



BROWARD COUNTY BOARD OF RULES AND APPEALS

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To: Members of the Ad Hoc Energy Conservation Committee

D. Rice, P.E.	M. Charnin	T. Fallon	W. Haygood
E. Jenison	A. Kamm, P.E.	C. Kirby	B. Lomel, P.E.
J. Travers	D. Ulmer	B. Volin	A. Zackria, CSI

From: Timothy G. de Carion, Chief Energy Code Compliance Officer

Date: May 16, 2022 (1:30PM – 3:30PM)

Subj: Energy Conservation Committee to Discuss Agenda Items

The Chairman of Energy Committee, Mr. Dave Rice P.E. called for a meeting of the Energy Committee for the items listed.

AGENDA

Roll Call

Approval of Minutes – April 18, 2022

Chairman’s Opening Remarks

Chief Energy Code Compliance Officer Opening Remarks

Regular Meeting

Item 1: BORA Commercial Energy Guidelines Schedule	6
Item 2: Energy Code Modifications for TAC Committee Meeting in Lake Mary, Florida	8
Cool Roof Mod EN9903.....	9
Item 3: BORA Commercial Energy Guidelines	32 (Dated 05-16-2022)
Building/Structural Checklist	37 (Dated 05-16-2022)
Mechanical Checklist	39 (Dated 05-16-2022)
Appendix A, B, C & D	41 (Dated 05-16-2022)

General Discussion

Schedule Next Meeting

Adjournment

Reference Documents for Committee Use

- 1) BORA Commercial Energy Guidelines (Pg. 32)

Sunshine Law Reminder: Advisory Board members cannot communicate with each other on a possible committee or Board topic outside of a public meeting, per State statute.

2022 Voting Members

Chair

Mr. Daniel Lavrich,
P.E.,S.I.,SECB,F.ASCE, F.SEI
Structural Engineer

Vice-Chair

Mr. Stephen E. Bailey, P.E.
Electrical Engineer

Mr. Sergio Pellecer
Fire Service Professional

Mr. Gregg D’Attile,
Mechanical Contractor

Mr. John Famularo,
Roofing Contractor

Mrs. Shalanda Giles Nelson,
General Contractor

Mr. Daniel Rourke,
Master Plumber

Ms. Lynn E. Wolfson,
Representative Disabled Community

Mr. Dennis A. Ulmer,
Consumer Advocate

Mr. John Sims,
Master Electrician

Mr. Ron Burr
Swimming Pool Contractor

Mr. Abbas H. Zackria, CSI
Architect

Mr. Robert A. Kamm, P.E.
Mechanical Engineer

2022 Alternate Board Members

Mr. Steven Feller, P.E.,
Mechanical Engineer

Mr. Alberto Fernandez,
General Contractor

Mr. William Flett,
Roofing Contractor

Vacant

Structural Engineer

Mr. Robert Taylor,
Fire Service

Mr. David Rice, P.E.,
Electrical Engineer

Mr. James Terry,
Master Plumber

Mr. David Tringo,
Master Electrician

Mr. Jeff Falkanger,
Architect

Board Attorney

Charles M. Kramer, Esq.

Board Administrative Director

James DiPietro

Energy Conservation Committee Minutes – April 18, 2022



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MEETING OF THE ENERGY CONSERVATION COMMITTEE

Minutes
April 18, 2022

Call to Order:

Chair David Rice, P.E., R.C. Engineering, Inc., called a published meeting of the Broward County Board of Rules and Appeals Energy Conservation Committee to order at 1:31 PM.

The roll was called, and the following members were present:

Present:

Mike Charnin	Art Kamm, P.E.	John Travers
Tim Fallon	Carlton Kirby	Bob Volin
Wyatt T. Haygood	Brian Lomel, P.E.	Abbas Zackria, CSI
Eric Jenison	David Rice, P.E.	

Staff: Timothy de Carion, Chief Energy Code Compliance Officer

Mr. Kamm, Mr. Lomel and Mr. Zackria arrived shortly after the roll was called.

Chair Rice introduced the newest member of the Energy Conservation Committee, Mr. Carlton Kirby, Broward County Environmental Protection and Growth Management Division, Resilient Environment Department. Mr. Kirby shared what his department does with the committee.

Chair Rice reminded the group that the Energy Conservation Committee cannot make changes to the code. The guidelines are intended to assist in how to interpret the code to aid in uniform code compliance throughout Broward County.

A MOTION WAS MADE BY MR. VOLIN AND SECONDED BY MR. TRAVERS TO APPROVE THE DECEMBER 14, 2021, ENERGY CONSERVATION COMMITTEE MEETING MINUTES. THE MOTION PASSED BY UNANIMOUS VOTE.

Chair Rice explained that if anyone ever has any questions, they should be sent to the Broward County Board of Rules and Appeals staff contact, Mr. Timothy de Carion, Chief Energy Code Compliance Officer, Broward County Board of Rules and Appeals.

Item 1: Energy Code Mod. Update

Mr. de Carion shared four items that he sent to the Department of Business and Professional Regulation with the committee. Modifications were sent to clarify what the existing code stated, not to change the code.

NO MOTION.

Item 1a: #9845-C402.5 Air Leakage

Mr. de Carion noted that this section was previously in the code as Section 405.5.9. To avoid the International Code Council (ICC) removing the section, Mr. de Carion recommended that it be moved to the mandatory section of the code. The section pertains to scenarios when a building cavity is above a drop ceiling. When a drop ceiling is in a commercial building, the area above the drop ceiling is vented to the outdoors. Without a complete seal, problems arise in such a humid environment.

Mr. Wyatt T. Haygood, City of Parkland, asked Mr. de Carion why he decided to renumber the modification. Mr. de Carion responded that he renumbered the section because under the first review process, the section was removed from the code and reassigned the number to a new code section. Mr. Haygood agreed that this code section included important information that should remain in the code.

NO MOTION.

Item 1b: #9972-C405.1 Lighting

Mr. de Carion explained that the next modification was based around the requirement that lighting installed in walk-in coolers and freezers had to comply with the lighting requirements of C403.2.14. In the current energy code, there are no lighting requirements. Before the modification, readers were sent to a section of the code for nonexistent information.

The section was not approved on the State level, so Mr. de Carion recommended that the lighting section that was being referred to be added back into the code. This section provides the option to install high efficiency lighting or a motion detector in a walk-in cooler.

Mr. Bernardo Cardenal, Rocamar Engineering, asked how many watts per square feet will be installed in coolers and freezers. Mr. de Carion stated that that information is included in a different section of the code.

Mr. John Travers, City of Fort Lauderdale, mentioned that when illumination is discussed, everyone should reteach themselves to speak about the lumens since the energy codes oversee efficacy specifically. Also, to not consider the brightness of the bulb as compared to the watts that it uses. Mr. de Carion agreed.

NO MOTION.

Item 1c: #10151-R402.4.1.2 – #7: Testing Procedures

Mr. de Carion was shared that this section was brought to his attention by Mr. Mikel Abbott, Mikel Abbott Energy Calcs. There is a problem with sweating on duct work in attics, leading to mold issues. The problems tend to

occur in spray foam houses. Mr. de Carion shared that Mr. Abbott believes that a lot of the issues stem from failing to seal the attic cavity in a spray foam house. He added that after a blower test of a spray foam house, leaks were found in the spray foam in the attic cavity. The leaks lead to humidity infiltrating the space. Mr. de Carion looked into the code, and it states that the spray foam houses must be tested with the volume included.

The modification added the verbiage to mirror the language in the standard and place it in the code.

Mr. Bob Volin, Air Design Concepts, said that the people who perform the calculations need to take volume into consideration. Without the volume included, the blower door test will provide completely different calculations. Mr. de Carion agreed and added that there will have to be training available to the code officials to inform them of the importance of including the volume of the space in the blower door tests.

Mr. Eric Jenison, Total Dynamic Balance, informed the committee that he performs blower door tests that way. His team verifies the area that that is being used because they found irregularities with given information, so they go through the process to verify the surface area themselves to provide consistency.

Mr. Travers asked if it will be required to know if a spray foam installation will occur at plan review so that the energy team will be made aware of the additional area that will need to be included in the leakage test.

Mr. de Carion said that there is nothing in the guidelines at this time. He would have to send a memo to the structural chiefs and inspectors about the issue, how to decipher the information and report it.

Mr. Pete Quintela, Miami-Dade County Department of Regulations and Economic Resources, added that by showing the thermal envelope, the attic will be included. The thumbnails have to show the value on the energy calculations, and they usually show the type of material that is being used.

Mr. Art Kamm, P.E., Kamm Consulting, said that it can be found on the architectural drawings too.

Mr. de Carion clarified that when reading a blower door test, it is not required to place the volume on the plans. In his experience, some jurisdictions require the volume of the space for the blower door test on the plans, but it is not required in the code. Mr., de Carion believes that with education, code officials can be taught how to read the reports carefully and correctly.

Mr. Volin added that the companies that perform blower door testing should be made aware of the same educational information that is given to the code officials.

