiency and their associated stakeholder processes, priorities and sensitivities. This report documents our findings from this task. Section 2 reviews the literature and describes key real estate events. Section 3 describes our approach to collect and synthesize information through structured interviews with stakeholders. Section 4 presents the stakeholder perspectives organized into seven themes. Section 5 presents guidelines for developing energy efficiency packages optimized for the real estate life cycle. Section 6 concludes.

¹ A net zero building is generally defined as a building in which the total amount of energy used by the building annually is roughly equal to the amount of renewable energy generated on-site.

² *Transaction costs* in this context refers to stakeholder investments for system specification, procurement, financing, installation, verification, startup, commissioning, and “soft” factors such as skill requirements, customer acquisition, amount of stakeholder coordination, and ease of execution.

³ FLEXLAB. <https://flexlab.lbl.gov/>. Lawrence Berkeley National Laboratory. Accessed July 2019.

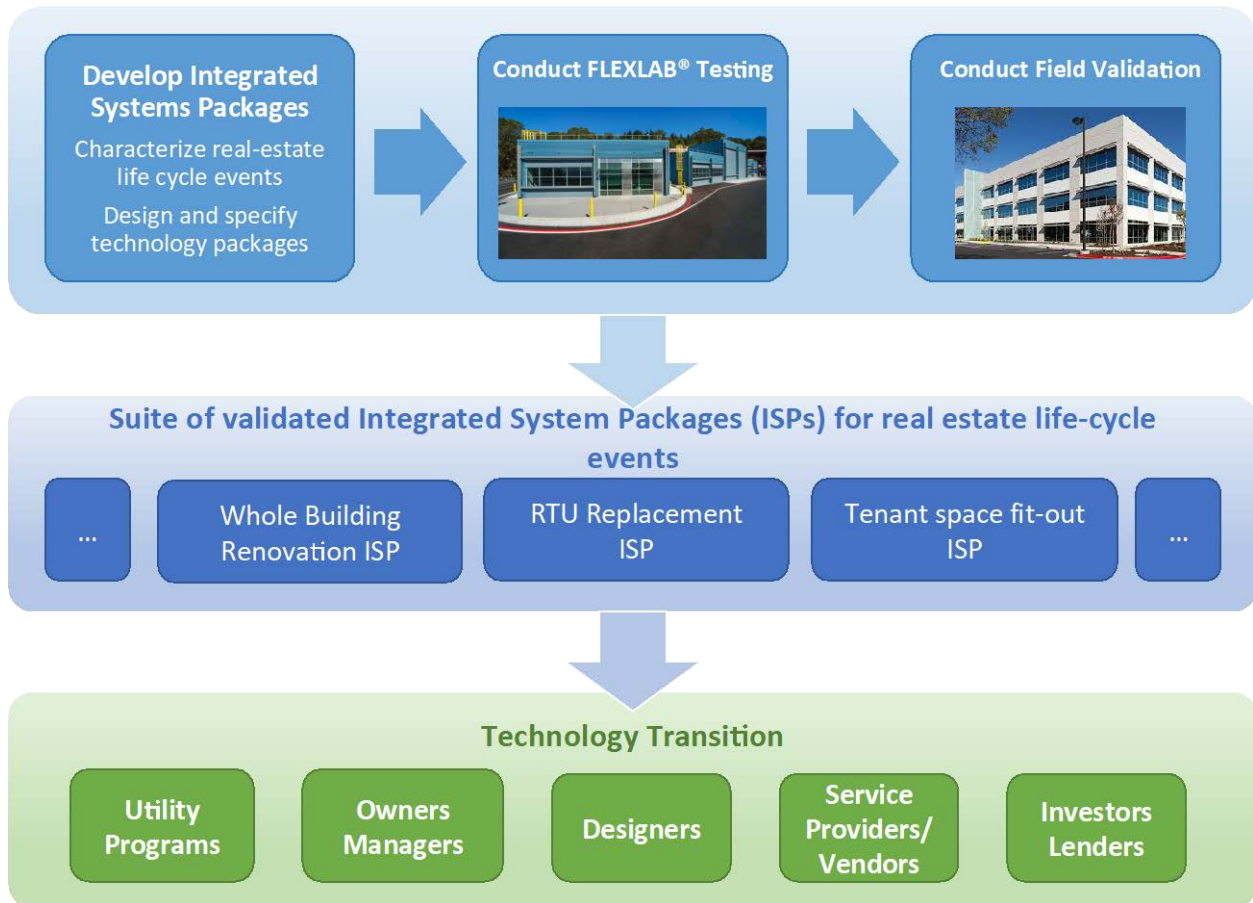


Figure 1. Project approach: Integrated systems packages optimized for real estate life cycle events

The findings presented here will guide the development of integrated systems packages (ISPs) optimized for specific real estate life-cycle events. More broadly, this report can be used by energy efficiency program implementers and policy makers to inform the development and wider deployment of energy efficiency solutions in the real estate market. Note, however, that this initial report does not describe or recommend specific technology solutions.

