

Building Codes Assistance Project & Energy Foundation Second Roundtable on Energy Code Compliance and Evaluation



BACKGROUND

BCAP held a second roundtable discussion (co-hosted by the New York State Energy Research and Development Authority (NYSERDA)) in Albany, NY in June 2009. The audience was comprised of a broader collection of stakeholders than the first roundtable, including representatives from several states (Texas, New Hampshire, Illinois, Vermont, and Massachusetts), national advocacy groups like the Natural Resources Defense Council, the American Council for an Energy Efficient Economy, and the Institute for Market Transformation, and code development organizations such as the International Code Council (ICC), the Massachusetts Board of Building Regulations and Standards (BBRS), and the New York State Department of State.



Courtesy of DOE/NREL, Warren Gretz

Also in attendance were representatives from state energy efficiency programs, third party code inspection organizations, code officials, public service commissions, and builder/contractor groups, all of whom are directly involved in residential and/or commercial energy code work in their respective areas, either nation-

ally, regionally, or both. In total, 37 participants from across the energy code spectrum attended, providing us with a more balanced discussion than the first roundtable, which was more heavily weighted towards the residential sector.

We primed the group with information intended to draw their thoughts and encourage feedback during the roundtable discussion, including a presentation on the summary of the first roundtable. We also provided the audience with new ideas and models for compliance that were developed during the 1st roundtable (See Roundtable 1 summary). BCAP then provided the Pacific Northwest National Lab (PNNL) with an opportunity to deliver a presentation on its progress in developing the United States Department of Energy's (DOE) national guidance on meeting the 90% compliance target outlined in the energy code provisions of the American Recovery and Reinvestment Act (ARRA) 2009.

OVERVIEW

The second roundtable yielded markedly broader results than the first. This was due in part to the diverse constituencies in attendance. The attendees also received a summary of the first roundtable several weeks beforehand, which allowed them to organize their thoughts and develop follow-up questions prior to attending. The focus of the roundtable was to discuss improving compliance and measuring the efficacy of energy codes. The group had the opportunity to discuss ARRA, and its impacts and implications. This provided some interesting insight into the progress of PNNL's work. *For context and a greater understanding of this summary, it is important that the reader reference the preceding first roundtable summary and introduction document.*

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DOE COMPLIANCE STRAWMAN

Mark Halverson of PNNL presented an overview of the work underway to develop guidance documents for the “90 percent compliance requirement.” Mark presented the current status of the PNNL guidance work as follows:

- PNNL and DOE are developing guidance for the “90 percent compliance” measurement to help increase the consistency of measurement across the country.
- Although the first DOE strawman tended to focus on compliance measurement methods that didn’t rely much on labor-intensive field measurement, feedback stressing the need for field verification has influenced PNNL to place a greater emphasis on it. For example, it was initially intended that the compliance data could somehow be collected electronically without inspecting actual buildings in the field to gather data on whether or not they complied with the energy codes. Since then, PNNL has included the need for in-field compliance verification of actual buildings as a major component of their guidance.
- PNNL is looking at different systems for determining a “statistically valid” sample, based on building types and sizes.
- One approach PNNL is considering to determine a state code’s overall efficacy is to compare its performance against a “top 20” checklist of energy code compliance problem areas.
- Generally, the group was concerned that focusing on specific checklists that either addressed major problem areas in code compliance measurement

(e.g. duct sealing, insulation installation, etc.), or on greatest areas of energy usage intensity, might draw focus to just those areas in enforcement, thereby diluting the overall impact of energy codes down the line.

- Mark clarified that states did not need to measure energy cost savings and job creation for ARRA compliance.

PNNL received some excellent feedback from the roundtable group, especially in the area of defining how to sample building compliance and its future impacts on overall energy code efficacy . PNNL later invited this roundtable audience to join the “90 percent strawman” comment group, an unanticipated but welcome outcome of the event that gave our attendees the opportunity to contribute to this important effort and expand PNNL’s access to qualified reviewers.



