

Evaluation, Measurement, and Verification Report for the Nonresidential Fenestration Certification Initiative (NFCI) #1227-04, #1496-04, #1497-04, #1498-04

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FINAL REPORT

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1. Executive Summary

This report provides the Evaluation, Measurement, and Verification (EM&V) findings for California State University, Chico Research Foundation (CSUCRF) Nonresidential Fenestration Certification Initiative (NFCI) #1227-04 (PG&E), #1496-04 (SCE), #1497-04 (SCG), and #1498-04 (SDG&E). This study was conducted by Robert Mowris & Associates (RMA) with public goods charge (PGC) funds under the auspices of the California Public Utilities Commission and is available for download at www.calmac.org. The objectives of the NFCI are as follows.

- Provide up to 212 on-site sessions for manufacturers, contractors, and building officials, 42 professional meetings, and directly impact up to 1096 key actors in the market stream of up to 443 businesses.
- Increase of the knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by a 25% increase on post-test scores.
- Reach the commercial “hard-to-reach” contractors.

The NFCI program also has following qualitative goals.

- Reach small C-17 contractors and those contractors considered to be “hard-to-reach.”
- Increase the availability of site-built certified contractors of wall and glass, roof systems.
- Provide correct information about Title 24 site-built code and proper procedure and protocols for acquiring a site-built certification for a fenestration product.
- Increase the amount of site-built NFRC-certified systems in the marketplace.
- Provide building officials with a working knowledge of Title 24 site-built certification requirements and an understanding of what certification means.

The NFCI program was developed through the cooperative efforts of the National Fenestration Rating Council (NFRC) and CSU, Chico Research Foundation (CSUCRF), and was implemented via a partnership with the California Glass Association (CGA), the California Energy Commission (CEC), and the four investor-owned utilities. Ex ante program goals and ex post accomplishments are shown in **Table 1.1**. Except for the number of businesses served, the program exceeded all PIP goals by a large margin, but only spent 71% of the budget.

Description	Program Implementation Plan (PIP) Ex Ante Goal	Ex Post Accomplishment	Ex Post Accomplishment with Respect to PIP Goal
Workshop Attendees	1,097	1,653	151%
Informational Classes	212	225	106%
Professional Meetings	42	54	129%
Business Served	443	588	62%
Targeted Mailings	5,000	5,823	116%
Serve Small C-17 Contractors	151	333	221%
Serve Hard-to-Reach Contractors	30	107	357%
Increase Participant Knowledge on Post-test Scores	25%	179%	716%
Program Budget	\$882,635	\$623,376	71%

NFCI developed the program goals and objectives, marketing strategy, and delivery of the trainings with an advisory team, consisting of representatives from the four investor-owned utilities, the CGA, the CEC, and the state chapters of the International Conference of Building Officials (ICBOs). The program provided training and technical assistance regarding NFRC site-built certification to 1,653 upstream and midstream market actors. More than 90 architects and design professional were trained and referred to the four investor-owned utilities' "Savings-By-Design" program for participation in their nonresidential energy efficiency programs. The procedure for program coordination is summarized below.

- The NFCI served as the outreach and technical assistance arm for the investor-owned utilities' nonresidential new construction programs and any major renovation programs that require NFRC-certified high performance fenestration products.
- The NFCI provided training and technical assistance for fenestration products for the statewide "Savings-By-Design" program.
- NFCI services also provided certification training regarding the Title 24 requirements for NFRC site-built certification in nonresidential buildings with more than 10,000 square feet of glazing.
- The following groups worked with NFCI in the project: California Glass Association (CGA), Investor-owned Utilities (IOU), and California Energy Commission (CEC) and the American Institute of Architects (AIA).

Since the CSUCRF NFCI Program was an information-only program, the quantitative evaluation was primarily concerned with meeting the goals of completing all training sessions and professional meetings. The EM&V study addressed the following research requirements and objectives specified in the CPUC Energy Efficiency Policy Manual for information-only programs.

- Develop and conduct a survey to assess the level of performance and success of NFCI.
- Establish a baseline of nonresidential information related to the number of systems with site-built certification for curtain wall, roof glazing, and glass walls (or combinations).
- Provide ongoing feedback and corrective and constructive guidance regarding program implementation.
- Provide upfront market assessments and baseline analysis especially for new programs.
- Measure indicators of effectiveness of the program including testing assumptions underlying the program theory and approach.
- Assess the overall levels of performance and success of the program.

The statistical sample size of surveyed participants is shown in **Table 1.2**. Surveys were conducted from a randomly selected sample of market actors targeted by the program. Seventy-five (75) participant surveys were completed. The highest participation rates were from building officials, design professionals, and glazing contractors.

Table 1.2 Statistical Sample Size of Surveyed Participants

Measure Description	Ex Ante Goal	Ex Post Achievement	Ex Ante Sample	Ex Post Sample	Ex Post n _{FPC}	Ex Post Cv	Participant Rate
Flat Glass Manufacturers	60	26	10	7	7	0.17	1%
Component Suppliers, incl. Extruders	120	76	10	7	9	0.18	2%
Building Officials & Inspectors	400	502	20	21	19	0.27	33%
Glazing Contractors (C-17)	150	306	10	12	10	0.19	21%
Curtain Wall Manufacturers	48	100	5	6	5	0.13	2%
Design Professionals (Architect/ Engineer)	200	567	10	13	10	0.19	31%
Utility Staff	18	31	3	3	3	0.10	2%
Professional Associations (A/A, CGA)	100	45	5	6	5	0.13	8%
Total	1,096	1,653	73	75	70	0.51	100%

Process survey findings indicate that participants are very satisfied with workshops offered by the program. The overall participant satisfaction rating is 8.78 +/- 0.18 based on based on 750 participant responses to ten questions (see **Table 1.3**). Process evaluation findings indicate the program provided valuable energy efficiency training to design professionals, building officials, glazing contractors, and manufacturers. Participants generally rated the NFCI staff as courteous and professional and found the training easy to understand and easy to implement on jobs that require fenestration calculations or specifications. Most participants reported that the NFCI workshops helped them comply with Title 24 fenestration requirements. Participants generally felt it was a “great program” and that the NFCI workshop presentation training materials and CD-ROM were useful and informative.

1.3 Participant Satisfaction Survey Questions and Responses			
Question	Rating	90% CI	Sample
1. The NFCI program trainers and staff are courteous and professional?	9.05	0.17	73
2. The NFCI program trainers and staff were knowledgeable about site-built/field-fabricated fenestration certification requirements for nonresidential buildings?	9.33	0.16	73
3. The amount of time required to complete the NFCI training was about right?	7.49	0.35	73
4. The NFCI workshop or training class was easy to understand?	8.23	0.16	72
5. The NFCI workshop recommendations are easy to implement on the jobs that you do that require these types of calculations or specifications?	8.23	0.16	72
6. NFCI training helped me comply with T-24 site-built fenestration requirements?	8.60	0.16	72
7. The information provided in the NFCI workshop was useful and informative?	8.63	0.21	73
8. The NFCI training materials and CD-ROM were useful and informative?	8.49	0.24	58
9. How would you rate the NFCI workshop in terms of presentation from 1 to 10?	8.75	0.21	73
10. Please provide your overall satisfaction with NFCI workshop or training class?	8.78	0.18	73

The program influenced participants to certify 34,779,217 square feet of nonresidential fenestration with T-24 standards. Participants shared information about the program with 900 peers and business associates and 450 of these businesses certified 13,025,000 square feet of nonresidential glazing. Therefore, the spillover from the program is estimated at 37% (i.e., 13.025 million divided by 34.779 million). All participants indicated that they would continue complying with the Title 24 site-built or field-fabricated fenestration requirements.

Surveys were completed with 68 non-participants or refusers. The average non-participant was responsible for 446,617 square feet of site-built or field-fabricated fenestration annually in terms of manufacturing, specifying, designing, installing, or inspecting. The primary reason given for non-participation was the hassle cost (i.e., lack of time for workshop), followed by information cost (i.e., didn’t know about program), performance uncertainty, and misplaced or split incentives (i.e., “don’t install site-built or field fabricated fenestration).

Participants provided a number of suggestions to improve the program. The most frequent suggestion from 72% of participants was “no suggestion” (i.e., great program). Approximately 39% of participants suggested longer workshops to help participants understand Title 24 fenestration requirements, focus on building officials and improve enforcement of Title 24 fenestration requirements, and improve training materials and provide more information on CD-ROM. The most frequent suggestion from non-participants was for better advertising, marketing, or website information about the program to increase participation (information cost market barrier). \

The EM&V study recommendations include continuing to offer training and technical assistance to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements. Of particular importance is training on fenestration certification and software tools to meet fenestration requirements (cited most often by participants). Other recommendations include focusing on early adopters, providing better advertising, and providing better coordination with other programs such as “Savings by Design” and “Flex Your Power” to gain more support for the NFCI program and greater demand and consumer awareness.

The study assessed the continuing need for the program by analyzing baseline survey data and the number of participants that reported compliance with Title 24 fenestration requirements. The process survey findings indicate that most participants and non-participants currently do not comply with the Title 24 fenestration requirements. Based on the survey findings all market actors require training and technical assistance to comply with the Title 24 fenestration requirements. Unfortunately, the program only trained a small percentage of industry actors. The NFCI program was unable to train all of the building officials throughout California, and trained building officials are required to enforce the Title 24 fenestration requirements. The default certification rating tables are based on out-of-date science and are being revised. NFRC has developed a web-based component certification program. These issues coupled with the proposed changes in the 2008 Title 24 building codes justify a critical need to continue and expand the program to provide training and technical assistance to improve compliance and code understanding. The program should be continued statewide since it provides cost effective training and technical support to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements.

Section 2 describes how the EM&V study addresses the required CPUC Energy Efficiency Policy Manual objectives, including baseline information, energy efficiency measure information, measurement and verification approach, and the evaluation approach. **Section 2** also includes equations used to develop energy savings and the sample design. **Section 3** discusses how the EM&V study met the Required CPUC Objectives and Components including baseline information, energy efficiency measure information, measurement and verification approach, and the evaluation approach. **Section 4** provides EM&V study findings including process evaluation findings, process evaluation recommendations regarding what works, what doesn't work, and suggestions to improve the program's services and procedures. **Appendix A** provides the participant and non-participant process survey instruments.

2. Program Description and Theory

In response to Assembly Bill 970 (AB970), the California Energy Commission (CEC) conducted an emergency rulemaking session to develop amendments to the Building Energy Standards, which were adopted by the CEC on January 3, 2001 (119 days after AB 970 was signed by the Governor). The AB970 amendments to the standards focused on reducing peak electricity consumption and demand in the shortest time possible. One of the most innovative and potentially productive methods for the reduction of demand for electricity, especially peak demand, was the required National Fenestration Rating Council (NFRC) testing and labeling for site-built fenestration in nonresidential buildings with more than 100,000 ft² of floor area and 10,000 ft² of vertical fenestration area. The proposed 2005 Standard includes modifications (Section §143, §10-111, §116), which further strengthened the fenestration requirements by requiring NFRC site built labeling for all nonresidential buildings with more than 100,000 ft² of glazing.

The CSUCRF NFCI program aided the CEC, building officials, and the fenestration industry to reduce electric consumption and demand by gathering and disseminating accurate information, while also avoiding diluted or incorrect messages about NFRC site-built ratings of fenestration products in an educational project designed to help the industry meet the fenestration goals outlined by Title 24. The result provided a comprehensive and compelling case for the use of the site-built rating solution. Support for the NFCI program was provided in the coordination and orchestration of the interests of the entire upstream and midstream market segments (including the small C-17 contractors) into a jointly beneficial effort to convert the market from its current state of conventional unlabeled products, to high performance site-built labeled products.

The CSUCRF NFCI information-only program provides training and technical assistance to code officials and the site-built fenestration curtain wall industry to ensure compliance with the 2005 California Energy Commission (CEC) Title 24 building energy efficiency standards.

2.1 Program Objectives

The program had the following quantitative market barrier-related goals.

