



NFRC Behind the Glass

A HISTORY OF NFRC AS TOLD BY THE PEOPLE WHO LIVED IT

I n A p p r e c i a t i o n

NFRC would like to thank the following individuals and organizations for their assistance in producing this history, and for their contributions to NFRC over the years:

Dariusz Arasteh

Gary Curtis

John Hogan

Mike Koenig

Jim Krah

Nehemiah Stone

Roland Temple

D&R International

Florida Solar Energy Center

Lawrence Berkeley National Laboratory

NFRC Staff

The U.S. Department of Energy

University of Massachusetts

University of Minnesota



A b o u t N F R C

The National Fenestration Rating Council (NFRC) is a non-profit, public/private organization created by the window, door, and skylight industry. It consists of representatives from fenestration product manufacturers, major trade organizations, state energy officials, research organizations, utilities, specifiers, testing laboratories, energy consultants, public interest groups, representatives from the building and code industries, and government agencies. Its mission is to establish and maintain a fair, accurate, and reliable energy performance rating and labeling system for windows, doors, and skylights.

Today, more than 300 manufacturers rate and label approximately 100,000 products. Architects, builders, building inspectors, code officials, contractors, homeowners, and others use ratings information that NFRC provides to:

- Compare the energy performance of different products on an apples-to-apples basis.
- Determine if products meet local energy code requirements.
- Make informed decisions about the windows, doors, and skylights they buy.



A Message from NFRC's Executive Director

Dear Friends,

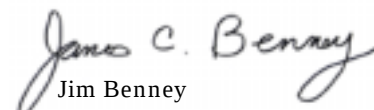
Welcome to *NFRC Behind the Glass*. It's been said that to know where you're going, you have to know where you've been. So we developed this history of NFRC to capture the collective institutional memory that resides in the hearts and minds of many of those present at the creation. We think it will prove very interesting for our current members and participants, and serve as a brief history lesson for newcomers.

In this booklet, we trace the history of NFRC back to its early days, and highlight the compromises, stresses, and successes that came with forming a consensus-based organization from scratch – and turning it into a permanent institution. We also look at how NFRC continues to press for industry improvements that are fair, appropriate, and ultimately helpful to regulators seeking to determine code compliance and to buyers hoping to make informed decisions about their window, door, and skylight purchases.

Since its humble beginnings in Vancouver, well over 200 individuals and organizations, representing the full spectrum of industry stakeholders, have joined in our discussions. They deserve an enormous amount of credit for creating NFRC, guiding it through its early years, and bringing it into maturity.

I'm honored to be a part of the NFRC experience, and I look forward to a future as successful as our past.

Best regards,


Jim Benney
Executive Director
NFRC



Before NFRC

“One reason we decided to proceed was that the folks from government told us that they wanted this to happen, and if we didn’t do it, they would.”

Mike Koenig, Andersen Corporation

“We must guarantee the integrity of the NFRC ratings if we want the system to be accepted, because the possibility of each state and utility developing its own rating system would be chaos.”

Gary Curtis, Oregon Office of Energy, now with the WestWall Group

The year 1989 brought many changes to American culture and matters abroad. George Herbert Walker Bush became the 41st president. The Berlin wall came crashing down. Hollywood brought us *Batman*, *Field of Dreams*, *When Harry Met Sally* and *The War of the Roses*. And an infectious tune by Bobby McFerrin, “Don’t Worry, Be Happy,” pervaded the airwaves.

Energy was also a big topic in the late 80s. During the summer of 1989, the U.S. Department of Energy announced that oil and natural gas reserves in the United States were 40 percent less than projected. Unpredictable weather and energy usage brought brownouts in some regions of the country when peak load demand exceeded capacity.