Courtesy of DOE/NREL, Building Science Corporation

COMPLIANCE

The compliance discussions focused on several areas of need that were identified by those in the energy code sector : 1) provide additional energy code infrastructure; 2) develop new and more effective training and compliance tools; 3) create multiple consumer

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and stakeholder “value propositions” and, finally 4) run pilot projects to test and develop solutions to the needs identified. In more detail:

1. Provide Additional Energy Code Infrastructure:

- Should an additional layer of more highly trained professionals be added to the existing infrastructure? The concept of Energy Code Professionals (ECPs) is gaining interest and action in Massachusetts and around New England. ECPs are generally third party inspection service professionals, such as energy raters in a HERS-As-Codes model or true 3rd party commissioning agents acting in support of code enforcement. The HERS-As-Codes model uses home energy rating system (HERS) certified raters that have received additional training in local or state codes. Since code enforcement is often not well supported, concern arose with how ECPs might be paid for. Several attendees indicated that splitting responsibility between ECPs and code enforcement officials (CEOs) would need to be well defined so that the



Courtesy of DOE/NREL, Warren Gretz

roles of both parties were understood. Might this infrastructure development fit in the community energy efficiency management (CEEM) concept?

- Third-party and special inspections¹ are crucial for code compliance, generally, and can also be used for energy code compliance. Private sector resources exist in this area but they have not been marketed well. Only a small portion of municipalities use this option; even very sophisticated building departments don't have the expertise to evaluate energy code compliance fully. We need a better definition of what these services are and how they might be better accessed by jurisdictions. Further, the role of commissioning and how to adapt it as a third party process, where plan review for energy code is utilized early in the design phase, was cited as a possible compliance improvement. This would help assure that commissioning agents are utilized early-on in the compliance process so that energy design is positively impacted.
- The opportunity to use HERS-As-Code compliance needs to be researched, defined, and utilized in a well-organized manner. How and where raters fit into the process, and how the rating process can be best integrated with code compliance needs investigation. Raters perform comprehensive testing and inspections, as well as plan reviews on homebuilding projects, usually for Energy Star or similar residential advanced homes programs.

1– **Third party inspector** (3rd party; Agent of jurisdiction): Independent consultant will do a task on a particular job when asked by the community. These individuals may have broad area of expertise and can evaluate multiple components of a building.

Special inspector (SI; Agent of building owner): Individual is required by code to perform an inspection or series of inspections. This individual has specific component of building that he/she can evaluate. SI reports on this particular component only.

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Tapping into this infrastructure, where it exists where it might be easily developed, can have the impact of improving code compliance while taking some of the plan review and inspection burden off of code officials. We need to explore whether this could be paid for through utility and other efficiency programs that currently use this infrastructure for beyond-code programs.

- Energy code “mentors” could be added to the compliance stream. The construction industry includes many potential players that could influence energy code compliance and efficiency decisions in the design and construction process, including building supply houses (estimators, outside sales people), and the design community (architects and engineers). For example, interested designers who receive additional training in energy codes and have an interest in mentoring their peers could be designated as energy code mentors for their community or region. Estimators and field sales people from building supply houses trained in efficiency and energy codes could provide input on code and beyond-code energy efficiency decisions when builders, developers, and consumers come to them for pricing on materials for homes. They may even support such services by charging a nominal fee for preliminary energy code plan review, as well as provide actual preliminary compliance advice, thereby creating a sustainable support infrastructure.
- The idea of community energy efficiency management (CEEM) is another way to expand the infrastructure of stakeholders that can influence energy efficiency and proper energy code compliance; a topic of major interest to the whole group when introduced by BCAP. Community energy efficiency management is a concept whereby energy efficiency professionals are trained in energy code



Courtesy of DOE/NREL, University of Texas at Austin

mentoring and provide assistance to communities with overall energy planning. They can provide expert guidance and hands-on training to local code officials in order to raise their general knowledge and provide answers to difficult energy code implementation issues. This effort can be further sustained if the CEEM integrates this work with community energy efficiency planning, and local, state and Federal efficiency and incentive programs. Energy savings identified by the CEEM service could pay for those services to the community, thus achieving sustainable support for both codes and other efficiency efforts.

