



Market Research Report

**2007 COMMERCIAL ENERGY CODE
COMPLIANCE STUDY**



*A study of U.S. architects, electrical engineers, lighting designers
and building contractors*

*Sponsored by Architectural Products Magazine and the Lighting
Controls Association*

January 2007

ZING Communications, Inc.
612 – 23rd Avenue SW
Calgary, AB T2S 0J7
403.802.1809
www.zinginc.com
cdilouie@zinginc.com

COPYRIGHT

©2007 ZING Communications, Inc. All rights reserved. No part of this report may be reproduced or distributed in any manner without prior permission from the publisher.

DISCLAIMER

Neither ZING Communications, Inc. nor its employees or officers makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information disclosed.

PUBLISHER

The 2007 Commercial Energy Code Compliance Study is published by ZING Communications, Inc., a marketing communications and consulting firm specializing in the lighting and electrical industries. ZING's principal, Craig DiLouie, is a former editor and publisher of *Architectural Lighting* and a frequent contributor to *Illuminate*, *Lighting Management & Maintenance*, *Electrical Construction & Maintenance*, *The Electrical Distributor*, *Architectural Products*, *Power Outlet*, *Architectural Solid-State Lighting*, *Archi-Tech* and other publications. He is also the author of hundreds of articles and several books on lighting, three of these used as primers for certification exams, and one published by the IESNA as its Recommended Practice (RP) for lighting maintenance.

COMMENTS

ZING Communications, Inc. is interested in receiving input on the research and conclusions presented in this report. If you have suggestions for improvements on existing questions or would like to pose new questions for subsequent editions, please submit your feedback to:

Craig DiLouie, Principal
ZING Communications, Inc.
612 – 23rd Avenue SW
Calgary, AB T2S 0J7
403.802.1809
www.zinginc.com
cdilouie@zinginc.com

Table of Contents

METHODOLOGY4
INTRODUCTION6
DEMOGRAPHICS17
CODE ENFORCEMENT23
PROJECT PARTICIPANT RESPONSIBILITIES.....34
CODE COMPLIANCE46
BARRIERS TO COMPLIANCE53
SOURCES OF ASSISTANCE58

APPENDICES

APPENDIX I: VERBATIM RESPONSES63
APPENDIX II: SURVEY73

Methodology

The 2007 Commercial Energy Code Compliance Study was completed to study attitudes and compliance rates among architects, electrical engineers, lighting designers and building contractors concerning commercial energy codes in the United States.

The problem/opportunity to be addressed in this study: To what extent are commercial energy codes enforced, who enforces them, which participants in a construction project is responsible for compliance and has the most influence for compliance, and what is the current rate of compliance?

Why is this information being sought? Commercial energy codes have demonstrated to generate significant power and energy savings, encourage development and adoption of energy-efficient lighting technologies, and reduce carbon emissions. They are a positive driver for building efficiency.

For commercial energy codes to be effective, they must be both obeyed and enforced. First, those participants in new construction projects with code compliance responsibility must be aware of these responsibilities and how to comply, be given a code that is clearly written and enforceable, prioritize compliance in their designs, and protect specifications intended to achieve code compliance. Second, enforcement authorities must actively promote compliance and enforce the code. If these conditions are met on every project, the compliance rate enables realization of the intent of the code—to achieve long-term power and energy cost savings for the owners of commercial buildings.

The Commercial Energy Code Compliance Survey was designed to address these issues and estimate to what degree commercial energy codes are being implemented and enforced.

Research Objectives

This study is a descriptive study, answering who/what/where/when/how questions. It contains both quantitative and qualitative research, focusing on quantitative research and using qualitative research for “nice to know” information and to add deeper understanding of attitudes. This study is the result of survey research. Its objectives are:

1. Determine to what extent documentation or intent to comply with the commercial energy code is required by jurisdictions to acquire a commercial building permit.
2. Identify which organization typically has authority for interpreting the energy code and approving its application.
3. Identify which organization typically has authority for inspecting to verify compliance with the commercial energy code.
4. Identify which project participant typically has the largest share of responsibility for ensuring compliance with the lighting requirements of the commercial energy code.
5. Determine the level of influence for each typical new construction project participant in decision-making regarding compliance with the lighting portion of the energy code.
6. For those respondents who know their energy code compliance rate in states with a code at least as stringent as ASHRAE/IES Standard 90.1-1999 or later, determine the compliance rate with 1) all lighting requirements of the energy code, 2) the LPD requirements of the energy code, and 3) the mandatory shutoff requirements of the energy code.
7. Determine the relative significance of various potential barriers to adoption of the commercial energy code.
8. Determine the frequency of contact with various organizations for guidance on compliance with the commercial energy code.

Research Method

ZING Communications, Inc. conducted the study and partnered with Architectural Products Magazine, which provided an email list of 11,000 commercial architects, engineers and building contractors. In addition, ZING Communications utilized its own list of about 1,000 lighting designers. Energy code experts at the U.S. Department of Energy and interested parties within the lighting manufacturing community provided input on the survey questions.

The 2007 Commercial Energy Code Compliance Survey is a probability study that uses cluster samples resulting from dividing the population of interest into mutually exclusive and exhaustive subsets: architects, engineers and lighting designers. Some data was produced for building contractors for additional interest.

Survey Accuracy and Biases

The objective was to be able to estimate studied data items for each subset onto the population of interest as a whole. The target allowable error is $\pm 2.5\%$ at a confidence level of 95% for multiple-choice answers.

The responses are projectable to the parent population (the lists used) and are suggestive of the overall U.S. population of commercial architects, engineers and lighting designers.

All surveys are subject to several sources of error. These include: sampling error (because only a sample of a population is interviewed); measurement error due to question wording and/or question order, deliberately or unintentionally inaccurate responses, non-response (including refusals), interviewer effects (when live interviewers are used) and weighting.

There are three known forms of bias in this survey. The first is the bias inherent in the fact that this study is not a true universe study. No attempt was made to make the respondent list perfectly proportional to the overall market. Second is the bias resulting from unit non-responses, which occurs in all mail or web-based surveys; only people interested in the topic responded to a survey on the topic, resulting in a natural bias. Third is the bias resulting from item non-responses, or a significant number of "don't know" responses to certain questions, in particular when respondents were asked to provide an estimate of their firm's rate of energy code compliance. The first two forms of bias are

apparent but not addressed within the study; the last form of bias is addressed within the study, as the high rate of non-response to certain questions becomes relevant information in itself.

The Population Sample

The list was developed from two sources. First, Architectural Products Magazine agreed to sponsor the survey by donating approximately a list of email addresses representing approximately 11,000 commercial architects, engineers and building contractors (general, design-build, etc.). This list was estimated to be comprised of about 10,000 architects and the rest engineers and building contractors. The second source was ZING Communications' list for its e-newsletter LightNOW, based at Lightsearch.com, from which approximately 1,000 lighting designers were pulled.

Methodology

In November 2006, an email was distributed to approximately 12,000 architects, engineers, lighting designers and building contractors. Approximately 2,000 addresses were disregarded due to the respondent being unable to access email due to vacation, travel, etc., resulting in a net list of about 10,000. Based on the response rate, a second email was sent a week later to the same list. The email invited construction market actors to complete an online survey.

SurveyMonkey.com was selected as the survey vendor, which hosted the survey and collected responses for tabulation. Selection of this vendor completely automated the process.

The total number of responses is 431, a 4.3% response rate out of a total list of about 10,000 potential respondents. The main body of this study highlights the results in text, tables and graphics. The results are projectable to the target list within a certain accuracy and are suggestive of the U.S. construction market.

Introduction

Energy codes are designed to set minimum standards for design and construction and can significantly reduce building system life-cycle costs. While lighting is a significant energy consumer, international energy codes have focused on thermal systems, although that is changing.

U.S. energy codes address lighting by setting lighting power density (LPD) limits on lighting for whole buildings. Setting LPD limits for whole buildings is important because energy-efficient lighting can be inefficient as a whole if installed in high densities in a building. Most codes now also mandate automatic lighting shut-off controls.

Prior to 1992, states in the U.S. enacted energy codes on a voluntary basis. Some developed their own codes, while others adopted model energy codes. These model energy codes include ASHRAE/IES Standard 90.1, or the International Energy Conservation Code (IECC) developed by the International Code Council [the successor to the council for American Building Code Officials (CABO) Model Energy Code (MEC)].

The Energy Policy Act of 1992 amended the Energy Conservation and Production Act (ECPA) to establish ASHRAE/IESNA 90.1-1989 *Energy-Efficient Design of New Buildings Except Low-Rise Residential Buildings* as the Federally mandated minimum design and construction standard for commercial buildings throughout the United States.

ECPA also empowered the U.S. Department of Energy (DOE) to review any updates to Standard 90.1 and determine whether such upgrades would save energy over previous versions. DOE estimated that adoption of ASHRAE/IES Standard 90.1-1999 would reduce source energy consumption by 6% and site energy consumption by 4% in a new building. When DOE made a positive determination for the 1999 Standard, it triggered a two-year window that required all 50 states to certify by July 15, 2004 that they had commercial energy codes in place that were at least as stringent as Standard 90.1-1999. Most states complied and adopted the 1999, 2001 or 2004 versions of Standard 90.1 or the 2001, 2003 or 2006 IECC. A few states, such as California, Florida, Oregon and Washington, developed their own codes.

Standard 90.1-1999 is referenced in the 2001 version of the IECC, while new Federal commercial construction is based on Standard 90.1-2001; specifically, new Federal commercial buildings must exceed Standard 90.1-2001 by 30% per a requirement created by the Energy Policy Act of 2005. Standard 90.1 and IECC are largely prescriptive, providing a set of measures that determine compliance, but also enable a performance approach using energy modeling. ASHRAE has proposed that portions of Standard 90.1-2004 dealing with lighting be adopted in the 2007 IECC supplement to the 2006 IECC.

Standard 90.1-1999/2001 (in terms of lighting, the two are virtually identical) and Standard 90.1-2004 (mainly more restrictive LPD limits) identify mandatory lighting controls that must be installed and set LPD limits for a range of building or space types, depending on the approach taken to determine compliance. These standards apply to new construction and renovation projects with specific exceptions for replacement of existing lighting systems with new lamps and ballasts. The U.S. Department of Energy estimates that more restrictive codes introduced after Standard 90.1-1999, such as Standard 90.1-2004, will achieve a total reduction of 18% in electricity compared to maintaining Standard 90.1-1999 as the national standard.

According to the Buildings Codes Assistance Project, as of August 2006, 17 states had adopted a code at least as stringent as Standard 90.1-2004, 11 states had adopted codes at least as stringent as Standard 90.1-2001, eight states had adopted codes at least as stringent as Standard 90.1-1999 (again, the lighting portions of the 1999 and 2001 standards are almost identical), six states and the District of Columbia had adopted a code—but one not at least as stringent as Standard 90.1-1999, and eight states had no statewide code—although the 2001 or 2004 standards had been adopted by some jurisdictions within these states. In other words, 36 states had instituted a code at least as stringent as the DOE-recognized energy standard, while 14 states had not. The adoption of codes based on the \geq 1999 standards has resulted in significant energy savings and adoption of energy-efficient lighting technologies and automatic controls.

States that had adopted, or were in the process of adopting, ASHRAE/IES Standard 90.1-2004/2006 IECC, as of August 2006, include:

Alaska
California
Florida
Georgia
Iowa
Kentucky
Montana
Nevada
New Jersey
North Carolina
Ohio
Oregon
Pennsylvania
South Carolina
Texas
Virginia
Washington

States that had adopted, or were in the process of adopting, ASHRAE/IES Standard 90.1-2001/2003 IECC, as of August 2006, include:

Arkansas
Connecticut
Idaho
Kansas
Maine
Maryland
Nebraska
New Mexico
Rhode Island
Utah
West Virginia

States that had adopted, or were in the process of adopting, ASHRAE/IES Standard 90.1-1999/2001 IECC, as of August 2006, include:

Delaware
Illinois
Louisiana
Massachusetts
Michigan
New Hampshire
New York
Vermont

States that had adopted a code that precedes ASHRAE/IES Standard 90.1-1999/2001 IECC

(and thereby does not comply with the DOE mandate), as of August 2006, include:

District of Columbia
Hawaii
Indiana
North Dakota
Minnesota
Oklahoma
Wisconsin

States that had not adopted any energy code, as of August 2006, include:

Alabama
Arizona
Colorado
Mississippi
Missouri
South Dakota
Tennessee
Wyoming

“All communities should follow the same energy code (ASHRAE/IESNA 90.1-2004) as that would eliminate many of the questions and confusion. Also, it would help to use that as it is baseline for LEED program.”

—lighting designer

In some of the states with no statewide energy code, there have been significant adoptions in jurisdictions. Colorado and Missouri have significant adoptions of ASHRAE/IES Standard 90.1-2001/2003 IECC in their jurisdictions. In Arizona, there have been significant adoptions of Standard 90.1-2004/2006 IECC in its jurisdictions.

About nine out of 10 commercial buildings were constructed before 1986; in most of these older buildings, lighting accounts for 50% of electrical energy use, according to the New Buildings Institute. In newer buildings that meet ASHRAE/IES Standard 90.1-1999, lighting accounts for only 30% of electrical energy use. Based on 2003 buildings data and 2005 average commercial electric energy costs, an average office building built according to the minimum requirements of Standard 90.1-1989 pays an estimated \$0.54/sq.ft. for energy to operate lighting

systems, while the average Standard 90.1-1999 office building pays \$0.42/sq.ft. and the average Standard 90.1-2004 office building pays \$0.33/sq.ft.

The 2007 Commercial Energy Code Compliance Study was formed to study implementation of energy codes. The Study posed the questions, “How are energy codes enforced, and who enforces them? Who in a typical construction project is influential in decision-making regarding compliance, and who is usually ultimately responsible for ensuring compliance? What is the rate of compliance in new construction projects? What barriers inhibit perfect compliance? Where do specifiers typically go when they need guidance?”

Important objectives are:

1. Determine to what extent documentation or intent to comply with the commercial energy code is required by jurisdictions to acquire a commercial building permit.
2. Identify which organization typically has authority for interpreting the energy code and approving its application.
3. Identify which organization typically has authority for inspecting to verify compliance with the commercial energy code.
4. Identify which project participant typically has the largest share of responsibility for ensuring compliance with the lighting requirements of the commercial energy code.
5. Determine the level of influence for each typical new construction project participant in decision-making regarding compliance with the lighting portion of the energy code.
6. For those respondents who know their energy code compliance rate in states with a code at least as stringent as ASHRAE/IES Standard 90.1-1999 or later, determine the compliance rate with 1) all lighting requirements of the energy code, 2) the LPD requirements of the energy code, and 3) the mandatory shutoff requirements of the energy code.
7. Determine the relative significance of various potential barriers to adoption of the commercial energy code.
8. Determine the frequency of contact with various organizations for guidance on compliance with the commercial energy code.

Key Findings

The results of this survey are not directly projectable to the overall U.S. construction market, but are suggestive. *The results suggest:*

1. Jurisdictions are more likely than not to require documentation or intent to comply with the applicable commercial energy code as a prerequisite for obtaining a commercial building permit.

“Provide a way for the codes to address lighting quality issues rather than watts. Yes, you can light a room at 0.5 watts per square foot, but quality suffers, productivity suffers. Also require the technology improvements to be viable before reducing wattage allowance to take advantage of the technology—i.e., 20W CMH.”

—lighting designer

2. In a jurisdiction, it is more common that the organization with authority to interpret the commercial energy code, approve its application, and then inspect the project to verify compliance is the local building department—specifically, an individual who also handles structural, plumbing, etc.
3. In a significant number of jurisdictions, the local authority does not inspect projects to verify commercial energy code compliance.
4. Engineers, in particular, consider lack of strict code enforcement to be a significant barrier to energy code compliance.
5. In a typical new construction project, the electrical engineer more often than not has the primary responsibility for ensuring commercial energy code compliance, and has the highest level of influence in decision-making related to compliance. If a lighting designer is involved in the project, however, the designer may acquire this responsibility and with it, a higher level of influence in decision-making.
6. Among specifiers who know, or are willing to share, their commercial energy code compliance rate, and whose primary work is in a state with an energy code at least as stringent as ASHRAE/IES Standard 90.1-1999, the average respondent complies with

- the lighting requirements of the code in an estimated 80% of new construction projects.
7. West Coast specifiers, on average, achieve a significantly higher rate of compliance with the code's mandatory automatic lighting shutoff requirements than specifiers in other states, and also exhibit a higher awareness of their firm's compliance rate.
 8. A population of specifiers considers their overall energy code lighting compliance rate to be higher than their compliance rate with the code's automatic lighting shutoff requirements, suggesting that some specifiers have less awareness of these requirements than for other requirements such as prescribed LPD limits.
 9. Value engineering, or a focus on initial cost that can result in the removal of critical lighting choices, is the most significant barrier to code compliance.
 10. A lack of awareness or knowledge of energy code lighting requirements and the code approval process is another significant barrier to compliance.
 11. Architects and engineers most often consult a product manufacturer when they have questions or need help with commercial energy code interpretation, application or guidance. Less frequently but fairly often, they consult the local building department.
 12. Product manufacturers are well regarded by specifiers in two issues related to energy code compliance—a "lack of commercially available product solutions" is considered a less than "somewhat significant" barrier to compliance, and architects and engineers, on average, most often consult a product manufacturer for energy code guidance.

Code Enforcement

A primary research question in this study is, "How are commercial energy codes enforced, and who enforces them?"

Respondents were asked several questions relating this primary research question. First, they were asked if their local jurisdiction requires documentation or intent to comply with the code as a prerequisite for obtaining a commercial building permit. Second, they were asked to identify which authority in their jurisdiction has authority to 1) interpret the code and approve its application, and 2) inspect the project to verify compliance.

Results were tabulated for individual subgroups—architects, engineers, lighting designers and building contractors—and a weighted average response was produced for an overall result.

"If building authorities would require compliance documentation prior to permit issue, plus enforce spot check field inspection to assure compliance, this would help get everyone to take the energy code more seriously."

—engineer

The results suggest that energy code compliance—documentation or intent to comply—is required to receive a building permit, that there is an authority that provides code interpretation and inspections to verify compliance, in a majority of jurisdictions in which an energy code is in effect. However, while a minority, there are a significant number of jurisdictions that do not require code compliance to receive a building permit, and a significant number of jurisdictions where inspections to verify compliance do not occur.

#1 – According to respondents, it is more typical than not for jurisdictions to require documentation or intent to comply with the applicable energy code as a prerequisite for obtaining a commercial building permit.

According to the weighted average response across all subgroups, 67% of respondents report that their jurisdiction requires documentation or intent to comply to obtain a commercial building permit, while 12% say their jurisdiction does not.

About one in five respondents (21%), however, report they do not know. This may be because other participants in the project other than the respondent, or other individuals at the respondent's firm, have primary responsibility for code compliance.

Looking at subgroups, 76% of architect respondents report that yes, their jurisdiction requires documentation or intent to comply to obtain a commercial building permit, while 9% say no, their jurisdiction does not, and 15% don't know. About three out of five (63%) engineer respondents report yes, 16% report no, and 20% say they don't know. About seven out of 10 (67%) lighting designer respondents report yes, 16% report no, and 16% say they don't know.

Three out of five (60%) building contractor respondents report yes, 7% report no, and one-third (33%) say they don't know.

#2 – According to respondents, the organization with authority to interpret the commercial energy code and approve its application, and inspect to verify code compliance, is most often a local building department—specifically, an individual or group who also deals with structural, plumbing, etc. As a weighted average of all respondents, about one in 10 reports that such inspections do not occur in their jurisdictions.

According to the weighted average response across all subgroups, 60% of respondents report that the local building department—specifically the same individual or group that also deals with structural, plumbing, etc.—has the authority to interpret the code and approve its application. Similarly, 47% of respondents report that this same person or group at the local building department has the authority to inspect projects to verify compliance with the energy code.

About one out of five (22%) of respondents report that the local building department—specifically a person or group who focuses solely on the energy code—has the authority to interpret the code and approve its application. Sixteen percent (16%) say this same person or group at the local building department has the authority to inspect projects to verify compliance.

A third-party contracted individual or organization is considered the authority to interpret the code and approve its application by 6% of respondents, and is considered the authority to inspect to verify compliance by 9% of respondents.

Interestingly, 5% of respondents say interpretation and approval of application of code is not done or required in their jurisdictions, and 12% say inspections to verify compliance is not done or required in their jurisdictions.

Additionally, 8% of respondents report they do not know what organization has authority to interpret code and approve code application, and 15% say they do not know what organization has authority to inspect to verify compliance.

Looking at subgroups, 73% of architect respondents and 71% of engineer respondents report the local building department—specifically the same person or group that deals with structural, plumbing, etc.—is the authority for interpreting the code and approving its application in their jurisdictions, compared to 56% for lighting

designer respondents and 58% for building contractor respondents. Eighteen percent (18%) of architect and 15% of engineer respondents report that it is the local building department but a person or group focusing solely on the energy code, while 33% of lighting designer respondents and 31% of building contractor respondents report that this person/group has this authority in their jurisdictions.

“In Oregon and Washington, we already have a well defined and delineated energy code that has been in place for well over a decade. Our electrical engineering consultants are well versed in commercial energy code compliance requirements. As both an architect and lighting designer, I would like to see manufacturers make product energy code information either more readily available—i.e., web or clearer. Right now we really don't have a residential lighting energy code but I'd like to see that information as well, as I feel this code will be coming around sooner or later. Better information saves the planet!”

—architect

A third party (contracted individual or organization) is rarely considered to be the local authority for interpreting and approving code application, according to respondents, although third parties are more frequently employed for inspection and verification. Six percent (6%) of architect, 8% of engineer, 4% of lighting designer, and 8% of building contractor respondents report that a third-party individual or organization has authority for interpreting the commercial energy code and approving its application. Eight percent (8%) of architect, 11% of engineer, 10% of lighting designer, and 10% of building contractor respondents report that a third-party individual or organization has authority to inspect projects and verify compliance.

It's a rare occurrence that there is no authority for interpreting code and approving its application, but it is more frequent that there is no authority for inspection and verification. Two percent (2%) of architect, 6% of engineer, 7% of lighting designer, and 4% of building contractor respondents report that code interpretation or approval of code application is not done or required in their jurisdictions. Twelve percent

(12%) of architect, 15% of engineer, 24% of lighting designer, and 3% of building contractor respondents report that inspection and verification is not done or required in their jurisdictions.

Project Participant Responsibilities

A primary research question in this study is, “Who holds the largest share of responsibility on the project team for ensuring code compliance, and what is the relative level of influence various project participants have on decision-making related to code compliance?”

Respondents were asked two questions relating this primary research question. First, they were asked to identify the project participant who typically holds the largest share of responsibility for ensuring energy code compliance. Second, they were asked to rate all typical possible project participants in terms of influence on decision-making related to code compliance, on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”

Results were tabulated for individual subgroups—architects, engineers, lighting designers and building contractors—and a weighted average response was produced for an overall result.