2. Background

Real estate life cycle events

For the purposes of this project we focus on the following key events in the real estate life cycle because they are likely to involve changes to building assets or operations that affect energy use, and therefore present an opportunity for energy efficiency.

- *Purchase or sale of a property.* From an asset standpoint, real estate investments generally fall into three categories: *core*, *value-add*, or *new construction*. Core assets are properties that will generally continue to be operated as is, without significant changes to the building. Core investments are generally considered lower risk. Value-add assets are properties where the purchaser intends to “reposition” the building by making significant improvements, such as upgrading the facade, replacing equipment, etc. Both core and value-add properties offer opportunities for incorporating efficiency improvements in the capital plan, although value-add offers a broader scope for improvements.
- *Renovation.* Owners may make major renovations of buildings in response to market needs or to meet the requirements of major new tenants. The scope of these renovations could include efficiency retrofits, either to reduce operating costs for the owner or make it more attractive to prospective tenants in markets that have a demand for green buildings.
- *Major equipment replacement.* These generally happen in two modes - planned replacement at the end of useful life (EUL) or unplanned replacement due to unexpected failure prior to EUL. Planned equipment replacement offers the opportunity to replace old equipment with higher efficiency systems and potentially bundle other efficiency improvements that could leverage the fact that there are contractors and construction activity on site. Unplanned equipment replacements generally do not afford an efficiency opportunity due to their emergency nature, but could incorporate efficiency if service providers have pre-defined energy-efficient options readily available to be specified and installed.
- *Lease turnover and renewal.* Most new leases have a tenant improvement allowance (TIA) to renovate the space to meet tenant needs. This tenant “fit out” offers efficiency opportunities for systems that are covered by the lease. While the scope and terms of the TIA can vary widely, typically it will include lighting, interior furnishings, and plug loads. In larger tenant spaces it could also include HVAC terminal units. In some cases, lease renewal may also offer opportunities if the renewal negotiations involve space upgrades.
- *Refinancing.* When buildings are refinanced, it may be an opportunity to get additional loan proceeds to upgrade the space. For example, Fannie Mae’s Green Rewards program offers additional loan proceeds for implementing energy efficiency upgrades in multifamily properties [Fannie Mae 2019].

Figure 2 conceptually illustrates the key stakeholders involved in each of the above events.

	Purchase/ Sale	Renovation	Equipment Replacement	Lease Turnover	Re-finance
Owner	●	●	●	●	●
Operator	●	●	●	●	
Tenant		●	●	●	
Investor/Lender	●	●	●		●
Developer	●	●			
Architect/Engineer		●	●	●	
Construction		●	●	●	

Major role
 Major role in selected cases

Figure 2. Real estate life-cycle events and stakeholders involved.

Literature review

We conducted a literature search for information on the process and stakeholder roles for each of the above events, and considerations pertaining to energy-related building assets and operations. We found no academic literature on this topic⁴. The practitioner community has developed numerous resources for various aspects of real estate management, but these generally do not have the information we were seeking. For example, the Institute for Real Estate Management (IREM) has guides and professional courses related to asset management, financial management, property maintenance, etc. [IREM 2019]. Similarly, the Building Owners and Managers Association (BOMA) has a host of guides and white papers on topics such as building system maintenance, emergency preparedness and how to allocate common area charges [BOMA 2019]. BOMA also has some resources on sustainability, including an energy performance contracting model and a guide for green leasing. The Building Codes Assistance Project describes the commercial building renovation project and gaps and opportunities for improvement [BCAP 2019]. We also found a few articles and blog posts by individual practitioners in trade publications and websites (see, e.g., Blumenfield [2015], Jennings [2008]), but these tend to offer “tip”-style information rather than structured in-depth information on processes and practices for these real estate events.

In the energy efficiency literature, we found a few resources that address energy efficiency in the context of real estate life-cycle events in commercial buildings. The ‘Zero Over Time’ report by the Rocky Mountain Institute [Jungclaus et al. 2018] describes steps and strategies for building portfolios to achieve net zero energy goals over time by aligning deep energy efficiency, energy storage and renewable energy projects with real estate life-cycle events. There are, of course, numerous resources on how to address energy efficiency in existing buildings - including technologies, strategies and processes - but they generally do not address the interplay with real estate life-cycle events.

⁴ Personal communication with a professor of real estate confirmed that there is generally no academic literature on real estate processes. Most real estate programs teach real estate processes through case studies and there are a few textbooks.

Regarding leasing, NYSERDA's Commercial Tenant Program has developed four case studies [NYSERDA 2019] on incorporating energy efficiency into leased spaces, and the associated savings. The Urban Land Institute (ULI) Tenant Energy Optimization Program describes a ten-step process to incorporate energy efficiency into a lease fit out [ULI 2019]. The Green Lease Leaders program by the Institute for Market Transformation (IMT) and DOE's Better Buildings Alliance provides guidance on how to incorporate energy efficiency into lease agreements [IMT 2019]. RMI has a guide for leasing net zero buildings [Carmichael and Peterson 2018]. Earlier, the Northwest Energy Efficiency Alliance (NEEA) identified and developed resources to incorporate energy efficiency in leasing, property management agreements, tenant improvements, and underwriting standards [Davis et al. 2010].

