





# International Energy Conservation Code: 2021 Changes, Getting Involved in the 2024 Process







#### Michael Ivanovich

Sr. Director, Global Affairs, AMCA International *Webinar Moderator* 

- Joined AMCA July 2011
- Coordinates advocacy efforts in N. America, Asia, Europe, and Middle East
- Leads AMCA energy efficiency initiatives involving codes, standards and regulations
- Voting member of ASHRAE 90.1 Mechanical Subcommittee









#### **Introductions & Guidelines**

- Participation Guidelines:
  - Audience will be muted during the webinar.
  - Questions can be submitted anytime via the GoToWebinar platform and will be addressed at the end of the presentation.
  - Reminder: This webinar is being recorded!
  - The presentation PDF & resource documents available in the Handouts section of the control panel.
  - To earn PDH or CEU credit for today, please stay clicked onto the webinar for the entire hour.
  - A post-webinar evaluation will be emailed to everyone one hour after today's broadcast, and it <u>must</u> be completed to qualify for PDH credit.







#### Q & A

#### To submit questions:

- From the attendee panel on the side of the screen, select the "Questions" drop down option.
  - Type your question in the box and click "Send".

- Questions will be answered at the end of the program.







AMCA International has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

Attendance for the entire presentation AND a completed evaluation are required for PDH credit to be issued.









#### **DISCLAIMER**

The information contained in this webinar is provided by AMCA International as an educational service and is not intended to serve as professional engineering and/or manufacturing advice. The views and/or opinions expressed in this educational activity are those of the speaker(s) and do not necessarily represent the views of AMCA International. In making this educational activity available to its members and others, AMCA International is not endorsing, sponsoring or recommending a particular company, product or application. Under no circumstances, including negligence, shall AMCA International be liable for any damages arising out of a party's reliance upon or use of the content contained in this webinar.







#### **COPYRIGHT MATERIALS**

This educational activity is protected by U.S. and International copyright laws. Reproduction, distribution, display and use of the educational activity without written permission of the presenter is prohibited.

© AMCA International 2021







#### **TODAY'S PRESENTERS**

- Ryan Colker, Vice President of Innovation, International Code Council
- Jerica Stacey, Energy Code Specialist, International Code Council

• Michael Ivanovich, Sr. Director Global Affairs, AMCA International







#### Jerica Stacey

#### Energy Code Specialist, International Code Council

- Over a decade of experience in development, adoption and implementation of building energy codes & standards, code compliance field studies and energy efficiency program evaluations
- Previously served as energy code consultant at environmental consulting firm Cadmus
- Participated in U.S. DOE's Building Energy Codes program while at Pacific Northwest National Laboratory









#### Ryan Colker

Vice President, Innovation, International Code Council

- Joined ICC in 2018
- Previously served as Vice President for National Institute of Building Sciences and Manager of Government Affairs for ASHRAE
- Frequently writes and speaks about build environment resilience, building performance and off-site construction
- Hold a JD form George Washington University Law School and a B.A. with honors in environmental policy from University of Florida









#### <u>International Energy Conservation Code: 2021 Changes, Getting</u> <u>Involved in the 2024 Process</u>

#### Purpose and Learning Objectives

The purpose of this presentation is to provide an overview of the significant changes to the 2021 IECC commercial and residential provisions, discuss the updated IECC development process, and explore opportunities for participation in the development of the 2024 IECC.

At the end of this presentation, you will be able to:

- Outline key changes to the IECC that improve usability.
- Identify significant changes to the IECC- Commercial provisions.
- Identify significant changes to the IECC—Residential provisions.
- Understand the IECC development process.
- Explore ways to participate in the 2024 development process.

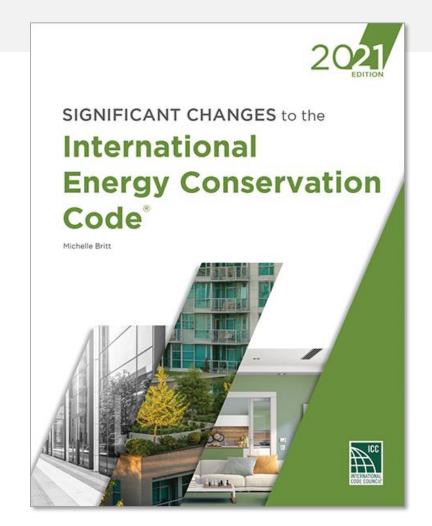






# 2021 IECC Significant Changes

- Increased efficiency
  - At least 10% over 2018 IECC
- Improved useability









#### Improved Useability: Commercial & Residential

- Mandatory and prescriptive labels removed
- Compliance paths named and defined in C401.2 and R401.2

**R401.2 Application.** Residential buildings shall comply with Section R401.2.5 and either Sections R401.2.1, R401.2.2, R401.2.3 or R401.2.4.

