

Final Report

Energy Efficiency Improvements through the North Carolina Building Code

Submitted to:

North Carolina Governor's Office
North Carolina State Energy Office

Compiled by: Mathis Consulting Company

Edited by: Appalachian State University Energy Center

October 1, 2009



INTRODUCTION

In June of 2008, The National Governor's Association awarded North Carolina \$50,000 towards this state's effort to increase energy efficiency and conservation in all buildings by accelerating and improving compliance with the existing Energy Code and by ensuring that new versions of the International Energy Conservation Code (IECC) are adopted by the state in a timely fashion. With that money, and the state's matching funds of \$27,250, a code official training program was developed and conducted across the state.

This work has now been completed and has been wildly successful at both the specific task level and the broader policy goal level. We were able to provide trainings, which were very well received, to more than twice the projected number of people. Furthermore, the National Governor's Association Grant was instrumental in obtaining subsequent funding supporting the same broad goals of driving energy efficiency improvements through the North Carolina Building Codes. Not only did significant education of code officials, builders and designers occur as a result of this grant but through this work we identified significant lessons learned and next steps. Some of lessons have already been implemented in on-going programs. Others will require additional funding.

ACCOMPLISHMENTS

- Provided training to almost one quarter of North Carolina's building officials
- Provided first ever training on the energy conservation codes for 16% of those responding to survey
- Designed and conducted Field Days for building code officials allowing them to integrate classroom learning with real life situations
- Collected invaluable data on the status of enforcement and the needs for improving energy efficiency compliance

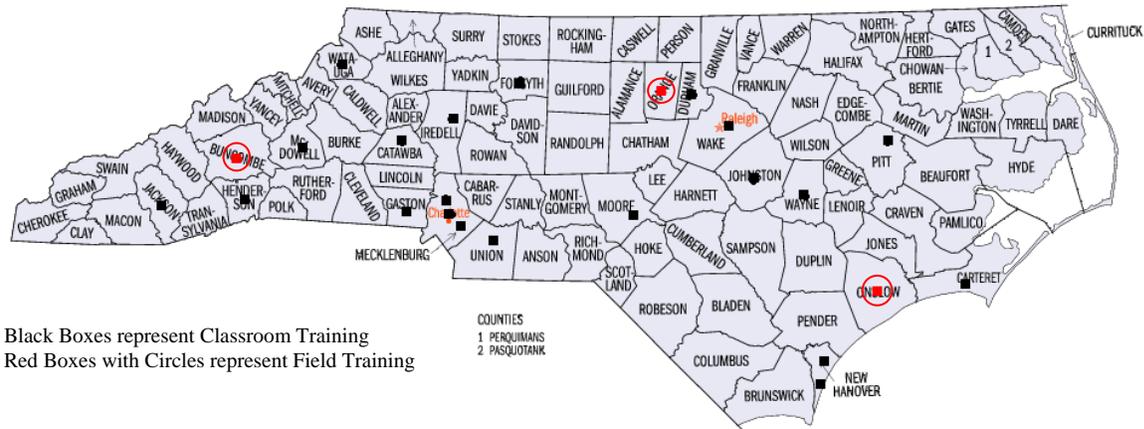
The primary activity supported by this grant was 22 sessions of energy code training designed for building code officials to cover the existing and upcoming codes for the State of North Carolina. While designed for code officials, the trainings were appropriate for builders and designers and in many cases builders and designers attended. We had anticipated providing 20 classroom trainings but were able to provide two additional trainings – improving our state wide coverage.

One of the critical elements of this program was to bring the training to the code officials in or near their home jurisdictions. Each year the state's building code association provides three major regional training seminars around the state and approximately 10% of the state's 4000 code officials attend those trainings. While recognizing that these seminars were an important place to provide training, we were also aware that we needed to bring the training to the inspectors closer to home. Many jurisdictions are extremely limited in manpower and funding and need the trainings to be free and to involve little or no travel time. Thus, the design of the program attempted to bring trainings to as many building inspectors as possible. We did an analysis of the state's building trends to determine how much training it would be appropriate to provide in each area (see Appendix A). Unsure of what the response would be we anticipated that we would average 20 attendees per training with an expected goal of 400 people. We far exceeded this expectation; 1031 people attended the trainings. Nearly one quarter of North Carolina's building code officials attended the training.

At the end of each training, participants were asked to complete both a survey (Appendix B) and an evaluation (Appendix C). The evaluations were useful in continuing to improve the material as the program rolled out and gave us excellent feedback regarding the quality of the presentation. We used these evaluations for immediate program modification and improvement where needed.

The survey has provided a wealth of information which will be used in on-going code and program development, as well as to assist in shaping energy code policy objectives. For example: the first question on the survey was "How many hours of training have you had in the energy codes prior to this class?" Sixteen percent of the respondents had no energy code training prior to the class. If we remove the responses from the state's building association trainings and only look at responses from trainings at local jurisdictions the percentage goes up to 22%. We observe that substantial training is required to become a building code inspector but, to date, none is required in the area of the energy code inspection and compliance. This important point will be discussed further in the NEXT STEPS section of this report.

