

Code Compliance Technical Meeting:

Building Technologies Office
Department of Energy

Washington, DC

APRIL 2013



Welcome to The Building Technologies Office's Code Compliance Technical Meeting and to Washington, DC. On behalf of the Department of Energy Building Technology Office (BTO), we would like to thank you for attending, for your participation.

The goal of this meeting is to review and discuss ongoing projects and existing activities that improve compliance with model energy codes. DOE should support state and local efforts to increase compliance with the energy codes as ultimately, like all building codes, this is about consumer protection. This consumer protection goal can only occur through accelerating a larger and more robust marketplace awareness and acceptance of codes and the related benefits.

As stewards of the model code, we are here today because we all -- in some way, shape, or form -- must agree with that proposition. We should, therefore, be interested in these ongoing projects and lively discussions that range in topic from quantifying the benefits of code compliance to demonstrating how compliance rolls up into helping communities meet their larger regional efficiency goals and aspirations.

Thank you all, in advance, for your frank and honest comments on these projects and topics.

JOE HAGERMAN,

Joe Hagerman
Senior Policy Advisor
DOE/Buildings

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LOGISTICS INFORMATION

The meeting will be held at the Navigant Consulting's Office in Washington, DC. Upon arrival to Navigant, please check in at the front desk in the lobby. They will sign you in and give you access to the elevator to Suite 700.

The address is 1200 19th St NW, Washington, DC 20005.

Lunch will be provided at the meeting on April 4th and the group is invited to an optional happy hour (no host) at a nearby restaurant.

DIRECTIONS TO NAVIGANT

The closest metro stations are Farragut North on the Red line and Farragut West on the Blue/Orange lines. From either station head north, then take a left on M St NW, followed by a right on 19th St NW. 1200 19th St NW is the first building on the left.

CONTACTS

Your point of contact at Navigant is Paige Crosby. If you have logistical questions, please contact Paige at paige.crosby@navigant.com or 202-973-4519 (office), 804-677-7076 (cell).

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MEETING OBJECTIVES

- » Discuss models that improve compliance with model energy codes.
- » Enhance understanding of the benefits of code compliance.
- » Accelerate marketplace acceptance of codes and energy efficiency as a whole to ensure consumer protection.
- » Discuss quantifying the benefits of code compliance to roll up into larger regional energy efficiency goals.

WELCOME & INTRODUCTIONS

8:00AM	Informal Coffee
8:30AM	Goals and Introductions, <i>Kym Carey and Joe Hagerman, DOE</i>

SESSION I: FRAMING THE CASE – FROM REGIONS TO THE NATION

8:40AM	Findings from Report on Involvement of Utilities in Code Adoption and Implementation <i>Harry Misuriello, ACEEE</i>
9:00AM	Attribution for Energy Savings Report <i>Carolyn Sarno, NEEP</i>
9:20AM	Q&A

SESSION II: STATE MODELS

9:40AM	Impact of Requiring HERS Ratings and the Benefits of Performance-based Codes <i>Ian Finlayson, Massachusetts Department of Energy Resources</i>
10:00AM	Compliance Efforts in Minnesota <i>Bruce Nelson, Minnesota Department of Commerce</i>
10:20AM	Compliance Efforts in the Northwest <i>Gary Nordeen, State of Washington</i>
10:40AM	Q&A

SESSION III: EMERGING INNOVATION

11:00AM	White Paper on Coordinated National Campaign to Increase Compliance <i>Eric Makela, BrittMakela Group</i>
11:20AM	Energy Code Ambassadors Project and Recent Consumer Outreach Efforts <i>Maureen Guttman, BCAP</i>
11:40AM	Q&A

WORKING LUNCH

12:30PM DOE Tools and Methodologies
Rose Bartlett, PNNL

FACILITATED DISCUSSIONS

1:00PM **Facilitated Discussion I:** Benefits – From the Consumer to the Utilities to the Public

2:15PM Break

2:30PM **Facilitated Discussion II:** The Right Stuff – Compliance Structures & Models that Work

3:45PM Break

4:00PM **Facilitated Discussion III:** Barriers & Opportunities – A Mapping & Brainstorming Session

Towards a future where consumers realize the full benefits of code compliance

Introduction

Buildings accounted for 41% of the primary energy consumption in the United States in 2010. This is more than either transportation or industry, which consumed 28% and 31% respectively. Buildings energy use cost totaled approximately \$400 billion (in 2010 dollars) and consumed 74% of all the electricity generated in the United States, along with 34% of the natural gas production. As a result of this energy consumption, buildings are also responsible for 40% of carbon dioxide emissions in the US, or 7.4% of total global carbon dioxide emissions. Clearly, energy efficiency measures in the buildings sector, if properly realized and captured provide a tremendous opportunity to reduce energy consumption and expenditures. Yet currently there is a lack of assurance that buildings as designed realize the levels of energy efficiency established in the ratified codes. As such, building owners and occupants may in turn not be realizing the energy and cost savings benefits inherent in the code.