In summary, while there is a vast body of resources on how to implement energy efficiency projects, it appears that there is very limited information on addressing energy efficiency specifically in the context and framework of real estate life cycle events.

3. Approach: Stakeholder Discussions

We conducted a series of interviews with a range of stakeholder types to obtain information on the process and their respective roles in the various real estate life-cycle events, as well as their perspectives on incorporating energy efficiency enhancements into each of these events. Given the nature of the information we were seeking, we used semi-structured interviews rather than a formal survey because this allowed us to explore nuances and lines of inquiry that could not be anticipated in advance. Figure 3 indicates the key interview questions. While there were a common set of questions, almost every interview covered additional topics depending on the stakeholder role and experience. For example, some stakeholders had considerable experience with advanced energy efficiency projects and provided more in-depth feedback on such technologies and strategies.

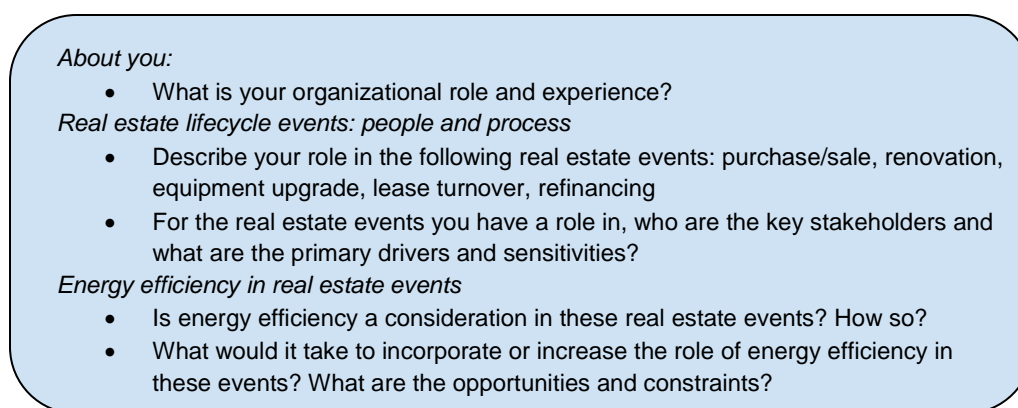


Figure 3. Key discussion questions for interviews

We conducted a total of 33 interviews with various organizations (Table 1). In a few cases, an individual stakeholder was able to represent more than one stakeholder type because of their role or experience. Figure 4 shows the total count for each stakeholder type. We identified stakeholders based on contacts within the project team, referrals from our project partner CBRE, as well as referrals from stakeholder interviewees themselves. While this was not a statistically representative sample, we would note that they were geographically distributed, had a range of experience, and represented virtually every major role in the commercial real estate industry, including investors, lenders, owner/occupiers, tenants, architect/engineers, portfolio managers, asset managers, construction managers, and others.

In almost all cases we had at least two project team members participate in the discussion. All interviewees were given the option of not being identified in public-facing reports. To analyze the findings, we first reviewed all the notes and sought to identify a few themes that emerged from the discussions. We identified seven themes. We then did a 'bottom-up' exercise of parsing and classifying the detailed content of each interview into the seven themes. This allowed us to assess the relative strength of each theme in terms of how many stakeholders it resonated with, and to identify cases in which stakeholders presented a counterpoint to the theme, or other nuances. Separately, we also classified other relevant content that did not fit into one of the themes (e.g., customary practices or technology considerations). Finally, we developed some takeaways for incorporating energy efficiency packages into real estate events, drawing on these themes as well as other direct input from the discussions. Section 4 presents the themes and section 5 the guidelines.

Table 1. Stakeholder organizations and types represented

Organization	Number of interviewees	Stakeholder type(s) represented
Ammon Heisler Sachs	1	A/E
CBRE	11	Operator, Owner, Construction
Robert Derector Associates	1	A/E
Gensler	1	A/E
Group14 Engineering	2	A/E
U.S. General Services Administration (GSA)	3	Owner, Tenant
LBA Realty	1	Owner, Investor
Mannatt, Phelps & Phillips	1	Tenant, Lease lawyer
McKinstry	1	Construction
NYLife Investors	1	Investor
NYSERDA	1	Efficiency program, Tenant
Taylor Engineering	1	A/E
TF Associates	1	Construction, Vendor
Tishman Speyer	1	Developer
VVA	2	Owner
Anonymous	9	Investor, Owner, Tenant