- Provide up to 212 on-site sessions for manufacturers, contractors, and building officials, 42 professional meetings, and directly impact up to 1096 key actors in the market stream of up to 443 businesses.
- Increase of the knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by a 25% increase on post-test scores.
- Reach the commercial “hard-to-reach” contractors.

The NFCI program also had the following qualitative goals.

- Reach small C-17 contractors and those contractors considered to be “hard-to-reach.”
- Increase the availability of site-built certified contractors of wall and glass, roof systems.
- Provide correct information about Title 24 site-built code and proper procedure and protocols for acquiring a site-built certification for a fenestration product.
- Increase the amount of site-built NFRC-certified systems in the NFRC database (if available).

- Provide building officials with a working knowledge of Title 24 site-built certification requirements and an understanding of what certification means.

The EM&V study found that the NFCI program exceeded all quantitative and qualitative goals.

2.2 Program Implementation

The NFCI Project was developed through the cooperative efforts of the National Fenestration Rating Council (NFRC) and CSU, Chico Research Foundation (CSUCRF), and was carried out via a partnership with the CGA, the CEC, and the four investor-owned utilities. CSUCRF and NFRC developed the goals and objectives, marketing strategy, and delivery of the trainings. An advisory team, consisting of representatives from the four investor-owned utilities, the CGA, the CEC, and the state chapters of the International Conference of Building Officials (ICBOs) reviewed the proposal strategy and offered constructive criticism and guidance. Those Upstream and Midstream market actors received training and technical assistance necessary to gain NFRC site-built certification. Architects and designers were trained and referred to the four investor-owned utilities' "Savings-By-Design" Program for participation in their nonresidential energy efficiency programs. The procedure for program coordination is summarized below.

- The NFCI served as the outreach and technical assistance arm for the investor-owned utilities' nonresidential new construction programs and any major renovation programs that require NFRC-certified fenestration products.
- The statewide "Savings-By-Design" program constantly generates requests for training and technical assistance related to fenestration products, and NFCI filled this training void.
- NFCI services ensured that the Title 24 requirement for NFRC site-built certification was met in nonresidential buildings with more than 10,000 square feet of glazing.
- The following groups worked with NFCI: California Glass Association (CGA), Investor-owned Utilities (IOU), the American Institute of Architecture (AIA) and California Energy Commission (CEC).

2.3 Market Actors

Market actors are categorized in two primary groups: Upstream and Midstream. In addition, professional associations are considered market actors because their membership includes participants at the midstream level, and collaboration with the associations is vital to rapid deployment of the project.

- Upstream Actors
 - Flat-glass manufacturers
 - Component manufacturers (primarily stile and rail extruders)
 - Curtain wall designers
 - Curtain wall manufacturers
 - Glass distributors
- Midstream Actors
 - Architects
 - Designers
 - Mechanical engineers
 - Title-24 consultants
 - Commercial C-17 glazing contractors (curtain wall installers)
 - Building officials

- ICBO-certified inspectors
- Associations
 - California Glass Association (CGA)
 - American Institute of Architectural (AIA)

Additional support will be solicited with CEC Energy Efficiency Standards personnel and with Lawrence Berkeley National Laboratory, and the Alliance to Save Energy.

2.4 Reaching Participants through Training

The training strategy was to raise the banner of more efficient, properly labeled fenestration products, and to provide each decision-maker with the tools needed to understand, design, specify and install better products. Specifically, NFCI implemented the following training approach:

- NFCI assisted the fenestration industry in gaining accurate and timely information to bridge the awareness gap regarding the NFRC site-built rating system for nonresidential fenestration products. Its training built a comprehensive and compelling case for the use of the site-built rating solution.
- NFCI orchestrated and coordinated the interests of the entire upstream and midstream market segments into a jointly beneficial endeavor to convert the market from conventional unlabeled products to high performance certified and labeled products. To that end, the NFCI project administered the following services:
 - Upstream and midstream training.
 - Incentives to assist responsible parties obtain initial NFRC certification of their products.
 - Upstream and midstream technical assistance.
- NFCI training and technical assistance, designed to neutralize barriers and stimulate market transformation, addressed such topics as:
 - The benefits of high performance fenestration products.
 - New technology products and systems.
 - Title 24 energy efficiency requirements, methods for compliance, forms and procedures.
 - NFRC site-built product certification—why and how, forms and procedures.
 - Incentives available through existing utility efficiency programs.
- Manufacturers were made aware of the certification process through:
 - Seminars at professional associations, such as sessions sponsored by glass manufacturers.
 - One-on-one sessions, where the training was taken on site and delivered to individuals and small groups.
- The upstream component was tailored primarily toward the needs of:
 - Flat-glass manufacturers
 - Curtain wall designers and manufacturers
 - Stile and rail extruders
 - Glass distributors
- Midstream services were focused toward:
 - Architects
 - Designers
 - Mechanical Engineers
 - Title 24 Consultants

- Commercial C-17 Glazing Contractors, especially those installing curtain wall systems (i.e., stick systems, unit systems, and unit and mullion systems).
- Building Officials and Building Inspectors
- International Conference of Building Officials (ICBO)-certified inspectors
- Associations
 - California Glass Association (CGA)
 - American Architectural Manufacturers Association (AAMA)

Additional collaboration occurred with CEC efficiency standards personnel and with Lawrence Berkeley National Laboratory, the Natural Resources Defense Council, and the Alliance to Save Energy.

2.5 Selection of Participants

The NFCI program outreach encompassed over a dozen organizations and market segments. The initial phase was devoted to the needs and interests of hard-to-reach commercial C-17 glazing contractors (primarily those installing curtain walls). Following this initial phase, the scope was broadened to include all market actors, both upstream and midstream. A summary of the NFCI training provided statewide is provided in **Table 2.1**.

Table 2.1 Summary of Program Training Provided Statewide

Description	Trained Statewide	Sessions	Professional Meetings	Small Groups	Class Sessions	Sales Staff	Purchasing Agents	Owners & Upper Mgt	Technicians & Engineers
Flat Glass Manufacturers	26	6	2	✓	✓	✓	✓	✓	✓
Component Suppliers, incl. Extruders	76	14	3	✓	✓	✓	✓	✓	✓
Building Officials & Inspectors	502	68	16	✓	✓	✓	✓	✓	✓
Glazing Contractors (C-17)	306	76	14	✓	✓	✓	✓	✓	✓
Curtain Wall Manufacturers	100	17	4	✓	✓	✓	✓	✓	✓
Design Professionals (Architects, Engineers and Title 24)	567	90	9	✓					
Utility Staff	31	2	4	✓					✓
Professional Associations (AIA, CGA)	45	2	2	✓	✓	✓	✓	✓	✓
Total	1,653	275	54						

2.6 Hard-to-Reach Contractors

The NFCI Project was designed to help create a level playing field for all market actors in the area of NFRC site-built products certification. Because of the new requirements, those small contractors who lacked the knowledge to be a “responsible party” in the labeling effort meet potential obstacles in marketplace under Title 24. In an effort to help these small contractors, NFCI collaborated with the CGA to initiate contact with small, “hard-to-reach” C-17 contractors

first, a full two weeks before contact is made with the other groups. The criteria used to determine if a contractor qualifies under the “hard-to-reach” category was as follows:

- Small commercial contractors (i.e. fewer than 10 employees).
- Contractors located in areas of low population concentration (i.e. those located in a geographic area other than the San Francisco Bay Area, the San Diego Metropolitan Area, the Los Angeles Basin, or the Sacramento Metropolitan Area).
- Contractors with language challenges (i.e. English is not the primary language of the contractor).

A portion of the project resources (comprising the training and technical assistance budgets) will be reserved for hard-to-reach contractors.

2.7 Geographic Area

NFCI was a statewide code and standards training and technical assistance program to serve the nonresidential contracting sector. It concentrated on the “hard-to-reach” areas which are defined as:

- Small commercial contractors (i.e. fewer than 10 employees).
- Contractors located in areas of low population concentration (i.e. those located in a geographic area other than the San Francisco Bay Area, the San Diego Metropolitan Area, the Los Angeles Basin, or the Sacramento Metropolitan Area).
- Contractors with language challenges (i.e. English is not the primary language of the contractor).

The targeted geographic areas of the program were determined in large part by the presence of the “hard-to-reach” audience.

3. Required CPUC Objectives and Components

This section discusses how the EM&V study addressed the required CPUC objectives and components listed in **Table 1.7** including baseline information, energy efficiency measure information, measurement and verification approach, and the evaluation approach.

3.1 Baseline Information

At present there are no existing studies available regarding NFRC-certification of site-built fenestration systems since this is a new area of building science. The study assessed program performance in serving the industry and local government building officials through an evaluation of the cross-section of participating customers. Existing baseline data were unavailable from the California Measurement Advisory Committee (CALMAC, <http://www.calmac.org>), and the California Energy Commission (CEC, <http://www.energy.ca.gov>).

3.2 Energy Efficiency Measure Information

The CSUCRF NFCI program was designed to focus on NFRC site-built fenestration products (i.e., energy efficient glazing measures). The program was designed to provide training and technical assistance to midstream and upstream market actors to gain NFRC site-built certification. Architects and designers will be trained and referred to the four investor-owned utilities’ “Savings-By-Design” Program for participation in their nonresidential energy efficiency programs. The procedure for planned program coordination is summarized below.

- The NFCI will serve as the outreach and technical assistance arm for the investor-owned utilities’ nonresidential new construction programs and any major renovation programs that require NFRC-certified high performance fenestration products.
- The statewide “Savings-By-Design” program constantly generates requests for training and technical assistance related to fenestration products, and NFCI will fill this training void.
- NFCI services will also ensure that the Title 24 requirement for NFRC site-built certification will be met in nonresidential buildings with more than 10,000 square feet of glazing.¹
- The following groups have expressed a strong desire to work with NFCI in this project: California Glass Association (CGA), Investor-owned Utilities (IOU), and California Energy Commission (CEC). The principal faculty has developed a very similar project funded by PG&E and co-sponsored by CGA, as well as working on a separate two-year American Architectural Manufacturers Association (AAMA).

Since the program is information-only, assumptions about energy savings, effective useful lifetime, and net-to-gross ratios are not relevant. However, program objectives and qualitative goals regarding the number of training workshops, on-site sessions, certified fenestration contractors, site-built NFRC-certified systems, and trained building officials were quantified and verified by the EM&V study.

3.3 Measurement and Verification Approach

The measurement and verification approach addressed the following research requirements and objectives specified in the CPUC Energy Efficiency Policy Manual (EPPM) for information-only programs as shown in **Table 3.1**.

Table 3.1 Measurement and Verification Approach (Information-Only Program)

CPUC EPPM Research Requirement	M&V Study Task
Providing up-front market assessments and baseline analysis, especially for new programs. Establish baseline of nonresidential information related to number of systems with site-built certification for curtain wall, roof glazing, and glass walls (or combinations thereof).	Solicit input from the CEC, AAMA, CGA, & guidance from the NFRC to facilitate development of a market assessment survey tool to solicit and compile information from industry actors. Program information was used to determine: <ol style="list-style-type: none"> 1. Number of NFRC-certified systems installed in buildings over 100,000 ft². 2. Number of products awarded site-built certification.
Providing ongoing feedback, and corrective and constructive guidance regarding the implementation of programs.	The NFCI team developed a comprehensive training plan comprising curricula, visual aids, demonstration materials, handouts, pre/post tests, and student evaluations. M&V staff reviewed the materials and made recommendations. Structure and content of the program was evaluated and modified by the Project Manager and/or Trainers as required based upon the assessment results and participant evaluations. The pre/post scores and course evaluations were used to monitor program progress.
Measuring indicators of the effectiveness of specific programs, including testing of the assumptions that underlie the program theory and approach.	Quantitative evaluation of the training and technical assistance efforts, program procedures, processes, and techniques was made to improve continuity, to increase learning, and to ensure the overall success of NFCI project.
Assessing the overall levels of performance and success of programs by conducting participant and non-participant	Overall success was determined by the following: <ol style="list-style-type: none"> 1. Number of participants trained and sessions conducted.

¹ October 1, 2005, the 100,000 square feet criteria will be removed because of the revised 2005 Title 24 Building Energy Efficiency Standards.