In addition to the classroom trainings, we conducted three Field Days across the state. We strategically positioned those trainings across the state, with one in the mountain region of the west; one in the central piedmont region and one in the coastal region (see Map).



These training were identified as “highlights” of the project for both trainers and participants. These “Field Days” allowed the code officials (and other “trainees”) to immediately apply their in-class learning to on-the-job field situations. Each participant noted that this element of the overall training program was invaluable. These Field Days were also valuable for the overall training program, helping to better shape the classroom lessons and added to our libraries many examples of critical energy code compliance issues, as well as common problem areas in both residential and commercial construction.

CONTRIBUTION TO BROADER GOALS

This project could not have been better timed. North Carolina’s Governor was eager to make an impact on energy efficiency and recognized that improving the efficacy and effectiveness of the minimum codes was crucial in that effort. This project initiated a focused effort on energy code education for code officials that will lead directly to improved enforcement. It is believed, though not yet quantified, that improved enforcement alone will generate significant energy savings for the state. These savings, coupled with a commitment to improving the NC energy code even further, should result in better energy and peak load management, reduce greenhouse emissions and better buildings for all North Carolinians.

This program:

- Supported North Carolina’s State Energy Plan’s call for evaluation of current compliance with the Energy Code and enhanced enforcement of the Energy Code at the local level.
- Contributed to State’s effort to improve the energy efficiency of its code by 30% thus potential saving North Carolinians over \$40 Million in energy costs.
- Paved the way for improvements in education and the professionalization of energy code enforcement.

While it was not the intent of this project to quantify the current energy code compliance levels, responses to the project surveys suggest that there is a great deal of non-compliance. The reasons for non-compliance ranged from insufficient education of builders and code officials to inadequate code enforcement funding to local prioritization of energy code enforcement.

In addition, we learned a great deal about common problems areas in energy code enforcement as well as some unexpected barriers to code enforcement.

For example, we asked the following question:

Having participated in this class, what do you think are the most common violations of the energy code that are typically overlooked?

The range of response almost covered every aspect of the energy code but the most frequent responses were:

- Gaps in insulation and improper installation
- Over sized equipment
- Improper or inadequate air sealing
- Window U-Factors, Unlabelled Windows

The code officials that took this training confirmed that often the most basic aspects of the energy code are being overlooked in the field.

Enhanced enforcement was already a priority of the state of North Carolina, thus the emphasis of this grant. However during the execution of this grant the stakes were raised by the passage of the American Recovery and Reinvestment Act and the requirement that states prove 90% compliance with the energy codes. Information gleaned during this training series suggests that North Carolina still has significant work to reach the ARRA 90% compliance target. On-going training at an annual level many times greater than this effort will be required to train the inspectors, builders, contractors, sub-contractors, designers, architects and all those who need to be trained to these standards if we are to establish such a high level of compliance.

Very soon after this grant was awarded, North Carolina applied for and received a grant from the Department of Energy, to produce a energy conservation code that is 30% more energy efficient than the 2006 International Energy Conservation Code (IECC). The existence of the training program support by the National Governor's Association was a part of North Carolina's commitment to its energy code that was instrumental in DOE awarding this grant. As work has proceeded on the DOE grant, we find that the information and connection fostered during the training program are invaluable. We anticipate that the new code will be adopted in 2011. The potential impacts of that code at 30% more energy efficient than the 2006 IECC per year are shown in the following table:

	Residential	Commercial	Total
Energy Bills (\$ million)	29	11	40
Electricity (million kWh)	227	112	339
Natural Gas (billion Btu)	655	136	791
Fuel Oil (billion Btu)	78	13	91
CO ₂ Emissions (1,000 tons)	167	69	236
SO ₂ Emissions (tons)	331	150	481
NO _x Emissions (tons)	188	65	253

LESSONS LEARNED/OBSTACLES ENCOUNTERED

- Much more energy code education, for all stakeholders is needed in North Carolina
- Institutional barriers exist which must be dismantled if North Carolina is to be successful in achieving high level of energy code compliance
- Significant variations exist in the resources of given jurisdictions with a marked distinction between rural and urban permit and inspection departments
- The code is not readily available to all, creating a significant impediment to enforcement

Another question on the survey was:

The State of North Carolina wants to make enforcing the energy conservation code a greater priority. What would be the most important thing the State can do to make your energy code enforcement job easier?

One response to this question stood out from all the rest – Education.

The building officials taking this training recognized that they need more energy code training and that all other stakeholders (builders, architects, developers, HVAC contractors, insulation contractors, window installers, etc...) need training as well. Energy provisions are not part of the curriculum for the required training for building code officials. If North Carolina is to achieve a high level of compliance with its energy code, the required curriculum must change.

Education must be widespread through the building community. However, energy code education for the building inspectors must become an even higher priority. Inspectors are often the front line in marketplace education – if for no other reason than they possess the education “power” of stopping a project. This “power of the red tag”, while immediately effective, is not the preferred approach to basic energy code education in the broader building community. This the need for the professionalization of energy code enforcement was one of the greatest lessons learned and will be discussed more in the NEXT STEPS section.