Mr. de Carion agreed and said that it is now very well known throughout the industry.

NO MOTION.

Item 1d: #10193-R402.4.1.2 Testing

Mr. de Carion shared the proposed changes for the *R402.4.1.2 Testing* section. The change that the dwelling units with an air leakage rate less than three shall be provided. The section also directs the reader to section M1507.3 of the Florida Building Code, Residential for reference.

NO MOTION.

Item 2: BORA Commercial Energy Guidelines

Mr. de Carion shared the current draft of the BORA Commercial Energy Guidelines. The purpose of the guidelines is to aid the plan reviewers and inspectors in determining what disciplines enforce which section of the energy code. Mr. de Carion went on to say that there is a reoccurring misconception that the energy code is not significant and only the mechanical trades need to pay attention to the energy calculations. In actuality, the energy code is the responsibility of the mechanical, structural, electrical and plumbing disciplines.

Referencing, Appendix A, Mr. Travers asked if the engineer on record will be expected to perform photometrics to determine the lumens at the walking level. Mr. de Carion clarified that it doesn't have anything to do with the lumens. The exterior lighting compliance has to do with the watts per square foot.

Mr. de Carion mentioned that there are a number of ASHRAE code sections listed in the guidelines document. He also reminded the committee that the Broward County Board of Rules and Appeals provided copies of ASHRAE to 90.1 to the building departments throughout Broward County.

Mr. Quintela noted that the ASHRAE standards can be accessed for free online as well.

Mr. de Carion continued to read through the BORA Structural Checklist and the group provided different perspectives about the current draft.

Mr. de Carion shared what a proper compliance report should look like. The input report and compliance report must match before being submitted to the building department.

NO MOTION.

Chair Rice told the committee members and guests to send questions and comments about the current Energy Guidelines draft to Mr. de Carion. Chair Rice said that he intends to schedule the next Energy Conservation Committee meeting in four weeks.

Mr. Travers said that he would like to discuss cool roofs at the next meeting. Chair Rice made a note to Mr. de Carion to include the subject on the next agenda.

Adjournment

Having no further business to go before the Committee, the meeting adjourned at 3:36 PM.

Item 1: BORA Commercial Energy Guidelines Schedule

Commercial Energy Guidelines Provisions Schedule May 16, 2022

May	Structural
June	Mechanical
July	Mechanical
August	Electrical
September	Electrical
October	Plumbing
November	Review of all Disciplines
December	Submit to the Board for approval
January	Publish to the public

Item 2: Energy Code Modifications for TAC Committee Meeting in Lake Mary, Florida

TAC: Energy

Total Mods for Energy in Pending Review : 79

Total Mods for report: 79

Sub Code: Energy Conservation

EN9903

7

Date Submitted	01/27/2022	Section	303.1.5	Proponent	pete quintela
Chapter	3	Affects HVHZ	Yes	Attachments	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review				

Comments

General Comments Yes

Alternate Language No

Related Modifications

Summary of Modification

This proposed modification increases the two compliance requirement options to the roof system solar reflectance values for low-slope roofs on commercial/nonresidential buildings directly above conditioned spaces and it is only applicable to Climate Zone 1A

Rationale

This proposed modification increases the roofing systems solar reflectance which will lead to less heat transmission into the building, resulting in a reduced cooling load demand, and a consequent decrease on energy consumption. By decreasing roof temperature, the life of the roof may be extended. This proposal also provides secondary benefits, such as reduced urban heat island effect.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

Energy savings

Impact to industry relative to the cost of compliance with code

Minimal. Based on the example of a standard new construction, two-ply and a mineral surfaced cap sheet built-up roof costing \$275 per square. The cost difference between a regular mineral surfaced cap sheet and an energy compliant cap sheet is \$50 per square. The \$50 increase is approximately 20%.

Impact to small business relative to the cost of compliance with code

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The proposed code change increases the amount of solar energy reflected away from low slope roof systems. Higher reflective materials lower the heat retained by the roof, lessens heat exposure to residents and reduces heat related health risks.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Decreases cooling load energy use, extends the life of the roof system, improves the energy efficiency of the code, reduces urban heat island effect.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

NO

Does not degrade the effectiveness of the code

NO

1st Comment Period History

Proponent Timothy de Carion Submitted 3/9/2022 11:06:00 AM Attachments Yes

Comment:

Letter of Endorsement from the City of Pompano Beach

1st Comment Period History

Proponent Timothy de Carion Submitted 3/9/2022 11:26:21 AM Attachments Yes

Comment:

Endorsement Letter from the City of Hollywood

1st Comment Period History

Proponent Susannah Troner Submitted 3/29/2022 11:39:48 PM Attachments No

Comment:

Writing to express support for proposed code modification EN9903 for additional commercial cool roof reflectance requirements for low-slope roofs in Climate Zone 1A. The proposed code modification provides community health and safety benefits which is the core purpose of the Florida Building Code. The Autocase Triple Bottom Line Economic Analysis submitted with the proposed code modification verifies these community health and safety benefits as well as lifetime economic benefit for building owners and tenants who will save significant money over the life of the building. The proposed code modifications also provide additional environmental benefits to the community. The analysis focuses on one prototype building so the benefits would be exponentially more significant when multiplied by the annual number of new low-slope roof commercial roofs in a community.

1st Comment Period History

Proponent Monica Ospina Submitted 4/8/2022 3:55:51 PM Attachments No

Comment:

Writing to express support for the proposed code modification EN9903 for additional commercial roof requirements. The submitted Economic Analysis and other supporting documentation verify that the changes will help building owners and tenants save money over the life of the building and provides many health and safety benefits to the community.

1st Comment Period History

EN9903-G5 Proponent Jackson Becce Submitted 4/13/2022 9:23:03 AM Attachments No
Comment:

The Smart Surfaces Coalition (SSC) SUPPORTS the increase in solar reflectance thresholds for commercial low-slope roofs in climate zones 1A as part of the FBC. This proposal would have a significant impact on energy and related monetary savings and heat reduction, resulting in health and safety improvements, among other benefits. There are already many commercially available products that allow low-slope commercial buildings to achieve the desired 3-year SRI threshold outlined in the code with no cost differential.

1st Comment Period History

EN9903-G6 Proponent kamrath christian Submitted 4/13/2022 12:31:22 PM Attachments No
Comment:

I support proposed code modification EN9903 for additional commercial cool roof reflectance requirements for low-slope roofs in Climate Zone 1A. We need to be building smarter and in a way that accounts for future hotter conditions. The economic analysis submitted with the proposed code modification verifies community health and safety benefits which are part of the core purpose of the Florida Building Code. Multiple studies over the years have also verified economic benefits for building owners and tenants who save on their electric bills over the life of the building. The proposed code modifications also provide additional environmental benefits to the community.

1st Comment Period History

EN9903-G7 Proponent Brenda Krebs Submitted 4/13/2022 3:02:44 PM Attachments No
Comment:

For low-slope roofs in Climate Zone 1A, I fully back the proposed code modification EN9903 for additional commercial cool roof reflectance requirements. The economic analysis, which was submitted with the proposed code modification, serves as verification of community health and safety benefits that are an integral part of the Florida Building Code's core purpose. Numerous studies over the years have also verified economic benefits over the life cycle of the buildings for both building owners and tenants who save on their electric bills. The proposed code modifications also provide additional community environmental benefits.

1st Comment Period History

EN9903-G8 Proponent Nicholas Gunia Submitted 4/14/2022 10:03:52 AM Attachments No
Comment:

As past Chair of the Miami Branch of the South Florida Chapter of the US Green Building Council, I am writing to voice my support for EN9903 for additional commercial cool roof requirements. I believe the proposed changes will help building owners and tenants save money over time and benefit the environment. As such, the proposed changes should be adopted.

1st Comment Period History

EN9903-G9 Proponent Jefferson Tcheou Submitted 4/14/2022 2:59:51 PM Attachments No
Comment:

Commenting in support of code modification EN9903. The Autocase Analysis states that a prototype 5,000 sf commercial building with thermoplastic membrane roofing provides an economic value of \$150k over 25 years. This potentially could save a tremendous amount of energy resources and money. Steps towards a greener future are much needed.

1st Comment Period History

EN9903-G10 Proponent Estela Tost Submitted 4/14/2022 6:31:38 PM Attachments Yes
Comment:
I am in support of the proposed modification EN9903 for additional commercial cool roof requirements. The supporting documents and data validates that this change will support building owners and tenants in reduction of operating expenses while providing enhanced safety and health benefits

1st Comment Period History

EN9903-G11 Proponent Richard Logan Submitted 4/15/2022 9:51:56 AM Attachments No
Comment:
AIA Florida Supports this code modification

1st Comment Period History

EN9903-G12 Proponent Sandra St. Hilaire Submitted 4/15/2022 2:42:09 PM Attachments No
Comment:
I support proposed code modification EN9903 for additional commercial cool roof reflectance requirements for low-slope roofs in Climate Zone 1A. The economic analysis submitted with the proposed code modification verifies community health, resilience and safety benefits which are part of the core purpose of the Florida Building Code. Multiple studies over the years have also verified economic benefits for building owners and tenants who save on their electric bills over the life of the building. The proposed code modifications also provide additional environmental benefits to the community.