This unknown is one of the great shortcoming in ensuring buildings are a proactive, reliable energy resource now and into the future.

DOE believes that building energy codes also influence the acceptance and application of energy efficiency technologies and practices. Thus, our participation within the code development process provides the opportunity, although challenging at times, to introduce and gain acceptance of new technologies and energy efficiency concepts. With a deeper understanding and appreciation of the process and more importantly the opportunity, DOE is shifting more emphasis on the benefits to consumers, building owners, and operators. DOE is putting renewed emphasis on working with state and local governments, and for that matter any interested party to develop alternative approaches, structures, and endeavors to establish self-sustaining markets where energy code compliance allows consumers to achieve the full benefits of compliance. This new emphasis will come in addition to DOE's traditional role of supporting model code development and adoption.

Compliance as a fundamental pillar for code development and adoption

Through our combined efforts, consumers now have the opportunity to achieve cost-effective energy savings from advances in the model codes and standards that are 30% more efficient than just 7 or 8 years ago ("National Energy and Cost Savings for New Single- and Multifamily Homes: A Comparison of the 2006, 2009, and 2012 Editions of the IECC"). It is widely acknowledged that these code development achievements represent significantly large gains within the model codes. This achievement subsequently leaves, for the next few years, small opportunities for future gains (through prescriptive approaches). In some sense, the energy efficient codes community may see diminishing returns for their efforts, and for the resultant consumers, through continued model code development compared to potential opportunities from code adoption and incorporation into construction practices through code compliance. To realize these opportunities, priorities may shift to reflect improved compliance in order to insure that consumers and structures are realizing these large efficiency gains --- and to ensure both the consumer and building are achieving the savings (i.e. that the savings are real, tangible, and bankable). Furthermore, effective compliance and enforcement may unlock deeper energy savings, reduced costs, higher building resale value, minimized environmental impact, and most importantly consumer safety protection.

The key to realizing the full benefits associated with building energy codes is through proper compliance and verification. Establishing, maintaining, and continually supporting state, municipal, and local mechanisms to ensure energy code compliance is critical for success as is, establishing mechanisms and institutions for self-sustaining markets where code compliance is valued and supported.

Exploring all models -- new and old

While there may be no “one-size-fits-all” solution for increasing and demonstrating energy code compliance across the United States (due to the interactive effects of components and building climate zones), DOE is focused on reviewing comprehensive models capable of verifying compliance as a fundamental pathway to meeting reduction targets, at multiple levels, without impeding current market practices. States and localities have been and will continually build and refine compliance programs in effort to protect public safety parameters that are valued locally within their municipal processes. In DOE's initial review of state models, key components of successful compliance have largely been based on the following characteristics:

- » **Scalable from a local jurisdictional level up through the state;**
- » **Capable of capturing the benefits of properly compliant structures in order to monetize energy savings or meet larger-scale efficiency goals of states, locals, or national policies;**
- » **Capable of quantifying the benefits over the lifetime of the building -- in order to demonstrate and market the true value compliant structures (using defined, quantifiable metrics), and;**
- » **Comprehensively designed to address the multi-faceted nature of construction and the code.**

By streamlining the energy code compliance process, states, counties, municipalities, and utilities can demonstrate a commitment to energy efficiency targets, and consumer protection can be advertised and quantified as realized energy savings among owners, occupants, and operators. Compliance may also serve as the best mechanism in pulling forward greater code developments and larger scale adoption given the remaining gains.

A technical review of compliance: from soup to nuts

Increasing the national focus on compliance has the potential to verify that the building sector will meet the energy reduction targets set at federal, state, and local levels. Through the discussion and review of state, local, and national projects, DOE hopes to further explore projects that demonstrate an understanding or exploration of the parameters for effective energy code enforcement. This activity may include identifying barriers, developing best practices, and disseminating resources to improve compliance at a larger scale. Furthermore, DOE hopes to evaluate the effectiveness of recent efforts and initiatives to ultimately work toward aspirational energy efficiency goals.