Additionally, building inspectors regularly point to the fact that North Carolina has no specific education requirements for anyone seeking a General Contractor’s license and there are no continuing education requirements for General Contractors. Code officials repeatedly stated their belief that GCs would benefit from – and should be required to take – continuing education similar to that required of the building inspectors. This may be a topic for future policy action in the state (and possibly across the country).

Other barriers that exist for effective education and enforcement became clearer as this project unfolded. For example, there is a marked distinction between the resources and training of building inspectors in the urban areas of North Carolina and inspectors in more rural counties. An inspector in an urban county is likely to have a computer in his truck by which he tracks all his inspections, acceptances, denials. He can call up the history of a particular project. In most rural counties, inspectors do not have mobile computers and some cases do not have desk computers. All records are still being kept on paper. In some of these poorer counties the inspectors share one set of code books.

These disparities not only create unintended barriers to effective energy code enforcement, they also have the unintended effect of having different levels of energy code compliance in different parts of the state. This can create a degree of chaos for builders and architects seeking to build or design for different areas of the state. It also makes local planning of energy and power needs significantly more difficult.

We acknowledge that the majority of the building activity underway is generally going on in the more urbanized areas with the better resourced inspection departments. Thus, educational programs must be tailored to meet the needs of both the urban and rural areas with the understanding that in order for poorer counties to take advantage of computer-based education or other important innovations, they may need assistance in obtaining the basic infrastructure.

Field training is one type of education that bridges that divide between the well-resourced and the under resourced inspection departments. Our training efforts to date have proven this to be extremely effective. As a result of these findings, we are currently expanding this part of the training programs under the DOE project.

Another unexpected, but significant, barrier to effective energy code enforcement is the lack of access to the code itself. Code books are expensive and some building departments cannot afford to provide a copy of the Energy Code to every inspector. One of the primary recommendations coming out of this program is to make the energy code available to everyone involved in the building process – especially the building officials. We believe that access to the energy code should be freely available to everyone in the building community. Access to the rules is essential to complying with them.

Another barrier identifies is the “language” of the code. The rules seem to be written in a language style that often makes it difficult for the reader (unless well versed in code-speak) to clearly and easily understand all of the requirements. “What does this paragraph really mean?” is a common question. And while the educational classes help to bridge some of the needed translation, this barrier may need to be addressed more aggressively – such as by rewriting the code into a more easy-to-understand style and structure, additional commentary/translation materials providing pictures and graphics for clarity, web-based training modules on topic-specific areas, and other possible tools and techniques.

NEXT STEPS

- Develop and adopt a North Carolina Energy Conservation Code that is 30% more efficient than the 2006 IECC
- Provide training to that new code, implementing innovative training techniques
- Develop and implement an energy code official training and certification program
- Review and revise other North Carolina codes to remove loopholes that undermine the intent of the energy conservation code
- Make the North Carolina Energy Conservation Code, Commentary and training materials available free to inspectors and to the public

The first two steps listed above are being addressed through the efforts of the DOE grant and matching funds, mentioned previously. We are currently in the final stage of developing the code; it will then need to go through the political and administrative process before adoption (anticipated in July 2011). Beginning next year, training around the new code will become available for builders, building inspectors and other stakeholders. While much of the training will be the traditional classroom style program, pilot projects of internet-based training modules and in-field training supported by mobile technology will be employed. We will be working to develop the most powerful and cost-effective mix of training for the future. Clearly the training needs will be much greater than the effort supported by this grant.

Developing an energy code official training and certification program is critical. The Energy Code must become part of the initial training of a North Carolina building inspector. This will require a revamping of the current training and certification program, which is administered by the Department of Insurance and overseen by the Building Inspectors Qualification Board. The State has identified that a portion of the stimulus money targeted to energy code enforcement will be used to develop this certification. If successful, this will go a long way in the professionalizing of the energy code.

As previously mentioned, an essential next step is to dramatically enhance and improve access to the Energy Code. It must be available to everyone in the building community. Making the North Carolina Energy Code (and potential other codes) available to inspectors and the general public for free or for a nominal cost, would go a long way in allowing for much improved compliance and enforcement.

Another future action needed is to assess other NC codes as to their connection to the improved Energy Code. For example, the North Carolina Rehab Code does not currently address energy performance, and allows for the redevelopment of an older building without any improvements in energy efficiency. Intended as a code that would encourage redevelopment over teardown, this code is often used exclusively to avoid the energy requirements. Ensuring that existing building improvements also appropriately consider energy efficiency is essential.

All of these steps should be taken before North Carolina faces the issue of measuring compliance. Ultimately the state will have to undertake that step, but the measures spelled out here, we already know are critical to success.