**Exception:** Additions, *alterations*, repairs and changes of occupancy to existing buildings complying with Chapter 5.

**R401.2.1 Prescriptive Compliance Option.** The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

**R401.2.2 Total Building Performance Option.** The Total Building Performance Option requires compliance with Section R405.

**R401.2.3 Energy Rating Index Option.** The Energy Rating Index (ERI) Option requires compliance with Section R406.

**R401.2.4 Tropical Climate Region Option.** The Tropical Climate Region Option requires compliance with Section R407.







#### Improved Useability: Commercial & Residential

TABLE C407.2 REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE								
SECTION <sup>a</sup>	TITLE							
Envelope								
C402.5	Air leakage—thermal envelope							
Mechanical								
C403.1.1	Calculation of heating and cooling loads							
C403.1.2	Data centers							
C403.2	System design							
C403.3	Heating and cooling equipment efficiencies							
C403.4, except C403.4.3, C403.4.4 and C403.4.5	Heating and cooling system controls							
C403.5.5	Economizer fault detection and diagnostics							
C403.7, except C403.7.4.1	Ventilation and exhaust systems							
C403.8, except C403.8.6	Fan and fan controls							
C403.9	Large-diameter ceiling fans							
C403.11, except C403.11.3	Refrigeration equipment performance							
C403.12	Construction of HVAC system elements							
C403.13	Mechanical systems located outside of the building thermal envelope							
C404	Service water heating							
C405, except C405.3	Electrical power and lighting systems							
C408	Maintenance information and system commissioning							

a. Reference to a code section includes all the relative subsections except as indicated in the table.

REQUIREMENTS FOR TOTAL BUILDING PERFORMANC SECTION* TITLE								
General								
R401.2.5 Additional energy efficiency								
R401 3	Certificate							
8401.3 Certificate  Building Thermal Envelope								
R402.1.1 Vapor retarder								
R402.2.3	Eave baffle							
R402.2.4.1	Access hatches and doors							
R402.2.10.1	Crawl space wall insulation installations							
R402.4.1.1	Installation							
R402.4.1.2	Testing							
R402.5	Maximum fenestration <i>U</i> -factor and SHGC							
Me	echanical							
R403.1	Controls							
R403.3, including R403.3.1, except Sections R403.3.2, R403.3.3 and R403.3.6	Ducts							
R403.4	Mechanical system piping insulation							
R403.5.1	Heated water circulation and temperature maintenance systems							
R403.5.3	Drain water heat recovery units							
R403.6	Mechanical ventilation							
R403.7	Equipment sizing and efficiency rating							
R403.8	Systems serving multiple dwell- ing units							
R403.9	Snow melt and ice systems							
R403.10	Energy consumption of pools and spas							
R403.11	Portable spas							
R403.12	Residential pools and permanent residential spas							
Electrical Power and Lighting Systems								
R404.1	Lighting equipment							
404.2	Interior lighting controls							

indicated in the table

- Tables added to clarify requirements for each compliance path
  - Total Building Performance
  - Energy Rating Index

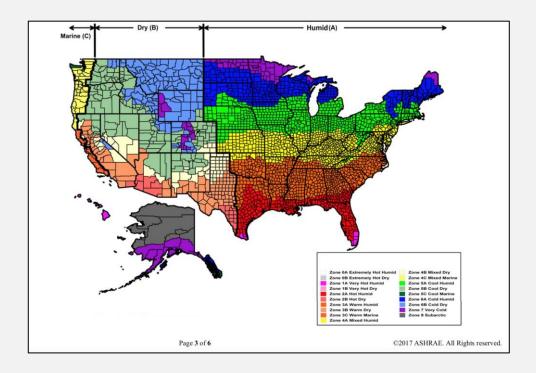






#### Improved Useability: Commercial & Residential

- Climate zones updated
  - New Climate Zone 0
  - 10% of US counties assigned new CZ