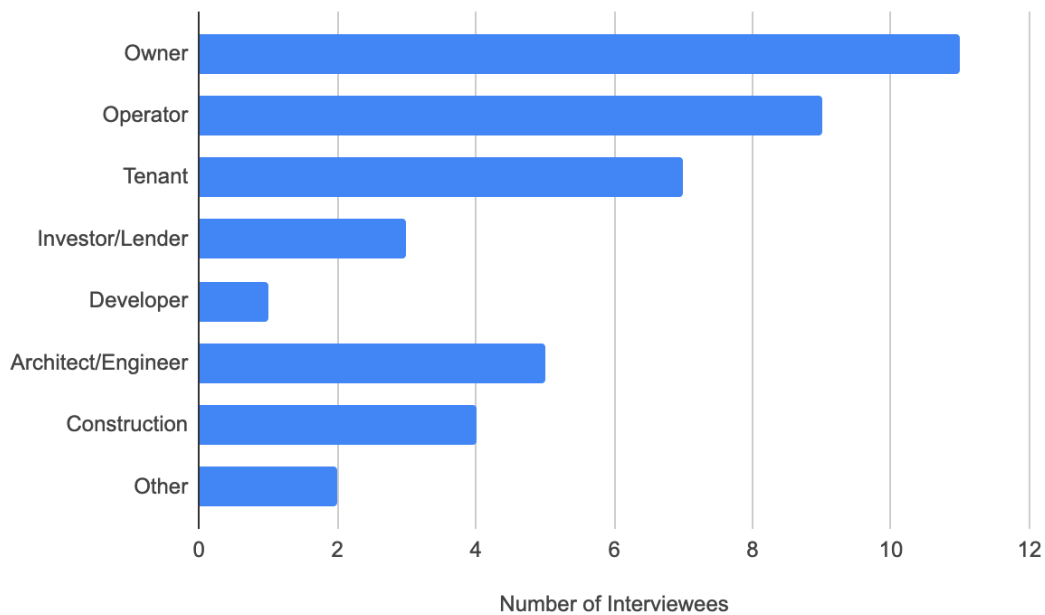


Figure 4. Number of interviewee perspectives for each stakeholder type.

Note: total is greater than the number of interviewees as a few represented more than one type.

4. Stakeholder Perspectives in Seven Themes

We identified seven themes from the stakeholder interviews, ranging from cost effectiveness to lease structures and organizational influence. Each of the themes are described below, followed by a summary of the relative strength of each theme across all the interviews.

1. Payback is (almost always) still important

Virtually all our interviewees brought up simple payback period⁵ as a key factor in the evaluation of prospective energy projects. As one construction project manager put it, “great ideas require that there is a meaningful rate of return to back them up.” As far as the thresholds their organizations are willing to accept, answers ranged from between a half year to ten, or possibly even up to fifteen in the case of one public sector entity. The most common responses fell in the *three- to five-year* range, and a couple mentioned that their organizations’ payback thresholds had actually decreased from previous practice (e.g., where five years had been acceptable ten years ago, three was now the cut-off). Timing and alignment with other construction activities can significantly improve payback. As one property manager put it “the capital threshold for implementing changes is more favorable when demo is ongoing: ceiling opened up, something else torn up, or don’t have to maintain HVAC operations ... it’s easy to add energy efficiency when electricians are already there for some reason.” In a similar vein, another property manager mentioned that when replacing equipment near the end of useful life, the costs for more efficient equipment can be “seen in a different light.”

There were some other exceptions cited to customary organizational payback period cut-offs too, for instance in situations where a “re-fresh/re-stack” of a building, particularly an owner-occupied one, was occurring. Other cited instances in which acceptable payback period might be lengthened are where a piece of equipment was being replaced at the end of its life, or where there was a perception that an energy efficiency upgrade would significantly increase the value of the asset. To quote one property manager “...doing a \$5 million upgrade two years before will often pay for itself in sale price.” One investor also mentioned that for capital upgrades, it’s not just about the payback but also that the level of investment has to be proportional to the asset value.

An interesting twist, however, was that a few organizations, as well as several individual actors, clearly steer go/no-go project decisions away from energy and toward proposed projects’ ancillary or non-energy benefits (NEBs). Cited NEBs included employee attraction/retention, increased worker productivity, improved tenant experience, positive public relations, enhanced views, and improved thermal comfort. One owner mentioned that their cost benefit analysis has considered items such as easier maintenance and reduced number of “truck rolls” (i.e. site visits by maintenance staff). One respondent crystallized the theme by exclaiming “Stop selling it as an energy project!” These respondents’ feeling is that the presence of energy savings in a project often leads to undue emphasis on that facet alone, such that other benefits of the proposal become ignored and the project can get abandoned solely based on the longer-than-desired payback period. The NEBs need to be the aspect that leads the discussion, they argue.

2. Packaging and standardization are valuable

The concept of our proposed “integrated systems packages” was well received, and this sentiment was virtually unanimous. At least in as much as they could be realized (a few interviewees seemed to question

⁵ A few interviewees also mentioned internal rate of return (IRR) and net present value (NPV) as metrics. For simplicity, we use payback in this document to broadly refer to cost effectiveness metrics.

this, particularly in the context of individual buildings' relative uniqueness), the prospect of standardized, drop-in energy efficiency solutions with well vetted associated savings was very popular. Two property managers mentioned that the package should include a roadmap for implementation, that has “programming, planning, payback, Cx, operations ... and can answer, ‘What is ROI?’, ‘What does it look like for tenants who have to live/work through this?’”