CONCLUSION

Historically, building codes have focused first and foremost on safety issues. The societal value of energy conservation has only become recognized relatively recently. As a result, energy code development and enforcement lag significantly behind the other codes. As a result of this grant and the efforts it has spawned, North Carolina has taken significant steps in closing that gap. However, the journey has just begun. Our initial steps have been very successful, but have also identified significant barriers the state must overcome to achieve its energy code objectives – for both new and existing construction. New educational tools and techniques, broader access to the code, improved enforcement, professionalizing energy code inspection are all necessary if we are to effectively measure compliance and accomplish our energy security objectives.

APPENDIX A

Preliminary Report

Energy Code Training Location Priorities Based on New Housing Projections by County and Region

For the Project: Energy Efficiency Improvements through the North Carolina Building Code

Submitted to:

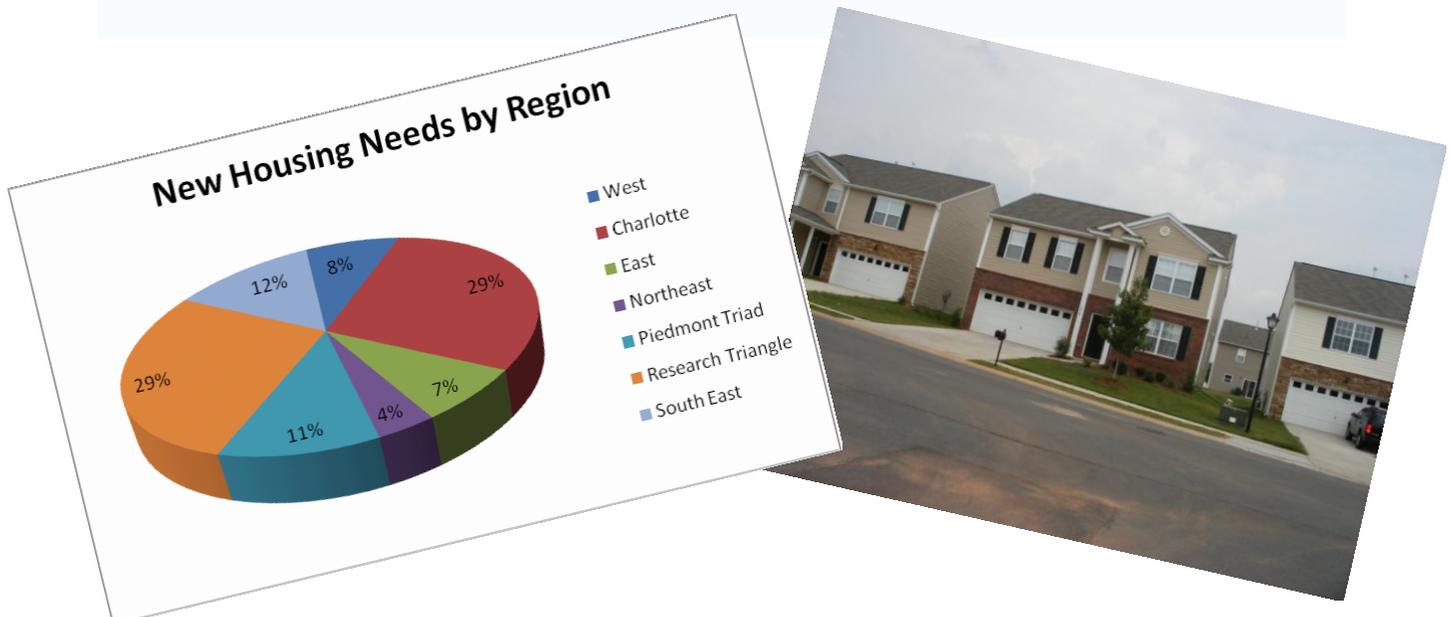
North Carolina Governor's Office

State Energy Office

Compiled by: Mathis Consulting Company

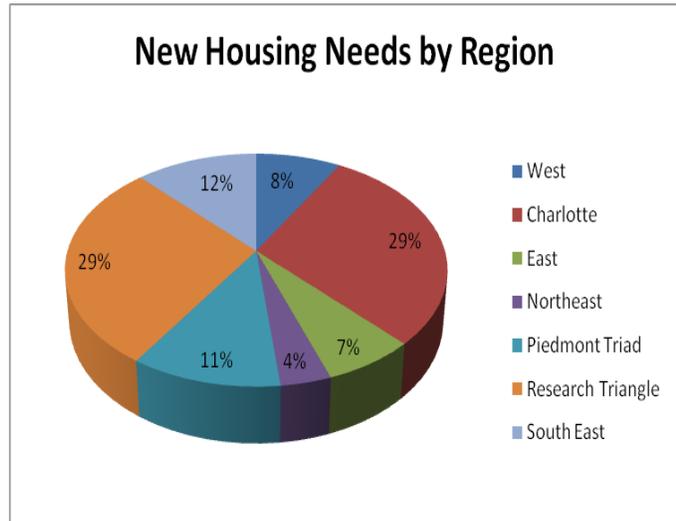
Edited by: Appalachian State University Energy Center

August 21, 2008



Introduction

Mathis Consulting Company is working with Appalachian State University to deliver 29 training seminars and 3 field training days for code enforcement officials and other target audiences. The intent of the training is to gain improved understanding and enforcement of the energy code. In order to achieve maximum impact, Task 1 of the project involves evaluation of housing data to determine which local jurisdictions should receive the highest priority for training programs.