With fenestration products representing a significant source of energy consumption in buildings (at the time it was estimated that compensating for heat loss through windows accounted for 25 percent of all heating dollars spent in the U.S.), the fenestration and glass industries sought to address concerns about energy efficiency with new and improved technologies. These included low-e coatings, low-conductance spacers, and argon gas fills. Although these improvements helped to improve the average energy performance of the nation’s fenestration stock, they also brought confusion to the marketplace.

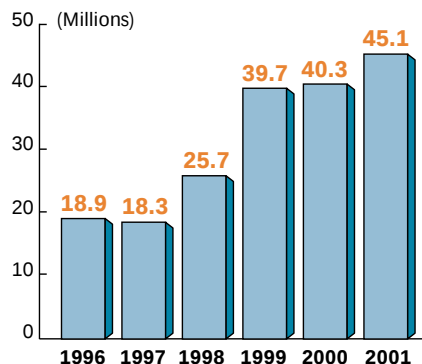
From Chaos to Order

Some manufacturers made outlandish claims about their products. Many manufacturers tested and rated their products, but the procedures were not consistent. According to one longtime NFRC member, some manufacturers just went to a test lab and said, “Give me a number.” The overall effect was to make “apples-to-apples” comparisons impossible.

Separately, a number of key industry stakeholders recognized that something had to be done to prevent widespread confusion, federal intervention, and perhaps

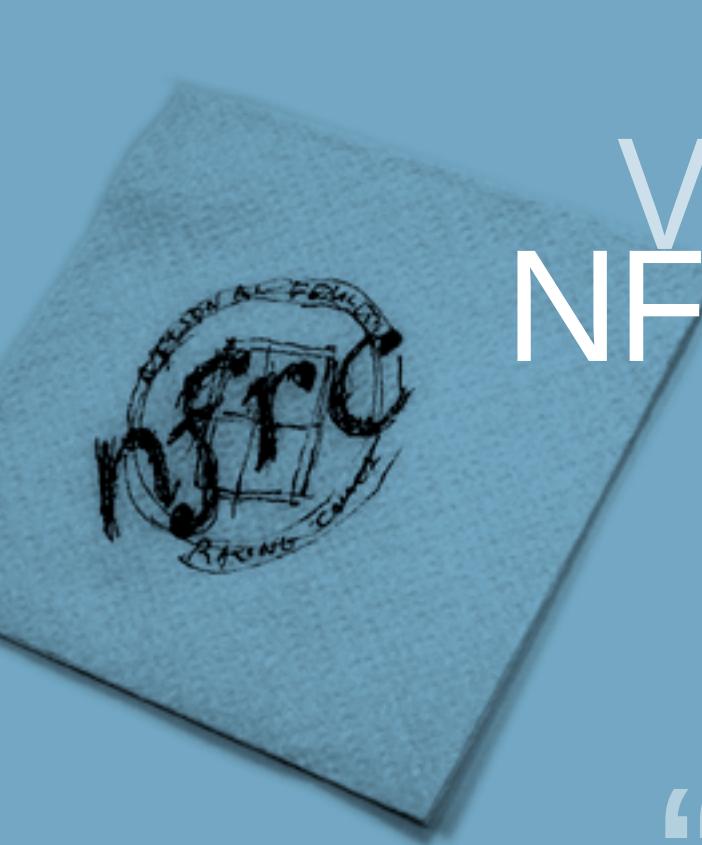
costly litigation. Slowly, but surely, a number of states, government agencies, industry leaders, and regulators began searching for a solution:

- The City of Seattle established what is generally recognized as the first “products directory” for thermally rated products. To sell products in Seattle, manufacturers had to get on this list. And to get on the list, manufacturers had to rate and test product performance under a defined set of procedures. Although relatively short and rudimentary, the Seattle list forced manufacturers to become familiar with the process of getting their products rated in a uniform, independent manner, and reporting those results to a third-party for confirmation and publication. Today’s massive online NFRC database, which includes tens of thousands of products, can trace its lineage back to those few, type-written pages stapled together.
- The federal government, spurred by the Federal Trade Commission and acting through the U.S. Department of Energy, applied steady pressure on the industry. “If you don’t create a system for testing and reporting fair, accurate, and credible energy performance information for windows, doors, and skylights, we will,” the department effectively said. That got everyone’s attention. “One reason we decided to proceed was that the folks from government told us that they wanted this to happen, and if we didn’t do it, they would,” said Mike Koenig, one of NFRC’s pioneers.
- The California Energy Commission laid out a plan for a statewide rating and labeling system for products sold in the Golden State, and shopped it around to manufacturers all over the country. Knowing well that California often acts as the locomotive pulling the national train, manufacturers paid attention. California’s efforts, along with those in Washington and Oregon, made it clear that if the industry didn’t take action on a national basis, manufacturers could wind up having to comply with 50 different ratings regimes, with the attendant hassle – and, most importantly, expense.



The sale of temporary labels has skyrocketed over the years, demonstrating the growing appeal of, and interest in, energy performance ratings provided by NFRC.

Over the course of a few years at the end of the 1980s, these individual efforts came together. At industry meetings beginning in the late 1980s, industry stakeholders often held rump sessions during breaks, over drinks, and on into the night to talk about rating and labeling fenestration energy performance. All they had to decide was who would do it – and how.



Vancouver – NFRC is “Born”

“Persistence wore down resistance.”

Roland Temple, VELUX-AMERICA

“When you look at how a window performs from an energy efficiency point of view, U-Factor is head and shoulders above the rest in terms of its overall effect.”

Jim Benney, Primary Glass Manufacturers Council, now NFRC's Executive Director

“Time, resources, and massive amounts of personal commitment are the keys to reaching our goals.”

John Mumaw, Owens-Corning, now with Integrex Testing Systems

June 25, 1989. Approximately 25 industry leaders attending ASHRAE's meeting in Vancouver, Canada got together to determine once and for all their interest in, and their sense of the necessity for, establishing a new organization focused on a national, uniform fenestration energy rating system. Since there was no official meeting space available in the hotel, the group eventually settled in the hotel bar. It was in this humble setting that NFRC was born, and its original logo sketched out on a bar napkin. By unanimous vote, these pioneers agreed to form the organization we know today.

Setting Up House

In the beginning, the immediate decisions revolved around the organization's structure and decision-making processes. What committees should be formed, and how should they be staffed? Who would find the right leadership to pull all the elements together? Where should they start? On December 4, 1989 – the first “official” NFRC meeting – a group of industry representatives met in Orlando, Fla., to address these and other issues.

One important task involved finding someone to actually run the organization. Through a competitive bidding process, the nascent group chose John Rivera from D&R International as its first administrator. John served in the position until 1999, and many early members credit him with almost single-handedly holding NFRC together through its early years



NFRC came into the world at the Hyatt Regency in Vancouver, British Columbia. On June 25, 1989, a rump group of fenestration professionals gathered in the hotel bar to declare the need for an independent organization to fairly, accurately, and credibly rate the energy performance of windows, doors, and skylights.

Another key early decision was to focus first on developing a rating and labeling procedure for U-Factor (or thermal transmission). “When you look at how a window performs from an energy efficiency point of view, U-Factor is head and shoulders above the rest in terms of its overall effect,” said Jim Benney.

Steady If Not Smooth

Alas, the process of creating a new organization is never completely smooth. And NFRC was not without its fits and starts. In the early days, people didn't quite trust each other, and reaching agreements was often hard to do. Many viewed the NFRC as another bureaucracy at best, or as a threat at worst. Many players feared losing control of a process – rating and testing – that they had controlled for decades. Some just didn't like being told what to do. Others didn't think they'd be treated fairly.

In fact, deciding on U-Factor turned out to be the easy part. The group also quickly agreed that NFRC would test only whole product performance – putting an end to misleading center-of-glass values. And there the agreement ended.