Table 3.1 Measurement and Verification Approach (Information-Only Program)

CPUC EEPM Research Requirement	M&V Study Task
surveys.	2. Increase in knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by pre/post test scores. 3. Fenestration training as evidenced by participant course rating via a course evaluation form. 4. Verify need for program to assist immediate and future proper implementation of Title 24 requirements. 5. Verify hard-to-reach contractors were reached.
Informing decisions regarding compensation and final payments.	Not Applicable to information-only programs.

3.4 Process Evaluation Approach

The process evaluation approach involved designing and implementing process surveys to measure participant satisfaction, and obtain suggestions to improve the program's services and procedures. Process surveys and review of training sessions and meetings were used to guide the overall process evaluation in terms of investigating operational characteristics of the program and developing specific recommendations to help make the program more cost effective, efficient, and operationally effective. Interview questions assessed the NFCI market assessment tool, training curricula, visual aids, materials, pre/post tests, and student evaluations. A sample of participants and non-participants was asked process questions. Participants were asked why and how they decided to participate in the program. Non-participants were asked why they chose not to participate. This was done to identify reasons why program marketing efforts were not successful with some customers as well as to identify additional hard-to-reach market barriers (i.e., incentives or other inducements to achieve greater participation). Analysis of process evaluation survey data included a summary of what works, what doesn't work, and the level of need for the program.

3.5 Sampling Design Approach

The statistical sample design approach for the process evaluations involved selecting a random sample of customers from the program population. Samples were selected to obtain a reasonable level of precision and accuracy at the 90 percent confidence level per CPUC Energy Efficiency Policy Manual (EEPМ). The proposed sample design was based on statistical survey sampling methods. Sampling methods were used to analyze the data and extrapolate results from sample measurements to the population of all program participants and to evaluate the statistical precision of the results.² Selecting participants for the sample was guided by the statistical sampling plan.

The sample size necessary to obtain the desired 10% relative precision for program mean savings estimates was calculated using **Equation 1**.

² Cochran, William G. *Sampling Techniques*. New York: John Wiley & Sons, 1977, Kish, Leslie. *Survey Sampling*. New York: John Wiley & Sons, 1965. Thompson, Steven K. *Sampling*. New York: John Wiley & Sons, 1992.

Eq. 1 Sample Size = $n_i = \frac{t^2 C_{vi}^2}{r^2}$

Where,

- n_i = Required sample size for measure “i”,
- t = The value of the normal deviate corresponding to the desired confidence probability of 1.645 at the 90 percent confidence level per CADMAC Protocols,
- r = Desired relative precision, 10% per CADMAC Protocols,
- C_{vi} = Coefficient of variation, $\frac{S_i}{\bar{y}_i}$, for measure “i.”

For small populations, the sample size was corrected using the finite population correction (FPC) equation as follows.³

Eq. 2 FPC Sample Size = $n_{FPCi} = \frac{n_i}{1 + (n_i - 1)/N}$

Where,

- n_{FPCi} = Sample size for measure “i” with finite population correction.

The approach to the sampling plan was to reduce the overall sample size requirements necessary to achieve the desired level of confidence and yield the greatest accuracy at the lowest cost. The ex ante and ex post statistical sample sizes for participants are shown in **Table 3.2**. The ex ante and ex post statistical sample size for non-participants was 68 non-participants. The sample sizes assumed a coefficient of variation (Cv) of 0.5 and relative precision of 0.1 to achieve the desired 90 percent confidence.⁴ The ex post sample size was adjusted up or down to achieve the desired confidence level and Cv.

Table 3.2 Statistical Sample Size of Surveyed Participants

Measure Description	Ex Ante Goal	Ex Post Achievement	Ex Ante Sample	Ex Post Sample	Ex Post n_{FPC}	Ex Post Cv	Participant Rate
Flat Glass Manufacturers	60	26	10	7	7	0.17	1%
Component Suppliers, incl. Extruders	120	76	10	7	9	0.18	2%
Building Officials & Inspectors	400	502	20	21	19	0.27	33%
Glazing Contractors (C-17)	150	306	10	12	10	0.19	21%
Curtain Wall Manufacturers	48	100	5	6	5	0.13	2%
Design Professionals (Architect/ Engineer)	200	567	10	13	10	0.19	31%
Utility Staff	18	31	3	3	3	0.10	2%
Professional Associations (AAMA, CGA)	100	45	5	6	5	0.13	8%
Total	1,096	1,653	73	75	70	0.51	100%

³ Ibid.

⁴ The proposed sample size is adjusted based on finite population correction.

3.6 List of Questions Answered by the Study

The following list of questions were answered by the study.

1. Will a program of consistent training and technical assistance for fenestration industry actors result in energy savings across the industry?

The study answered this question by interviewing participants and verifying that 66 participants applied knowledge gained from the NFCI workshop attendance to install 34,779,217 square feet of Title 24-certified fenestration. In addition the spillover square feet of T24-certified fenestration influenced by participants was 13,025,000 square feet. The program achieved a total of 47,804,217 square feet of T24-certified fenestration influenced by participants. The NFCI program provided documentation regarding 26 firms that submitted 78 projects to the Savings by Design Program. Approximately 74 +/- 4% of participants agreed that the comprehensive NFCI program would result in energy savings across the industry (see question 22, Section 4.2.1 Participant Results).

2. What are the additional needs of industry actors that may be addressed by qualified personnel in training and technical assistance opportunities for continued savings and professional growth?

Participants were asked what additional training or technical assistance they would suggest for continued savings and professional growth. Approximately 71% of respondents asked for more training. 13% asked for technical assistance from the website or CD-ROM, and 16% said the training was successful and sufficient (see question 17, Section 4.2.1 Participant Results). NFCI provided training and technical assistance during 2004-05. The EM&V participant survey findings indicate that industry actors require additional training and technical assistance. Participant survey findings from design professionals indicate that only 33% print the U-factor and SHGC values on drawings and only 50% sign Title 24 compliance documents. For non-participant design professionals only 38% print the U-factor and SHGC values on drawings and only 23% sign the Title 24 compliance documentation. Participant survey findings from building inspectors indicate that only 5 ask for site fenestration certificates, 10% understand how to verify compliance, and 14% verify Title 24 fenestration certificates. For non-participant building inspectors only 33% ask for the required Title 24 site-built or field-fabricated label certificates for fenestration. The participant survey findings for glazing contractors indicate that only 25 to 33% of glazing contractors are complying with Title 24 even after the NFCI training. For non-participant glazing contractors, the survey results indicate that none of them review Title 24 fenestration requirements, obtain site label certificates, ensure Title 24 compliance documentation is on site. Only 10% of non-participant glazing contractors submit bids with Title 24 compliant products and install Title 24 compliant fenestration. The participant survey findings for manufacturers indicate that only 15 to 30% of manufacturers are complying with Title 24 even after the NFCI training. The non-participant survey findings for manufacturers indicate that none of them provide NFRC labels or Site-Built labels on window products showing U-factor and SHGC values. None of them are working with NFRC to certify and label their products, verify product performance, or communicate building code compliance. This is especially true for building officials who were not able to be trained during 2004-05. The survey findings indicate a significant lack of knowledge about the requirements of the Title 24 non-residential fenestration requirements. NFCI was only able to train 1,655 industry

actors and this is a small fraction of the total number of the fenestration industry actors that require training.

3. What effects have the new Title 24 regulations had upon the small C-17 and “hard-to-reach” contractors in California (small is defined as a company with 35 or fewer employees)?

The study answered this question by interviewing C-17 and hard-to-reach contractor participants. The participant survey findings for C-17 glazing contractors indicate significant improvements regarding Title 24 fenestration requirements after attending NFCI training workshops. However, only 25 to 33% of glazing contractors comply with Title 24 even after the NFCI training. The non-participant survey findings for glazing contractors indicate that none of them review Title 24 fenestration requirements, obtain site label certificates, ensure Title 24 compliance documentation is on site. Only 10% of non-participant glazing contractors submit bids with Title 24 compliant products and install Title 24 compliant fenestration. These survey findings indicate that the new Title 24 regulations created a technical and economic burden for small C-17 and hard-to-reach contractors because there was no infrastructure in place to provide training and technical assistance to help these contractors meet the new Title 24 regulations. Small contractors purchase fenestration systems from distributors who sell glass and extrusions or frames. These distributors were unaware of or did not comply with the Title 24 regulations. The NFCI program attempted to fill this gap by providing training and assistance to 322 small C-17 contractors (goal was 151), and 103 hard-to-reach contractors (goal was 30). The survey findings indicate that the Title 24 regulations have had a significant impact on small C-17 glazing contractors and hard-to-reach contractors in California. Additional training is necessary to help small C-17 contractors comply with the new Title 24 fenestration requirements.

4. What are the benefits of increased knowledge of correctly labeled fenestration products in the industry?

The study answered this question by interviewing participants, professional associations (AAMA, CGA, NFRC, CEC), and utility program managers. Based on a sample of 9 professional associations and utilities, the survey findings indicate 467% improvements regarding NFRC labels on how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements. Based on available data from the California Energy Commission and survey responses from C-17 Contractors, there were very few fenestration certifications completed using the existing NFRC protocols (NFRC-SB). The number of NFRC certified products decreased statewide during the two years that the NFCI Program was implemented. This is attributable to two factors: 1) The two largest extruders stopped providing site-built certification as an option, and 2) Contractors developed an understanding of how to provide site-built fenestration certification using the CEC Alternate Default Label Certificate option. The extruder stopped providing certification due to lack of control over each of the components being installed and the liability risk. The NFCI program understood this problem and recommended redesigning the NFRC certification process. The NFCI program also understood that the CEC Alternate Default Label Certificate option was more appropriate for smaller jobs and in some cases provided a more accurate label. The NFCI program provided participants with detailed form instructions and technical assistance

for completing the required CEC Certificates (i.e., NRFC label, Default, and Alternate Default).

5. Are customers satisfied with the program implementation and are customers satisfied with the training and information offered in the program?

The study answered this question by summarizing customer satisfaction questions from surveys. The overall participant satisfaction rating was 8.78 +/- 0.018 based on survey responses to 713 questions. The satisfaction rating for training was 8.85 +/- 0.04. The satisfaction rating regarding trainers and staff being courteous and professional was 9.05 +/- 0.017. The satisfaction rating regarding trainers and staff being knowledgeable about fenestration certification requirements was 9.33 +/- 0.016. Approximately 75 +/- 3.5% of participants believed the time required to complete the NFCI workshop training was about right. Approximately 73.8 +/- 4% of participants felt that the NFCI program offered accurate and reliable one-day training on site-built/field/fabricated fenestration certification requirements, including product design, marketing, distribution, and sales information and supportive on-call telephone technical assistance for the fenestration industry will result in energy savings across the industry. Approximately 82.3 +/- 1.6% of participants felt that the NFCI workshops were easy to understand and the recommendations were easy to implement on jobs that require fenestration calculations or specifications. Approximately 86 +/- 1.6% of participants felt that the NFCI workshops helped them comply with Title 24 fenestration requirements. Approximately 86.3 +/- 2.1% of participants felt that the NFCI workshops were useful and informative. Approximately 84.9 +/- 2.4% of participants felt that the training materials and CD-ROM were useful and informative. The participant satisfaction rating for presentation was 8.75 +/- 0.021. of participants felt that the NFCI workshop presentation training materials and CD-ROM were useful and informative.

6. Are there some customers who choose not to participate in the program?

The study answered this question by conducting survey interviews with non-participants or market actors who were aware of the program but chose not to participate (i.e., refusers). Non-participant and refuser process survey results are provided in **Table 3.3**. The primary reason for non-participation was the hassle cost (i.e., “lack of time for workshop”), followed by information cost (i.e., didn’t know about NFCI), not interested, performance uncertainty, and misplaced or split incentives (i.e., “don’t install site-built or field fabricated fenestration). Many design professionals were unable to participate in the NFCI program training workshops due to losing income (i.e., billable hours) while attending the workshops. Many building officials indicated that they were unable to participate in the NFCI program due to budget cuts and demands on their time to perform new construction inspections. Small C-17 contractors indicated that they didn’t participate due to lack of awareness about the Title 24 requirements and their current practice to ignore Title 24 fenestration requirements, fenestration label certificates, and documentation. These critical information gaps lead to compliance gaps.