We used housing and population data projections from the NC Department of Commerce (NCDOC) for the next 5 years to prioritize the training efforts. The NCDOC procedure uses population projections to estimate the need for new housing. The data analysis estimates that the state will require about 412,000 new housing units by 2012. Data is parsed into 7 geographical regions as shown.

As expected, the Charlotte area and the Research Triangle have the highest expected needs for new housing construction – together totaling to 58% of the state. The Piedmont Triad and the South East region (in the Wilmington area) are the next largest growth centers, totaling about 23% of the state’s new housing needs. The smallest growth is projected in the East and Northeast regions where economic

activity and population growth are both relatively low.

	Estimated Number of New Homes Needed in the Next 5 Years	% of Total	# of Training Programs
West	34,592	8%	2-3
Charlotte	121,181	29%	5-6
East	27,749	7%	1-2
Northeast	15,148	4%	1
Piedmont Triad	45,108	11%	2-4
Research Triangle	118,020	29%	5-6
South East	49,768	12%	2-3
Totals	411,566	100%	20

Based on the percentage of the total population, we propose to conduct the number of training programs shown to the left. The range would allow

flexibility based on both interest in the training and need based on inspections of local housing quality conducted as part of a separate project.

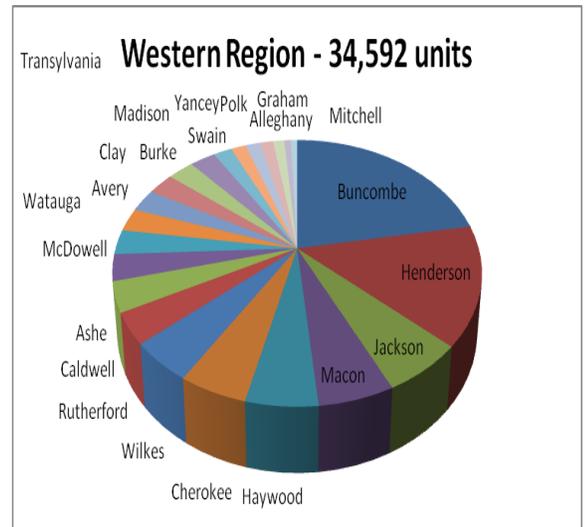
We will focus our efforts on the largest jurisdictions (cities and counties) in each region, but promote the training sessions to code enforcement officials in the outlying jurisdictions to participate. Since the total number of workshops to be conducted is 29, we will have an additional 9 workshops to target areas with strong interest and need, which may include some smaller jurisdictions.

Training by Region

West Region

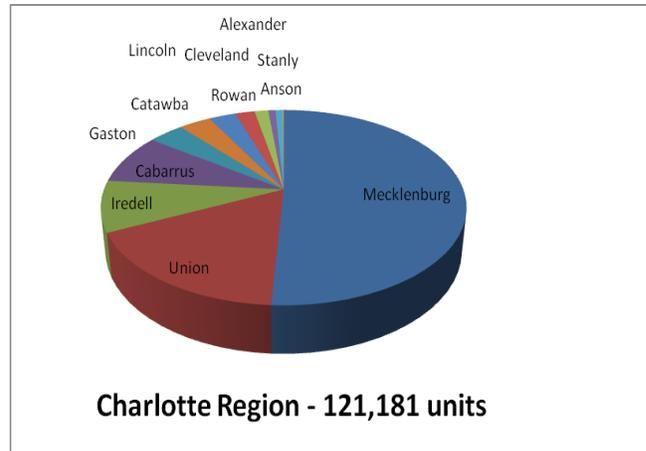
The West Region has the counties shown in the table to the right. The data projects a total of 34,592 new housing units, 8% of the state total.

West Region		
Primary Counties	Estimated New Homes Needed	% of Total
Buncombe	7,670	7.30%
Henderson	5,009	10.00%
Jackson	2,136	9.40%
Macon	1,946	8.30%
Haywood	1,845	5.80%
Cherokee	1,758	11.00%
Wilkes	1,666	5.30%
Rutherford	1,291	4.10%
Caldwell	1,265	3.50%
Ashe	1,116	7.50%
McDowell	1,044	5.20%
Subtotal	26,746	77.32%
Secondary Counties		
Watauga	982	3.80%
Avery	971	7.20%
Clay	952	14.30%
Burke	938	2.40%
Transylvania	920	5.40%
Madison	659	6.10%
Swain	539	6.80%
Yancey	527	5.00%
Polk	482	4.80%
Alleghany	408	5.80%
Graham	236	4.30%
Mitchell	232	2.80%
Subtotal	7,846	22.68%
Total	34,592	



Charlotte Region

The Charlotte Region has the largest number of projected housing needs, over 120,000 units, about 29% of the total. Four counties make up about 85% of the region's needs – Mecklenburg, Union, Iredell, and Cabarrus.