There are as many ways to measure U-Factor as there are places to attach a thermocouple to a window. How hot should the hot side be? Where should test labs place the thermocouples? How many should there be? How long should the window stay in the box? What size should the products be?

And those only cover the technical side of the equation. NFRC faced as many questions on the labeling side. How should U-Factor be reported? What should a label look like? Who should report numbers, and how would they be verified? One long and often heated debate involved who would do what. One faction insisted that testing and simulation labs could be one and the same. Another demanded that they be separate. Some wanted to establish a system of “independent agencies” that would administer and police the program.

The group fought over these questions, and a lot more. The arguments often got pretty heated. Several of those present remember screaming matches, accusations of unethical behavior, and the occasional wild outburst. (Although, at least according to the official records and the recollections of those involved, no one ever actually threw a punch.)

“There was more than one point at which I was sure the organization was finished,” said one combatant.

The Key Compromises

		National Fenestration Rating Council		
AAA Fenestration Company				
Manufacturer stipulates that these ratings were determined in accordance with NFRC100-91.				
U-value	A	5'x3'	0.40	Model #1500, Horizontal Slider with 1/2", low-e glazing
U-value	B	6'x4'	0.38	
NFRC ratings are determined for a fixed set of environmental conditions and may not be appropriate for determining seasonal energy performance. For additional information contact: NFRC, 982 Wayne Avenue, Suite 750, Silver Spring, MD 20910; Phone : (301) 589-NFRC, FAX (301) 589-0864.				

◀ *The original NFRC temporary label. The double U-Factor ratings reflect the compromise NFRC adopted to settle a debate on the size of products tested. In 2003, NFRC moved to single-sized testing, eliminating double ratings on the label.*

“Credibility is not derived from structure.
Credibility is derived from successful operation.
It can't be 'designed in.'”

Rick Curkeet, Intertek Testing Services

“The finances committed to and the hours invested in NFRC to date can only be recovered if members and participants work to increase the demand for the NFRC rating label.”

John Mumaw, Owens-Corning, now with Integrex Testing Systems

Just as everything looked lost, consensus began to emerge. No matter how much they disagreed, everyone in the meeting rooms during those early sessions knew that the forces that conspired to bring them together still existed outside the walls. If they couldn't agree, the federal government would dictate its own system. States might opt to go their own way, adding unacceptable delays and expense to product testing and certification.

Eventually, compromises were reached on all of the most contentious issues. Some of these included decisions regarding:

The roles and responsibilities of various players. At a March 1990 meeting in Berkeley, Calif., members reached agreement on the proper roles and responsibilities for simulation labs, test labs and certification representatives. To maintain the integrity of the system, many argued that no one organization should perform more than one of those functions. Others argued that the need for efficiency was paramount, and demanded no restrictions on who did what. Ultimately, the two sides met in the middle. The certification representatives, or inspection agencies (IAs) as they are now known, would have to remain independent. But the same entities could perform both simulations and testing. The compromise has held ever since.

Responsibility and liability of the IA. You can't have a successful organization unless you first answer the question, What do we do if we get sued? This came up again and again in the early days, as different participants in the process jockeyed to avoid being liable if a customer was harmed in some way due to false information provided



The decision to form NFRC was the easy part. It proved more difficult to agree on a number of important issues relating to how NFRC would operate, who would run it, and how products would be rated and labeled. During many long meetings and contentious debates in 1989 and 1990, consensus began to emerge.

by NFRC. Ultimately, the group decided that the IAs should not be held totally liable, and that liability would be determined based on where in the process the error occurred.

Physical Tests Key to Credibility

Simulations vs. testing. The manufacturers wanted as little physical testing as possible because of the expense, and argued that computer simulations would be adequate. City and state representatives wanted to test everything because they didn't trust the simulations. Dariush Arasteh at Lawrence Berkeley National Laboratory, which developed the software that made simulations possible in the first place, mediated between the two groups and ultimately settled one of the most intractable debates in the organization's history. Again, both sides gave a little. NFRC would use simulated ratings, but two physical tests would be conducted to validate the simulated results. NFRC recently reduced the number of physical tests to one and changed the procedure for selecting products to be tested (now randomly from a production line). But physical testing remains an important component of the system because it lends credibility to the value of the simulated results.

