

High Performance Buildings

REQUIRE A

High Performance Regulatory Environment

Background

The national movement toward mandated high energy performance buildings is driven by a confluence of scientific, business, and government interests. The goal to reduce energy cost aligns closely with goals to reduce the environmental impacts associated with energy consumption. As a national leader in this movement, California has established aggressive State level mandates for high performance buildings via the California Energy Commission. The California Building Energy Efficiency Standards are on a track consisting of a three year cycle of regulatory updates to achieve Zero Net Energy for all new, low rise, residential buildings statewide by 2020 and all new commercial buildings by 2030. Some communities – such as Santa Monica’s “reach codes” put these objectives on an even shorter timeline. It is clear that achieving these goals will require significant changes in building design, products, systems, construction practices, and the regulatory environment. Given the complexity of the marketplace, it may be valuable to consider the challenges that arise in real world application of complex regulations. A review of “lessons learned” can help us avoid confusion about what is required, wasted and duplicative efforts, unintentional disincentives, plan review and enforcement disconnects, and conundrums that may unduly impact certain kinds of projects and customers.

This whitepaper examines examples drawn from recent informal conversations with design professionals, business owners, contractors, and property owners. It highlights regulatory challenges that result in outcomes that are unintended, unexpected, or less than optimal. It also suggests potential steps toward resolution. The intent of this whitepaper is to encourage the perspective that an effective program to move the marketplace toward very high performance buildings requires significant attention not only to policy, science, and regulatory mandates, but also on the regulatory environment itself. The Streamline Institute believes that the intended outcomes can be achieved with lower frustration, cost, and time by incorporating considerations for more efficient and effective regulations and processing as key components of the overall plan. This look at specific challenges and progress in California provides valuable case studies that may assist others in their movement toward a more efficient and sustainable energy future.

Challenges

1. Unduly Complex Regulations and Documentation Requirements

Understanding new regulations and *preparing the documentation* required by them are two separate challenges which can involve significant cost and effort by the private sector. After submittal documentation is completed, there are additional public sector costs to process it through review, approval, and final field inspections. Excessive and duplicative documentation requirements can amplify the burdens on both the public and private sector and even lead to instances where the paperwork becomes a simple “paperweight” – too complex and cumbersome to effectively review. In the same light, regulations that become a voluminous spider web of complexity may act as a significant disincentive.

Ultimately, a “user perspective” must be at the table as new regulations are developed. Otherwise, there is a risk that costs may outweigh benefits and unexpected disincentives may be created.

Examples cited by a California Building Official: The 146 pages of the California Energy Code are followed by some 2000 pages of official supporting documentation, compliance manuals, and reference appendices. This begs the questions of how end users who are not engineers dedicated to this one area of expertise are going to apply the information in their day-to-day activities. Take the example of a simple residential water heater replacement. There at least seven different code sections that might apply to this common task, and a typical submittal requires 47 pages of paperwork. The replacement of 24 HVAC units in a small apartment building requires a total of 936 pages of forms. Each and every one of these pieces of paper has a cost associated with it: finding the requirement, filling out the forms, handling them, reviewing them, correcting, filing, and so on. These costs are imposed on the designer, the contractor, the building department, and the public at large. This dramatic escalation of paperwork is diverting resources from every party involved without corresponding benefits in performance or compliance.

2. Lack of Products to meet requirements at all project scales

When the last cycle of commercial California energy regulations first went into effect, some design professionals and contractors found that there were no cost effective products available in the marketplace to reasonably achieve some mandates such as lighting dimming and panel segregation for small projects. The result: electrical bids for a 1,500 sq. ft. wine tasting room were over quadruple the expected amounts (over \$40 per square foot). The same outcome was reported for a similar sized tenant improvement for a car rental company office. In conversations with manufacturer representatives, there was an indication that while they were well aware of the need that would be driven by the new regulations, there was a tendency to “hold back” on development of a full range of products that would be matched to all project sizes until demand was established. The result: products in the marketplace designed to be used in 10,000 sq. ft. and larger projects had to be jammed into tiny TI’s at a very high cost. This marketplace “gap” extended for nearly a year, and during this time, unreasonably higher costs hurt a number of small businesses, contractors and property owners without corresponding energy or public benefit.