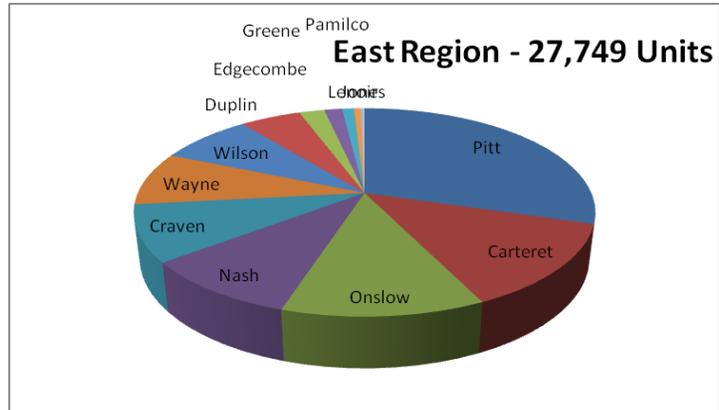


Charlotte Region

Primary Counties	Estimated New Homes Needed	% of Total
Mecklenburg	61,688	16.60%
Union	20,718	31.20%
Iredell	10,273	15.80%
Cabarrus	10,171	15.40%
Subtotal	102,850	84.87%
Secondary Counties		
Gaston	4,521	5.20%
Catawba	4,104	6.20%
Lincoln	3,450	11.30%
Rowan	2,524	4.30%
Cleveland	1,752	4.10%
Alexander	937	6.00%
Stanly	905	3.50%
Anson	138	1.30%
Subtotal	18,331	15.13%
Total	121,181	

East Region

The Charlotte Region has the largest number of projected housing needs, over 120,000 units, about 29% of the total. Four counties make up about 85% of the region's needs – Mecklenburg, Union, Iredell, and Cabarrus.

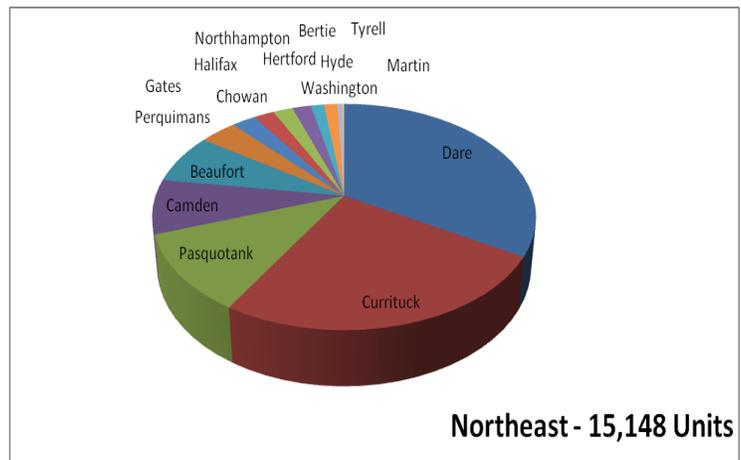


East Region

Primary Counties	Estimated New Homes Needed	% of Total
Pitt	8,248	29.72%
Carteret	3,654	13.17%
Onslow	3,326	11.99%
Nash	2,657	9.58%
Craven	2,437	8.78%
Wayne	2,310	8.32%
Wilson	2,173	7.83%
Subtotal	24,805	89.39%
Secondary Counties		
Duplin	1,416	5.10%
Edgecombe	588	2.12%
Greene	415	1.50%
Pamilco	282	1.02%
Lenoir	149	0.54%
Jones	94	0.34%
Subtotal	2,944	10.61%
Total	27,749	100.00%

Northeast Region

The Northeast Region has the smallest number of projected housing needs – 15,148 units, which only represents 4% of the total. Five counties make up about 85% of the region’s needs – Dare, Currituck, Pasquotank, Camden, and Beaufort.

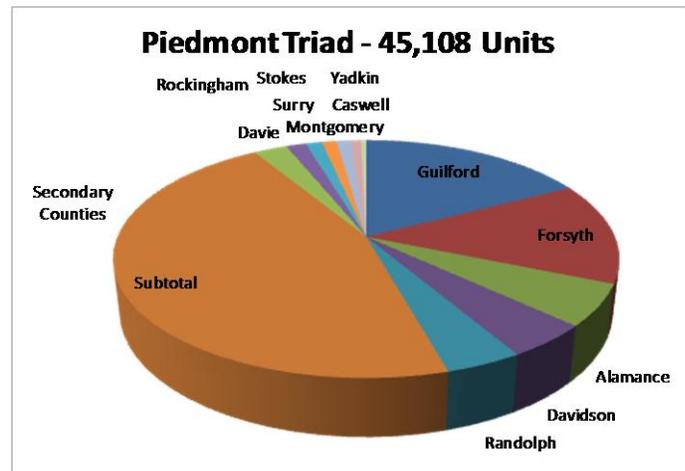


Northeast Region

Primary Counties	Estimated New Homes Needed	% of Total
Dare	5,069	33.46%
Currituck	3,802	25.10%
Pasquotank	1,671	11.03%
Camden	1,179	7.78%
Beaufort	1,091	7.20%
Subtotal	12,812	84.58%
Secondary Counties		
Perquimans	563	3.72%
Gates	366	2.42%
Chowan	310	2.05%
Halifax	302	1.99%
Northhampton	286	1.89%
Hertford	202	1.33%
Bertie	200	1.32%
Hyde	48	0.32%
Washington	37	0.24%
Tyrell	21	0.14%
Martin	1	0.01%
Subtotal	2,336	15.42%
Total	15,148	