Table 3.3 Non-Participant and Refuser Process Survey Results

Reasons Given for Non-Participation (i.e., Market Barriers)	Percent
1. Didn't know about the NFCI program (i.e., information cost).	31.5%
2. Didn't understand benefits of NFCI program (i.e., performance uncertainty).	5.5%
3. Don't install site-built or field-fabricated fenestration (i.e., misplaced or split incentive).	5.5%
4. Lack of time for workshop or training class (i.e., hassle cost).	41.1%
5. Hired architect or contractor who didn't know about NFCI (i.e., asymmetric information).	0.0%
6. Architect specifies windows and I'm not involved in decision (i.e., bounded rationality).	0.0%
7. Didn't understand site-built or field-fabricated certification was required under Title 24.	0.0%
8. Not interested	16.4%
9. Other	0.0%
Total	100.0%

7. Is there a continuing need for the program?

The study answered this question by conducting process surveys with participants, non-participants, and refusers. The process survey findings indicate that most participants and non-participants currently do not comply with the Title 24 fenestration requirements. Based on the survey findings all market actors require training and technical assistance to comply with the Title 24 fenestration requirements. Unfortunately, the program only trained a small percentage of industry actors. The NFCI program was unable to train all of the building officials throughout California, and trained building officials are required to enforce the Title 24 fenestration requirements. The default certification rating tables are based on out-of-date science and are being revised. NFRC has developed a web-based component certification program. These issues coupled with the proposed changes in the 2008 Title 24 building codes justify a critical need to continue the program to provide training and technical assistance.

8. Are there measurable program multiplier effects?

Program multiplier effects questions are used to measure program participants sharing information learned from the program with non-participants, and if sharing of information is acted upon in a way that results in the installation of similar measures within a non-participant population. For example, the program promotes Title 24 compliant site-built fenestration systems. Programs that link technologies with educational measures can have multiplier effects as high as 25-30 percent including the sharing of program information to a population that is several times larger than the participant population. The following questions will be included in the participant process surveys.

8.1. Have you shared program information with any of your business associates about the benefits of Title-24 compliant site-built fenestration products?

Based on survey results 60% of participants shared program-provided information regarding the benefits of Title-24 compliant site-built fenestration products with their peers or business associates.

8.2. With how many other businesses have you shared this information in the last 12 months?

NFCI participants shared program-provided information with more than 900 businesses in the last 12 months.

8.3 About how many builders or contractors have installed site-built fenestration products?

Participants said 450 businesses installed 13,025,000 square feet of T24-certified site-built/field fabricated fenestration products that were influenced by sharing of information.

3.7 List of Tasks Undertaken by the Study

The following eight (8) tasks will be undertaken by the study.

Task 1. Prepare EM&V Plan

The EM&V Plan contained a detailed description of all activities required to complete the study.

Task 2. Conduct Market Assessments and or Baseline Analyses

The market assessment and or baseline analyses used existing saturation survey data (if available and applicable). Existing studies were used to evaluate current practices regarding site-built fenestration products.

Task 3. Develop Assessment Survey Instruments

Verification and process survey instruments were designed to collect necessary data to achieve the study objectives.

Task 4. Conduct Phone/Mail/Email or In-person Surveys

Process surveys were conducted with participants and non-participants.

Task 5. Conduct Review of Implementer's Records

Review of program implementer's records were used to evaluate the objects (i.e., number of training sessions, workshops, referrals, etc.).

Task 6. Analyze Survey Data

For the process evaluation the in-depth surveys were analyzed to identify what works, what doesn't work, and the level of need for the program. Analyses of interview responses included an assessment of market barriers to energy efficiency, participant satisfaction, and suggestions to improve the program. Statistical analysis was used to extrapolate survey results to the program as a whole.

Task 7. Provide Feedback to Implementer

The progress reports provided preliminary impact evaluation results as well as process evaluation results including on-going feedback and guidance on EM&V findings that might improve the program process and procedures.

Task 8. Provide Interim, Draft, and Final EM&V Reports

Interim, draft, and final EM&V reports included a description of the study methodology and all deliverables as per the CPUC EEPM. The reports provided results of the process evaluation and recommendations.

3.8 How Study met CPUC EEPM Objectives

The study met the following CPUC objectives described in the EEPM (pg. 31).

1. Measure the level of energy and peak demand savings achieved.

Not applicable to information-only programs. The NFCI program provided documentation regarding 26 firms that submitted 78 projects to the "Savings by Design" Program. The participant survey results verified that 66 participants applied knowledge gained from the NFCI workshop attendance to install 34,779,217 square feet of Title 24-certified fenestration. In addition the spillover square feet of T24-certified fenestration influenced by participants was 13,025,000 square feet. The program achieved a total of 47,804,217 square feet of T24-

certified fenestration influenced by participants. It was beyond the scope of this study to measure energy savings for the program.

2. Measure cost-effectiveness.

Not applicable to information-only programs.

3. Provide up-front market assessments and baseline analysis.

The study met this objective by performing a market assessment and baseline analysis of non-participant and participant compliance with Title 24 fenestration requirements before and after implementation of the NFCI program. Telephone survey interviews included questions about market barriers to Title 24 fenestration compliance and the success of the program in meeting the needs of hard-to-reach customers.⁵ Based on a sample of 31 non-participant design professionals, only 48% provide U-value and SHGC values on drawings. Based on a sample of 13 participant design professionals, only 23% provided U-factor and SHGC values on drawings prior to NFCI training. Based on a sample of 15 non-participant building inspectors, only 33% ask Title 24 fenestration site-label certificates. Based on a sample of 21 participant building officials, only 5% asked for site-label certificates, only 10% understood the Title 24 fenestration requirements, and only 14% verified the fenestration U-factors and SHGC values before the NFCI training. Based on a sample of 10 non-participant C-17 glazing contractors, only 10% submit bids with Title 24 compliant products and install Title 24 compliant fenestration. Based on a sample of 12 participant glazing contractors, virtually none of them submitted bids with Title 24 complaint products or installed Title 24 compliant fenestration prior to the NFCI training. Based on a sample of 16 non-participant manufacturers none of them provide NFRC labels or Site-Built labels on window products showing U-factor and SHGC values. Based on a sample of 20 participant manufacturers, none of them provided NFRC labels or Site-Built labels on window products showing U-factor and SHGC values prior to the NFCU training. The non-participant and participant interview findings indicate the baseline without the NFCI program is a very low level of compliance with the Title 24 fenestration requirements.

4. Provide ongoing feedback and corrective or constructive guidance regarding the implementation of programs.

The study met this objective by performing surveys of trained participants. Results of surveys were used to provide ongoing feedback and corrective or constructive guidance regarding implementation of the program. This included improvements to training efforts or program procedures. Surveys also documented that all activities were completed as per the contract requirements.

5. Measure indicators of the effectiveness of the program, including testing of the assumptions that underlie the program theory and approach.

The study met this objective by performing a process evaluation of the program including telephone surveys of participants and non-participants. The following metrics were used to measure the effectiveness of the program.

⁵ The CPUC definition of small commercial hard-to-reach customers are those who do not have easy access to program information or generally do not participate in energy efficiency programs due to language (i.e., primary language non-English), business size (less than ten employees); geographic (i.e., outside San Francisco Bay Area, Sacramento), or lease (i.e., split incentives barrier).

- a. Number of participants trained and sessions conducted.
- b. Increase in knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by pre/post test scores.
- c. Fenestration training as evidenced by participant course rating and evaluation form.
- d. Program assistance for immediate and future implementation of Title 24 requirements.
- e. Hard-to-reach contractors reached.
- f. The study determined participant satisfaction and ways to improve the program. A battery of different questions were developed to evaluate participant satisfaction under the process survey task. Questions covered all aspects of program delivery components.
- g. Non-participating customers were interviewed to evaluate why they chose not to participate.

6. Assess the overall levels of performance and success of the program.

Overall success was determined by evaluating the following metrics.

- a. Number of participants trained and sessions conducted.
- b. Increase in knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by pre/post test scores.
- c. Fenestration training as evidenced by participant course rating and evaluation form.
- d. Program assistance for immediate and future implementation of Title 24 requirements.
- e. Hard-to-reach contractors were reached.
- f. The study determined participant satisfaction and ways to improve the program.
- g. Non-participating customers were interviewed to evaluate why they chose not to participate.

7. Assess whether program increased participant knowledge about fenestration products.

Telephone surveys were conducted with participants and non-participants. Interviews assessed how the program influenced participant knowledge of Title 24 compliant site-built fenestration products.

8. Help to assess whether there is a continuing need for the program.

Telephone surveys were conducted with participants and non-participants. Interviews assessed how the program influenced awareness of linkages between Title 24 compliant site-built fenestration products and bill savings and increased comfort for end users. The study also identified what works, what doesn't work, and the level of need for the program. The following metrics were used to assess whether there is a continuing need for the program.

- a. Number of participants trained and sessions conducted.
- b. Increase in knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by pre/post test scores.
- c. Fenestration training as evidenced by participant course rating and evaluation form.
- d. Program assistance for immediate and future implementation of Title 24 requirements.
- e. Hard-to-reach contractors reached.
- f. The study determined participant satisfaction and ways to improve the program. A battery of different questions were developed to evaluate participant satisfaction under the process survey task. Questions covered all aspects of program delivery components.

- g. Non-participating customers were interviewed to evaluate why they chose not to participate.

4. EM&V Findings

This section provides load impact results for the program and for each measure. This section also provides the process evaluation results based on participant and non-participant surveys and recommendations regarding what works, what doesn't work, and the continuing need of the program. Also provided are recommendations for each measure to increase savings, achieve greater persistence of savings, and improve customer satisfaction.

4.1 Load Impact Results

Load impact results are not required for information-only programs. Nevertheless, the NFCI program provided documentation regarding 26 firms that submitted 78 projects to the "Savings by Design" Program. In addition, participant survey results verified that 66 participants applied knowledge gained from the NFCI workshop attendance to install 34,779,217 square feet of Title 24-certified fenestration. Furthermore, the spillover square feet of T24-certified fenestration influenced by participants was 13,025,000 square feet. The program achieved a total of 47,804,217 square feet of T24-certified fenestration influenced by participants.

4.2 Process Evaluation Results

Process evaluation recommendations are based on process telephone surveys conducted with 75 participants and 68 non-participants or refusers. Participants were asked why and how they decided to participate in the program. Non-participants were asked why they chose not to participate. The process surveys were used to evaluate participant satisfaction and obtain suggestions to improve the program's services and procedures. Survey results were used to guide the process evaluation in terms of investigating operational characteristics of the program and developing specific recommendations to help make the program more cost effective, efficient, and operationally effective. The process survey instruments are provided in Appendix A.

4.2.1 Participant Results

The program provided training and technical assistance regarding NFRC site-built certification to 1,653 upstream and midstream market actors. More than 90 architects and design professional were trained and referred to the four investor-owned utilities' "Savings-By-Design" program for participation in their nonresidential energy efficiency programs. Process evaluation recommendations are based on process telephone surveys conducted with 75 participants. Participant process survey results are summarized to answer the following questions from the CPUC-approved EM&V plan.

1. Do you remember attending the NFCI workshop or training class?

- All of the surveyed participants remembered attending the NFCI workshops.

2. When did you attend the workshop?

- Most of the surveyed participants (i.e., 97%) attended the NFCI workshops in 2005. One attending in 2004 and one attending in 2006.

3. Did you receive any supplemental NFCI training in 2004/2005?

- Twenty three percent of the surveyed participants received supplemental NFCI training (17 out of 75). The supplemental training included attending additional NFCI workshops, technical support over the telephone, or information provided by CD-ROM, newsletter, or internet.

4. Before the NFCI workshop or training class did you believe fenestration was exempt from Title 24?

- None of the surveyed participants believed fenestration was exempt from Title 24 before attending the NFCI workshops or training.