Additionally, DOE hopes to explore projects where the public has been educated and advertised on the value of code compliance. In the future, DOE must properly quantify and communicate the benefits of code compliance such that it can be (realistically) accounted for in national and regional models.

Conclusion

The purchase of a home, or a building acquisition, is often the single largest purchase, or an investment in the future, for a family or business. Ownership and real estate acquisition is still widely considered to be one of the largest contributors to individual wealth and asset valuation. Therefore, it should be a national priority to ensure that consumers and owner entities are properly protected by insuring that properties clearly meet or exceeds state and local code minimums. DOE's goal is to provide America with public acceptance, agreement, and understanding in the value of codes and compliance. This goal can only be realized through proper recognition, support, and investment in state compliance programs and related endeavors.



HARRY MISURIELLO is a Visiting Fellow at the American Council for an Energy-Efficient Economy (ACEEE) and is engaged in advocacy for energy-efficient new residential and commercial construction through development, adoption and enforcement of building energy codes. Prior to joining ACEEE, Misuriello was Manager of Energy Efficiency Strategies at Owens Corning and Director of Buildings and Utility Programs at the Alliance to Save Energy. He is a voting member of the ASHRAE Standard 90.1 and 90.2 Committees, and serves on the Oversight Committee developing the ASHRAE Building Energy Quotient (“bEQ”) advanced building energy labeling program. Misuriello also served on the ASHRAE committees that produced the Advanced Energy Design Guides for small office and retail buildings. He has 35+ years of experience in the field as a consulting firm executive and energy efficiency advocate.

Presentation Overview »

Findings from Report on Involvement of Utilities in Code Adoption and Implementation

There are several developments coming together in the last few years that make a strong case for the involvement of utilities in advancing adoption, implementation and compliance verification of building energy codes. At the same time, there are several barriers and regulatory challenges that have to be overcome in order to mainstream building energy codes into utility programs. Chief amongst these is the question of quantification of a) compliance to the provisions of the energy codes and b) measurement of savings from this compliance. This report addresses some of the barriers and recommends possible solutions for Evaluation, Measurement and Verification of savings from energy code compliance. The report also summarizes related state activities. Based on best practices in the leading states we identify appropriate activities for utilities in the energy code cycle and conclude by suggesting pilot program concepts for utility programs.

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CAROLYN SARNO manages Northeast Energy Efficiency Partnerships' (NEEP) High Performance Building team. She assists states with the development and implementation of strategies to improve energy code compliance and promote operational energy savings in retrofits and new buildings. Carolyn has over 11 years of hands on Facilities Management experience most notably with the City of Newton, Mass. where she managed and coordinated all facilities operations and maintenance activities for 85 public buildings. Carolyn was responsible for developing a capital improvement plan that incorporated sustainable best practices as well as coordinating the commissioning of a 330,000 sq. ft. addition to a high school. Carolyn has a bachelor's degree in psychology from Salem State College and is a Certified Building Operator.

Carolyn's High Performance Building team has been the recipient of a Green Apple Award from CHPS for advancing public policy for high performance schools and was part of a group that won the Jeffrey A. Johnson Award for excellence in the advancement of building energy codes and performance from the U.S. Department of Energy for developing the nation's first stretch energy code.

Presentation Overview »

Attribution for Energy Savings Report

As states increasingly look to utilities to play an active role in supporting building energy codes, a new report from a coalition of energy efficiency advocates, has been issued to provide guidance for how state regulatory commissions and energy offices can best develop and evaluate such efforts. The report, "Attributing Building Energy Code Savings to Energy Efficiency Programs," developed by Northeast Energy Efficiency Partnerships (NEEP; the Institute for Market Transformation (IMT); and IEE, an institute of the Edison Foundation, provides in-depth guidance on program options, evaluation protocol, and regulatory considerations for efficiency program administrators and policymakers. Carolyn will provide an overview of the new report including the role utilities can play to increase energy code compliance.

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IAN FINLAYSON is the Manager of Buildings and Climate Programs at the Department of Energy Resources in Massachusetts. His current clean energy initiatives include development and implementation of the 'stretch' building energy code, and building energy labeling and efficiency pilots for both residential and commercial buildings. Ian authored the buildings chapter of the Massachusetts clean energy and climate plan for 2020. Prior to joining State government Ian worked for a large US affordable housing developer, and internationally in Afghanistan and Japan. He holds degrees from Edinburgh University, and MIT, and is a recipient of the Jeffrey Johnson award from US DOE for work on building energy codes, and an EPA - New England award for work on reducing diesel air pollution.