Time urgency was cited as a big obstacle and factor in fit outs and renovations (see theme 4), such that commoditization of solutions was seen as highly beneficial and much more likely to result in energy efficiency advances than customized approaches. “Time and effort are definitely more top of mind than is efficiency itself at lease turnover.” One example cited was how standardized RTU replacements at branches of one prominent national retail bank were carefully designed and packaged so that implementation could happen within a very tightly prescribed time limit from Friday evening through Sunday. The purpose of this was to minimize economic loss from business disruption. Construction project managers and their subs, in particular, were portrayed by many as (understandably) eager to avoid any additional headaches in these jobs, underscoring the value of standardized rather than custom-designed solutions. One property manager indicated that packaging could also reduce overall approval transaction costs, saying “if I have to justify five different things, that’s a lot of approval time.” One benefit of standardization cited was that it could help reduce the need for skilled architects and construction staff. It could also help with costs by enabling volume purchasing across a portfolio. A couple of the discussants mentioned the proof of savings, for example to cost estimators, as a critical factor in keeping proposed energy efficiency improvements off the chopping block.

A couple of respondents, particularly one at an engineering consulting firm, stated that, for better or worse, the perception is that “every building’s different” (and that this phenomenon is especially prevalent in the New York City commercial real estate market). One engineer noted that for standardized packages to be accepted, it’s critical to allow for some level of customization to account for building context-specific constraints and preferences.

3. Get in the specs

The importance of having a hard-wired directive or preference — whether housed in a set of specifications, design standards, guidelines, 5-year plans, or even, in one instance, a purchasing portal — is somewhat obvious, but cannot be overstated. Due in large part to the time squeeze, in planning/design as well as construction (see below), it is almost inherent in most of the real estate events on which we are focusing that “what’s easy gets done”. One owner mentioned that they have fairly centralized criteria and decision-making for specifications, e.g., approved light fixtures and criteria for new HVAC equipment. Several large organizations said they have tenant fit out requirements, but the scope and specificity of these varied.

We heard this, in various forms, from nearly ten respondents, and rarely heard anything that would contradict it. The predilection to avoid headaches and go with a known, replicated solution is a very strong one and cannot be ignored in the development of any initiative aimed at penetrating the process.

4. Timing is critical

The “time is money” perspective is very apparent in commercial real estate, where rent payments generally do not begin flowing until a space is completed. For construction, “time is almost always a constraint and typically everybody’s behind the eight ball” as one architect put it. In addition, there are often contractual penalties that accrue to lessors, such as indemnification of excess rental (sometimes called “holdover”) payments that the lessee must pay in its prior space to extend its stay.

The time pinch in construction is fairly obvious and easy to apprehend, but the phenomenon goes deeper, extending to the planning and design stages for the events. As one developer put it, “there’s a three- to four-week window” in which key decisions regarding capital planning take place (regarding major renovations, primarily upon building purchases, though this could apply to other real estate events as well). He and others emphasized the importance of getting one’s desired outcome into the capital planning process such that these windows are not missed. In fact, one respondent mentioned that the energy plan should be wholly integrated with the capital plan. He said he’s “sick of doing energy master plans because they don’t get built.”

A few property managers mentioned that they look at sustainability options any time there is a renovation. Under emergency situations such as equipment failure, lead time is of course a key factor. One respondent mentioned that it can take weeks to get a permit from the city, which buys them some time to search for efficient options, and that packaged standardized solutions could mitigate that time risk. Interestingly, one of the reasons cited for lack of uptake of utility incentives in leased spaces was that the timing to apply for the incentives does not mesh with the time frame of tenant fit outs.

Several affirmed that tenant fit outs are a key opportunity in leased space. One property manager mentioned that lease renewals of existing tenants can also be an opportunity for efficiency improvements because they trigger discussions about the use and updates of the space. This can also apply in owner occupied spaces that are undergoing a change of use, although these are harder to predict and plan for. In either case, timing upgrades with such events significantly mitigates the risk of disrupting occupants — a major consideration for property managers.

5. Lease and ownership structure (and term) matter

This theme — cited by a few interviewees as the biggest factor/obstacle in implementing energy efficiency — could be expressed more succinctly (and crudely) as “follow the money.” The well-documented “landlord-tenant dilemma” of “split incentives” in energy efficiency was quite evident in interviewees’ responses. The important contrast here is between the *gross* (aka “full service”) lease, in which the landlord pays the energy bills, and the *triple net* (often abbreviated as NNN) lease, in which the tenant pays them. In the former case, predictably, respondents indicated that their organizations were largely unmotivated to pursue any kind of energy efficiency improvements when they are in the tenant role, and quite motivated when they are the owner/landlord (though a representative from one large public sector entity noted that his organization maintains a policy of leasing space only in ENERGY STAR buildings, i.e., those designated as being in the top quartile *vis a vis* energy efficiency).

With triple net leases, where the tenant is paying for the building’s energy costs, the situation can be nuanced. The key factor here appears to be whether the building is sub-metered (or the organization is the lone occupant), such that the tenant is *directly* paying for its energy usage, versus the more common situation in which the tenant is charged for energy on a per-area (e.g., square foot) basis, such that the savings for any efficiency initiatives it implements are only captured in proportion to the degree of its occupancy in the building (e.g., if it installs new shades and lighting and saves 10% of the building’s energy expense but only occupies one-fifth of the building, it will “see” only a savings representing 2% of the building’s energy costs).