The results suggest that energy code compliance is largely the province of the electrical engineer, although in projects with a lighting designer participating, the lighting designer is also likely to play a lead role. Interestingly, architect, engineer and lighting designer respondents do not consider the electrical contractor to hold this responsibility, although 20% of building contractor respondents do. The results further suggest that the lighting designer and the engineer have the highest degree of influence in decision-making regarding energy code compliance, followed by the architect and the owner.

#3 – In a typical new construction project, the electrical engineer is most often the participant that has primary responsibility for ensuring energy code compliance, and has the greatest degree of influence in decision-making related to energy code compliance. In projects with a lighting designer involved, the lighting designer may assume this responsibility and with it, a higher level of influence in decision-making.

According to the weighted average response across all subgroups, 42% of respondents report that the electrical engineer most often has the largest share of responsibility for ensuring com-

pliance with the commercial energy code, followed by the lighting designer (21%), architect (14%) and electrical contractor (10%). On a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential” and 7 being “very influential,” the lighting designer is assigned the highest degree of influence on decision-making related to code compliance with a 5.7, followed by the engineer (5.5) and architect (5.0).

“In the state of North Carolina, it is required to put an energy code statement of compliance on contract documents prior to issue for bid and or final review set submitted to the authority having jurisdiction. The biggest issue we have with meeting the code is manufactured products. There needs to be more products designed to help meet the energy code.”

—engineer

Forty-three percent (43%) of architect respondents consider the engineer to most often have the largest share of responsibility for ensuring compliance with the energy code, followed by the architect (25%) and the lighting designer (21%). The architect considers the lighting designer to have the highest degree of influence in decision-making related to code compliance (5.6), followed by the architect (5.4) and engineer (5.4). The owner is also considered to have some influence (4.4).

Three out of five (61%) engineer respondents report that the engineer most often has the largest share of responsibility for ensuring code compliance, followed by the architect (11%) and lighting designer (11%). On average, engineer respondents consider the engineer to be the most influential in decision-making related to code compliance (5.8), followed by the lighting designer (5.5) and architect (4.8). The owner is also considered to have some influence (4.4).

Forty-four percent (44%) of lighting designer respondents report that the lighting designer most often has the largest share of responsibility for ensuring code compliance, followed by the engineer (34%). Interestingly, lighting designer respondents report that electrical contractors more frequently hold this responsibility (8%) than architects (7%). On average, lighting designer respondents consider the lighting de-

signer to be most influential in code compliance-related decision-making (6.5), followed by the engineer (5.2) and architect (4.0).

About one in three (32%) building contractors report that the engineer most often has the largest share of responsibility for ensuring code compliance, followed by the electrical contractor (20%), the owner (16%) and the architect (12%). On average, building contractor respondents consider the engineer to be most influential in code compliance-related decision-making (5.8), followed by the architect (5.3), owner (5.3) and lighting designer (5.0).

Code Compliance

A primary research question in this study is, “What is the rate of compliance with commercial energy codes?”

Respondents were asked three questions relating this primary research question. First, they were asked to estimate the percentage of their firm’s projects, for which the energy code applies, complies with all lighting requirements of the applicable energy code. Second, they were asked what percentage of projects complies with the code’s LPD limits. Third, they were asked what percentage of projects complies with the commercial energy code’s requirements for automatic lighting shutoff.

Results were tabulated for individual subgroups—architects, engineers and lighting designers—and a weighted average response was produced for an overall result. Building contractor responses were disregarded due to an insufficient response rate to these questions.

For these three questions, respondents were qualified based on whether their primary work was conducted in a state that had complied with the DOE mandate recognizing ASHRAE/IES Standard 90.1-1999 as the national energy standard and had, as of August 2006, implemented a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999. Respondents were therefore drawn from the 36 states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Caro-

lina, Texas, Utah, Virginia, Vermont, Washington and West Virginia.

#4 - The actual energy code compliance rate—relative to the national energy standard—is lower than believed by a significant number of specifiers. Respondents in each subgroup, on average, report a lower compliance rate for automatic lighting shutoff requirements than for overall code compliance.

“I comply by using COM Check to verify it but this is all the inspectors look at and go by. I can have a compliance certificate with the permit application and place an entirely different system on site. Although I know I am still in compliance, nobody ever questions it, which leads me to question the competency of the inspectors.”

—architect

The results further suggest that a significant number of specifiers do not know, or are unwilling to reveal, their code compliance rate. It is possible that this is due to the respondent expressing a more limited personal role in producing energy code compliance compared to other project participants or other members of the respondent’s firm. However, the high rate of non-response may also suggest non-compliance.

Among those specifiers who do know, or are willing to share, their compliance rate—and whose primary field of work is in a state that has complied with the DOE mandate that all states have a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999—the rate of compliance is about 80% as a weighted average, based on compliance with the automatic lighting shutoff requirements of ASHRAE/IES Standards 90.1-1999, 2001 and 2004 as the lowest common denominator.

According to the weighted average response across all subgroups—based on respondents 1) who know their firm’s energy code compliance rate and 2) are in states that have enacted a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999—85.7% of new construction projects handled by respondent firms, for which the energy code applies, comply with all lighting requirements of the applicable

commercial energy code. The next two questions attempt to generate a more detailed response about aspects of the lighting requirements. Respondents report 86.5% of their projects comply with the prescribed LPD limits, and 80.0% comply with the code's requirements for automatic lighting shutoff.

Reporting a lower number for automatic shutoff compliance than overall lighting compliance was typical across all respondent subgroups. This in turn may be because 1) respondents are not aware of these requirements for compliance, or 2) attempt at compliance is made but automatic lighting controls are more sensitive to market barriers such as value engineering.

An interesting finding came from the high rate of item non-response for these questions. Item non-response occurs when an individual responds to a survey but refuses to answer a particular question or indicates a "don't know" answer. A high rate of item non-response injects bias into the survey results; in the case of this survey's response tabulation, it resulted in the response being qualified to respondents who know their firm's compliance rate, with those who do not being discounted in the results. As a weighted average, 38.6% of respondents did know, or refused to answer, the question about estimating their firms' overall code compliance rate specific to the code's lighting requirements. Further, 54.8% of respondents did not know, or refused to answer, the question about the percentage of projects complying with the code's prescribed LPD limits; and 48.9% of respondents did not know, or refused to answer, the question about their percentage of projects complying with the code's mandatory automatic lighting shutoff requirements. It is possible that item non-response to these questions is due to the respondent simply being unable to estimate their code compliance rate. It is likely due to the respondent expressing a more limited personal role in producing energy code compliance compared to other project participants or other members of the respondent's firm. However, the high rate of non-response may also suggest non-compliance.

Qualified architect respondents, on average, report that 87.4% of their new construction projects, for which the energy code applies, comply with all lighting requirements of the commercial energy code; 42% of respondents did not answer the question, indicating either they don't know the answer, or were unwilling to provide it. Architect respondents, on average, report that

86.2% of their new construction projects comply with the prescribed LPD limits; 63% of respondents did not answer this question. Architect respondents, on average, report that 79.8% of their new construction projects comply with the mandatory requirements for automatic lighting shutoff; 55% of respondents did not answer this question. Architect respondents exhibited the highest item non-response to the survey's questions about compliance with their applicable energy code's lighting requirements.

“[There should be] an easier ‘checklist’ for commercial buildings and clearly stated requirements—i.e., codes and regulations.”
—architect

Qualified engineer respondents, on average, report that 79.6% of their new construction projects, for which the energy code applies, comply with all lighting requirements of the commercial energy code; 38% of respondents did not answer the question, indicating either they don't know the answer, or were unwilling to provide it. Engineer respondents, on average, report that 82.2% of their new construction projects comply with the prescribed LPD limits; 38% of respondents did not answer this question. Engineer respondents, on average, report that 78.9% of their new construction projects comply with the mandatory requirements for automatic lighting shutoff; 35% of respondents did not answer this question. One would assume that engineers would have the highest level of awareness of their firms' energy code compliance rate, given that other respondents assign this professional such a high level of responsibility for ensuring energy code compliance. In the case of engineers, it is possible that a number of mechanical engineers responded to the survey, resulting in a significant level of item non-response.

Qualified lighting designer respondents, on average, report that 86.2% of their new construction projects, for which the energy code applies, comply with all lighting requirements of the commercial energy code; 16% of respondents did not answer the question, indicating either they don't know the answer, or were unwilling to provide it. Lighting designer respondents, on average, report that 89.4% of their new construction projects comply with the prescribed LPD

limits; 25% of respondents did not answer this question. Lighting designer respondents, on average, report that 81.0% of their new construction projects comply with the mandatory requirements for automatic lighting shutoff; 35% of respondents did not answer this question. Lighting designers exhibited the highest rate of compliance and highest item non-response to these questions, among the three respondent subgroups.

#5 - Looking at a weighted average of West Coast (California, Oregon, Washington—a region commonly associated with the country's strictest energy codes) respondents versus the rest of country's states that have a commercial energy code at least as stringent as Standard 90.1-1999, West Coast specifiers exhibit a much higher rate of compliance with the code's mandatory automatic lighting shutoff requirements. West Coast respondents also exhibited a much higher awareness of their firm's compliance rate.

The weighted average response across all subgroups—based on respondents 1) who know their firm's energy code compliance rate and 2) are in either on the West Coast (California, Oregon or Washington) or other states that have enacted a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999—was calculated to compare the West Coast to other states of interest. The hypothesis was that energy codes are more stringent on the West Coast and are more aggressively enforced, and that specifiers possess a greater level of awareness of the applicable energy code and its requirements.

The survey found that West Coast respondents' self-rated estimates of code compliance (lighting section) are marginally higher in terms of overall compliance and specifically compliance with prescribed LPD limits. However, the survey also found that self-rated estimates of compliance with energy code mandatory requirements for automatic lighting shutoff are significant higher for West Coast respondents than other respondents. Further, the survey found that West Coast respondents exhibited a significantly higher level of awareness of their firms' compliance rate than other respondents.

As a weighted average, 86.7% of new construction projects handled by West Coast respondent firms, for which the energy code applies, comply with all lighting requirements of the applicable commercial energy code, compared to 84.9% of respondents whose primary

work is in other states with codes at least as stringent as ASHRAE/IES Standard 90.1-1999. More specifically, 88.6% of projects handled by West Coast respondents comply with the applicable code's prescribed LPD limits, compared to 84.9% of projects completed by the firms of respondents doing work in other states. A significant finding is that 85.8% of West Coast respondents' projects comply with the applicable code's automatic lighting shutoff requirements compared to 76.3% of projects completed by firms of respondents in the rest of the country.

“Interdepartmental code writing needs to be on the same page, such as low power densities governed by energy codes in conflict with high footcandle levels governed by health codes. They don't match up well. There are other examples of these types of conflicts as well.”

—lighting designer

Additionally, as a weighted average, 32% of West Coast respondents didn't know, or refused to answer, when asked to estimate their firms' overall energy code (lighting section) compliance rate, compared to 42.6% of respondents in other states of interest. When asked to estimate their firms' compliance rate with the code's LPD limits, 42.8% of West Coast respondents didn't know, or refused to answer, compared to 60.6% of respondents in other states of interest. When asked to estimate their firms' compliance rate with the code's mandatory automatic lighting shutoff requirements, 37.9% of West Coast respondents didn't know, or refused to answer, compared to 54.4% of respondents in other states of interest.

Barriers to Compliance

A primary research question in this study is, “What potential barriers inhibit full compliance with the lighting portion of commercial energy codes?”

Respondents were asked to rate six potential barriers on a 1-7 scale, with 1 being “not significant,” 4 being “somewhat significant,” and 7 being “very significant.” The potential barriers included:

1. Value engineering (initial cost) removes critical lighting choices
2. Lack of commercially available product solutions
3. Lack of awareness or knowledge among design team of energy code lighting requirements
4. Lack of awareness or knowledge of approval process
5. Code language is unclear or not actionable
6. Energy code is not strictly enforced

Results were tabulated for individual subgroups—architects, engineers and lighting designers—and a weighted average response was produced for an overall result. Building contractor responses were disregarded due to an insufficient response rate to this question.

#6 – Respondents across all subgroups consider value engineering, resulting in the removal of critical lighting choices, to be the most significant barrier to commercial energy code compliance. Lack of awareness or knowledge of energy code lighting requirements and the code approval process, lack of strict enforcement of energy codes, and unclear or non-actionable code language, are also regarded to be more than somewhat important by respondents. In addition, lack of commercially available product solutions is regarded as less than somewhat significant as a potential barrier.

According to the weighted average response across all subgroups, “value engineering (initial cost) removes critical lighting choices” is regarded as the most significant barrier (5.1) to energy code compliance, followed by “lack of awareness or knowledge among design team of energy code lighting requirements” (4.5), “lack of awareness or knowledge of approval process” (4.4), “energy code is not strictly enforced” (4.4), “code language is unclear and not actionable” (4.2) and “lack of commercially available product solutions” (3.6).

Architect respondents, on average, rate “value engineering (initial cost) removes critical lighting choices” as the most significant barrier (5.1) to energy code compliance, followed by “lack of awareness or knowledge among design team of energy code lighting requirements” (4.5), “lack of awareness or knowledge of approval process” (4.5), “energy code is not strictly enforced” (4.3), “code language is unclear and

not actionable” (4.2) and “lack of commercially available product solutions” (3.7).

Engineer respondents, on average, rate “value engineering (initial cost) removes critical lighting choices” as the most significant barrier (5.1) to energy code compliance, followed by “energy code is not strictly enforced” (5.0), “lack of awareness or knowledge among design team of energy code lighting requirements” (4.5), “lack of awareness or knowledge of approval process” (4.3), “code language is unclear and not actionable” (4.2) and “lack of commercially available product solutions” (3.8).

“I think that becoming more familiar with LEED requirements and regulations, and implementing these procedures, [will] definitely create compliance with energy codes.”

—architect

Lighting designer respondents, on average, rate “value engineering (initial cost) removes critical lighting choices” as the most significant barrier (5.2) to energy code compliance, followed by “lack of awareness or knowledge among design team of energy code lighting requirements” (4.6), “lack of awareness or knowledge of approval process” (4.4), “energy code is not strictly enforced” (4.4), “code language is unclear and not actionable” (4.2) and “lack of commercially available product solutions” (3.3).

Sources of Assistance

A primary research question in this study is, “Where do specifiers go for guidance on commercial energy code compliance?”

Respondents were asked to rate how often they consult eight potential sources of energy code assistance on a 1-7 scale, with 1 being “never,” 4 being “occasionally,” and 7 being “always.” The potential sources included:

1. Local building department
2. State code office
3. Third-party consultant
4. Code development organization (i.e., ASHRAE, IECC)
5. Utility company
6. Product manufacturer

7. U.S. Department of Energy (www.energycode.gov)
8. Industry associations

Results were tabulated for individual subgroups—architects, engineers and lighting designers—and a weighted average response was produced for an overall result. Building contractor responses were disregarded due to an insufficient response rate to this question.

#7 – Respondents, as a weighted average, most often consult a product manufacturer when they have questions or need help with commercial energy code interpretation, application or guidance. They also “occasionally” consult the local building department.

According to the weighted average response across all subgroups, the product manufacturer is most often consulted for questions or help with commercial energy code interpretation, application or guidance (4.4), followed by the local building department (4.0). Less frequently than “occasionally,” they consult with the state code office (3.7), third-party consultant (3.7), code development organization (3.6), industry association (3.4), U.S. Department of Energy (3.2) or utility company (2.7).

Architect respondents, on average, most often consult with a product manufacturer for questions or help with commercial energy code interpretation, application or guidance (4.9), followed by a third-party consultant (4.3) and the local building department (4.1). Less frequently than “occasionally,” they consult with the state

code office (3.5), code development organization (3.5), industry association (3.5), U.S. Department of Energy (3.2) or utility company (2.8).

“The codes need to be very specific, not subject to interpretation, and enforced equally across the board!”

—lighting designer

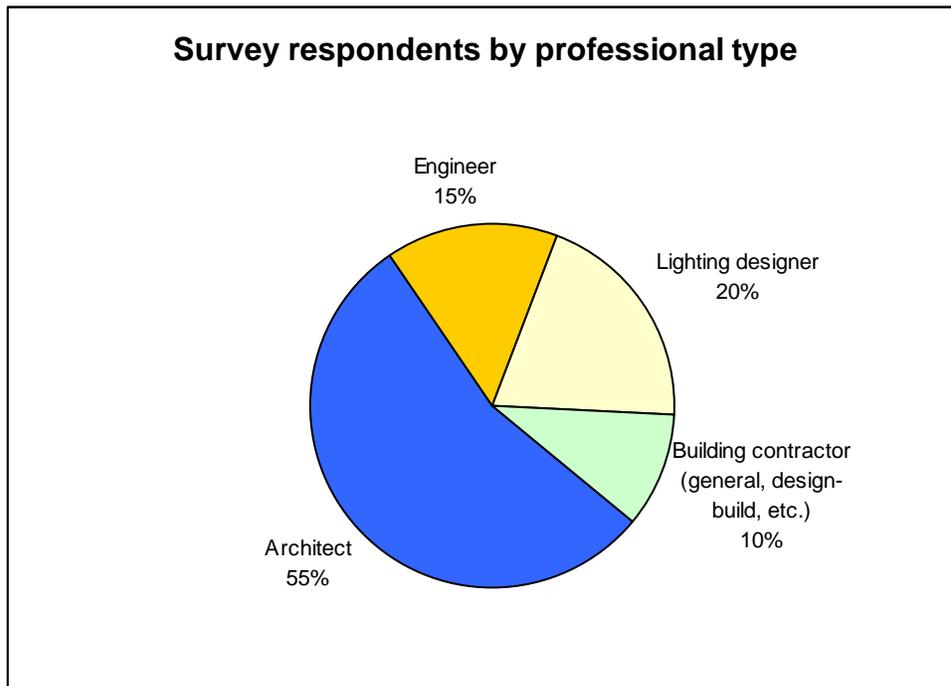
Engineer respondents, on average, most often consult with a product manufacturer for questions or help with commercial energy code interpretation, application or guidance (4.3), followed by the local building department (4.1). Less frequently than “occasionally,” they consult with a code development organization (3.9), the state code office (3.8), third-party consultant (2.9), industry association (2.9), U.S. Department of Energy (2.9) or utility company (2.9).

Lighting designer respondents, on average, most often consult with the state code office for questions or help with commercial energy code interpretation, application or guidance (4.0). Less frequently than “occasionally,” they consult with the local building department (3.8), a code development organization (3.8), U.S. Department of Energy (3.4), a product manufacturer (3.3), industry association (3.3) or utility company (2.3).

Demographics

Q: Which of the below professions most closely matches your own?

	Respondents	%
Architect	197	54%
Engineer	55	15%
Lighting designer	73	20%
Building contractor (general, design-build, etc.)	37	10%
Total respondents	362	100%



Q: In which state do you do most of your work?

	Architects		Engineers		Lighting designers		Building contractors	
Alabama	2	1%	3	5%	2	3%	1	3%
Alaska	0	0%	0	0%	0	0%	0	0%
Arizona	0	0%	0	0%	0	0%	0	0%
Arkansas	0	0%	0	0%	0	0%	0	0%
California	36	18%	6	11%	14	19%	5	14%
Colorado	0	0%	0	0%	1	1%	0	0%
Connecticut	3	2%	1	2%	1	1%	2	5%
Delaware	2	1%	0	0%	0	0%	0	0%
District of Columbia	5	3%	0	0%	0	0%	1	3%
Florida	12	6%	3	5%	3	4%	3	8%
Georgia	9	5%	1	2%	3	4%	2	5%
Hawaii	2	1%	0	0%	0	0%	0	0%
Idaho	0	0%	0	0%	0	0%	0	0%
Illinois	2	1%	1	2%	7	10%	0	0%
Indiana	7	4%	0	0%	1	1%	1	3%
Iowa	1	1%	0	0%	4	5%	0	0%
Kansas	0	0%	0	0%	0	0%	0	0%
Kentucky	2	1%	0	0%	0	0%	0	0%
Louisiana	0	0%	0	0%	0	0%	0	0%
Maine	1	1%	0	0%	0	0%	0	0%
Maryland	9	5%	1	2%	1	1%	2	5%
Massachusetts	10	5%	3	5%	3	4%	5	14%
Michigan	4	2%	4	7%	1	1%	1	3%
Minnesota	2	1%	0	0%	1	1%	0	0%
Mississippi	0	0%	0	0%	0	0%	0	0%
Missouri	0	0%	0	0%	0	0%	0	0%
Montana	0	0%	0	0%	0	0%	0	0%
Nebraska	0	0%	0	0%	1	1%	0	0%
Nevada	0	0%	0	0%	1	1%	0	0%
New Hampshire	0	0%	0	0%	0	0%	0	0%
New Jersey	12	6%	0	0%	2	3%	1	3%
New Mexico	0	0%	0	0%	1	1%	0	0%
New York	24	12%	5	9%	7	10%	4	11%
North Carolina	3	2%	3	5%	2	3%	1	3%
North Dakota	0	0%	1	2%	0	0%	0	0%
Ohio	10	5%	2	4%	3	4%	0	0%
Oklahoma	0	0%	0	0%	0	0%	0	0%
Oregon	5	3%	2	4%	4	5%	4	11%
Pennsylvania	11	6%	3	5%	0	0%	0	0%
Rhode Island	0	0%	0	0%	1	1%	0	0%

Q: In which state do you do most of your work?

	Architects		Engineers		Lighting designers		Building contractors	
South Carolina	1	1%	2	4%	0	0%	0	0%
South Dakota	0	0%	0	0%	0	0%	0	0%
Tennessee	0	0%	0	0%	0	0%	1	3%
Texas	0	0%	2	4%	0	0%	0	0%
Utah	0	0%	0	0%	1	1%	0	0%
Vermont	3	2%	0	0%	0	0%	0	0%
Virginia	6	3%	5	9%	0	0%	0	0%
Washington	8	4%	4	7%	7	10%	1	3%
West Virginia	0	0%	0	0%	0	0%	0	0%
Wisconsin	5	3%	3	5%	1	1%	2	5%
Wyoming	0	0%	0	0%	0	0%	0	0%

Architects (197 respondents)



Q: In which state do you do most of your work?

Engineers (55 respondents)



Lighting designers (73 respondents)



Q: In which state do you do most of your work?