Piedmont Triad Region

The Piedmont Triad has the fourth highest number of projected housing needs – 45,108 units –which represents 11% of the total. Two counties make up about 57% of the region’s needs – Guilford and Forsyth, with Alamance, Davidson, and Randolph being the other primary counties.

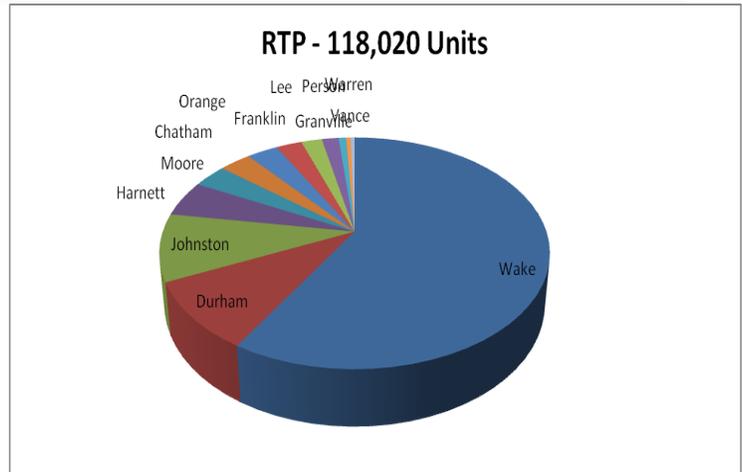


Piedmont Triad Region

	Estimated New Homes Needed	% of Total
Primary Counties		
Guilford	14,417	31.96%
Forsyth	11,505	25.51%
Alamance	4,677	10.37%
Davidson	3,835	8.50%
Randolph	3,436	7.62%
Subtotal	37,870	83.95%
Secondary Counties		
Davie	2,119	4.70%
Rockingham	1,261	2.80%
Surry	1,032	2.29%
Stokes	926	2.05%
Montgomery	918	2.04%
Yadkin	647	1.43%
Caswell	335	0.74%
Subtotal	7,238	16.05%
Total	45,108	

RTP Region

The RTP region is the second largest in terms of projected housing needs – 118,020 units –which represents about 29% of the total. Wake County dominates the region with about 59% of the region’s needs, with Durham and Johnston being the other primary counties. There is substantial interest in high efficiency construction in Chatham and Orange County.

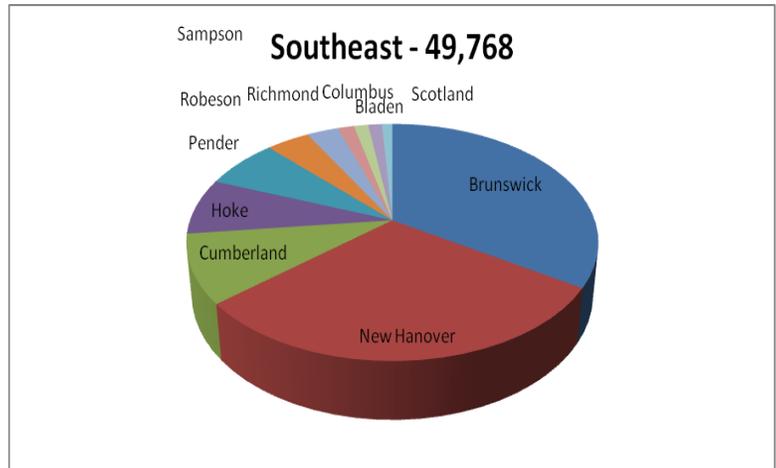


RTP Region

Primary Counties	Estimated New Homes Needed	% of Total
Wake	69,158	58.60%
Durham	11,237	9.52%
Johnston	11,125	9.43%
Subtotal	91,520	77.55%
Secondary Counties		
Harnett	5,952	5.04%
Moore	3,950	3.35%
Chatham	3,698	3.13%
Orange	3,604	3.05%
Franklin	3,035	2.57%
Lee	2,426	2.06%
Granville	1,967	1.67%
Person	878	0.74%
Vance	523	0.44%
Warren	467	0.40%
Subtotal	26,500	22.45%
Total	118,020	

Southeast Region

The Southeast Region has the third highest number of projected housing needs – 49,768 units, which represent 12% of the total. Five counties make up about 85% of the region’s needs – Brunswick, New Hanover, Cumberland, Hoke, and Pender.