From the standpoint of non-occupying investors, the “hold period” — i.e., the length of time the investor expects to retain the investment — is highly germane to the payback threshold. Investors purchasing buildings with “value-add” intentions - i.e., those looking to improve the buildings and sell out at a profit —

generally have 5-8 year expected hold periods. Naturally, their payback thresholds for energy efficiency upgrades are short, unless the upgrades increase the building's value at the point of sale. On the other hand, investors seeking "core assets," buildings they will hold for a long time and be content with lower returns on, are likely to have longer payback period thresholds.

Similarly, *tenant* lease period and expectation of renewal are key, according to a couple of respondents. One property manager has tried to push his client organizations to consider making their decisions from a "portfolio" perspective - e.g., if you're going to renew in 80% of these spaces, why not factor that into the calculation rather than just saying "we might be out in four years so forget about it"?

A key factor in leases is the tenant improvement allowance (TIA), which is negotiated between the landlord and the tenant. Operators and design professionals are usually not involved in TIA negotiations. While the TIA is usually not line-itemed within the lease, the TIA contributed by the landlord is typically used to cover hard construction and not soft costs such as architectural design that does not show payback for the next tenant. Typical TIA is \$40-60/sf, although it can be \$100/sf or higher in some cases (e.g., tech tenants in the San Francisco Bay Area).

Several people said that tenants, especially smaller ones, rarely ask about energy. The focus is on rent, not energy costs. Presumably, these responses represent the sentiments of gross (full service) lease tenants, though this was not specified.

6. Organizational priorities and practices vary widely

As implied in the first theme above ("Payback is (almost always) still important"), cost reduction and payback are paramount for most organizations when considering energy efficiency. As one property manager put it, the "motivation of clients is dollar savings, not energy or sustainability." However, several organizations clearly evidence a "green lean," with a strong push (and sometimes requirements) for their buildings to attain ENERGY STAR and LEED labels, for instance. One investor even said that "energy efficiency is core to our business beyond curb appeal." At least a couple of interviewees mentioned that they have seen a few tenants willing to pay more for efficient buildings because it helps their branding. Interestingly, some interviewees indicated that their organizations or clients were greener in some parts of their footprint, particularly on the west, and to a lesser extent east, coasts. At the other end of the spectrum, at least a few respondents mentioned that "green hasn't yet been part of the conversation" in their experience. A couple indicated that the emphasis on sustainability can be driven by individual organizational champions, e.g., where a certain regional division of a company implements more green or energy-efficient activity due to a manager in charge who deems it more important. Some respondents mentioned that local energy disclosure policies are also a driving factor.

In addition, we learned of three or four organizations that clearly see energy efficiency as a core competency that can be used to augment their bottom line. One large company, for instance, uses a 2% lower discount rate to evaluate its energy projects relative to other prospective projects it evaluates, because it believes that the likelihood of estimated savings actually coming to fruition is significantly higher for the energy projects. Two of the banking institutions we interviewed fell in this category too, hiring (or training) employees who have the responsibility to identify and test new energy efficiency opportunities, and then, ideally, implementing them broadly across the firms' property holdings.

7. The key influencer is ... not obvious

The final theme we identified regards the influence of different stakeholders in the various real estate events. The influencers are diverse, varying by event, organization, region, lease structure, etc. People across the entire spectrum of roles — owner, tenant, asset manager, architect/engineer, project manager, consultant, or vendor — can play the enabler (and sometimes disabler) of energy efficiency decisions. Moreover, the driver in any given situation regarding which role predominates seems to have almost as much to do with skill sets and personalities as it does with organizational decision-making structures. For some leased spaces (e.g., anchor tenants with big names or long leases), the tenant's architect and general contractor are key for sustainability decisions, but in other cases the property manager may be the most important point of influence. Two asset managers said they defer to their property condition assessment (PCA) providers as “trusted advisors” to decide what improvements to make in the building. In another case, the asset manager has regular meetings with the operator and leasing manager to decide on building improvements.

This finding — the nebulosity of the appropriate decision-making role to target — underscores an important challenge in promoting our integrated system packages: to whom should they be pitched in which settings? Unfortunately, there isn't a straightforward answer to this question, but better alignment of stakeholder groups within an organization can help address this challenge (for example, ensuring that property managers, design professionals and energy managers are all fully engaged in capital planning decisions).

In summary, Figure 5 shows the number of interviewees who provided feedback supporting each theme, illustrating the relative emphasis of each theme across the full set of interviews.