- Finally, the interrelated roles of the code enforcement officials (CEOs), builders, and designers with special third party energy code compliance agents/agencies must be better defined if the potential benefit of adding this new infrastructure element is to be fully realized.

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2. New and better tool and training development/ deployment:

- The PNNL compliance tools REScheck and COMcheck have made considerable headway in improving energy code compliance over the years. Feedback from the field has taught us that these are excellent tools and that they have improved compliance greatly. The downside and concern is that REScheck will be less flexible as the code becomes less flexible. This means that care needs to be taken to maximize its usability. It was suggested that REScheck needs to better reflect the performance compliance approach, which allows greatest design flexibility of all the code compliance methods in the IECC.
- Texas A&M ESL is developing the International Code Compliance (IC3) software to not only demonstrate compliance for the IECC residential requirements, but for gathering, compiling and reporting data up to DOE for the ARRA “90 percent compliance” metric. Should the private sector be encouraged, even incentivized, to provide this service and support? Is this primarily a DOE role? Should DOE provide criteria and guidance for private sector support and software development? These questions were left open at the end of the meeting.
- Many CAD programs are now available that integrate codes into their boilerplates; can we promote this use more consistently for the energy codes? There may be some ways to automate some of the compliance process into the more complicated building design process. Also, working freeware energy efficiency guidance tools --like EPA’s “Target Finder”-- into design tools to help optimize design based on energy efficiency gains can yield energy code and overall energy efficiency design

benefits. This must be accompanied by advanced training. Otherwise, this approach could allow for major “gaming” to evade compliance if code officials or other third party reviewers don’t understand these technologies.

- There was considerable agreement that in light of ARRA and the American Clean Energy and Security Act of 2009 (ACES), there should be a big push to take on the development of tools in a coordinated manner among the states. Like ARRA, the ACES Bill and its Senate companion legislation provide significant direction to adopt even more stringent codes with stricter compliance targets, along with financial support for their implementation.



Courtesy of DOE/NREL, Warren Gretz

- Research, develop, and promote new methods of training for all stakeholders. End “silo training” (i.e. the habit of training builders, CEOs, and designers separately) and bring the same message/information to all stakeholders. Work with circuit riders (trainers who travel from jurisdiction to jurisdiction supplying hands-on, in-the-field training and onsite training) and other in-field, onsite, and

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distance learning methods to expand the accessibility of training and make it easier for busy stakeholders to receive it.



Courtesy of DOE/NREL, Eric Telesmanich

3. Create consumer and stakeholder “value propositions”:

- The roundtable discussion identified the need to create better consumer awareness and demand to promote additional compliance. One example of this is the Town of Bedford, NY, where Energy Star was adopted as the residential energy code. The REMRate software utilized to demonstrate compliance contains carbon savings reports which are used to create an incentive for homeowners and builders to build more efficient homes. The greater the energy efficiency and carbon savings reached, the lower the permit fees charged by the Bedford building codes department. Homeowners tend to think that energy efficiency happens automatically through the codes, which we know is not true. We also need to create time-of-sale consumer informational pieces so that consumers can express a demand for fully demonstrated, transparent energy code compliance from builders and developers.
- CEOs are charged with, and pay most attention to,

the enforcement of the “life-health-safety” (l/h/s) codes, like fire, mechanical, and plumbing. Energy efficiency is secondary in that scheme. There is a need to promote the l/h/s elements of energy codes, including their positive impacts on carbon savings and global warming, occupant comfort, and building operation and ownership costs.

- Communities from states down to towns and villages need to be educated on the importance of energy codes through increased levels of outreach to all stakeholders, including decision-makers. They should be reinforced by incentives (i.e. via Waxman-Markey) in national, state and local policy. For example: performance on energy code compliance could be linked to state access to federal funding for infrastructure as an incentive to perform better.