Building contractors (37 respondents)



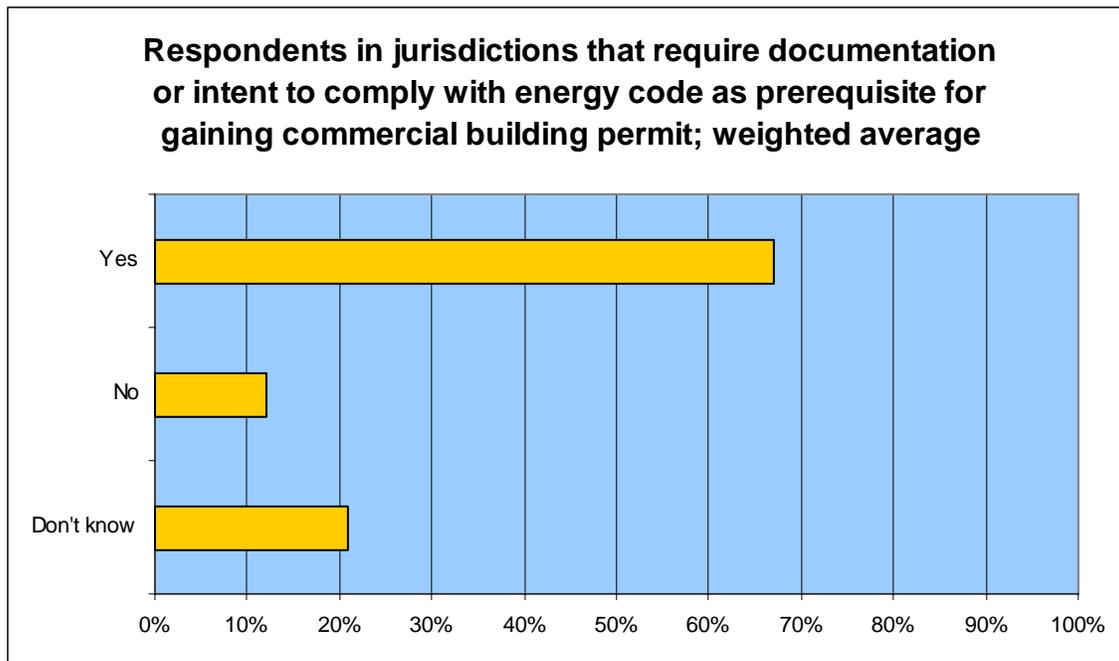
Code Enforcement

#1 – According to respondents, it is more typical than not for jurisdictions to require documentation or intent to comply with the applicable energy code as a prerequisite for obtaining a commercial building permit.

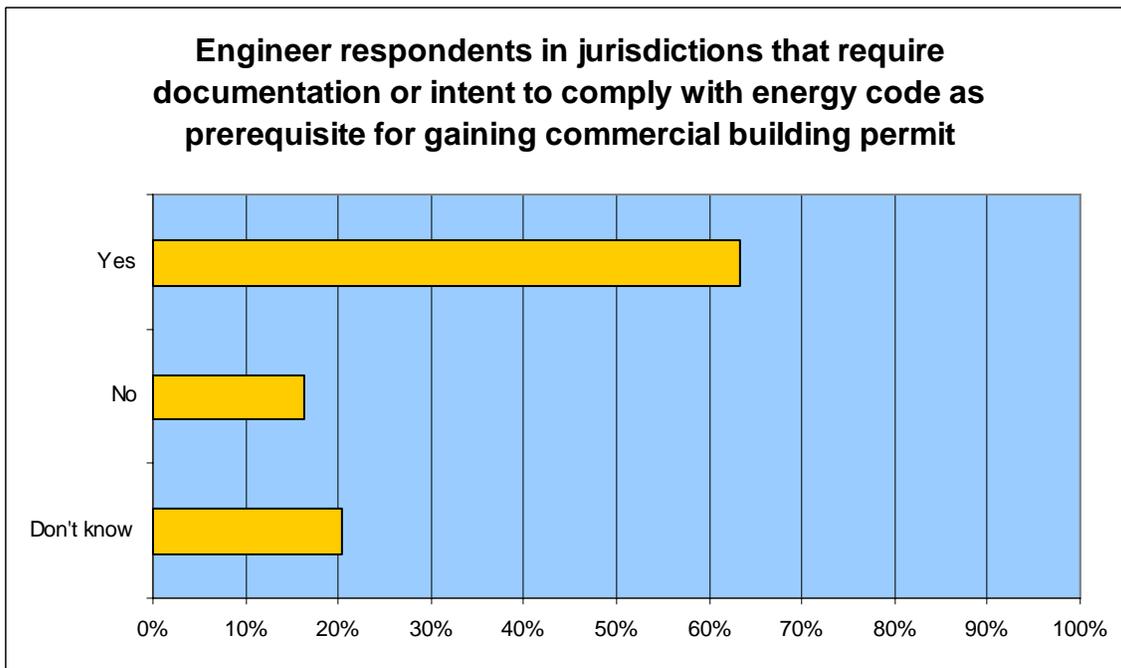
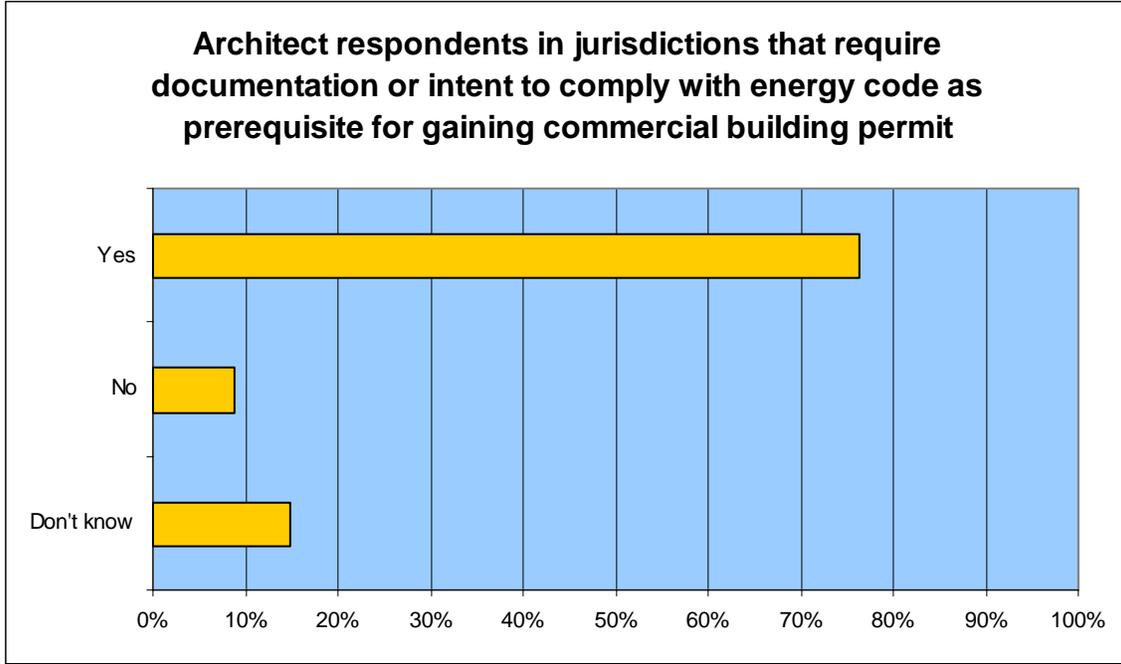
#2 – According to respondents, the organization with authority to interpret the commercial energy code and approve its application, and inspect to verify code compliance, is most often a local building department—specifically, an individual or group who also deals with structural, plumbing, etc. As a weighted average of all respondents, about one in 10 reports that such inspections do not occur in their jurisdictions.

Q: Does your local jurisdiction require documentation or intent to comply with the energy code as a prerequisite for obtaining a commercial building permit?

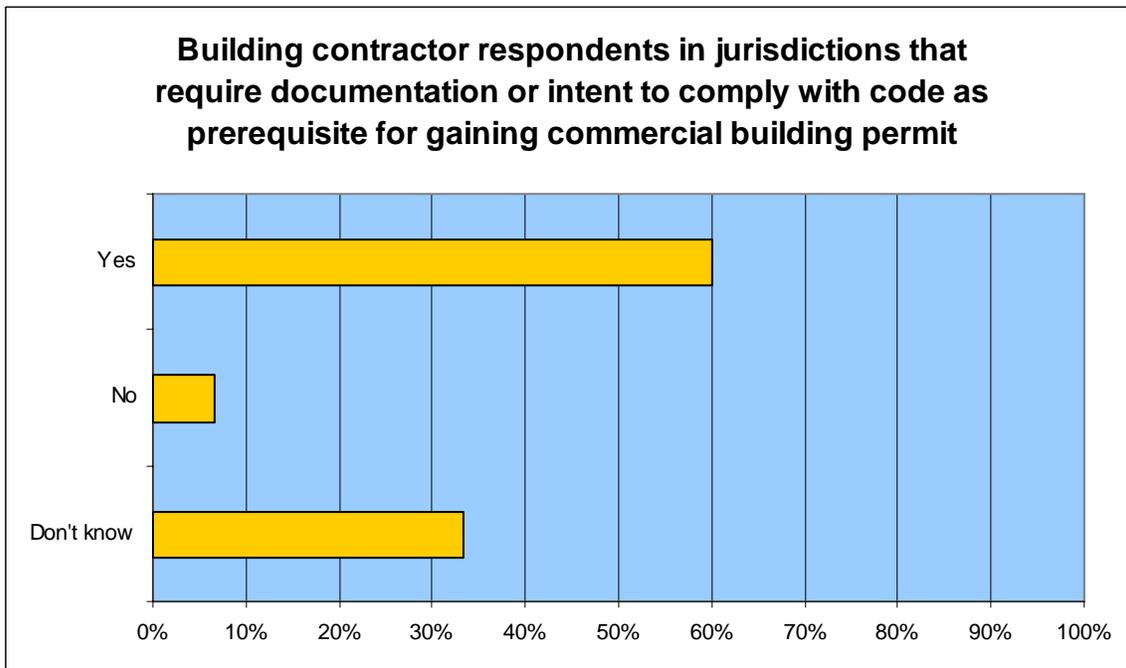
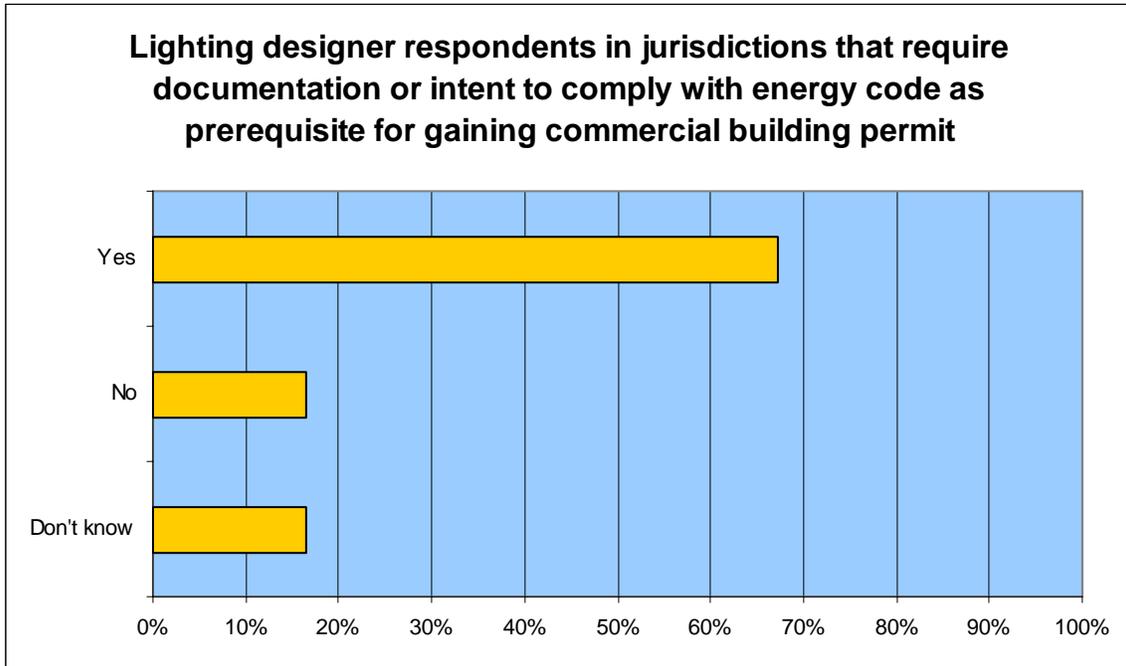
	Architects		Engineers		Lighting designers		Building contractors		Weighted average
Yes	129	76%	31	63%	41	67%	18	60%	67%
No	15	9%	8	16%	10	16%	2	7%	12%
Don't know	25	15%	10	20%	10	16%	10	33%	21%
	169		49		61		30		



Q: Does your local jurisdiction require documentation or intent to comply with the energy code as a prerequisite for obtaining a commercial building permit?



Q: Does your local jurisdiction require documentation or intent to comply with the energy code as a prerequisite for obtaining a commercial building permit?



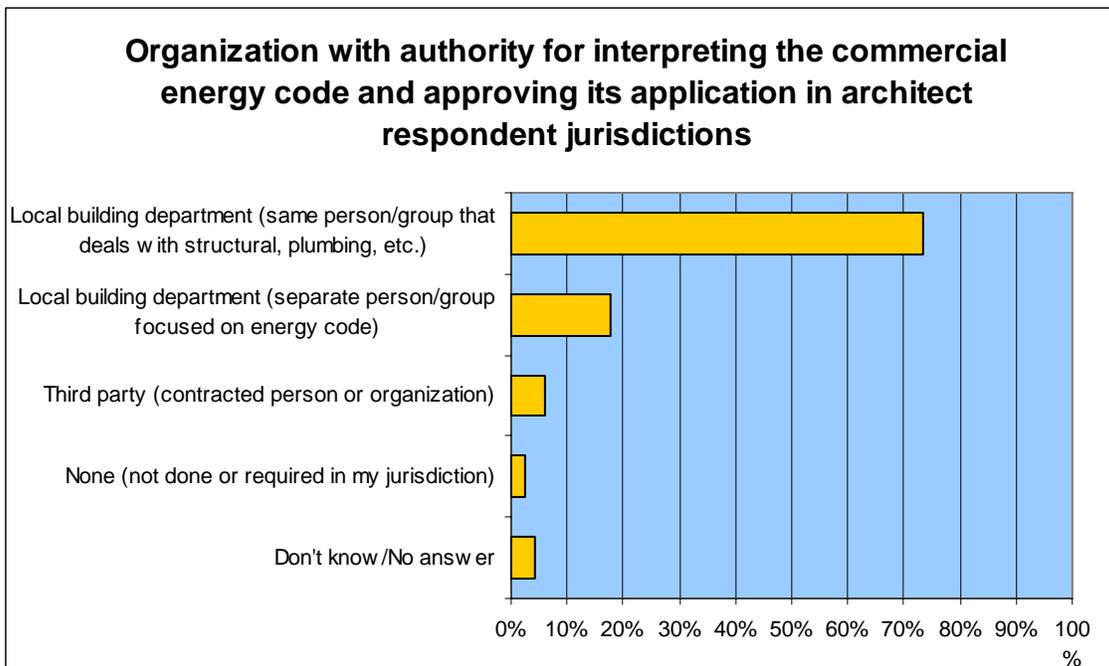
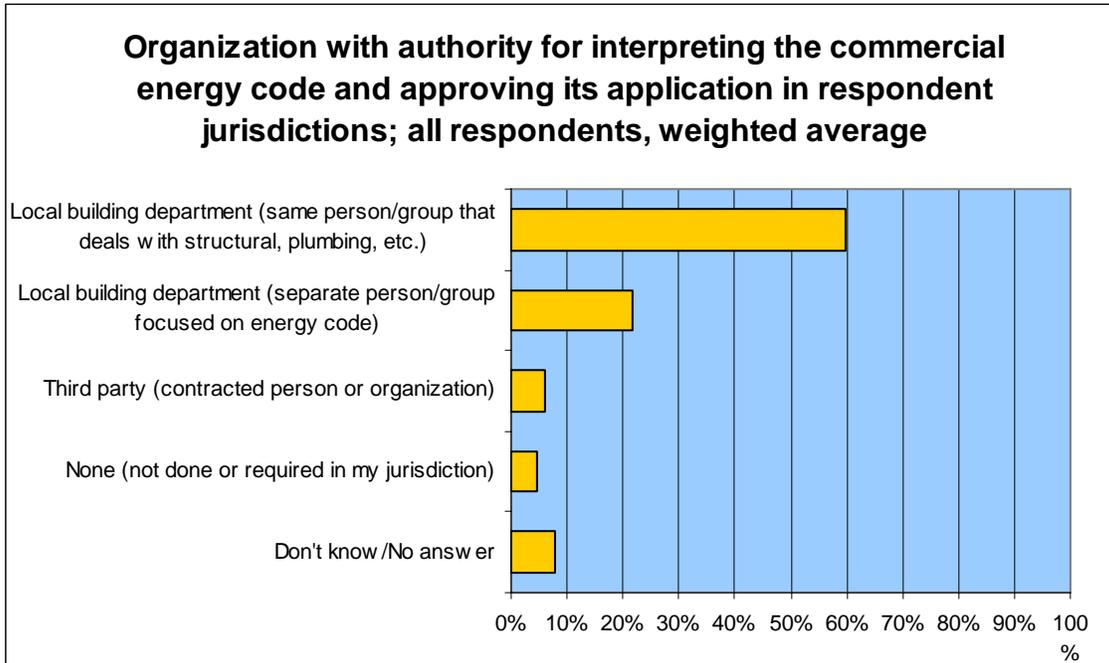
Q: In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?

	Architects		Engineers		Lighting designers		Building contractors		Weighted average
	Count	%	Count	%	Count	%	Count	%	
Local building department (same person/group that deals with structural, plumbing, etc.)	119	73%	34	71%	30	56%	15	58%	60%
Local building department (separate person/group focused on energy code)	29	18%	7	15%	18	33%	8	31%	22%
Third party (contracted person or organization)	10	6%	4	8%	2	4%	2	8%	6%
None (not done or required in my jurisdiction)	4	2%	3	6%	4	7%	1	4%	5%
Don't know/No answer	7	4%	1	2%	7	13%	4	15%	8%
	169		49		61		30		

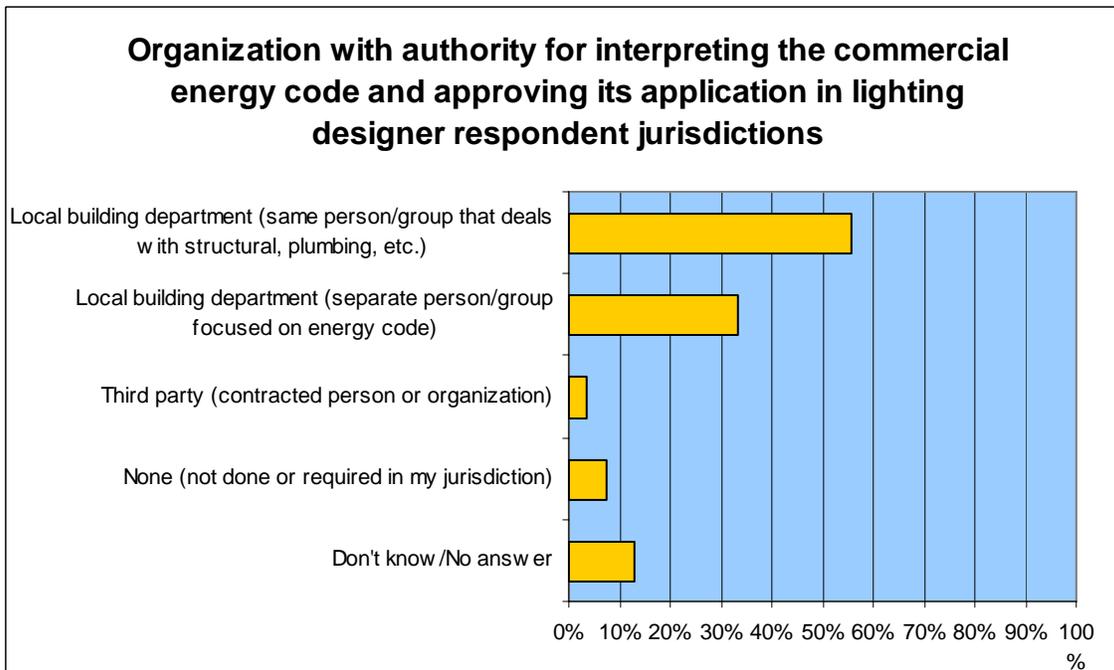
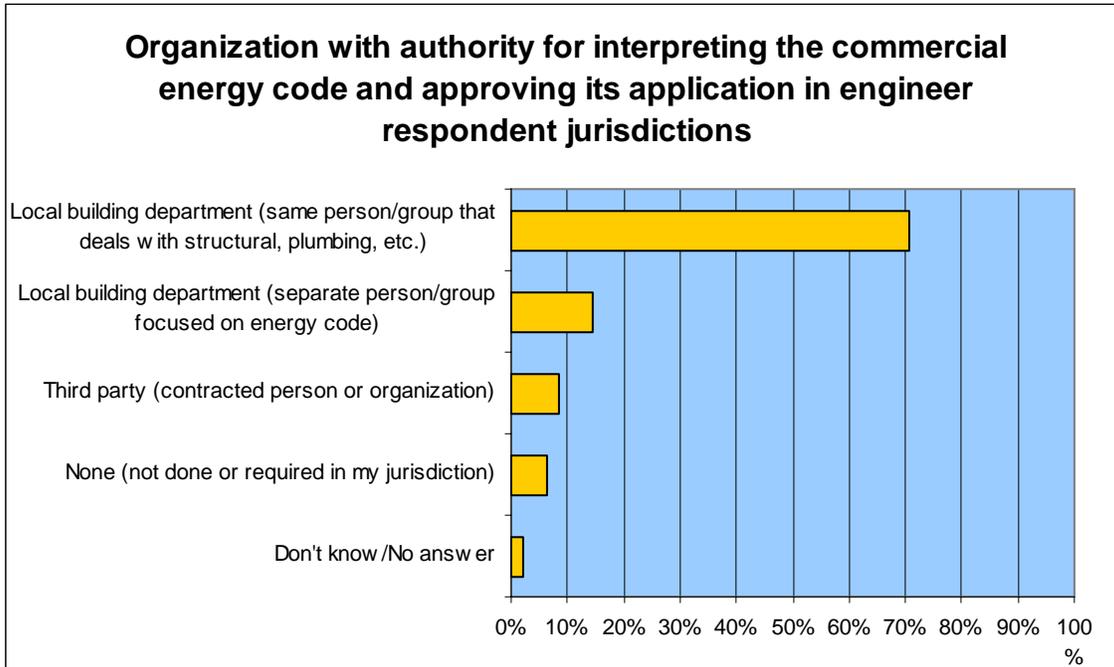
Q: In your local jurisdiction, which organization has authority for INSPECTING to VERIFY COMPLIANCE with the commercial energy code?