3. Failure to consider “single dimensional” retrofit projects

The typical regulatory environment is based on a multi-dimensional project that includes many changes that happen concurrently, affording the potential to “trade off” higher performance in one area against lower performance in another area. When there is a “one dimensional project,” there is no potential for such trade offs. If these cases don’t fit into the code framework, they can be highly discouraged or perhaps even unfeasible even when they would result in significant energy performance and environmental benefits.

Example: A tenant and building owner would like to replace existing, single glazed storefront windows with a new double glazed system which will provide both significant energy savings, as well as a quieter interior. As a “one dimensional” project, it may prove difficult or impossible to conform to the current regulatory milieu without a significant

reduction in glass transparency that would render the retail setting unworkable, while also violating design review mandates that specify clear glazing for retail storefronts. The inflexibility of mandated “minimum standards” in examples like this can create a “Catch 22” that either stops some potential upgrades in their tracks or drives them “underground” to be executed without permits at all.

4. All or Nothing Framework

There are times when a building owner or a tenant are discouraged or outright dissuaded from pursuing simple projects that can provide major energy savings. One such example is replacement of existing, older lighting with high performance LED lamps or fixtures. If regulations mandate that all relamping or fixture replacements must incorporate daylight zoned dimming, for example, the controls required may trigger expensive rewiring - impacting existing operation and finishes and costly controllers, not to mention the extensive engineering and paperwork. The result: a tenant or owner who was ready to invest in a lighting upgrade that would yield high energy savings finds that they must either spend two to four times as much, proceed without permits, or leave the status quo.

5. Cost/Benefit considered at 20,000 foot level

Lighting is an area that has received considerable attention in the California energy regulations, and new systems that meet the current requirements certainly perform at high levels. What is less clear, however, is if the operational savings are sufficient to offset throwing away fixtures that are slightly less high performing but not able to meet the new requirements for lighting controls.

On some tenant improvements involving spaces less than 10 years old, design professionals noted that literal application of current regulation required demolition of “truckloads of less than 10 year old highly efficient light fixtures and lamps” as they could not be incorporated into the newly mandated zonal control networks. This situation raises the questions: are the environmental and financial costs associated with the destruction of the existing lighting improvements offset by operational savings during the lifetime of the new fixtures?

Another related question concerns the major shift in the marketplace that is occurring away from fixtures that can be “re-lamped” toward fixtures that must be “replaced in their entirety.” Will this shift - not addressed in current regulations - have the potential for unintended consequences? LED fixtures have long service lives, but they do eventually fail, in a “statistical” manner. In other words, a small number of fixtures will fail sooner than most others. In a 10,000 square foot office that has been reconfigured with fixtures that must be replaced when they reach the end of their service life, what happens when the first few fixtures fail? Will the entire area need to be redone because it would create an unacceptable variation in color, light level, or even finished appearance if visually matching fixtures are simply not then available? This scenario seems inevitable in a decade or less. Will the result bring both unexpected costs and negative environmental impacts at the 20,000 foot level?

Potential Mitigation

The issues noted above are but examples, but they beg the question: what kind of shifts in the regulatory environment might help prevent the unintended consequences illustrated:

- Impediments to simple and cost effective implementation of energy saving measures
- Exacerbated and focused negative impacts on small businesses
- Costs and uncertainty imposed on the private sector without proportional benefits
- Hidden delayed or unanticipated environmental and financial impacts

The broad perspective of the Streamline Institute's research on best practices for regulatory streamlining in the building permitting and entitlement processes provides suggestions for relatively simple adjustments that may help provide effective relief from these impacts and barriers.

1. Full engagement of the marketplace must occur: Design Professionals, Vendor, Code Officials, and Building Owners.

Regulations are developed in an "open" process where the "public" is invited to review drafts, offer suggestions, and vet outcomes. How engaged, however, is the full spectrum of stakeholder in the actual nitty gritty of regulatory evolution? Old school methods of public engagement involve posting notices of hearings and meetings in the designated official vehicle. Is this really a reliable or effective means for understanding issues, building relationships, and finding the common ground essential to "win-win" outcomes? Small firms and individuals still make up a large number of those who design and construct buildings and who operate stores and businesses. As but one example: some 2/3'ds of Architectural design firms have four people or fewer. Most firms of this size do not have the resources to devote time to regulatory development review. Similar disconnects occur in other aspects of the marketplace which creates and operates buildings. To really engage a full cross section of stakeholder, more direct and proactive means are necessary - going to the sources directly, providing channels tuned to customer and stakeholder preferences and resources, funding participation as necessary, and using technology to create high bandwidth, two way communication. All these and more are essential to success in creating a high performance regulatory environment.