Courtesy of DOE/NREL, Kenneth Shipp

- There is a need to determine whether or not the adoption of advanced codes has had a positive impact on code compliance in jurisdictions where they are adopted. There was some indication that this had happened from members of the audience, and we need to track that information. At the same time, we also heard that EPA is specifically discouraging the adoption of Energy Star as code in

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jurisdictions, even though it has already been adopted in many communities. Can we do a better job of coordinating?

- Codes implementation needs to be bought into at the grassroots level in order to have lasting impact. Jurisdictions and states should bring all affected parties into the discussion. To this end, stop “silo” training and outreach by engaging all stakeholders; i.e. elected officials, developers, CEOs, builders, designers, contractors, homeowners, etc.



Courtesy of DOE/NREL, Warren Gretz

other NY towns, and other jurisdictions. There is need and interest in testing a model in VT, MA, ME and NY. These states have either included such approaches in recent legislation (MA, ME), or are faced with the need (VT), or are interested in measuring the impacts to improve compliance (NY, TX, FL, MN). The most extreme example and need is VT, where legislation to adopt the 2009 IECC and follow ARRA compliance requirements has been passed, but where there is currently no code enforcement infrastructure. There are many states nationwide with weak or sparse code enforcement infrastructures; VT may provide a valuable and replicable model for these places. BCAP, NEEP, VEIC, DOE and others are engaging in a discussion of a pilot project.



Courtesy of DOE/NREL, FEMA

- 4. Pilots:** In response to feedback and needs heard from the roundtable audience, BCAP has proposed some ideas for pilots. These pilots will be featured as discussion topics for further feedback at roundtable 3. This will help gain further input from many state and regional players that are already working on these issues.
- Research existing HERS-As-Codes compliance systems at work in other states and jurisdictions and conduct a well-informed, coordinated pilot to test and design the system with benefits and lessons learned from all current and past examples. Examples of this model are being used in CA, FL, Austin, Texas (TX), Long Island, New York (NY),

- Pilot other potential third party compliance models such as commissioning with true third parties or special inspections through A&E or other firms, and develop guidance criteria for those systems. BCAP is currently researching and developing some guidance for the state of ME, and has discovered that this option needs much clarification and development for use with energy codes. The criteria development may be complicated and require

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Courtesy of DOE/NREL, Bill Timmerman

new and advanced standards for certification and consistency. This topic needs further study. MA, NY, NH, and TX are interested.

- Research and report on the impacts of advanced codes on overall code compliance. Select 2 or 3 jurisdictions that have adopted advanced codes and measure the compliance in those jurisdictions. Assess what training and other mechanisms exist in those advanced code jurisdictions that might have contributed. We have heard from TX representatives that they have observed such positive impacts in TX where advanced codes have been adopted; BCAP is following up.
- Develop and conduct training assessments to determine what new or existing training models work best and pilot them to determine their potential for improving training efficacy. BCAP is in conversations with MA, NY, and NEEP on this.
- Pilot an Energy Code Professional (ECP) specialist position in a jurisdiction with a portion of the salary funded by a grant, the remainder funded by the jurisdiction or some other market-based means. This energy code specialist's work might be conducted in conjunction with other efficiency duties,

or as a stand-alone. This might be worth integrating with the BCAP community energy efficiency management (CEEM) model as one approach. NYSERDA and BCAP have had some discussions about this; the model will be discussed further at the US-DOE "Energy Codes 2009" National Conference in Portland, and roundtable 3. Likewise, other code infrastructure additions such as energy code mentors should be investigated during the pilot.

- There were suggestions that BCAP should convene a national working group to guide the compliance pilot development coming out of these roundtables.