	Architects		Engineers		Lighting designers		Building contractors		Weighted average
	Count	%	Count	%	Count	%	Count	%	
Local building department (same person/group that deals with structural plumbing etc.)	98	64%	27	57%	22	44%	12	40%	47%
Local building department (separate person/group focused on energy code)	24	16%	8	17%	11	22%	5	17%	16%
Third party (contracted person or organization)	12	8%	5	11%	5	10%	3	10%	9%
None (not done or required in my jurisdiction)	19	12%	7	15%	12	24%	1	3%	12%
Don't know/No answer	16	10%	2	4%	11	22%	9	30%	15%
	12		5		5		3		

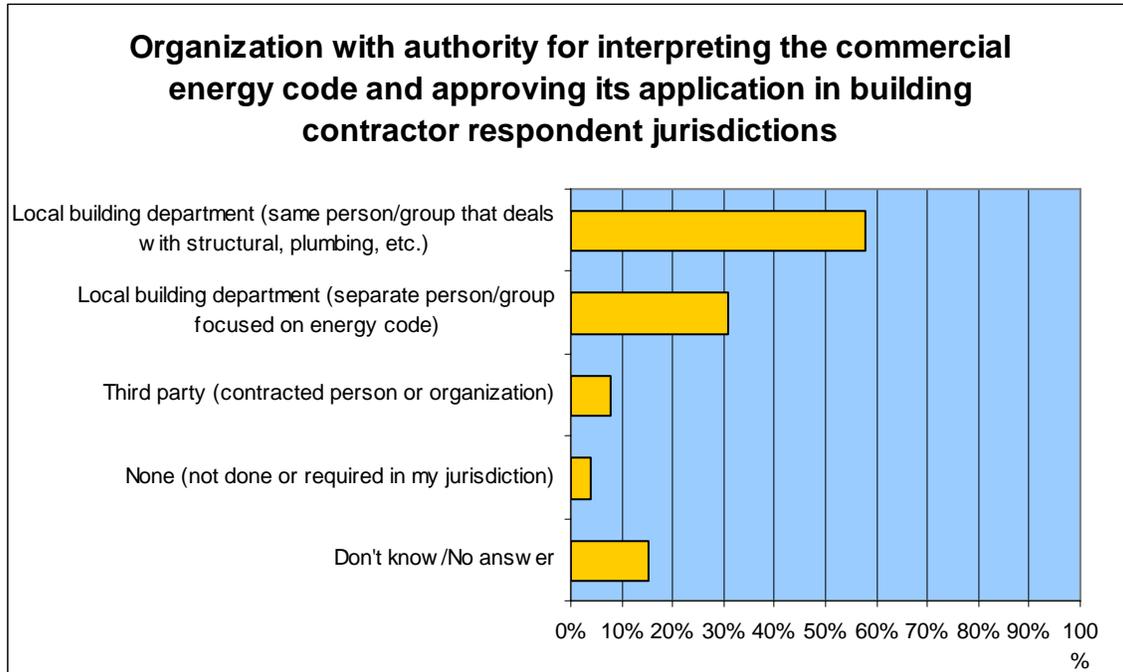
Q: In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?



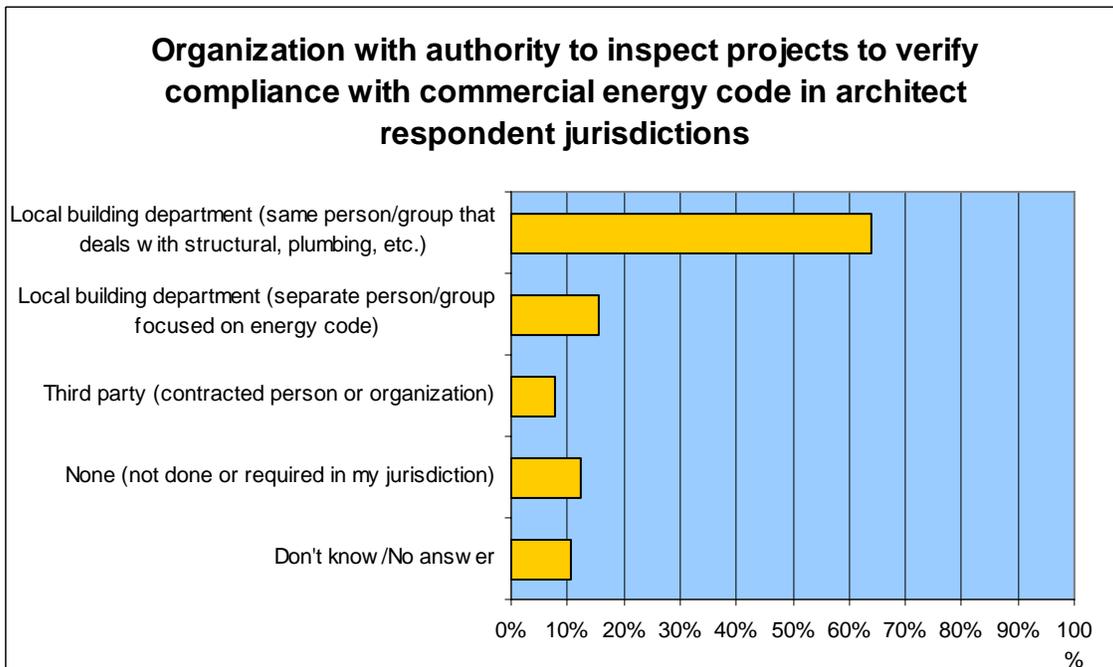
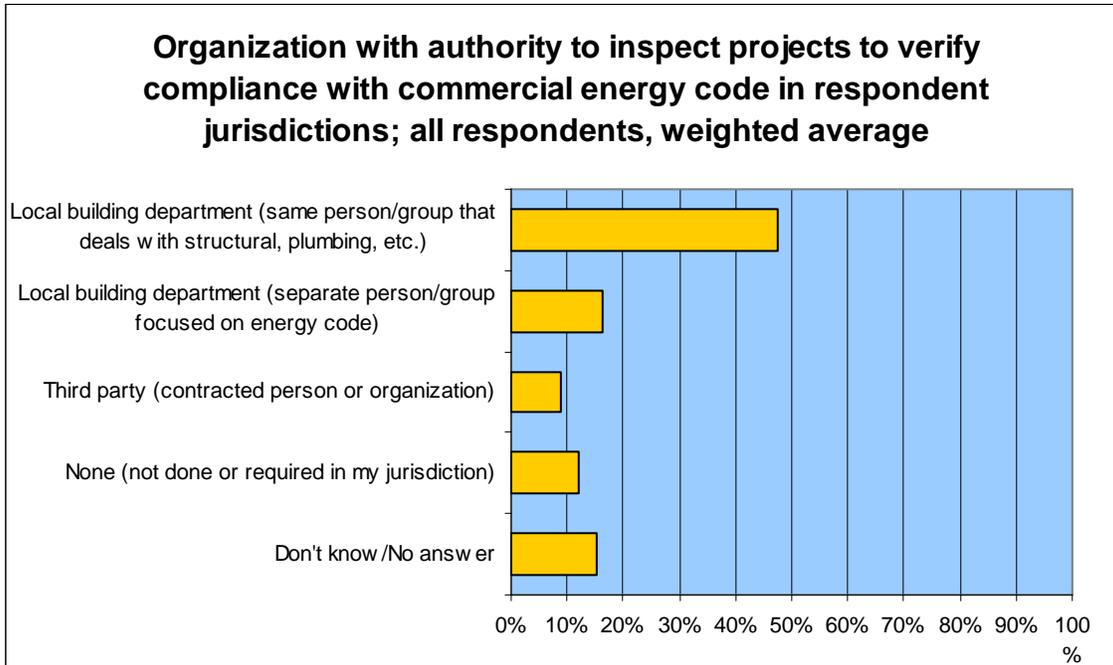
Q: In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?



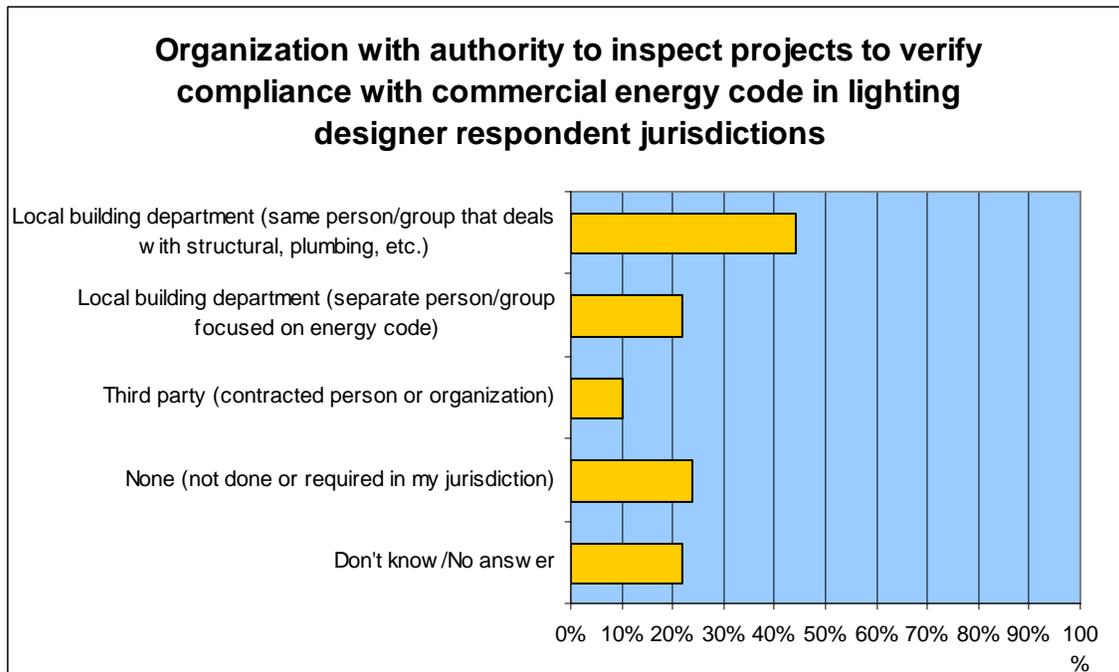
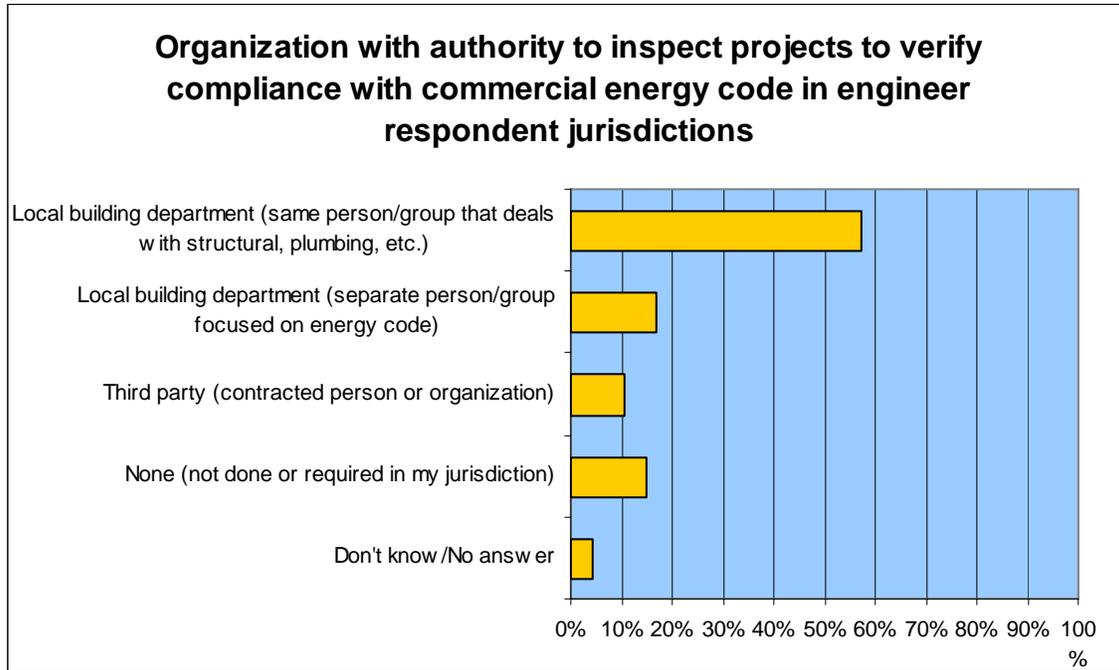
Q: In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?



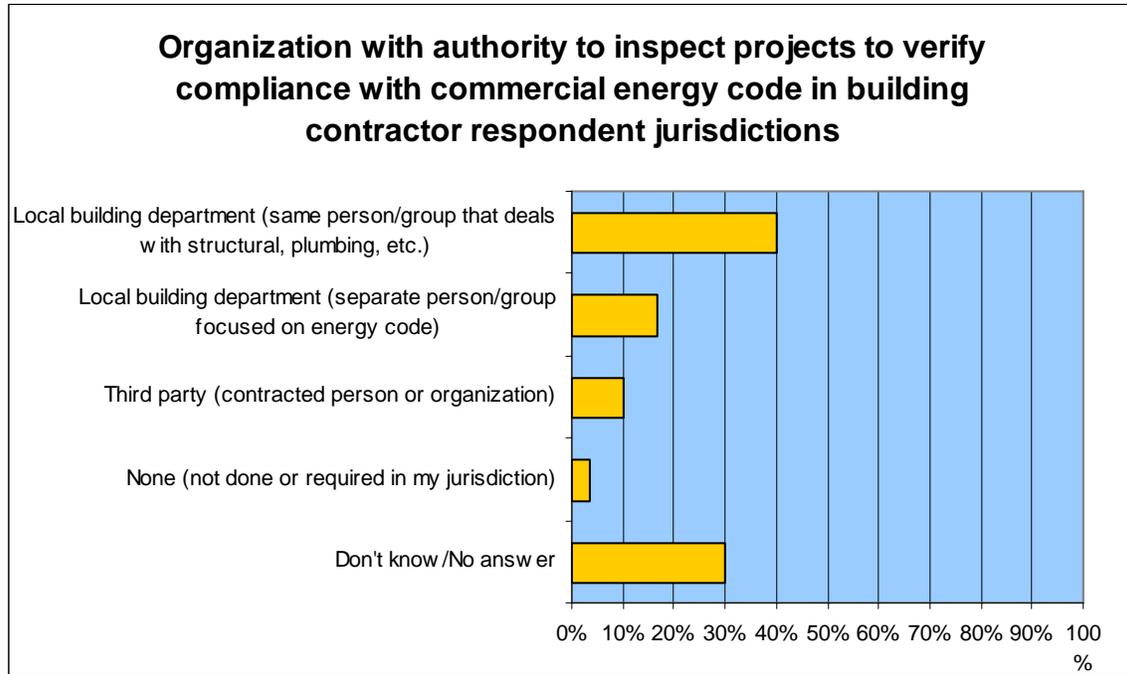
Q: In your local jurisdiction, which organization has authority for INSPECTING to VERIFY COMPLIANCE with the commercial energy code?



Q: In your local jurisdiction, which organization has authority for INSPECTING to VERIFY COMPLIANCE with the commercial energy code?



Q: In your local jurisdiction, which organization has authority for INSPECTING to VERIFY COMPLIANCE with the commercial energy code?

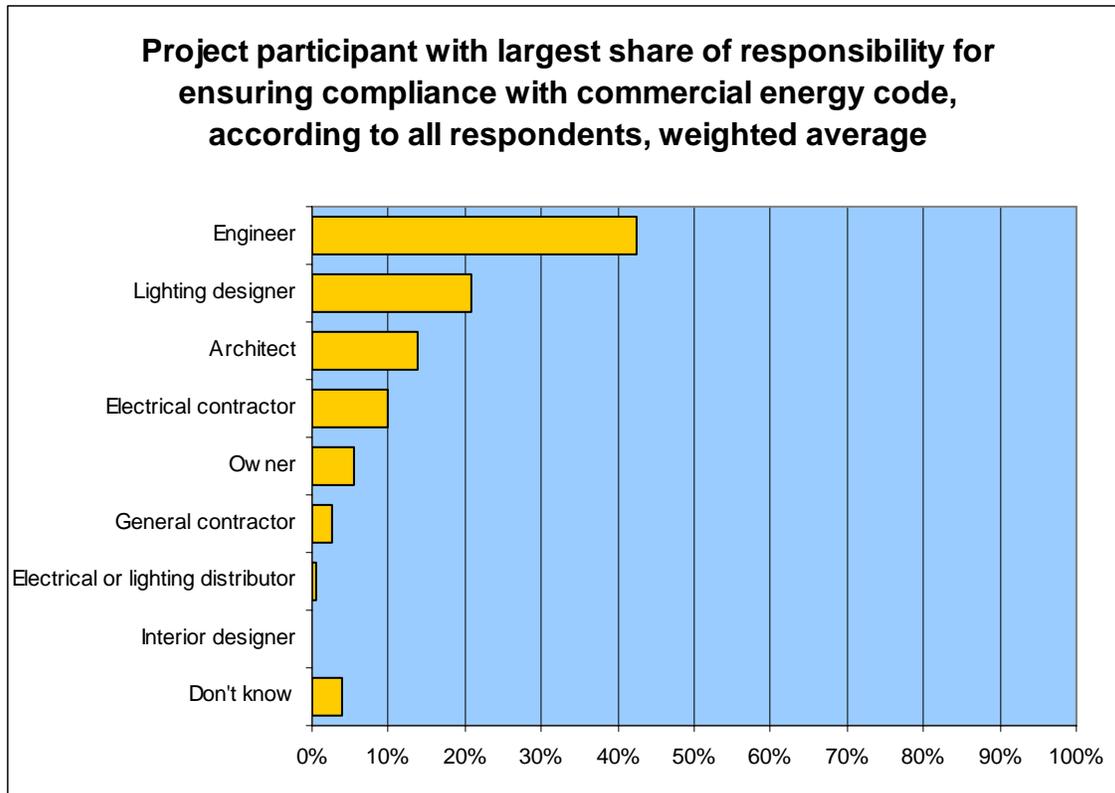


Project Participant Responsibilities

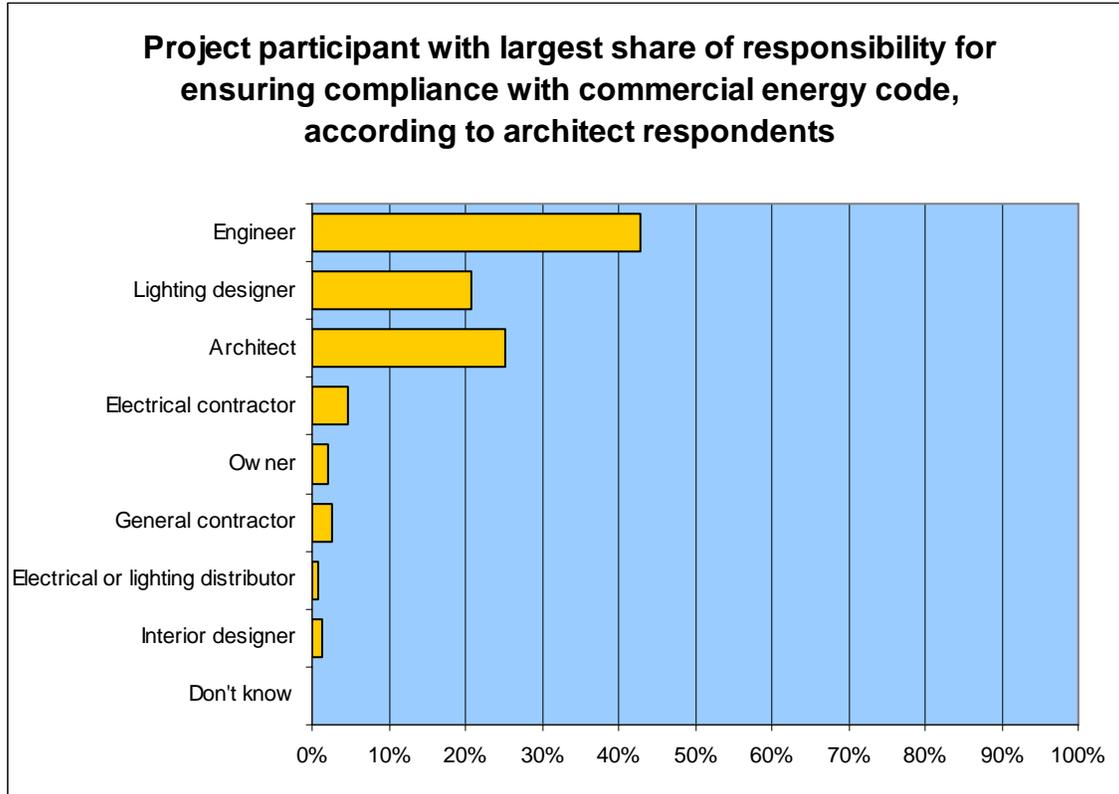
#3 – In a typical new construction project, the electrical engineer is most often the participant that has primary responsibility for ensuring energy code compliance, and has the greatest degree of influence in decision-making related to energy code compliance, according to respondents. In projects with a lighting designer involved, the lighting designer may assume this responsibility and with it, a higher level of influence in decision-making.

Q: In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?