1st Comment Period History

EN9903-G13 Proponent Mike Gibaldi Submitted 4/15/2022 4:33:11 PM Attachments No
Comment:
I fully support this easy way to conserve energy. Florida must do all we can to reduce inefficient energy use. This change will passively save energy for years and years in in every structure where it gets implemented.

1st Comment Period History

EN9903-G14 Proponent Chris Sanchez Submitted 4/15/2022 5:06:49 PM Attachments No
Comment:
I support proposed code modification EN9903 for additional commercial cool roof reflectivity requirements for low-slope roofs in Climate Zone 1A. The economic analysis submitted with the proposed code modification verifies community health and safety benefits which are part of the core purpose of the Florida Building Code. In addition, multiple studies have verified the economic benefits associated for building owners and tenants who save on their electric bills over the life of the building. The proposed code modifications also provide additional environmental benefits to the community.

1st Comment Period History

Proponent Marta Marello Submitted 4/17/2022 3:48:39 PM Attachments No
Comment:

I support proposed code modification EN9903 for additional commercial cool roof reflectance requirements for low-slope roofs in Climate Zone 1A. The proposed code modification will provide economic savings and as well as community health and safety benefits which are part of the core purpose of the Florida Building Code. Additionally, the proposed code modification will assist building owners and tenants in saving on their electric bills and be more resilient in the face of extreme weather events and extreme heat.

TADD Section C303.1.5 to Chapter 3 General

C303.1.5 Roof solar reflectance and thermal emittance

Low-sloped roofs directly above cooled conditioned spaces in Climate Zones 1a shall comply with one or more of the options in Table C402.3.

C402.3 Roof solar reflectance and thermal emittance.

Low-sloped roofs directly above cooled conditioned spaces in Climate Zones 1, 2 and 3 shall comply with one or more of the options in Table C402.3.

Exceptions: The following roofs and portions of roofs are exempt from the requirements of Table C402.3:

1. Portions of the roof that include or are covered by the following:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water-heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems and components, and other opaque objects mounted above the roof.

2. Portions of the roof shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings.

3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot [74 kg/m²] or 23 psf [117 kg/m²] pavers.

4. Roofs where not less than 75 percent of the roof area complies with one or more of the exceptions to this section.

TABLE C402.3 MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS ^a

Three-year aged solar reflectance ^b of 0.55 (0.63 for Climate Zone 1A) and 3-year aged thermal emittance ^c of 0.75

Three-year-aged solar reflectance index ^d of 64 (75 for Climate Zone 1A)
--

^a The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section C402.3.1 and a 3-year-aged thermal emittance of 0.90.

^b Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-1 Standard.

- c. Aged thermal emittance tested in accordance with ASTM C1371 or ASTM E408 or CRRC-1 Standard.
- d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E1980 using a convection coefficient of $2.1 \text{ Btu/h} \cdot \text{ft}^2 \cdot ^\circ\text{F}$ ($12 \text{ W/m}^2 \cdot \text{K}$). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance.

Autocase

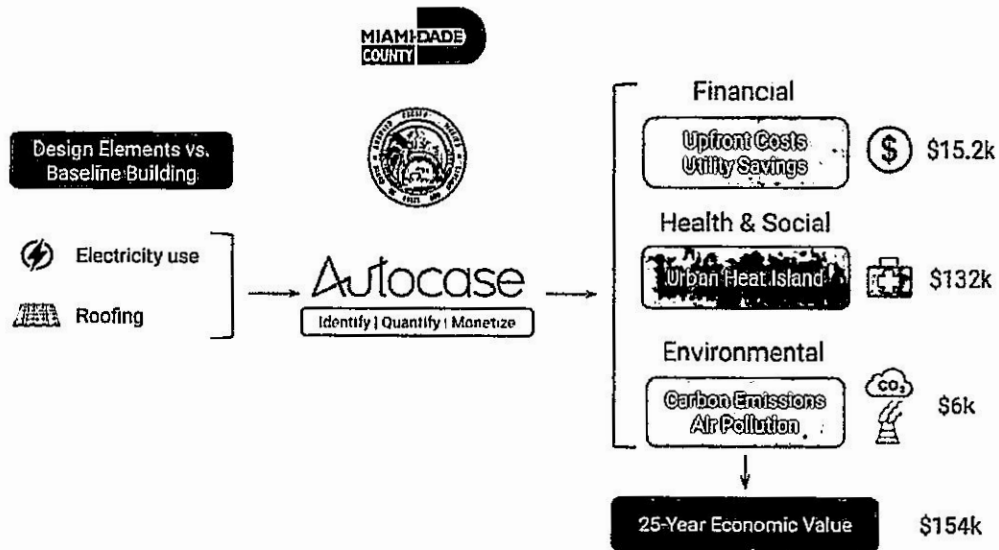
Triple Bottom Line Analysis of a Cool Roof Policy Proposal



Project Overview and Analysis Results

Miami-Dade and Broward County Boards of Rules and Appeals are committed to providing education and interpreting building codes, and when necessary, proposing building code modifications based on informed, responsible economic investment, to ensure the welfare and safety of building inhabitants and surrounding communities. A business case tool was utilized by Autocase to monetarily quantify and value the economic benefits of proposed cool roof requirement changes to augment current building standards. The analysis demonstrated a lifetime economic value of the proposed roofing policy of \$154,100 over 25 years for a prototypical 5,000 square foot commercial building with thermoplastic membrane roofing installed, when comparing a dark roof with a solar reflectance (SR) of 5% to a cool roof with a SR of 63%.

Autocase



Key Results

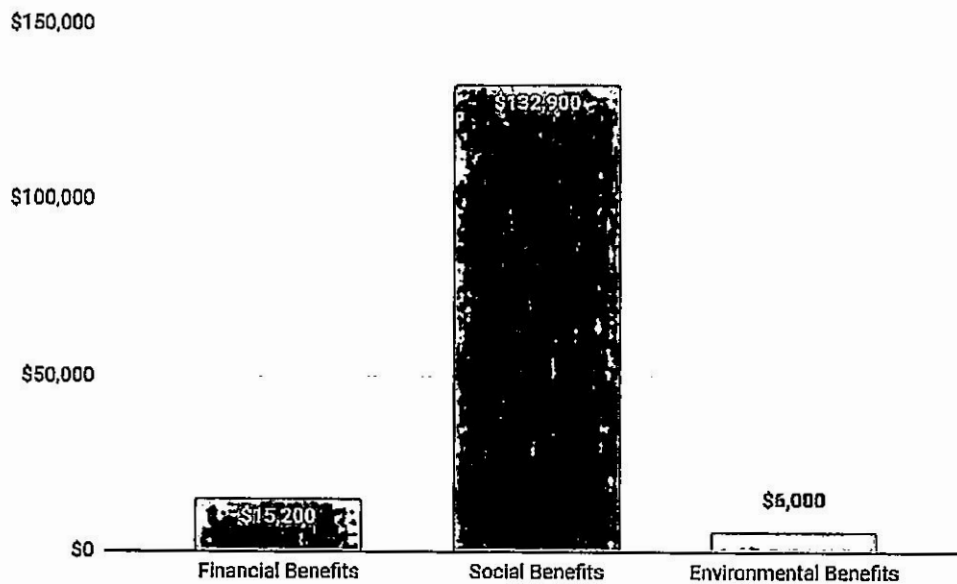
Using data provided by peer-reviewed literature, the Autocase tool was able to quantify the triple bottom line economic value of the cool roof policy intervention proposed by Miami-Dade and Broward Counties. Over a 25-year operational period, the new requirements would provide the following benefits for one prototypical 5,000 square foot commercial building with thermoplastic membrane roofing installed:

- Direct Financial Savings ("in pocket") of **\$15,200**
- Health & Social Benefits amounting to **\$132,900**
- Environmental Benefits of **\$6,000**
- Triple Bottom Line Total Economic Benefits estimated at **\$154,100** for one 5,000 square foot building.

The benefits of the proposed roofing policy would apply to more than one building in actuality. Therefore, if one assumes a hypothetical situation where the policy is applied to 500 commercial buildings, the lifetime benefits for this scenario could be extrapolated to \$77 million of economic value over 25 years for a pool of 500 prototypical 5,000 square foot commercial buildings with thermoplastic membrane roofing installed.

Triple Bottom Line Detailed Results

Figure 1: Net Present Value of Economic Impacts - Cool Roof SR: 5% to SR: 63% over 25 years (\$2021)



Financial Benefits: Lower electricity consumption through reduced cooling loads offered by the cool roof provides electricity bill savings estimated at \$15,200. Lower peak electricity demand also helps electric utility providers avoid expensive power purchases from other utilities on the open market.

Health & Social Benefits: Choosing a high reflective roof material will also reduce the surrounding ambient temperature of the building and benefit the community in terms of avoided heat related illnesses estimated at \$132,900.