Presentation Overview »

Impact of Requiring HERS Ratings and the Benefits of Performance-based Codes

Massachusetts has been looking at building energy code compliance in conjunction with a broader focus on greater use of energy performance modeling in building codes. Tying energy code compliance to energy performance allows for a more streamlined metric relative to the current lengthy checklist of prescriptive requirements, it also simplifies the complex issue of defining what an appropriate level of compliance is.

Early results are also positive, with a study of energy code compliance in the residential sector, showing that homes with 3rd party HERS ratings have significant improvements in energy performance, and commercial energy ASHRAE appendix G modeling requirements in the MA stretch energy code have also been integrated well into the code compliance process to date.

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BRUCE NELSON is a Senior Engineer with the Minnesota Department of Commerce, State Energy Office. He manages projects to bring about energy efficient market transformation in Minnesota buildings, equipment, and business practices. Since 1981 he has been intimately involved in both with writing and educating udders of the Minnesota Energy Code. In 2008 Mr. Nelson received the U.S. Department of Energy Building Energy Codes Program Jeffrey A. Johnson Award for Excellence in the Advancement of Building Energy Codes and Performance. Mr. Nelson has an engineering degree from the University of Minnesota and is a registered professional engineer (mechanical) in Minnesota.

Presentation Overview »

Compliance Efforts in Minnesota

Since 2000 the Minnesota residential energy code has mandated stringent air tightness, mechanical ventilation, and make up air. Also, because of the make up air requirements virtually all homes built to this code have high efficiency furnaces. Surveys have confirmed a very high rate of compliance with the strict requirements. This presentation will discuss how Minnesota was able to persuade its construction industry to undergo this market transformation. It will also addressed issues identified in the IECC for both residential and commercial buildings that will be correcting by Minnesota amendments to ensure a more effective energy code.

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GARY NORDEEN is Senior Building Science Specialist with extensive knowledge relating to building, energy and ventilation codes. He has worked with a variety of state and utility energy conservation programs for the last 25 years. Currently, Gary serves as the Manager of the WSU Energy Codes Program; provides code training for building department staff, designers, builders and the general public; assists with code development for the Washington State Building Code Council; and provides technical assistance to local jurisdictions and the public.

Presentation Overview »

Compliance Efforts in the Northwest

Washington State has a demonstrated track record of being a national leader in energy conservation and progressive energy codes. It has long been recognized that without good compliance the energy codes in place will not result in the intended savings. A newly released Washington State Residential Compliance study by the Cadmus Group shows a 97% compliance rate. A training program and development of compliance resources for enforcement officials, designers, builders and other interested parties has been in place in the State of Washington for almost 30 years with the intent of educating the building industry in order to gain consistent compliance with energy code requirements. This presentation will focus on efforts over the last five years and includes discussion about training efforts, compliance tools, technical assistance and outreach needed to achieve effective compliance rates.

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ERIC MAKELA Eric's building energy codes expertise spans 25 years, numerous states, and several foreign countries. Eric served on the ICC IECC Code Development Committee for four cycles. Since 1986 he has trained or presented on energy codes in over 22 states, two US territories and internationally with sessions focused on residential and commercial building energy codes. He was a recipient of the 2009 Jeffrey A. Johnson Award and was the 2008 Canyon County Habitat for Humanity Volunteer of the Year. Eric has a B.A. in environmental studies from Sonoma State University and an M.A. in education from California State University, Sacramento.

Presentation Overview »

Broadening the National Energy Code Compliance Strategies

Although significant resources have been spent on energy code adoption, limited compliance and enforcement of the code have resulted in unrealized energy savings. These outreach strategies complement existing work by DOE, the REEOs and BCAP and other interested and affected parties by broadening the stakeholders driving compliance and broadening the outreach audiences. The strategies target the existing and new audiences to create a market force "pull" among policy and decision makers and consumers for efficient buildings, while simultaneously, generating a market force "push" through education and skill building within energy code practitioners, designers, and building communities. Working in tandem, these market forces will generate transformation in the building energy code landscape, creating a new norm of compliant buildings.