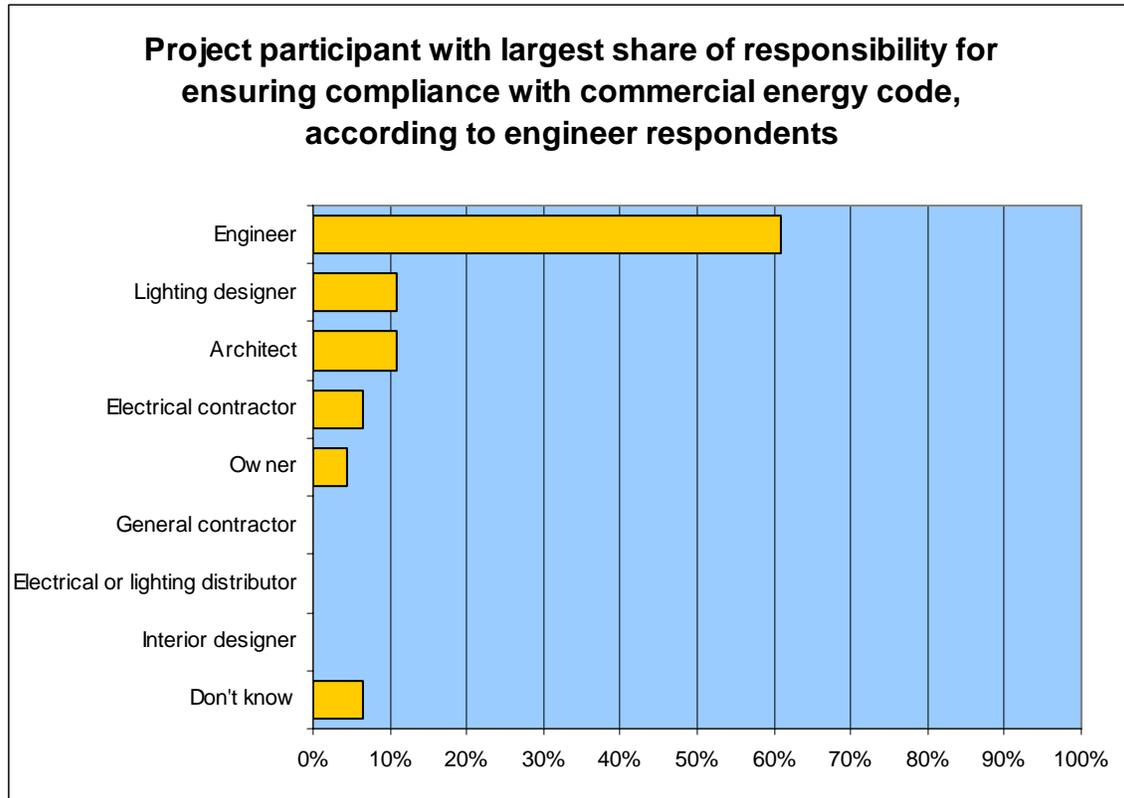
	Architects		Engineers		Lighting designers		Building contractors		Weighted average
Architect	39	25%	5	11%	4	7%	3	12%	14%
Engineer	66	43%	28	61%	20	34%	8	32%	42%
Lighting designer	32	21%	5	11%	26	44%	2	8%	21%
Owner	3	2%	2	4%	0	0%	4	16%	6%
General contractor	4	3%	0	0%	0	0%	2	8%	3%
Electrical contractor	7	5%	3	7%	5	8%	5	20%	10%
Electrical or lighting distributor	1	1%	0	0%	1	2%	0	0%	1%
Interior designer	2	1%	0	0%	0	0%	0	0%	0%
Don't know	0	0%	3	7%	3	5%	1	4%	4%
	154		46		59		25		



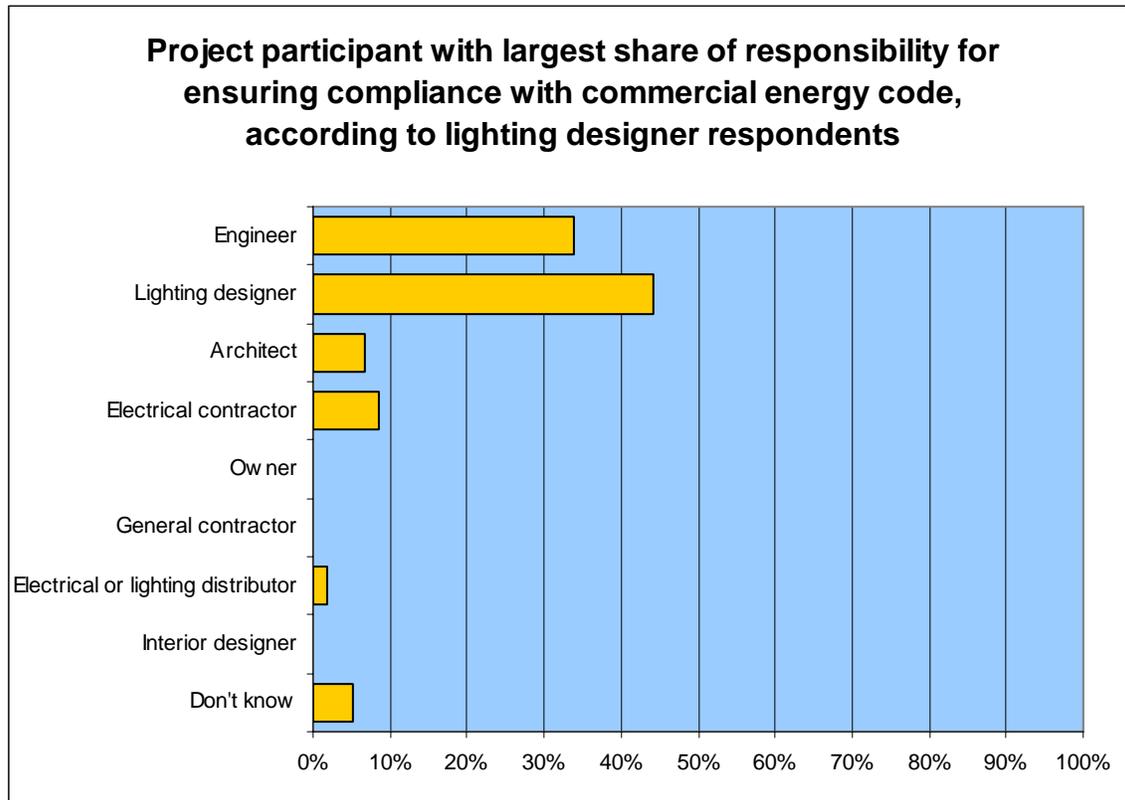
Q: In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?



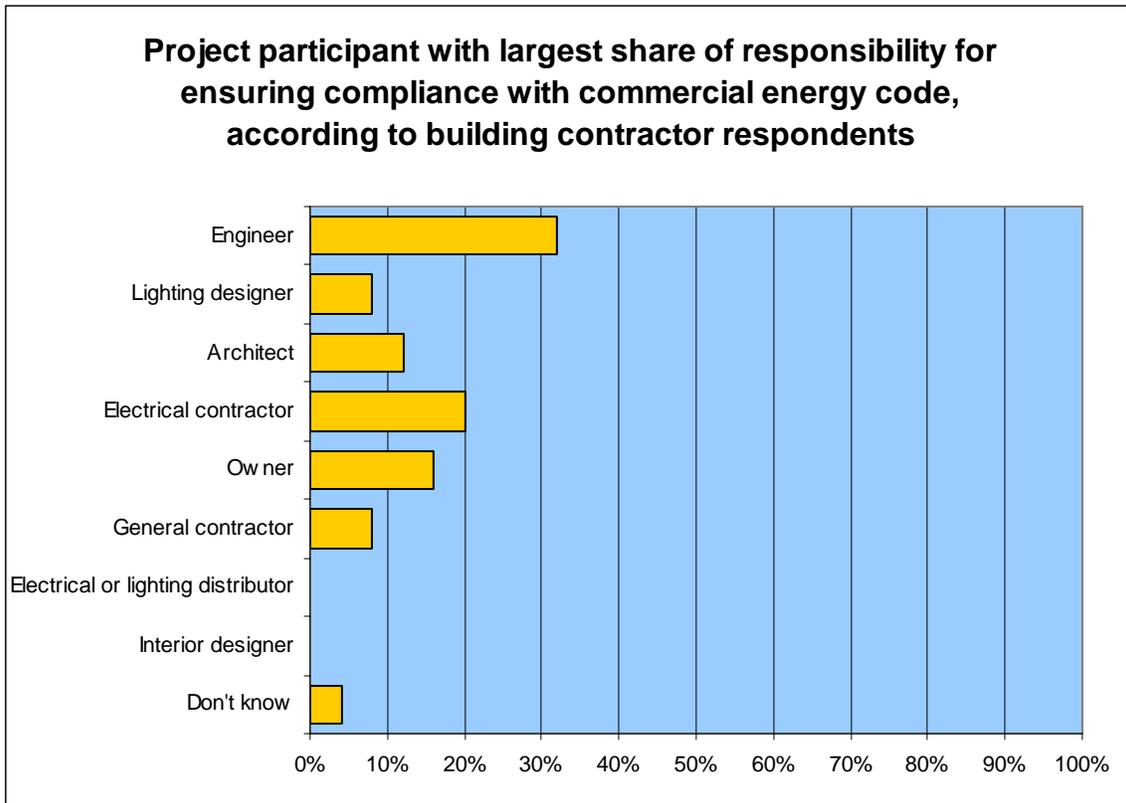
Q: In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?



Q: In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?

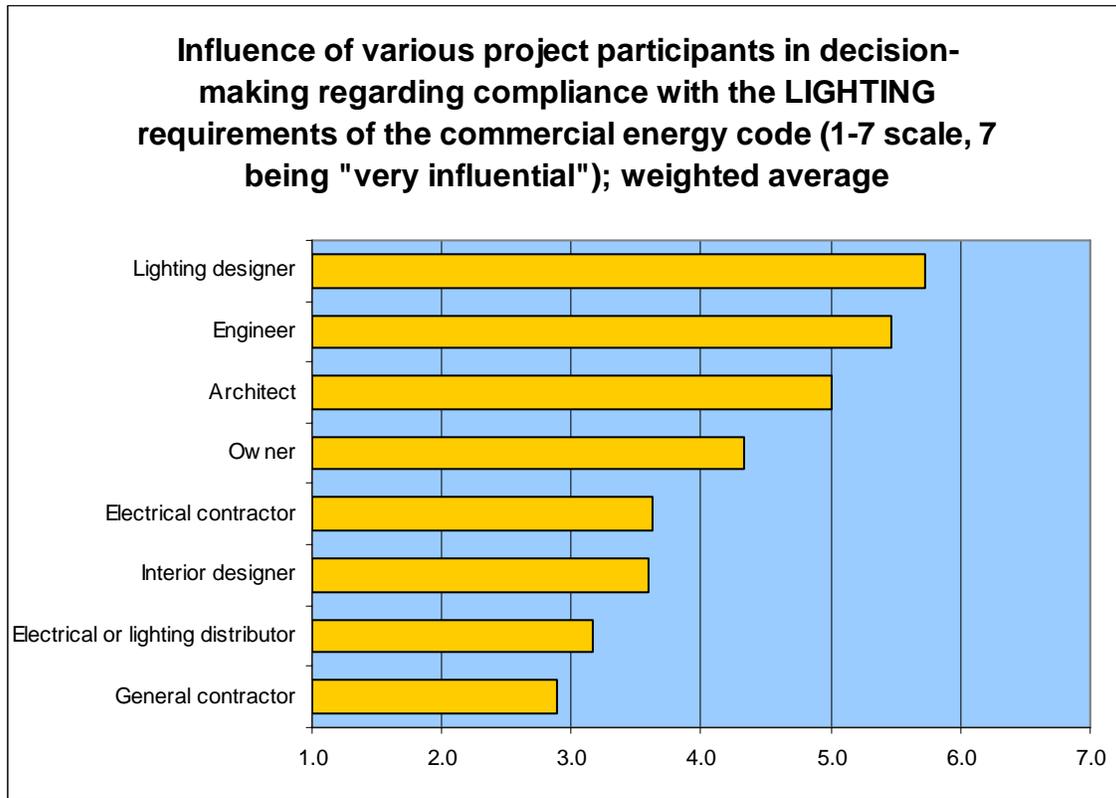


Q: In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?

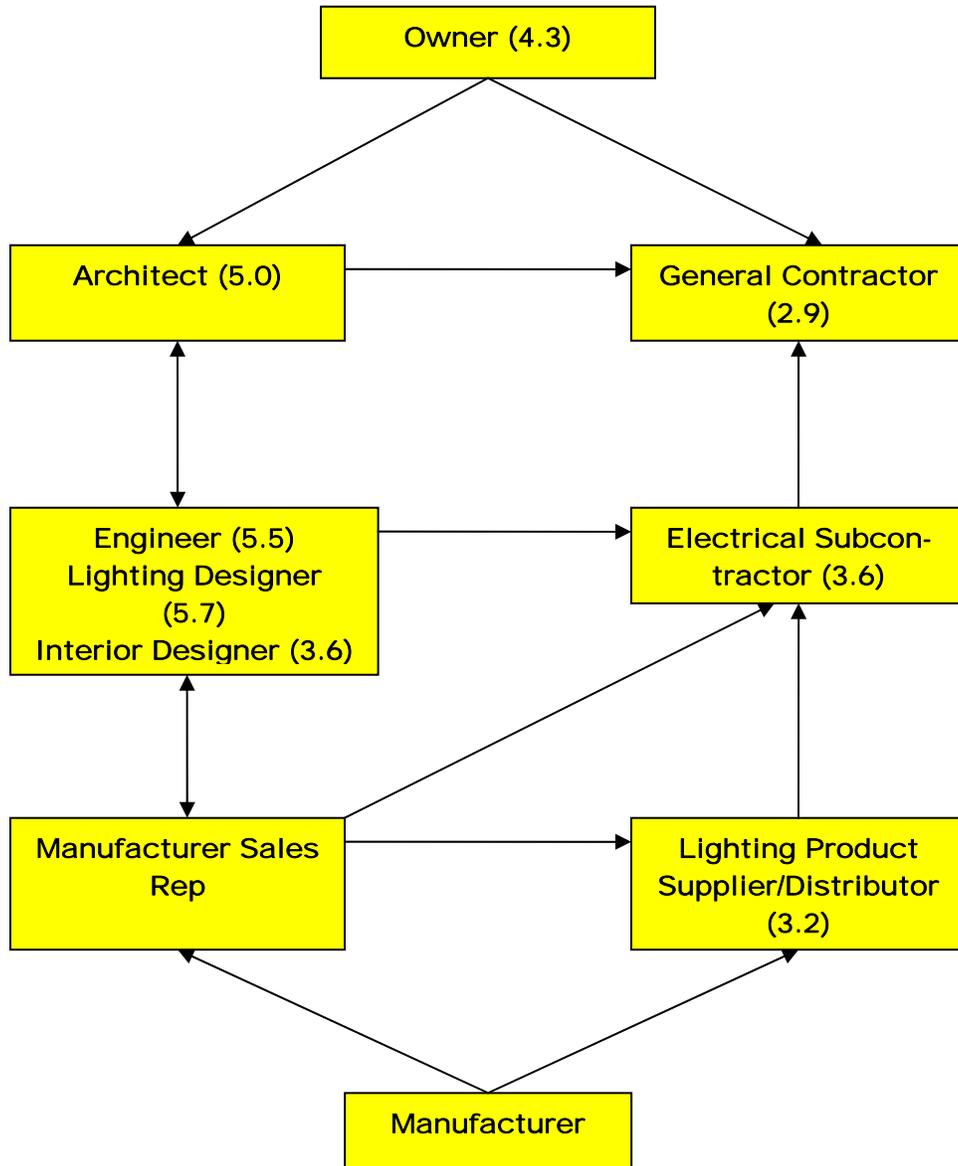


Q: Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”

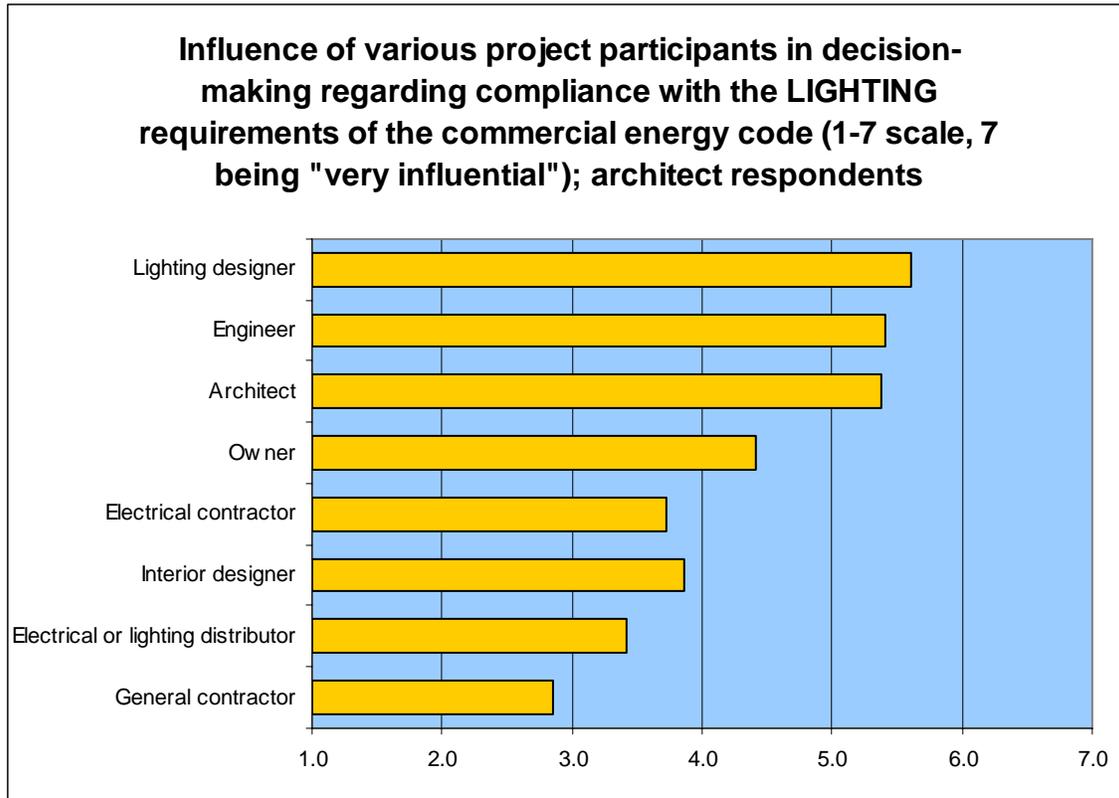
	Architects	Engineers	Lighting designers	Building contractors	Weighted average
Architect	5.4	4.8	4.0	5.3	5.0
Engineer	5.4	5.8	5.2	5.8	5.5
Lighting designer	5.6	5.5	6.5	5.0	5.7
Owner	4.4	4.4	3.7	5.3	4.3
General contractor	2.9	3.0	2.5	4.1	2.9
Electrical contractor	3.7	3.6	3.2	4.2	3.6
Electrical or lighting distributor	3.4	3.2	2.3	3.6	3.2
Interior designer	3.9	3.6	2.7	4.1	3.6



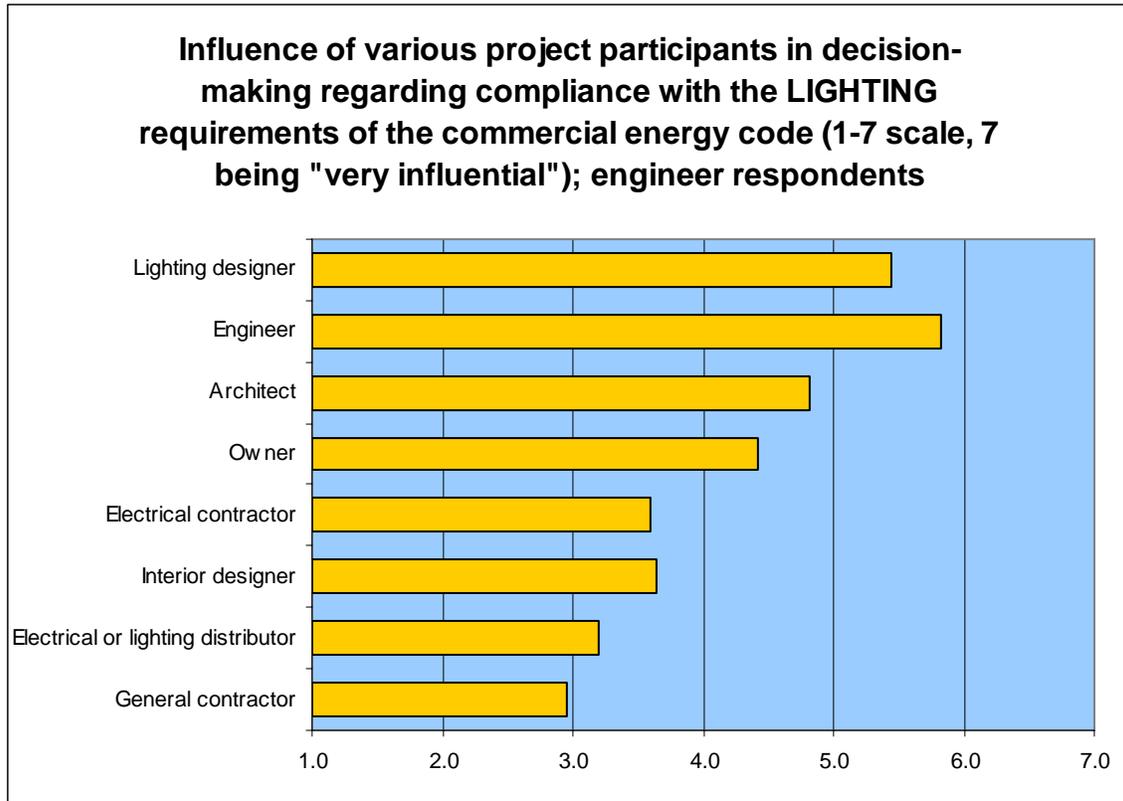
Levels of influence in decision-making regarding compliance with the lighting portion of the applicable energy code in a typical new construction project. The below graphic illustrates the typical relationships between various participants in a project. The numbers represent respondent-rated levels of influence in decision-making regarding commercial energy code compliance on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”



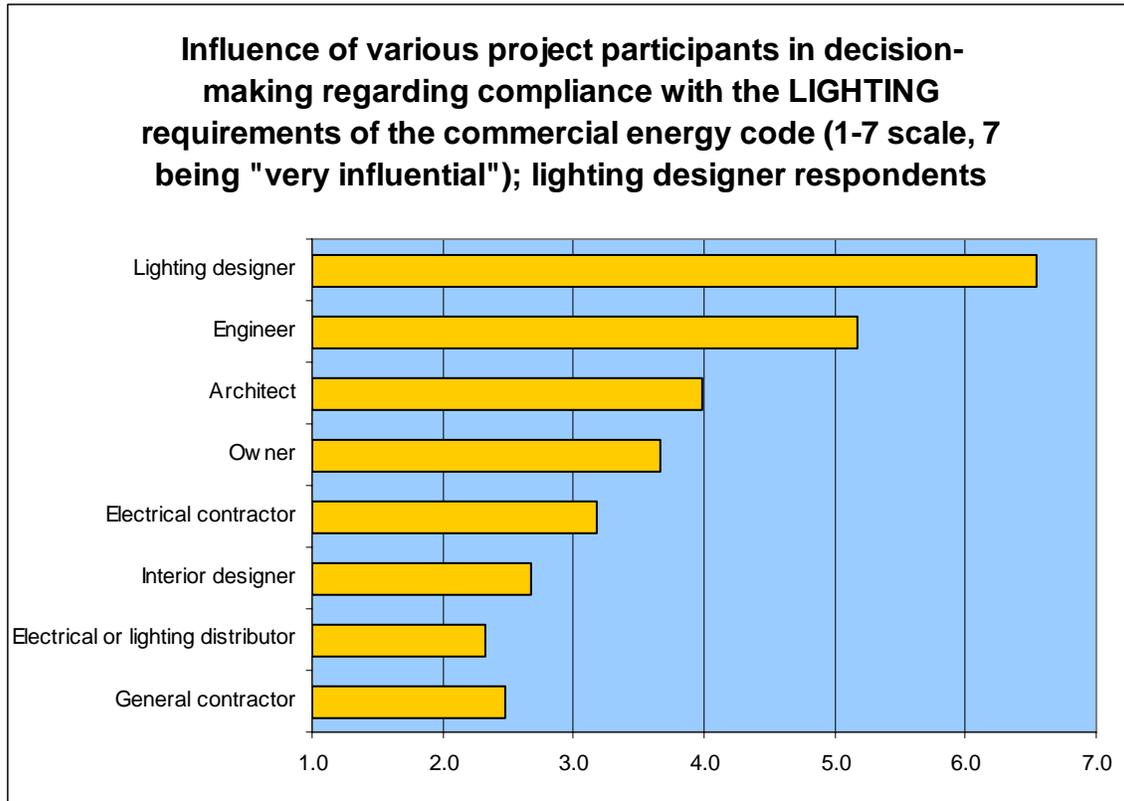
Q: Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”