Environmental Benefits: Lowering electricity consumption reduces the local climate and health impacts from carbon dioxide emissions and other air pollutants generated by the local electrical grid worth \$6,000 in combined total savings.

To better understand the cost impacts stemming from the proposed cool roof policy as compared to standard dark roof surfaces, the results are further segmented into respective low-slope roofing categories in Table 1 (below), along with the expected cost premiums for installing high reflective surfaces. This scenario is meant to capture the holistic triple bottom line economic impacts from mandating cool roofs with a SR value of 63%, as compared to a dark roof with a SR value of 5%.

High reflective roofing can have significant impacts on the operational costs of a building and has the potential to reduce cooling loads by 55%. For example, a building with a dark roof is expected to require 8.4 kBtu/ft² per year to cool the space, as compared to 3.7 kBtu/ft² per year if a cool roof with a SR of 63% was installed (Oak Ridge National Laboratory, 2020).

There was a positive return on investment for all three types of roofs analyzed (see Table 1). Even in the cases that a cool roof is slightly more costly upfront to install (as compared to dark roof surfaces), such additional expenditures are paid back through financial savings from electricity bills, reduced urban heat island effect, as well as by avoiding electrical grid related air pollution, including carbon emissions.

Most low slope commercial roofs currently use single-ply roof coverings such as Thermoplastic Polyolefin (TPO) and Polyvinyl Chloride (PVC), and other thermoplastic membrane roofing products which represent over 58% of new construction roof systems (NRCA, 2015), most of which already meet the proposed level of performance. Therefore, implementing this change will have no cost effect on single-ply roof projects. There are no cost premiums associated with these types of installations since a white or light colored surface can be chosen at no additional charge (U.S. Department of Energy, 2010) and these roofing materials are widely available.

Built-Up Roofs require an upgraded mineral surfaced cap sheet that increase material costs, resulting in an expected premium of \$0.50/ft². Modified Bitumen roofs that have an asphalt coating require a field applied coating on top of the asphaltic coating that has an expected cost premium of \$1.78/ft² (U.S. Department of Energy, 2010).

Table 1: Net Present Value (NPV) of Economic Impacts - Cool Roof SR: 5% to SR: 63% over 25 years (\$2021)

Category	Stakeholder	Impact	Built-Up Roof - Mineral surfaced cap sheet	Thermoplastic Membranes	Modified Bitumen - Asphalt coating
Financial	Owner	Upfront Capital Costs	-\$2,500	\$0	-\$8,900
Financial	Owner	Financial Savings from Electricity	\$15,200	\$15,200	\$15,200
Social	Community	Health - Heat Island Effect	\$132,900	\$132,900	\$132,900
Environmental	Community	Carbon Emission Reductions	\$4,000	\$4,000	\$4,000
Environmental	Community	Air Pollution Reductions	\$2,000	\$2,000	\$2,000
Financial Benefits			\$12,700	\$15,200	\$6,300
Social Benefits			\$132,900	\$132,900	\$132,900
Environmental Benefits			\$6,000	\$6,000	\$6,000
Triple Bottom Line Lifetime Benefits			\$151,600	\$154,100	\$145,200
Financial Return on Investment (ROI)			506.1%	N/A	70.2%

The built-up roof with a mineral surfaced cap sheet has a financial return on investment of 506.1% and a financial payback period of 5 years and 6 months, resulting in a total NPV/ft² of \$30.32/ ft².

Since the thermoplastic membranes do not have a cost premium, the return on investment and payback period cannot be calculated, however the total NPV/ft² for this roof type is \$30.82/ ft².

The modified bitumen with an asphalt coating has a financial return on investment of 70.2% and a financial payback period of 15 Years and 8 Months, resulting in a total NPV/ft² of \$29.04/ ft².

There is currently no minimum solar reflectance requirement in the Florida Building Code (FBC), as the prescriptive path is optional. The prescriptive path option of the FBC includes a SR value of 55%, which is considered to be the typical minimum cool roof requirement according to the U.S. Department of Energy (U.S. DOE, 2010). Since the policy proposes a marginal increase in the SR value to 63% (from a SR of 55%), there is no expected cost premium based on extensive research across available literature and industry sources, as reflected by the \$0 upfront capital cost line item in Table 2 (below).

The proposed cool roof policy, mandating a solar reflectance (SR) value of 63%, led to a lifetime triple bottom line value of \$23,620 in economic benefits over 25 years, when compared against the SR value of 55% included in the optional Florida Building Code prescriptive path.

Table 2: Net Present Value (NPV) of Economic Impacts - Cool Roof SR: 55% to SR: 63% over 25 years (\$2021)

Category	Stakeholder	Impact	Net Present Value (NPV)	\$ NPV / ft ²
Financial	Owner	Upfront Capital Costs	\$0	\$0.00
Financial	Owner	Financial Savings from Electricity	\$2,090	\$0.42
Social	Community	Health - Heat Island Effect	\$20,700	\$4.14
Environmental	Community	Carbon Emission Reductions	\$550	\$0.11
Environmental	Community	Air Pollution Reductions	\$280	\$0.06
Financial Benefits			\$2,090	\$0.42
Social Benefits			\$20,700	\$4.14
Environmental Benefits			\$830	\$0.17
Triple Bottom Line Lifetime Benefits			\$23,620	\$4.73

Appendix: Key Inputs & Assumptions

Basic Project Assumptions

This analysis assumes the prototypical commercial building to have a gross floor area of 5,000 ft².

This project has been evaluated over a 25 year operational period. In order to account for the time value of money, Autocase displays project results in terms of net present value, discounting all year-over-year impacts at a real discount rate of 3% with all results presented in 2021 dollars.

Inputs for Proposed Cool Roof Policy - SR: 5% to SR: 63%

Impact Category	Design Element	Baseline Building	Built-Up Roof - Mineral surfaced cap sheet	Thermoplastic Membranes	Modified Bitumen - Asphalt coating	Units
Roofing	Cost Premiums	\$0.00	\$0.50	\$0.00	\$1.78	\$/ft ²
Roofing	Solar Reflectance (SR)	5%	63%	63%	63%	SR
Roofing	Solar Reflectance Index (SRI)	5.5	76	76	76	SRI
Energy	Electricity Use Intensity (EUI) - Cooling Load	8.36	3.73	3.73	3.73	EUI (kBtu/ft ²)

Inputs for Proposed Cool Roof Policy - SR: 55% to SR: 63%

Impact Category	Design Element	Baseline Building	Cool Roof Proposal	Units
Roofing	Cost Premiums	\$0.00	\$0.00	\$/ft ²
Roofing	Solar Reflectance (SR)	55%	63%	SR
Roofing	Solar Reflectance Index (SRI)	65	76	SRI
Energy	Electricity Use Intensity (EUI) - Cooling Load	4.37	3.73	EUI (kBtu/ft ²)

External Research Conducted

To estimate the expected cost premiums from installing a roof with higher reflectivity, external research was conducted by leveraging government literature and contacting roofing industry professionals including the Royal American Management and Single Ply Roofing Industry (SPRI) organizations.

According to Senior Code Officers in the County, it is expected that built-up roofs require an upgraded energy performing cap sheet resulting in a 20% material cost increase for most projects.

Upfront capital costs for other roofing types were estimated from the guidelines for selecting cool roofs published by the U.S. Department of Energy (2010), which analyzed the cost premiums associated with installing a high reflective cool roof over a traditional dark roof surface. In addition, to inflate such cost estimates from 2010 dollars to 2021 dollars, the U.S. Bureau of Labor Statistics (BLS) (2021) was leveraged to estimate year-over-year increases in the expected cost of roofing materials.

Cooling load energy use estimates for operating the building with a dark roof and various cool roofs (SRs of 5%, 55%, and 63%) were collected from the Cool Roof Calculator released by the U.S. Department of Energy's Oak Ridge National Laboratory (2020) that outlined the expected amount of electricity required to operate and cool the building on an annual energy use intensity basis (kBtu/ft²).

To calculate the solar reflective indexes (SRIs) from the various solar reflectance values given by the project team, the SRI calculator from Lawrence Berkeley National Laboratory (2014) was used.

About Autocase

Autocase uses cost benefit analysis for translating economic impacts into triple bottom line metrics. Autocase believes in the contribution of economics, and specifically Triple Bottom Line Cost Benefit Analysis (TBL-CBA), to the optimal design of buildings and infrastructure. We have performed economic analyses for a multitude of private and public sector clients such as Pratt Whitney, Arup, Stantec, HOK, Corgan, Gensler, Burohappold Engineering, EPCOR Utilities, Dallas Fort Worth International Airport, Hartsfield-Jackson Atlanta International Airport, San Francisco International Airport, Port of Long Beach New York, City of San Antonio, City of Vancouver, Los Angeles County, and many more.