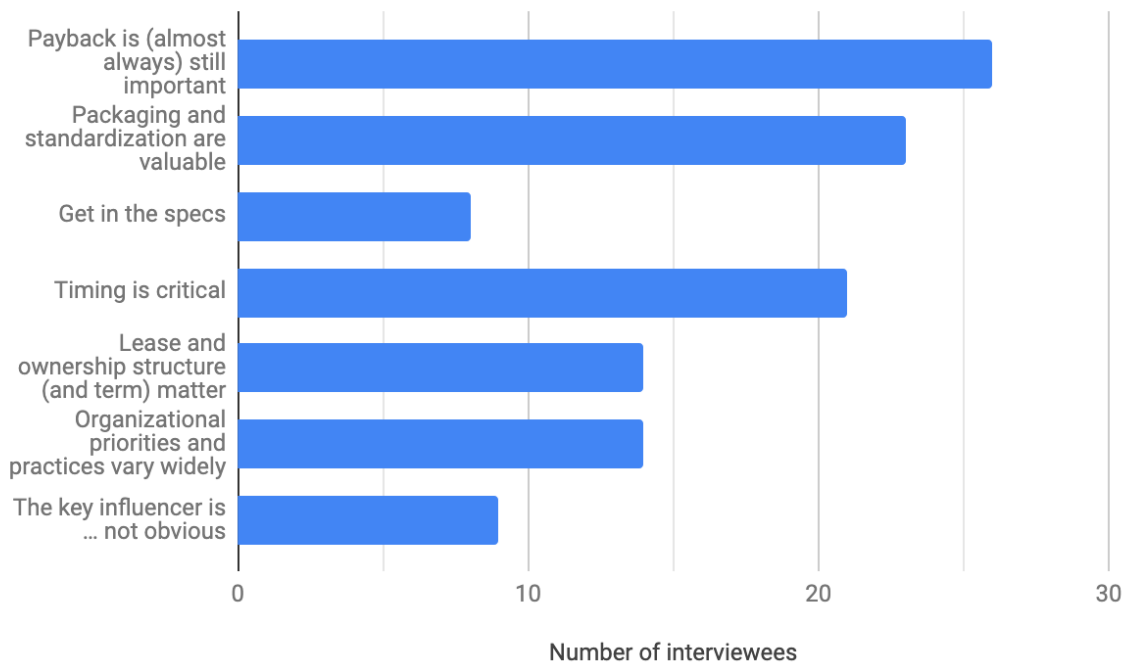


Figure 5. Number of interviewees providing feedback supporting each theme

5. Takeaways for Developing Energy Efficiency Packages

The stakeholder perspectives described above should inform the development of energy efficiency packages optimized for the real estate life cycle (Figure 6). Toward that end, below are six key takeaways described below.

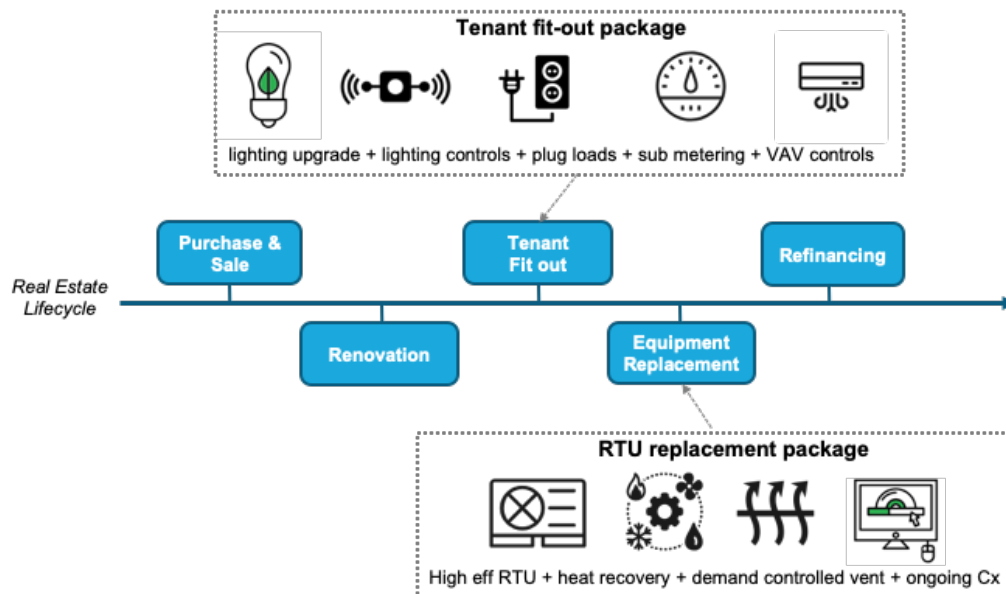


Figure 6. Conceptual illustration of energy efficiency packages aligned with real estate lifecycle events.

1. Provide context-specific guidance to select packages

Key decision-makers likely have very little time and “bandwidth” to spend effort trying to determine energy efficiency options during major real estate events. They need easy-to-use tools (e.g., flow charts) to help select the right energy efficiency package and associated options. It’s important that these tools provide guidance from *their* perspective and role. The tools should address context and scope (e.g., “Will the tenant fit out include any HVAC systems modifications?”), relevant existing conditions (e.g., “Does the facility have a building automation system?”), business processes (e.g., “Are there standard tenant fit out requirements and procedures?”), etc.