#### Commercial Significant Changes: Building Envelope



- Increased insulation requirements
- Clarifying language for roof and ceiling assembly insulation
- Reduced fenestration U-factors and SHGCs
- Extended requirements for envelope air leakage testing and verification
- New provisions for operable openings interlocking and mandatory controls

#### Air Leakage – Thermal Envelope: C402.4







- Dwelling unit air leakage testing required for Group R and Group I occupancies
- Required air leakage testing for occupancies other than Group R and I
- Performance verification requirement for buildings exempt from testing









#### Commercial Significant Changes: Mechanical



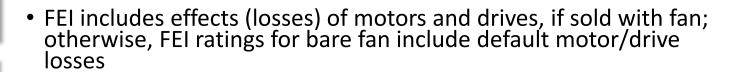
- Updated equipment efficiency requirements
- Refinement of energy recovery ventilation requirements
- Updated fan efficiency metric



#### Fan Efficiency – C403.8.3



- Fan Energy Index (FEI) replaces Fan Efficiency Grade (FEG) metric





- Sizing / selection window eliminated
  - "15 percentage points from peak total efficiency "--- difficult to enforce

#### Fan Efficiency – C403.8.3



- Other changes to C403.8.3 Fan efficiency
  - Exemption removed for powered roof ventilators (PRVs)
  - Refined exemptions for fans sold (embedded) within packages
  - Lower-size limit reduced from 5 HP to 1 HP











#### FEI Origin and Future

- Sprung from incomplete DOE fan-efficiency regulation
  - 2015: U.S. DOE ASRAC Term Sheet
  - 2018 ANSI/AMCA Standard 208 (Calculating the Fan Energy Index)
  - 2019: ASHRAE 90.1
  - 2020: ASHRAE 189.1
  - 2021 IECC, IgCC
  - 2019 Florida Building Code: Adopted 2018 IECC with 2021 FEI provision
  - 2021 Oregon Energy Code (via 2019 ASHRAE 90.1)
  - Proposed: California Title 20 product energy standard/regulation
  - Proposed: California Title 24-2022
- For more information: www.amca.org/FEI







#### **AMCA** Resources

- AMCA Website: www.amca.org
- FEI Website: www.amca.org/fei
  - Technical papers and educational resources about Fan Energy Index
- Find AMCA-certified FEI ratings: <a href="www.amca.org/find-FEI">www.amca.org/find-FEI</a>
- General info about AMCA Certified Ratings Program: www.amca.org/certify







## Commercial Significant Changes: Electrical Power and Lighting Systems



- Increased lighting efficacy and decreased lighting power density requirements
- New provisions for plant growth lighting
- New provisions for automatic receptacle control
- New provisions for energy metering and monitoring









- Applies to new buildings 25,000 ft<sup>2</sup> or larger
- Must be equipped to measure, monitor, record and report energy consumption data
- Exception: R-2 occupancies and individual tenant spaces if the space has its own utility services and meters and has less than 5,000 ft<sup>2</sup>

TABLE C405.12.2 ENERGY USE CATEGORIES							
LOAD CATEGORY	DESCRIPTION OF ENERGY USE						
Total HVAC system	Heating, cooling and ventilation, including but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use.						
Interior lighting	Lighting systems located within the building.						
Exterior lighting	Lighting systems located on the building site but not within the building.						
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.						
Process load	Any single load that is not included in an HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building, including but not limited to data centers, manufacturing equipment and commercial kitchens.						
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, inground spas and snow-melt systems.						







# Commercial Significant Changes: Additional Efficiency Requirements

- Revised structure of C406
  - Points-based
  - 10 points required
  - Equity of efficiency options across climate zones
- Expanded options
  - 11 options total, 3 new