Learn more at: <https://autocase.com>

Autocase

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City of Miami



ASAFI ACF MARRERO, RA, RID, AIA, ICC
Building Director

ARTIUR NORIEGA, V
City Manager

January 13, 2022

Mr. Mo Madani
Florida Building Commission
2601 Blair Stone Road
Tallahassee, FL 32399-1027

Dear Mr. Madani,

The City of Miami supports proposed cool roof modifications to 2023 Florida Energy Conservation Code for Climate Zone 1A., as submitted to the Florida Building Commission by Broward County/Miami-Dade County BORA. The proposal will save money over the long-term for commercial building owners and tenants, help maintain comfortable indoor air temperatures for occupants, and reduce ambient air temperatures that endanger community health.

Tested and certified cool roof materials with the reflectance specifications contained in the proposal are widely available and typically cost no more than equivalent products with lower specifications. Even in those few circumstances where there might be a greater initial expense, it would be offset by cumulative savings from lower cooling costs over the long term. Cost savings in the southern region of Florida are multiplied greatly because cooling is needed year-round and little energy for heating is needed during winter. Cool roof materials also extend roof service life, generating further savings to property owners.

We also support these "cooler" roof code changes because heat issues are becoming a serious public health concern in Climate Zone 1A. The proposed code changes will ensure that more solar energy is reflected away from heat-retaining concrete and asphalt in our community's built environment. By retaining and emitting heat, these materials can significantly raise ambient heat levels across the landscape and heat-related health risks to residents, especially outdoor workers and people without sufficient air conditioning or ventilation. Studies have shown that cool roofs can reduce average urban heat intensity by approximately 23% and have the potential to limit dangerous extreme temperatures during heatwaves.

The Florida Building Code exists to ensure the general welfare, health, and safety of building inhabitants and surrounding communities. The proposed code modifications advance these goals and will provide meaningful economic and public health benefits. For these reasons, we support the proposed Cool Roof modifications to the 2023 Energy Conservation Code for Climate Zone 1A.

Yours sincerely,

Maurice Pons,
Building Official
City of Miami Building Department

cc: Broward County Board of Rules and Appeals, James DiPietro (JDIPietro@broward.org)
Miami-Dade County Board and Code Administration Division, Jaime Gascon (Jaime.Gascon@miamidade.gov)

BUILDING DEPARTMENT/ P.O. Box 330708 / Miami, FL 33233-0708 / (305) 416-1100



BROWARD COUNTY
Board of Rules & Appeals
 ONE NORTH UNIVERSITY DRIVE, SUITE 3500-B, PLANTATION, FLORIDA 33324
 PHONE (954) 765-4500 FAX: (954) 765-4504
<http://www.broward.org/codeappeals>


To: Mo. Madani, Technical Director, DBPR Building Codes and Standards Office
From: James Dipietro
Date: January 19, 2022
RE: Miami Dade County "Cool Roof" Code Modification Proposal

Please accept this letter from staff as an endorsement of the proposed "cool roof" modification to 2023 Florida Energy Conservation Code for Climate Zone 1A, as submitted to the Florida Building Commission by Miami-Dade County BORA.

Since 1999, several widely used building energy-efficiency standards, including ASHRAE 90.1, ASHRAE 90.2, the International Energy Code, and California's Title 24 have adopted cool-roof credits or requirements. Manufacturers have invested many hours doing research, development, and testing, of these products, and they are now easily obtained from all the major suppliers.

Over the last 20 years the FECC has increased the minimum efficiency standards for windows, doors, skylights, air conditioners, water heaters, and lighting fixtures. Sadly, the codes have basically ignored the great benefits of energy efficient roofing product materials by not setting minimum standards. Many designers are now aware of these benefits and are specifying these products on new commercial buildings because of the significant long-term savings. As code officials, we must set minimum standards for construction materials and cannot ignore the cost savings and benefits of using a "cool roof" roofing product anymore. These cost savings in Broward County Florida are multiplied greatly because cooling is needed year-round and little energy for heating is needed during winter. Cool roof materials also extend roof service life, generating further savings to property owners.

The Florida Building Code exists to ensure the general welfare, health, and safety of building inhabitants and surrounding communities. The proposed code modifications advance these goals and will provide meaningful economic and public health benefits. For these reasons, we support the proposed Cool Roof modifications to the 2023 Energy Conservation Code for Climate Zone 1A.

Respectfully,

 James Dipietro
 Administrative Director
 Broward County Board of Rules and Appeals
 jdipietro@broward.org 954-765-4500 ext. 9892

Business & Professional Regulation

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Proposed Code Modifications

Business & Professional Regulation > Registration & Fees > License Renewal > License Renewal > License Renewal > General Comment Detail

* Required fields

No. Modification	EN9903-G10
Name	Estela Test
Address	8530 SW 117 Avenue Suite 123
City	Miami
State	FL
Zip Code	33163
Email	estelatest@post.health.net
Primary Phone	(785) 643-6171
Alternate Phone	(785) 554-6912
Fax	
Code Change Type	2025 Triennial First Comment Period (01/01/2022 - 04/27/2022)
Code Version	2023
Code Code	Energy Conservation
Chapter & Topic Section	Chapter 3 - [REDACTED] - General Requirements 303.2.5

Status Pending DOP Review

General Comment
I am in support of the proposed modification EN9903 for additional commercial cool roof requirements. The supporting documents and data validates that this change will support reducing energy and decrease in reduction of operating expenses while providing enhanced safety and health benefits.

[Upload Comment File](#)

Date Submitted 04/14/2022

Department of Development Services
Building Division



tel: 954.921.3335
fax: 954.921.3037

January 5, 2022

Mr. Mo Madani
Florida Building Commission
2601 Blair Stone Road
Tallahassee, FL 32399-1027

Dear Mr. Madani,

The City of Hollywood supports the proposed cool roof modifications to 2023 Energy Conservation Code for Climate Zone 1A, as submitted to the Florida Building Commission by Miami-Dade County. The proposal will save money over the long-term for commercial building owners and tenants, help maintain comfortable indoor air temperatures for occupants, and reduce outdoor ambient air temperatures that endanger community health.

Cool roof materials with the reflectance specifications contained in the proposal are widely available and typically cost no more than equivalent products with lower specifications. Even in those few circumstances where there might be a greater initial expense, it would be offset by cumulative savings from lower cooling costs over the long term. Cool roof materials also extend roof service life, generating further savings to property owners.

We also support these "cooler" roof code changes because heat issues are becoming a serious public health concern in Climate Zone 1A. The proposed code changes will ensure that more solar energy is reflected away from heat-retaining concrete and asphalt in our community's built environment. By retaining and emitting heat, these materials can significantly raise outdoor ambient heat levels across the landscape and increase heat-related health risks to residents, especially outdoor workers and people without sufficient air conditioning or ventilation. Studies have shown that cool roofs can reduce average urban heat intensity by approximately 23% and have the potential to limit dangerous extreme temperatures during heatwaves.

The Florida Building Code exists to ensure the health and safety of building inhabitants and surrounding communities and to support cost-effective maintenance and operation of structures. The proposed code modifications advance these goals and will provide meaningful economic and public health benefits. For these reasons, we support the proposed Cool Roof modifications to 2023 Energy Conservation Code for Climate Zone 1A.

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DEPARTMENT OF DEVELOPMENT SERVICES
CITY OF POMPANO BEACH
BUILDING INSPECTIONS DIVISION
100 West Atlantic Boulevard – Room 360

Date: November 23, 2021
To: Broward County Board of Rules and Appeals
From: Michael Rada, Building Official
Subject: Energy Conservation Code Modification

Gentlemen.

Thank you for the opportunity for our Building Department to opine on the proposed modification to the Energy Conservation Code.

The municipality of the City of Pompano Beach has a current population of over 100,000 residents. We have districts of Commercial, Industrial and Residential use throughout our City and are experiencing very aggressive growth in all aspects of construction.

Our Leadership has maintained a progressive vision of sustainability for all future development within our City.

We believe the proposed modification to the Energy Conservation Code to adopt an increase in solar reflectance for all new Commercial roofs would have a huge impact on limiting greenhouse emissions and overall energy consumption.

We sincerely appreciate your consideration for allowing the City of Pompano Beach to support your endeavor.

Respectfully.

Michael Rada, Building Official
City of Pompano Beach



Mr. Mo Modani
Florida Building Commission
2601 Blair Stone Road
Tallahassee, FL 32399-1027

February 4, 2022

Dear Mr. Modani,

The City of Fort Lauderdale supports proposed “cool roof” modifications to the **Energy Conservation volume** of the 2023 **Florida Building Code (FBC)**, for Climate Zone 1A, as submitted to the Florida Building Commission by the Broward County Board of Rules and Appeals (Broward BORA). The proposal will save money over the long term for commercial building owners and tenants, help maintain a comfortable interior environment for occupants and reduce ambient air temperatures that present challenges to community health and well-being.

Tested and certified cool roof materials with the reflectance specifications contained in the proposal are widely available. Typically, their costs are equal to materials with lower specifications. In the case where there might be a greater initial installation expense, cumulative savings due to lower cooling costs would offset the installation costs over the long term.