5. Prior to participating in the NFCI workshops, how would you rate your level of understanding of the Title 24 site-built/field-fabricated fenestration certification requirements for nonresidential buildings on a 1 to 10 scale where a 1 is not knowledgeable and a 10 is having expert knowledge?

- On a scale of 1 to 10 (with 1 being low and 10 being high), participants rated their pre-NFCI workshop knowledge at 4.2 +/- 0.4.

6. Following participation in NFCI, how would you rate your level of understanding of the Title 24 site-built/field-fabricated fenestration certification requirements for nonresidential buildings on a 1 to 10 scale where a 1 is not knowledgeable and a 10 is having expert knowledge?

- On a scale of 1 to 10 (with 1 being low and 10 being high), participants rated their post-NFCI workshop knowledge at 7.4 +/- 0.3. This represents a self-reported increase in knowledge of 76% and is consistent with the verified average pre- versus post-test results showing a 179% increase in average test scores.

7. What is your profession in the building construction industry?

- The following table shows the statistical sample of surveyed participants. Building officials and design professionals (architects, engineers) were the largest participating profession at 33% and 31% respectively. The third largest participating profession was glazing contractors (C-17) at 21%. Each group of professionals was asked a series of follow-up questions to evaluate how the NFCI program influenced their efforts to specify, certify, or install site-built or field fabricated fenestration consistent with Title 24 requirements.

Table 4.1 Statistical Sample Size of Surveyed Participants

Description	Ex Ante Goal	Ex Post Achievement	Assumed Cv	Ex Ante Sample	Ex Post Sample	Participant Rate
Flat Glass Manufacturers	60	26	0.5	10	7	1%
Component Suppliers, incl. Extruders	120	76	0.5	10	7	2%
Building Officials & Inspectors	400	502	0.5	20	21	33%
Glazing Contractors (C-17)	150	306	0.5	10	12	21%
Curtain Wall Manufacturers	48	100	0.5	5	6	2%
Design Professionals (Architects, Engineers)	200	567	0.5	10	13	31%
Utility Staff	18	31	0.5	3	3	2%
Professional Associations (CEC, AAMA, CGA)	100	45	0.5	5	6	8%
Total	1,096	1,653	0.5	73	75	100%

8. Influence of NFCI Workshops on Design Professionals?

- Design professionals (i.e., architects, engineers, Title 24 consultants) were asked the following questions to determine the relative improvement in Title 24 fenestration compliance after attending NFCI training workshops (**Table 4.2**). Based on a sample of 13 design professionals, the survey results indicate an 18% improvement regarding evaluation of Title 24 fenestration compliance options after attending the NFCI workshops. There was a 33% improvement in terms of providing U-factor and SHGC values on drawings. No improvement was found regarding printing Title 24 fenestration compliance information on drawings. There was a 50% improvement regarding signing of submittal documentation for Title 24 compliance. The survey results indicate that only 33% of design professionals are displaying U-factor and SHGC values on drawings and only 50% are signing the Title 24 compliance documents. These findings indicate more training is necessary to obtain greater Title 24 fenestration compliance.

Table 4.2 Influence of NFCI Workshops on Design Professionals

Response	8a. Do you provide plans to T24 energy consultants for review for your firm?	8b. Do you evaluate T24 fenestration compliance options prior to submitting plans for approval?	8c. Do you specify fenestration products?	8d. Do you provide U-factor and Solar Heat Gain Coefficient (SHGC) values on your drawings, elevations, schedules, or specifications?	8e. Do you print required T24 compliance forms on drawings?	8f. Do you sign submittal Title 24 compliance documentation?
Pre-NFCI	100%	85%	100%	23%	23%	15%
Post-NFCI	100%	100%	100%	31%	23%	23%
Improvement	N/A	18%	N/A	33%	0%	50%

9. Influence of NFCI Workshops on Building Inspectors?

- Building officials were asked the following questions to determine the relative improvement in Title 24 fenestration compliance after attending NFCI training workshops (**Table 4.3**). Based on a sample of 21 building officials, the survey results indicate significant improvements of 533 to 1900 percent regarding verification of compliance with Title 24 site-built/field fabricated fenestration certification requirements, site label certificates, and fenestration U-factor/SHGC values that match Title 24 plans. The survey results indicate that 90 to 100% of building officials are complying with Title 24 after the NFCI training. The NFCI program trained 502 building officials, but there are thousands of buildings officials in California. The success with building officials indicates a continuing need for the NFCI program to obtain greater Title 24 fenestration compliance.

Table 4.3 Influence of NFCI Workshops on Building Officials

Response	9a. Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?	9b. Do you ask for site label certificates for all fenestration?	9c. Do you verify fenestration U-factor/SHGC values match T24 plans?
Pre-NFCI	10%	5%	14%
Post-NFCI	100%	95%	90%
Improvement	950%	1900%	533%

10. Influence of NFCI Workshops on Glazing Contractors (C-17)?

- Glazing contractors (C-17) were asked the following questions to determine the relative improvement in Title 24 fenestration compliance after attending NFCI training workshops (**Table 4.4**). Based on a sample of 12 glazing contractors, the survey results

indicate significant improvements regarding review of Title 24 fenestration requirements, submitting bids, obtaining label certificates, installing Title 24 compliant fenestration, ensuring Title 24 compliance documentation is on the site for inspectors, and the impact the Title 24 fenestration regulations have had on their business. The survey results indicate that only 25 to 33% of glazing contractors are complying with Title 24 even after the NFCI training. These findings indicate more training and enforcement are necessary to obtain greater Title 24 fenestration compliance. The expanded programs should coordinate with the investor-owned utility programs, NFRC, California building officials, and the California Energy Commission to increase code compliance for non-residential fenestration certification.



Table 4.4 Influence of NFCI Workshops on Glazing Contractors (C-17)

Response	10a. Do you review Title 24 fenestration requirements, schedules, and specifications?	10b. Do you submit bids with Title 24 compliant products?	10c. Do you obtain site label certificates for all fenestration?	10d. Do you install Title 24 compliant fenestration?	10e. Do you ensure Title 24 compliance documentation is on site for inspectors?	10f. Have T24 fenestration regulations had any impact on your business?
Pre-NFCI	0%	8%	0%	0%	0%	0%
Post-NFCI	33%	33%	25%	33%	25%	33%
Improvement	Significant	300%	Significant	Significant	Significant	Significant

11. Influence of NFCI Workshops on Flat Glass Manufacturers, Component Suppliers, Extruders, and Curtain Wall Manufacturers?

- Flat glass manufacturers, component suppliers, extruders, and curtain wall manufacturers were asked the following questions to determine the relative improvement in Title 24 fenestration compliance after attending NFCI training workshops (Table 4.5). Based on a sample of 20 flat glass and curtain wall manufacturers, suppliers, and extruders, the survey results indicate significant improvements regarding NFRC labels on window products and working with NFRC to certify and label products for building code compliance. The survey results indicate that only 15 to 30% of manufacturers are complying with Title 24 even after the NFCI training. These findings indicate more training is necessary to obtain greater Title 24 fenestration compliance. The investor-owned utilities and the CEC should provide support to expand the NFCI to increase building code compliance.

Table 4.5 Influence of NFCI Workshops on Manufacturers, Suppliers, and Extruders

Response	11a. Do you provide National Fenestration Rating Council (NFRC) Label or Site-Built 100-SB Label on all window products showing U-factor and SHGC values?	11b. Do you work with NFRC to certify and label all products for uniform accurate product comparison, verification of product performance, common communication, and building code compliance?
Pre-NFCI	0%	0%
Post-NFCI	30%	15%
Improvement	Significant	Significant

12. Influence of NFCI Workshops on Professional Associations and Utilities?

- Professional associations (AAMA, CGA, CEC) and utilities were asked the following questions to determine the relative improvement in Title 24 fenestration compliance after attending NFCI training workshops (Table 4.6). Based on a sample of 9 professional associations and utilities, the survey results indicate 467% improvements regarding NFRC labels on how to verify compliance with the Title 24 site-built/field-fabricated

fenestration certification requirements. The survey results indicate that only 67% of professional associations and utilities understand how to comply with Title 24 even after the NFCI training. These findings indicate more training and technical assistance from the website or CD-ROM are necessary to obtain greater Title 24 fenestration compliance.

Table 4.6 Influence of NFCI Workshops on Professional Associations and Utilities

Response	12a. Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?
Pre-NFCI	12%
Post-NFCI	67%
Improvement	467%

13. Influence of NFCI Workshops on Title 24 Compliance Authors?

- Not applicable.

14. Influence of NFCI Workshops on Builders?

- Not applicable.

15. Influence of NFCI Workshops on Plan Checkers?

- Not applicable.

16. Which type of fenestration training are you most likely to use in next 2 years?

- Participants were asked which type of fenestration training they are most likely to use in the next 2 years and the responses are provided in Table 4.7. Fenestration certification was cited most often by 68% of respondents followed by understanding the benefits of fenestration requirements cited by 60% of respondents.

Table 4.7 Fenestration Training Most Likely to Use in Next 2 Years

16. Which type of fenestration training are you most likely to use in next 2 years?	Average Response	90% CI	Total Count
1 Fenestration certification requirements for nonresidential buildings. (info cost).	68%		50
2 Understanding benefits of fenestration requirements (performance uncertainty).	60%		44
3 Advertising benefits of fenestration requirements (misplaced or split incentive).	15%		11
4 Software tools to meet fenestration certification requirements (hassle cost).	16%		12
5 Ten steps to educate clients about requirements (i.e., asymmetric information).	8%		6
6 Helping architects understand requirements (i.e., bounded rationality).	36%		26
7 How fenestration requirements for nonresidential buildings can increase profits.	0%		0

17. What additional training or technical assistance would you suggest this program consider for continued savings and professional growth?

- Participants were asked what additional training or technical assistance they would suggest for continued savings and professional growth. Approximately 71% of respondents asked for more training. 13% asked for technical assistance from the website or CD-ROM, and 16% said the training was successful and sufficient. Market actors are confused, uninformed, and untrained and manufacturers and suppliers are not engaged in code compliance due to lack of enforcement.

18. Have you shared any program-provided information regarding benefits of Title-24 compliant site-built fenestration products with your peers or business associates?

- Approximately 60% of respondents shared program-provided information with peers or business associates.

19. How many other businesses have you shared this information in the last 12 months?

- Participants said they shared program-provided information to more than 900 businesses in the last 12 months.

20. About how many installed T24-certified site-built/field fabricated fenestration products that may have in some way been influenced by the sharing of information?

- Participants said 450 businesses installed 13,025,000 square feet of T24-certified site-built/field fabricated fenestration products that were influenced by sharing of information.

21. Will you continue complying with T 24 site-built fenestration requirements?

- 100% of participants said they would continue complying with the Title 24 site-built/field fabricated fenestration requirements.

22. A comprehensive program offering accurate and reliable one-day training on site-built/field/fabricated fenestration certification requirements, including product design, marketing, distribution, and sales information and telephone technical assistance for fenestration industry will result in energy savings across the industry?

- 73.8 +/- 4% of participants agreed that the comprehensive NFCI program would result in energy savings across the industry.

23-32. Overall participant satisfaction was evaluated based on responses to the following ten questions?

Overall participant satisfaction was 8.78 +/- 0.18 based on 750 participant responses to ten questions (see **Table 4.8**).

Table 4.8 EM&V Participant Satisfaction Process Survey Questions and Findings

EM&V Process Survey Question	Average Response	90% CI	Total Count
23. The NFCI program trainers and staff are courteous and professional?	9.05	0.17	73
24. The NFCI program trainers and staff were knowledgeable about site-built/field-fabricated fenestration certification requirements for nonresidential buildings?	9.33	0.16	73
25. The amount of time required to complete the NFCI training was about right?	7.49	0.35	73
26. The NFCI workshop or training class was easy to understand?	8.23	0.16	72
27. The NFCI workshop recommendations are easy to implement on the jobs that you do that require these types of calculations or specifications?	8.23	0.16	72
28. NFCI training helped me comply with T-24 site-built fenestration requirements?	8.60	0.16	72
29. The information provided in the NFCI workshop was useful and informative?	8.63	0.21	73
30. The NFCI training materials and CD-ROM were useful and informative?	8.49	0.24	58
31. How would you rate the NFCI workshop in terms of presentation from 1 to 10?	8.75	0.21	73
32. Please provide your overall satisfaction with NFCI workshop or training class?	8.78	0.18	73

33. Have you applied the skills learned in the NFCI workshops?

- Participants said they applied the NFCI workshop training to Title 24 compliance (38%), design (20%), manufacturing (31%), construction (7%), and other programs (4%).