Test size. Once everyone agreed on the number of physical tests, they turned to the issue of what size product to test. After much debate, they reached back in time to find consensus. In the early 1980s, ASTM argued over the same issue for months as it sought to develop its first thermal test method for windows. Ultimately, a grand compromise between wood window manufacturers (who wanted a smaller size) and aluminum window manufacturers (who wanted a bigger size) led to the inclusion of two different sizes in the test method known as "residential" and "non-residential." NFRC simply adopted the ASTM compromise, but decided to call the two sizes "AA" and "BB."

Interestingly, NFRC borrowed from another organization again almost 15 years later when it moved to single-size testing. Once again unable to reach agreement on its own, NFRC turned to the North American Fenestration System (NAFS, made up of representatives from the United States, Canada, and Mexico). The fenestration industry, while attempting to develop common air-water-structural test methods under NAFS, adopted a single metric test size. NFRC looked at what NAFS had done and decided it couldn't do better. Beginning in 2003, participating manufacturers will rate to one product size similar to NAFS.

Milestones Along the Way



“I have overheard members describe the organization’s decisionmaking process as ‘tougher than herding cats.’ I know from experience that isn’t easy, but at least the cats are all in the same room.”

Jim Krahn, Marvin Windows and Doors



◀ *NFRC leaders gather at the official launch of the U.S. Department of Energy's ENERGY STAR® Windows Program. The program endorsed the legitimacy and credibility of the NFRC rating and labeling system by requiring that qualifying products be NFRC certified. Pictured left to right are: Richard Karney, P.E., ENERGY STAR Program Manager, and NFRC Board Members Jim Krahn, Marvin Windows and Doors; Mike Curtis, Cardinal IG; Debra Brunold, Jeld-Wen, Inc.; and Mike Koenig, Andersen Corporation.*

With most of the difficult issues settled, NFRC began to produce certified U-Factor ratings in 1991. Shortly thereafter, the first NFRC-certified products – complete with a paper label affixed to the glass – began to arrive in showrooms and model homes across the country. Since then, NFRC has achieved a number of very important milestones:

- In October 1992, the National Energy Policy Act officially recognized NFRC as the country's fenestration energy performance rating and labeling organization – lending some much-appreciated credibility to the effort. The Act mandated the establishment of a voluntary national energy rating system for windows and window systems, and charged NFRC with making it happen. It also called on the U.S. Department of Energy to continue its support for the fledgling organization and to monitor its activities. To this day, a DOE representative sits on the NFRC Board of Directors as a non-voting member.
- Before NFRC officially formed, some states were beginning to demand rating and labeling standards for windows sold within their borders. California was one of the first. So Nehemiah Stone approached the California Energy Commission (CEC) to shop around a set of procedures he had developed for verifying U-Factor performance. Around the same time, Gary Curtis from the Oregon Office of Energy told him about a group called NFRC. So Nehemiah attended an ASHRAE meeting in Atlanta to see how the two organizations could work together. He told the attendees that California was developing its own procedures, but was willing to work with the NFRC to create a national standard. But there was a catch. CEC

needed a procedure in place by August 1990, and it was already March. The short deadline caused one attendee to throw his pencil upwards with such force that it stuck in the ceiling. Amazingly, NFRC was able to come through and finalize procedures for California. The CEC became the first vehicle to get the U-Factor procedure in place through the new rating and labeling system.

NFRC Embraces Education

For the ratings and labeling program to be successful, it became apparent that an education component was needed, and the role of communications expanded to fill that role. First, NFRC needed to brand itself so that people would recognize its members as the experts in fenestration ratings. In 1997, NFRC adopted a more modern, dynamic and full-color logo still in use today. A series of fact sheets, educational materials, the *NFRC Update* newsletter, and the label also received facelifts, as they became the principal tools for communicating about NFRC to builders, code officials, manufacturers, and purchasers of window products. Later, NFRC embarked on a proactive media relations effort to reach an even greater audience.