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MAUREEN GUTTMAN AIA, BCAP Executive Director, is a licensed architect with over 25 years of experience in energy-efficient and green building design. Ms. Guttman directs several technical, outreach and advocacy projects to help various stakeholder groups realize the benefits of energy codes and efficient buildings. Prior to joining BCAP, Ms. Guttman spent four years as Executive Director of the Pennsylvania Governor's Green Government Council.

Presentation Overview »

Energy Code Ambassadors Project and Recent Consumer Outreach Efforts

BCAP has established a national leadership role in promoting the importance of energy code compliance, beginning with the Compliance Planning Assistance Program in 2010. This presentation will provide information on two of BCAP's current compliance projects, the Energy Code Ambassadors Program (ECAP), a joint initiative with the International Code Council designed to create locally available expertise on energy code adoption and enforcement issues, and our Consumer Outreach project, which is designed to educate homebuyers on how energy codes ensure the energy efficiency standards for new homes and turn them into grassroots advocates for code compliance.

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Questions for Discussion »

Facilitated Discussion I: Benefits – From the Consumer to the Utilities to the Public

Who benefits from compliance?

How do we get the beneficiaries of compliance to care? How do we monetize compliance?

What else needs to be done to capture, explain, and communicate, the benefits?

Facilitated Discussion II: The Right Stuff – Compliance Structures & Models that Work

Who are the key players in compliance, and under what structure do they work?

What are the roles, responsibilities, activities, and skills needed of these players?

How must these key players interact with one another and other stakeholders (such as utilities)?

Facilitated Discussion III: Barriers & Opportunities – Mapping & Brainstorming Session

SEE Action: Are these still relevant?

What other barriers are out there? Are any of them opportunities?

How do we overcome these barriers?



JAYSON ANTONOFF has been with the Institute for Market Transformation since May 2012, and serves as the U.S. Director of the Global Building Performance Network, an international network working to achieve significant and measurable reductions in the energy consumption and greenhouse gas emission from buildings. He is responsible for managing technical research, policy and program development, and the promotion of best practices in order to accelerate improvements in the energy performance of the U.S. building stock. Jayson's key areas of focus include energy code compliance, building rating and disclosure, and development of integrated energy efficiency policy strategies.

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CHRIS BAKER is a Senior Energy Analyst at The Weidt Group. He works on utility DSM programs for commercial new construction. He also works with The Weidt Group's software department developing energy modeling and benchmarking tools.

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ED BARBOUR is a Managing Director in the Emerging Technologies group of the Energy practice. He has provided consulting to the building product manufacturers, private gas and electric utilities, energy and manufacturer trade associations and State and Federal governments. His work is largely in technology management and market assessment, with particular interests in linking business and technology strategies, accelerating the product adoption process, and the effective management and commercial exploitation of research and development (R&D).

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MIKE BARCIK is a Senior Engineer and the Director of Technical Services at the Southface Energy Institute in Atlanta, Georgia. Mike is responsible for energy efficiency and energy code training throughout the southeastern US and has taught and developed materials for thousands of presentations and workshops covering residential and commercial energy codes and high performance buildings. Mike and his much-smarter architect wife, young daughters and dachshund live in an old bungalow in Decatur, Georgia that they are lovingly and sustainably restoring and making more efficient.

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ROSE BARTLETT is a project manager at the Pacific Northwest National Laboratory supporting compliance and adoption activities in DOE's Building Energy Codes Program. She has over 20 years of experience in the study of energy efficiency in buildings.

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SHARON BONESTEEL has over 30 years of experience in the Construction Industry; from running an architectural firm, to providing expert witness and code enforcement. She brings this experience to the utility industry; facilitating the adoption of energy efficient building codes and providing education on construction methods to the customers served by the Salt River Project.

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LIZA BOWLES has been the Executive Director of Newport Partners since its founding in 2002. Under her leadership, the organization has grown substantially in revenue, staff, and diversity of clients. In 2005, she set up a sister company, Newport Ventures, located in Schenectady, NY to serve the expanding market in the Northeast for energy efficiency. Ms. Bowles has substantial experience as a speaker and author of numerous publications. She has served on numerous committees and boards, currently serving as President of Home Builders Care Foundation, and as a board member for the Fire Protection Research Foundation. Previous employment includes: President of the NAHB Research Center, Office of Community Planning and Development, HUD and Staff to the Fairfax County Board of Supervisors.