34. How many square feet of windows are you responsible for each year?

- Participants said they were responsible for 52,303,700 square feet of windows per year.

35. Please provide % of projects where NFCI skills have been applied? (% Projects)?

- Participants said they applied skills learned at the NFCI workshops to 68% of their projects and applied the Title 24 certified fenestration skills to 34,779,217 square feet of window area since attending the workshops.

36-37. What are the NFCI participant demographics?

- Education of participants
 - High school education - 100%.
 - Attended college - 85%.
 - College graduate - 84%.
 - Attended graduate school - 9%.
 - Graduate school degree – 5%.
- Ethnicity of participants
 - Caucasian - 87%.
 - Hispanic - 9%
 - Asian – 1%
 - Other or Refused - 3%.

38. Do you home have any suggestions to improve the program?

Participants provided the following suggestions to improve the program.

- “Great training workshops and program” - 72%.
- “Longer workshops would help” – 39%.
- “Focus on building officials and improve enforcement of Title 24 fenestration requirements” – 10%.
- “Improve training materials and provide more information on CD-ROM” – 5%

4.2.2 Non-Participant Results

Non-participants are market actors who were unaware of the program or who were aware of the program and decided not to participate (i.e., refusers). The EM&V study interviewed 68 non-participants or refusers. Non-participant process survey interviews were conducted to understand reasons for non-participation and obtain suggestions to increase participation and improve the program.

1. Do you believe site-built and field-fabricated fenestration products are exempt from Title 24 compliance standards?

- None of the surveyed non-participants or refusers believed fenestration was exempt from Title 24. They know that they are not in compliance with the building codes, but lack of enforcement reinforces complacency.

2. Have you heard about the program or training provided by the program?

- The survey results indicate that 54% of non-participants heard about the program, and 46% heard about the program but chose not to participate (i.e., refusers). Those that heard about the program learned about through the following marketing channels: flyers 48%,

e-mail 32%, phone 6%, flyers and phone 12%. Better enforcement of the building codes would motivate greater participation in training. The non-participant survey results indicate that the investor-owned utilities and the California Energy Commission need to provide financial support to expand the NFCI to increase participation.

3. Would you have participated if you knew the program provided free workshops and training on the CEC Title 24 requirements and compliance approaches for site-built and field-fabricated fenestration for non-residential buildings?

- The survey results indicate that 79% of non-participants and refusers decided not to participate even if they knew that the program provided free workshops and training on the CEC Title 24 requirements and compliance approaches for site-built and field-fabricated fenestration for non-residential buildings.

4. Please tell me why you choose not to participant in the program?

- Non-participant and refuser process survey results are provided in **Table 4.9**. The primary reason for non-participation was the hassle cost (i.e., “lack of time for workshop”), followed by information cost (i.e., didn’t know about NFCI), not interested, performance uncertainty, and misplaced or split incentives (i.e., “don’t install site-built or field fabricated fenestration). Reducing hassle costs could be accomplished with on-line training, on-site training and course segment structuring to reduce the inconvenience and lost income associated with attending training classes.

Table 4.9 Non-Participant and Refuser Process Survey Results

Reasons Given for Non-Participation (i.e., Market Barriers)	Percent
1. Didn’t know about the NFCI program (i.e., information cost).	31.5%
2. Didn’t understand benefits of NFCI program (i.e., performance uncertainty).	5.5%
3. Don’t install site-built or field-fabricated fenestration (i.e., misplaced or split incentive).	5.5%
4. Lack of time for workshop or training class (i.e., hassle cost).	41.1%
5. Hired architect or contractor who didn’t know about NFCI (i.e., asymmetric information).	0.0%
6. Architect specifies windows and I’m not involved in decision (i.e., bounded rationality).	0.0%
7. Didn’t understand site-built or field-fabricated certification was required under Title 24.	0.0%
8. Not interested	16.4%
9. Other	0.0%
Total	100.0%

5. How many square feet of site-built or field-fabricated fenestration are you responsible for manufacturing, specifying, designing, installing, or inspecting each year?

- Non-participants and refusers are responsible for an average of 446,617 +/- 127,514 square feet of fenestration per year (based on 52 responses). The total is 21,191,000 square feet.

6-7. What is the highest level of education you have completed and what is your racial or ethnic background?

- Education of participants
 - High school education - 100%.
 - Attended college - 98%.
 - College graduate - 97%.
 - Attended graduate school - 3%.

- Graduate school degree – 3%.
- Ethnicity of participants
 - Caucasian - 90%.
 - Hispanic - 8%
 - Asian – 2%
 - Other or Refused - 0%.

8. What is your profession in the building construction industry?

- Responses from 62 non-participants and refusers found 55.4% are architects, 23.1% are building inspectors, 15.4% are glazing contractors, and 6.2% are glass manufacturers or distributors. The non-participant sample is representative of the industry.

9. Current Practices of Non-Participant/Refuser Design Professionals?

- Non-participant design professionals (i.e., architects, engineers, Title 24 consultants) were asked the following questions to evaluate current practices with respect to Title 24 fenestration compliance requirements (**Table 4.10**). Based on a sample of 31 design professionals, the survey results indicate that 94% evaluate fenestration compliance options, but only 48% provide U-value and SHGC values on the drawings. Only 38% print required Title 24 compliance forms on the drawing and only 23% sign the Title 24 compliance documentation. These findings indicate that design professionals require training to obtain greater Title 24 fenestration compliance.

Table 4.10 Current Practices of Non-participant/Refuser Design Professionals

Response	9a. Do you determine proposed fenestration for new buildings?	9b. Do you provide plans to T24 energy consultants for review?	9c. Do you evaluate fenestration compliance options?	9d. Do you provide U-factor and Solar Heat Gain Coefficient (SHGC) values on your drawings or specifications?	9e. Do you print required T24 compliance forms on drawings?	9f. Do you sign submittal Title 24 compliance documentation?
Yes	100%	100%	94%	48%	39%	23%
No	0%	0%	6%	52%	61%	77%

10. Current Practices of Non-Participant/Refuser Building Inspectors?

- Non-participant building inspectors were asked the following questions to evaluate current practices with respect to Title 24 fenestration compliance requirements (**Table 4.11**). Based on a sample of 15 building inspectors, the survey results indicate that 100% understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements. However, only 33% of non-participant building inspectors ask for the required Title 24 site-built or field-fabricated label certificates for fenestration. These findings indicate that building inspectors require training to obtain greater Title 24 fenestration compliance. The CEC must work with NFCI to educate local building departments to understand the Title 24 fenestration compliance requirements.

Table 4.11 Current Practices of Non-participant/Refuser Building Inspectors

Response	10a. Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?	10b. Do you ask for site label certificates for all fenestration?
Yes	100%	33%
No	0%	67%

11. Current Practices of Non-Participant/Refuser Glazing Contractors (C-17)?

- Non-participant design glazing contractors were asked the following questions to evaluate current practices with respect to Title 24 fenestration compliance requirements (Table 4.12). Based on a sample of 10 glazing contractors, the survey results indicate that none of them review Title 24 fenestration requirements, obtain site label certificates, ensure Title 24 compliance documentation is on site. Only 10% submit bids with Title 24 compliant products and install Title 24 compliant fenestration. Only 10% indicated any impact on their business from the Title 24 fenestration regulations. These findings indicate that glazing contractors require training to obtain greater Title 24 fenestration compliance.

Table 4.12 Current Practices of Non-participant/Refuser Glazing Contractors (C-17)

Response	11a. Do you review Title 24 fenestration requirements, schedules, and specifications?	11b. Do you submit bids with Title 24 compliant products?	11c. Do you obtain site label certificates for all fenestration?	11d. Do you install Title 24 compliant fenestration?	11e. Do you ensure Title 24 compliance documentation is on site for inspectors?	11f. Have T24 fenestration regulations had any impact on your business?
Yes	0%	10%	0%	10%	0%	10%
No	100%	90%	100%	90%	100%	100%

12. Current Practices of Non-Participant/Refuser of Flat Glass Manufacturers, Component Suppliers, Extruders, and Curtain Wall Manufacturers?

- Non-participant design Flat glass manufacturers, component suppliers, extruders, and curtain wall manufacturers were asked the following questions to evaluate current practices with respect to Title 24 fenestration compliance requirements (Table 4.13). Based on a sample of 16 manufacturers none of them provide NFRC labels or Site-Built labels on window products showing U-factor and SHGC values. None of them are working with NFRC to certify and label their products, verify product performance, or communicate building code compliance. These findings indicate more manufacturers require training to obtain greater Title 24 fenestration compliance.

Table 4.13 Current Practices of Non-participant/Refuser Manufacturers and Suppliers

Response	12a. Do you provide National Fenestration Rating Council (NFRC) Label or Site-Built 100-SB Label on all window products showing U-factor and SHGC values?	12b. Do you work with NFRC to certify and label all products for uniform accurate product comparison, verification of product performance, common communication, and building code compliance?
Yes	0%	0%
No	100%	100%

13. Current Practices of Non-participant/Refuser Professional Association Representatives (AGA, AAMA, NRFC, CEC)?

- Not applicable.

14. Current Practices of Non-participant/Refuser Title 24 Compliance Authors?

- Not applicable.

15. Current Practices of Non-participant/Refuser Builders?

- Not applicable.

16. Current Practices of Non-participant/Refuser Plan Checkers?

- Not applicable.

17. Do you home have any suggestions to improve the program?

- Suggestions to improve the program from non-participants are provided in **Table 4.14**. The most frequent market barrier response was the information cost (i.e., better advertising, marketing, or website information about the program to increase participation) followed hassle cost (i.e., too busy), and performance uncertainty (i.e., didn't understand benefits). The other suggestions and market barriers were equally represented.

Table 4.14 Suggestions to Improve the NFCI Program from Non-Participants

Suggestion	Market Barrier	Percent
1. Better advertising - didn't know about NFCI.	Information Cost	59.1%
2. Too busy, no time to participate.	Hassle Cost	18.2%
3. Didn't understand benefits of NFCI.	Performance uncertainty	9.0%
4. Don't install site-built or field-fabricated fenestration or unaware of didn't understand Title 24 requirements.	Misplaced or split incentive	4.5%
5. Hired architect or contractor who didn't know about NFCI.	Asymmetric Information	4.5%
6. Architect specifies windows and not involved in decision.	Bounded Rationality	4.5%
Total	Total	100.0%

The following section provides process evaluation recommendations to improve the program.

4.2.3 Process Evaluation Recommendations

The following process evaluation recommendations are provided as per the CPUC-approved EM&V plan regarding what works, what doesn't work, and suggestions to improve the program's services and procedures.

4.2.3.1 General Program Recommendations

The following general program recommendations are provided to improve the program's services, procedures, and cost effectiveness.

1. Continue offering training to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements. Of particular importance is training on fenestration certification and software tools to meet fenestration requirements (cited most often by participants). Continued training would eliminate market barriers such as information cost, hassle cost, performance uncertainty, organizational practices, and service availability.
2. Define the target market and focus on areas likely to adopt the Title 24 fenestration certification requirements first, and build upon success to expand to other markets. One of the 4 P's of marketing is "place" (i.e., product, price, place and promotion). The California Building Officials and Green Building Councils throughout California are early adopters of energy efficiency. Focusing on these groups might help reach more participants.
3. Increase compliance programs and enforcement efforts and provide more and better advertising to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements.