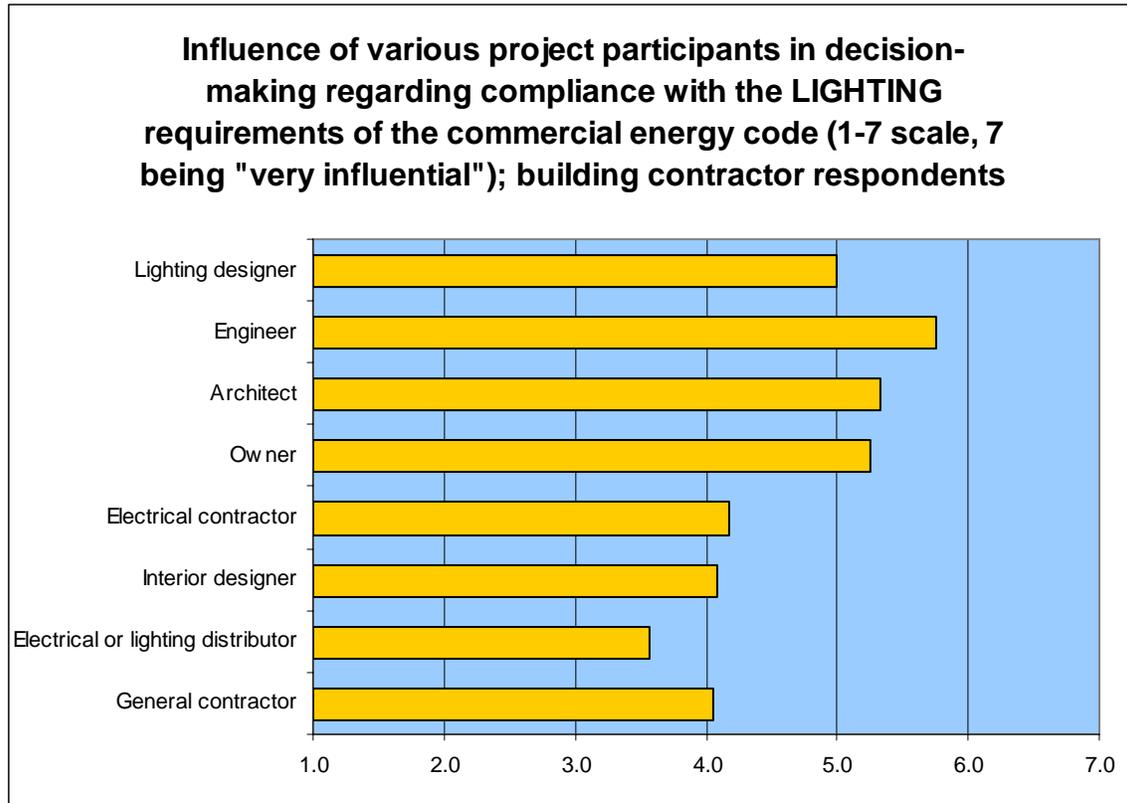
Q: Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”



Q: Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”



Q: Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code on a 1-7 scale, with 1 being “not influential,” 4 being “somewhat influential,” and 7 being “very influential.”



Code Compliance

#4 - The actual energy code compliance rate—relative to the national energy standard—is lower than believed by a significant number of specifiers. Respondents in each subgroup, on average, report a lower compliance rate for automatic lighting shutoff requirements than for overall code compliance.

The results further suggest that a significant number of specifiers do not know, or are unwilling to reveal, their code compliance rate. It may be likely that this is due to the respondent expressing a more limited personal role in producing energy code compliance compared to other project participants or other members of the respondent's firm. However, the high rate of non-response may also suggest a degree of non-compliance.

Among those specifiers who do know, or are willing to share, their compliance rate—and whose primary field of work is in a state that has complied with the DOE mandate that all states have a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999—the rate of compliance is about 80% as a weighted average, based on compliance with the automatic lighting shutoff requirements of ASHRAE/IES Standards 90.1-1999, 2001 and 2004 as the lowest common denominator.

#5 - Looking at a weighted average of West Coast (California, Oregon, Washington—a region commonly associated with the country's strictest energy codes) respondents versus the rest of country's states that have a commercial energy code at least as stringent as Standard 90.1-1999, West Coast specifiers are much more likely to comply with the code's mandatory automatic lighting shutoff requirements. West Coast respondents also exhibited a much higher awareness of their firm's compliance rate.

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?

	Architects		Engineers		Lighting designers		Weighted average
... all LIGHTING requirements of the commercial energy code	87.4%		79.6%		86.2%		85.7%
Answered question	76	58%	25	63%	46	84%	
Don't know/No answer	56	42%	15	38%	9	16%	
... prescribed code LIGHTING POWER DENSITY LIMITS	86.2%		82.2%		89.4%		86.5%
Answered question	49	37%	25	63%	41	75%	
Don't know/No answer	83	63%	15	38%	14	25%	
... the code requirement for AUTOMATIC LIGHTING SHUTOFF	79.8%		78.9%		81.0%		80.0%
Answered question	59	45%	26	65%	36	65%	
Don't know/No answer	73	55%	14	35%	19	35%	

NOTE: Building contractor respondents were not included due to insufficient response based on a high number of “don’t know” responses.

NOTE: Respondents to these questions were qualified based on whether their primary field of work was in a state that had complied, as of August 2006, with the DOE mandate recognizing ASHRAE/IES Standard 90.1-1999 as the national energy standard and requiring all states to enact a commercial energy code at least as stringent as Standard 90.1-1999 by July 15, 2004. As of August 2006, 36 states were in a state of compliance.

The qualified respondent group **INCLUDED 1)** states that had adopted ASHRAE/IES Standard 90.1-2004/2006 IECC as of August 2006: Alaska, California, Florida, Georgia, Iowa, Kentucky, Montana, Nevada, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Virginia and Washington.

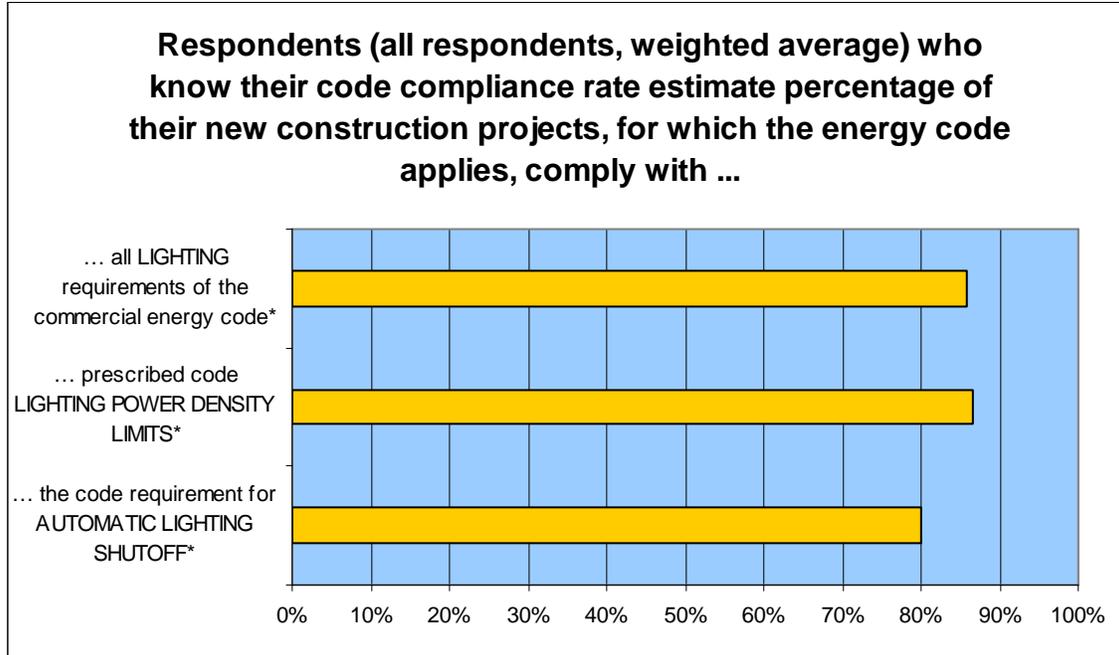
The qualified respondent group **INCLUDED 2)** states that had adopted ASHRAE/IES Standard 90.1-2001/2003 IECC as of August 2006: Arkansas, Connecticut, Idaho, Kansas, Maine, Maryland, Nebraska, New Mexico, Rhode Island, Utah and West Virginia.

The qualified respondent group **INCLUDED 3)** states that had adopted ASHRAE/IES Standard 90.1-1999/2001 IECC as of August 2006: Delaware, Illinois, Louisiana, Massachusetts, Michigan, New Hampshire, New York and Vermont.

The qualified respondent group **EXCLUDED 1)** states that had adopted a code that precedes ASHRAE/IES Standard 90.1-1999/2001 IECC (in a condition of non-compliance with DOE mandate) of August 2006: Hawaii, Indiana, North Dakota, Minnesota, Oklahoma and Wisconsin.

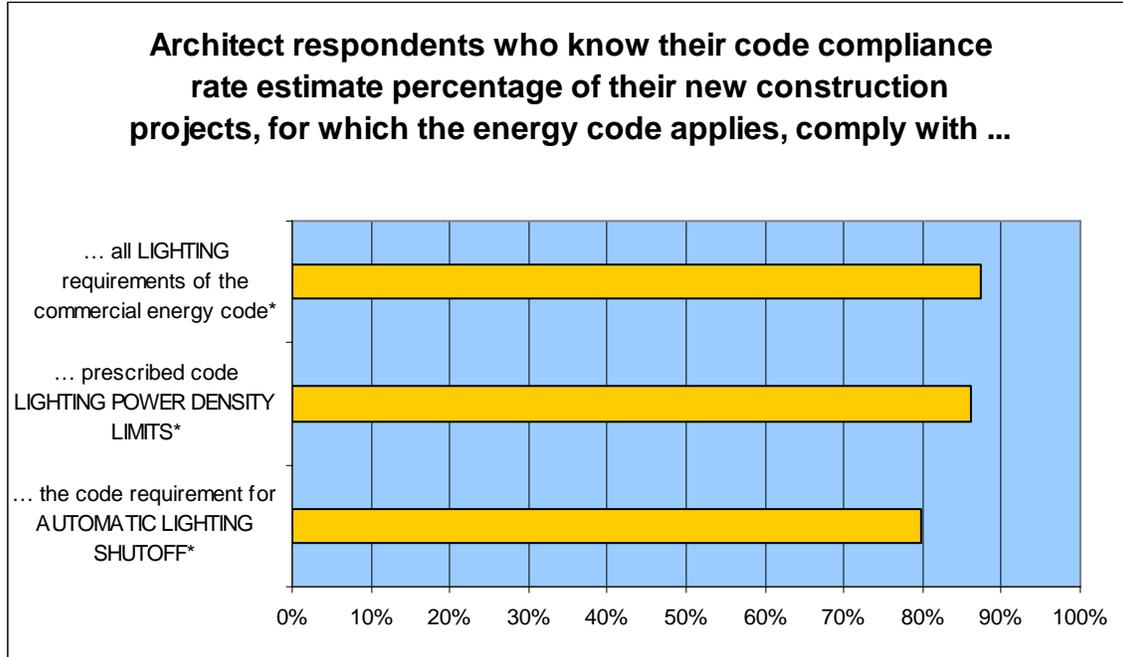
The qualified respondent group **EXCLUDED 2)** states that had adopted no statewide commercial energy code as of August 2006: Alabama, Arizona, Colorado, Mississippi, Missouri, South Dakota, Tennessee and Wyoming.

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?



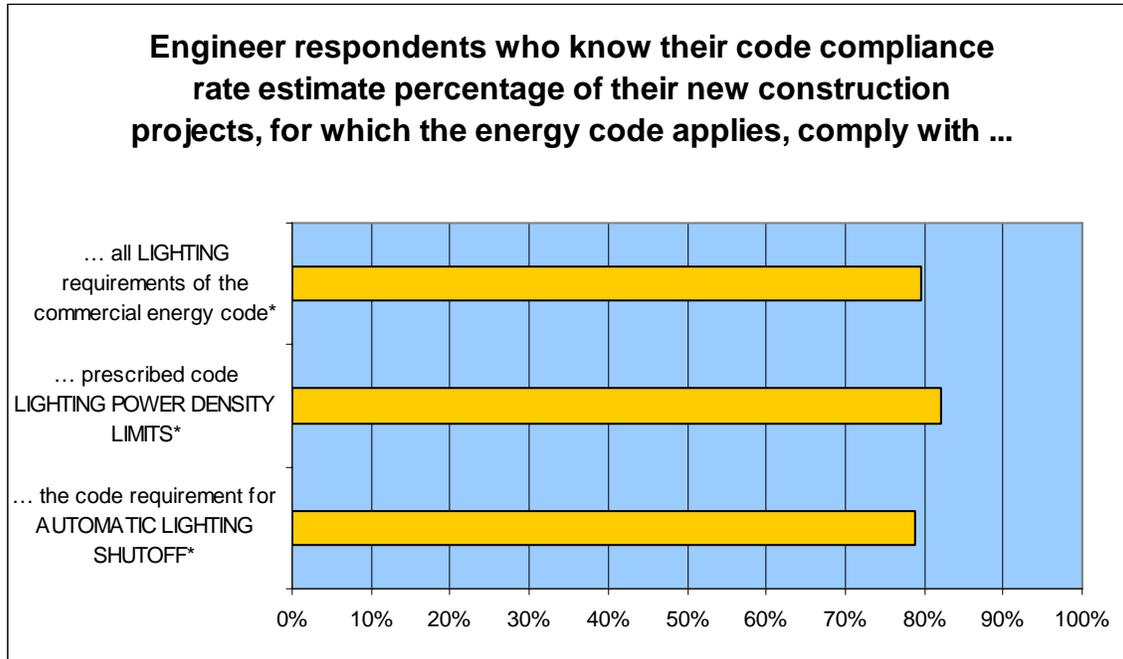
**respondents drawn from the 36 states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Vermont, Washington and West Virginia.*

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?



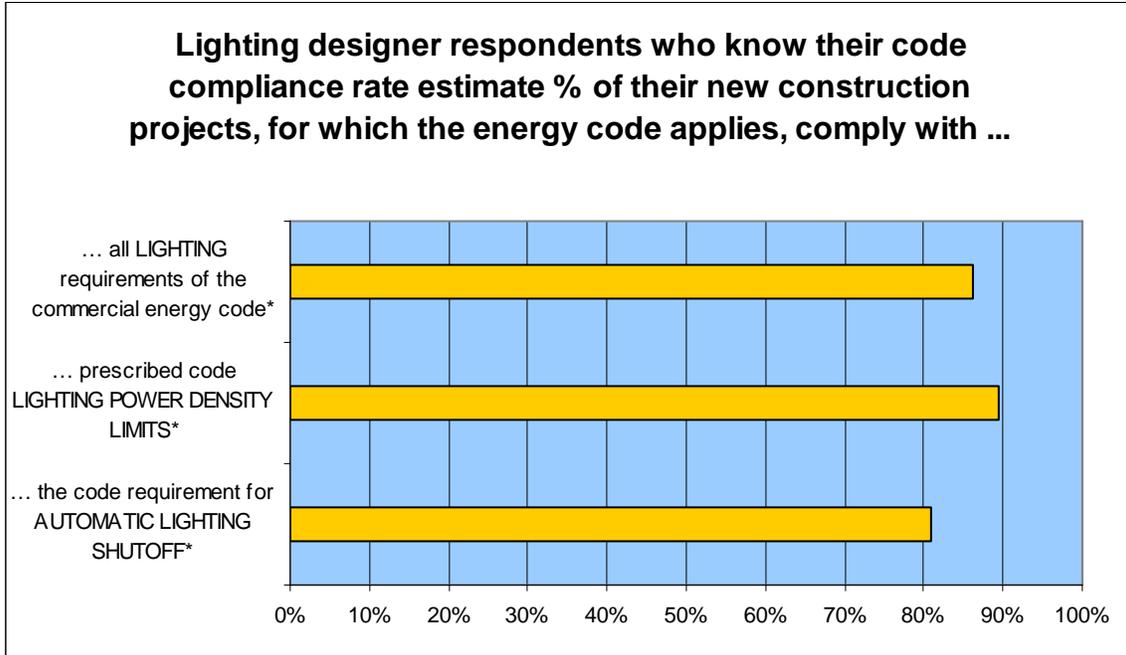
**respondents drawn from the 36 states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Vermont, Washington and West Virginia.*

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?



**respondents drawn from the 36 states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Vermont, Washington and West Virginia.*

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?

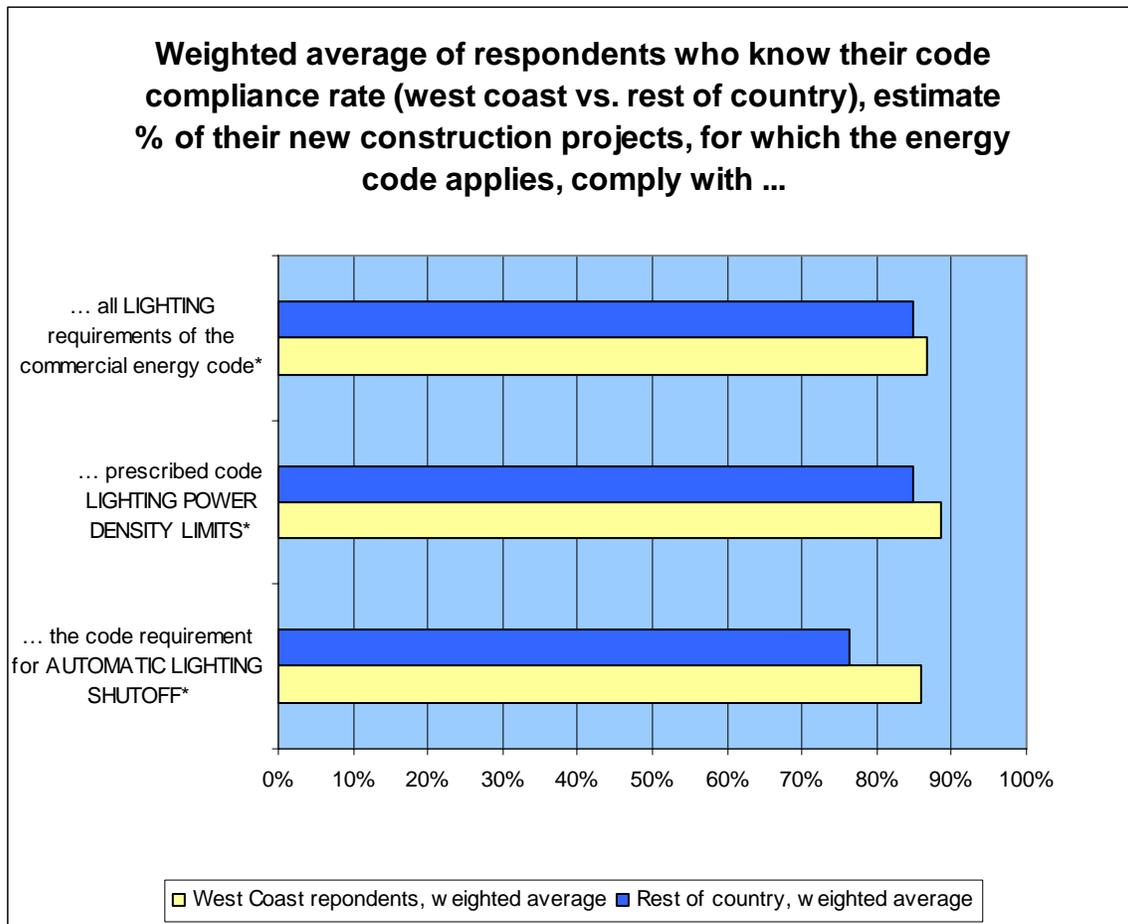


**respondents drawn from the 36 states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Vermont, Washington and West Virginia.*

Q: What percentage of your new construction projects, for which the energy code applies, would you estimate comply with ...?