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CHRIS BURGESS MEEA Technical Manager for Codes Compliance – Chris is a LEED AP, Illinois licensed architect with over 25 years of experience working on projects across the Midwest. His practical experience with building and energy codes covers five states and over 25 local jurisdictions. Chris is part of the MEEA team working to develop a statewide energy code compliance, utility claimed savings program in IL.

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KYM CAREY is the Building Energy Code Adoption and Compliance Technical Manager for the US Department of Energy's Building Technologies Program. Her focus is on successful implementation of building energy codes. She also participates on the newly revived ASHRAE 90.2 (residential) committee and is the alternate voting member for ASHRAE 90.1. Ms. Carey has worked on energy codes for nearly six years. Prior to DOE, she was the Resource Development and Outreach Program Manager at the Alliance to Save Energy's Building Energy Code Project (BCAP). While there she created and developed an online information sharing website for the codes community. She has a B.S. in Psychology from the University of Houston and a M.A. in International Relations from the University of London, Royal Holloway.

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DAVID CONOVER has graduate and undergraduate degrees in Mechanical Engineering. He has been involved with the development, adoption, implementation and enforcement of building construction regulations, focused primarily on energy use and technology acceptance, since 1976. He has been involved with the building industry at the global, national and local level, including work with ISO and IEC on standards development, as an employee of the International Code Council helping other countries adopt and implement the ICC model codes, and with the World Federation of Technical Assessment Organizations on conformity assessment issues.

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ADAM COOPER manages electric efficiency research projects at IEE, an Institute of the Edison Foundation focused on advancing the adoption of innovative and efficient technologies among electric utilities and their technology partners that will transform the power grid. Prior to joining IEE, Mr. Cooper was a consultant that developed regional economic analyses in the fields of environmental regulation, tax policy, economic development, transportation, and the automotive industry for the private sector, local, state, and federal U.S. governments and the European Commission. Mr. Cooper received a Masters in Public Policy from the University of Michigan and Bachelors of Arts in Economics and History from Brandeis University.

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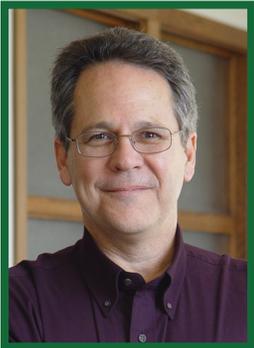
BEN EDWARDS works with Mathis Consulting Company in energy efficiency and sustainability. He focuses on national code and standards development, and the efforts to bring those models to jurisdictions. Currently, he is creating educational programs for stakeholders, providing technical assistance for regulators and industry interests.

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ISAAC ELNECAVE MEEA Senior Policy Manager for Codes – Isaac came to MEEA with extensive codes experience working with the Northeast Energy Efficiency Partnership. He is nationally recognized for his codes work and has grown MEEAs codes team to four full-time staff. Isaac has led statewide codes coalitions in Illinois, Iowa, Indiana, Michigan, Minnesota and Ohio. His expertise includes code development and adoption, and strategies to increase code enforcements and compliance.

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DEANE EVANS is a registered architect and currently directs the Center for Building Knowledge (CBK) at the New Jersey Institute of Technology. He has over 30 years of experience in creating and disseminating information on high performance buildings; including jobs as: Senior Principal at Steven Winter Associates; Vice President for Research at the American Institute of Architects in Washington, DC; and the founding director of the Partnership for Advancing Technology in Housing (PATH) program at the US Department of Housing and Urban Development. Mr. Evans is a Fellow of the American Institute of Architects and currently serves as the Vice Chair of the Sustainable Buildings Industry Council in Washington, DC.

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ROXANNE GREESON joined SEEA as an Energy Policy Associate in April 2012, after garnering deep experience in the energy codes and green building programs working for the Southface Energy Institute. Roxanne is a LEED Green Associate and graduated summa cum laude from the Georgia Institute of Technology in Industrial Engineering.

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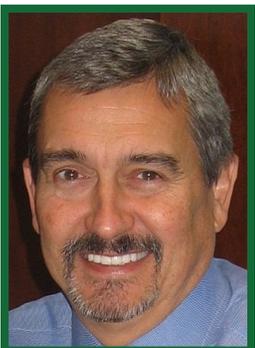
CHARLIE HAACK is a consultant with ICF International, where he employs his educational background in building science in energy efficiency policy development, demand side management studies, and utility energy efficiency program implementation. Mr. Haack has also provided technical programmatic support for the U.S. EPA's ENERGY STAR Certified Homes program since 2010. Prior to joining ICF International, Mr. Haack served as ASHRAE's public policy intern in Washington, DC.