4. Provide better coordination with other programs such as Savings by Design and Flex Your Power to gain more support for the NFCI program and greater demand and consumer awareness. The other programs need to work with NFCI to motivate market actors to specify and certify nonresidential fenestration in order to meet or exceed the Title 24 fenestration requirements to achieve greater savings from energy efficient windows.

4.2.3.2 Recommendations for Marketing

The following marketing recommendations are provided to increase demand for the NFCI training among design professionals, building officials, glazing contractors, and manufacturers.

1. Define the target market and focus on areas likely to adopt the Title 24 fenestration certification requirements first, and build upon success to expand to other markets. One of the 4 P's of marketing is "place" (i.e., product, price, place and promotion). The California Building Officials and Green Building Councils throughout California are early adopters of energy efficiency. Focusing on these groups might help reach more participants.
2. Provide more and better advertising to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements.
3. Provide better advertising through telephone, email, mail, newspapers, or television to increase participation. Advertising should explain the benefits of the Title 24 fenestration certification requirements and how these requirements can be used to generate increased business and sales of fenestration products that comply with Title 24. Stricter enforcement of the Title 24 building codes will help stimulate interest for fenestration certification and labeling. Other strategies should be considered to increase demand for nonresidential fenestration certification including inspections and fines to builders after information and education efforts are ignored. The investor-owned utilities and the CEC need to coordinate with the NFCI to examine other market intervention strategies to improve nonresidential fenestration building code compliance.
4. Provide better coordination with other programs such as "Savings by Design" and Flex Your Power to gain more support for the NFCI program and greater demand and consumer awareness.

4.2.3.3 Recommendations for Training

Inspector participants provided the following recommendations to improve training and marketing.

1. Continue offering training to design professionals, building officials, glazing contractors, and manufacturers to help them understand the benefits of compliance with Title 24 fenestration requirements. Of particular importance is training on fenestration certification and software tools to meet fenestration requirements (cited most often by participants). Continued training would eliminate market barriers such as information cost, hassle cost, performance uncertainty, organizational practices, and service availability.
2. Offer longer and more in-depth training to help participants understand the benefits of compliance with Title 24 fenestration requirements and certification tools. Also consider shorter and more focused training in intervals to increase participation from design professionals who are too busy to attend longer training workshops and classes.
3. Be sure to follow-up with all the participants who are trained to find out if they are continuing to apply knowledge learned during the training workshops to comply with Title

24 fenestration certification requirements. If follow-up doesn't improve compliance, then consider other strategies such on-line training or greater enforcement of Title 24 building codes.

4.2.3.4 Recommendations for Website

1. Publish a list of trained participants on the NFCI website and consider developing an NFCI label for certified fenestration design professionals, building officials, glazing contractors, and manufacturers. Identifying certified fenestration professionals might help motivate professionals to pay for training.
2. Advertise NFCI training and the website by encouraging more links from NFCI participant websites.

Appendix A: Process Survey Instrument for Nonresidential Fenestration Certification Initiative (NFCI) #1227-04, #1496-04, #1497-04, #1498-04 Process Survey

Interview Instructions for Process Survey

1. Purpose

- The purpose of the Process Survey is to evaluate what works, what doesn't work, participant satisfaction, and suggestions for improving the program's services and procedures. Survey results from participants will be used to develop an estimate of how the NFCI program met the following objectives and goals:
 1. Provide up to 212 on-site sessions for manufacturers (i.e., window wall or glass distributors, manufacturers), architects, Title-24 consultants, general contractors (i.e., B), C-17 contractors, and local building officials (i.e., plan checkers, field inspectors, or building official), 42 professional meetings, and directly impact up to 1096 key actors in the market stream of up to 443 businesses (based on review of NFCI tracking database and auditing workshops and classes).
 2. Increase of the knowledge of code officials, manufacturers, C-17 contractors, and design professionals as evidenced by a 25% increase on post-test scores (based on review of NFCI test pre-/post-test scores).
 3. Reach the commercial "hard-to-reach" C-17 contractors.
 4. Increase the availability of site-built certified C-17 contractors of wall and glass, roof systems.
 5. Provide correct information about Title 24 site-built code and proper procedure and protocols for acquiring a site-built certification for a fenestration product (i.e., FC-1 and FC-2, NFRC Label forms).
 6. Increase the amount of site-built NFRC-certified systems in the marketplace.
 7. Provide building officials with a working knowledge of Title 24 site-built certification requirements and an understanding of what certification means.

2. Selection of Respondent

Participants must be the person who participated in the NFCI training workshops.

Non-participants must be a person in the local utility service area who was unaware of the program or decided not to participate (i.e., refuser) in the NFCI training workshops (see non-participant survey at end). Refusers were offered the program, remember being offered, and said no. Non-participants were never offered or do not remember being offered the program.

3. How to Start a Survey

Complete the following steps to start one of these surveys:

1. Review NFCI tracking database file information (for participants).
2. Make sure you understand what type of training was provided by NFCI prior to initiating the interview.
3. Participant Survey Introduction.
Say: "Hello! My name is [_____], and I am conducting a survey regarding the Nonresidential Fenestration Certification Initiative (NFCI) Program. The program provided workshops and/or training regarding the Title 24 compliance requirements for site-built and field-fabricated fenestration for non-residential buildings. Funding for the program came from the California Public Utilities Commission. Would you mind spending 20 minutes to answer a few questions to help us evaluate and improve the program?"
4. Non-participant Survey Introduction. *Make sure they understand what the term "fenestration" means (i.e., windows, doors, skylights, and other openings covered with glass).*
Say: "Hello! My name is [_____], and I am conducting a survey regarding the Nonresidential Fenestration Certification Initiative (NFCI) Program. The program was funded by the California Public Utilities Commission in 2004 and 2005. You didn't participate in the program, but your feedback will help us evaluate and improve the program. The program provided workshops and/or training regarding the Title 24 compliance requirements for site-built and field-fabricated fenestration for non-residential buildings. Would you mind spending 5 minutes to answer a few questions?"

NFCI Participant Survey

PARTICIPANT PROCESS SURVEY

Company _____ Last _____ First _____ Title _____
 Address _____ City _____ ZIP _____
 Phone Number _____ Survey Date _____ Surveyor Initials _____

Participant Survey (Manufacturers, Architects, Title-24 Consultants, Contractors, and Local Building Officials)

1. Do you remember attending the Nonresidential Fenestration Certification Initiative (NFCI) workshop or training class conducted by [Trainer_Name] on [Workshop_Date]? ___ **1** (Yes, *If yes, then ask following question.*) Please tell me how you heard about the program? ___ **2** (phone) ___ **3** (internet/email) ___ **4** (Mail) ___ **5** (Other _____) ___ **6** (No=Non-Participant) ___ **98** (DK) ___ **99** (Refused)
2. When did you attend the workshop or training class?
 _____ 00/00/00 (Month/Day/Year) ___ **98** Don't Know ___ **99** Refused to Answer
3. Have you received any supplemental NFCI training in 2004-05?
 ___ **1** (Yes, Describe: _____) _____ (Month/Day/Year) ___ **3** (No) ___ **98** DK ___ **99** Refused
4. Before the NFCI workshop or training class did you believe fenestration was exempt from Title 24?
 ___ **1** (Yes) ___ **2** (No) ___ **98** (DK) ___ **99** (Refused)
5. Prior to participating in the NFCI workshops, how would you rate your level of understanding of the Title 24 site-built/field-fabricated fenestration certification requirements for nonresidential buildings on a 1 to 10 scale where a 1 is not knowledgeable and a 10 is having expert knowledge?
 ___ Response (**1 is low and 10 is high**) ___ **98** DK ___ **99** Refused
6. Now, following your participation in NFCI, how would you rate your level of understanding of the Title 24 site-built/field-fabricated fenestration certification requirements for nonresidential buildings on a 1 to 10 scale where a 1 is not knowledgeable and a 10 is having expert knowledge?
 ___ Response (**1 is low and 10 is high**) ___ **98** DK ___ **99** Refused
7. What is your profession in the building construction industry?
 ___ Architect (➔ **Skip to Q8**) ___ T24 Compliance Author (➔ **Skip to Q9**) ___ Builder (➔ **Skip to Q10**)
 ___ Installer (➔ **Skip to Q11**) ___ T24 Plan Checker (➔ **Skip to Q12**) ___ Building Inspector/Official (➔ **Skip to Q13**)
 ___ Glass Manufacturer, Glass or Window Wall Distributor (➔ **Skip to Q14**) ___ NFRC or CEC (➔ **Skip to Q15**)
8. **Design Professionals** (Architects, Engineers, Title 24 Consultants) - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
8a	Do you provide plans to T24 energy consultants for review for your firm?		
8b	Do you evaluate fenestration compliance options prior to submitting plans for approval?		
8c	Do you specify fenestration products?		
8d	Do you provide U-factor and Solar Heat Gain Coefficient (SHGC) values on your drawings, elevations, schedules, or specifications?		
8e	Do you print required T24 compliance forms on drawings?		
8f	Do you sign submittal Title 24 compliance documentation?		

NFCI Participant Survey

9. **Building Inspector or Building Official** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
9a	Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?		
9b	Do you ask for site label certificates for all fenestration?		
9c	Do you verify fenestration U-factor/SHGC values match T24 plans?		

10. **Glazing Contractors (C-17) Installers** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
10a	Do you review Title 24 fenestration requirements, schedules, and specifications?		
10b	Do you submit bids with Title 24 compliant products?		
10c	Do you obtain site label certificates for all fenestration?		
10d	Do you install Title 24 compliant fenestration?		
10e	Do you ensure Title 24 compliance documentation is on site for inspectors?		
10f	Have T24 fenestration regulations had any impact on your business? Answer:		

11. **Manufacturer, Glass Distributor, or Window Wall Distributor** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
11a	Do you provide National Fenestration Rating Council (NFRC) Label or Site-Built 100-SB Label on all window products showing U-factor and SHGC values?		
11b	Do you work with NFRC to certify and label all products for uniform accurate product comparison, verification of product performance, common communication, and building code compliance?		

12. **Professional Association Representatives (AGA, AAMA, NRFC, CEC) and Utility Staff** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
12a	Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?		

NFCI Participant Survey

13. **Title 24 Compliance Author** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
13a	Do you calculate building energy use for compliance with the Title 24 energy budget?		
13b	New Oct05 – Do you define fenestration types in software and identify U-factor/SHGC values (site-built, field-fabricated)?		
13c	Do you determine necessary fenestration performance for compliance?		
13d	Do you confirm product availability of complying fenestration?		
13e	Do you provide architects with compliance alternatives including glass type, # panes, gas fill, coatings, frame, U-factor, and SHGC values?		
13f	Do you submit completed Title 24 compliance documentation?		

14. **Builder** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
14a	Do you ensure fenestration products used in Title 24 compliance calculations are specified and provided to bidders (C-17 contractors)?		
14b	Provide relevant pages from Title 24 calculations.		
14c	Do you provide bidders with specifications of glass type, # panes, gas fill, coatings, frame type, U-factor, and SHGC values?		
14d	Do you complete Title 24 compliance documentation for inspectors?		

15. **Plan Checker** - I am going to ask you a series of questions. As I ask each question I would like for you to provide me with two separate answers to each question. First I would like you to tell me the answer to the question as it applies to your current knowledge. Then I would like you to provide an answer as you would have answered the question before your participation in the NFCI fenestration workshop classes. Ready? *If no re-explain using different words that mean the same until they understand how to respond.*

#	Title 24 Compliance Questions	Pre-NFCI 1=Yes, 2=No	Post NFCI 1=Yes, 2=No
15b	Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?		
15c	Do you review fenestration values (U-factor/SHGC) used in T24 calculations?		
15d	Do you verify T24 site-built/field-fabricated fenestration U-factor/SHGC values printed on plans?		
15e	New Oct05 – Do calculations identify sources of U-factor/SHGC.		