Southeast Region

Primary Counties	Estimated New Homes Needed	% of Total
Brunswick	16,910	33.98%
New Hanover	14,866	29.87%
Cumberland	4,643	9.33%
Hoke	3,832	7.70%
Pender	3,451	6.93%
Subtotal	43,702	87.81%
Secondary Counties		
Robeson	2,021	4.06%
Sampson	1,475	2.96%
Richmond	777	1.56%
Columbus	664	1.33%
Bladen	643	1.29%
Scotland	486	0.98%
Subtotal	6,066	12.19%
Total	49,768	

Distribution by County

The following table shows that the top 25 counties, out of the total of 100 counties in the state, are projected to have 78% of the housing needs. By focusing efforts in these jurisdictions, but seeking to include as many neighboring cities, towns, and counties as possible, the training effort should have a maximum impact.

		Total Housing Needs	% of Total	Cumulative %
1	Wake	69,158	16.8%	16.8%
2	Mecklenburg	61,688	15.0%	31.8%
3	Union	20,718	5.0%	36.8%
4	Brunswick	16,910	4.1%	40.9%
5	New Hanover	14,866	3.6%	44.5%
6	Guilford	14,417	3.5%	48.0%
7	Forsyth	11,505	2.8%	50.8%
8	Durham	11,237	2.7%	53.6%
9	Johnston	11,125	2.7%	56.3%
10	Iredell	10,273	2.5%	58.8%
11	Cabarrus	10,171	2.5%	61.2%
12	Pitt	8,248	2.0%	63.3%
13	Buncombe	7,670	1.9%	65.1%
14	Hamett	5,952	1.4%	66.6%
15	Dare	5,069	1.2%	67.8%
16	Henderson	5,009	1.2%	69.0%
17	Alamance	4,677	1.1%	70.1%
18	Cumberland	4,643	1.1%	71.3%
19	Gaston	4,521	1.1%	72.4%
20	Catawba	4,104	1.0%	73.4%
21	Moore	3,950	1.0%	74.3%
22	Davidson	3,835	0.9%	75.3%
23	Hoke	3,832	0.9%	76.2%
24	Currituck	3,802	0.9%	77.1%
25	Chatham	3,698	0.9%	78.0%

APPENDIX B

Survey on NC Energy Code Enforcement

1. Prior to this class, how many hours of training on Energy Codes have you had in your career?
2. Please fill in the table.

You have seen go unenforced (check all that apply)	Common energy problems	You have Red Tagged (check all that apply)
	Insufficient Insulation Levels (wrong R-values)	
	Improper Insulation Installation (fit, holes, compressed etc.)	
	Improper or Inadequate Air Sealing	
	Wrong Window U-factors	
	Wrong Window SHGCs	
	Unlabeled Windows	
	Inadequate Duct Insulation or Duct Sealing	
	Improper (or no) Load and Sizing Calculations	
	Service Water Heating Violations	
	Non-compliant Lighting	
	Other (write-in)	
	Other	
	Other	

3. Having participated in this class, what do you think are the most common violations of the energy code that are typically overlooked?

4. The State of North Carolina wants to make enforcing the energy conservation code a greater priority. What would be the most important thing the State can do to make your energy code enforcement job easier?

5. List any other impediments you see to effective Energy Code enforcement _____

6. How many years have you been a North Carolina building inspector? _____
7. What level certificates do you hold? Building _____, Mechanical _____
 Plumbing _____ Electrical _____ Fire _____
8. Are your inspections recorded in a computer in your truck? _____
 If not, would you see a truck computer as a useful tool? _____
 Would a state-wide compliance database be helpful? _____
9. What tools are needed for better energy code enforcement (eg. IR camara, blower door, duct blaster, load calc. training, etc)? _____
10. On the back, please list improvements in the energy code you would like to see enacted.

APPENDIX C
NORTH CAROLINA CODE
OFFICIALS QUALIFICATION BOARD
Continuing Education Course Evaluation

This is an evaluation form for students who have taken the Qualification Board's CONTINUING EDUCATION Courses. The information provided will be used in planning future classes.

Name of Course: _____ Date: _____

Name of Sponsor/Institution: Appalachian State University Energy Center

Name of Instructor(s): _____ Course # _____

SCALE:	1 = Outstanding	4 = Below Average
	2 = Above Average	5 = Poor
	3 = Average	

Use the Scale above to answer the following questions.

Instructor Evaluation

1. How do you rate the overall quality of teaching in this course? _____

Rate the instructor in terms of the degree to which he/she:

2. Used a variety of teaching strategies effectively. _____

3. Demonstrated in-depth knowledge of course content. _____

4. Covered the subject matter thoroughly. _____

5. Responded to students' questions. _____

Course Evaluation

Rate the course in terms of the degree to which:

6. Resource materials (slides, figures, etc.) effectively supplemented instructor's presentation. _____

7. Course will be valuable to inspection position. _____

8. Would you recommend this course to others? _____

Other Comments: _____