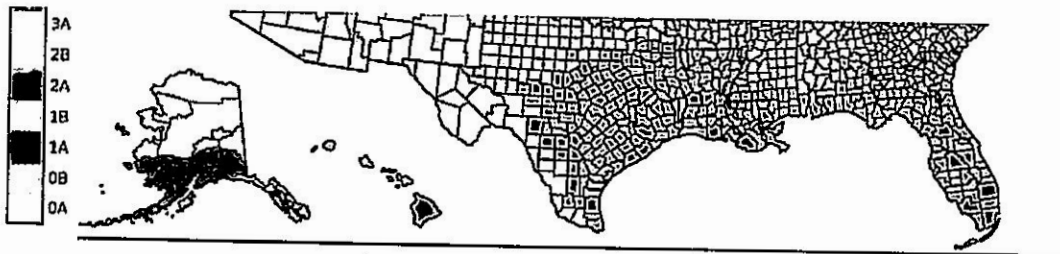


Figure A-2 Climate Zones for United States Counties

As seen in the portion of Figure A-2 above, from **ASHRAE 169-2020 - Climatic Data for Building Design Standards**, South Florida is identified as Climate Zone 1A. Cool roof cost savings in this southern region of Florida are multiplied because cooling is needed throughout the year, and energy use for heating interior environments is very limited during the winter. Cool roof materials are also very durable, extending the roof service life, thus generating greater savings to building owners, due to the life expectancy of the materials.

The City of Fort Lauderdale further supports these “cool roof” changes because climate change has affected the number of days that record temperatures greater than 90 degrees occur, during the year. These increased periods of high temperatures are becoming a serious public health concern in our Climate Zone. The proposed Code change will ensure that more solar energy is reflected away from heat retaining sources such as conventional materials that are used in roof construction. Conventional roofing materials, which retain and emit heat, can significantly affect ambient heat levels across the landscape and present heat related health risks to residents and tenants, while they are outdoors, or to those



who are without sufficient air conditioning or ventilation. Studies have shown that cool roof installations can reduce urban heat intensity by more than 20% and can help limit extreme temperatures during heatwaves.

Our Florida Building Code (FBC) was formulated by a Florida Building Code Study Commission, during the term of former Governor Lawton Chiles, in 1998. It became an adopted Code in Statute 553, in 2001. It was created and tailored to ensure the general welfare, health and safety of communities and building inhabitants in the State of Florida. The proposed Code modifications advance these goals and would provide recognizable economic and health benefits to the public who live, work and visit the State of Florida. For these reasons, the City of Fort Lauderdale supports the proposed "cool roof" modifications to the 2023 **Energy Conservation Volume** of the FBC.

Sincerely,

John T. Travers, CBO, CFM, BU1315
Building Official
Building Services Division of Development Services Department
City of Fort Lauderdale, Florida

Cc: Broward County Board of Rules and Appeals, James Dipietro (JDipietro@broward.org)
Miami-Dade County Board and Code Administration Division, Jaime Gascon (Jaime.Gascon@miamidade.gov)
Development Services Department Director, Anthony Fajardo (AFajardo@fortlauderdale.gov)

Item 3: BORA Commercial Energy Guidelines

BORA Commercial Energy Guidelines

Broward County Board of Rules and Appeals

Energy Conservation Seventh Edition (2020)



FBC Seventh Edition (2020),
Effective xxxxxxxxxxxxxxxxxxxx
For Energy Conservation
Committee approval
Draft #2

Table of Contents

<u>Section</u>	<u>Page</u>
Title Page	1
Table of Contents	2
Overview	3
Building Code Administrators Checklist	4
Building/Structural Checklist	5-6
Mechanical Checklist	7-8
Plumbing Checklist	
Electrical Checklist	
Appendix A (Compliance Pathway Form)	9
Appendix B (Compliance Review Form)	10
Appendix C (Fenestration Submittal Form)	11-12
Appendix D (Fenestration Chart for Untested Windows)	13

Overview

To obtain uniform energy code enforcement in commercial buildings in Broward County, the Energy Conservation Committee has developed guidelines to aid jurisdictions in determining which discipline specific code official enforces certain sections of the 2020 Florida Building Code Energy Conservation.

The following code sections regarding enforcement duties are as stated:

R103.3 & C103.3 Examination of documents.

The code official shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

R103.3.1 & C103.3.1 Approval of construction documents.

When the code official issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance."

R104.1 & C104.1 General

Construction or work for which a permit is required shall be subject to inspection by the code official or his or her designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until approved.

Basis for the Guidelines:

The Florida Building Code Seventh Edition (2020) Energy Conservation for new and existing buildings has designated that the code official is responsible for both the construction document approval and construction inspection approval.

Unfortunately, the Florida Building Code Energy Conservation administrative chapters do not designate which discipline-specific code official will review compliance documents and building plans and inspect specific items for code compliance found in the Energy Conservation Code.

The "building official" or "code official" for energy code purposes shall be defined as: "The officer or other designated authority having jurisdiction charged with the administration and enforcement of this standard or a duly authorized representative."

Broward County is unique in that we have individual certified plan review and inspection personnel for each discipline and that a multi-discipline code official is not the norm. Subsequently, uniformity has been lacking in the enforcement of the energy code which created confusion by code officials over which specific disciplines will enforce certain provisions of the code.

This guide can be used as a tool for the Building Official to determine which discipline-specific code official will review and inspect specific sections of the Energy Code for code compliance to address those issues. This guide shall not prevent any certified code official from issuing a correction notice for any Energy Code deficiency found in another discipline if they notify the Chief inspector of that discipline of the correction notice.

***This is a minimum checklist. The local AHJ may have additional checklist items. ***

BORA ENERGY GUIDELINES
Building Code Administrators Checklist

Plan Review

- | | <u>Code Section</u> |
|--|---|
| <input type="checkbox"/> 1. The <u>building official shall appoint</u> a code official to verify that all disciplines have reviewed the plans and the code compliance report for energy code compliance. This code official shall sign the code compliance report stating that the plans have been reviewed by all disciplines and the plans will be inspected according to the FECC. The building department may use " Appendix B " as a compliance tool. | C103.3
C103.3.1
FS. 553.908
*4.2.2 |
| <input type="checkbox"/> 2. The <u>building official shall ascertain</u> the commercial energy compliance pathway chosen by the designer and the energy credits taken upon application for permit. The " BORA Energy Compliance Pathway Form " found in " Appendix A " may be used for compliance. | C401.2
*4.2.1.1 |
| <input type="checkbox"/> 3. The <u>building official shall provide</u> all plan reviewers access to " ASHRAE Standard 90.1-2016 " if the designer chooses the ASHRAE 90.1 pathway for code compliance. Code references with an *asterisk correspond with like code references in ASHRAE 90.1-2016. | C401.2 #1 |

Certificate of Occupancy

- | | <u>Code Section</u> |
|--|--|
| <input type="checkbox"/> 1. Buildings which require commissioning according to section C408.2 <u>shall not be considered acceptable for final inspection</u> pursuant to Section C104.3 until the code official has received a letter of transmittal from the building owner acknowledging that the building owner or owner's authorized agent has received the preliminary commissioning report." "The code official may require a review of the preliminary commissioning report before final inspection to identify deficiencies found during testing that violate the code. | C408.2.4
*4.2.5
*4.2.5.1
C408.2.4.1
C408.2.4.2 |
| <input type="checkbox"/> 2. <u>Construction documents shall specify</u> that documents required by Section C408 be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the certificate of occupancy. | C408.3.2
C408.2.5
*4.2.2.3 |