West Coast Versus Rest of Country

	West Coast respondents, weighted average	Rest of country, weighted average
... the code requirement for AUTOMATIC LIGHTING SHUTOFF	85.8%	76.3%
... prescribed code LIGHTING POWER DENSITY LIMITS	88.6%	84.9%
... all LIGHTING requirements of the commercial energy code	86.7%	84.9%



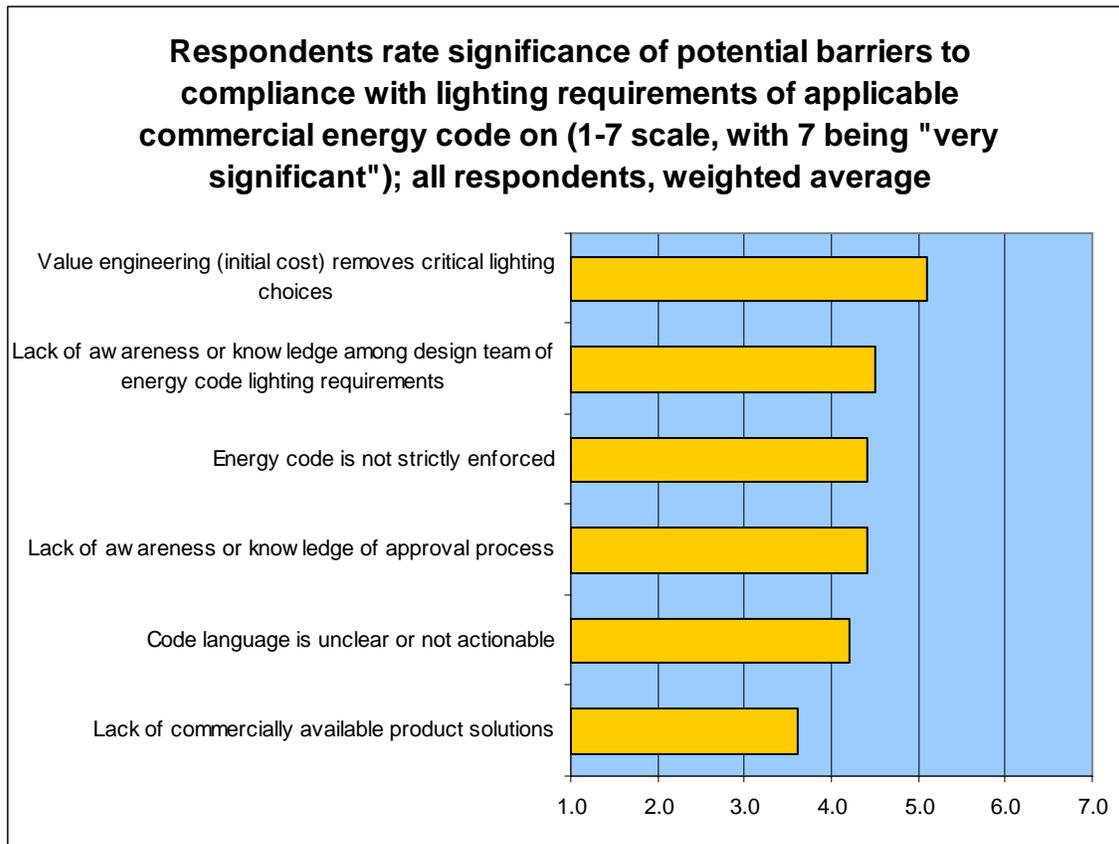
**WEST COAST respondents drawn from three states: California, Oregon and Washington. REST OF COUNTRY respondents drawn from the 33 other U.S. states with a commercial energy code at least as stringent as ASHRAE/IES Standard 90.1-1999 as of August 2006: Alaska, Arkansas, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Vermont and West Virginia.*

Barriers to Compliance

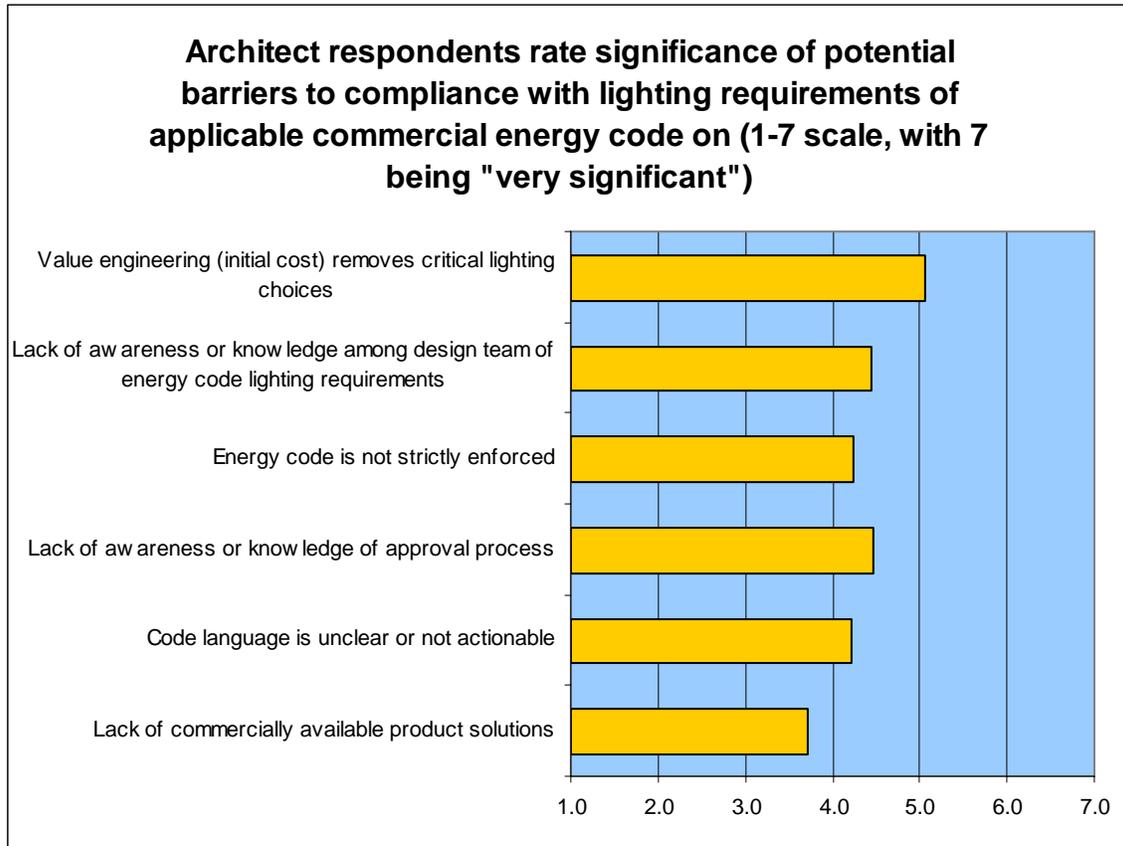
#6 – Respondents across all subgroups consider value engineering, resulting in the removal of critical lighting choices, to be the most significant barrier to commercial energy code compliance. Lack of awareness or knowledge of energy code lighting requirements and the code approval process, lack of strict enforcement of energy codes, and unclear or non-actionable code language, are also regarded to be more than somewhat important by respondents. In addition, lack of commercially available product solutions is regarded as less than somewhat significant as a potential barrier.

Q: Please rate the significance of the following potential barriers to compliance with the lighting requirements of the commercial energy code on a 1-7 scale, with 1 being "not significant," 4 being "somewhat significant," and 7 being "very significant."

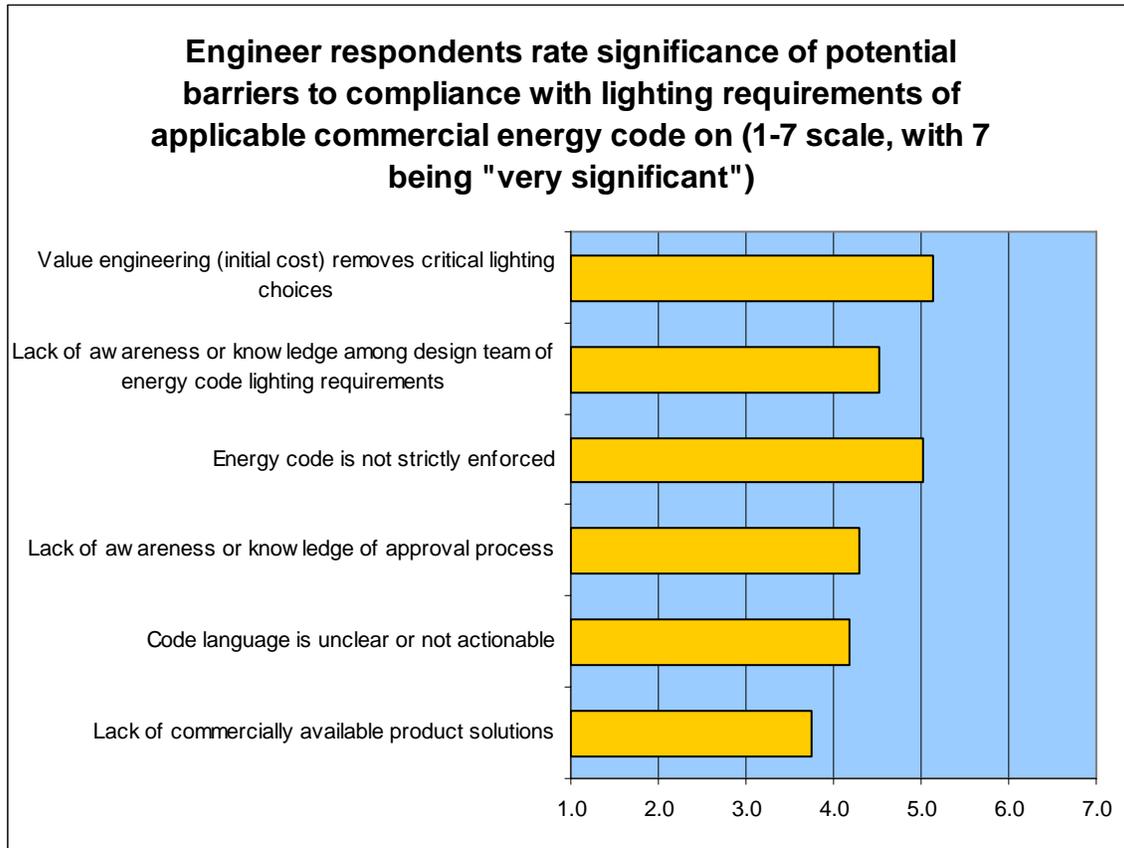
	Architects	Engineers	Lighting designers	Weighted average
Value engineering (initial cost) removes critical lighting choices	5.1	5.1	5.2	5.1
Lack of commercially available product solutions	3.7	3.8	3.3	3.6
Lack of awareness or knowledge among design team of energy code lighting requirements	4.5	4.5	4.6	4.5
Lack of awareness or knowledge of approval process	4.5	4.3	4.4	4.4
Code language is unclear or not actionable	4.2	4.2	4.2	4.2
Energy code is not strictly enforced	4.3	5.0	4.4	4.4



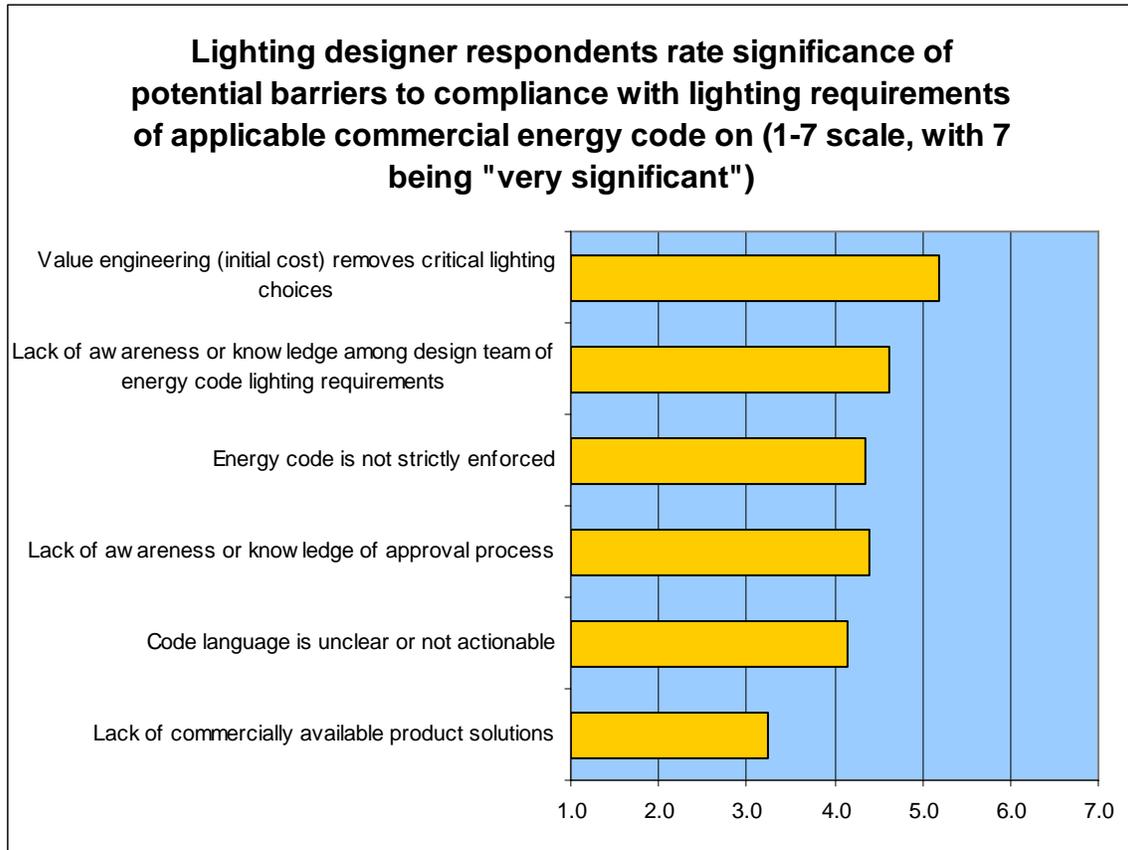
Q: Please rate the significance of the following potential barriers to compliance with the lighting requirements of the commercial energy code on a 1-7 scale, with 1 being "not significant," 4 being "somewhat significant," and 7 being "very significant."



Q: Please rate the significance of the following potential barriers to compliance with the lighting requirements of the commercial energy code on a 1-7 scale, with 1 being "not significant," 4 being "somewhat significant," and 7 being "very significant."



Q: Please rate the significance of the following potential barriers to compliance with the lighting requirements of the commercial energy code on a 1-7 scale, with 1 being "not significant," 4 being "somewhat significant," and 7 being "very significant."

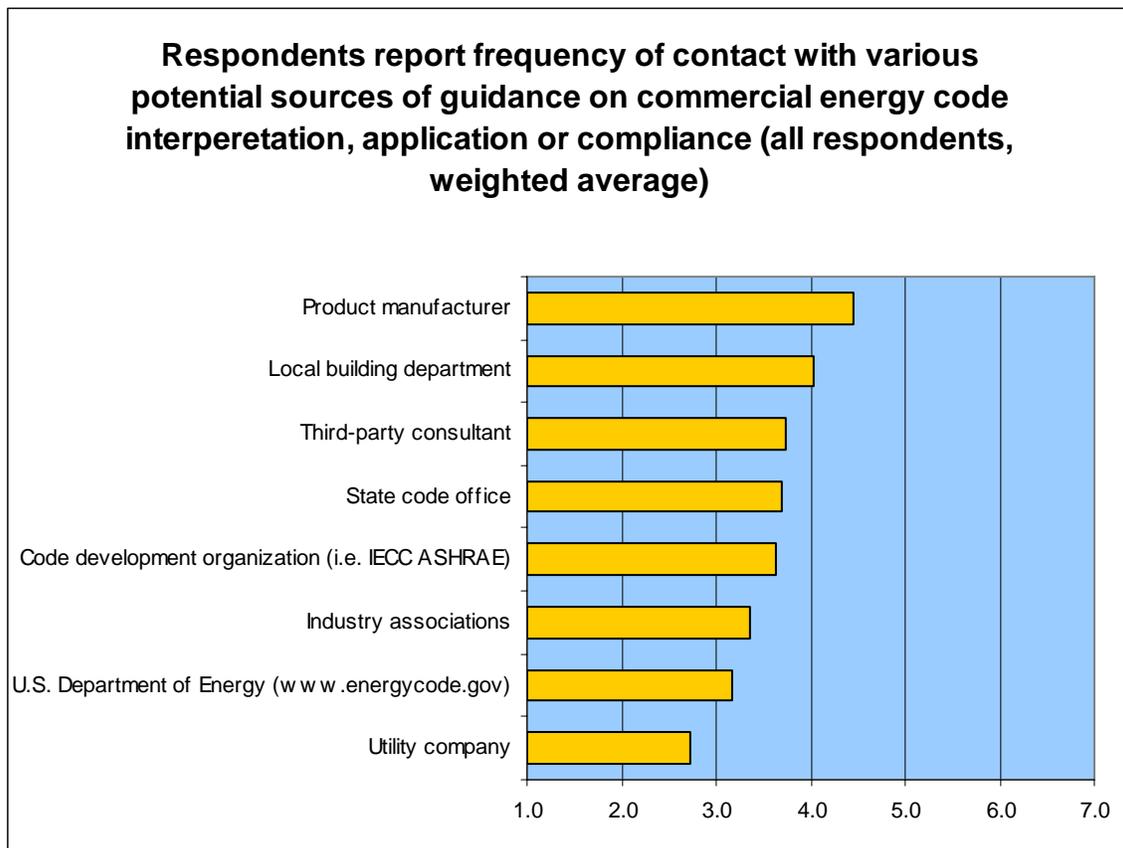


Sources of Assistance

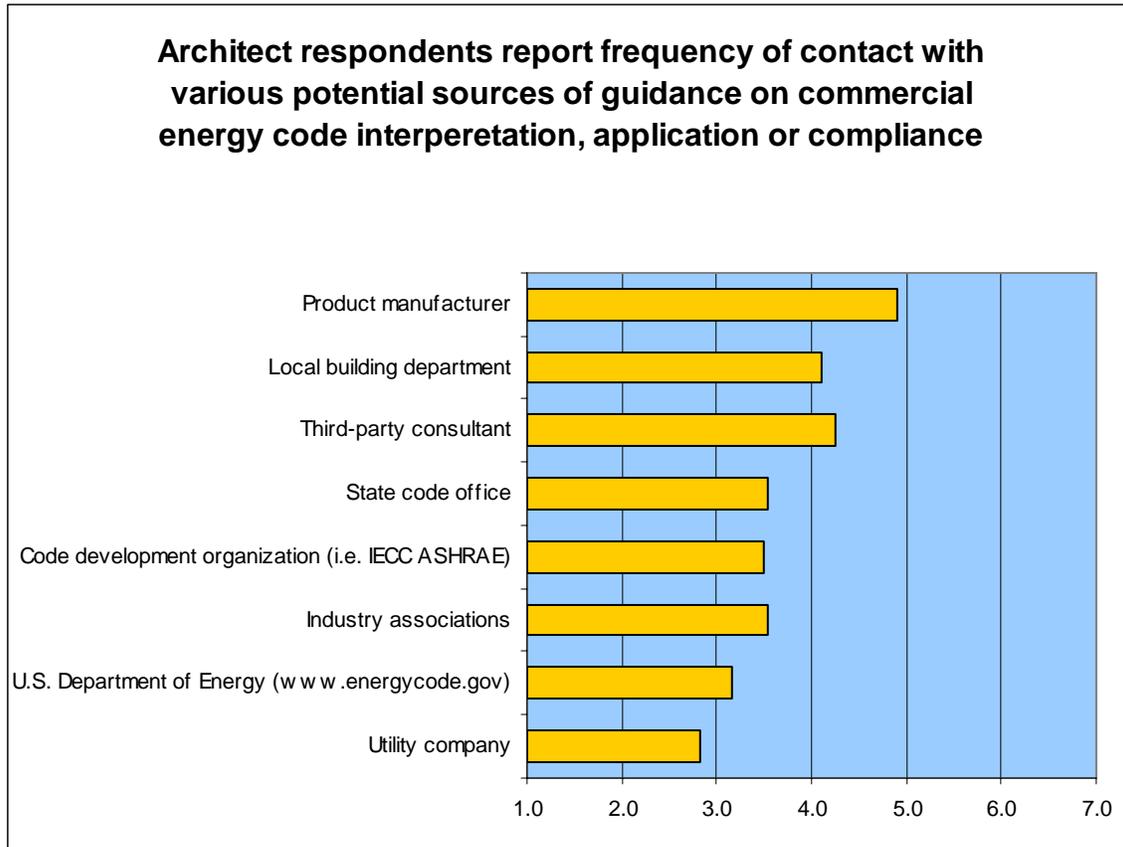
#7 – Respondents, as a weighted average, most often consult a product manufacturer when they have questions or need help with commercial energy code interpretation, application or guidance. They also “occasionally” consult the local building department.

Q: When you have questions or need help with commercial energy code interpretation, application or compliance, how often do you seek guidance from the below sources of information on a 1-7 scale, with 1 being "never," 4 being "occasionally," and 7 being "always"?

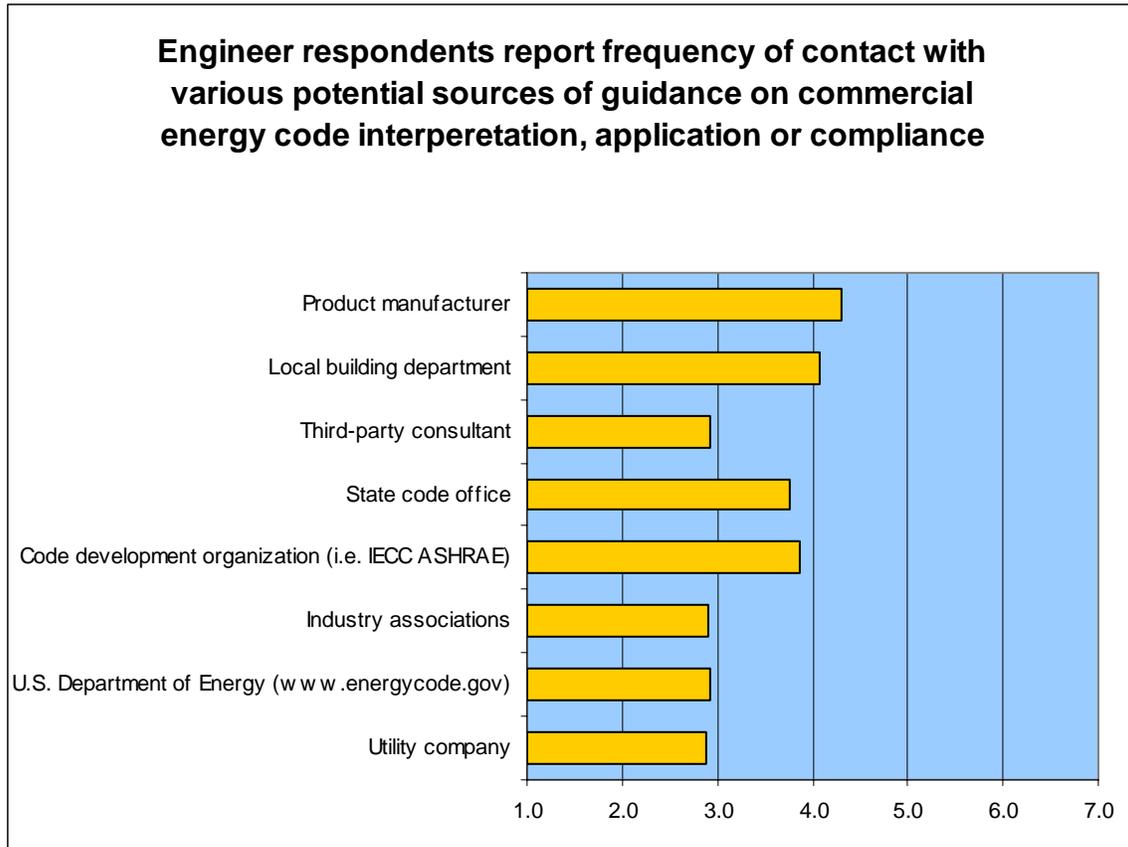
	Architects	Engineers	Lighting designers	Weighted average
Local building department	4.1	4.1	3.8	4.0
State code office	3.5	3.8	4.0	3.7
Third-party consultant	4.3	2.9	3.0	3.7
Code development organization (i.e. IECC ASHRAE)	3.5	3.9	3.8	3.6
Utility company	2.8	2.9	2.3	2.7
Product manufacturer	4.9	4.3	3.3	4.4
U.S. Department of Energy (www.energycode.gov)	3.2	2.9	3.4	3.2
Industry associations	3.5	2.9	3.3	3.4