More efficient F	HVAC performance
------------------	------------------

Reduced lighting power

Enhanced lighting controls

On-site supply of renewable energy

Dedicated outdoor air systems

High-efficiency service water heating

Enhanced envelope performance

Reduced air infiltration

Energy monitoring system

Fault detection and diagnostics

Efficient kitchen equipment

TABLE C406.1(2) ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP R AND LOCCUPANCIES																	
	CLIMATE ZONE																
SECTION	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% heating efficiency improvement	NA	NA	NA	NA	1	NA	NA	1	NA	1	1	1	1	2	1	2	2
C406.2.2: 5% cooling efficiency improvement	3	3	2	2	1	1	1	1	1	NA	1	1	NA	1	1	1	NA
C406.2.3: 10% heating efficiency improvement	NA	NA	NA	NA	1	NA	NA	1	1	1	2	2	1	3	2	3	4
C406.2.4: 10% cooling efficiency improvement	5	5	4	3	2	3	1	2	2	1	1	1	1	1	1	1	1
C406.3: Reduced lighting power	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
C406.4: Enhanced digital lighting controls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.5: On-site renewable energy	8	8	8	8	7	8	8	7	7	7	7	7	7	7	7	7	7
C406.6: Dedicated outdoor air system	3	4	3	3	4	2	NA	6	3	4	8	5	5	10	7	11	12
C406.7.2: Recovered or renewable water heating	10	9	11	10	13	12	15	14	14	15	14	14	16	14	15	15	15
C406.7.3: Efficient fossil fuel water heater	5	5	6	6	8	7	8	8	8	9	9	9	10	10	9	10	11
C406.7.4: Heat pump water heater	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C406.8: Enhanced envelope performance	3	6	3	5	4	4	1	4	3	3	4	5	3	5	4	6	6
C406.9: Reduced air infiltration	6	5	3	11	6	4	NA	7	3	3	9	5	1	13	6	8	3
C406.10: Energy monitoring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C406.11: Fault detection and diagnostics system	1	1	1	1	1	1	NA	1	1	NA	1	1	NA	1	1	1	1







#### Commercial Significant Changes: Appendices

- New Board of Appeals appendix
- New provision for system-ready area for electrical energy storage added to Solar-Ready Zone appendix
- New Zero Energy
   Commercial Building
   Provisions appendix









#### Residential Significant Changes: Building Envelope

- Increased insulation requirements
- Reduced fenestration Ufactors and SHGCs
- Basement wall clarification
- Revised air leakage requirements
- Revised duct testing requirements



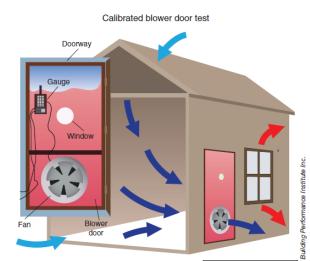


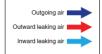






- Maximum air leakage rate is 5
   ACH for all compliance paths
  - 3 ACH for CZ 3-8 following Prescriptive path
- Testing alternative for smaller homes and attached single family and multifamily
- Dwelling unit enclosure area defined











#### Residential Significant Changes: Systems

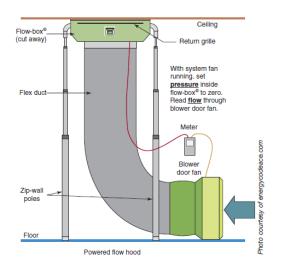


#### Testing: R403.6.3









- Mechanical systems must be tested and verified to provide minimum ventilation flow rates
- Kitchen hoods exempt if:
  - Ducted to the outside
  - 6 inch or larger duct
  - Not more than one 90-degree elbow







# Residential Significant Changes: Electrical Power and Lighting Systems

- New exterior lighting requirements for limited residential buildings
- New interior lighting controls requirements
- New exterior lighting controls requirements



#### Exterior Lighting: R404.1.1







- Compliance with C405.4 exterior lighting provisions required for residential buildings, except
  - Detached one- and two-family dwellings
  - Townhouses
  - Solar-powered lighting
  - Lighting controlled by motion sensors









# Residential Significant Changes: Energy Rating Index Compliance Alternative

- ERI values lowered
- Additional 5 percent energy reduction applied

TABLE R406.5 MAXIMUM ENERGY RATING INDEX							
CLIMATE ZONE	ENERGY RATING INDEX						
0-1	52						
2	52						
3	51						
4	54						
5	55						
6	54						
7	53						
8	53						









# Residential Significant Changes: Additional Efficiency Package Options

#### R401.2.5

- Total Building Performance option
  - Proposed design must have annual energy cost less than or equal to 95% of the referenced design
- Energy Rating Index
  - ERI value must be at least 5% less than ERI target
- Prescriptive Compliance Option
  - Select one additional efficiency package option in Section R408.2



### Additional Efficiency Package Options: R408.2



Choice of additional efficiency measure required for Prescriptive Compliance Option



Enhanced envelope performance More efficient HVAC equipment performance Reduced energy used in service water heating



More efficient duct thermal distribution system Improved air sealing and efficiency ventilation system