NFCI Participant Survey

16. Which of the following types of fenestration training are you most likely to use in the next two years?
- 1 Fenestration certification requirements for nonresidential buildings (i.e., information cost).
 - 2 Understanding the benefits of fenestration certification requirements for nonresidential buildings (i.e., performance uncertainty).
 - 3 Advertising the benefits of fenestration certification requirements for nonresidential buildings (i.e., misplaced or split incentive).
 - 4 Software tools to meet fenestration certification requirements for nonresidential buildings (i.e., hassle cost).
 - 5 Ten simple steps to educate clients about fenestration certification requirements for nonresidential buildings (i.e., asymmetric information).
 - 6 Helping architects understand fenestration certification requirements for nonresidential buildings (i.e., bounded rationality).
 - 7 How fenestration certification requirements for nonresidential buildings can increase profits.
 - 8 Other _____
- 98 Don't Know 99 Refused to Answer
17. We would like to hear your suggestions for additional training or technical support that could be provided by the Nonresidential Fenestration Certification Initiative. What additional training or technical assistance would you suggest this program consider for the future service offerings to companies like yours? Please provide at least one or two suggestions for us to consider. 98 Don't Know 99 Refused
- Additional Need(s). _____
18. Have you shared any of the program-provided information regarding the benefits of Title-24 compliant site-built fenestration products with your peers or business associates?
- ___ 1 (Yes) ___ 2 (No) 98 (DK) 99 (Refused)
19. With how many other businesses have you shared this information in the last 12 months?
- ___ # Businesses Shared Information ___ None 98 (DK) 99 (Refused)
20. About how many of these businesses installed T24-certified site-built/field fabricated fenestration products that may have in some way been influenced by the sharing of information?
- ___ # Businesses ___ ft² of T24-certified fenestration ___ None 98 (DK) 99 (Refused)
21. Will you continue complying with the Title 24 site-built or field-fabricated fenestration requirements?
- ___ 1 (Yes) ___ 2 (No) 98 (DK) 99 (Refused)

For the following questions I will ask you to respond on a scale of 1 to 10 where 1 is strongly disagree and 10 is strongly agree. If you provide a response of 7 or less I would like to ask you why you provided that response.

22. A comprehensive, professionally-developed program offering accurate and reliable one-day training on site-built/field/fabricated fenestration certification requirements, including product design, marketing, distribution, and sales information and supportive on-call telephone technical assistance for the fenestration industry will result in energy savings across the industry?
- ___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
23. The NFCI program trainers and staff are courteous and professional?
- ___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
24. The NFCI program trainers and staff were knowledgeable about site-built/field-fabricated fenestration certification requirements for nonresidential buildings?
- ___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
25. The amount of time required to complete the NFCI workshop/training was about right?
- ___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused

NFCI Participant Survey

26. The NFCI workshop or training class was easy to understand?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
27. The NFCI workshop recommendations are easy to implement on the jobs that you do that require these types of calculations or specifications?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
28. The NFCI workshop information helped me comply with Title 24 site-built fenestration requirements?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
29. The information provided in the NFCI workshop or training was useful and informative?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
30. The information provided in the NFCI training materials and CD-ROM was useful and informative?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
31. For the next question I would like you to use the same 1 to 10 scale, but now a 1 means very poorly done and a 10 means very well done. How would you rate the NFCI workshop or training class in terms of presentation on a scale from 1 to 10?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
32. The next question asks about your level of satisfaction. I ask you to respond to this question using the same 1 to 10 scale, with a 1 meaning you are very dissatisfied and a 10 meaning your are very satisfied. Please provide your overall satisfaction with the NFCI workshop or training class?
___ Response (1 is low and 10 is high. If 7 or less, Why? _____) 98 DK 99 Refused
33. For the next question I would like you to provide a short answer regarding how you have applied the skills and tools learned since your NFCI workshop where more than one answer is acceptable?
___ 1 (Design) ___ 2 (Compliance) ___ 3 (Construction) ___ 4 (Manufacturing) ___ 5 (Program) 98 DK 99 Refused
Other (s). _____
34. On average, about how many square feet of site-built or field-fabricated fenestration are you responsible for manufacturing, specifying, designing, installing, or inspecting each year?
_____ # Site-Built Fenestration ft²/yr _____ # Field-Fabricated Fenestration ft²/yr 98 DK 99 Refused
35. Please provide the percentage of projects or square feet where the skills have been applied since your NFCI workshop attendance?
_____ 1 (% Projects) _____ 2 (Square Feet of Projects) 98 DK 99 Refused
36. What is the highest level of education you have completed?
___ 1 (H.S.) ___ 2 (College) ___ 3 (College Grad) ___ 4 (Grad. School) ___ 5 (Grad. Degree) 98 DK 99 Refused
37. Which of the following best describes your racial or ethnic background?
___ 1 (Hispanic) ___ 2 (African) ___ 3 (Caucasian) ___ 4 (Asian) ___ 5 (Native Amer) ___ 6 (____) 98 DK 99 Refused
38. Do you have any suggestions to improve the program?
___ 1 (Yes) ___ 2 (No) 98 Don't Know 99 Refused to Answer
If so, please provide the suggestion(s). _____

NFCI Participant Survey

NON-PARTICIPANT PROCESS SURVEY

Company _____ Last _____ First _____ Title _____
Address _____ City _____ ZIP _____
Phone Number _____ Survey Date _____ Surveyor Initials _____

Non-Participant Survey (Manufacturers, Architects, Title-24 Consultants, Contractors, and Local Building Officials)

[Select sample from manufacturer directory, AIA directory, CALBO Title 24 consultant directory, alternatively, ask NFCI to provide a list of non-participants]. Make sure they understand what the term “fenestration” means (i.e., windows, doors, skylights, and other openings covered with glass).

I am conducting a survey regarding the Nonresidential Fenestration Certification Initiative (NFCI) Program. The program was funded by the California Public Utilities Commission in 2004 and 2005. You didn't participate in the program, but your feedback will help us evaluate and improve the program. The program provided workshops and/or training regarding the Title 24 compliance requirements for site-built and field-fabricated fenestration for nonresidential buildings. Would you mind spending 5 minutes to answer a few questions?

First, I would like to ask you...

1. Do you believe site-built and field-fabricated fenestration products are exempt from Title 24 compliance standards?
___ 1 (Yes) ___ 2 (No) 98 (DK) 99 (Refused)
2. Have you heard about the program or training provided by the program? ___ 1 (Yes=Refuser, If yes, then ask following question) Please tell me how you heard about the program? ___ 2 (phone) ___ 3 (internet/email) ___ 4 (Mail) ___ 5 (Other _____) ___ 6 (No=Non-Participant) 98 (DK) 99 (Refused)
3. Would you have participated if you knew the program provided free workshops and training on the CEC Title 24 requirements and compliance approaches for site-built and field-fabricated fenestration for non-residential buildings?
___ 1 (Yes) ___ 2 (No) 98 Don't Know 99 Refused to Answer
4. Please tell me why you choose not to participant in the program?
(Read list – Multiple answers are okay.)
 - 1 Didn't know about the NFCI program (i.e., information cost).
 - 2 Didn't understand benefits of NFCI program (i.e., performance uncertainty).
 - 3 Don't install site-built or field-fabricated fenestration (i.e., misplaced or split incentive).
 - 4 Lack of time for workshop or training class (i.e., hassle cost).
 - 5 Hired architect or contractor who didn't know about NFCI program (i.e., asymmetric information).
 - 6 Architect specifies windows and I'm not involved in decision (i.e., bounded rationality).
 - 7 Didn't understand site-built or field-fabricated certification was required under Title 24.
 - 8 Other _____98 Don't Know 99 Refused to Answer
5. How many square feet of site-built or field-fabricated fenestration are you responsible for manufacturing, specifying, designing, installing, or inspecting each year?
_____ # Square Feet per year 98 Don't Know 99 Refused to Answer
6. What is the highest level of education you have completed?
___1 (H.S.) ___2 (Some College) ___3 (College Grad) ___4 (Grad. School) ___5 (Grad Degree) 98 DK 99 Refused

NFCI Participant Survey

7. Which of the following best describes your racial or ethnic background?
 __1 (Hispanic) __2 (African) __3 (Caucasian) __4 (Asian) __5 (Native Amer.) __6 (____) 98 DK 99 Refused

Can you ask this question in California or is it an illegal questions to ask?

8. What is your profession in the building construction industry?
 __ Architect (➔ Skip to Q9) __ T24 Compliance Author (➔ Skip to Q10) __ Builder (➔ Skip to Q11)
 __ Installer (➔ Skip to Q12) __ T24 Plan Checker (➔ Skip to Q13) __ Building Inspector/Official (➔ Skip to Q14)
 __ Glass Manufacturer, Glass or Window Wall Distributor (➔ Skip to Q15) __ NFRC or CEC (➔ Skip to Q16)

9. **Design Professionals** (Architects, Engineers, Title 24 Consultants)
 Please provide responses to the following Title 24 compliance questions (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
9a	Do you determine proposed fenestration for new buildings?	
9b	Do you provide plans to T24 energy consultants for review?	
9c	Do you evaluate fenestration compliance options?	
9d	Do you specify fenestration products?	
9e	Do you provide U-factor and Solar Heat Gain Coefficient (SHGC) values on your drawings, elevations, schedules, or specifications?	
9f	Do you print required T24 compliance forms on drawings?	
9g	Do you sign submittal Title 24 compliance documentation?	

10. **Building Inspector or Building Official**
 Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
10a	Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?	
10b	Do you ask for site label certificates for all fenestration?	
10c	Do you verify fenestration U-factor/SHGC values match T24 plans?	

11. **Glazing Contractors (C-17) Installers**
 Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
11a	Do you review Title 24 fenestration requirements, schedules, and specifications?	
11b	Do you submit bids with Title 24 compliant products?	
11c	Do you obtain site label certificates for all fenestration?	
11d	Do you install Title 24 compliant fenestration?	
11e	Do you ensure Title 24 compliance documentation is on site for inspectors?	
11f	Have T24 fenestration regulations had any impact on your business? Answer:	

12. **Manufacturer, Glass Distributor, or Window Wall Distributor**
 Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
12a	Do you provide National Fenestration Rating Council (NFRC) Label or Site-Built 100-SB Label on all window products showing U-factor and SHGC values?	
12b	Do you work with NFRC to certify and label all products for uniform accurate product comparison, verification of product performance, common communication, and building code compliance?	

NFCI Participant Survey

13. Professional Association Representatives (AGA, AAMA, NRFC, CEC) and Utility Staff

Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
13a	What are the benefits of increased knowledge of correctly labeled fenestration products in the industry?	
13b	Will a program of consistent training and technical assistance for fenestration industry actors result in energy savings across the industry? Answer:	

14. Title 24 Compliance Author

Please provide responses to the following Title 24 Compliance questions and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
14a	Do you calculate building energy use for compliance with the Title 24 energy budget?	
14b	New Oct05 – Do you define fenestration types in software and identify sources of U-factor/SHGC values (mfgr., site-built, field-fabricated)?	
14c	Do you determine necessary fenestration performance for compliance?	
14d	Do you confirm product availability of complying fenestration?	
14e	Do you provide architects with compliance alternatives including glass type, # panes, gas fill, coatings, frame, U-factor, and SHGC values?	
14f	Do you submit completed Title 24 compliance documentation?	

15. Builder

Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Yes/No
15a	Do you ensure fenestration products used in Title 24 compliance calculations are specified and provided to bidders (C-17 contractors)?	
15b	Provide relevant pages from Title 24 calculations.	
15c	Do you provide bidders with specifications of glass type, # panes, gas fill, coatings, frame type, U-factor, and SHGC values?	
15d	Do you complete Title 24 compliance documentation for inspectors?	

16. Plan Checker

Please provide responses to the following Title 24 Compliance questions before and after attending the NFCI workshop or training class (Yes or No)?

#	Title 24 Compliance Questions	Pre-NFCI Yes/No
16a	Do you understand how to verify compliance with the Title 24 site-built/field-fabricated fenestration certification requirements?	
16b	Do you review fenestration values (U-factor/SHGC) used in T24 calculations?	
16c	Do you verify same T24 fenestration values printed on plans?	
16d	New Oct05 – Do calculations identify source of U-factor/SHGC.	

17. Do you have any suggestions that might have helped you participate in the program?

___ 1 (Yes) ___ 2 (No) 98 Don't Know 99 Refused to Answer
 If yes, please provide the suggestion(s).