As part of NFRC's marketing and education efforts, staff spreads the word about NFRC's good work to customers across the country. Here, Susan Douglas, former Executive Director, addresses a session at the 1998 National Glass Show. The NFRC exhibit appears at many shows every year.

- The first *NFRC Certified Products Directory* was produced in 1991. Unlike the automated system of today, the staff hand-crunched the data and printed the pages. The first edition consisted of only 200 copies. Today, the *Directory* includes almost 100,000 products and has become so large that it exists only as an electronic database.
- In the spring of 1997, the U.S. Department of Energy unveiled its ENERGY STAR® Windows Program at an NFRC meeting in Nashville. This program is designed to promote energy efficiency by rating windows' heating and cooling performance while taking climate differences into account. NFRC received a vote of confidence when the agency decided to require that manufacturers wanting to participate in the program first obtain performance values generated through NFRC testing procedures and label their products.

Today's NFRC



“ We have two primary responsibilities over the next ten years. One is to maintain the technical excellence and integrity of our rating and labeling system. The other is to turn the NFRC label into a market advantage. ”

Debra Brunold, Jeld-Wen, Inc.

“ I never allowed myself to think that it would fail, because I saw such need for it that it had to succeed. ”

Jim Krahn, Marvin Windows and Doors



One of NFRC's latest initiatives is its retailer program, which seeks to place information about fenestration energy performance in the hands of homeowners, contractors, and builders as they shop for windows in retail outlets nationwide.

Today, NFRC is the country's only independent source of window, door, and skylight energy performance information. Over the years, it has earned the respect of the federal government, state and local energy representatives, utilities, builders, code officials, manufacturers, consumers, and the media for its tireless efforts to build a solid organization of unquestioned integrity.

Most importantly, the NFRC achieved what it set out to do all those years ago in a hotel bar in Vancouver – to establish a fair, accurate, and credible energy rating system for fenestration products.

So... what's next?

From a Bar to Raising the Bar

In the early years, NFRC built the foundation for the next generation of certification programs. As participation continues to grow and the organization achieves widespread national recognition, it will continue to raise the bar for the processes in place, while maintaining the organization's credibility, integrity, and legitimacy. Some of the issues that will be sure to keep NFRC busy over the next several years include:

- *The development of new ratings procedures.* NFRC is working now on procedures for rating long-term energy performance and daylighting.
- *Bringing existing products and new technologies within the NFRC ratings regime.* Right now, the organization does not have rating procedures for some specialty products such as domed skylights and revolving doors.

And new technologies involving fenestration attachments and dynamic glazings are not yet accounted for in NFRC's existing standards.

- *More of a presence on the Internet.*

NFRC conducts most of its business the old-fashioned way – through the mail and in face-to-face meetings. Ultimately, it hopes to become more of a Web-based organization, with online balloting, meeting registration, and document management, as well as with a simpler, easier-to-use online products database.



No matter what happens, NFRC will be there to ensure that its various customer groups have all the information they need to make educated decisions about their fenestration products – whether they make, regulate, or buy them. With integrity, excellence, and compromise, NFRC will no doubt achieve all of the goals it sets for itself. Not unlike most windows, there will be a few smudges and streaks along the way. But in the end, the light will always shine through.



Speakers at NFRC gatherings are asked to provide a different perspective on the parochial interests of NFRC and on the world in general. Some crowd favorites include (from left) Rear Admiral Gary Roughhead, Commandant of the Naval Academy (spring 1998); Frank Thompson, Chairman of NAHB's Construction Codes and Standards Committee (spring 2002); and dog-sled racing champion DeeDee Jonrowe (fall 2002).