2. A full range of Project and Customer Personas, along with mock ups and trial runs, must be part of the regulatory development process.

Transforming the marketplace requires deep understanding of the marketplace – including not just the "big players" and the 85% level, but the "small players" and the 5% level. The small projects must be accounted for, including their different economics. There must also be "simple paths" that can be used for simple projects and situations. Forms should be minimized, simplified, and automated. Small businesses are a critical part of the economic vitality of every community, and they must be part of the plan to achieve a high performance built environment. There must be consideration of the documentation required, both from the perspective of the cost to create it, as well as the value (or lack of value) to those required to enforce regulations. Complex technical matters should not be assumed to be able to be resolved only with correspondingly

complex regulatory processes and procedures. By way of example, consider the technology required to create a smart phone and the “simplicity” of these devices from the user perspective. That same “yin/yang” must exist in the regulatory environment for it to be successful at all levels. The fact that a business model of experts can rise to meet the challenges of complex regulations is not an indication of moving in the right direction. I would submit that it is, in fact, just the opposite. To simplify and clarify requires a dedicated perspective, effort and resources beyond analysis, engineering, and codification.

3. Enforcement Officials must be empowered to achieve intended outcomes using alternative approaches.

Modern uniform building codes recognize that there is no way to craft a set of regulations that can anticipate every possibility. Not only are there complexities and variables that cannot all be addressed, but there are also innovations and new approaches that are constantly emerging. To most reasonably deal with the messy complexity of the “real world,” at some point judgment must be brought to the table. In the Uniform Codes, this is accommodated with the provisions that permit Alternative Materials and Methods Requests (AMMR’s). This same approach should be incorporated into Energy Codes and Regulations which would allow for consideration of those inevitable situations where the intended result can be achieved by approaches that were not anticipated when the regulations were created. Building officials must have clear authority to use their professional judgement, just as they do in implementing life safety codes where Section 104.11 of the International Building Code provides an alternative path forward.

4. Sharing of Best Practices and an Active Feedback loop must be robustly supported.

When new codes and regulations roll out, there is a significant cost associated with learning their nuances and details. There is also a significant amount of “trial and error” that occurs as the marketplace seeks to find the most cost effective and simple means to achieve the required outcome. This process should be more literally and formally supported so that small innovations that might occur at the level of a single project, subcontractor, or design professional have potential to become known to the many others who are facing similar challenges. This is especially important as the complexity of code and regulatory compliance escalates. It is easy to envision an environment where example solutions and creative innovations might surface if there were a dynamic, flexible, searchable, and accessible means of knowledge sharing.

On a similar note, another key to success in moving aggressive energy saving and environmental goals forward is the establishment of a robust, active, and continual “Feedback Loop,” where disconnects, unanticipated consequences, and conundrums can come to light as early as possible. An ideal Feedback Loop would support a continuum of collaboration, which in turn would drive the fine grained adjustments that must be considered and implemented to maintain progress toward the intended trajectory. All this ideally happens while complex and diverse business environments continue to function effectively, providing the economic health and prosperity that is the core driver that supports progress forward.

Conclusion

This Whitepaper is intended to help start conversations, and it should be considered in that light. The Streamline Institute welcomes opportunities to be engaged in the movement toward more effective and efficient regulatory environment. The Streamline Institute believes that real streamlining results in High Performance Regulatory Systems that are an integral part of our progress forward. Streamlining does NOT imply regulatory abandonment.

To be comprehensive, effective streamlining efforts must be integrated throughout all dimensions of the development, adoption, implementation, application, interpretation, and enforcement of regulations. The most effective streamlining is not “applied” after regulations are implemented. A high level of attention to streamlining is essential to the success of the national movement toward buildings which are high performance, net zero net energy, and beyond.

Michael F. Malinowski, FAIA
President
Streamline Institute

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