2. Modularize packages

Packages should allow for options to account for building-specific characteristics and broaden their applicability. The options should be configured as standardized “plug-in” modules for the packages. For example, a tenant fit out package might include plug load control and automated interior shading as optional modules in addition to the core set of lighting and HVAC measures. More modularization will allow for more flexibility and wider applicability, but this has to be traded off against ease of selecting and applying a package. Also note that there should be multiple product options for specific components within a package to allow for competitive bidding. This will require interoperability between various component options.

3. Be technology-agnostic

Interestingly, most stakeholders we spoke to did not have strong views on particular technologies. In effect, they seem to be largely technology-agnostic as long as the packages meet their criteria for cost-effectiveness, ease of implementation and market acceptance. Technologies that stakeholders have implemented generally followed expected patterns - LED lighting and control changes such as setbacks and setups are the most common, while HVAC measures generally lag lighting measures, and envelope measures are rare.

Occupancy-based plug load controls were noted as having issues in terms of acceptance by users. One person mentioned that most owners and operators are hesitant to implement measures in their data centers. Several mentioned that packages should include some form of continuous monitoring. However, they also cautioned against complexity on this front, with one saying that they are “drowning in data” and don’t know what to do with it. Only a few stakeholders had implemented more than one leading edge technology such as dynamic glass, energy storage, or phase change materials. As one project manager put it, “nobody wants to be the guinea pig.” He also cautioned against advanced controls, saying that operators would inevitably override them saying “I don’t want any issues today.” In sum, it appears most stakeholders have a fairly low tolerance and capacity for the risks of trying leading edge technologies. Efficiency packages targeted at the broader market should carefully weigh the benefits of such technologies against the real and perceived risks for the vast majority of real estate stakeholders.

4. Calculate cost-effectiveness with user-relevant baselines

The cost-effectiveness of an upgrade is always determined relative to a baseline (reflecting what would have been installed anyway), and that baseline varies for each real estate event. Therefore, it is critical that cost-effectiveness be calculated based on incremental savings and costs from the baseline *relevant to the particular real estate event* (and not a pre-specified general baseline as is the case in utility incentive programs). For example, if motorized roller shades were going to be installed anyway, that planned shading system, not manual venetian blinds, should represent the baseline for cost and savings generated by a more advanced shading upgrade. Baselines can vary for similar events and similar buildings even within the same organization. This will require that costs and savings for the package elements be parsed accordingly. Cost analysis should include “accountable” costs such as energy, water and O&M. Benefits such as improved comfort, user satisfaction and productivity may be part of the value proposition (see next item) but should not be included in the ROI calculations for purposes of financial hurdle analysis due to the current lack of accepted approaches to monetizing them.

5. Articulate the value of non-energy benefits

As mentioned above, the value proposition is not only about lower energy costs. Besides energy cost savings, it is necessary to substantively - ideally quantitatively - articulate the value proposition pertaining to higher quality space, smoother operations, ease of installation and reduced time and risk due to standardization and packaging, and meeting sustainability goals. The relative weight for each of these benefits can vary widely by stakeholder and context and it is difficult to anticipate in advance how best to articulate the message for a given stakeholder. Rather, the point here is to have this information ready for an advocate to construct an appropriate value proposition. Case studies of relevant peers should be included in the articulation.

6. Make it easy across the whole delivery chain

As noted in the themes section, reducing complexity and hassle is a key and under-appreciated driver in commercial real estate events. This is especially true for more advanced or less familiar energy efficiency solutions, even if they are proven and cost-effective. Accordingly, packages should have a comprehensive set of resources to reduce the burden in every step of the delivery chain: selection, specification,

procurement, installation, commissioning, and operations. These would take the form of guides (e.g., how to select the right package), template language (e.g., product specifications), protocols (e.g., functional testing procedures), and tools (e.g., savings and cost calculators). It is important to configure these resources in a manner that allows for “drop-in” to the existing processes for each real estate event, rather than as a stand-alone process for a dedicated energy retrofit project. It would also be helpful to show variance or additionality relative to a typical process, so that users can clearly comprehend the marginal difference and level of effort required.

6. Conclusions

In sum, the stakeholder interviews fairly clearly point to the value that the concept of “integrated system packages” of energy efficiency measures could have in commercial real estate events such as sales/purchases, fit outs, and re-financing. But at the same time, they also underscored the difficulty of creating these standardized packages in a way that appropriately addresses the challenges faced in these opportunities. They need to reliably pay back their incremental expense quickly (or if not, have a very compelling and apparent non-energy benefit) and must be easy to replicably “drop in” to existing processes (such as design, installation, and operations), but also need to accommodate the different exigencies of individual buildings, as well as landlord and tenant needs.

Does an intersection set exist? Or does the degree of flexibility called for across differing situations (buildings, geographies, landlords, tenants, etc.) defy a commoditized approach? In other words, will the demands of modularization and implementation guidance weigh down the essential simplicity that stakeholders very clearly demand to make any package work? And if so, can they be successfully pitched into a fairly segmented market with numerous actors that need to be considered. Indeed, this is the next challenge for this project: the creation of a small set of modularized packages, which will be lab-tested and then field-piloted for their fit into this complex market.

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