NFRC Chairmen

Lou Masonick
(Temporary Chairman)
3M Company
1989

Eric Eckstrom
*National Window and
Door Association*
1990 – 1992

Julie Cahn
*Vinyl Window and
Door Institute*
1993

Mark Jackson
*Bonneville Power
Administration*
1993 – 1994

Timeline

1989



1991



1992



1988
LBNL publishes
simulation software
WINDOWS 3.1

1989
The Berlin Wall
comes down

December
NFRC is born

1990
John Rivera of
D&R International
named NFRC
Administrator

1991
The first Gulf war

NFRC publishes
its first *Certified
Products Directory*

March 1991
NFRC adopts
U-Factor
procedure for
non-residential
products

May 1991
NFRC adopts
U-Factor
procedure for
residential
products

1992
Bill Clinton elected
42nd President

June
Window 4.0
and Frame 3.0
approved

October 1992
National Energy
Policy Act codifies
NFRC's role

John Mumaw
Owens-Corning
1994 – 1996

Debra Brunold
Jeld-Wen, Inc.
1997 – 1998

Jim Krahn
*Marvin Windows
and Doors*
1999 – 2001

Tony Rygg
*California Energy
Commission*
2002 – Present

1993



1993
Astronauts repair
Hubble Space
Telescope

January
First NFRC-labeled
products roll off
production lines

California Sate
labeling program
begins

1996



1996
Summer Olympics
held in Atlanta

June
Frame 4.0
becomes
mandatory

1997



1997
Hong Kong
returns to Chinese
control

September
New logo
adopted

2002



2002
The Enron scandal

May
NFRC moves to its
current location in
Silver Spring, Md.

2003
April
NFRC implements
one-size testing

NFRC's 2003 Board of Directors

In the drive to achieve credibility and consensus in the early days of NFRC, the organization's founders created a Board of Directors designed to represent all of the stakeholders involved in the business of rating, certifying and enforcing fenestration energy performance.

This diversity makes NFRC unique among industry associations, and represents one of the organization's key strengths. It should be noted that NFRC is not a "trade" association, but is a true, nonprofit research and educational organization. Its structure ensures that everyone has a voice in the chief policymaking body of NFRC, and allows the Board to consider all points of view in making decisions. The Board includes representatives from:

- Product manufacturers
- Product suppliers
- Simulation and testing laboratories
- Utilities and energy service providers
- Consumer organizations
- State and local agencies
- The building and design community
- Universities and national laboratories

This same drive towards credibility directed NFRC to establish a structure of committees, subcommittees and task groups, similar to other successful consensus organizations such as the American Society for Testing and Materials and American National Standards Institute. This structure allows interested parties to begin the drive towards developing standards at the task group level and builds buy-in and eventual consensus as the document travels up the organization.

At the task group level, interested parties with various (and sometimes opposite) interests are allowed to express their views and provide technical support for their opinions in an open and frank discussion. As the standards move up through the subcommittee and committee levels, negative ballots and other comments are formally addressed and dealt with by written and oral ballots.



William A. (Tony) Rygg, Chairman
California Energy Commission

Randy Van Voorst, Vice Chairman
Quality Testing, Inc.

Roland Temple, Treasurer
VELUX-AMERICA INC.

Marvin Stover, Secretary
Mikron Industries, Inc.

Dariusz Arasteh
Lawrence Berkeley National Laboratory

Marcia Falke
Fenestration Manufacturers Association

John Hogan
City of Seattle

Jim Larsen
Cardinal IG

Tom Mewbourne
AFG Industries, Inc.

William Prindle
American Council for an Energy Efficient Economy

Garrett Stone
Brickfield, Burchette, Ritts & Stone, P.C.

Richard Karney, ex officio
U.S. Department of Energy

John Mumaw, ex officio
Integrex Testing Systems

Jim Krahn, Ombudsman
Marvin Windows and Doors

Jim Benney, Executive Director
NFRC



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