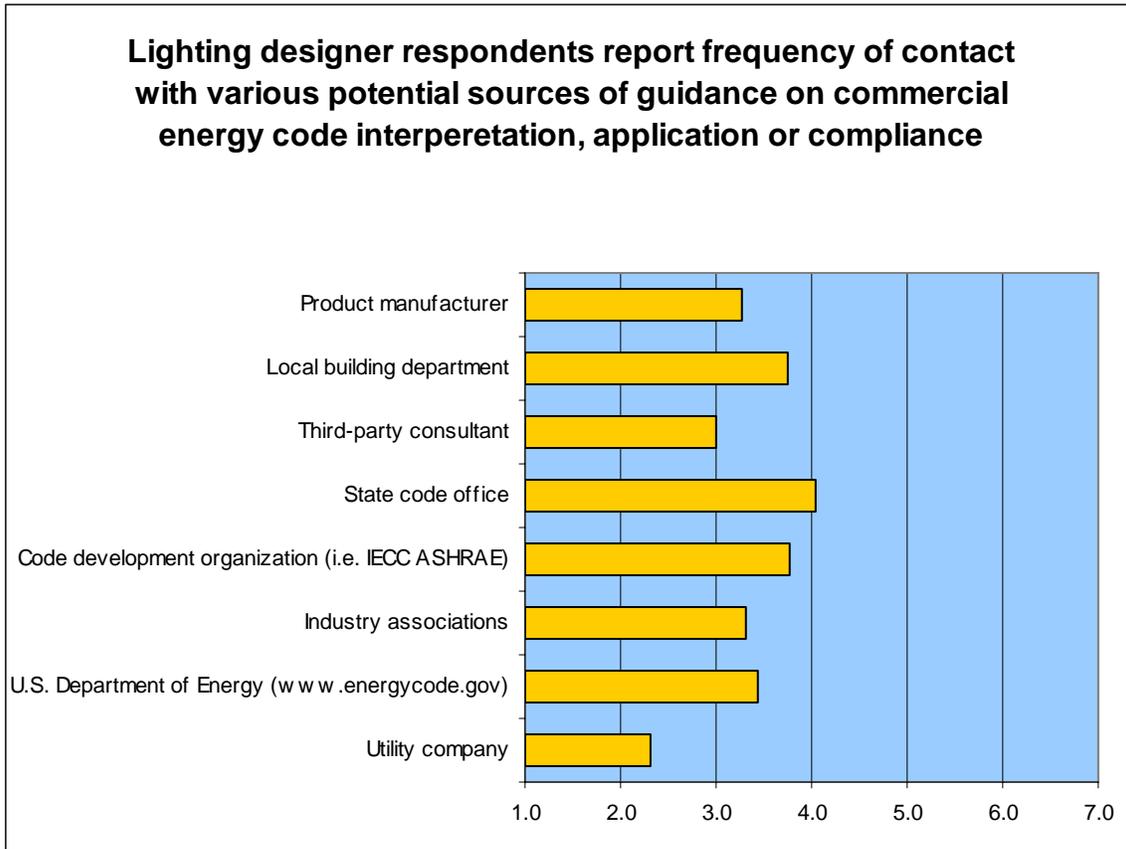
Q: When you have questions or need help with commercial energy code interpretation, application or compliance, how often do you seek guidance from the below sources of information on a 1-7 scale, with 1 being "never," 4 being "occasionally," and 7 being "always"?



Q: When you have questions or need help with commercial energy code interpretation, application or compliance, how often do you seek guidance from the below sources of information on a 1-7 scale, with 1 being "never," 4 being "occasionally," and 7 being "always"?



Q: When you have questions or need help with commercial energy code interpretation, application or compliance, how often do you seek guidance from the below sources of information on a 1-7 scale, with 1 being "never," 4 being "occasionally," and 7 being "always"?



Appendix I. Verbatims

Q: What actions could be taken that would help you comply with the energy code?

Architect respondents

1.	educational campaign
2.	In Oregon and Washington we already have a well defined and delineated energy code that has been in place for well over a decade. Our electrical engineering consultants are well versed in commercial energy code compliance requirements. As both an architect and lighting designer I would like seeing manufacturer's make product energy code information either more readily available—i.e., web or clearer. Right now we really don't have a residential lighting energy code but I'd like to see that information as well, as I feel this code will be coming around sooner or later. Better information saves the planet!
3.	Ensure the code is widely distributed and make it a requirement for training annually or more frequently.
4.	Made a lot more available, state, county, city and community and as important: merchants/consumers—maybe it affects everyone mentioned beforehand in the pocketbook—THEY will listen, but for a very SHORT time, history will repeat itself.
5.	BIM model analysis software for determining energy code compliance.
6.	More education.
7.	More integration with new renewable energy systems.
8.	Greater overall awareness of the importance of the requirements. Emphasis on the sustainable aspects of these requirements.
9.	Easier access to information. Information that is consistent. Straightforward information. Information that is usable.
10.	Discuss the issue with my MEP engineers.
11.	Make selection and control choices less complicated, like once a fixture is picked to be able to simply say what jurisdiction it is in and spec to comply, let manufacturers select what complies.
12.	I think that becoming more familiar with LEED requirements and regulations, and implementing these procedures would definitely create compliance with energy codes.
13.	Clearer code language, uniform enforcement.
14.	None, I always comply.
15.	More education of design professionals, software that is both economical and easy to use by non-technical design professionals.
16.	List the actual power requirements of each lamp/fixture type.
17.	A step by step matrix guide.
18.	Free on-line codes.
19.	Consistent enforcement, prescriptive handbook for C.E.C. issues.
20.	Better knowledge about lighting alternatives that provide good lighting despite the low watts/sq.ft. allowed by code.
21.	National energy policy based on a tax on carbon sources of energy. The market will quickly demand energy efficiency and great changes in lighting and energy code compliance.

22.	Oregon and latest California codes are overly restrictive compared to the rest of the country, at least for specialty retail. Also, California does not follow the code most of the rest of the country uses, and it requires some pages to be pasted on the drawings even though they are included with the rest of the required pages in a booklet.
23.	We at the State of Washington are always interested in successful solutions when it comes to dealing with the energy code. Publishing project case studies demonstrating effective solutions is very helpful in getting this information out/in front of people.
24.	Have an easier "checklist" for commercial buildings and clearly stated requirements, ie codes and regulations.
25.	Manufacturer product information and compliance strategies.
26.	Understanding the various local requirements and then using the "Com-Check" Program to design the fixtures to comply with those requirements.
27.	Be realistic—broaden understanding to include all factors.
28.	More education (seminars, etc.).
29.	Education.
30.	Provide educational seminars.
31.	Website outlining requirements and providing examples of successful compliances challenges met. Overview of importance of energy code compliance in national and global energy management contexts.
32.	Access to building code authorities without having to be a member.
33.	Manufacturers supplying software on the products for completing analysis.
34.	Awareness by owners and code enforcement officials has to be improved.
35.	Update code to current industry standards or adopt an existing standard.
36.	Strict enforcement.
37.	More awareness all around—building officials, owners, etc. It is coming with the LEED system gaining popularity and energy rates rising.
38.	Clear, logical laws.
39.	The lighting is not a major part of any local code; mostly still dealing with insulation and heating requirements in this locale.
40.	energy code seminars to educate professionals of latest codes and products that meet code requirements.
41.	More tax incentives, architect education, free tech support and consultation.
42.	Workshop.
43.	Code enforcement and responsible contact with code officials.
44.	I comply by using COM Check to verify it but, this is all the inspectors look at and go by. I can have a compliance certificate with the permit application and place an entirely different system on site. Although I know I am still in compliance, nobody ever questions it which leads me to question the competency of the inspectors.
45.	More products, better code enforcement/inspection.
46.	A need for education classes for state CEU requirements.

47.	Knowledge, understanding, and uniform enforcement of code.
48.	Require verification prior to issuing a Certificate of Occupancy.
49.	Wider distribution of the state energy code.
50.	Tools to help explain code ramifications to the owner.
51.	More products that are lower in cost and that are designed well.
52.	Ads should state code compliance.
53.	Put into clear and precise language, including compliance criteria and ways to evaluate installations.
54.	Stricter code enforcement to stop contractors and developers from cheating.
55.	Create organization (like ASHRAE) for understanding and sharing info on energy code issues.
56.	Educating consumers and federal legislation that complies with the strictest energy codes that mandates that each state must comply with White papers.
57.	Clear and uniform interpretations.
58.	More strict enforcement and requirements to submit backup material for each project. Stricter requirements could also help to reduce energy consumption.
59.	Make codes more user friendly.
60.	We already have compliance on our projects. Our electrical engineering consultants keep up to date with the code requirements.
61.	More info on products and systems available to provide a total design approach.
62.	More education would be a big help and a closer working arrangement with major manufacturers of lighting.
63.	Our electrical engineer has to compile the state's energy code compliance submittal.
64.	Education of architects and owners to new code requirements.
65.	Easier interface with requirements.
66.	Advertise inexpensive or free lighting code sources for cheap companies that don't want to invest in educating their staff on current code issues.
67.	Coordination with the various compliance issuing authorities to assure that only compliant information may be inserted into compliance software packages. Use of compliance software by all engineers and consultants in the design process that will avoid using out-of-date information upon submission.
68.	Awareness.
69.	More consistent application of code requirements throughout various code jurisdictions.
70.	Training of both the code officials and the suppliers.
71.	Better standardization of information. Can be difficult to find the right answers. Codes don't address renovations and additions well
72.	Could send us table of energy code for designers.
73.	More helpful people in the aforementioned departments, Some kind of classes for junior designers such as myself who don't know the lighting specifications well. Recommend books that can be helpful.

74.	Simplify process.
75.	Standardized computer program used to determine code compliance.
76.	Availability of design review by local authority having jurisdiction.
77.	Interpretations of the code between the various building officials differ significantly. One official "interpretation" is very loose and the next is very stringent, by the book. Need better overall, one interpretation.
78.	Greater awareness on the part of the local building department personnel and the developers of the project with respect to the requirements for compliance with the state energy code.
79.	A short concise written article defining the code requirements along with potential solutions for compliance with links to various manufactures supplying resources or products available.
80.	Local seminar to spread the word that there is a code and that we are expected to follow it.
81.	Majority of our projects are commercial projects and require energy calculations from our engineers submitted with the permit documents.

Q: What actions could be taken that would help you comply with the energy code?

Engineer respondents

1.	Ensure that the code enforcement personnel know that the codes exist. Next, they must be taught how to determine if the codes have been met or hire someone like my firm that knows what must be done.
2.	Publish successful real life applications in professional literature with reference materials.
3.	Better understanding of the Energy Code by the architects, the developers, and owners.
4.	increase developing language that is well written and not open to interpretation
5.	Apply common sense.
6.	Assign specific responsibility to each key project team member (Owner, Contractor, AE firm, utility and product suppliers).
7.	Make the Code more reasonable. Everyone complains that there is too little light. Also, the lighting controls are ridiculous in this part of the country. Almost everyone turns lights off to save on their electric bill. The Code only adds cost to the building owner and does very little for energy conservation.
8.	The lighting energy codes as written fail to also require that the lighting comply with the illumination requirements necessary for quality lighting as measured by (1) lighting levels needed by occupants of all ages to perform their work accurately and efficiently (2) lighting uniformly within the space so as to eliminate a checkerboard pattern of lighting (3) lighting that avoids the "gloom factor" by providing appropriately lit walls and ceilings (4) lighting that is not glaring (5) lighting that is the appropriate color rendering index and color temperature In other words the lighting energy codes as presently written are only measuring power density, or energy consumption, and are not measuring the quality of illumination provided in the work space. To be useful the lighting energy codes need to be written to require that the illumination conform to the lighting quality standard issued by the International Commission on Illumination "Lighting of indoor work places" publication CIE S 008/E:2002 (also identified as ISO Standard 8995), and to the International Commission on Illumination "Lighting of outdoor work spaces" publication CIE S015/E:2002.
9.	Better training of code officials.
10.	It should address the differences in occupancies—i.e, institutional, such as hospitals, I do not believe would ever fully comply with IECC 2003 requiring automatic lighting shutoff, 805.2.2.2.
11.	Education of contractors, owners, developers, etc.
12.	If building authorities would require compliance documentation prior to permit issue, plus enforce spot check field inspection to assure compliance, this would help get everyone to take the energy code more seriously.
13.	Enforce the code ... Require designers to indicate lighting power density on lighting plans.
14.	Improve readability especially to clarify interpretations.
15.	Products and proper education regarding the code and solutions to stricter guidelines. Reduction of some of the power density requirements. Owners that understand the requirements.
16.	Enforcement.
17.	Increase enforcement.

18.	In the state of North Carolina it is required to put an energy code statement of compliance on contract documents prior to issue for bid and or final review set submitted to AHJ. The biggest issue we have with meeting the code is manufactured products. There needs to be more products designed to help meet the energy code.
19.	More attention from the inspectors.
20.	A stricter enforcement of the law as prescribed and not to circumvent the law and to ensure that the State and Local Officials be very clear in what they can and/or cannot do to make sure of compliance with the law.
21.	More enforcement by inspectors.
22.	The AIA and IES need to actively encourage their members to take the code requirements seriously. Most architects and lighting design consultants do not want to comply as it will "sacrifice" the design. As an engineer it would be easier to comply with the code if these disciplines would be more aware and conscientious during design.
23.	Simplify the energy code and provide an "interpretation & intent" publication.
24.	Education of alternative design including daylighting for energy saving.
25.	Fewer trade-offs in the energy code. Strict enforcement. Greater energy reductions required, as required to get additional LEED points. IES light levels enforced. More controls to take people out of the equation.
26.	Simplify, and add uniformity.
27.	A unified building code for the U.S. and a more aggressive energy code.
28.	Code enforcement.
29.	Clearly written codes that are uniformly enforced. Products that actually do meet the code requirements, and not just promotional B.S. from manufacturers and distributors only interested in a sale.

Q: What actions could be taken that would help you comply with the energy code?

Lighting designer respondents

1.	More attention should be give to lighting controls this would allow great energy savings.
2.	Have some people stop playing politics and do their job including learning about new technologies.
3.	To formalize the process of daylight integration and tempering of the envelope. Right now, daylighting and tempering are done at different times, usually too late to influence changes, and by different consultants. If daylight and solar harvesting and commissioning were like sailing a boat and everything had a clear relationship, and we could picture all of it together like a sail boat, maybe we could integrate it into practice in the same way a fixture schedule is integrated into a plan set.
4.	Better information about exactly what codes apply in each jurisdiction and when new codes come into effect (bcap.org is pretty good but often details are unclear). All standards and all state variants, etc. available online. Clear information on compliance "proof" paperwork requirements of every jurisdiction.
5.	Owner's commitment to require energy efficient installations—and equipment priced reasonably which produces an incentive to the owner for shorter pay back time, since pay back and system obsolescence are often too close together.
6.	A uniform energy code for all 50 states.
7.	The codes need to be very specific, NOT subject to interpretation, and enforced equally across the board!
8.	More enforcement on the local level. We are responsible designers but design/ build contractors offer "free" services—and don't comply with energy codes.
9.	Enforce the code.
10.	Make clearer.
11.	Create more public awareness and civic responsibility and tie into sustainability/green design movement.
12.	Develop a better credit system for lighting controls and building management. The lighting design is the first to be changed when you can not meet the numbers.
13.	I believe the codes are far too strict to meet and often compromise a good lighting solution. I feel these codes are a power play promulgated by a few to make themselves feel important and influential. That didn't really answer your question, but there it is.
14.	Education into the world without energy restrictions. A tie into greenhouse gases might help both forces.
15.	More classes offered locally. Time commitment is a consideration.
16.	Simpler device integration and commissioning, especially between sensors, fixtures and control systems.
17.	A clearer understanding of what savings your client will receive if he is willing to use SSL or programmed lighting control although the initial costs would be higher. If the client thinks they will in the long run benefit financially it would be easier to get them to invest in a cleaner future.
18.	A well written software program/spreadsheet that would be intuitive, flexible, accurate, and

	help speed up the process of tabulating energy usage.
19.	Interdepartmental code writing needs to be on the same page, such as low power densities governed by energy codes in conflict with high footcandle levels governed by health codes. They don't match up well. There are other examples of these types of conflicts as well.
20.	Circulate a one page laminated check list/reminder, with contact information, web site links and software sources.
21.	Universal requirement to show compliance. Educate AHJ. To require compliance and proof of compliance. Educate interior designers as to requirements of energy codes.
22.	A universal code would be nice, similar to the IBC. I practice on the West Coast so I have codes for California, Washington and Oregon that are all different.
23.	Loosen it up. Here in CA, it's become so restrictive that achieving high quality lighting is difficult even for those of us who have been practicing energy-efficient lighting design for many years.
24.	Provide a way for the codes to address lighting quality issues rather than watts. Yes, you can light a room at 0.5 watts per square foot but quality suffers, productivity suffers. Also, require the technology improvements to be viable before reducing wattage allowance to take advantage of the technology (ie: 20W CMH).
25.	Make them mandatory to a level—e.g., 50%, 75%, 100% at these levels they pay or don't pay fines.
26.	Simpler! But it makes more work for lighting designers and that means more fees.
27.	Post occupancy review of installed systems.
28.	Concise Instructions, not in "code speak," and better education of AHJs.
29.	A clear cut document of the Illinois energy codes by county. This along with current regulations describing how to administer tax deductions for new construction and retrofit lighting systems (conversion to energy efficient lighting from an aged existing system), in compliance with the State/County codes would be most helpful.
30.	A simpler form for figuring title 24 requirements.
31.	Get others to comply. Total code compliance is rare.
32.	Have it be enforced within more municipalities.
33.	Make all communities follow the SAME energy code (ASHRAE/IESNA 90.1 - 2004) as that would eliminate many of the questions and confusion. Also, would help to use that as it is baseline for LEED program.

Q: What actions could be taken that would help you comply with the energy code?*Building contractor respondents*

1.	Can't think of any additional actions to assure compliance. My projects always include energy code compliance and/or energy conservation measures. Doing a project right the first time, is less work and less cost in the long run.
2.	More tax credits.
3.	No, we are committed to exceeding it.
4.	Learn more.
5.	More knowledge made more available, more often, thru more sources.
6.	We comply now.
7.	Publications outlining the general requirements with references on where to access the necessary information.
8.	Having a source or a simple course in how all this works.
9.	Better clarification of the codes and stated facts for application.
10.	Clear specifications and guidelines.

Appendix II. Survey

I. About Your Firm

This survey contains 14 questions related to whether your area has an energy code, who interprets and enforces it, and how often it is complied with. The questions deal with the energy code generally, followed by a focus on lighting requirements. Questions marked with an asterisk require a response.

Your response is completely confidential.

*1. Which of the following professions most closely matches your own?

Architect

Engineer

Lighting designer

Building contractor (general, design-build, etc.)

*2. In which state do you do most of your work? (Please select one.)

[LIST }

*3. Does your state or local jurisdiction where you do most of your work have a commercial energy code in place?

Yes – I am aware of an applicable energy code

No – There is no commercial energy code applicable in my area

II. Authority & Jurisdiction

This survey is now about 25% complete.

4. Does your local jurisdiction require documentation or intent to comply with the energy code as a prerequisite for obtaining a commercial building permit?

- Yes
- No
- Don't know

5a. In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?

Local building department (same person/group that deals with structural, plumbing, etc.)	Local building department (separate person/group focused on energy code)	Third party (contracted person or organization)	None (not done or required in my jurisdiction)
--	--	---	--

5b. In your local jurisdiction, which organization has authority for INTERPRETING the commercial energy code and APPROVING its application?

Local building department (same person/group that deals with structural, plumbing, etc.)	Local building department (separate person/group focused on energy code)	Third party (contracted person or organization)	None (not done or required in my jurisdiction)
--	--	---	--

III. Influence of Project Participants
This survey is now about 40% complete.

6. In a typical new construction project in which your firm is involved, which of the below participants most often has the largest share of responsibility for ensuring compliance with the LIGHTING requirements of the commercial energy code?

- Architect
- Engineer
- Lighting designer
- Owner
- General contractor
- Electrical contractor
- Electrical or lighting distributor
- Interior designer
- Don't know

7. Please rate the influence of the following professionals on decision-making regarding compliance with the LIGHTING requirements of the commercial energy code, on the below scale.

1 - Not 2 3 4 - Somewhat 5 6 7 - Very

influential

influential

influential

- Architect
- Engineer
- Lighting designer
- Owner
- General contractor
- Electrical contractor
- Electrical or lighting distributor
- Interior designer
- Don't know

IV. Code Compliance: Lighting
This survey is now about 50% complete.

8. What percentage of your new construction projects, for which the energy code applies, would you estimate comply with all LIGHTING requirements of the commercial energy code? (If you don't know, skip this question.)

___% projects comply with lighting requirements of energy code

9. What percentage of your new construction projects (for which the commercial energy code applies) do you estimate complies with prescribed code Lighting Power Density limits? (If you don't know, skip this question.)

___% projects comply with Lighting Power Density limits for building or space type

10. What percentage of your new construction projects (for which the commercial energy code applies) do you estimate complies with the code requirement for automatic shutoff of lighting? (If you don't know, skip this question.)

___% projects comply with Automatic Lighting Shutoff control requirements

V. Barriers to Code Compliance
This survey is now about 80% complete.

11. Please rate the significance of the following potential barriers to compliance with the lighting requirements of the commercial energy code on the below scale.

1 - Not significant 2 3 4 - Somewhat significant 5 6 7 - Very significant

- Lack of commercially available solutions
- Lack of awareness or knowledge of approval process

Lack of awareness or knowledge among design team of energy code lighting requirements

Lack of awareness or knowledge among design team of energy code lighting requirements

Code language is unclear or not actionable

Energy code is not strictly enforced

Value engineering (initial cost) removes critical lighting choices

VI. Sources of Assistance

This survey is now about 85% complete.

12. When you have questions or need help with commercial energy code interpretation or application or compliance, how often do you seek guidance from the below sources of information, on the below scale?

1 - Never 2 3 4 - Occasionally 5 6 7 - Always

State code office

Local building department

Third-party consultant

Utility company

Product manufacturer

Code development organization (i.e., IECC, ASHRAE)

Industry associations

U.S. Department of Energy (www.energycode.gov)

VII. Your Opinion

This is the final question. Once completed, click "Next" to go to the next page, then click "Submit" to send us your responses.

13. What actions could be taken that would help you comply with the energy code?

[OPEN-ENDED RESPONSE]

VIII. Thank you!

Thank you for taking some time to complete this survey. A summary of results will be published in Architectural Products Magazine and the Lighting Controls Association's website, www.aboutlightingcontrols.org.