EVALUATION

The discussion was generally less animated around the issue of evaluation, except for one subject that the entire audience agreed on; we as a sector need to get a much better handle on the impacts and efficacy of energy codes in terms of energy and carbon savings as well as in overall compliance. This data is essential to helping "sell" energy codes and achieve sustainable, long-term support. To summarize the major points that arose: 1) utilities need to be more involved; 2) we may be missing the boat for improving evaluation through ARRA 90% compliance guidance by focusing on code compliance alone; 3) there is a need for a more in-depth national dialogue on energy code evaluation; and 4) we need to pilot new approaches to evaluation.

1. Utilities need to be more involved in energy code evaluation (and energy code support).

- For the most part, utilities have been disinclined to be involved in energy codes implementation in the past. We need to determine why this is. Is it because energy code savings were assumed

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(incorrectly in many cases) to be accruing at high rates because they are required? Utilities have generally not received credit for energy codes savings in state public benefit (PBF) or demand side management (DSM) programs. Utility PBF and DSM programs are funded by electric utility rate charges and administered through the utilities and their ratepayers to provide “credits” to the utilities for their involvement and offset the costs of their investment. Explore the CA model where utilities are credited for energy codes and develop methods to take that model nationwide. Research the National Action Plan for Energy Efficiency (NAPEE) and the “CA Model”; <http://www.epa.gov/cleanenergy/energy-programs/napee/index.html> the paradigm that doesn’t allow utilities to receive credit for energy code investments needs to change .

- Energy code advocates, adopters, administrators, and implementers need to connect more closely with the energy efficiency evaluation arena to help establish consensus guidelines for energy code evaluation; one example is the National Evaluation Conference; (www.iepec.org)

2. ARRA and DOE: are we “missing the boat” with the compliance requirements?

- Should there be a closer connection between the ARRA 90 percent compliance guidance being developed and current energy efficiency program evaluation models that measure savings in energy and carbon savings?
- Can DOE or others emphasize a closer connection with evaluation of energy codes and measuring their efficacy in terms of energy savings in setting out the 90 percent compliance guidance? There is concern that by using checklists or concentrating

on ranked “top 20” code compliance problems to measure state compliance, we may diminish the overall impact of energy codes when the word gets out. Is it therefore necessary to connect with energy measurement this time around, or is simple compliance worthwhile?

- Should concerns about this potential disconnect be carried to the lawmakers through Waxman-Markey or other means? Since it may be too late via ARRA, do we need to express this need to policy makers soon? Evaluation is costly, too. Perhaps we need to provide greater incentives for better energy code evaluation via national policy efforts.



Courtesy of DOE/NREL, Eric Telesmanich

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3. *We need to start a national dialogue.*

- The attendees generally agreed that a national standard or guidance for doing energy code evaluation needs to be developed to create some consistency.
- There was an assertion made during the discussion that there is no accurate means by which to evaluate the actual performance of buildings relative to energy codes or other models. Do we need to assess this? There seemed to be considerable disagreement on this point, however no consensus on an answer or next step.



Courtesy of DOE/NREL, David Springer

4. *Pilots to respond to needs.*

- Pilot an evaluation model with a community or region to test some of the concepts above. This may be worth an evaluation working group approach. Look at the DC model (which uses Target Finder) and the “Canadian” model (needs further research and definition). Include development of model energy use indices (EUI) and true building performance measurements. Investigate how this might be integrated with the ARRA 90% compliance guidelines.

- Find funding for a national program to engage energy code evaluation more actively in the national energy efficiency evaluation effort through the International Energy Program Evaluation Conference (IEPEC), and related organizations representing that industry. Efficiency program evaluators in the audience indicated that while there are widely recognized protocols for the measurement of energy savings from single projects (IPMVP, FEMP M&V Guideline, ASHRAE Guideline 14), these need to be further researched and understood. There are no similar widely accepted protocols or guidance documents for measuring energy savings from programs, including energy codes.
- Create a National Energy Code Evaluation Working Group. Work with ASHRAE or other organizations to develop an energy code evaluation standard. Promote the use of the standard within state energy efficiency programs and programs to track carbon emissions reductions.



Courtesy of DOE/NREL, IBACOS

For more information please consult the Building Codes Assistance Project website at www.bcapi-energy.org