BORA ENERGY GUIDELINES

BORA Structural Checklist

<u>Plan Review (General)</u>	<u>Code Section</u>
<input type="checkbox"/> 1. Existing buildings shall be classified as exempt, except those buildings defined as “ renovated buildings ”, in which the total work exceeds 30% of the value of structure. Buildings which have a change of occupancy type or unconditioned buildings to which comfort cooling is added are not exempt. Buildings specified in Sections C101.4.2.1 thru C101.4.2.4 are exempt.	C101.4.2 *4.2.1.3 *4.4.1.5
<input type="checkbox"/> 2. An existing building or portion thereof shall not be altered to become less energy efficient.	EBC701.2
<input type="checkbox"/> 3. The designer of record shall provide a complete energy compliance report (Energy Calc’s) from specific computer software approved by the Florida Building Commission and show “Pass” for the thermal envelope, interior lighting, exterior lighting, mechanical and plumbing.	C101.5.1 *4.2.2
<input type="checkbox"/> 4. The input data report from the approved software shall be generated simultaneously with the compliance report to verify each entry into the software.	C407.4.2.2 *4.2.2
<input type="checkbox"/> 5. The code official shall have the authority to approve a permit for part of the entire energy conservation system (such as a shell permit). Adequate information and detailed statements listing all code requirements must be submitted with this permit. The permit holder shall proceed at their own risk without assurance that the permit to complete will be granted. All spaces inside buildings shall be considered as “ conditioned spaces ” at time of construction regardless of equipment installed unless approved by building official.	C103.3.3 *4.2.2 *5.1.2.3
<input type="checkbox"/> 6. The designer of record shall specify the compliance pathways. “ Appendix A ” may be utilized.	C103.2 *4.2.1
<input type="checkbox"/> 7. The design professional responsible for the design of the building “ thermal envelope/shell ” shall certify compliance with the code by signing the energy code compliance form.	C103.1.1.1.2
<input type="checkbox"/> 10. The plans shall show in detail all the pertinent energy data and features of the building including but not limited to: a) Insulation materials and their R-values b) Fenestration U-factor, solar heat gain coefficient, (SHGC) and visible transmittance (VT) shall be shown. “ Appendix C ” may be used for compliance. c) Air leakage sealing details	C103.2 *4.2.2.1 *5.4.1 *5.4.2 *5.4.3
<input type="checkbox"/> 11. The entire building thermal envelope shall be designed and constructed with a continuous air barrier and shall be clearly identified on the construction documents.	C402.5.1 *5.4.3
<input type="checkbox"/> 12. The U-factor, SHGC, VT, and air leakage rate for all manufactured fenestration products shall be determined by an accredited, independent laboratory and certified and labeled by the manufacturer or given default values in the tables. “ See Appendix C ”	C303.1.3 *5.4.2
<input type="checkbox"/> 13. Roof insulation (as part of the envelope) shall not be located on a suspended ceiling with removable ceiling panels. (Insulation installed for sound and not part of envelope is allowed.)	C402.2.3 *5.8.1.8
<input type="checkbox"/> 14. Where unsealed or vented cavities occur over conditioned spaces, the ceiling shall be considered the pressure envelope of the building. Ceilings with drywall may be an air barrier but dropped acoustical tile ceilings (T-bar) may not. (See air barrier definition)	C402.5.9 C202 *5.4.3
<input type="checkbox"/> 15. Blown or loose fill insulation shall not be used in attic roof (ceiling slope) spaces in slopes greater than three in twelve. Baffling of eave vents are required to deflect incoming air.	*5.8.1.3 *5.8.1.4
<input type="checkbox"/> 16. Weatherseals shall be installed on all loading dock/cargo doors for separating conditioned space from unconditioned space. “ See Table C402.5.2 ”	C402.5.4 C402.5.6

BORA ENERGY GUIDELINES

BORA Structural Checklist

Plan Review (Prescriptive)

	<u>Code Section</u>
<input type="checkbox"/> 1. “Cool Roofs” Low-sloped roofs directly above cooled conditioned spaces in Climate Zones 1a shall have a minimum three-year solar reflectance of .55 and thermal emittance of 0.75 or a three-year solar-reflectance index (SRI) of 64.	C402.3 *5.5.3.1.1
<input type="checkbox"/> 2. The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall be as specified in Table C402.4. The Projection Factors (Overhangs) shall be calculated.	C402.4 *Table 5.5-1
<input type="checkbox"/> 3. The vertical fenestration area shall not be greater than 30% of the gross above grade wall area. Vertical fenestration may be increased to 40% per requirements of C402.4.1.1	C402.4.1 *5.5.4.2
<input type="checkbox"/> 4. Maximum skylight areas shall be 3% of the gross roof area and can increase to 6% when daylight responsive controls are provided in daylight zones that are under skylights that comply with C405.2.3.1	C402.4.1 C402.4.1.2. *5.5.4.2.2
<input type="checkbox"/> 5. Minimum skylight areas shall apply to specified conditioned and unconditioned spaces greater than 2500 sq. ft. when ceiling heights are greater than 15ft. (See exceptions)	C402.4.2 *5.5.4.2.
<input type="checkbox"/> 6. Skylight curbs shall be insulated to the level of roofs with insulation above deck or R-5 except when tested per NFRC 100	C402.2.2 *5.5.3.1
<input type="checkbox"/> 7. The minimum R-value of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3	C402.2.2 *5.5.3.1
<input type="checkbox"/> 8. Opaque doors shall meet the thermal requirements specified in the tables. *5.5.3.6 or	C402.4.5
<input type="checkbox"/> 9. Plans, specifications, and /or calculations provide all information with which compliance can be determined for the mandatory selection of one (1) of the efficiency package options .	C406

Plan Review (Performance)

	<u>Code Section</u>
<input type="checkbox"/> 1. The roof or ceiling that functions as the thermal envelope shall be insulated to at least R-10. Multifamily Residential roof/ceilings shall be insulated to a minimum of R-19 space permitting	C407.2.1
<input type="checkbox"/> 2. Building types and thermal blocks shall be accurately identified on the compliance report and shall not be combined unless they share the same features. The code official shall be permitted to require thermal zone diagrams consisting of floor plans showing each zone.	C407.5.2 C405.3.2 (1) C407.4.2.1
<input type="checkbox"/> 3. Multifamily residential spaces (dwelling unit) may be combined into one thermal block if they share the same orientation, wall, roof and floor loads that share the same features.	C407.5.2.3 *App.G3.1(9)

Rough Inspection

	<u>Code Section</u>
<input type="checkbox"/> 1. Insulation shall be installed to manufacturers recommendations in a manner as to achieve the rated R-value. Insulation shall be labeled with R-value or a certificate providing R-value shall be provided.	C303.2 *5.8.1.2
<input type="checkbox"/> 2. A label shall be affixed to the window showing the tested U-Value, SHGC, and VT. Products lacking such a label shall be given the default values in tables C303.1.3. Installed vertical fenestration values shall be consistent with the specifications submitted with the plans.	C104.2.2 C303.1.3 *5.9.1.4
<input type="checkbox"/> 3. The entire building thermal envelope shall be constructed with a continuous air barrier.	C402.5.1 *5.9.1

Final Inspection

	<u>Code Section</u>
<input type="checkbox"/> 1. The building envelope components and assemblies shall be inspected for air leakage. When testing is specified, an independent third party shall test air leakage to ≤ 0.40 cfm/ft ² .	C402.5 *5.4.3.1.3

BORA ENERGY GUIDELINES

BORA Mechanical Checklist

<u>Plan Review (General)</u>	<u>Code Section</u>
<input type="checkbox"/> 1. Existing buildings shall be classified as exempt, except those buildings defined as “ renovated buildings ”, in which the total work exceeds 30% of the value of structure. Buildings which have a change of occupancy type or unconditioned buildings to which comfort cooling is added are not exempt. Buildings specified in Sections C101.4.2.1 thru C101.4.2.4 are exempt.	C101.4.2 *4.2.1.3 *4.1.1.5
<input type="checkbox"/> 2. An existing building or portion thereof shall not be altered to become less energy efficient.	EBC701.2
<input type="checkbox"/> 3. The designer of record shall provide a complete energy compliance report from specific computer software approved by the Florida Building Commission and show “Pass” for . envelope, interior lighting, exterior lighting, mechanical and plumbing.	C101.5.1 *4.2.2
<input type="checkbox"/> 4. The input data report from the approved software shall be generated simultaneously with the compliance report to verify each entry into the software.	C407.4.2.2 *4.2.2
<input type="checkbox"/> 5. The code official shall have the authority to approve a permit for part of the entire energy conservation system (such as a shell permit). Adequate information and detailed statements listing all code requirements must be submitted with this permit. The permit holder shall proceed at their own risk without assurance that the permit to complete will be granted. All spaces inside buildings shall be considered as “ conditioned spaces ” at time of construction regardless of equipment installed unless approved by building official.	C103.3.3 *4.2.2 *5.1.2.3
<input type="checkbox"/> 6. The design professional responsible under Florida law for the design of the mechanical systems shall certify compliance with the code by signing the energy code compliance form.	C103.1.1.1.2
<input type="checkbox"/> 7. The plans shall show in detail all the pertinent energy data and features of the mechanical systems and equipment. Details shall include but not limited to: a) Mechanical system design criteria b) Mechanical system and equipment types, sizes and efficiencies c) Economizer description d) Equipment and system controls e) Fan motor horsepower (hp) and controls f) Duct sealing, duct and pipe insulation and location	C103.2 *4.2.1 *4.2.2
<input type="checkbox"/> 8. Design heating and cooling loads shall be in accordance with ANSI/ASHRAE/ACCA Std. 183 or ACCA Manual N or an approved equivalent and shall be attached to the compliance form. A signed and sealed summary sheet designed by a registered engineer may be submitted in lieu of the complete calculation but must show the required information.	C403.2.1 *6.4.2.1
<input type="checkbox"/> 9. The output capacity of the cooling and heating equipment shall not be greater than the loads calculated. Standby/Backup equipment and duplicate sequenced systems are exempt.	C403.2.2
<input type="checkbox"/> 10. HVAC equipment shall meet the minimum efficiency requirements in Tables C403.2.3 and shall be verified through certification by an approved program or equivalent.	C403.2.3 *6.4.1
<input type="checkbox"/> 11. Specific HVAC system controls shall be provided for temperature, setpoint overlap, off hour controls, shutoff dampers, fan control, economizers, VAV systems.	C403.2.4 *6.4.3
<input type="checkbox"/> 12. AMCA-500D tested, labeled, and approved motorized or gravity shutoff dampers shall be provided on outdoor air intakes and exhaust openings.	*C403.2.4.3 *6.4.3.4.2

BORA ENERGY GUIDELINES
BORA Mechanical Checklist

Plan Review (General Cont.)