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SHERRY HUBBARD joined AEP Ohio in August, 2009 as Education & Training Coordinator for energy efficiency and peak demand reduction. As R&D Coordinator, her current responsibilities include developing pilots to examine technologies and program designs for incorporation into AEP Ohio's 2015-2017 portfolio. Prior to joining AEP, Sherry had served as the Ohio Energy Office Chief for the Ohio Department of Development. Ms. Hubbard is a graduate of The Ohio State University with an MBA, and a BSBA in Production and Operations Management.

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DAVE KARMOL is Vice President for Federal and External Relations at the International Code Council. He has responsibility for managing the Council's relationships with Congress, Federal agencies, and outside organizations. Prior to joining the Code Council, Mr. Karmol was the NIST Standards Advisor to Iraq, stationed at U.S. Embassy Baghdad for one year, where he was detailed by the U.S. Department of Commerce. He previously served five years as Vice President, Public Policy and Government Affairs at the American National Standards Institute (ANSI).

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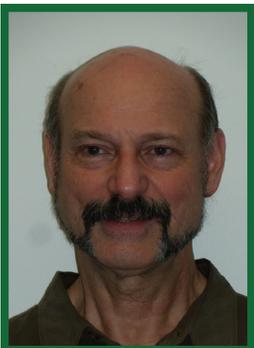
ALEISHA KHAN has over 13 years of experience in program management promoting energy efficiency in commercial and residential buildings, and over 20 years working broadly in the building and environmental sectors. Ms. Khan is a Principal with ICF and is the technical advisor for global energy efficiency projects under ICF's clean energy Leaders with Associates cooperative agreement with USAID. Prior to joining ICF, she served as the executive director of the Building Codes Assistance Project (BCAP).

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ERIC LACEY has served for the last 7 years as Chairman of the Responsible Energy Codes Alliance. He has been involved in the process of energy code adoption and implementation in over 40 states. This work has included oral and written advocacy for the IECC, as well as drafting legislative or regulatory language to bring about the effective adoption and implementation of these codes. Eric also serves on the ICC Industrial Advisory Council and the ICC Sustainability Membership Governing Council.

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ALLEN LEE is an executive director at Cadmus. He has 30 years of experience in energy-efficiency program design, implementation, and evaluation. He currently leads Cadmus' energy codes and standards business area and has managed 10 code program studies.

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MARK LESSANS is a Fellow with the U.S. Department of Energy Building Technologies Program, where he manages energy code development, adoption, and compliance programs. Prior to joining DOE, Mark was a Senior Associate at the Building Codes Assistance Project, working on technical analyses, strategic plans, and consumer outreach programs at the state and local levels. Mark received his B.S. in Architecture from the University of Maryland and is currently pursuing a Masters in Engineering Management from George Washington University.

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ALISON LINDBURG is a Senior Policy Associate at Fresh Energy, where her work focuses on energy efficiency related to buildings and the built environment. She holds a BA in architecture with a focus on sustainable design from the University of Minnesota, Twin Cities, is a LEED AP, a member of Minnesota GreenStar Technical Advisory Committee, and chair of the Residential Committee of the Minnesota Chapter of the USGBC. She has been featured in state and nationally syndicated media outlets, and authored numerous reports on green buildings for Minnesotan communities.

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BING LIU P.E., is a Chief Engineer at the Pacific Northwest National Laboratory (PNNL). She is also the Manager responsible for the PNNL's Building Energy Codes Program. Ms. Liu has more than 18 years of experience in building energy efficiency analysis, codes and standards development, and high-performance building metering and measurement.

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JAMES LYONS P.E. of Newport Partners is a senior researcher in building performance research and energy efficient design. He focuses on advanced technology development and implementation, codes and standards training and education, and working with industry partners to improve both code compliance and overall building performance.

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SEAN MACDONALD is a project manager and senior economist in the Energy and Environmental Division at PNNL with 29 years of experience in the energy sector. He has extensive strategic, multi-year, and performance-based, planning experience using both in-house developed and formal Balanced Scorecard (BSC) methodologies. He has adopted and applied Stage-Gate® processes for the management of R & D projects. Sean has performed program evaluations with application to the Government Performance and Results Act (GPRA) and the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART).

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