## Residential Significant Changes: Appendices







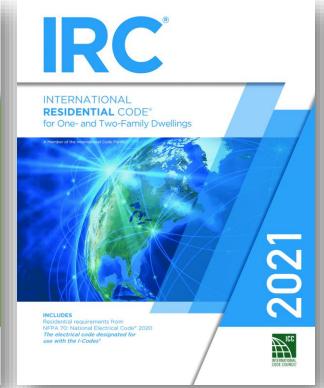


# **IECC**°

INTERNATIONAL **ENERGY CONSERVATION** CODE\*









INTERNATIONAL **GREEN CONSTRUCTION CODE®** 



POWERED BY ANSI/ASHRAE/ICC/USGBC/IES 189.1-2020
Standard for the Design of High-Performance
Green Buildings Except Low-Rise Residential Buildings















**USDN** urban sustainability directors network









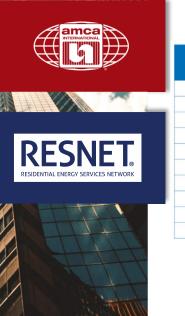
Pledge, Compact, Commitment, or Initiative	Number of Participating US Local Governments	
Climate Mayors	407	
We are Still In	307	
Ready for 100	148	
Under2MOU	26	
Bloomberg American Cities Climate Challenge	25	
Rockefeller 100 Resilient Cities	24	
2030 Districts	21	
DOE Zero Energy Schools Accelerator	14	
DOE Energy Accelerator	11	
DOE Zero Energy Districts Accelerator	4	

#### ACCEPTANCE ON BEHALF OF THE UNITED STATES OF AMERICA

I, Joseph R. Biden Jr., President of the United States of America, having seen and considered the Paris Agreement, done at Paris on December 12, 2015, do hereby accept the said Agreement and every article and clause thereof on behalf of the United States of America.

Done at Washington this 20th day of January, 2021.

JOSEPH R. BIDEN JR.











#### LEADING THE WAY TO ENERGY EFFICIENCY

A Path Forward on Energy and Sustainability to Confront a Changing Climate

www.iccsafe.org

www.iccsafe.org/energy



Updated IECC development process



Enhanced Energy & Carbon Reduction resources



Energy Efficiency and Carbon Advisory Council

## Leading the Way to Energy Efficiency







### **IECC** Development

- A code developed through a standards process
- ASHRAE Standard 90.1 as commercial compliance path
- Residential provisions also captured in IRC Chapter 11
- Revised Scope and Intent:
  - Considerations for future efficiency increases are based on language vetted by diverse stakeholder interests
  - Provide solutions for diversity of jurisdictions
  - Maintain 3-year cycle and prevent roll backs
  - Support simplification to advance adoptions







Appoint Committees	Public Comments	Committees Review Proposals	Public Comment Draft	Committee Ballot
Residential & Commercial	Initial draft posted  Public comments	Approve, disapprove or further work	Committee publishes public comment draft	Once all comments resolved committee votes on approval
Call for members closed on April 23	(code change proposals) solicited	Further work	capturing results of proposal review	of final document
	,	proposals to work groups or in	Seeks comments on	Content published as next edition IECC
Appointed by Code Council Board of Directors	All conducted online similar to cdpAccess	committee	review draft	as next edition lecc
		Further work proposals where standards process	Committee reviews and addresses comments	
		shines	Comments	
		Open meetings	Repeat public comment period on revised draft if	
			necessary	







- Opportunities for Participation
  - IECC Development Committee Membership
    - Residential
    - Commercial
  - Submit code changes
  - Development Committee Work Groups
  - Participate in development committee meetings (open)
  - Review and comment on public review drafts



- More on the Committees
  - Committee Criteria/Membership
    - Consistent with CP 12, CP 7, Consensus Procedures
    - Diversity across 9 interest categories
    - 1/3 Government Regulators, Chair=Government Regulator
    - Diversity of experience, climate zone, organization size
    - Membership represents racial, gender and socioeconomic diversity
    - Working groups to allow broad participation, consensus building









#### Why is the IECC development process being changed?

The International Code Council Board of Directors, which consists of 18 governmental members, has determined that for the IECC a...

#### Who will be on the IECC Development Committees?

The Code Council Consensus Procedures comply with ANSI's Essential Requirements, which ensure committee balance. Recognizing the important role of governments...