Code Section

- 1.

- 2.

- 3.

- 4.

- 5.

- 6.

- 7.

- 8.
- 9.

Plan Review (Performance)

Code Section

- 1.

- 2.

Rough Inspection

Code Section

- 1.

- 2.

- 3.

Final Inspection

Code Section

- 1.

APPENDIX A

PROJECT ADDRESS _____ PERMIT NUMBER _____

TYPE OF CONST. NEW CONST. *ADDITION *RENOVATED BLDG. *CHANGE OF OCCUPANCY
**Additions, alterations, repairs, and changes in occupancy to existing buildings shall comply with Chapter 5*

Florida Energy Conservation Code Compliance Options

Select One pathway below:

- | | |
|---|-------------------------------|
| <input type="checkbox"/> Option 1) <u>ANSI/ASHRAE/IESNA 90.1</u> excluding Section 9.4.1(g), 8.4.2, & 8.4.3 (2016 Version) | Code Section
C401.2 |
| <input type="checkbox"/> Option 2) <u>Prescriptive Method</u> complying with Sections C402 thru C406 & C408.
Tenant spaces shall also comply with C406.1.1 | C401.2 #1
C401.2 #2 |
| <input type="checkbox"/> Option 3) <u>Performance Method</u> complying with Section C407 and the mandatory provisions listed in C407.2 including C402.5, C403.2, C404, C405.2, C405.4, C405.5, and C408. | C401.2 #3 |

Option #1 ANSI/ASHRAE/IESNA 90.1 (2016 Version)

Select One pathway below:

- | | |
|--|----------------------|
| <input type="checkbox"/> 1) *Prescriptive Method complying with Section 5 thru Section 9 | 4.2.1 |
| <input type="checkbox"/> 2) Energy Cost Budget Method complying with Section 11 | 4.2.1.1a
4.2.1.1b |
| <input type="checkbox"/> 3) Performance Rating Method complying with Appendix G | 4.2.1.1c |
| *Envelope Path <input type="checkbox"/> 1) Prescriptive Building Envelope Option <input type="checkbox"/> 2) Building Envelope Trade-Off Option | 5.2.1 a or b |

Option #2 Prescriptive Method

Select One from each section below:

- | | |
|--|-----------------------|
| Envelope Select One | Code Section |
| <input type="checkbox"/> 1. Insulation Component R-Value method. (Table C402.1.3) | C402.1 #1
C402.1.3 |
| <input type="checkbox"/> 2. Assembly U-Factor, C-Factor, or F factor-based method (Table C402.1.4) | C402.1.4 |
| <input type="checkbox"/> 3. Component performance alternative in lieu of Table C402.1.4 above. | C402.1.5 |
| Mandatory Lighting Controls Select One | C405.2 |
| <input type="checkbox"/> 1. Lighting Controls per C405.2.1 through C405.2.6 | C405.2 #1 |
| <input type="checkbox"/> 2. Luminaire Level Lighting Controls and compliance with C405.2.1; C405.2.4 and C405.2.5 | C405.2 #2 |
| Interior Power Lighting Allowance Select One | C405.3.2 |
| <input type="checkbox"/> 1. Building Area Method per C405.3.2.1 <input type="checkbox"/> 2. Space by Space Method per C405.3.2.2 | C405.4.2 |
| Exterior Lighting Zone Area Type Select One | C405.4.2 |
| <input type="checkbox"/> #1 Park & Rural <input type="checkbox"/> #2 Residential <input type="checkbox"/> #3 Other than 1, 2, 4 <input type="checkbox"/> #4 High Activity Commercial | C406.1 |
| Efficiency Package Select One | C406.2 |
| <input type="checkbox"/> More efficient HVAC performance | C406.3 |
| <input type="checkbox"/> Reduced lighting power density | C406.4 |
| <input type="checkbox"/> Enhanced digital lighting controls | C406.5 |
| <input type="checkbox"/> Onsite renewable energy | C406.6 |
| <input type="checkbox"/> Dedicated outdoor air system | C406.7 |
| <input type="checkbox"/> Reduced energy use in service water heating | C406.7 |

Option #3 Performance Method*

Mandatory Lighting Controls Select One

- | | |
|--|-------------------------------|
| <input type="checkbox"/> 1. Lighting Controls per C405.2.1 through C405.2.6 | Code Section
C405.2 |
| <input type="checkbox"/> 2. Luminaire Level Lighting Controls and compliance with C405.2.1; C405.2.4 and C405.2.5 | C405.2 #1
C405.2 #2 |
| Optional Credits | C407.5.2.4 |
| <input type="checkbox"/> Vegetative Roofs | C407.5.2.4.1 |
| <input type="checkbox"/> Enthalpy Recovery Ventilation | C407.5.2.4.2 |

**The building energy cost shall be equal to or less than 85% of the standard reference design of the building.*

DESIGN PROFESSIONAL NAME _____

SIGNATURE _____



APPENDIX B

COMMERCIAL ENERGY CODE COMPLIANCE REVIEW FORM

PERMIT # _____ ADDRESS _____

A review of the plans and specifications covered by this compliance report indicates compliance with the _____ Florida Energy Conservation Code.

<u>DISCIPLINE</u>	<u>NAME</u>	<u>SIGNATURE</u>	<u>DATE</u>
STRUCTURAL			
MECHANICAL			
PLUMBING			
ELECTRICAL			

APPENDIX C

Commercial Fenestration Product Rating Submittal Form

In accordance with of the Florida Energy Conservation Code C303.1.3, this form can be used as a tool for the submittal process to document the proposed energy product rating for windows, doors, and skylights.

Recommended for Review:

- Copy of the approved input report report from the Energy Calculations showing each fenestration design rating (U-value, SHGC and VT) for all fenestration in the entire building.
- A list of the NFRC “Certified Product Directory” number of each window showing the U-Value, SHGC and VT on the attached form. These numbers may be found on the NFRC website:
<https://search.nfrc.org/search/searchDefault.aspx>

Notes:

- Products not listed in the NFRC directory shall be tested by an accredited, independent laboratory in accordance with FECC C303.1.3. Products not tested and lacking certification and labeling shall be assigned a default rating from the energy tables.
- Products submitted that do not match the approved Energy Calculations shall require a revised energy compliance report or window submittal per FECC C103.4

<u>Window #</u>	<u>*NFRC Directory Number</u>	<u>Description</u>	<u>U-Value</u>	<u>SHGC</u>	<u>VT</u>
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

<u>Window #</u>	<u>*NFRC Directory Number</u>	<u>Description</u>	<u>U-Value</u>	<u>SHGC</u>	<u>VT</u>
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
31					
33					
34					
35					
36					
37					
38					

*Products not certified by NFRC must submit **“Thermal Simulation Report”** or use **“Default Table”** below.

APPENDIX D

TABLE C303.1.3(1)
DEFAULT GLAZED FENESTRATION U-FACTORS

<u>FRAME TYPE</u>	<u>SINGLE PANE</u>	<u>DOUBLE PANE</u>	<u>SKYLIGHT</u>	
			<u>SINGLE</u>	<u>DOUBLE</u>
<u>Metal</u>	<u>1.20</u>	<u>0.80</u>	<u>2.00</u>	<u>1.30</u>
<u>Metal with Thermal Break</u>	<u>1.10</u>	<u>0.65</u>	<u>1.90</u>	<u>1.10</u>
<u>Nonmetal or Metal Clad</u>	<u>0.95</u>	<u>0.55</u>	<u>1.75</u>	<u>1.05</u>
<u>Glazed Block</u>	<u>0.60</u>			

TABLE C303.1.3.(2)
DEFAULT OPAQUE DOOR U-FACTORS

<u>DOOR TYPE</u>	<u>U-FACTOR</u>
<u>Uninsulated Metal</u>	<u>1.20</u>
<u>Insulated Metal (Rolling)</u>	<u>0.90</u>
<u>Insulated Metal (Other)</u>	<u>0.60</u>
<u>Wood (Other)</u>	<u>0.50</u>
<u>Insulated, nonmetal edge, max 45% glazing.</u>	<u>0.35</u>
<u>Any glazing double pane</u>	<u>0.35</u>

TABLE C303.1.3 (3)
DEFAULT WINDOW, GLASS DOOR, AND SKYLIGHT SHGC AND VT

	<u>SINGLE GLAZED</u>		<u>DOUBLE GLAZED</u>		<u>GLAZED BLOCK</u>
	<u>CLEAR</u>	<u>TINTED</u>	<u>CLEAR</u>	<u>TINTED</u>	
<u>SHGC</u>	<u>.08</u>	<u>.07</u>	<u>.07</u>	<u>.06</u>	<u>.06</u>
<u>VT</u>	<u>.06</u>	<u>.03</u>	<u>.06</u>	<u>.03</u>	<u>.06</u>