#### What will change about the substance of the IECC?

The 2021 IECC will be the starting point for revisions for the 2024 IECC. The 2021 IECC base efficiency requirements...

#### What will change for the IECC with the standard development process?

The IECC will remain a code (called the IECC), but will be developed under a standards development process, like the...



## **Energy and Carbon Reduction Resources**







- Potential resource topics:
  - Electric vehicle charging
  - Electrification and decarbonization
  - Zero energy and zero carbon
  - Embodied carbon
  - Grid interactivity/efficiency
  - Performance standards for existing buildings
  - Enhancing energy savings through water efficiency and reuse
  - Integration of on-site renewable energy generation and energy storage

## **Energy and Carbon Advisory Council**







- Inform development of IECC and Resources
- Support adoptability, implementation
- Membership could include:
  - Mayors, county executives, or other local government sustainability/resilience leaders
  - State government sustainability/resilience leaders
  - Federal agency representatives
  - Leaders from public interest and private industry organizations, including, but not limited to, finance, academia, research, manufacturing, building, affordable housing, energy and climate policy, and insurance stakeholders









About ▼ Advoca

Membership 🕶

Professional Development 🕶

Products & Services





#### I-Code Essentials

#### 2018 I-Code Essentials

Explore code fundamentals using non-code language

IBC • IRC • IFC • IEBC iust arrived: IPC



#### **Energy Efficiency and Carbon Reduction**

Energy fuels our lives - households, businesses and society in general. Yet, energy use and associated greenhouse gas emissions can pose significant challenges to communities, homeowners and renters, and business owners.

- · Americans currently spend more than \$200 billion annually on energy bills.
- Energy use impacts housing affordability, with low-income households facing a median energy burden threetimes that of non-low-income households.
- Globally, buildings and building construction sectors combined are responsible for over one-third of global final energy consumption and nearly 40 percent of total direct and indirect CO2 emissions.

However, there are solutions. Building energy codes contribute to the health, safety and welfare of communities and citizens, reducing energy bills, improving occupant and community health, enhancing resilience and reducing greenhouse gas emissions.

Homeowners recognize the benefits of investing in energy efficiency. According to the National Association of Home Builders (NAHB), Americans are willing to invest in long-term energy savings – "Nearly half of home buyers are willing to invest between \$1,000 and \$9,999 for \$1,000 annual savings on their utility bills" according to 2019 survey results.

The International Code Council Family of Companies has resources available to assist jurisdictions, builders, manufacturers, and the public with building energy efficiency ranging from support for adoption and implementation of the International Energy Conservation Code (IECC) to a toolkit for states and communities with advanced energy efficiency and carbon reduction goals.

Learn more by clicking on the buttons below.

IECC Adoption

Compliance and Enforcement Net Zero Energy and Decarbonization Resources and Model Policies https://www.iccsafe.org/ advocacy/energyefficiency-and-carbonreduction/

Spanish I-Codes

### Additional Resilience Initiatives







- Global Resiliency Dialogue: <a href="https://www.globalresiliency.org">www.globalresiliency.org</a>
- Energy Efficiency and Carbon Reduction Resources: <u>https://www.iccsafe.org/advocacy/energy-efficiency-and-carbon-reduction/</u>
- Alliance for National & Community Resilience: www.resilientalliance.org







# Thank You

Ryan M. Colker, J.D., CAE

Vice President Innovation

Executive Director, Alliance for
National & Community Resilience

International Code Council

rcolker@iccsafe.org

Jerica Stacey

Energy Code Specialist – Product
Development

International Code Council
jstacey@iccsafe.org







## Thank you for your time!

To receive PDH credit for today's program, you <u>must</u> complete the online evaluation, which will be sent via email 1 hour after this webinar.

PDH credits and participation certificates will be issued electronically, 15-30 days after this program, once all attendance records are checked and online evaluations are received.

Attendees will receive an email at the address provided on your registration, listing the credit hours awarded and a link to a printable certificate of completion.







# Questions?



Jerica Stacey



Ryan Colker



Michael Ivanovich







## NEXT PROGRAM

### Join us for our next AMCA insite <sup>™</sup>Webinar:

- Wednesday, May 11
- 12:00-1:00pm CT
- Topic: Car Park Ventilation Solution Part 2
- Presenters: Dr. Geoff Sheard, Consultant, AMCA Member Company
  Eric Scheffrahn, Technical Manager, AMCA Member Company
- >> For additional webinar details go to: www.amca.org/webinar